EASTERN INSTRUMENTS

CENTRIFEEDER ELECTRONICS

FOR USE WITH CENTRIFEEDER with Integrated Control Valve (ICV)
HIGH TEMPERATURE APPLICATIONS

REV 7/23

VERSION 6.6.4 SOFTWARE

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EASTERN INSTRUMENTS

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SAFETY

SAFE OPERATION

PLEASE READ BEFORE OPERATING THE CENTRIFEEDER

- Only authorized personnel should operate Eastern Instruments equipment. Untrained personnel present a hazard to themselves and the equipment and improper operation will void the warranty.
- Check for damaged parts before operating the feeder. Any damaged part should be properly repaired or replaced by trained personnel. Do not operate the feeder if any component does not appear to be functioning correctly. Contact Eastern Instruments for assistance or for repair components.
- Use the appropriate Personal Protection Equipment as required for operating the feeder within its installation location.
- The various surfaces of the equipment may have sharp edges and have the potential to cause injury. Use the proper protection for your hands when servicing or maintaining your equipment.
- Because the CFH Feeder is designed specifically for installation in areas where temperatures can reach up to 500 C, proper protection should be worn when operating the meter at all times.
- The electrical panel (digital electronics) should be closed and the safety latch engaged at all times except during installation or service. At those times, only authorized personnel should have access to the electronics panel. When power is activated, AC voltage may be present throughout the panel. Therefore extreme caution is required.

♦ **DO NOT modify or alter this equipment in any way. If modifications are necessary, all such requests must be handled by Eastern Instruments. Any modification or alteration of any Eastern Instruments equipment could lead to personal injury and/or mechanical damage and will void the warranty.**

WARNINGS AND CAUTIONS

- Once power has been supplied to the equipment, it is always on and there is a potential that product may run through it at any time.
- Avoid entering or placing body parts within the equipment or its enclosure.
- Do not operate without proper training
- Always wear proper PPE
- NEVER service equipment while power is connected.

SAFETY PLACARDS

SOME OR ALL OF THESE WARNINGS MAY BE ON YOUR METER. BE AWARE OF THE POSSIBLE DANGERS PRESENT.

ELECTRICAL SERVICE

Electrical shock or electrocution is possible when servicing the electronics of any Eastern Instruments equipment. Be sure to disconnect power before conducting any repairs on the electronics.

PRODUCT FLOW

The Control Valve for the CentriFeeder is used only as a control valve and does not act as an isolation valve. A secondary isolation valve is recommended to be installed before the CentriFeeder's control valve in order to isolate the CentriFeeder from flow during maintenance or repairs.

PINCH POINTS

The control valve of the CentriFeeder can cause serious injury or amputation. Keep hands clear of the control valve at all times.

LIVE ELECTRICITY

Live electrical wires may be present. Please note that coming into contact with the live wires (AC Power) could cause electrical shock or electrocution.

INSTALLATION

INSTALLATION REQUIREMENTS

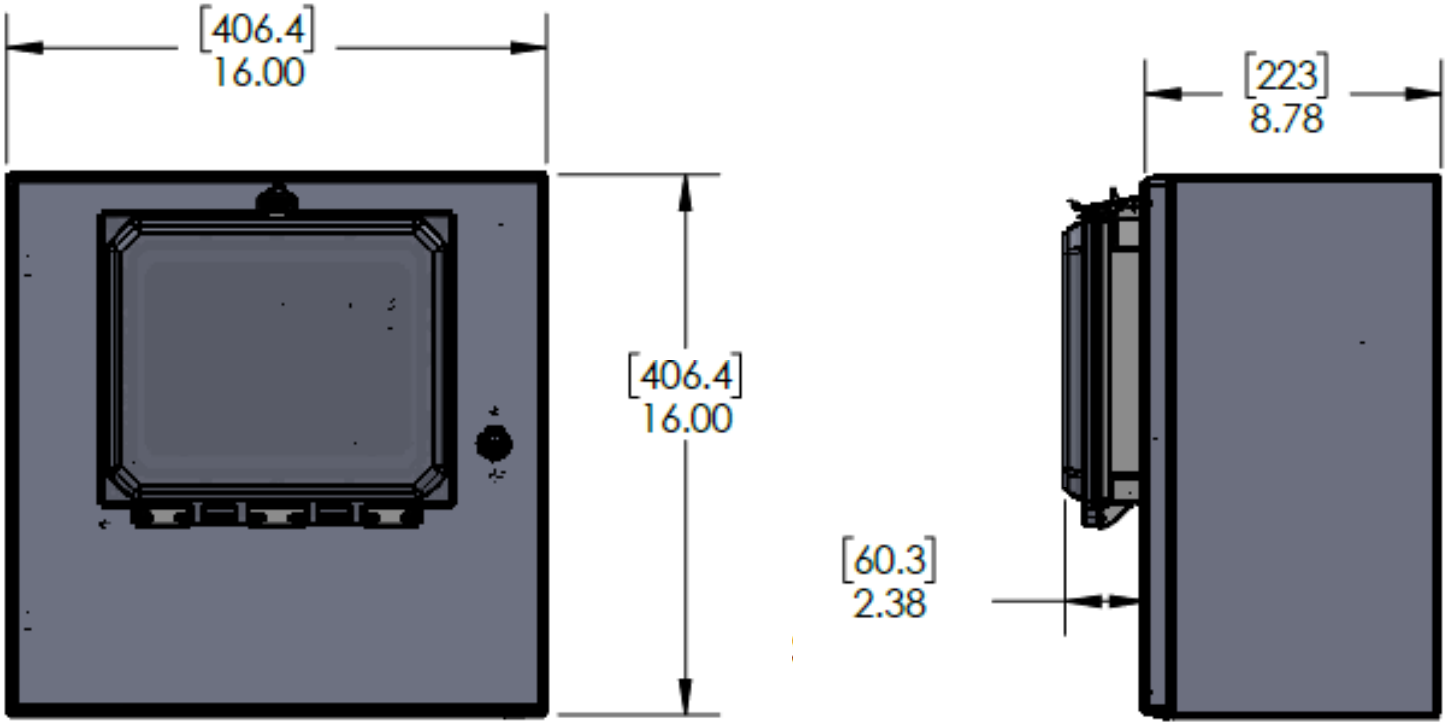
- The feeder is to be mounted in a location where product is stored (i.e. a silo or holding tank) and can fall via gravity through the feeder. The storage location should have enough product within it to ensure that the feeder is never starved of product.
- The feeder is NOT to be used as a shut off valve for the storage location (silo, holding tank, etc). The feeder's slide gate valve is a control valve only and should never be considered the safety shutoff for product flow.
- The feeder should be installed so that it is level in two planes. Use the Bubble Level on top of the Valve to help.
- The feeder should be mounted using the mount brackets only. The mounting method should minimize vibration and any movement. Mounting should not be done using the in-take/discharge flanges.
- The discharge chute that the product stream empties into after traveling through the feeder must be free flowing, meaning that it does not allow product to build up and consequently contact the Pan of the feeder.
- The Electronics Enclosure and valve should be wired using only the factory cable. There is a standard 25' cable package that includes the Meter's Power Cable and Electronics Cable as well as the Valve's Power Cable and Electronics Cable. The cables should be cut to the exact length required. Do not coil the cables.
- It is required that the Remote Electronics Cable be run through its own grounded metallic conduit connected on the side of the module and the bottom of the Electronics Enclosure. This Cable MUST be in a separate conduit than that of the AC Power or 24 Vdc Power supplied to the Electronics Enclosure.

INSTALLATION TROUBLE AREAS

- The CentriFeeder's 4-20mA signal is self-powered and does not require any additional voltage.
- DO NOT RUN 480V, 240V, OR 120V AND SIGNAL LINES IN THE SAME CONDUIT. The power and signal lines should be separate from each other and from all other devices. Running any other power or signal lines in the same conduit could affect the performance of your meter. Isolate both power and signal lines from each other at all times.
- The CentriFeeder is balanced at a specific angle and should not be subject to vibration or movement. The mass of the mount should be at least 2 times the mass of the feeder.
- The Seal Top should be on the meter at all times that you are not working inside the feeder. This is to keep all foreign materials out of the feeder that could obstruct its movement or impair its functionality.

Electronics Enclosure

Dimensional Drawing



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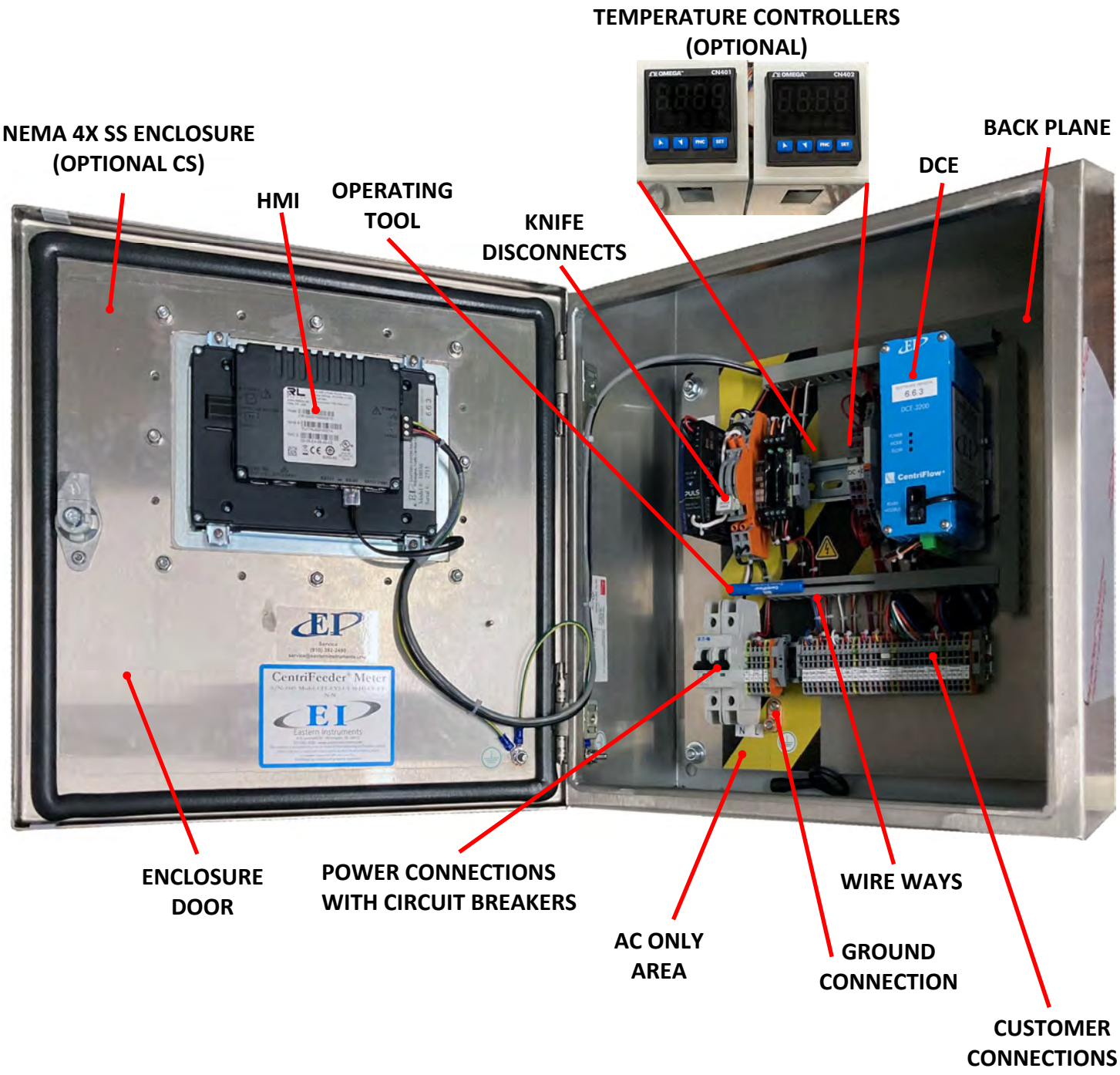
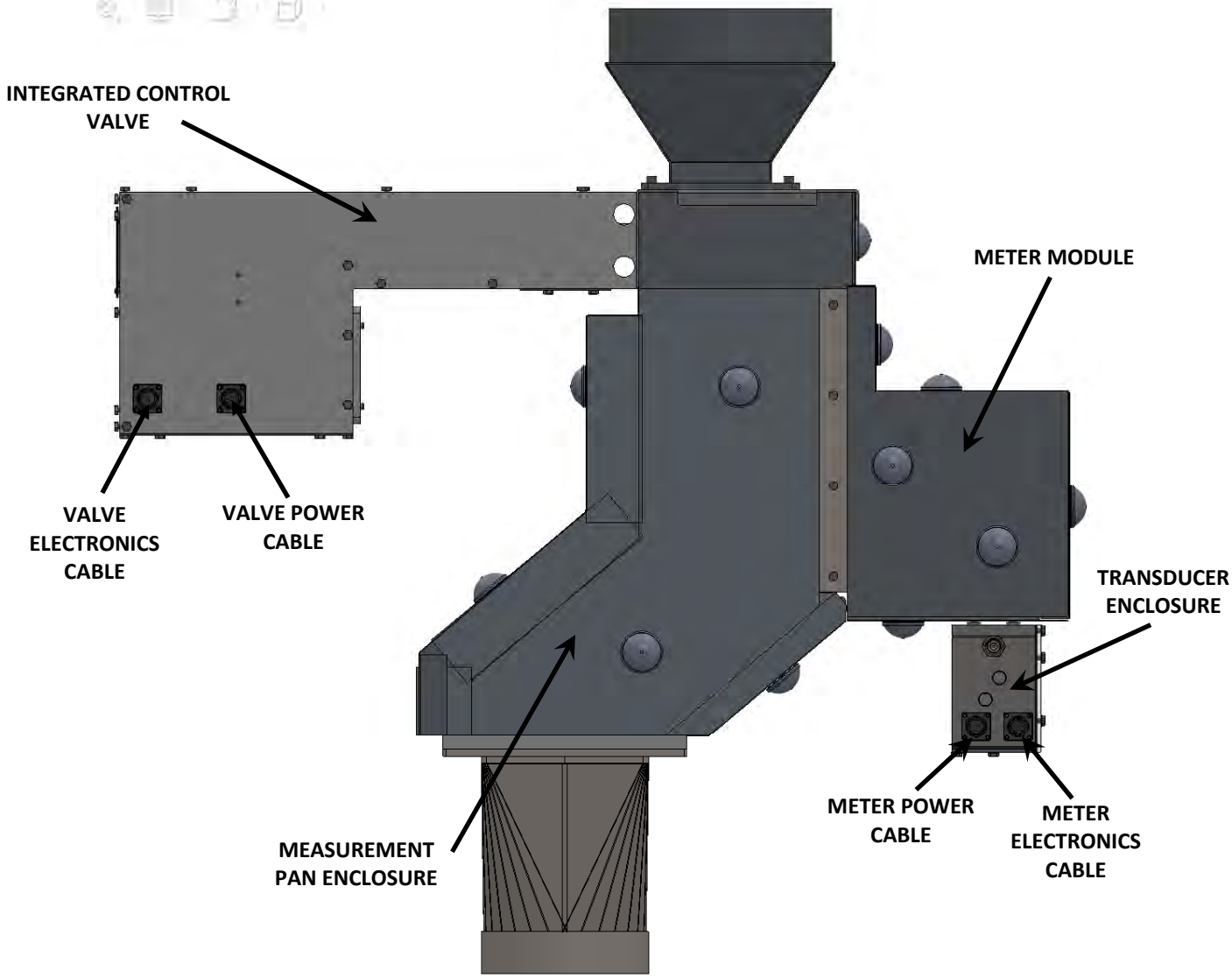
Identifying Your Components: Electronics

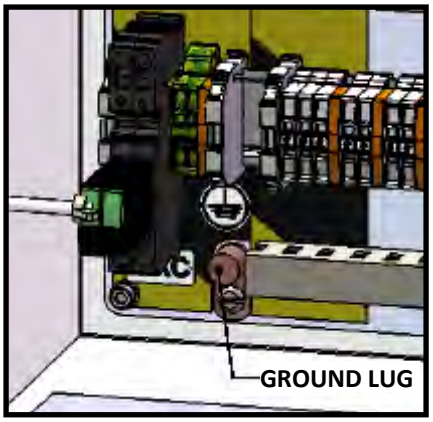


The Digital Electronics Enclosure contains the HMI, the Digital CentriFlow® Electronics (DCE), Power Supply, Alarm Relay, Power Connections with Knife Disconnects, and the Customer Connections.

Identifying Your Components: CentriFeeder with ICV (with Amphenol Connectors)



Please be sure to ground the Wago Connector for the Transducer. To do so, run your ground wire, along with the Transducer Cable, through the Customer Provided Conduit and Connect to both the Meter and The Digital Electronics as shown. The Ground Wire should attach to both the Ground Screw on the Wago Connector Mount (Above) as well as to the Ground Lug within your Digital Electronics (Right).



Wiring

Wiring of the CentriFeeder™ can be broken down to the following categories:

- Ground the CentriFeeder Module
- Wiring Electronics Cable and Power Cable at the Meter
- Wiring Electronics Cable and Power Cable at the Valve
- Wiring the Customer Connections at the Electronics Enclosure
- Connecting the Power to the Electronics Enclosure

Electrical Information:

The following DCE digital signals are phototransistor outputs:

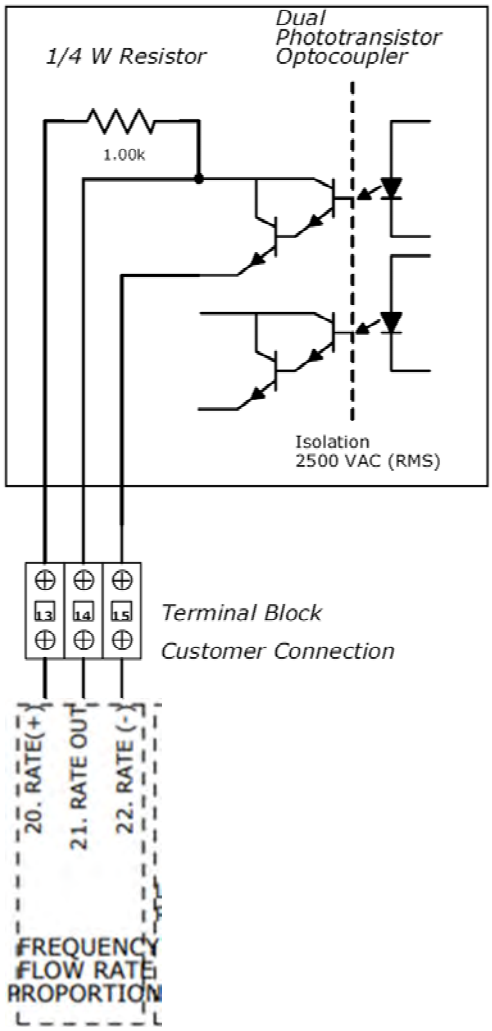
- Frequency, Flow Rate Proportional (Rate)

The Internal DCE Schematic to the right shows the Rate Output. However, all digital outputs are designed using the same circuit.

*Digital Output 1 and 2 share power and ground

**Digital Output 3 and 4 share power and ground

Internal DCE Schematic



Digital Output	Function
DOUT1*	(Option)
DOUT2*	Alarm
DOUT3**	(Option)
DOUT4**	(Option)
RATE	Frequency, Flow Rate Proportional
COUNT	Weighted Count (Option)

GROUNDING THE CENTRIFEEDER

A separate Earth Ground Wire (14 gauge) is recommended to be connected to the meter module. This ground wire is required for operator safety and for proper operation. This ground should be supplied from the main plant ground at the service entrance.

PLEASE BE SURE TO GROUND THE CENTRIFEEDER METER MODULE TO AN EARTH GROUND!

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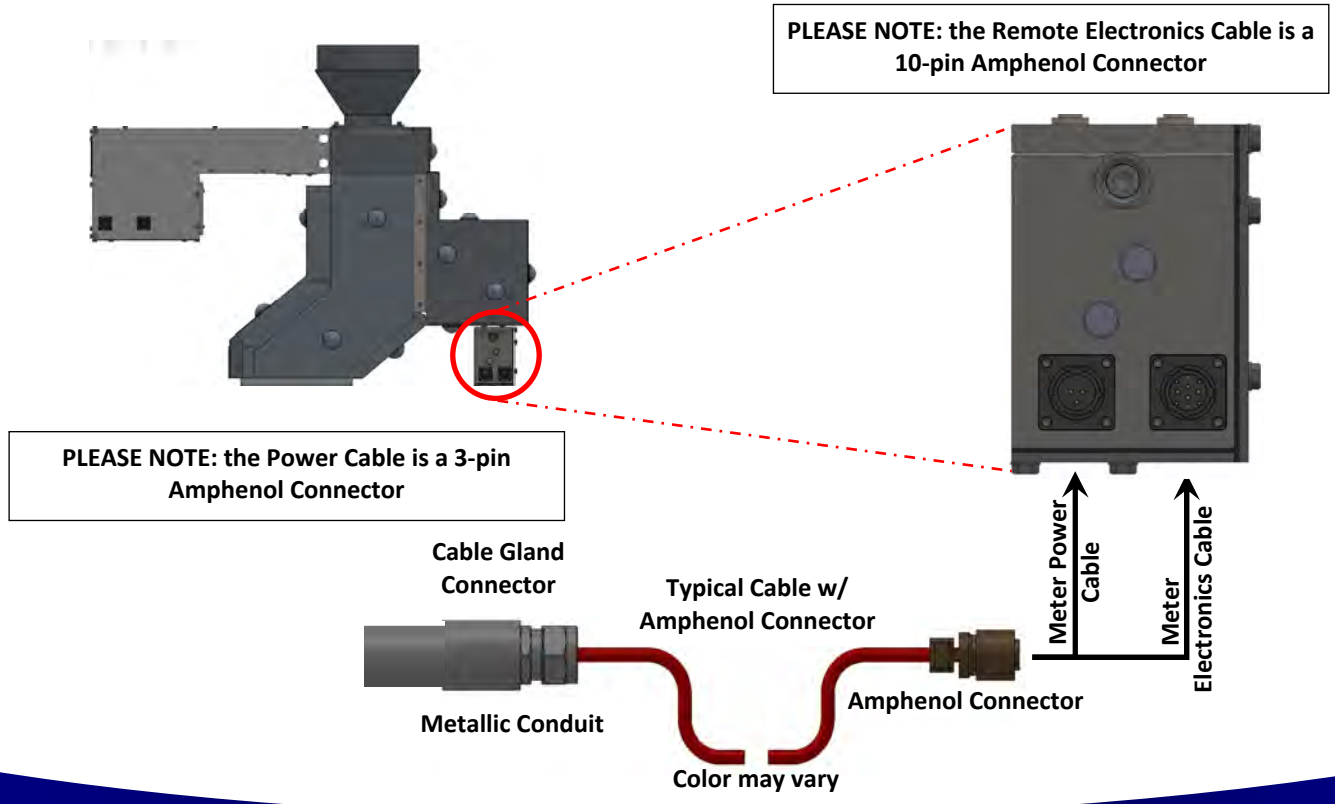
CENTRIFEEDER WITH ICV - METER MODULE
WIRING THE ELECTRONICS CABLE AT THE METER MODULE:

The Electronics Cable is a 9 conductor cable with a shield that attaches the CentriFlow® Meter Module of your CentriFeeder to the Electronics Enclosure. It sends the measurement signal from the Transducer inside the Module to the Electronics Panel inside the Electronics Enclosure. The standard length is 25' long, but it should be cut to the exact length needed. If the distance from the CentriFlow® Meter Module to the Electronics Enclosure is more than 25', a custom length cable which may be supplied with the meter, should also be cut to fit. Excess cable should never be coiled up and placed into the CentriFeeder® Meter Module. One end of the Remote Electronics Cable will be affixed to the meter module, while the other end will be cut to length and will be wired to the Electronics Enclosure as demonstrated in the "Wiring Customer Connections at the Electronics Enclosure" portion of this manual. PLEASE NOTE: The Electronics Cable MUST be run through grounded metallic conduit. If your Electronics Cable has an Amphenol Connector on one end, we would recommend leaving a short length of cable out of the conduit near the meter module and using a cable gland/wire grip type of connector on the end of the conduit. The Amphenol connector can be exposed without being inside the conduit.

WIRING THE POWER CABLE AT THE METER MODULE:

The power cable is a three wire cable that will provide 110VAC power to the meter module for the heater element for the loadcell of the feeder.

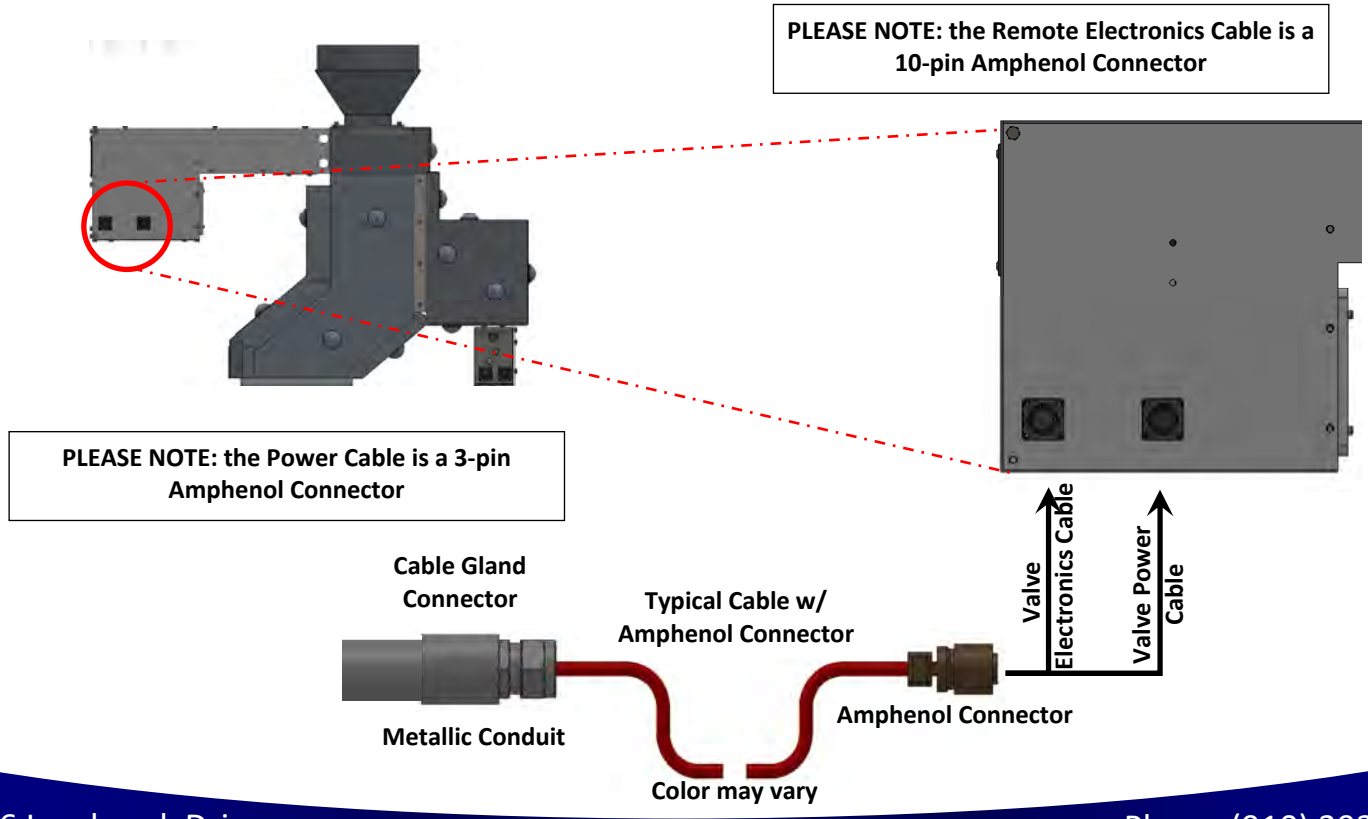


CENTRIFEEDER WITH ICV - ICV VALVE:
WIRING THE ELECTRONICS CABLE AT THE VALVE:

The Electronics Cable is a 9 conductor cable with a shield that attaches the CentriFeeder's valve to the Electronics Enclosure. It sends the control valve's control signals, open/close information and various other signals to the Electronics Panel inside the Electronics Enclosure. The standard length is 25' long, but it should be cut to the exact length needed. If the distance from the CentriFeeder's valve to the Electronics Enclosure is more than 25', a custom length cable which may be supplied with the meter, should also be cut to fit. Excess cable should never be coiled up and placed into the CentriFeeder® Meter Module. One end of the Electronics Cable will be affixed to the valve, while the other end will be cut to length and will be wired to the Electronics Enclosure as demonstrated in the "Wiring Customer Connections at the Electronics Enclosure" portion of this manual. PLEASE NOTE: The Electronics Cable MUST be run through grounded metallic conduit. If your Electronics Cable has an Amphenol Connector on one end, we would recommend leaving a short length of cable out of the conduit near the valve module and using a cable gland/wire grip type of connector on the end of the conduit. The Amphenol connector can be exposed without being inside the conduit.

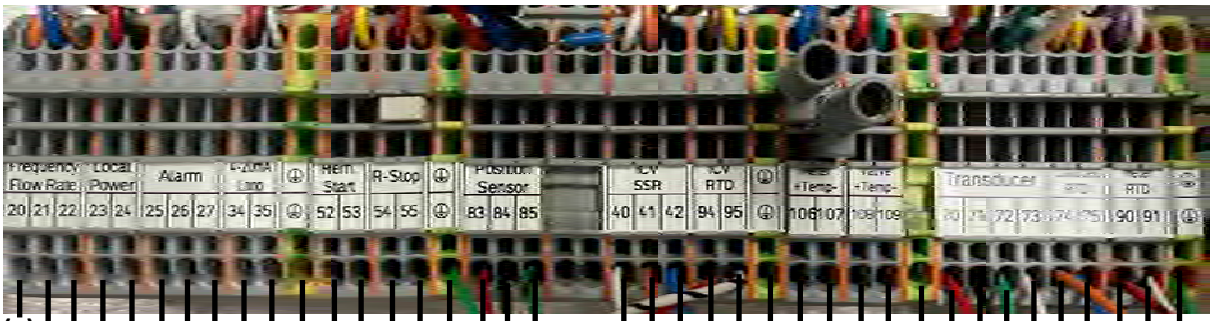
WIRING THE POWER CABLE AT THE VALVE:

The power cable will provide 110VAC power to the valve for the motor and the fan required to run the CentriFeeder.



EASTERN INSTRUMENTS

Wiring Customer Connections At the Electronics Enclosure



Freq. Flow Rate (+)
Freq. Flow Rate (OUT)
Frequency Flow Rate (-)
Local Power (+)
Local Power (-)
Alarm Relay (N.C. OUT)
Alarm Relay (COM OUT)
Alarm Relay (N.O. OUT)
4-20 mA Loop (+)
4-20 mA Loop (-)
EARTH GROUND
Remote Start (Switch Input)
Remote Start (Switch Input)
Remote Stop (Switch Input)
Remote Stop (Switch Input)
EARTH GROUND
Position Sensor (+)
Position Sensor (Signal)
Position Sensor (-)
ICV SSR (Close)
ICV SSR (Open)
ICV SSR (COM)
ICV RTD (+)
ICV RTD (-)
EARTH GROUND
Meter RTD - Output (+)
Meter RTD - Output (-)
Valve RTD - Output (+)
Valve RTD - Output (-)
EARTH GROUND
Remote Electronics Cable (- Signal)
Remote Electronics Cable (- Excitation)
Remote Electronics Cable (+ Excitation)
Remote Electronics Cable (+ Signal)
Loadcell RTD (+)
Loadcell RTD (-)
Meter RTD (+)
Meter RTD (-)
EARTH GROUND

N.C. - Normally Closed
N.O. - Normally Open

All Connections are made to the Bottom of the Terminal Blocks

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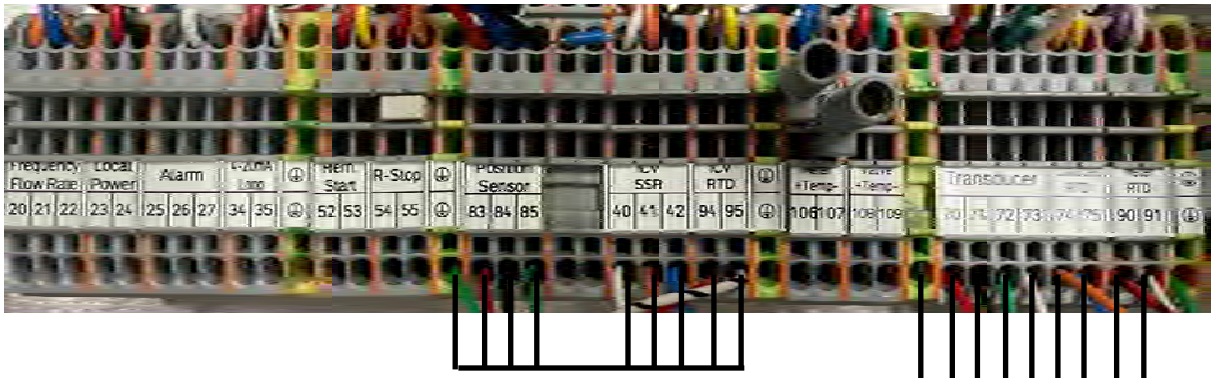
Wiring Customer Connections At the Electronics Enclosure
Cable Breakdown



Valve Electronics Cable

Meter Electronics Cable

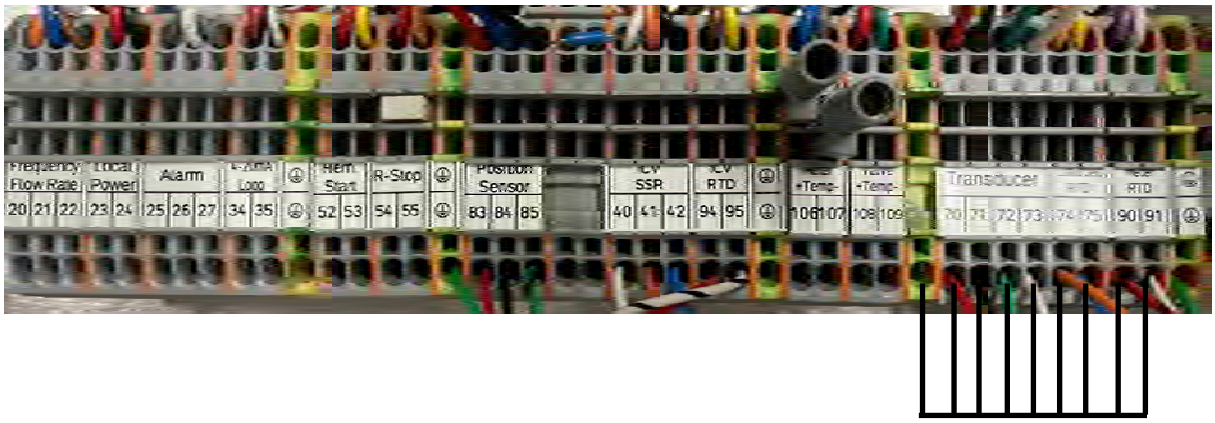
Valve Power Cable

Meter Power Cable

All Connections are made to the Bottom of the Terminal Blocks

Wiring the Meter Electronics Cable

When wiring the Meter Electronics Cable to your Digital Electronics Enclosure, please match the Customer Connections terminals inside your Digital Electronics to the picture below. If they are different please contact EI for further instructions. The table below shows the correct wire color and terminal for each type of Remote Electronics Cable available. Match your cable to the column in the table below and ensure that the appropriate wires are landed to the appropriate terminals.

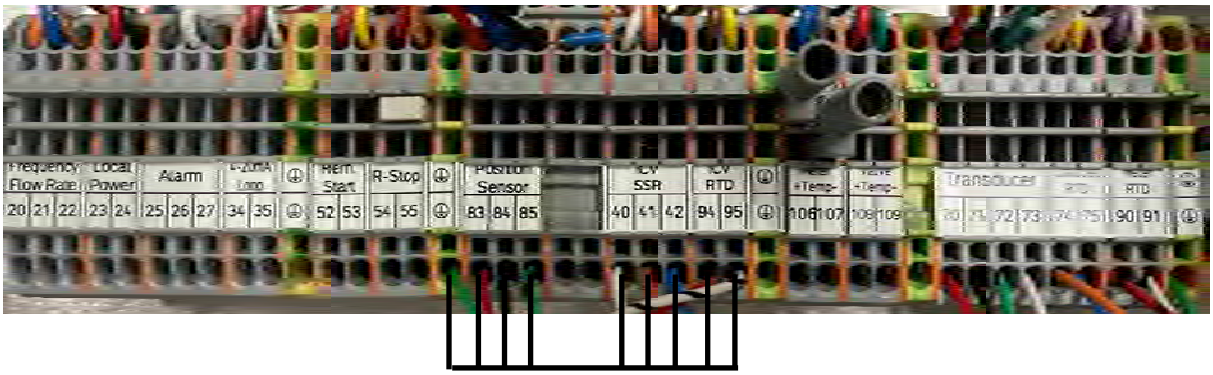


Meter Electronics Cable

Meter Electronics Cable	*9 Conductor Cable*	*Landing Terminal*
Shield	N/A	Ground Terminal
- Signal	Red Wire	70
- Excitation	Black Wire	71
+ Excitation	Green/Black Wire	72
+ Signal	White Wire	73
Loadcell RTD (+)	Gold Wire	74
Loadcell RTD (-)	Blue Wire	75
Meter RTD (+)	Red/Black Wire	90
Meter RTD (-)	White/Black Wire	91
Ground	Green Wire	Ground Terminal

Wiring the Valve Electronics Cable

When wiring the Valve Electronics Cable to your Digital Electronics Enclosure, please match the Customer Connections terminals inside your Digital Electronics to the picture below. If they are different please contact EI for further instructions. The table below shows the correct wire color and terminal for each type of Remote Electronics Cable available. Match your cable to the column in the table below and ensure that the appropriate wires are landed to the appropriate terminals.



Valve Electronics Cable

Valve Electronics Cable	*9 Conductor Cable*	*Landing Terminal*
Shield	N/A	Ground Terminal
+ Position Sensor	Red Wire	83
Position Sensor Signal	Black Wire	84
- Position Sensor	Green/Black Wire	85
ICV SSR Close	White Wire	40
ICV SSR Open	Gold Wire	41
ICV SSR Common	Blue Wire	42
+ ICV RTD	Red/Black Wire	94
- ICV RTD	White/Black Wire	95
Ground	Green Wire	Ground Terminal

Customer Connections Outputs

24V Local Power Output

For your convenience a 24 Volt Local Power Output has been provided that can be used to power the various outputs as listed above. Install a Jumper Wire from the positive terminal of the Local Power Output to the positive terminal of the desired output and a Jumper Wire from the negative terminal of the Local Power Output to the negative terminal of the desired outputs to provide power to the output.

Note: Use of local power will result in a loss of isolation.

4-20 mA Output

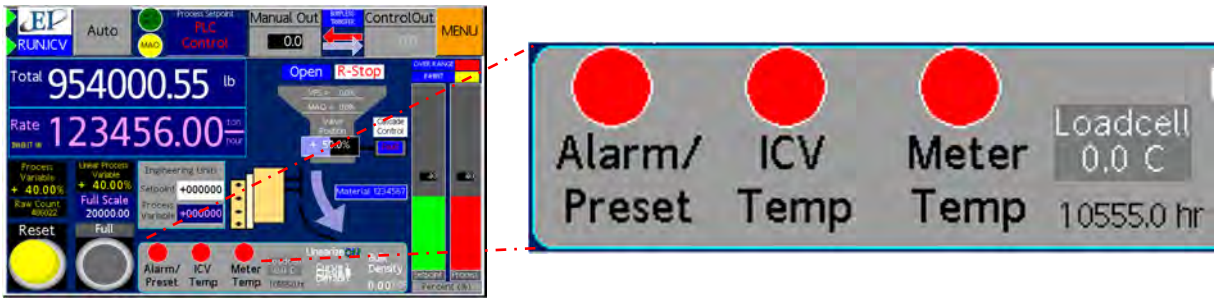
Analog Output (Sourced)
Loop Power NOT Required
Maximum Load Resistance = 900 ohms

The CentriFlow® Meter Electronics is capable of outputting an analog signal. This signal is a 4-20 mA instantaneous isolated signal. The signal output is proportional to the Electronic Full Scale Flow Rate. For example, if the Electronic Full Scale Flow Rate were calibrated to be 300 lb/min, then an output of 12 mA would correspond to a Flow Rate of (12-4)/(20-4) x 300 = 150 lb./min or 50% of the Electronic Full Scale Flow Rate. Since this output is directly related to the Electronic Full Scale Flow Rate any change in Calibration to change the Electronic Full Scale Flow Rate would result in a change in the signal so as to retain the proportionality. Thus, if the Electronic Full Scale Flow Rate were changed from 300 lb./min to 500 lb./min, then a 20 mA output would correspond to the 500 lb/min flow rate. Connection to this output signal will be made according to the "Wiring Customer Connections at the Electronics Enclosure" diagram. It is recommended that the wires for this signal be routed through the conduit housing the power connection. It is recommended that this analog output be used for Control purposes and not for Trending unless a signal filter is used. Please see the filtering section of this manual for more details on filtering.

Alarm Output

Relay Output

The relay can be used to trigger alarms which warn the operator that there is a valve fault. A valve fault occurs when the valve position is not on setpoint, or when the valve position is greater than maximum auto out (MAO).



Alarm Output

Alarm/Preset - Relay Output

The relay can be used to trigger alarms which warn the operator that there is a valve fault. A valve fault occurs when the valve position is not on setpoint, or when the valve position is greater than maximum auto out (MAO).

Meter Temp

The connection for the meter temperature (temperature inside of the meter enclosure) is a two wire +/- connection. The output is 0-10 V and is equivalent to a temperature output of 0—500 C. If the temperature of the meter goes above 300 C, the Meter Temp alarm will trigger and the Meter Temp icon will turn red.

Valve/ICV Temp

The connection for the valve temperature (temperature inside of the control valve) is a two wire +/- connection. The output is 0-10 V and is equivalent to a temperature output of 0—500 C. If the temperature inside the valve goes above 100 C, the Valve/ICV Temp alarm will trigger and the ICV Temp icon will turn red.

PLEASE NOTE: Warranty will be void if operation over the alarm set point for more than five minutes is detected.

Frequency, Flow Rate Proportional (Rate)

Digital Output
Power Required

The CentriFlow® Meter Electronics is capable of outputting a Totalizing Pulse Output signal. The Frequency, Flow Rate Proportional signal is a pulse signal and is labeled “Rate” at the CUSTOMER CONNECTION block. The frequency of the signal is 0 to 500 pulses per second. The Rate +, supplied by the customer can be between 12 and 24 Volts. The Rate - is connected to the Common or Power Supply Ground. By connecting the Rate + and Rate - with customer supplied power and ground, the Rate Out signal will be isolated from the Digital Electronics. Although the preferred method of supplying power to the Rate output is customer supplied power, +24V local power is also available. Using the local power, however, results in a loss of isolation.

This Totalizing Pulse Output will output a Voltage Pulse that is related to the Electronic Full Scale Flow Rate. For example, if the Electronic Full Scale Flow Rate were calibrated to be 300 lb./min, then a flow rate of 150 lb./min would correspond to a pulse of 250, or 50% of Electronic Full Scale Flow Rate.

Power - Electronics Enclosure

The Digital Electronics Package includes a Power Supply to convert the customer provided VAC power to 24Vdc. Please see the diagram below for wiring connections.

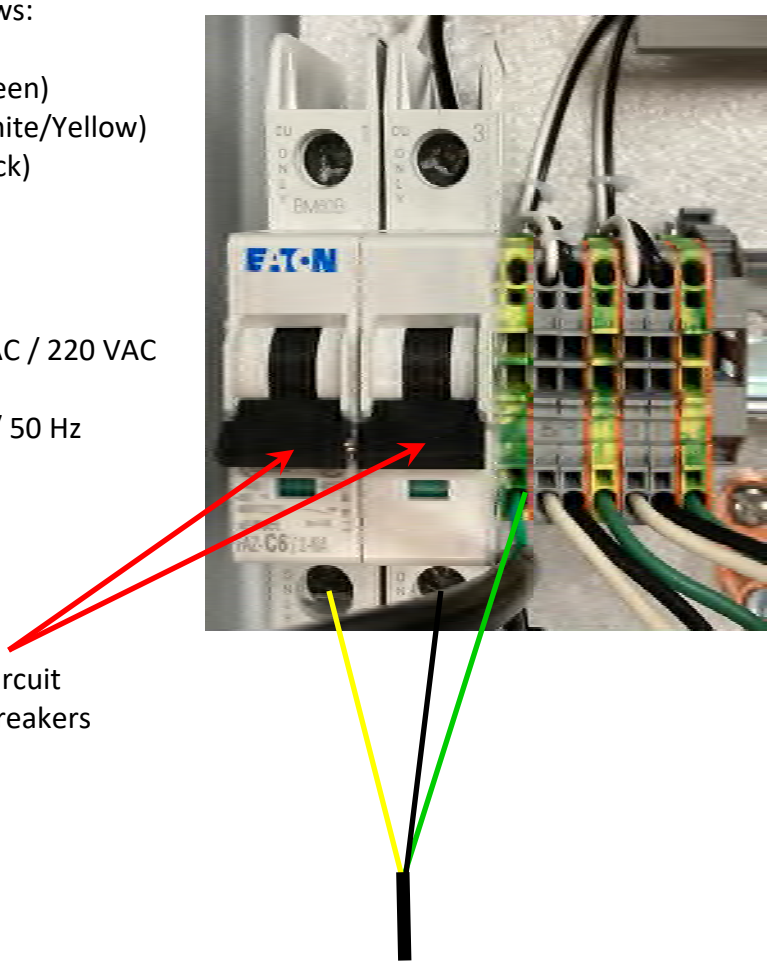
WARNING: TURN POWER OFF AT SUPPLY CIRCUIT BREAKER BEFORE WIRING THE POWER TO YOUR DIGITAL ELECTRONICS PACKAGE!

VAC ***ONLY*** can be connected to the Power terminals illustrated below. The VAC power is then converted to 24 Vdc through the factory wired Power Supply to supply 24 Vdc power to the electronics.

Wire the VAC Neutral and VAC Line connections to the terminal blocks using the tool provided. The wiring connections are as follows:

AC Ground	-	G (Green)
VAC Neutral	-	N (White/Yellow)
VAC Line	-	L (Black)

Input Voltage	115 VAC / 220 VAC
Input Current	5A
Input Frequency	60 Hz / 50 Hz

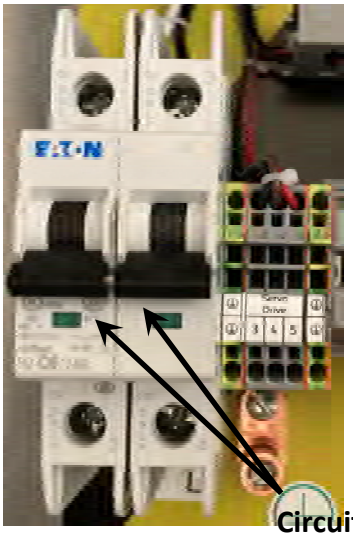


All Connections are made to the Bottom of the Terminal Blocks

OPERATION:

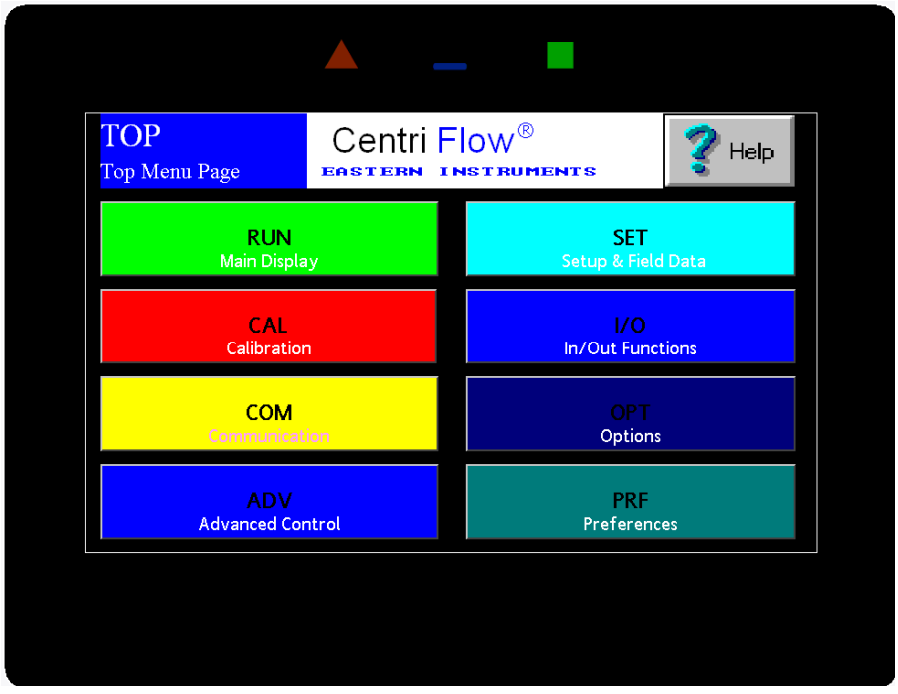
Powering On

To power on your digital electronics, open the Digital Electronics Enclosure and switch the circuit breakers to the on position. The breakers are located on the VAC Power wiring connections as shown below.

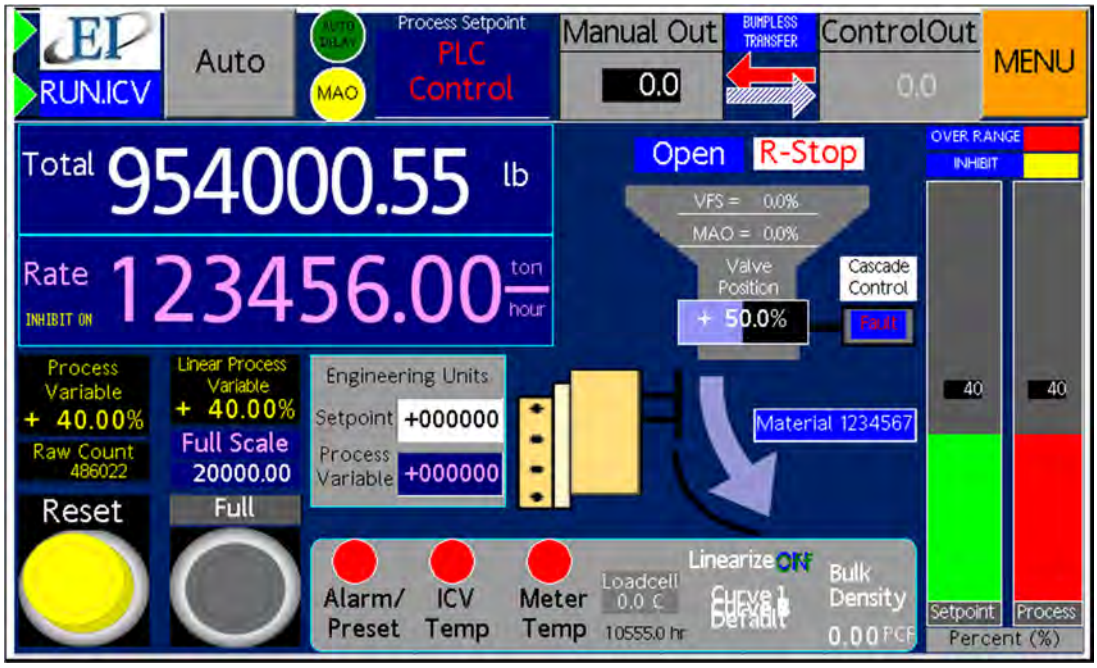


Circuit Breakers

Close the Digital Electronics Enclosure. The HMI should now be coming on. Upon startup, the HMI will display the Main Menu Screen, also called TOP, as shown below.



If the menu page is left undisturbed for several minutes the page will automatically switch to the TOP.Run page seen below:



For more information on both the TOP page and the TOP.RUN page please see the HMI Screen Guide within this manual.

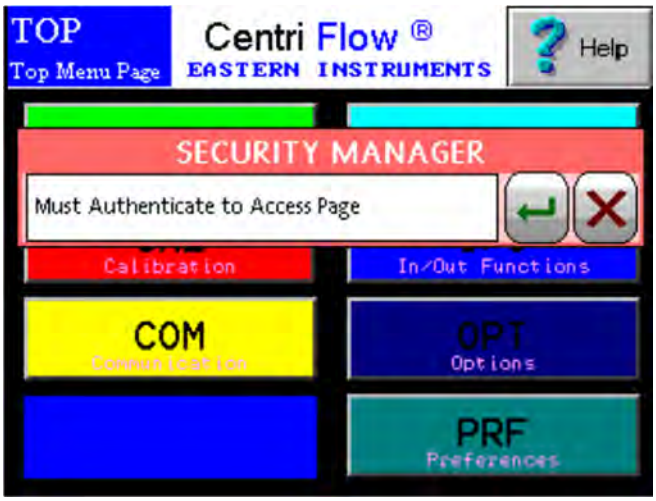
Security Features

Your CentriFlow® HMI is equipped with a security system that allows sensitive information and settings for your process to be protected via a password-based security layer. The password-based security system is designed to protect your information and settings from unauthorized access and tampering.

Please note that three pages require no security authorization to view. These pages are the TOP Menu, the TOP.RUN (or Main Display) page and the RUN.TREND (Plotting) page. All other pages require the entry of both a username and password to access.

Logging On

When accessing any page other than the three mentioned above, an orange "SECURITY MANAGER" dialog box will appear. Press the RETURN button to enter your username. Enter your username into the security dialog box, and press the Enter Button. You can then, enter your password into the security dialog box and press the Enter Button.



Please note that a default username and password have been entered. The default username and password are listed below:

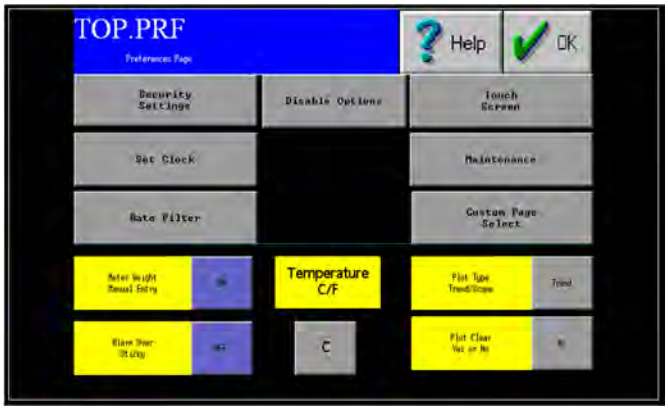
Username: **admin**
Password: **345**

After correctly entering your username and password, you will be logged on to the system. Please note that the HMI security system is configured to time out after 60 minutes of inactivity, at which time you will be required to login again. You will also be required to login any time the HMI unit is powered up.

Changing Your Password

The password-based security system of your HMI was designed to have a similar look and feel to computer-based security systems commonly encountered on a PC. It is recommended to change your password for security purposes, upon entering your system, however it is important to remember your password and to write it down and store it in a secure place, as once the password has been changed, the new password is required to operate the Centri-Flow® HMI.

From the Top Menu Page, Click the "Preferences" button. You will now be on the TOP.PRF (Preferences) page (seen on right). Click on the "Security Settings" button to go to the PRF.PASSWORD.SETUP page. Click "SET PASS" to change the Admin password. The "ENTER NEW PASSWORD" dialog box (shown below) will appear. You may now type in the new password. Again, you may click the "Symbol" button to use numeric characters. You will then be prompted to repeat the new password. The password should now be successfully changed.



PROCEDURES

STATIC CALIBRATION (STATIC CAL.)

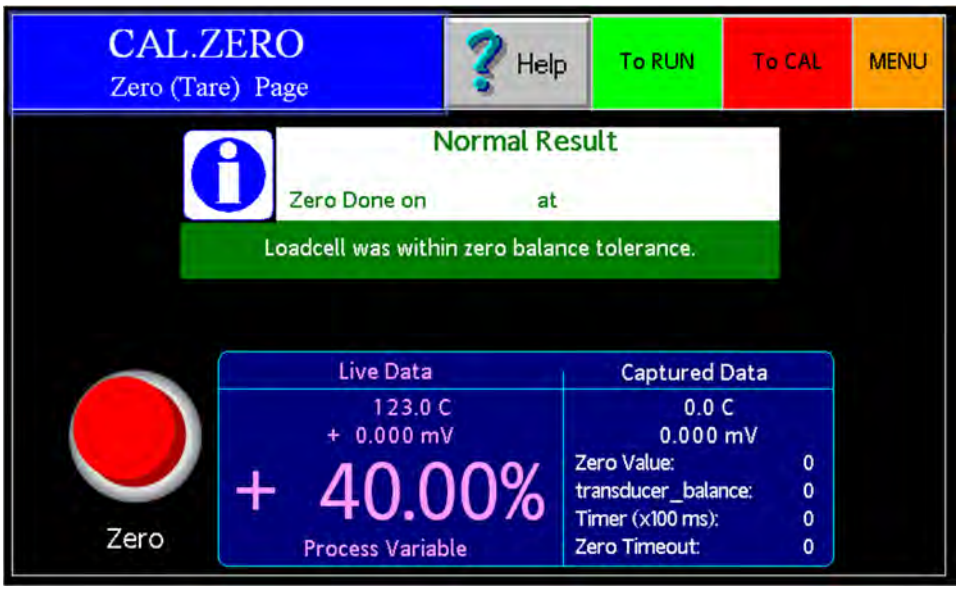
Static Calibration sets the Range of the Transducer in the CentriFeeder™ Meter. This allows the meter to be versatile in a way such that it can be ranged up, known as Extended Static Calibration, or it can be ranged down, known as Reduced Static Calibration. The Static Calibration is a Factory Setting and should not need to be changed while the meter is in service, unless the Transducer has been replaced. Setting or checking the Static Calibration consists of two steps – Zero and Static Calibration. Note that readings are measured using two different units - %PV and Display Range. The difference between the two scales is the Dynamic CAL multiplier. The nominal value is five (5), this value equates to multiplying by one.

Before beginning the calibrations, make sure that there is no product on the Pan or around the Pan Arms.

The procedure for setting or checking the Static Calibration is as follows:

Step 1: Click the CAL Button on the TOP Menu, then click the ZERO Button.

Step 2: You should now be on the CAL.ZERO page as seen below.

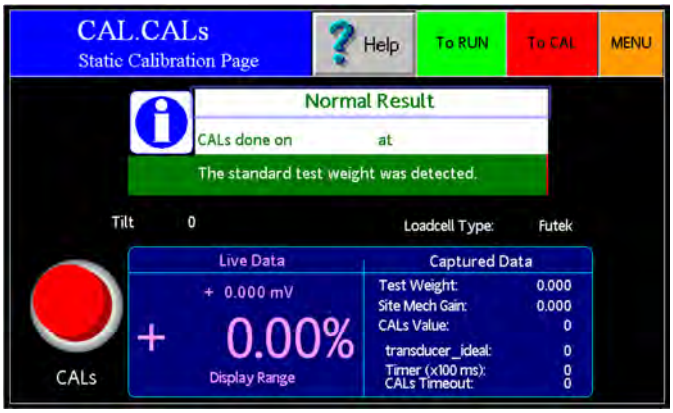


Step 3: Press the Zero Button. Verify that the number displayed in the Diagnostic Window is 0.0 % Process Variable.

Step 4: The Zero portion of Static Calibration is complete. Press the Red TO CAL Button on the upper right of the screen in order to return to the TOP.CAL page.

Step 5: Press the CALs Button. You should now be on the CAL.CALs page as seen on the next

Step 6: Hang the Test Weight provided with the Electronics Enclosure from the Calibration Stud located under the bottom edge of the Pan as seen below. For Pans that have more than one Calibration Stud, there should be a Test Weight for each. Some optional pans may not have a Stud. In these cases the wire will be long enough to hook onto the top edge of the pan and be draped over the front end of the pan as shown below. Be sure that the Test Weight hangs freely from the Calibration Stud. It is also good practice to allow the Test Weight to become stable and movement free before proceeding.



Step 7: Press the CALs Button located on the lower left side of the screen. Note the % Volts reading displayed in the Diagnostic Window. Verify the reading is correct for the selected range. For example, 25% is the correct value for the Standard Range setting. Please see the table below for the correct % Volts reading for each range.

Range	Extended	Standard	Reduced	Minimum
% Volts	12.5%	25.0%	50.0%	100.0%

Step 8: Remove the Test Weight from the Calibration Stud. The voltage should return to 0.00% Volts.

PAN WITH PAN LINER AND CALIBRATION STUD

ALL-WELDED PAN LINER WITHOUT A CALIBRATION STUD

Site Calibration

When the CentriFeeder™ Meter is sent from the Factory it is set with Default values for the Static Calibration and the Calibration Voltage, which were chosen for the particular material being measured with the meter. As described in the previous Section, the Static Calibration is an adjustment that ranges the Transducer, the Measurement Element of the meter. This Setting will not change unless the Electronic Full Scale is changed.

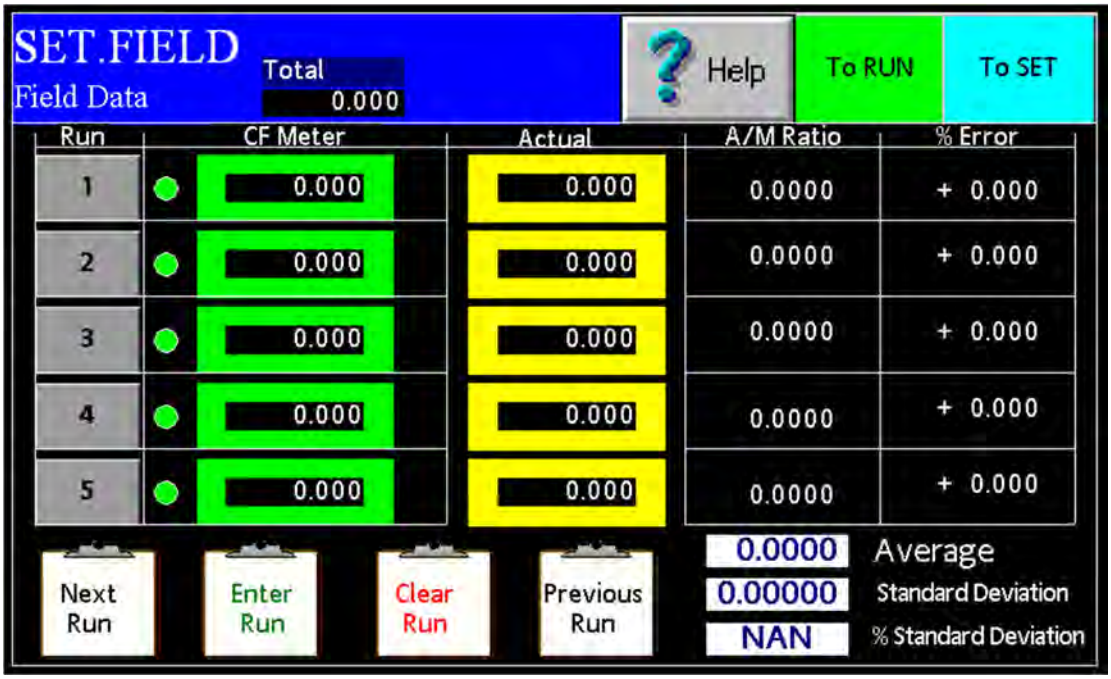
The Calibration Voltage, however, is the adjustment that is made to Calibrate or Site Calibrate the Electronics to a particular application. Although the Factory setting may be quite accurate, it is likely due to differences in installation, feed systems, and material being measured, that an adjustment be made after the CentriFeeder™ Meter is installed. This procedure is very simple and will require a means of capturing material that is run through the meter and weighing that material. Depending on the Configuration of the CentriFlow® Meter, either Type I or Type II, the method of capturing the material to be weighed will be different. For a Type I Configuration the material can be captured after it leaves the Pan Section of the meter, if the installation allows, or at some other point in the flow path after it has been measured by the CentriFlow® Meter. The closer the capture point is to the end of the Pan Section of the meter the less likely that there will be loss in the measurement sample and therefore less likely that there will be an error in the Calibration of the Electronics. It is important not to come in contact with the Pan Section when capturing the measurement sample so that the Electronics does not give incorrect results from measuring the contact. Always remember to fully secure the door back to the enclosure before resuming normal flow through the meter.

When performing the Site Calibration, it is recommended that a minimum of five samples be taken before making any Adjustments to the Electronics. Also, it is recommended that the sample run be a minimum of 10 seconds long. This will allow a reasonable amount of material to be run through the CentriFeeder™ Meter ensuring an accurate adjustment to the Calibration. The procedure is explained as follows:

Step 1: Make sure that the TOP.RUN page is accessed to begin the procedure. Press the Reset Button on the Lower Left to reset your count to zero before running product through the meter.

Step 2: Run product through the meter for a designated period of time, collecting the material in some manner after it has passed through the meter.

Step 3: After product has stopped flowing through the meter, go to the SET.FIELD page located under the SET option on the MAIN MENU. **HINT: Go to TOP Menu.**



Step 4: Click on the "ENTER RUN" Button and you should see the GREEN value (CF Meter) change from "0.000" to a number signifying the weight that the electronics calculates passed through the meter.

Step 5: Weigh the collected material on a static scale and record the weight in the YELLOW block (Actual) next to the value automatically entered in STEP 4. Press the YELLOW box to bring up a numeric keypad. After entering the value, press the NEXT RUN Button to prepare for the next run. It is important that the container holding the material not be included in the weight. The only weight that is important is the material that actually went through the meter.

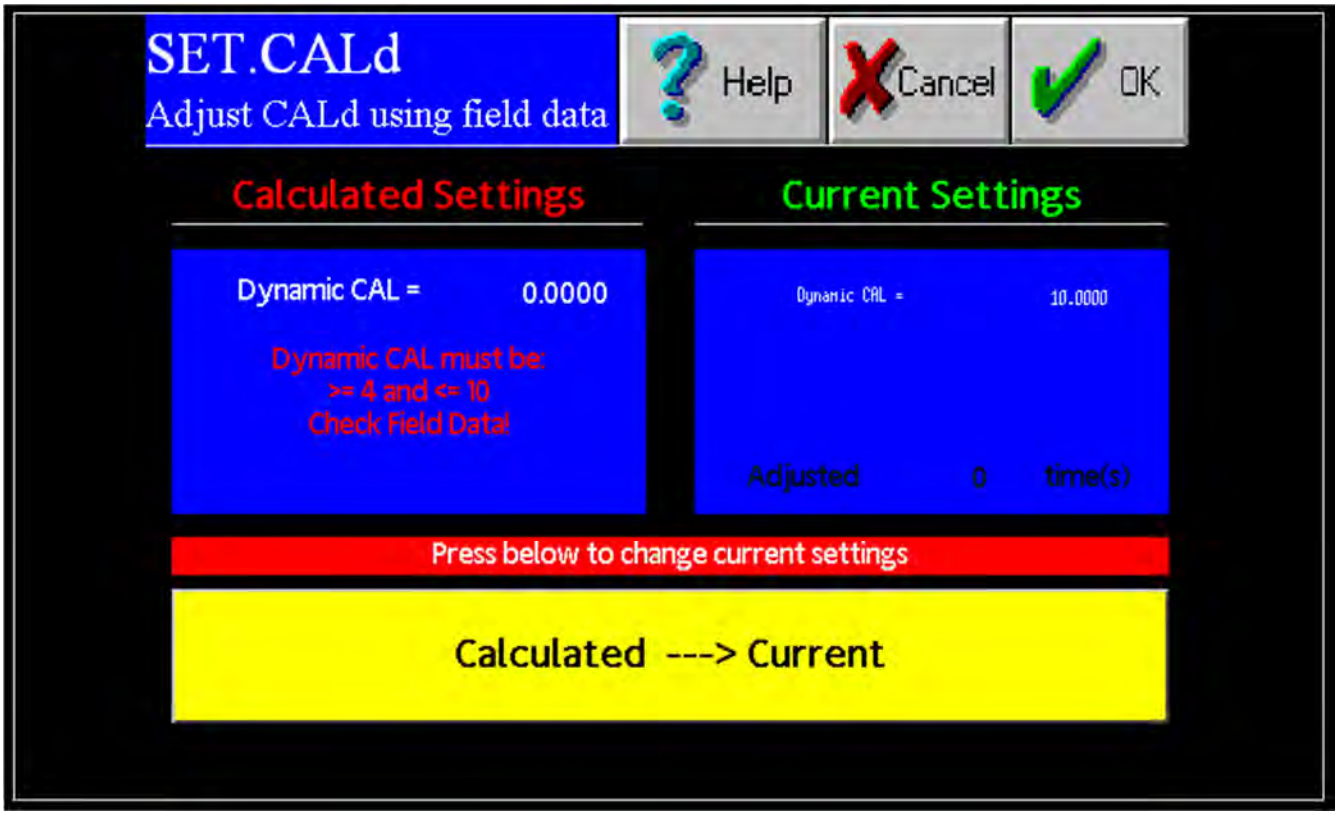
Step 6: Return to the TOP.RUN page and press the RED RESET Button on the bottom left.

Step 7: Repeat Steps 2-6 four more times to complete the 5 Field Data runs.

Step 8: Once all five runs are completed click on the RUN Number next to each set of data in order to select each data RUN. When selected the circles next to the numbers will become green as seen in the picture above.

Step 9: Now return to the TOP.SET page by clicking on the TO SET shortcut key in the top right corner. Now press the FIELD CALd Button.

Step 10: You should now be on the SET.CALd page. The newly calculated Dynamic Calibration can be seen on the left side of the page, while the current Dynamic calibration can be seen on the right side of the screen. If you would like to change your current settings with the settings that you calculated please move on to Step 11. If you would like to keep your current settings, please press the CANCEL Button.



Step 11: To accept the new Dynamic Calibration press the YELLOW CACULATED to CURRENT Button and press the OK Button. A pop up screen will appear, asking if you are sure you would like to accept this value. Press YES.

Setting the Valve's Upper and Lower Limits - CentriFeeder with ICV only

The valve's upper limits (Maximum Auto Out) and its lower limits (Virtual Flow Stop) can be set from the Advanced Setting Menu.

Virtual Flow Stop

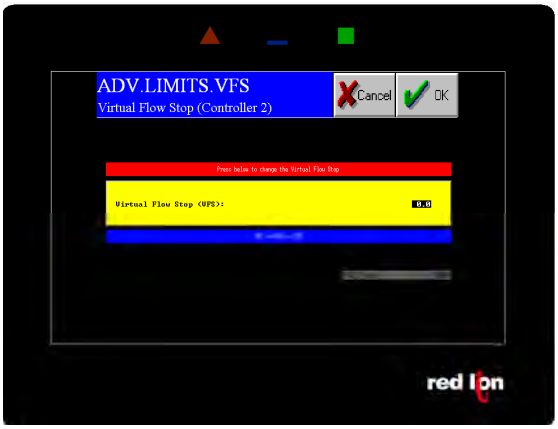
Virtual Flow Stop™ is a function of the CentriFeeder™ that allows you to manipulate the position of the blade of the Integrated Control Valve so that flow can be stopped without closing the Integrated Control Valve completely, thus, not damaging product and minimizing damage to the leading edge of the valve and the Tangential Back Plate as well.

Maximum Auto Out

Maximum Auto Out is a function of the CentriFeeder™ that allows you to set the upper limits of the valve ensuring the meter's accuracy by preventing a volumetric flow rate that exceeds the meter's capacity. In certain applications product may flow over the sides of the pan if the flow rate is too high. Maximum Auto Out may also be used as an alarm indication to warn that the upstream product flow may be constrained. Please note that setting the Maximum Auto Out on the ADV.PID2.LIMIT page will only provide an alarm that the signal has passed the Maximum Auto Out threshold. To actually limit the upper threshold of the valve, you must turn on the limiting function located at the ADV.CTRL.ICV.LIMITS page.

Setting the Virtual Flow Stop

To set the Virtual Flow Stop™ press the ADV Button from the TOP (Main Menu) page. Press the FEEDER LIMITS Button and then, press the SET VFS Button. You should be on the ADV.LIMITS.VFS page as shown to the right.

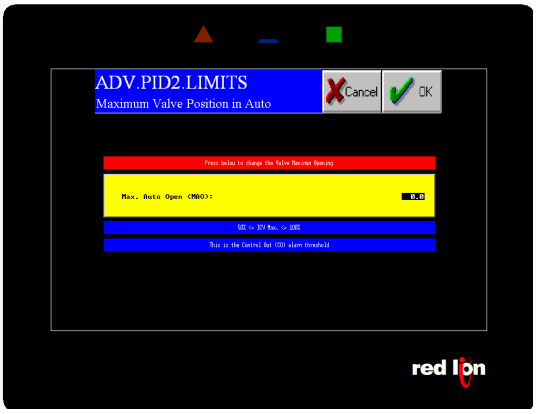


Press on the Virtual Flow Stop Button to open a numeric keypad and enter the percentage value you wish to set for your Virtual Flow Stop™. The Virtual Flow Stop™ is typically set by increasing the Manual Valve until flow just begins to trickle from the valve and then, set the Virtual Flow Stop™ to 2/3 of that value. This value is, of course, dependent on the particle size and characteristics of your product.

Please note that it is very important that the valve not stick or "crunch" upon closure. If this happens, increase the Virtual Flow Stop value to 85% of the "flow just starts value". It is normal for the valve to "trickle" for a short period after a stop command as it established the Virtual Flow Stop condition.

Setting the Maximum Auto Out

For an upper limit alarm, you can set the Maximum Auto Out. To do so, press the ADV Button from the TOP (Main Menu) page. Press the FEEDER LIMITS Button and then, the MAO THRESHOLD Button. You should now be on the ADV.PID2.LIMITS page as shown to the right.



Press on the Maximum Auto Out Button (Yellow Button) to open a numeric keypad and enter the percentage value you wish to set for your Maximum Auto Out. The Maximum Auto Out should be between 50% and 100% of full scale.

PLEASE NOTE THAT THIS WILL ONLY SET THE ALARM FOR MAXIMUM AUTO OUT BUT WILL NOT ACTUALLY LIMIT THE UPPER CAPACITY OF THE CENTRIFEEDER™.

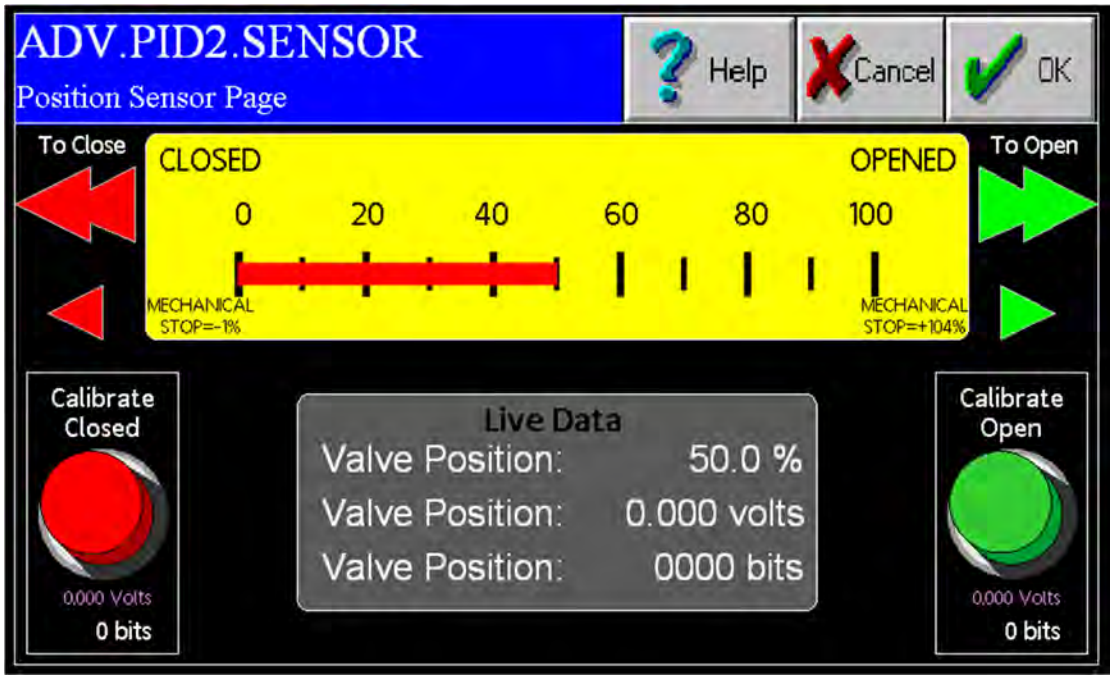
In order to limit the upper range of the CentriFeeder™, you must enable it. To do so, you must press the ADV Button from the TOP (Main Menu) page. Next, press the FEEDER LIMITS Button from the ADV Menu and then, press the MAO ENABLE LIMIT Button. You will be on the ADV.LIMITS.SP2 page as seen to the right. Press ENABLE in order to enable the upper limit of the CentriFeeder™ (Maximum Auto Out) in order to actually limit the opening of the valve.

Stroking the Valve - CentriFeeder with ICV only

Stroking the Integrated Control Valve is a way of setting the position sensor output to correspond to the actual stroke or range of travel of the valve's blade. Stroking the valve may be required if the electronics package is replaced or the HMI is reprogrammed, however, new installations will typically include a properly stroked valve that will not need to be adjusted.

Please note that the operating stroke of the valve is 3.5". Mechanical Stops are the actual, mechanical endpoints (fully open and fully closed) of the valve's stroke. In order to properly stroke the valve, the electronic endpoints should be moved from these actual stops to 1% under the defined closed position and to 4% over the defined open position. This will prevent damage to the valve.

To stroke the valve, you must access the Position Sensor page. To access this page press the ADV Button from the TOP (Main Menu) page. Then, press the PID #2 Tuning Button and finally, press the Position Sensor Button. You should now be on the ADV.PID2.SENSOR page seen below.



Step 1: Move the valve to the mechanical stops by depressing the Open or Close arrows. ***DO NOT PRESS THE RED CLOSE or OPEN PUSH BUTTONS.*** The large arrow produces a hard movement command and the small arrow produces a softer movement command. Use the small arrow for all movements towards the stops. Do not use the large arrow against the stops. It should only be used to bring the valve off the stops, if needed. The speed of travel is about the same for both arrows and takes less than a minute for a full stroke. The valve is at the end of its stroke when it quits moving as indicated in the Potentiometer value in the Diagnostic Window. Confirm the end of the stroke by moving off and then back on to the mechanical stop.

Step 2: Check your Percent Open values in the Diagnostic Window. The Percent Open values should read **+104% (±0.4%)** against the open stops and **-1% (±0.2%)** against the closed stops. The Maximum Live Value should be 2.0V, ±0.25V the Minimum Live value should be 0.5V, ±0.25 V.

Step 3: If conditions described in Step 2 are met, then the valve is properly stroked and the valve position is correctly read into the system. If the conditions described are not met, continue to Step 4.

Step 4: Move the valve to the fully open position against the mechanical stops as described in Step 1 and press the Open Push Button. ***Please note that the Open Push Button and Open Arrows are not the same button!*** This will set the Percent Open Value to 100% in the Diagnostic Window.

Step 5: Close the valve to the fully closed position against the mechanical stops as described in Step 1 and press the Closed Push Button. ***Please note that the Closed Push Button and Closed Arrows are not the same button!*** You have now set your 0% and 100% values to the mechanical stops, so you must now set the Operating Stroke of the Valve.

Step 6: Since you are on the Closed mechanical stop, move the valve off the mechanical stop by 1%. You are now at the defined Closed Valve position. Again, press the Close Push Button. The Percent Open value should now be 0%. If you move the valve back to the mechanical closed stop, the value should read -1.0%.

Step 7: Now move the valve to the fully open position as described in Step 1. Ease it against the fully open mechanical stop The Percent Open value should be 100%. Back the valve off of the mechanical stop until the Percent Open value is 96%. You are now at the defined Full Open position. Press the Open Push Button. The Percent Open value should now be 100%. You may check by easing the valve back to the mechanical stop and confirm a reading of 104%. To verify that the stroking of the valve was successful, check your values against those specified in Step 2.

Helpful Hint:

If the valve becomes, inadvertently stuck against the mechanical stops, it can be freed by removing the access cover and with a large screwdriver, moving the large timing belt pulley in the direction required to free the valve. There is a direction arrow on the pulley indicating which direction causes the valve to open. If the valve is stuck in the open position, then the pulley should be turned in the closed direction. Do the opposite if stuck in the closed position. If you are unsure of the position, it may be determined by the Mechanical Position Indicator on the side of the valve.

PID Control Loop Tuning - CentriFeeder with ICV only

PID #1 and #2 control the ICV in what is termed a cascade control in which the control output of PID #1 becomes the set point of PID #2 , which in turn, controls the valve. Set PID #1 according to the following table for Electronic Full Scale (eFS)= 100% Meter Volumetric Full Scale (vFS). Use the heaviest material to calculate the vFS.

TABLE 1
PID Values For ICV with 2.0 second maximum stroke
w/PID #2 K_P=100; $\mathbf{K_I}$=0; and $\mathbf{K_D}$= 100

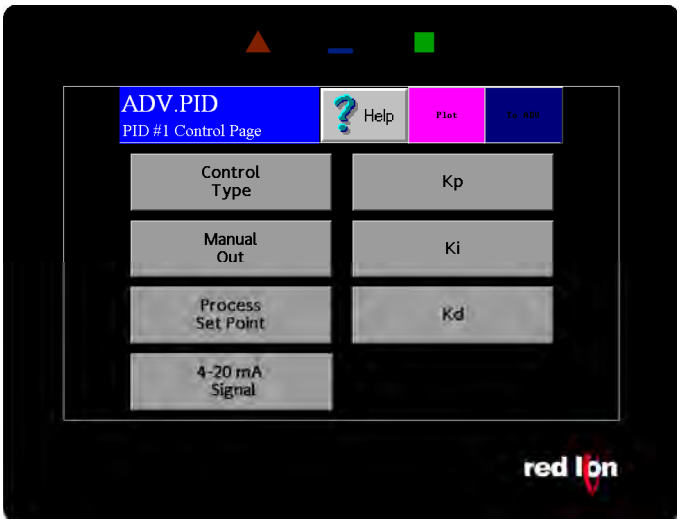
	$\mathbf{K_P}$	$\mathbf{K_I}$	$\mathbf{K_D}$
Conservative	0.031	0.125	0
Normal	0.062	0.187	0
Aggressive	0.062	0.250	0

If the vFS is other than 100%, then multiply the PID value by the ratio. For example, If vFS = 150% then multiply the respective PID values by 1.5. For Normal (default) setting, then:

$\mathbf{K_P}$ = 0.062 x 1.5 = 0.093
$\mathbf{K_I}$ = 0.187 x 1.5 = 0.28
$\mathbf{K_D}$ = 0

Setting the PID 1

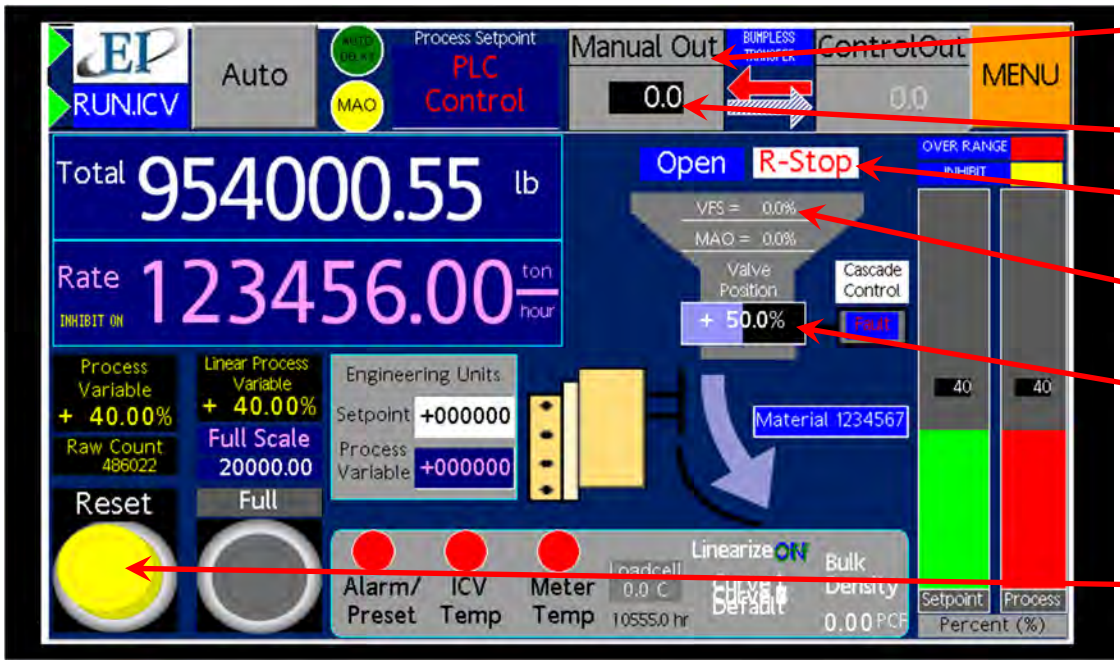
From the TOP.MENU page, press the ADV button which will open the TOP.ADV Advanced Control Page. Press the PID #1 TUNING Button which will open the ADV.PID PID #1 Control Page. Press the KP, KI, or KD Buttons to enter the values above.



<u>Do not change the PID values for #2 PID.</u> Leave them at $\mathbf{K_P}$=100; $\mathbf{K_I}$=0; and $\mathbf{K_D}$= 100
These values are determined by the speed of the valve and are for a valve which will stroke 3.5 inches in 2.0 seconds.

Running the CentriFeeder with ICV

Assuming that the meter has been properly installed and calibrated, your CentriFeeder™ can be run in one of two modes which can be quickly and easily switched between even while your process is running. These two modes are Manual and Automatic. These modes can be accessed from the main run display shown below. This display is accessed by pressing the Run Button from the TOP (Main Menu) page.



MANUAL

Entering Manual Mode

Manual Mode allows you to manually input the desired location of the valve by entering a value for the Manual Output. This allows more control of the flow, however, please note that starting and stopping the flow are manually controlled as well. To enter Manual Mode, simply press the Manual Out Button at any time, whether product is flowing through the CentriFeeder™ or not.

While in Manual Mode, you can manually enter values for the Manual Output of the CentriFeeder™. Your desired Manual Output, or the percentage that the valve is open, can be entered by double clicking on the Manual Out Button and entering your value in the pop up numeric keypad.

Starting Flow

Please Note: The ICV will not run if the R-Stop Indicator is visible on the screen. The valve will only operate if there is a closure between Customer Connections #18 and #19 and a jumper has been installed to serve this purpose. If this jumper has been removed, or the Remote Stop is engaged, the R-Stop Indicator will be visible onscreen.

If the Run/Stop Button is Red, then the valve is currently closed and product is not flowing through the CentriFeeder™. Press the Run/Stop Button so that it turns Green in order to open the valve to the desired position (as indicated by the entered Manual Out value). Once a value has been entered and the Run/Stop Button is Green, the valve will open and the actual position of the valve will be indicated by the Valve Position Indicator.

Please note that the valve will most likely have the ability to open to a point which will exceed the flow indicated by your Electronic Full Scale. The CentriFeeder™ will not be damaged, but you will experience an excessive amount of flow through the meter. Incremental changes in the valve's position are recommended if a large flow value is not desired. However, opening the valve to 100% can be useful to clear the valve of residual product when the feed hopper is empty in order to prepare for a product change.

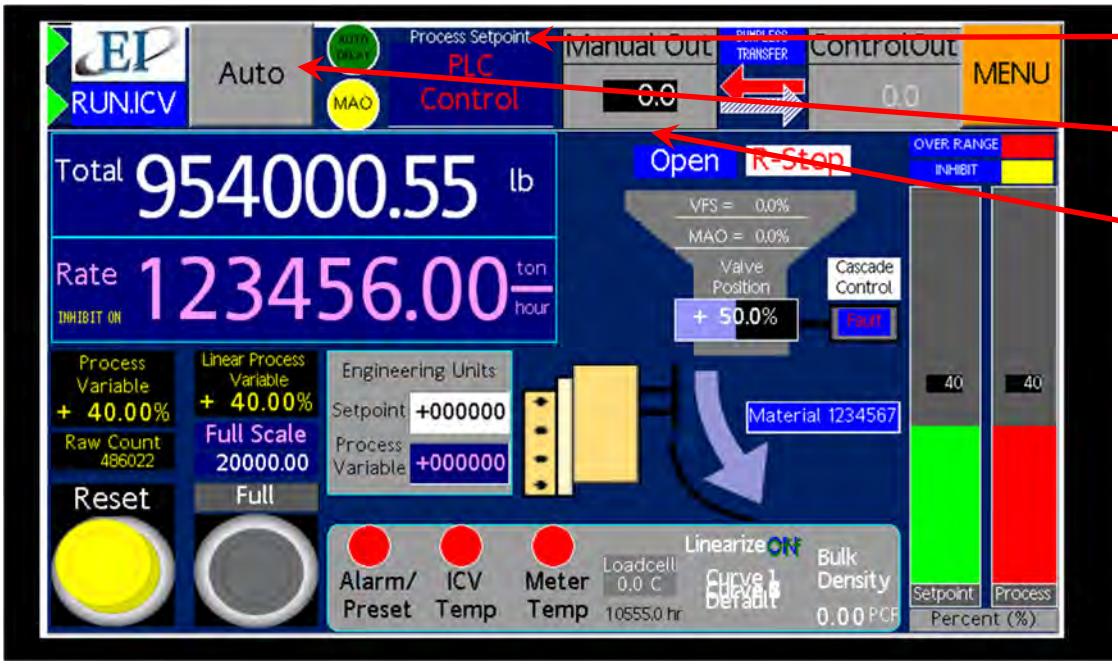
Stopping Flow

To stop flow while it is running, (the Run/Stop Button is Green) press the Run/Stop Button. The Button should now be Red. Pressing this button will cause the valve to close to the Virtual Flow Stop value indicated above the Integrated Control Valve actuator icon.

If the valve does not close to within +1% of the target value in about 15 seconds, the Anti-Binding Function will activate, and try to close the ICV to within +1% of the closed target value. If it is not able to reach target in 3 minutes, a "Stuck" alarm will be activated. On closing, this is usually due to product bridging between the valve and Tangential Liner, and will usually open when asked. For more information, refer to the Anti-Binding Section of this manual.

AUTOMATIC

Automatic Mode is a mode that enables the valve's position, or output, to be changed automatically based on a desired process Set Point. The valve will automatically adjust until the Set Point is reached or maintained.



PROCESS SET POINT BUTTON

AUTOMATIC BUTTON

MANUAL BUTTON

Entering Automatic Mode

You can access Automatic Mode from the Run page (pressing Run from the TOP page - Main Menu) by pressing the Automatic Button. You should now be in Automatic Mode. If you have not run the CentriFeeder™ before, then simply press the Run/Stop Button and when it has turned to green, the Integrated Control Valve will open.

If product has been run through the CentriFeeder™ before, then the stored Auto Delay value should be indicated in the Control Out Display. Pressing the Run/Stop Button will signal to the Integrated Control Valve to access the previously saved Auto Output value and will run in Manual Mode for the allotted time indicated in your Auto Delay Settings. After the Auto Delay set time has expired, the system will switch to Automatic Mode and you should see the Manual Button change from green to gray and the Automatic Button change from gray to green indicating that it has changed modes.

Changing the Set Point Value

The Process Set Point is similar to the Manual Output value for Manual Mode, however rather than indicating a percent open value for the valve itself, the Process Set Point indicates a percentage of your Electronic Full Scale value. This value can be changed by pressing on the Process Set Point Button and entering your value in the pop up numeric keypad.

CHANGING BETWEEN MODES

Auto to Manual

You can change from Automatic Mode to Manual Mode even while in process, by pressing the Manual Button. The Manual Button should now be green, indicating that Manual Mode is activated. The last Auto Output value will be transferred to the Manual Out Display, and the system will run at the new Manual Out value. Changing the Process Value will require changing the Man Out value via the keypad pop-up. Please note that while in Manual Mode, the Process Value will no longer be under automatic control.

Manual to Auto

You can change from Manual Mode to Automatic Mode even while in process, by pressing the Automatic Button. The Automatic Button should now be green, indicating that Auto Mode is activated. Changing to Automatic Mode will cause the Manual Output value to be transferred to the Auto Output value. Because you are in Automatic Mode, the Auto Output value will change, if necessary, to make the Process Value equal to the Set Point value. As long as there is not a significant change in the process, you should be able to change from Automatic Mode to Manual Mode and back again without a significant process change, at least for a short while.

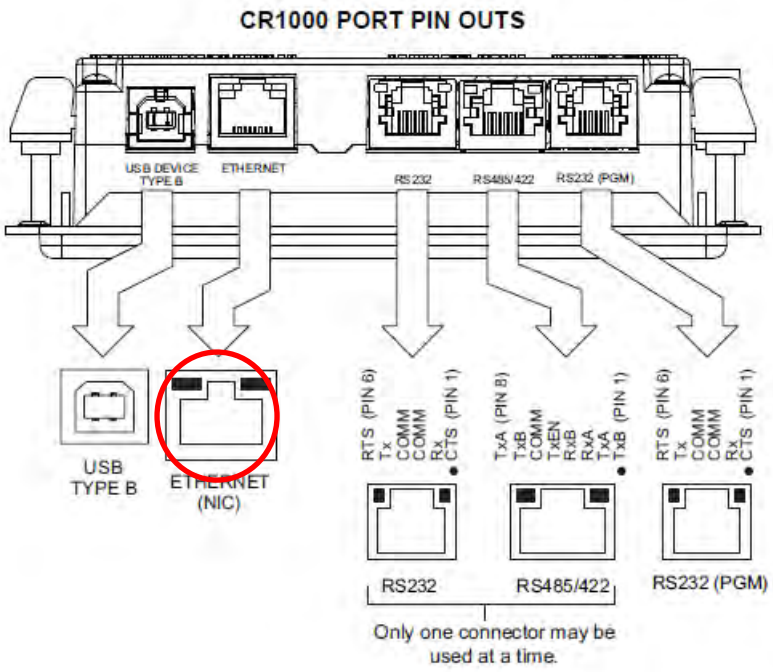
ANTI-BINDING FUNCTION

If the Integrated Control Valve becomes stuck, it will put itself into “maximum impulse” and will attempt to free itself 5 times after which it will go into rest mode for a duration of 10 minutes. While in rest mode, the valve will move, however the power to the valve is reduced in order to prevent it from overheating. A “Stuck” warning will also appear on the main run page beneath the Valve Actuator Icon. In addition, a “Stuck” bit will be set in the assigned Modbus register for remote access.

Changing the Ethernet/IP Address (Optional)

If you have purchased the Ethernet/IP Option read on for the procedure to set up your IP Address to communicate with your existing PLC. The Ethernet/IP option allows you to output both the flow rate and the totalization signals via an Ethernet connection, directly to your PLC. The main tasks involved to successfully enable this option are to physically connect your HMI to your PLC, to assign an appropriate IP Address to your HMI and then, to instruct your PLC to accept the signal through your Ethernet connection.

Step 1: Install your Ethernet Cable into the RJ45 connection (Ethernet NIC) on the back of your HMI. To access the back of your HMI, simply open the door of your Digital Electronics Unit. The HMI is attached to the door itself. Please see the drawing (Below) for the location of the RJ45 Connection.



Step 2: You must first Manually Configure the IP Address for your Digital Electronics. In order to accomplish this, you must first access the COM.IP page by pressing the COM Button on your TOP Menu and then, pressing the IP CONFIG Button.

Step 3: Enter the IP Address for your HMI by double clicking on the Address section. To switch between numbers and letters, press the SYMBOL Button that is located next to the IP Address display.

*Please note that pressing the PREVIOUS and NEXT Arrow Keys will scroll between your Address, NetMask and Gateway Fields until you have begun entering your IP Address numerically. At that time, the PREVIOUS and NEXT Arrows will move the cursor back and forth to edit your IP Address.

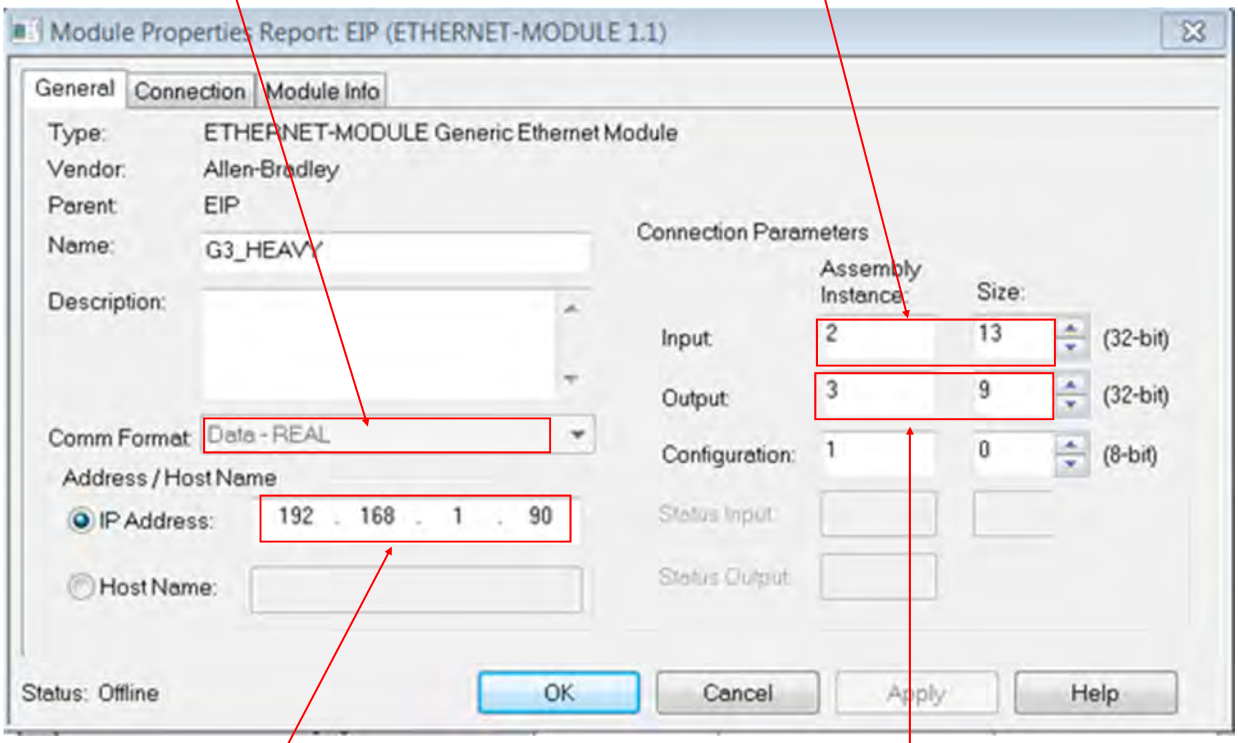
Step 4: After entering the IP Address for your HMI, press the ENTER key and then, press the OK Button located in the Upper Right hand corner. A pop up will prompt you to save the IP Address changes to your Flash. Pressing the YES Button will refresh the HMI and will implement the changes made.

Step 5: You have now configured your HMI to communicate with your PLC and must ensure that your PLC will receive the output from your HMI. The following section offers a specific example of PLC configuration using a ControlLogix PLC.

Example of Establishing Communication To PLC: ControlLogix Unit

Set Comm Format to “Data-Real”

Input Assembly Instance must be set to 2.
Input Size must be set to 13.



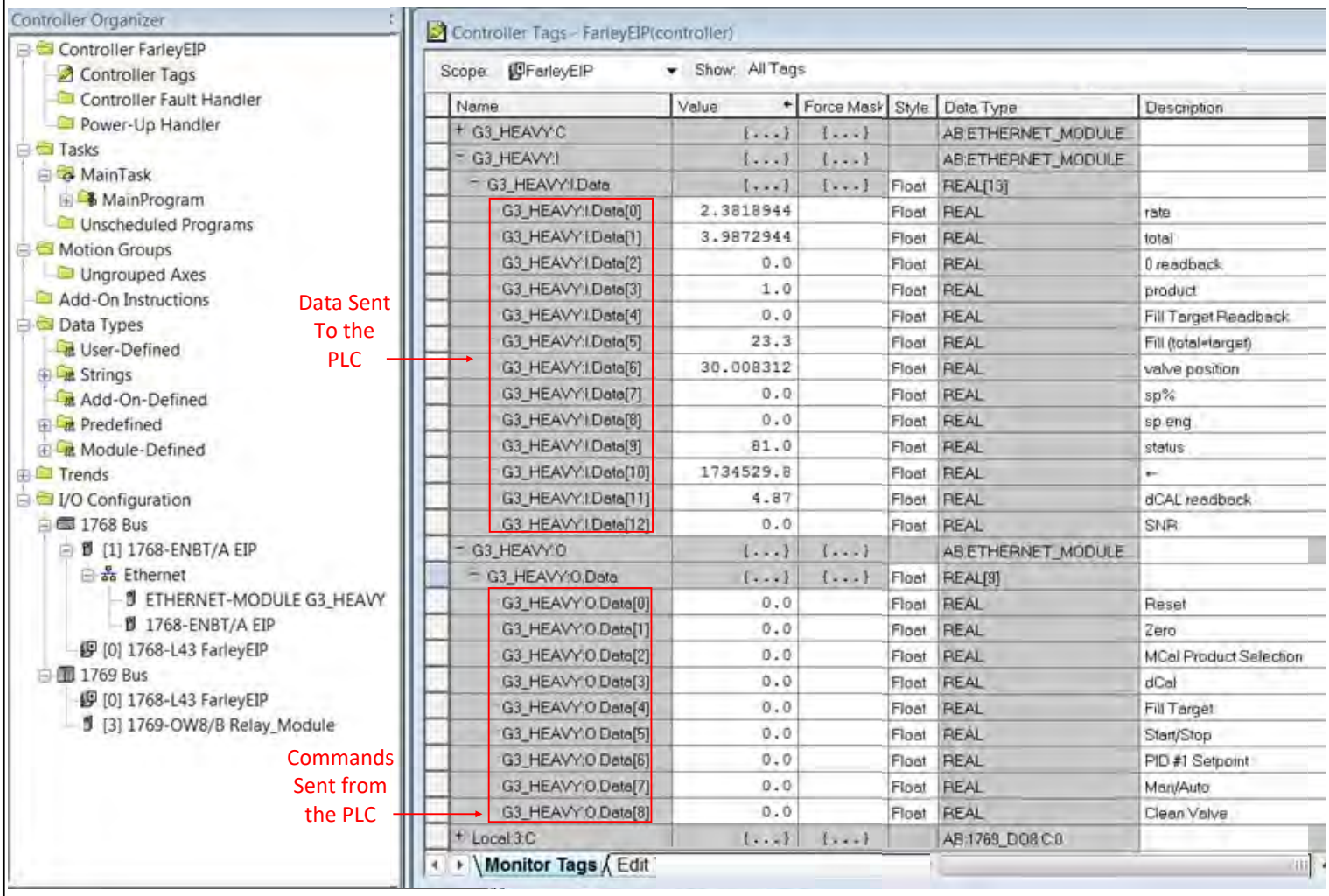
The IP Address is the address of the HMI. This must be the same as the address set in the HMI.

Output Assembly Instance must be set to 3.
Output Size must be set to 9.

The diagram above is a screen capture from RSLogix 5000 software. See Red Lion Technical Note TNOI17 for a description of the ControlLogix configuration steps. Note that the Module Properties as shown above and on page 3 of the technical note differ. Please set the Comm Format to Data-Real, Input Size to 10, and Output Size to 9, as shown above.

Set the Comm Format, IP Address, and Connection Parameters as shown in the diagram.

Tag Mapping



416 Landmark Drive
Wilmington, NC 28412
www.easterninstruments.com
Phone:(910) 392-2490
Fax: (910) 392-2123

Controller Tags

CONTROLLER TAGS			
Data Sent to the PLC			
Address	**Description**	**HMI Internal Tag**	**Comments**
C02:00	Flow Rate	DS_rate (real)	Displayed on run page as "Rate"
C02:01	Totalization	counter_eng (real)	Displayed on run page as "Total"
C02:02	Remote Zero Readback	PLC_zero_rdbk (real)	1-norm; 2-abnorm; 3-prohib/not done; 4-prohib/abnorm; 5-prohib/PV > inhibit
C02:03	Remote mCAL Readback	PLC_MCAL_rdbk (real)	Readback for "Remote Product"
C02:04	Remote Fill Readback	PLC_FillTarget_rdbk (real)	Readback for Fill Total Target
C02:05	Bit 0 - Fill/Batch Enable Bit 1 - Fill/Batch Stop Bit 2 - Fill/Batch Target Error	BC_Batch_En (int) BC_Batch_Stop (int) remoteFillTarget_invalid (flag)	0=off; 1=Fill/Batch Enable 0= (Total <Target); 1=(Total >=Target) 0=OK; 1=(Target <=Weight Correct)
C02:06	Valve Position	PID2_position (real)	Displayed on run page as "ICV Pos"
C02:07	SP % Readback	PID_SetPoint_Value (real)	Displayed on run page as "Process SP"
C02:08	SP Eng Readback	PID_SetPoint_Engr (real)	Displayed on run page as "SP"
C02:09	Bit 0 - Local/Remote Control Bit 1 - Manual/Auto SP (PID1) Bit 2 - Not Used Bit 3 - Maximum Auto Out Bit 4 - Valve Open/Closed Bit 5 - SP Valid/Invalid Bit 6 - % Eng SP Bit 7 - Valve OK/Valve Fault	PB_PLC_enable (flag) FeederFlowCtl (int) PID2.MaxOpen_LED (flag) RB_DOUT1 (int) remoteSP_invalid (int) PB_PLC_engr (flag) PID2_ValveStuck (int)	0=Local Control; 1=Remote Control 0=Manual SP; 1=Auto SP 0=Below MAO; 1=Above MAO 0=Valve Closed; 1=Valve Open 0=Valid; 1=Invalid 0=%; 1=ENG 0=OK; 1=FAULT
C02:10	Continuous Bulk Density	MB_Density_Bulk	CBD Signal
C02:11	dCAL Voltage Readback	RB_CALVoltage_value	Curent dCAL Value (4 - 10)
C02:12	Ready Counter	PID1_Heartbeat	Normal = Counter is incrementing

Data Received from the PLC			
Address	**Description**	**HMI Internal Tag**	**Comments**
C03:00	Remote Reset	EIP_reset_cntr (real)	Resets Totalization 0=normal; 1=reset
C03:01	Remote Zero	EIP_zero_PV (real)	Zeros the PV
C03:02	Remote mCAL	OPT_Product_Num	Selects Product Preset (1-8)
C03:03	Remote dCAL	RB_CALVoltage_value (real)	Selects dCAL (4-10)
C03:04	Remote Fill Target	BC_SetPoint_usr_flt (real)	Fill Total Target (weight correct -999999)
C03:05	Start/Stop Valve	PLC_start (real)	Starts/Stops the process (edge triggered)
C03:06	PID#1 SP	PID1.SetPoint_usr[_E] (real)	Remotely Sets SP (dependant on format)
CO3:07	Manual/Auto Control	FeederFlowCtl	Switch Modes 0=Manual, 1=Auto
CO3:08	Clean ICV		Switch from 0 to 1 in order to clean ICV

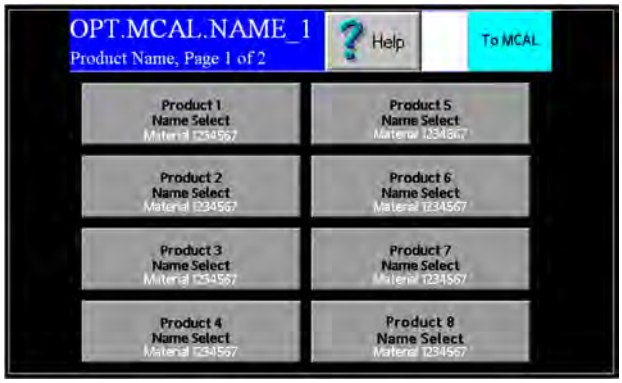
Setup of Multiple Calibration Screens (Optional)

The Multiple Calibration Screens option allows you to run more than one product through your meter without having to recalibrate each time the product is switched. This option allows you to store up to 8 product calibrations at one time. To access the option once it has been purchased, press the MULTIPLE CAL Button from the TOP.OPT page, accessed by pressing the OPTIONS button from the TOP Menu. You will now be at the screen shown below.

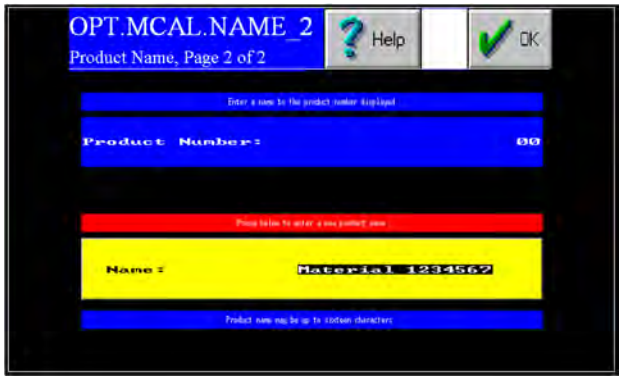
From this screen, you are able to differentiate your different products by assigning them names and Dynamic Calibrations that are specific to each product. You can also choose the Calibration you will be using from this menu.

Please note that the first time the Multiple Calibration Option is selected, the screen to the right may be displayed unless the option was ordered prior to shipment in which case the option would be unlocked at the factory. If you have purchased the option, you will receive a 7-digit password. Enter the password when prompted to unlock the Multiple Calibration Option. If you have not purchased the option and would like too, or if you are having problems unlocking the option, please contact Eastern Instruments for assistance.

Step 1: The first step is to enter names and positions for each of your products. To do so, press the NAME Button. You should now see this screen (Right). Select the product you would like to name if none have been previously selected, select Product 1.



Selecting the product above will allow you to rename the selected product. Although this step is not necessary in order to continue it will help you differentiate your products and their calibration voltages in the future. Once a product is selected, you should see the screen (Right).



Step 2: You can now assign the product calibration a name. Often, the name of the product itself is used, but any name can be used. Double click the presently entered value for Name and you will be prompted to enter your product's name. When finished, press the ENTER Button and then, press the OK Button in the Upper Right hand corner. Press the TO MCAL Button to return to the Multiple Calibrations page.

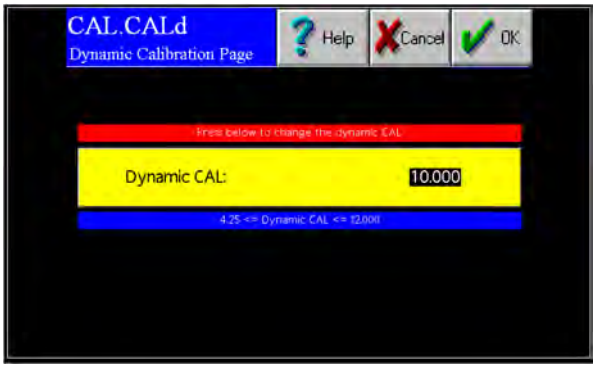
Step 3: Now you should be able to enter your calibrations for each of the products that you have assigned with names. You should have been returned to the OPT.MCAL Menu. If not return there now and press the ASSIGN Button. You should now see this screen (Right).

Continued on next page

Step 3: *(continued)* If you have named your products, then you should see them listed on this page. Select the product that you would like to assign a calibration voltage and press the corresponding button. You should now see this page (Right). Your Digital Electronics' current Dynamic Calibration value is displayed in the Current Cal(d) table on the left hand side of the page. If this is the correct dynamic calibration for your particular product, press the CURRENT/PRODUCT Button (Yellow) and then, press OK. Please note that if more than one product will have the same Dynamic Calibration, they must be entered one at a time from the previous page.

Step 4: If the current Dynamic Calibration is not correct for your particular product and you would like to change it, or none has been specified, you can either enter one manually or you can calculate another value by running a Site Calibration. To run a Site Calibration, please see the Site Calibration section of the Procedures section of this manual.

Step 5: To manually enter a Dynamic Calibration, return to the main TOP Menu and press the CAL Button and then, press the CALd Button. You should now see this screen (Right). Double click the current value for Dynamic Calibration and enter your new value. Press the ENTER Button when finished and then, press the OK Button in the Up per Right hand corner.



Step 6: Once the value is entered return to the OPT.MCAL.SAVE page as described above and save the new current Dynamic Calibration to the selected product. Repeat this process for all of your products, up to 8.

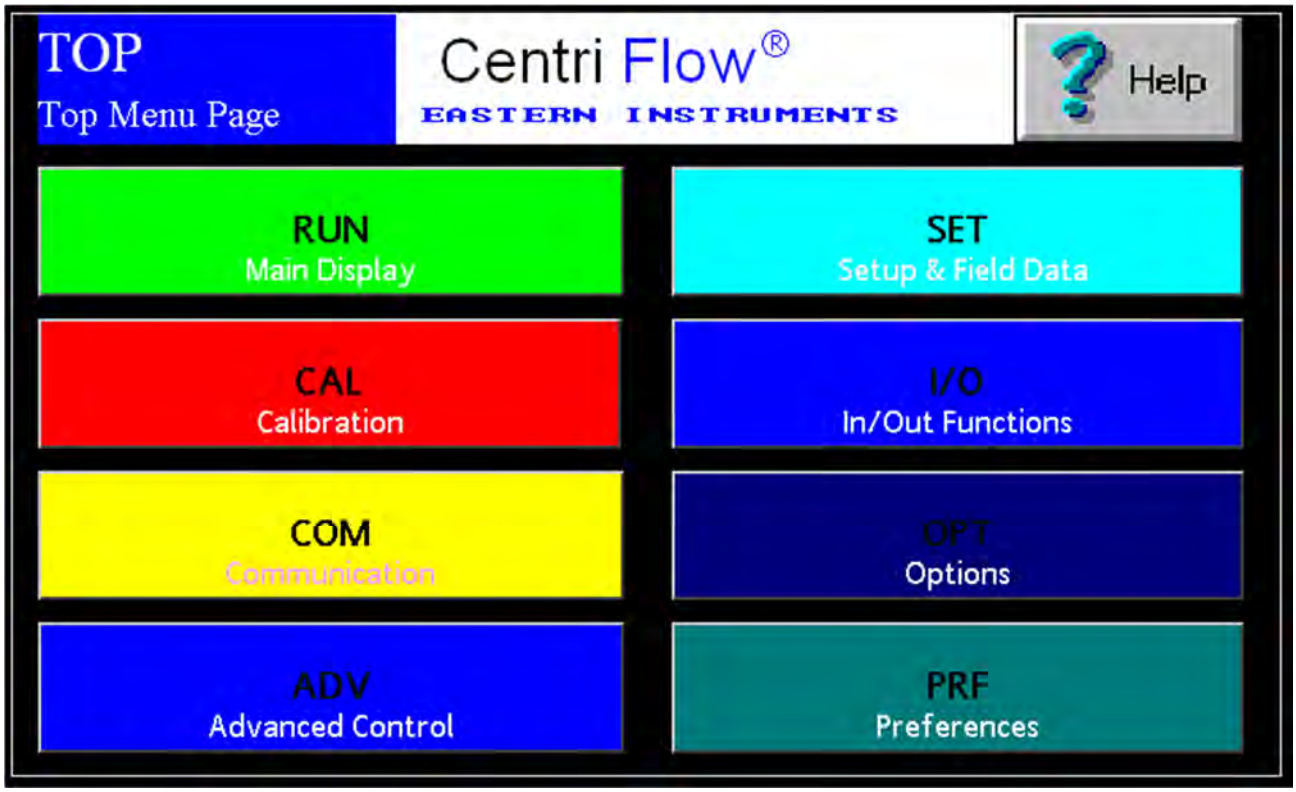
Step 7: To access any of your saved Dynamic Calibrations for running your process, simply click the SELECT Button from the OPT.MCAL page and chose the product that is currently running. Press the OK Button located in the Upper Right hand corner.

SCREEN GUIDE

Every HMI page has a unique name that includes the previous page name combined with a description of the current page. A period separates the names. When the DCE is first powered on, or when you press the soft-key labeled MENU, the TOP page is displayed.

TOP

TOP is the Main Menu Screen. There are six buttons on the TOP page. They are RUN, CAL, COM, SET, I/O and ADV. Press the RUN button to go to the TOP.RUN page. This is the normal display mode. Press the CAL button to go to the TOP.CAL page. This is where the DCE calibration is performed (comparable to analog electronics Static Calibration). Press SET Button to go to the TOP.SETUP page. This is used to perform the DCE site calibration. Press the I/O button to go to the TOP.I/O page. This is used to set up the digital inputs and outputs. Press the ADV button to go to the TOP.ADV page. This page is where advance functions such as batching and PID are set-up. In the lower corner you will also notice an indicator displaying whether you currently have a Flash Card Installed and if you have any alarms currently activated. In the upper right corner you can access a Help Menu.



TOP.RUN

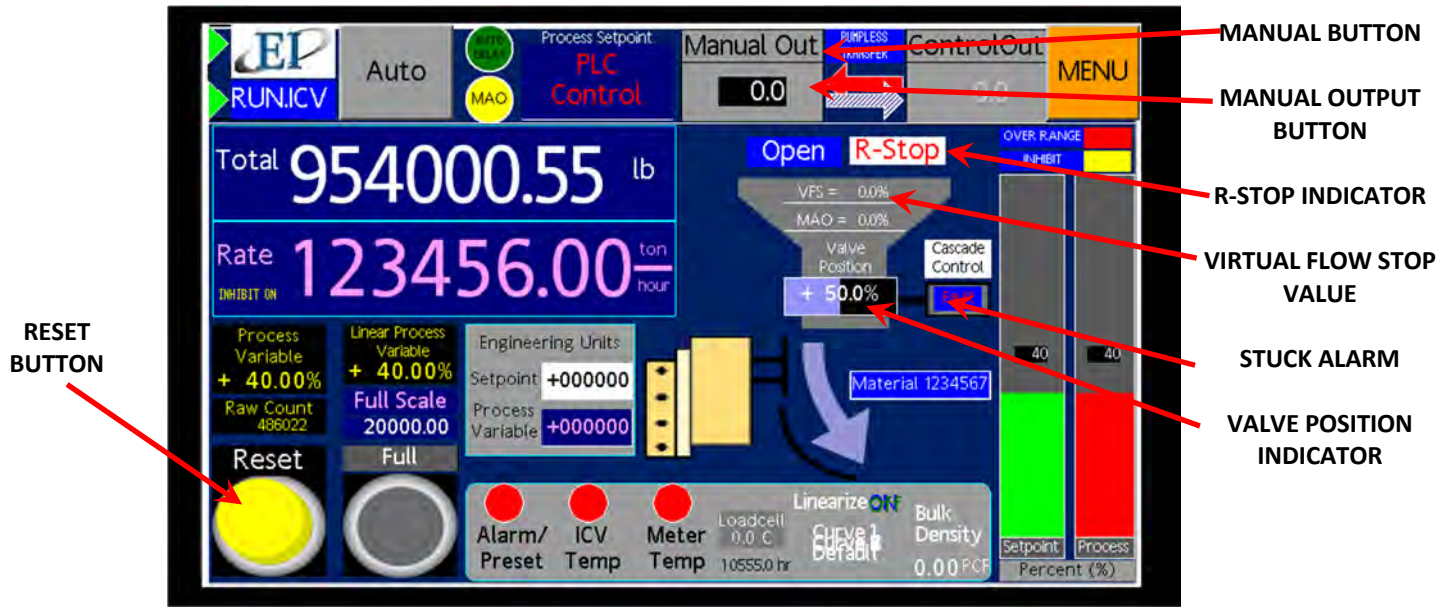
TOP.RUN is the main display mode. Access this screen by pressing the RUN Button from the TOP screen. The customer can choose between Automatic Mode and Manual Mode from this screen as well as view data in real time.

The Red and Green Bar on the Lower Right labeled SP and PV: SP stands for Set Point and represents the chosen value you would like the process to run at. It is represented as a percentage of your EFS value, or Electronic Full Scale. PV indicates your Process Value, or what the process is actually running at.

PV/SP in Engineering Units: The SP and PV values are also represented in Engineering Units in the square above the Run/Stop button on the lower left side of the screen.

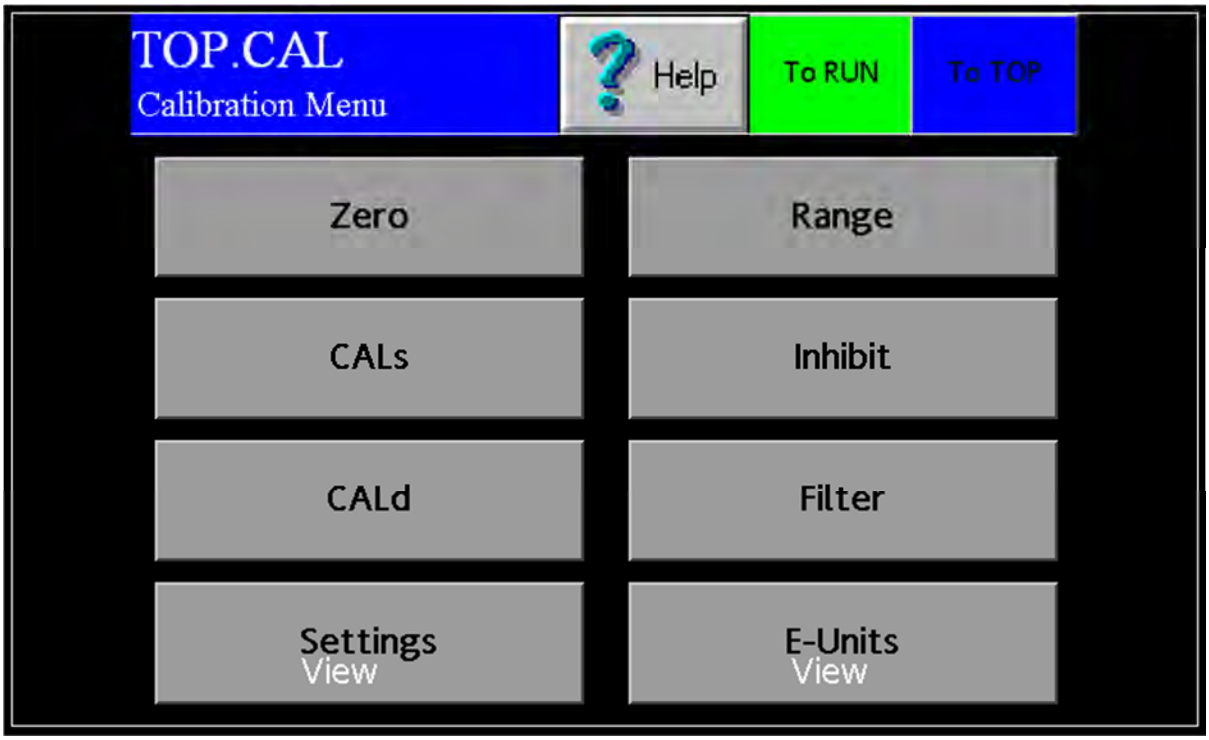
The diagram of the valve/meter: A graphical representation of the valve and meter are seen on the center right of the screen and information relating to the valve can be viewed here. An Open/Closed indicator is above the valve graphic while the position of the valve is indicated in the white block under the word "position" on the valve graphic. The value is shown as a fraction of 100% open. The VFS Value, or Virtual Flow Stop Value is also indicated as a percentage of 100% open. Please see the manual for more information on the Virtual Flow Stop. Near the meter representation is an alarm indicator showing whether the alarm has triggered or not.

Total/Rate Indicator: In the top left corner under the Auto and Man Buttons are the numerical values of the calculated Total and Rate values for your process as well as the units of these values.



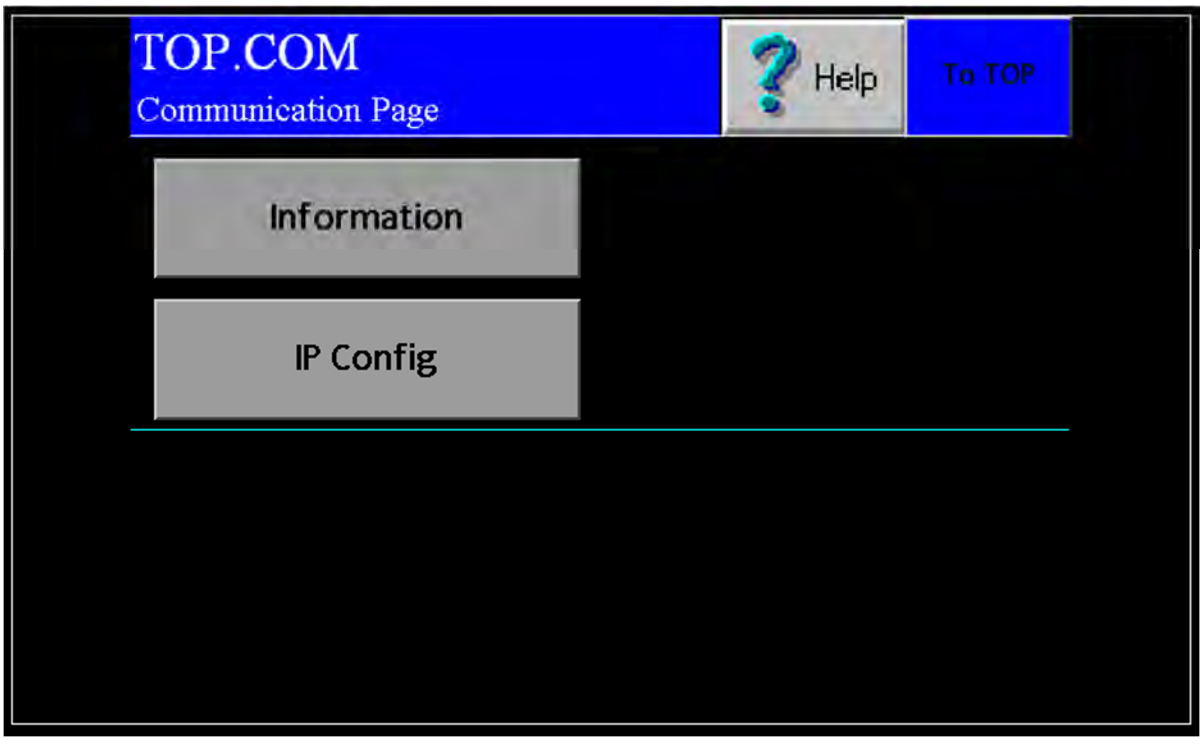
TOP.CAL

TOP.CAL is the Main Calibration Page. Access this screen by pressing the CAL Button from the TOP page. There are eight buttons on the TOP.CAL page. They are ZERO, CALs, CALd, SETTINGS, RANGE, INHIBIT, FILTER, and E-UNITS. Press the ZERO button to go to the CAL.ZERO page. This is where you can perform a Zero Calibration. Press the CALs Button to go to the CAL.CALs page. This is where you can perform Static Calibration. Press the CALd Button to go to the CAL.CALd page. This is where you can perform Dynamic Calibration. Press the SETTINGS Button to go to CAL.SETTINGS. This is where you can view your currently selected settings. Press the RANGE Button in order to go to the CAL.RANGE page. This is where you select the current range of your electronics. Press the INHIBIT Button to go to the CAL.INHIBIT page. This is where you can select a threshold below which the Electronics will not take a flow measurement. Press the FILTER Button in order to go to the CAL.FILTER page. This is where you can filter the output of your 4-20 mA signal from instantaneous to averaged. Press the E-Units Button to go to the CAL.EUNITS page. This is where you can view data such as your Full Scale and your Count to Weight Ratio.



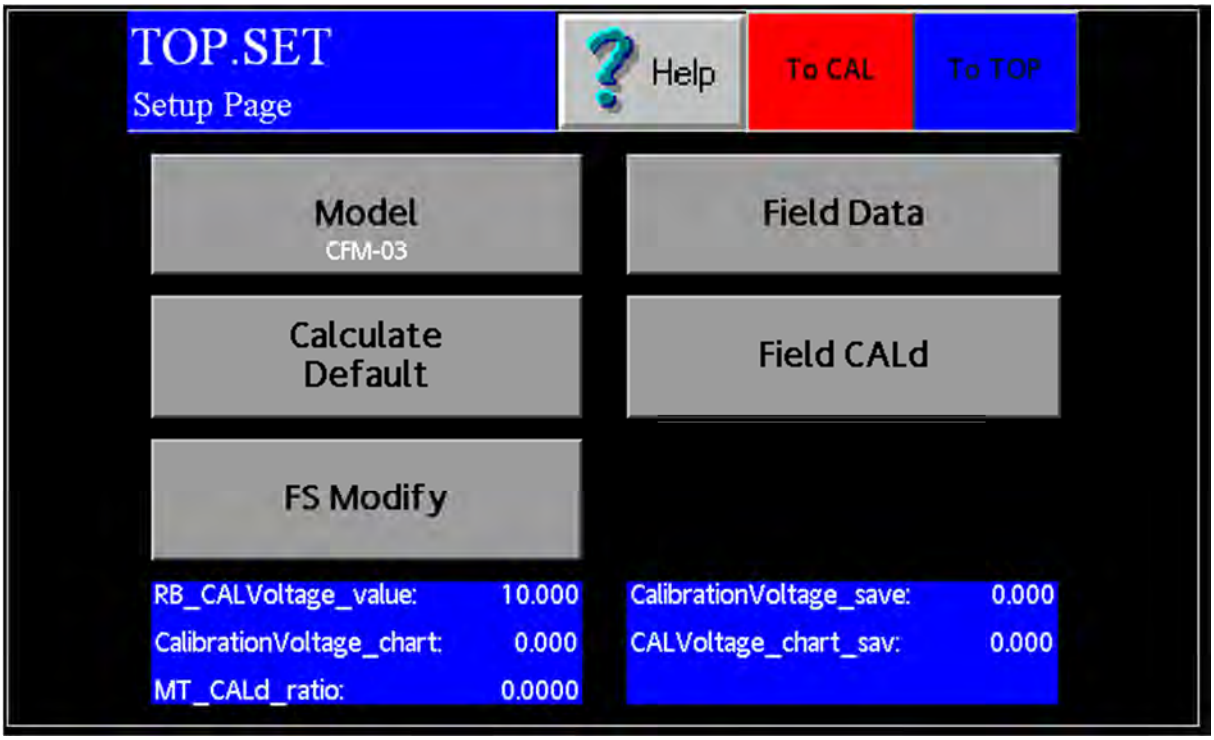
TOP.COM

TOP.COM is the Main Communication Page. Access this page by pressing the COM Button from the TOP page. There are two buttons on the TOP.COM page. They are INFORMATION and IP CONFIG. Press the INFORMATION Button to view information concerning your Software's version and your communication protocol information.



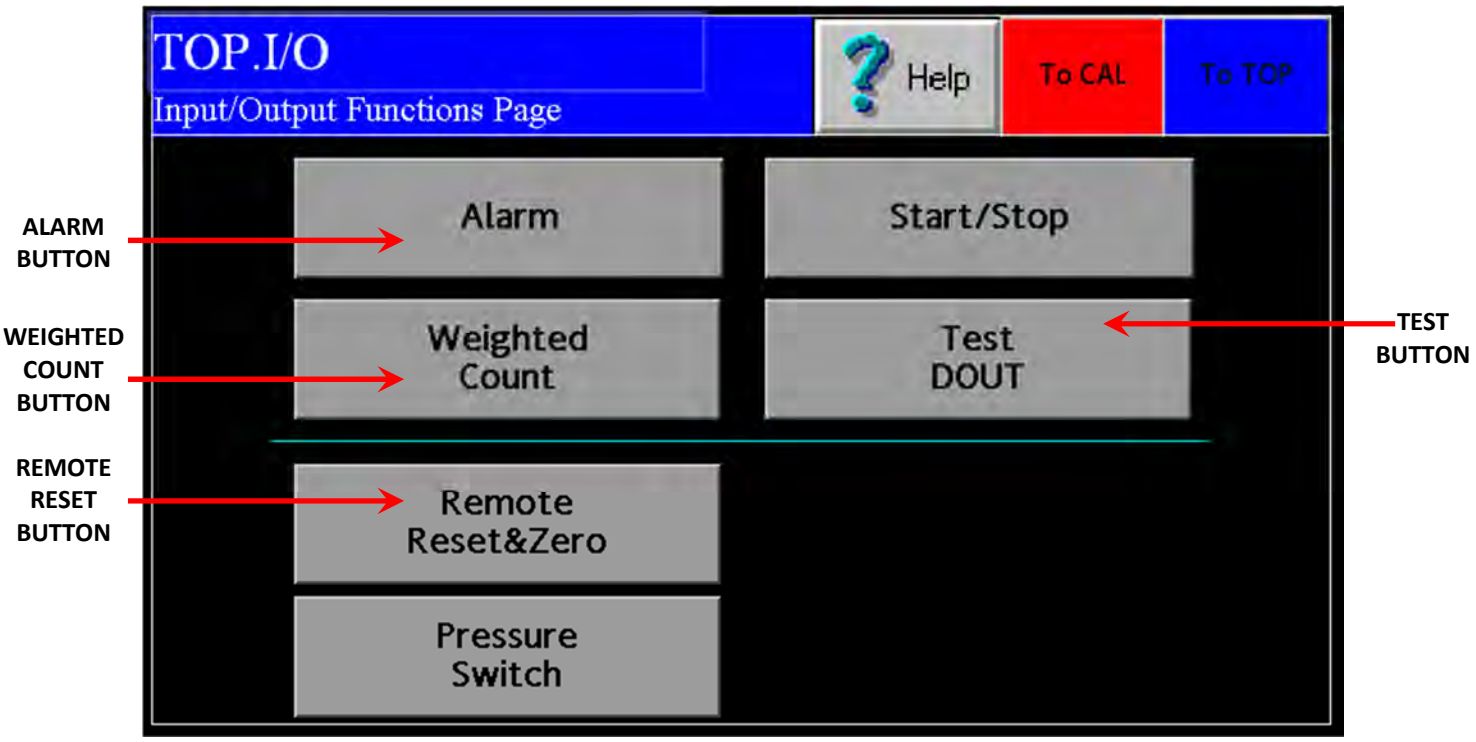
TOP.SET

TOP.SET is the Main Data Entry menu. Access this page by pressing the SET Button from the TOP page. There are five buttons on the TOP.SET page. They are CALCULATE DEFAULT, FIELD DATA, FIELD CALd, FIELD SAVE and FS MODIFY. From the SET Menu, seen below, you can enter values for your Count to Weight Ratio (CALCULATE DEFAULT Button), enter Field Data such as is taken during Site Calibration (FIELD DATA Button), change your Dynamic Calibration Settings based on your Dynamic Calibration data (FIELD CALd Button), modify your Full Scale value (FS MODIFY Button), or save calibration data to your Flash Card (FIELD SAVE Button).



TOP.I/O

TOP.I/O is the Main Input/Output Menu page. Access this screen by pressing the I/O Button from the TOP page. This page is for accessing all options associated with setting the alarm on your process.



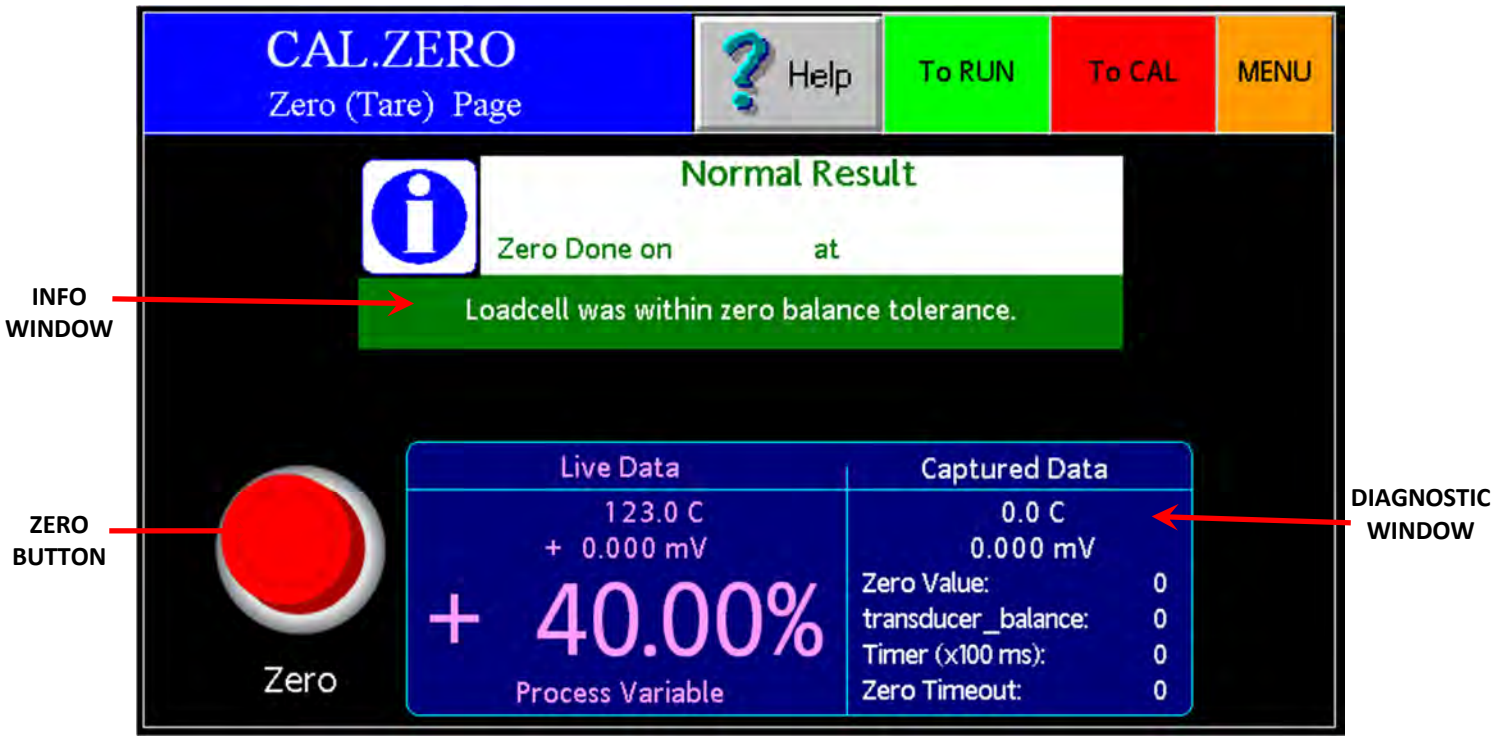
CAL.ZERO

CAL.ZERO is the Zero Calibration page. Access this screen by pressing the ZERO Button on the TOP.CAL screen after pressing the CAL Button from the TOP page. This page is for conducting Zero Calibrations. The procedure for a Zero Calibration can be found under the Static Calibration Section. (See page 21.)

The Diagnostic Window displays the Process Variable. The Red Zero Button is pushed in order to run a Zero Calibration. Information on whether the calibration was successful and whether there may be excess product on your Meter Pan may be found in your Information Window.

The meter should normally be re-zeroed when the Process Variable % is greater than +/- 0.25% with no flow. If highest accuracy is required, zero when greater than +/- 0.1%. Conversely, if lower accuracy is required this value can be raised. One can view the Process Variable % on the bottom right of the TOP.RUN page to determine if a zero is needed. (See page 32.)

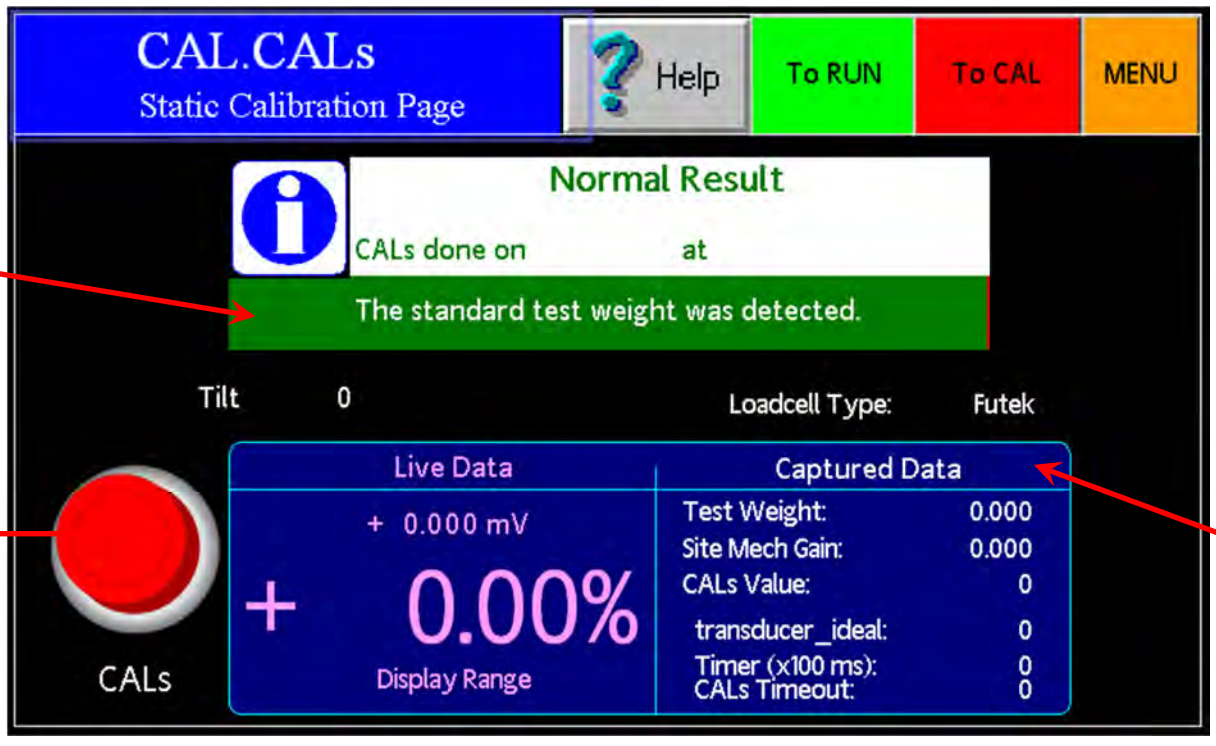
Ensure there is no flow prior to performing a zero!



CAL.CALs

CAL.CALs is the Static Calibration page. Access this screen by pressing the CALs Button on the TOP.CAL page after pressing the CAL Button from the TOP page. This page is for conducting Static Calibrations. The procedure for a Static Calibration can be found under the Static Calibration Section. (See page 21.)

The Diagnostic Window displays Voltage. The Red CALs Button is pushed in order to run a Static Calibration. Information on whether the calibration was successful may be found in your Information Window. The screen capture below indicates a Static Calibration failure.

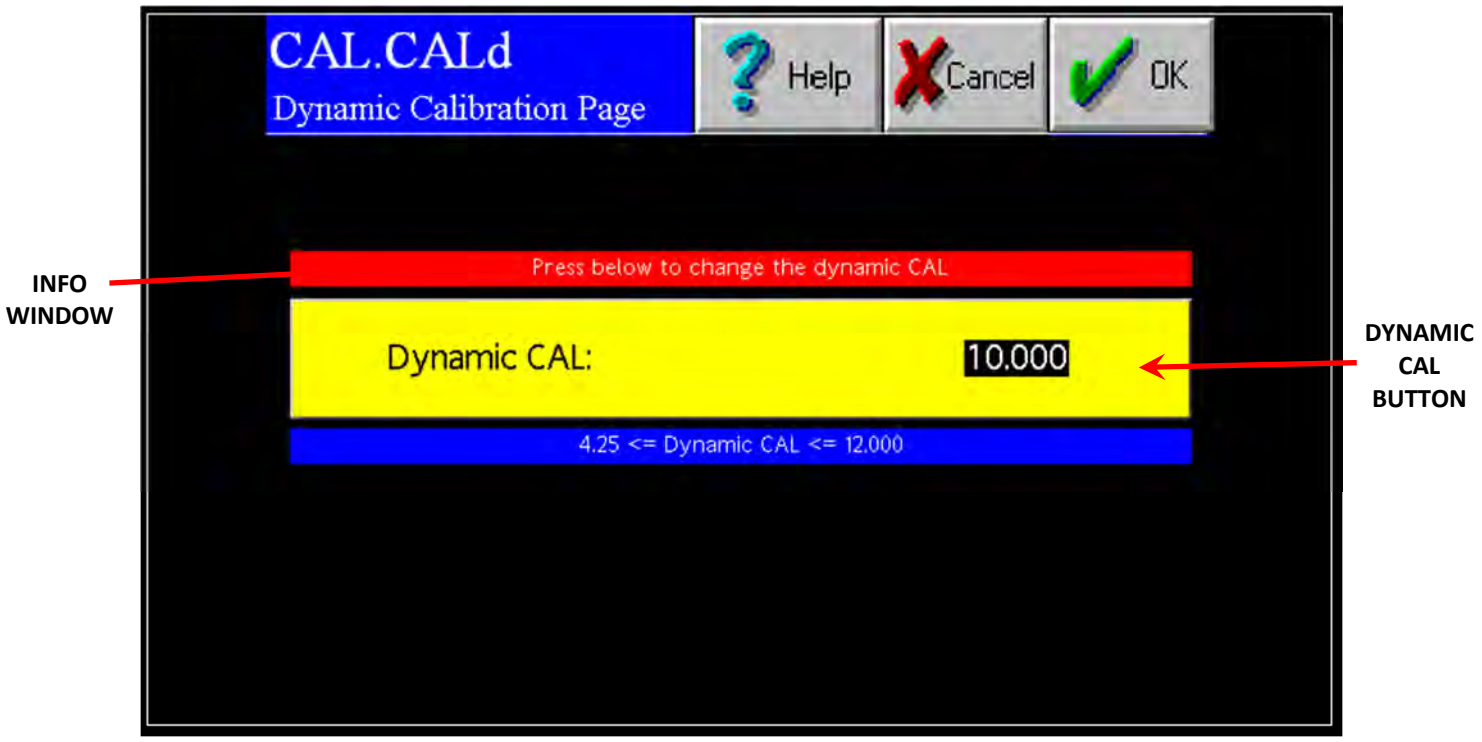


CAL.CALd

CAL.CALd is the Dynamic Calibration page. Access this screen by pressing the CALd Button on the CAL Screen after pressing the CAL Button from the TOP page. This page is for conducting Dynamic Calibration. The procedure for a Dynamic Calibration (or Site Calibration) can be found on page 22.

The Information Window displays helpful information regarding the options on this screen. Pressing the Dynamic Calibration Button ***Twice*** brings up a numeric keypad that allows you to manually enter your Dynamic Calibration Number.

Dynamic Calibration: Displays the setting used to adjust the Electronic Full Scale Flow Rate to the appropriate value. This Voltage can range from a minimum of 4 to a maximum of 10.



CAL.RANGE

CAL.RANGE is the Calibration Range page. Access this screen by pressing the RANGE Button on the TOP.CAL page after pressing the CAL Button from the TOP page. This page is for changing the Range of you electronics.

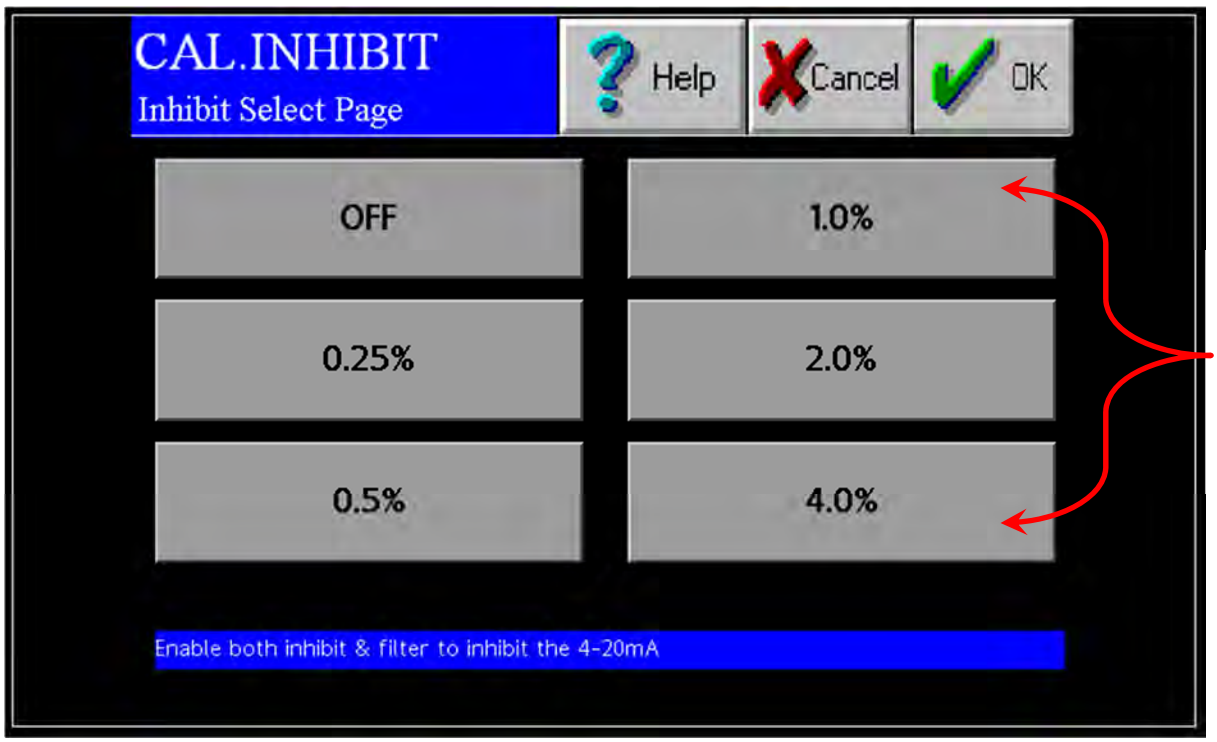
The Range can be changed to the desired value by clicking on the appropriate button.
The range setting is already selected by the factory and typically adjustment is not required.

CAL.INHIBIT

CAL.INHIBIT is the Inhibit page. Access this screen by pressing the INHIBIT Button on the TOP.CAL page after pressing the CAL Button from the TOP page. This page is for changing the Inhibit that sets a threshold which the Flow Rate Output must rise above in order for the electronics to begin counting. The range for setting this threshold is from 0.25% of full scale to 4.0% of full scale.

The Inhibit can be changed by pressing the accompanying Inhibit Buttons.

Unless OFF is selected for Inhibit, the Total display on the page TOP.RUN and the output signal 'Frequency, Flow Rate Proportional' will be inhibited. The Inhibit for the Flow Rate display on the page TOP.RUN and the output signal '4-20mA' operate slightly different. The Inhibit is OFF for the Flow Rate and 4-20mA signal when the 4-20mA moving average filter is OFF. (See the page CAL.FILTER.) To Inhibit the Flow Rate and 4-20mA signal, both the 4-20mA moving average filter and the Inhibit must be on.



INHIBIT BUTTONS

CAL.FILTER

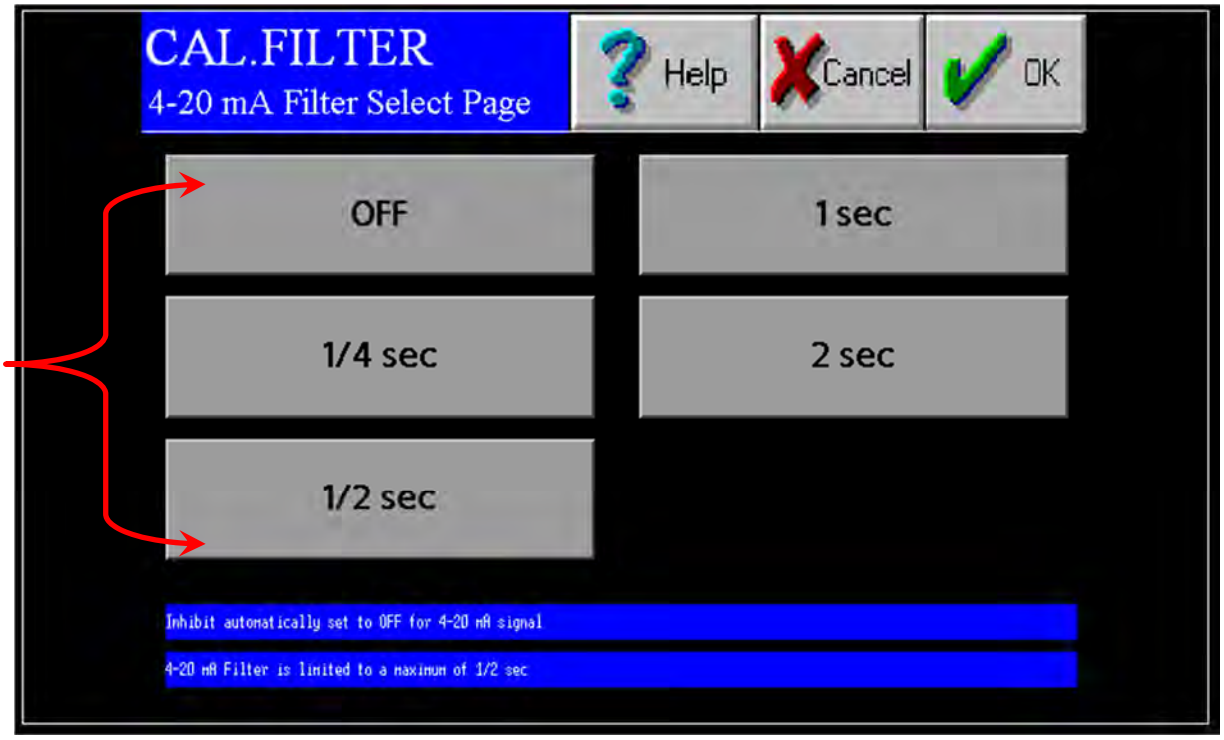
CAL.FILTER is the Filter page. Access this screen by pressing the FILTER Button on the TOP.CAL page after pressing the CAL Button from the TOP page. This page is for selecting the number of points used in the 4-20mA moving average filter. The formula for a moving average filter is shown below. Press one of the Filter Buttons to select the desired time increment for the filter. For example, a time increment of 1 second will filter (or average) 200 samples of the input signal to create the 4-20mA filtered output signal. This is because the transducer input sample rate is 200 samples per second. The 4-20mA output signal is updated at the same sample rate as the input signal. However, the output signal will be delayed by the selected time. The moving average filter can also be turned off from this screen.

Moving Average Filter

$$y[i] = \frac{1}{M}\sum_{j=0}^{M-1} x[i+j]$$

$x[\,] = input\ signal$
$y[\,] = output\ signal$
$M = number\ of\ points$

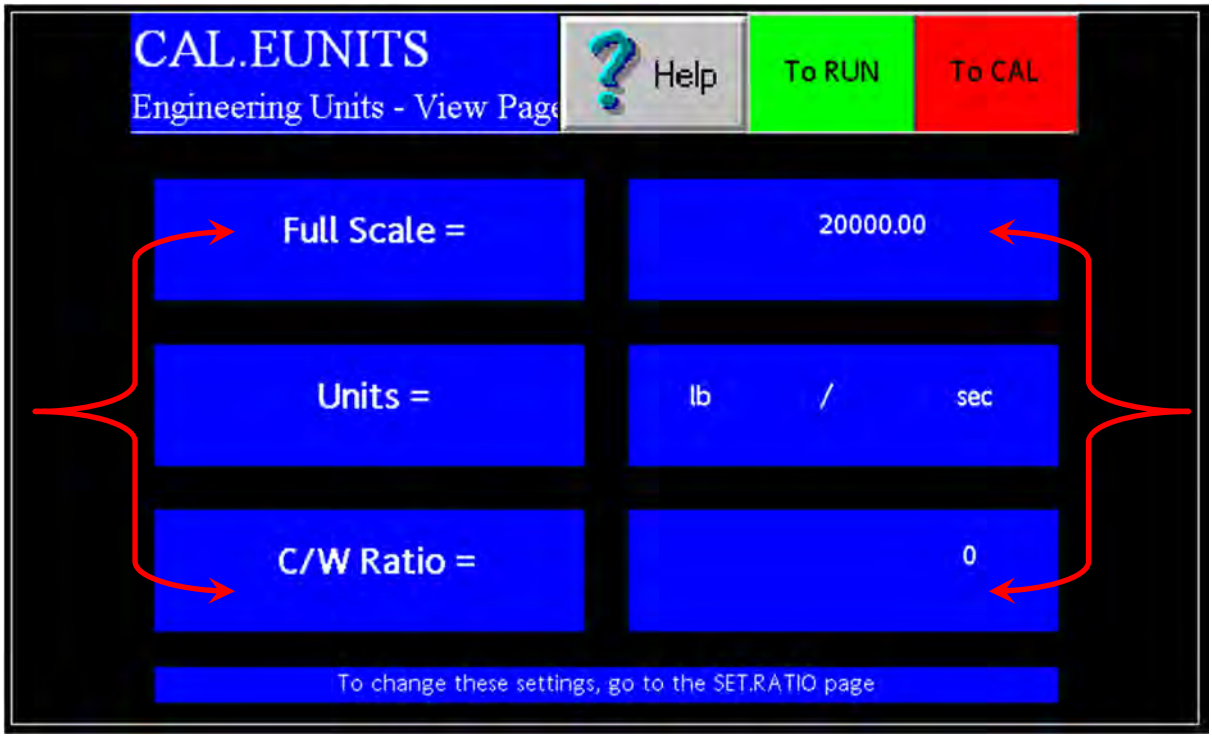
The moving average is a very common filter in digital signal processing. Despite its simplicity, the filter is optimum at performing the common task of reducing random noise while retaining a sharp step response.



CAL.EUNITS

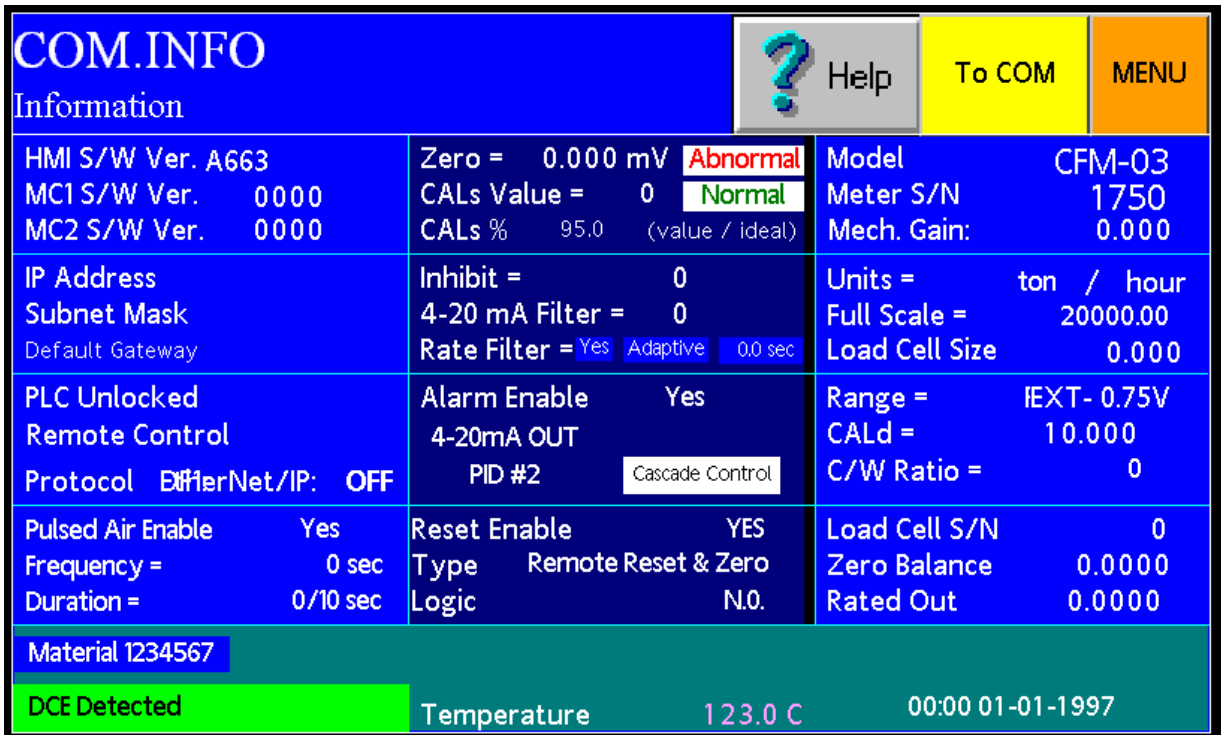
CAL.EUNITS is the Unit Display page. Access this screen by pressing the EUNITS Button on the TOP.CAL page after pressing the CAL Button from the TOP page. This page displays the Electronic Full Scale, the mass and time units, and the C/W Ratio. The C/W Ratio, or Count per Weight Ratio, is determined by the factory. This value is the number of counts that the Electronics Counter will display per weight of material that is run through the meter.

These settings can not be modified from this page.



COM.INFO

COM.INFO is the page that displays current information about your meter's setup and configuration. This page is very helpful to use as a diagnostic tool while troubleshooting.

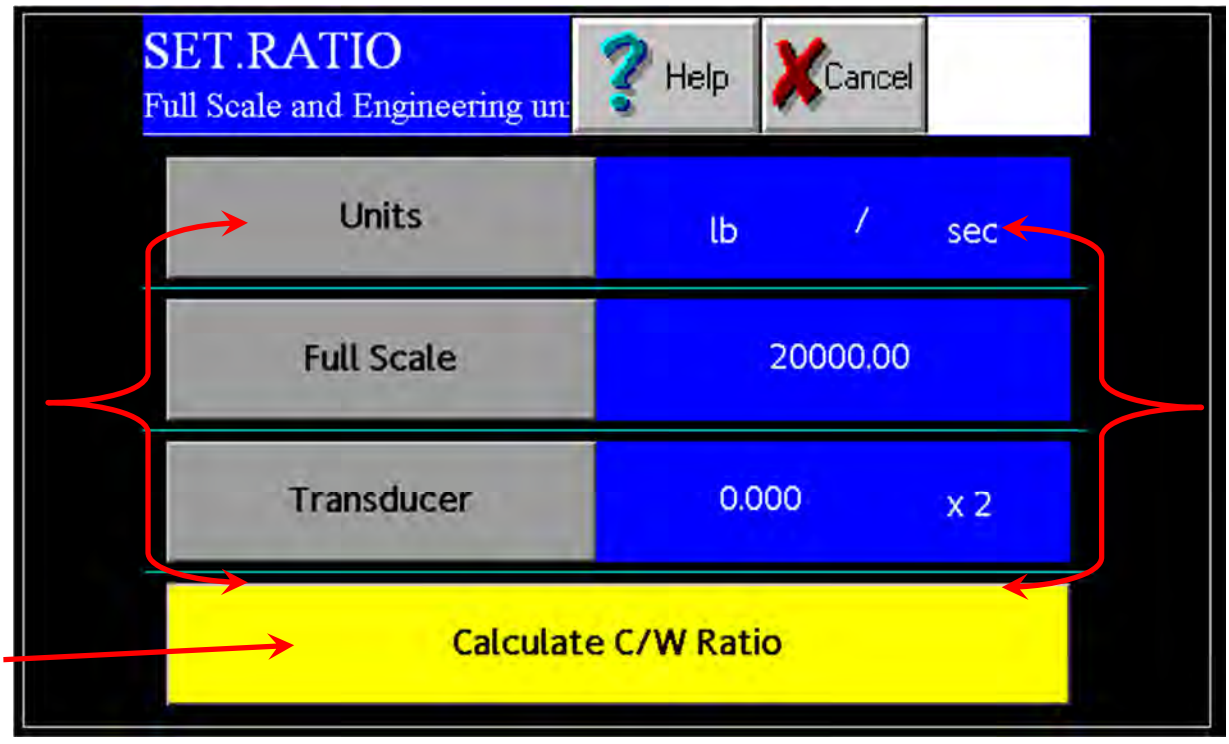


SET.RATIO

SET.RATIO is the page that allows you to calculate your count per weight ratio. The C/W Ratio, or Count per Weight Ratio, is determined by the factory. This value is the divisor used to calculate the engineering count (total) from the raw count. Your Full Scale value can be changed, the units of your Full Scale value can be modified and the number and size of your Transducers can be modified from this page. The button near the bottom will use this data and recalculate your C/W ratio.

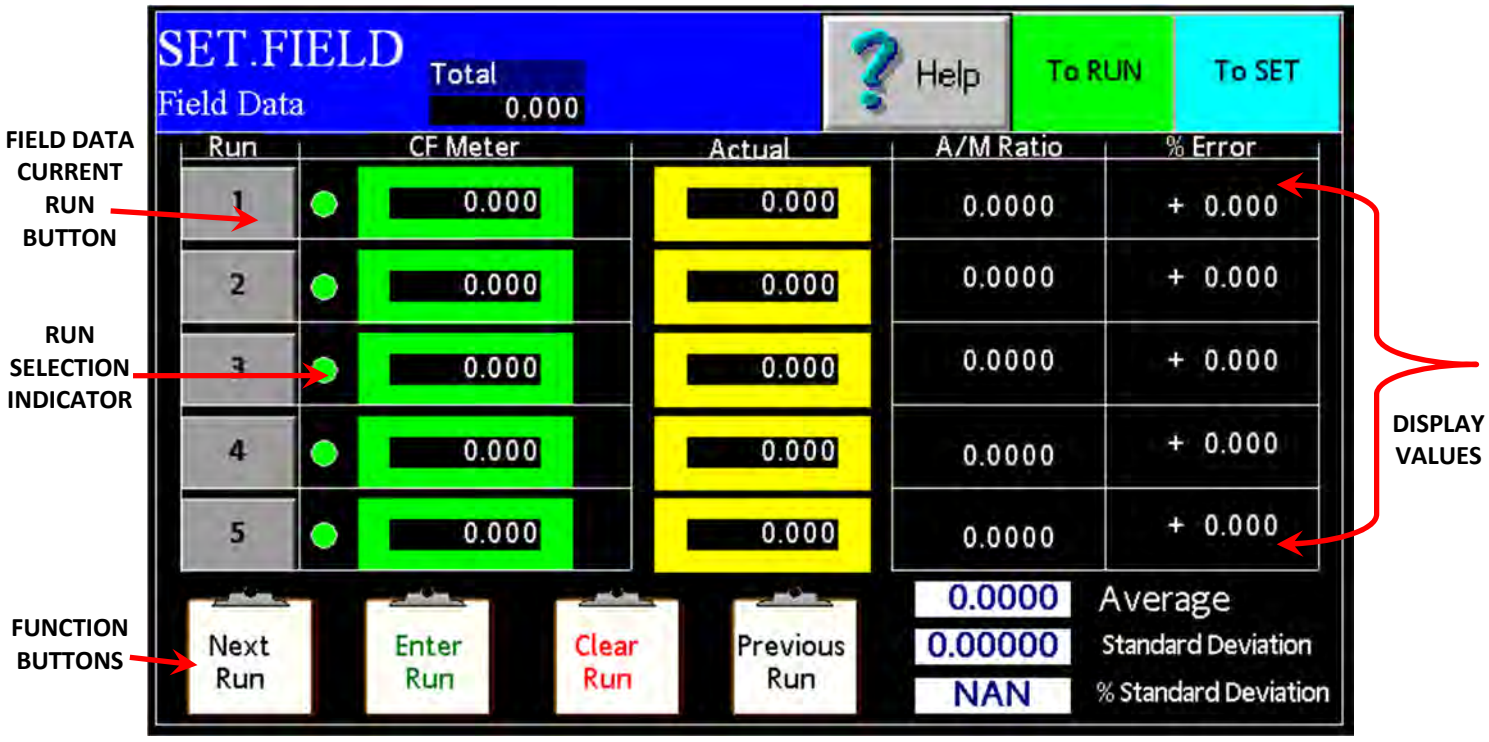
Engineering Count = Raw Count / Count per Weight Ratio

This data is set by the factory and should not be changed by the customer.



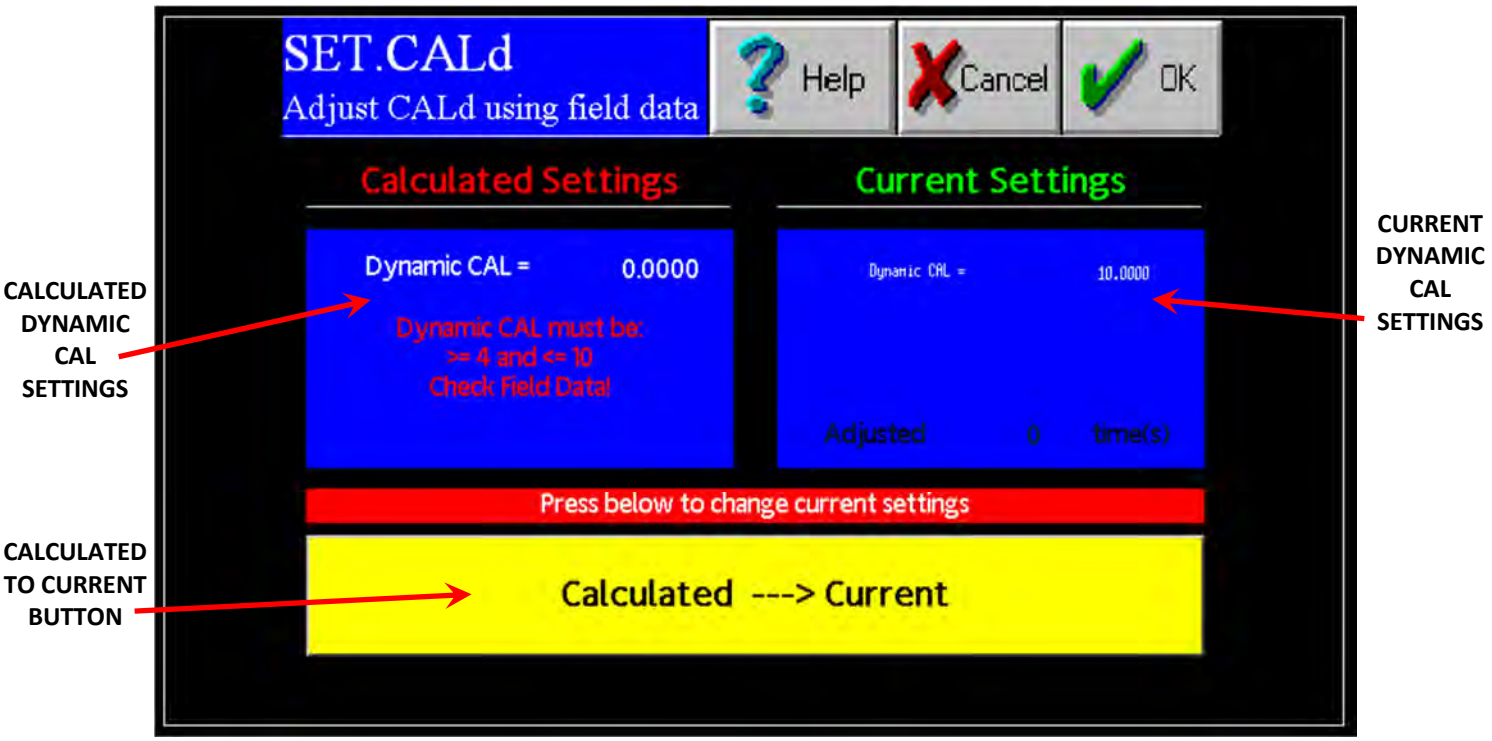
SET.FIELD

SET.FIELD is the page that allows you to collect and verify your site calibration data. This page is used extensively in Site Calibration as shown in the Site Calibration section of Chapter 3 of this manual. This screen allows you to compare the metered weight of material run through the meter versus the actual weight of the material, often weighed by a static scale after being diverted. By pressing the FIELD DATA CURRENT RUN Buttons (1-5) you can select which runs will be used during your Site Calibration calculation. The green RUN SELECTOR INDICATOR lights will be lit green when selected. Selecting certain runs using your FIELD DATA CURRENT RUN Buttons will also be useful when used in conjunction with the FUNCTION Buttons at the bottom of the screen for clearing a certain run or entering the actual data for a specific run. Values for the actual weight of material run through the meter can be entered by touching the appropriate area in the "Actual" column. A numeric keypad will prompt you to enter your data.



SET.CALd

SET.CALd is a page used in conjunction with SET.FIELD page in order to adjust your Dynamic Calibration using recently collected field data. Once the field data is entered, open this page and you should see the new calculated Dynamic Calibration value under the CALCULATED DYNAMIC CALIBRATION SETTINGS section. Your current calibration settings will be displayed under the CURRENT DYNAMIC CALIBRATION SETTINGS section. The CALCULATED TO CURRENT Button allows you to change your Dynamic Calibration using the new, calculated value. For detailed instructions on how to perform a Dynamic, or Site, Calibration, please see the Site Calibration section of Chapter 3.

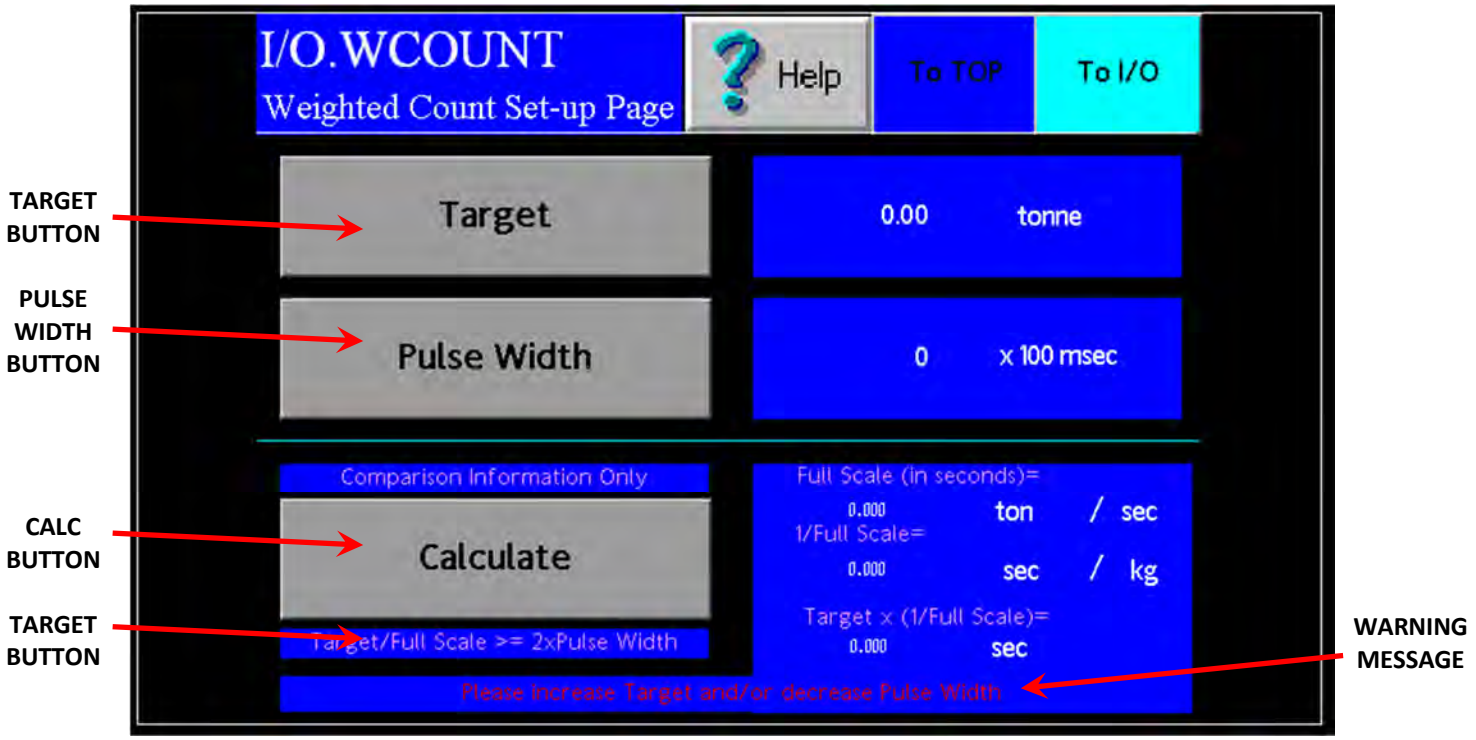


I/O.WCOUNT (Optional)

The I/O.WCOUNT page allows you to set up the weighted count option. This option allows you to set a target weight that will trigger a pulsed signal each time that target weight passes over the meter. The TARGET Button allows you to determine when the pulse will trigger by selecting the target weight, while the PULSE WIDTH Button allows you to determine the length, or duration, of the pulse signal. The values become effective immediately upon entry. You do not need to press the CALCULATE Button for the new Weighted Count values to become effective. The CALCULATE BUTTON is used as a reference guide only and will estimate, using your Full Scale value and your flow rate, the time taken to reach the target weight and thus, an estimate of the time between each pulse signal. The CALCULATE Button offers a way to ensure that the Target value is compatible with your Pulse Width value.

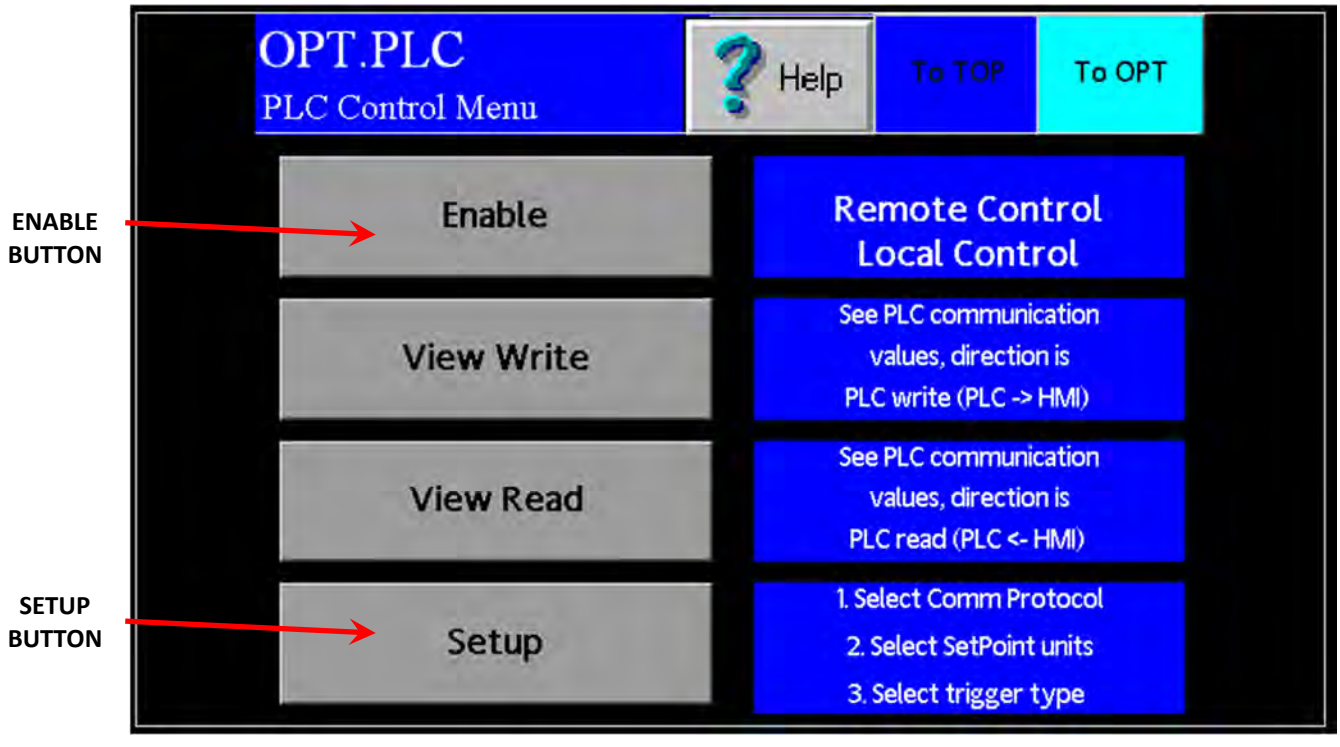
For example, if you are using your Weighted Count option to monitor product flowing at 60,000 lb/min in order to send a pulsed signal to an indicator light every time 1,000 lb passes through the meter and your pulse width is set to one second, the indicator light will never go off before it is signaled to come back on again.

If this is the case, a warning message like the one shown below, will appear. Raising your target value, lowering your pulse width, or both will remedy this.



OPT.PLC

OPT.PLC is the page that allows you to determine whether you are utilizing local control (control through use of the digital electronics' HMI) or whether you have remote control (control through use of PLC commands). Access this screen by first pressing the OPT Button from the TOP.MENU page. Then, press the Ethernet/IP Button. Control can be toggled between PLC control and HMI control by pressing either the ENABLE Button (for Remote PLC Control) or the DISABLE Button (for Local HMI Control). You can also set up remote control by pressing the Setup Button.



REFERENCE

Definition of Terms

Automatic Control: Adjustment of the Integrated Control Valve's position so that the Process Value is equal to the Set Point Value. Output of this operation is referred to as "Auto Out".

Anti-Binding Function: A programmed algorithm which will try to free the ICV if the controls system detects that valve is stuck. The valve will attempt to free itself five times by transferring to a "maximum impulse" condition. After the 5th attempt, if the valve remains stuck, it will go into rest mode for 3 minutes in which the valve will continue moving, but at a reduced power in order to prevent overheating. The valve will cycle every 3 minutes through this same process in an attempt to reach its target value. Changing the target value will reset the algorithm.

Control Mode: Mode of control. Either Auto or Manual.

Control Out: The resultant output of either Manual or Automatic Control. It is usually represented as a percentage of Electronic Full Scale.. It is the value sent to the final control device.

Control Type: Determines how the control output is sent to the final control device: Linear Proportional, Bifurcating Time Proportioning, Scalable Time Proportioning.

Dynamic Calibration: Setting that adjusts the Calibration of the Electronics so that 100% Output is equal to the Electronic Full Scale Flow Rate (Mass). This number ranges from a minimum of 4 to a maximum of 10.

Electronic Full Scale Flow Rate (Mass): Flow Rate that Electronics is calibrated at such that the Electronics output is 100%.

Extended Static Calibration: This is a non-standard setting of the Static Calibration that will electronically range the Transducer up to 2 times the standard Transducer Value. The Range setting for this is 0.75 Volts.

Inhibit Threshold: Voltage level that is adjusted to allow Electronics not to measure product that might be present only at certain periods. An example of this would be at start up when there might be product dribbling onto meter. This Voltage would represent a percent of the 100% output of the Electronics. That is, if the 100% output represented an Electronic Full Scale Flow Rate of 300 lb./min, then an Inhibit Threshold setting of 2% of the Electronic Full Scale Flow Rate would be 6 lb./min.

Manual Control: Manual setting of the Integrated Control Valve to a specified value with an acceptance of the resulting Process value. Output of this operation is referred to as "Manual Out".

Minimum Static Calibration: This is a non-standard setting of the Static Calibration that will electronically range the Transducer down to ¼ times the standard Transducer Value. The Voltage setting for this is 6.0 Volts. (This is used only under special circumstances).

Manual Value: The set value of the Manual Output, usually in percent.

NC: Normally Closed. This term refers to electronic signal outputs and means that the output is normally closed until a signal is received at which point the output will open.

NO: Normally Open. This term refers to electronic signal outputs and means that the output is normally open until a signal is received at which point the output will close.

PID Control: The independent sum of the proportional (Kp * E), integral (Ki * E_{sum}), and derivative (Kd * E_{delta}) terms to produce an auto out. The Error (E) is the difference between the Set point and the Process Variable. The values of the proportion gain (Kp), integral gain (Ki), and derivative gain (Kd) are dimensionless and can be entered as a number from 0.001 to 999.999. Entering a zero value disables that function. Increasing the value decreases the control stability while increasing the responsiveness of the system.

Process Value: The actual value of the process in engineering units or in percent of Electronic Full Scale

Process Value/Set Point in Engineering Units: Representation of the Process Value in actual units, such as lb/min.

Reduced Static Calibration: This is a non-standard setting of the Static Calibration that will electronically range the Transducer down to ½ times the standard Transducer Value. The Voltage setting for this is 3.0 Volts .

Retained Auto Output: The saved value when Auto Control is switched to Manual Control. It is the Control Out Value that satisfies the condition that Process Value is equal to Set Point Value at the moment that the switching occurs.

Static Calibration (Static Cal): Voltage setting that Ranges Transducer in a STATIC State. This setting is made while the Test weight is hung from the Calibration Stud on the Pan End and no product is on the Pan.

Set Point: The desired value of the process under automatic control, in engineering units or percent of Electronic Full Scale

Virtual Flow Stop: Setting that stops flow without closing the Integrated Control Valve (ICV) completely and damaging the product and minimizes damage to the leading edge of the ICV and the Tangential Plate.

Weighted Count: The weighted count is the engineering unit count divided by a scale factor to generate a much slower count (i.e. 1 pulse/100 lb or 1 pulse/1,000 lb.). Typically, the weighted count is used as an input to a PLC and is transmitted to the PLC via a solid state relay (SSR).

CERTIFICATE & DECLARATION OF CONFORMITY FOR CE MARKING

Company contact details:
Eastern Instruments
416 Landmark Drive, Wilmington, NC 28412, USA

Eastern Instruments declares under their sole responsibility that their:
Digital CentriFlow Electronics
listed as the following model numbers
CV-UV-25-H1-CV-ET-MC-WC-IT-AZ-FL-EH-AF-5K-PA
CV-UV-25-H1-CV-DN-MC-WC-IT-AZ-FL-EH-AF-5K-PA
CV-UV-25-H1-CV-PB-MC-WC-IT-AZ-FL-EH-AF-5K-PA
CV-UV-25-H1-CV-CAN-MC-WC-IT-AZ-FL-EH-AF-5K-PA
SV-UV-25-H1-CV-ET-MC-WC-IT-AZ-FL-EH-AF-5K-PA
SV-UV-25-H1-CV-DN-MC-WC-IT-AZ-FL-EH-AF-5K-PA
SV-UV-25-H1-CV-PB-MC-WC-IT-AZ-FL-EH-AF-5K-PA
SV-UV-25-H1-CV-CAN-MC-WC-IT-AZ-FL-EH-AF-5K-PA

comply with the Essential Requirements of the following EU Directives:
Low Voltage Directive 2006/95/EC
Electromagnetic Compatibility Directive 2004/108/EC
RoHS 2 Directive 2011/65/EU

and further conform with the following EU Harmonized Standards:
EN 61010-1:2010
EN 61326-1:2013

Dated: 13 November 2015
Position of signatory: Technical Director
Name of Signatory: Robert Otto Brandt, Jr.
Signed below:
on behalf of Eastern Instruments

Panel Shop Certification Record

Listing# E212589
Original Certification: June 30, 2015
Revised Certification: N/A

MET Laboratories, Inc.
First in Certification

This Certification is issued to:
Eastern Instruments
416 Landmark Drive
Wilmington, NC 28412

For the product(s):
Open/Enclosed Industrial Control Panels

Have been certified to the following standard(s):
UL 508A: Standard for Safety, Industrial Control Panels, Revision Date: January 13, 2014
CSA C22.2 #14: Industrial Control Equipment, Revision Date: March 2013

Rick Cooper,
Director of Laboratory Operations
Safety Laboratory

All changes proposed in the previously identified product that affects the above information must be submitted to MET for evaluation prior to implementation to assure continued MET Certification status.

The covered product(s) shall be subject to follow-up inspections to ensure that the Certified product(s) are identical to the product sample evaluated by MET Laboratories, Inc. and that all manufacturer's responsibilities are being fulfilled as specified in the Manufacturer's Responsibility section of the Certification report. The applicant named above has been authorized by MET Laboratories, Inc. to represent the product(s) listed in this record as "MET Certified" and to mark this/these product(s) according to the terms and conditions of the MET Applicant Contract, MET Listing Reports, and the applicable marking agreements. Only the product(s) bearing the MET Mark and under a follow-up service are considered to be included in the MET Certification program. This certification has been granted under a System 3 program as defined in ISO Guide 67.

MET Laboratories, Inc. is accredited by OSHA and the Standards Council of Canada.
The Nation's First Nationally Recognized Testing Laboratory

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