



EASTERN INSTRUMENTS

CENTRIFEEDER™

DIGITAL ELECTRONICS
INSTALLATION & OPERATION
MANUAL



REV 01/11

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INSTALLATION

INSTALLATION REQUIREMENTS

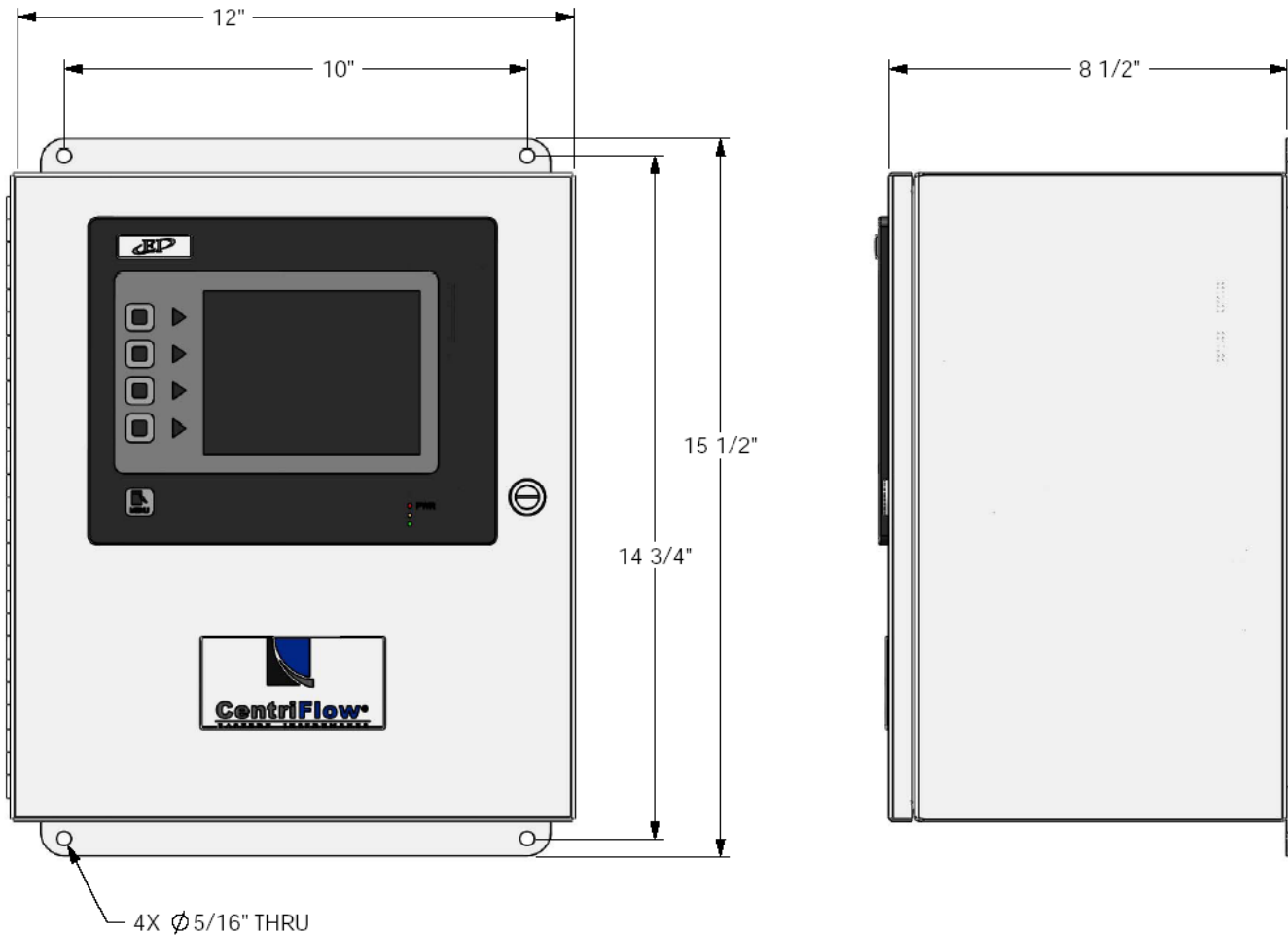
- The meter is to be used in a location where the product can be dropped from a fixed height such as a conveyor, or any type of feed system, which will give a reasonably constant initial vertical velocity. The design of the meter requires the product to contact the Tangential Plate and have some vertical drop.
- The meter should be installed so that it is level in two planes. Use the Bubble Level on top of the Seal Top to help.
- The meter should be mounted using the mount holes only. The mounting method should minimize vibration and any movement. Mounting should not be done using the flange(s).
- The discharge chute that the product stream empties into after traveling through the meter must be free flowing, meaning that it does not allow product to build up and consequently contact the Pan of the meter.
- The Electronics Enclosure and valve should be wired using only the factory cable. There is a standard 10' cable package that includes the Remote Electronics Cable, the valve Power Cable, and the Valve Position Sensor Cable supplied with the CentriFeeder™ Meter. 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. The valve power and position sensor signal cable can be together in their own grounded metallic conduit.

INSTALLATION TROUBLE AREAS

- The CentriFeeder™ Meter'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™ Meter 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 meter .
- The Seal Top should be on the meter at all times that you are not working inside the meter. This is to keep all foreign materials out of the meter that could obstruct its movement or impair its functionality.



Electronics Enclosure
Dimensional Drawing



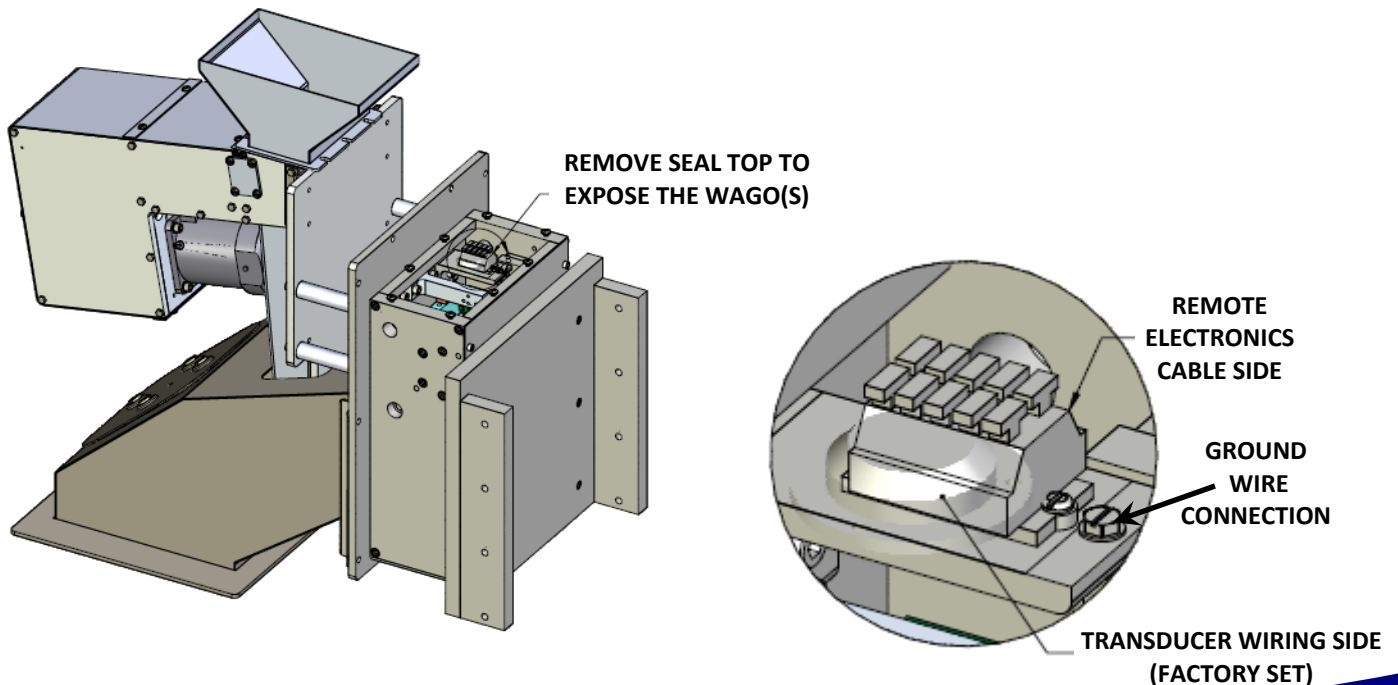
Basic Wiring

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

- Remote Electronics Cable and Grounding Wire
- CentriFeeder™ Meter Power
- Customer Connections

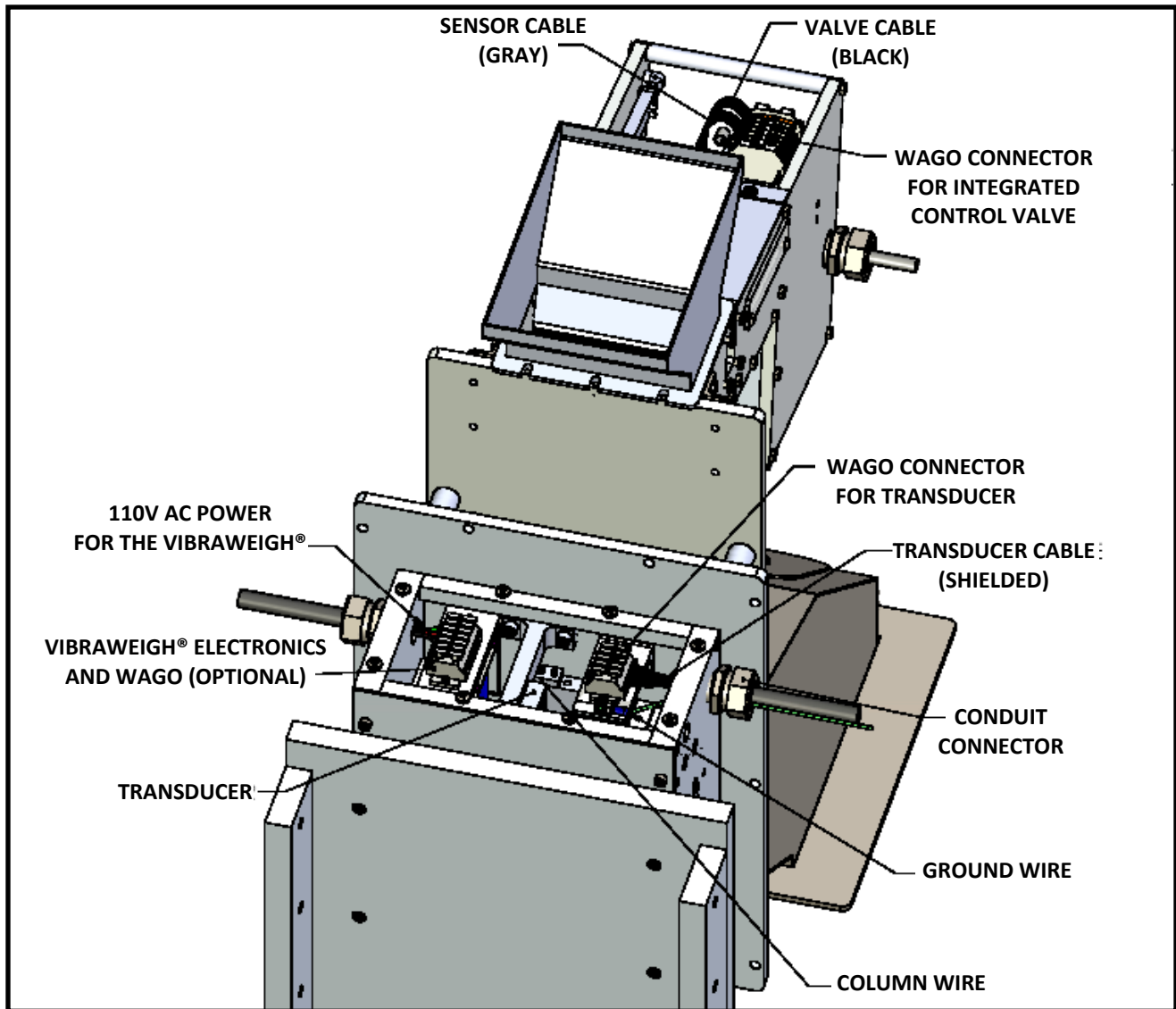
REMOTE ELECTRONICS CABLE

The Remote Electronics Cable is a four-conductor cable with a shield that attaches the CentriFeeder™ the Electronics Enclosure. It sends the measurement signal from the Transducer inside the CentriFeeder™ Meter Module to the **Customer Connections** inside the Electronics Enclosure. There is also a ground wire supplied, and it should be routed with the Remote Electronics Cable. The standard length is 10' long, but it should be cut to the exact length needed. If the distance from the CentriFeeder™ Meter Module to the Electronics Enclosure is more than 10', then the optional 25', 50', 100' or 250' cable should also be cut to fit. Excess cable should never be coiled up and placed into the CentriFeeder™ Meter Module. Each end of the cable has been precut and labeled for the appropriate end connection. The cable MUST be run through grounded metallic conduit connected at both the Module and the Enclosure. Upon removing the Seal Top, the connector will be seen mounted toward the conduit connection point. All of the four conductors and the shield must be connected here. All connectors are designed so that when the push buttons are depressed, the wire crimp will open on the side. Under the connector is a label that will aid in connecting the wires to the correct position. The colors should be matched to the label.

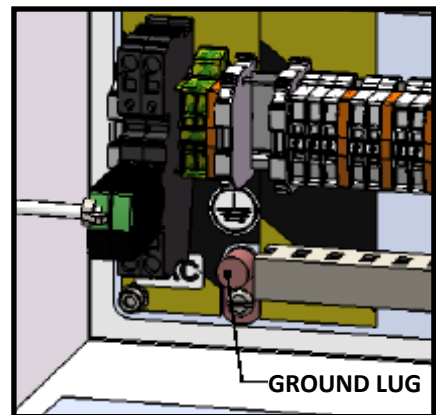




Basic Wiring Components Drawing



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).





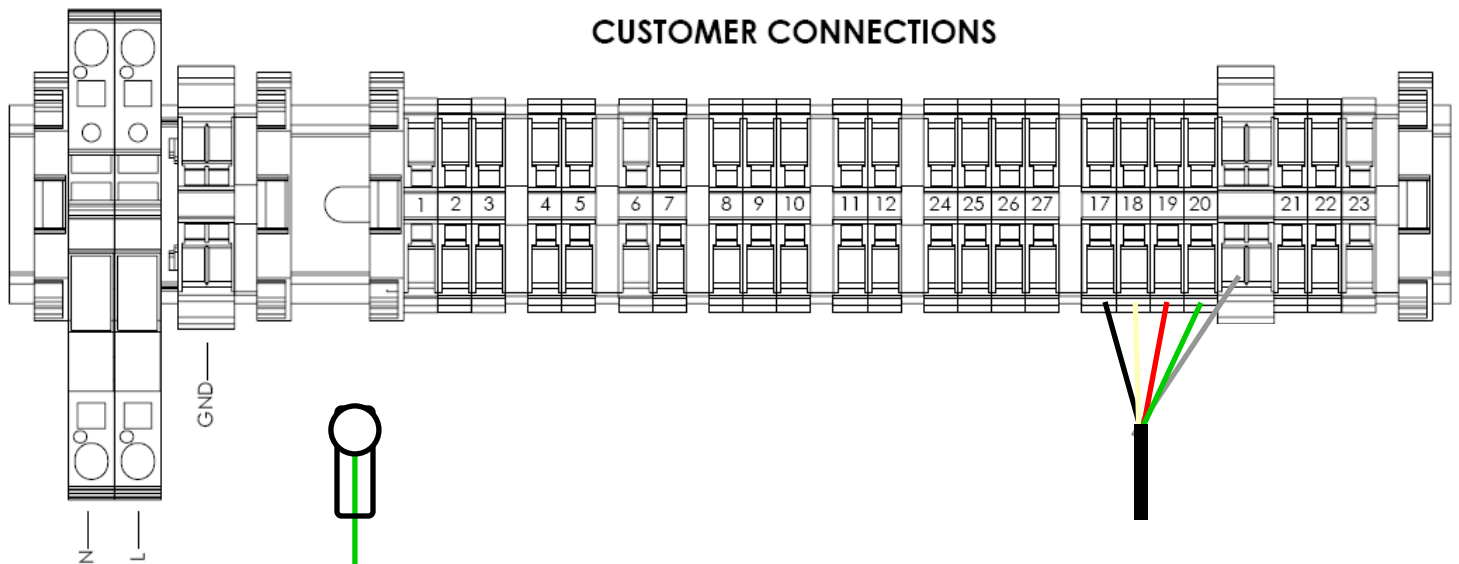
Wiring Customer Connections

REMOTE ELECTRONICS CABLE

The opposite end of the cables (Remote Electronics Cable and Grounding Cable) should be routed through the conduit and into the Electrical Enclosure. Again, as with the connection at the Module, the four conductors and the shield are connected according to color, and the ground wire will be connected to the grounding lug. The Remote Electronics Cable wires will be connected to the CUSTOMER CONNECTIONS according to the Label placed inside the Enclosure as follows:

Shield	-	Shield (See Below)
Black Wire	-	#17
White Wire	-	#18
Red Wire	-	#19
Green Wire	-	#20

All Connections are made to the Bottom of the Terminal Blocks



**All Connections are made to the Bottom of the Terminal Blocks*



Power

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.

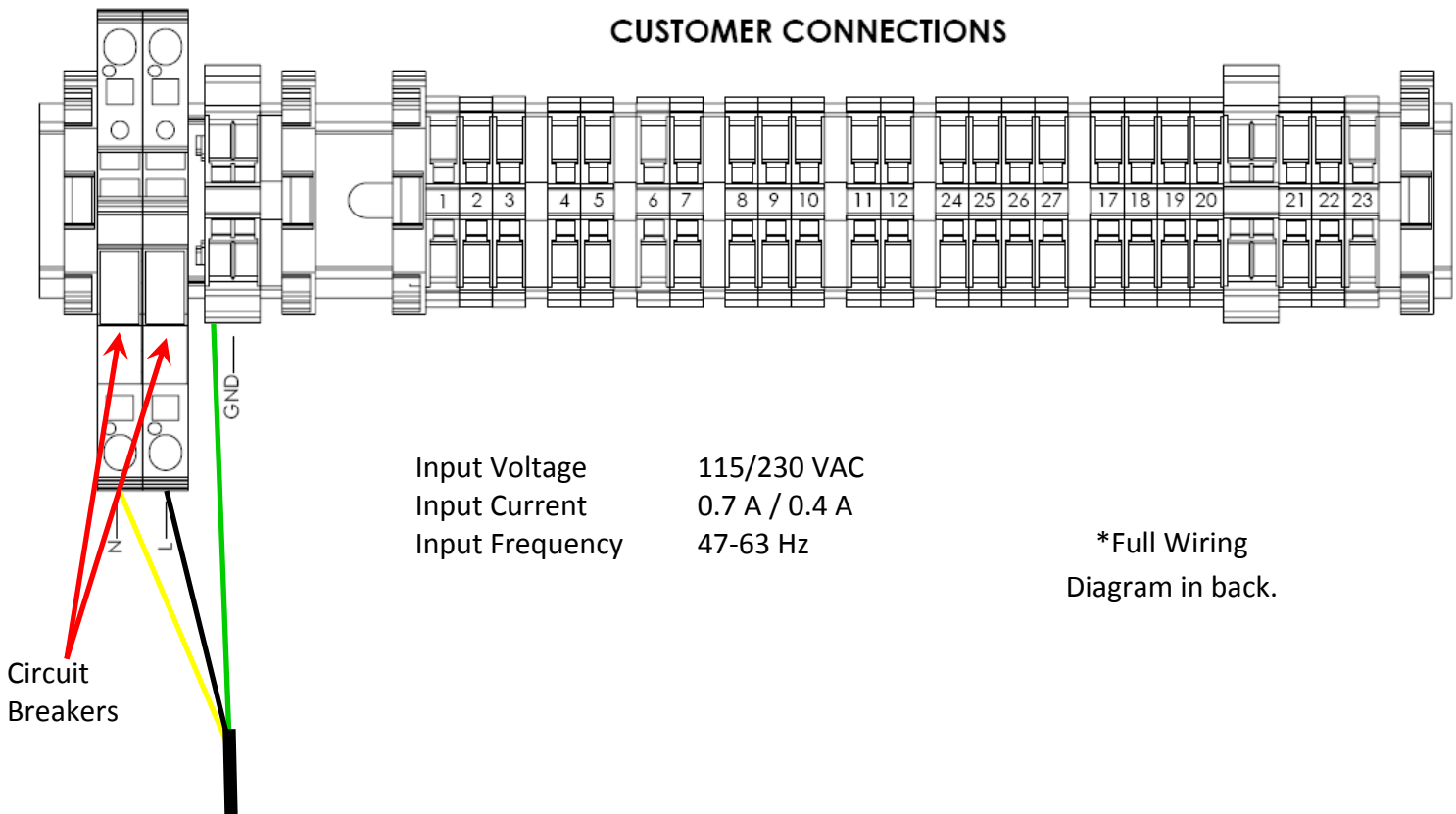
WARNING: TURN POWER OFF AT SUPPLY CIRCUIT BREAKER BEFORE WIRING THE POWER TO YOUR DIGITAL ELECTRONICS PACKAGE!

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 (Yellow)
- VAC Line - L (Black)

CUSTOMER CONNECTIONS



Input Voltage 115/230 VAC
 Input Current 0.7 A / 0.4 A
 Input Frequency 47-63 Hz

*Full Wiring Diagram in back.

**All Connections are made to the Bottom of the Terminal Blocks*



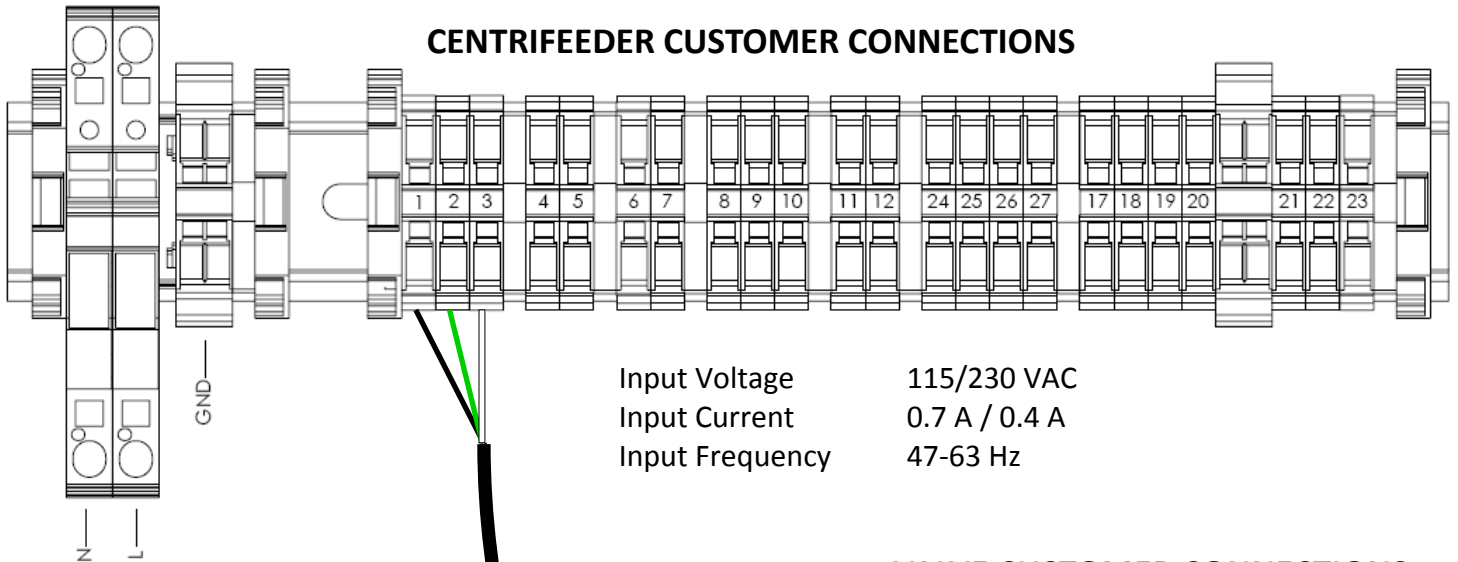
Integrated Control Valve

Black Cable

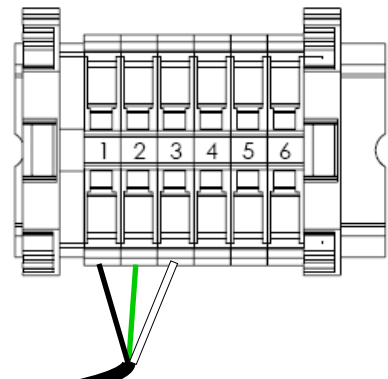
There are two steps to wiring the Integrated Control Valve properly. First, you must wire the Integrated Control Valve itself using the provided black cable (shown below), and then you must wire the Position Sensor using the provided gray cable (next page). For both steps, the terminals are wired to the indicated terminal within the Integrated Control Valve itself.

- VALVE COM (#1) - #1 (VALVE CUSTOMER CONNECTIONS)
- VALVE OPEN (#2) - #2 (VALVE CUSTOMER CONNECTIONS)
- VALVE CLOSE (#3) - #3 (VALVE CUSTOMER CONNECTIONS)

CENTRIFEEDER CUSTOMER CONNECTIONS



VALVE CUSTOMER CONNECTIONS



*Full Wiring Diagram in back.

**All Connections are made to the Bottom of the Terminal Blocks*

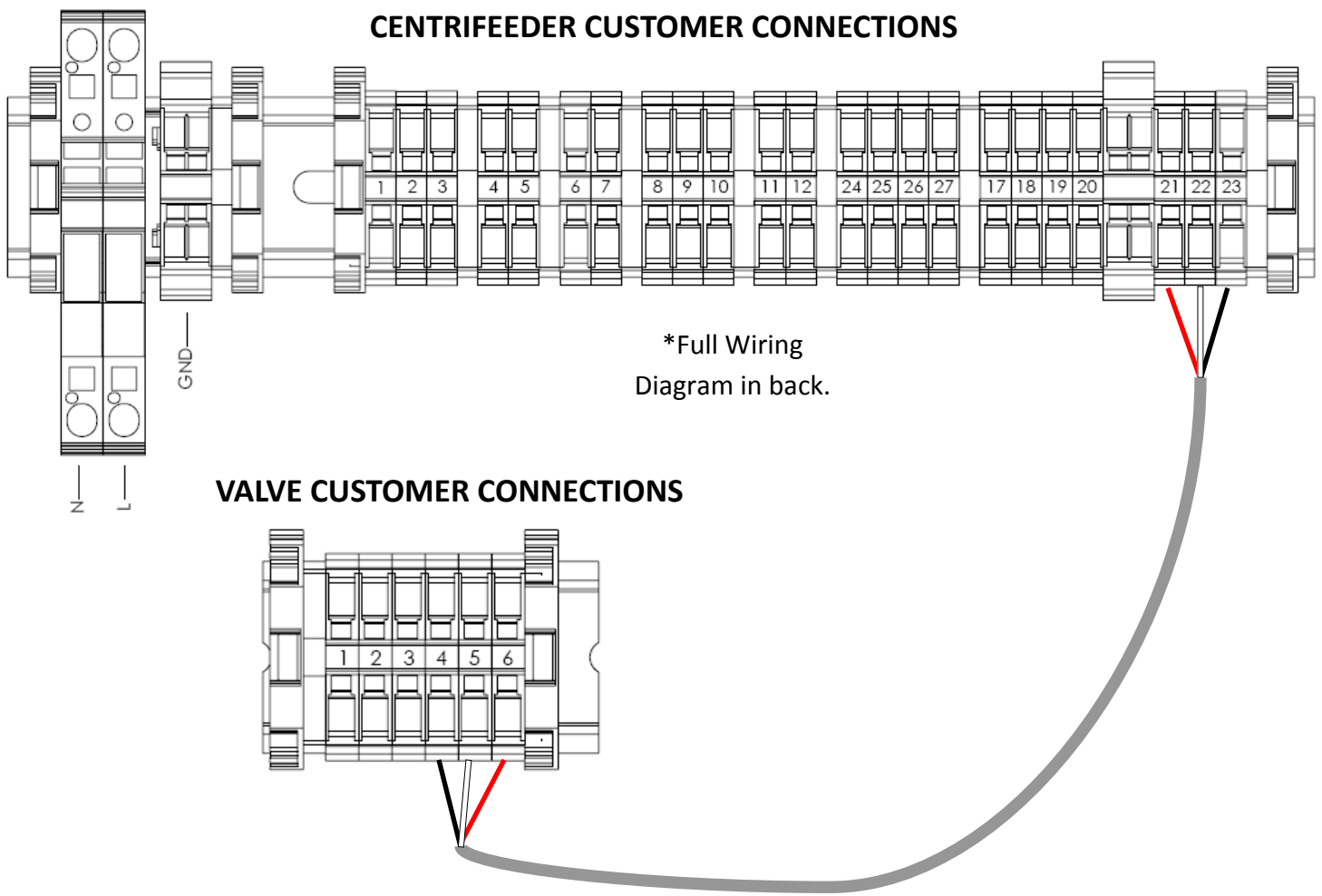


Position Sensor

Gray Cable

The Position Sensor allows the Digital Electronics to “sense” the position of the blade within the valve in order to determine how open or how closed it is. To wire the Position Sensor, use the gray cable provided to wire the terminals on your **Customer Connections** to the corresponding terminal in your Integrated Control Valve as shown below:

- POS SEN RED (#21) - #6 (VALVE CUSTOMER CONNECTIONS)
- POS SEN WHT (#22) - #5 (VALVE CUSTOMER CONNECTIONS)
- POS SEN BLK (#23) - #4 (VALVE CUSTOMER CONNECTIONS)



**All Connections are made to the Bottom of the Terminal Blocks*



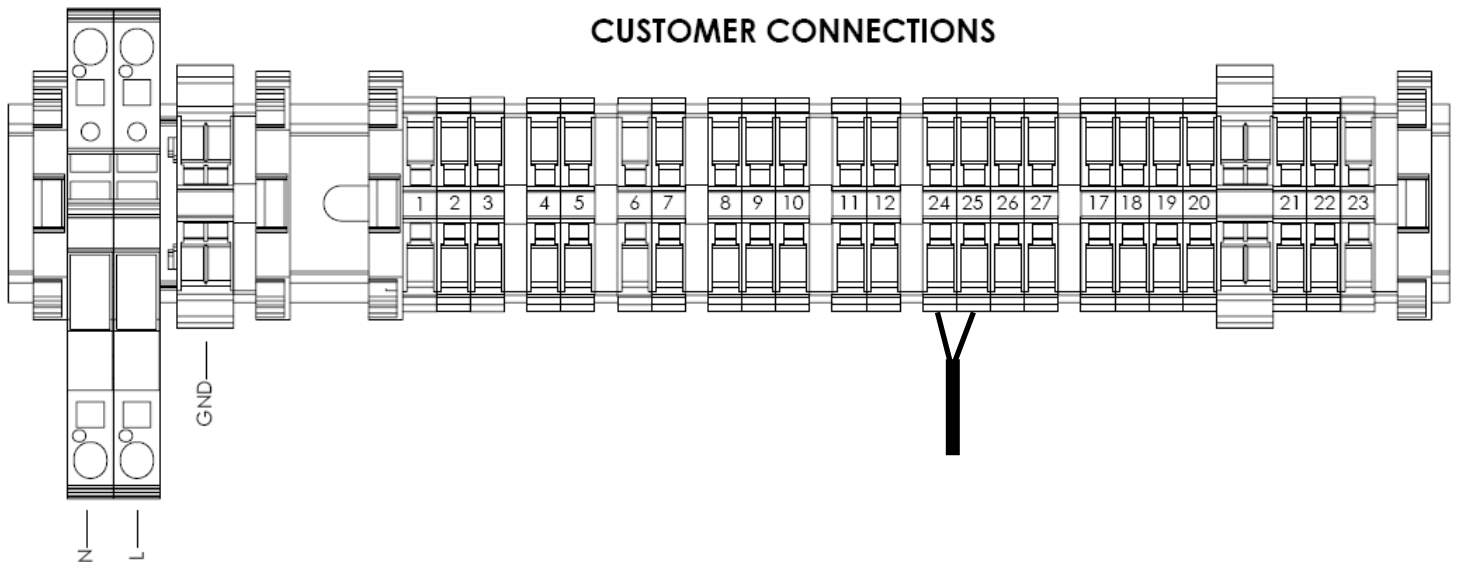
Proximity Sensor Input

The Proximity Sensor Input is used to detect motion or discrete events for use in setting a delayed start or configuring multiple CentriFeeder™ Meters to synchronize product flows.

NOTE: Proximity Sensor not included

Counter (+) (#24)

Counter (-) (#25)



*Full Wiring
Diagram in back.

**All Connections are made to the Bottom of the Terminal Blocks*



Wiring Customer Connections

4-20 mA

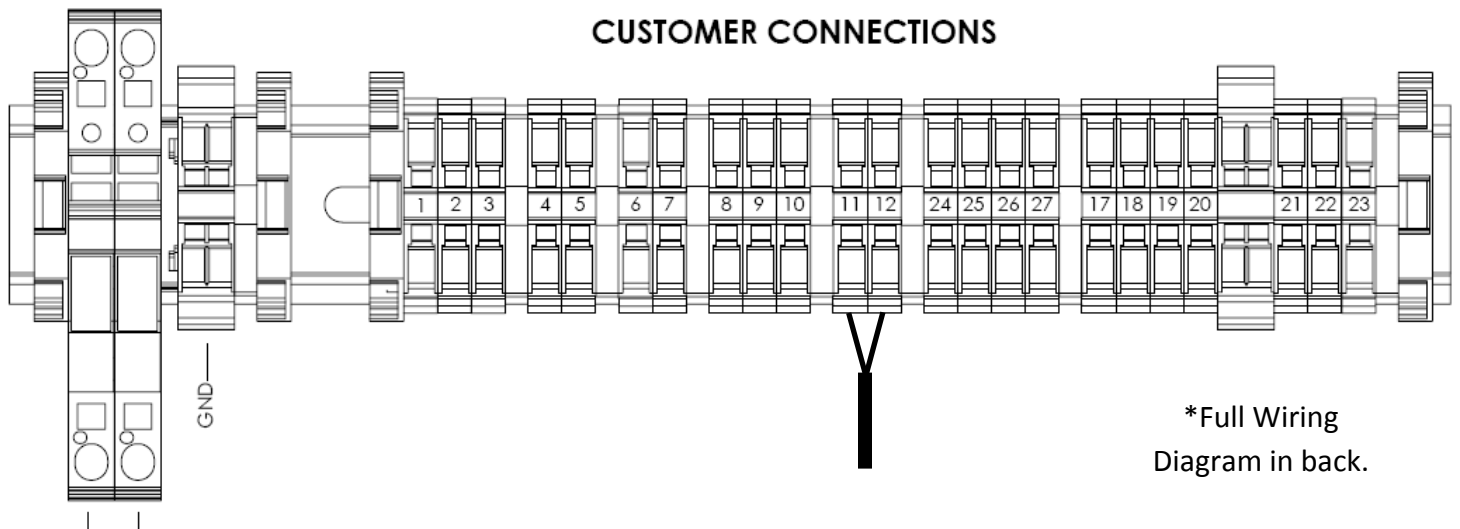
Analog Output (Sourced)

Loop Power **NOT** Required

Maximum Load Resistance = 900 ohms

The CentriFeeder™ 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 $(12-4)/(20-4) \times 300 = 150$ 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 CUSTOMER CONNECTIONS diagram below. 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 page 39 for more details on filtering. Wiring for the 4-20 mA signal is as follows:

- (+) 4-20 mA - #11
- (-) 4-20 mA - #12



*Full Wiring Diagram in back.

**All Connections are made to the Bottom of the Terminal Blocks*

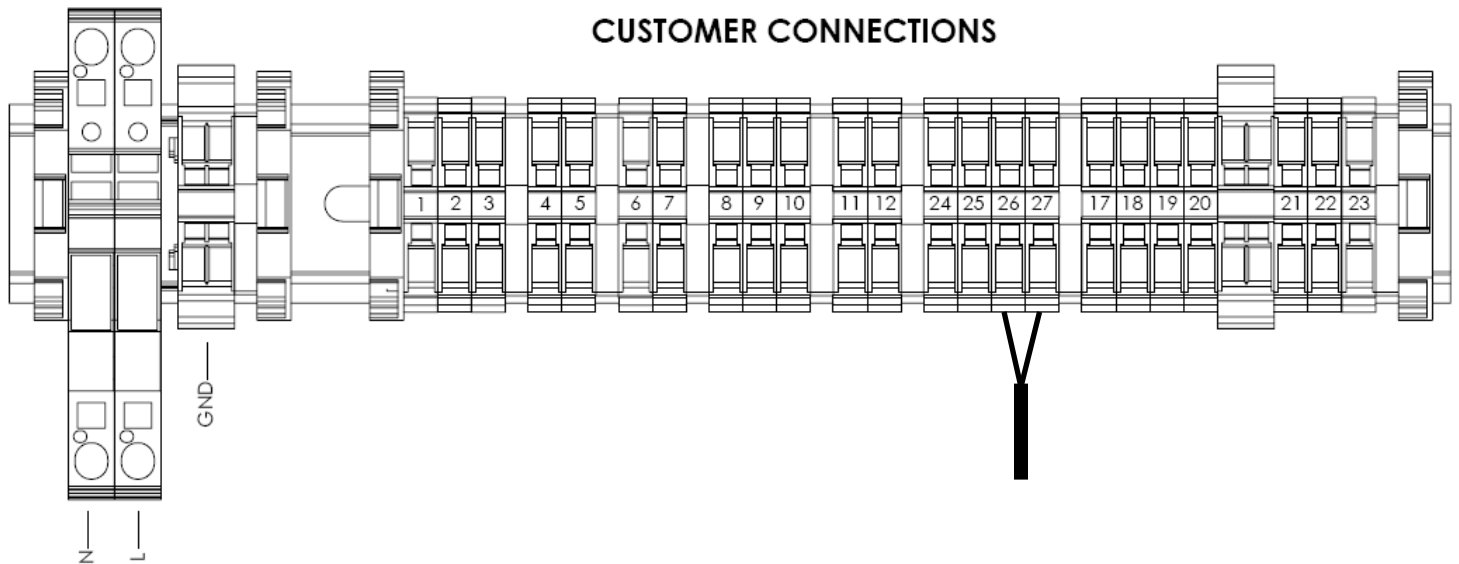


Remote Stop

Remote Stop is a function of the **Master HMI Controller** that allows a full stop of all functions of the CentriFeeder™ devices connected via the Remote Stop outputs, immediately upon use of the mechanical, push-button stop switch located on your **Master HMI Controller**, Electronics Enclosure. The valves on all connected CentriFeeder™ devices will close, preventing product from flowing through them.

All Connections from the Remote Stop Terminals will be connected to the corresponding terminals in your Master HMI Controller, Electronics Enclosure. Please note that 2 sets of Remote Stop Connection Terminals are located in your Master HMI Controller Electronics Enclosure, but that these sets of terminals are interchangeable as shown below.

- #26 Remote Stop (+) - #1 or #3 Remote Stop (+) (Master HMI Controller)
- #27 Remote Stop (-) - #2 or #4 Remote Stop (-) (Master HMI Controller)



*Full Wiring
Diagram in
back.

All Connections are made to the Bottom of the Terminal Blocks

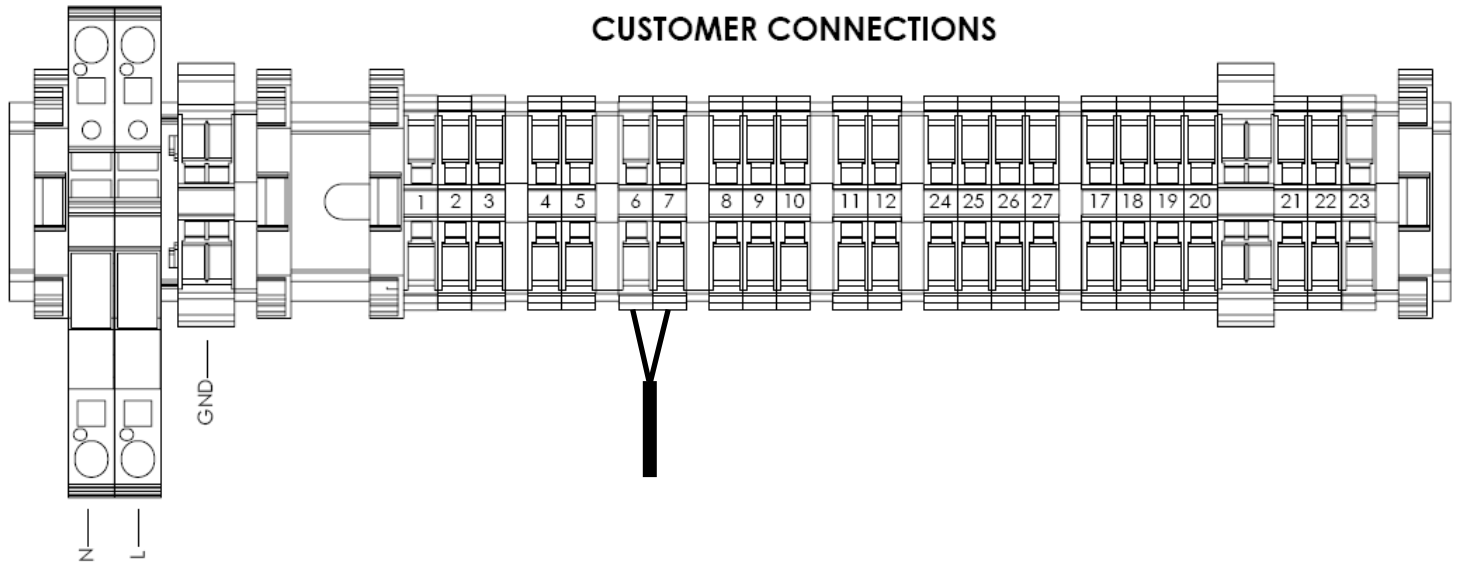


Switch Input

A remote reset switch can be wired in as illustrated below. This remote switch can be used to reset the totals and/or initiate an event in some configurations.

Switch In - #6

Switch In - #7



*Full Wiring
Diagram in
back.

All Connections are made to the Bottom of the Terminal Blocks

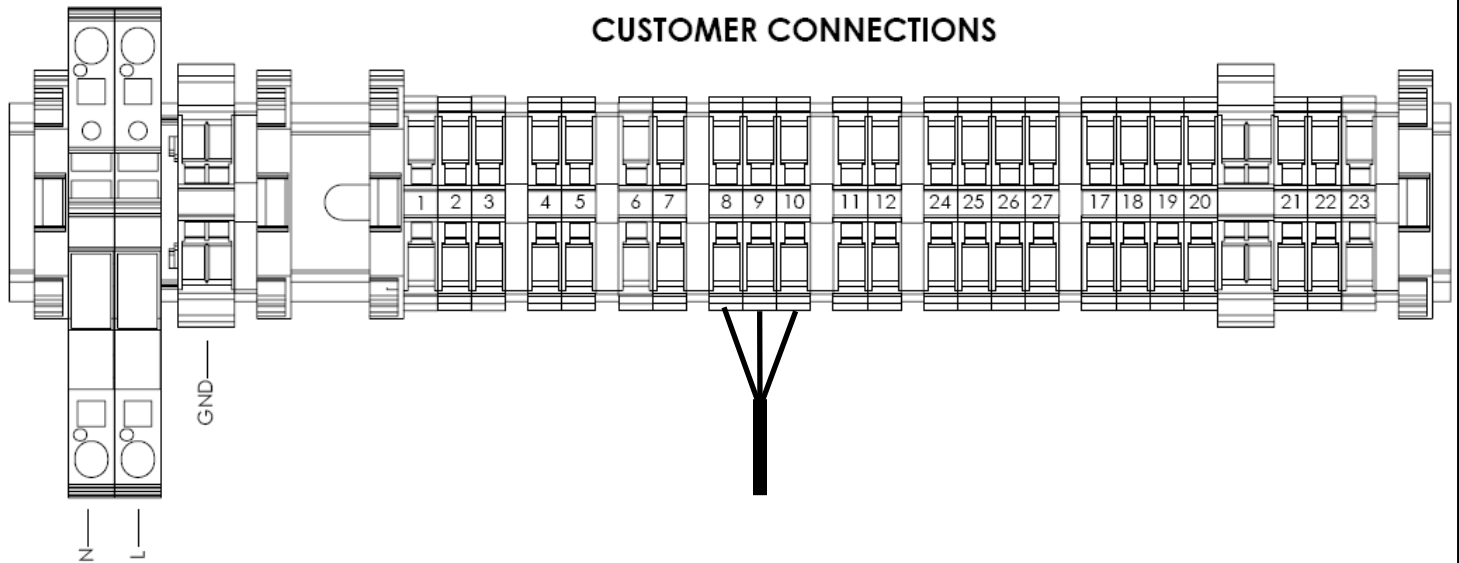


Alarm

Relay Output

The relays can be used to trigger alarms which warn the operator that a batch is complete or that the rate has exceeded a set speed. The outputs are programmable to be assigned for rate or count. When assigned to the count, the relays can have a user selectable on time (duration) or can be latched until reset.

N.C. OUT	-	#8
COM OUT	-	#9
N.O. OUT	-	#10



*Full Wiring Diagram in back.

Contact Type
 Maximum Switching Voltage
 Limiting continuous current

Single contact, 1 PDT
 250 V AC/DC
 6 A (resistive)

All Connections are made to the Bottom of the Terminal Blocks

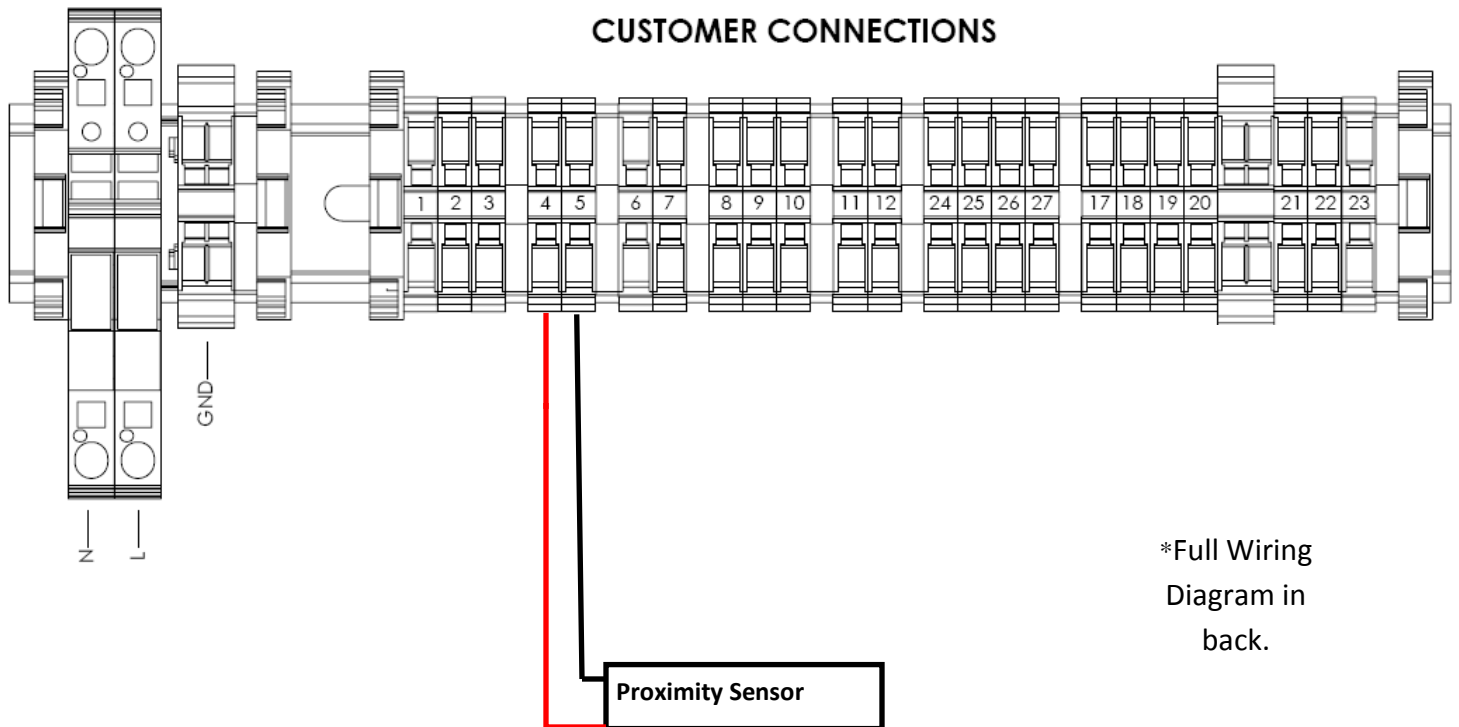


24V Local Power Output

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.

An example of an output device being utilized in this fashion, can be seen below:



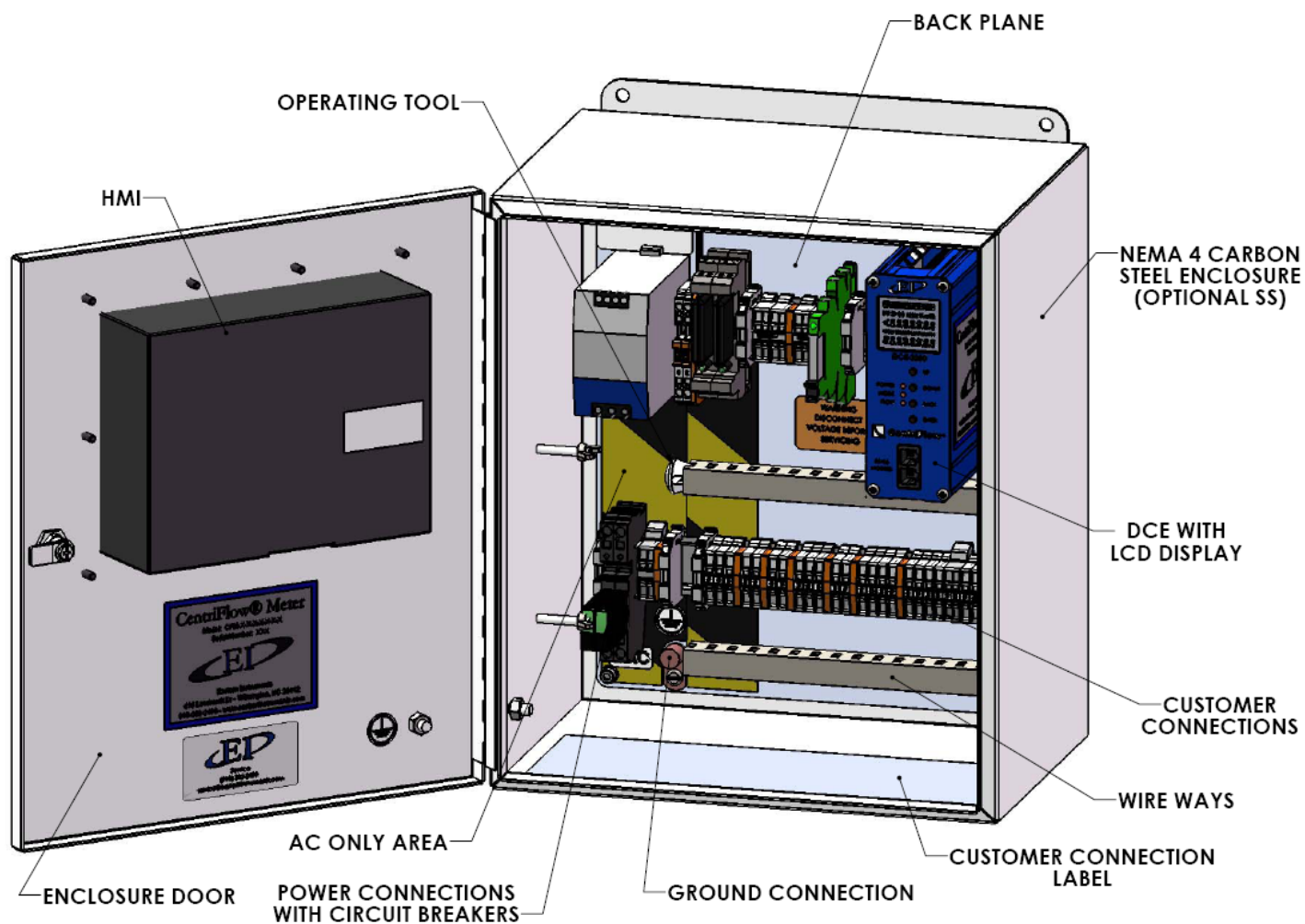
*Full Wiring
Diagram in
back.

All Connections are made to the Bottom of the Terminal Blocks



OPERATION

Identifying Your Components

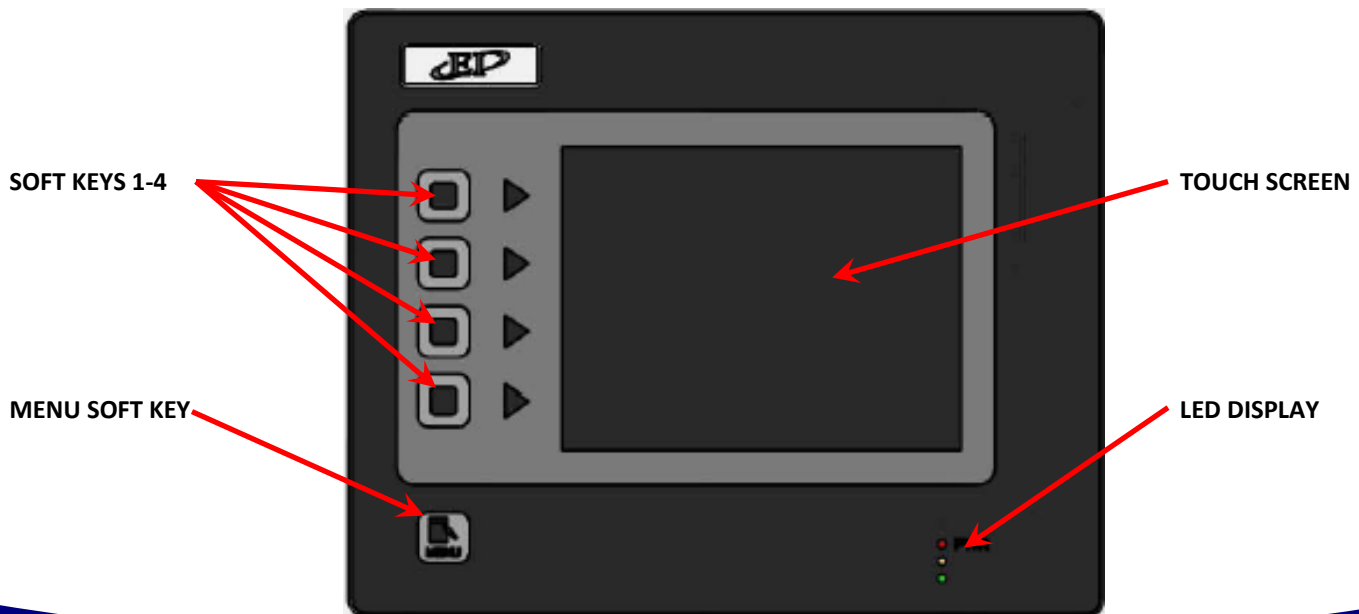


A Closer Look at Your HMI

The main components of your HMI Touch Screen will be the Touch Screen itself, the LED Display, the Menu Soft-Key, and Soft-Keys 1 thru 4. By pressing the Menu Soft-Key, you will be returned to the Main Menu, or TOP page. The LED Display will give you information on your process, the status of your Compact Flash Card and on the status of any alarms that have been activated. Below is a detailed description of the LED Display.

LED DISPLAY CHART

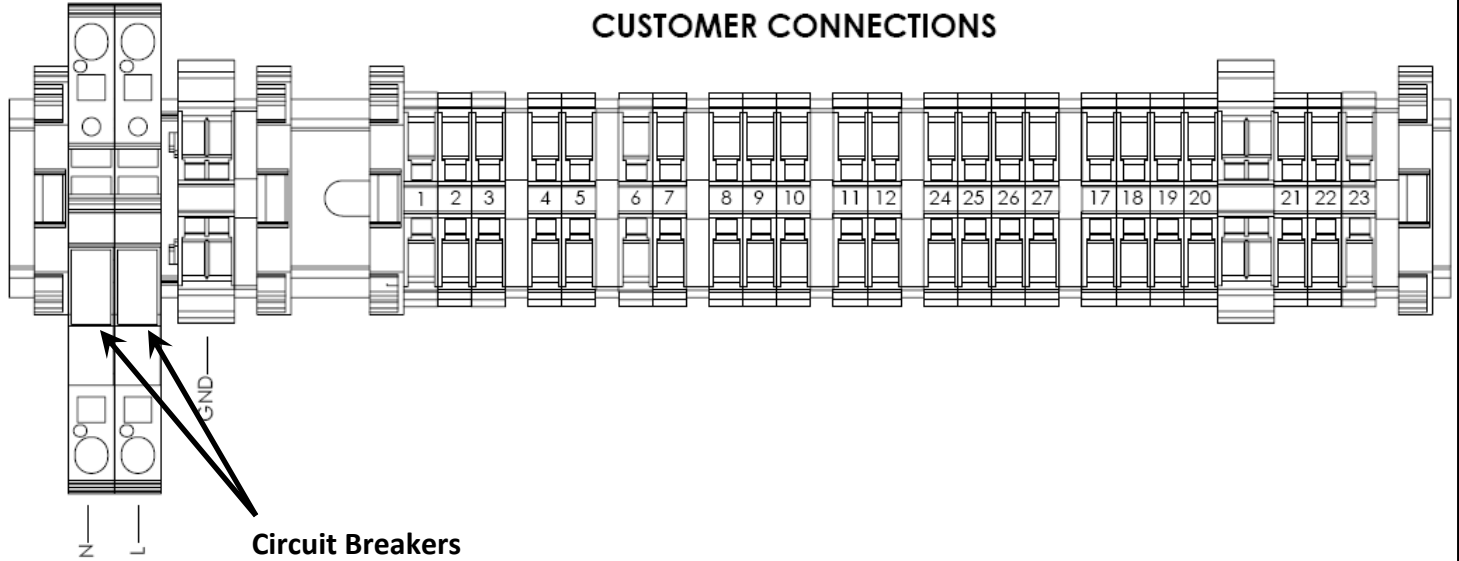
LED	ACTIVITY	INDICATION
RED (TOP)		
	FLASHING	Unit is in the boot loader, no valid configuration is loaded
	STEADY	Unit is powered and running an application
YELLOW (MIDDLE)		
	OFF	No Compact Flash is present
	STEADY	Valid Compact Flash card is present
	FLASHING RAPIDLY	Compact Flash card is being checked
	FLICKERING	Unit is writing to the Compact Flash, either because it is storing data, or because the PC connected via the USB port has locked the drive
	FLASHING SLOWLY	Incorrectly formatted Compact Flash card is present
GREEN (BOTTOM)		
	FLASHING	A tag is in an alarm state
	STEADY	Valid configuration is loaded and there is no alarm present



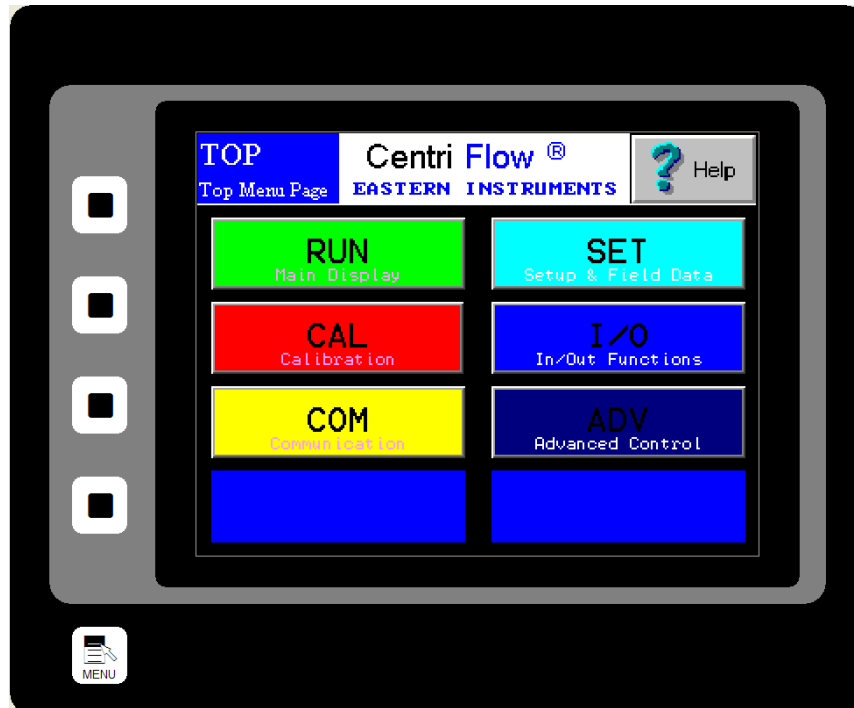


Powering On

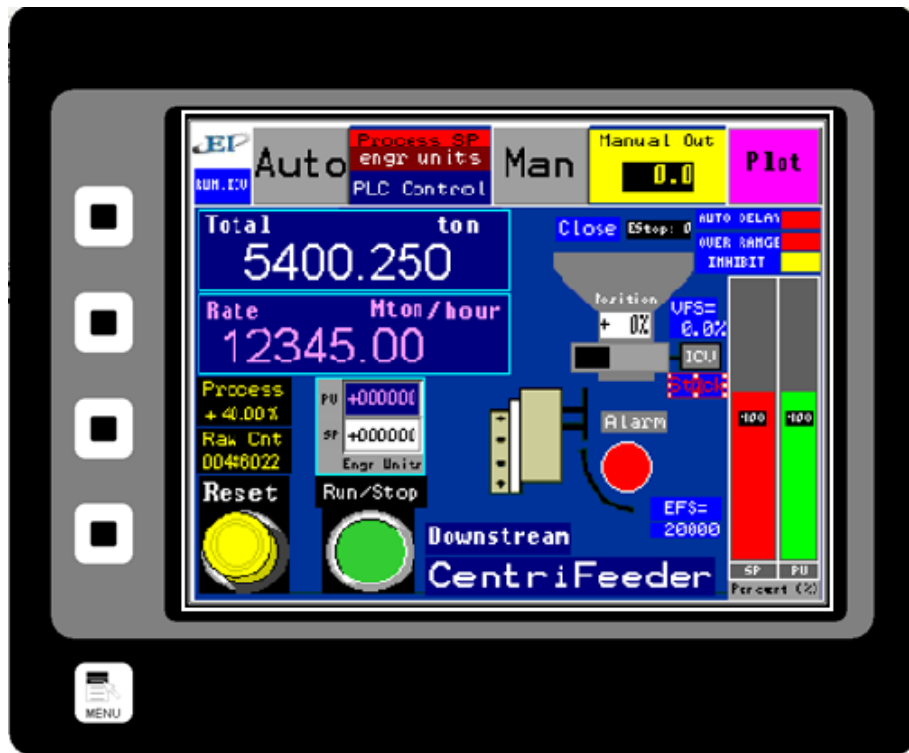
To power on your digital electronics, open the Digital Electronics Enclosure and close the knife disconnects located on the VAC Power wiring connections as shown below.



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 on page 34.

PROCEDURES

Static Calibration (Static Cal.)

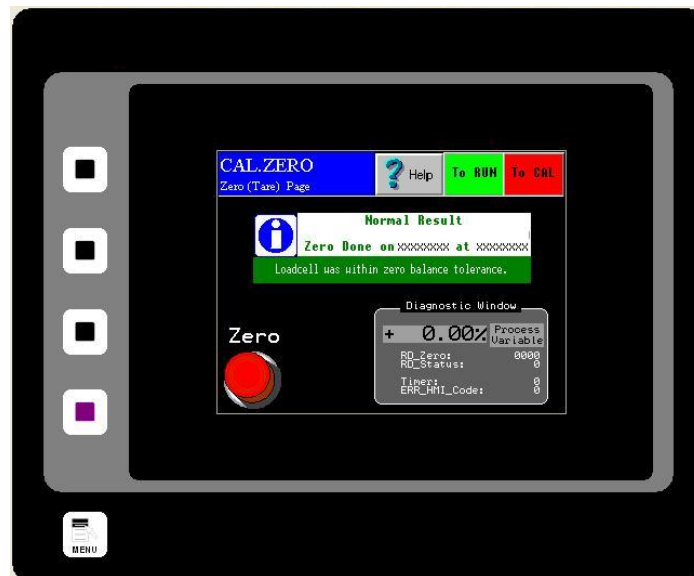
Static Calibration sets the Range of the Transducer in the CentriFeeder™ Meter. This allows the meter to be versatile in a way such that it can be ranged up, known as Extended Static Calibration, or it can be ranged down, known as Reduced Static Calibration. The Static Calibration is a Factory Setting 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 % Volts. 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 page.

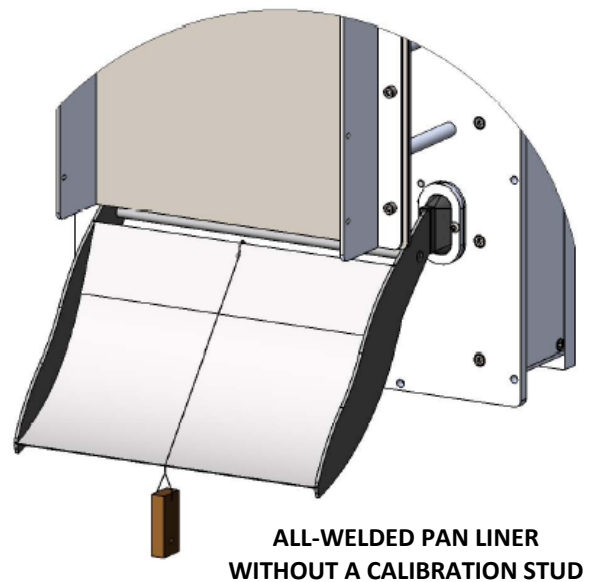
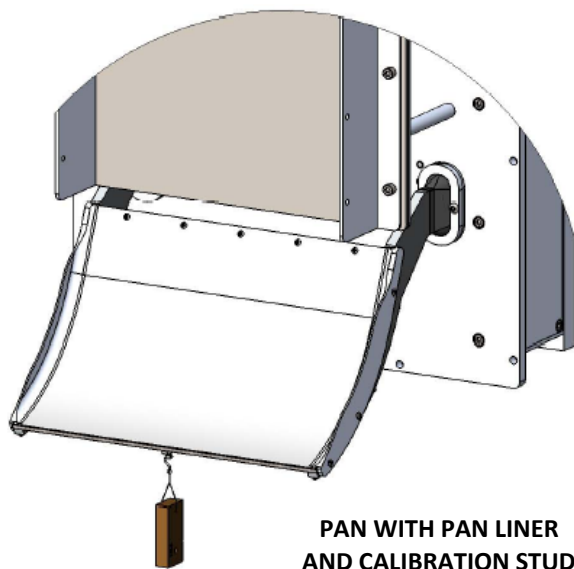
Step 6: Hang the Test Weight provided with the Electronics Enclosure from the Calibration Stud located under the bottom edge of the Pan as seen below. For Pans that have more than one Calibration Stud, there should be a Test Weight for each. Some optional pans may not have a Stud. In these cases the 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.





Site Calibration

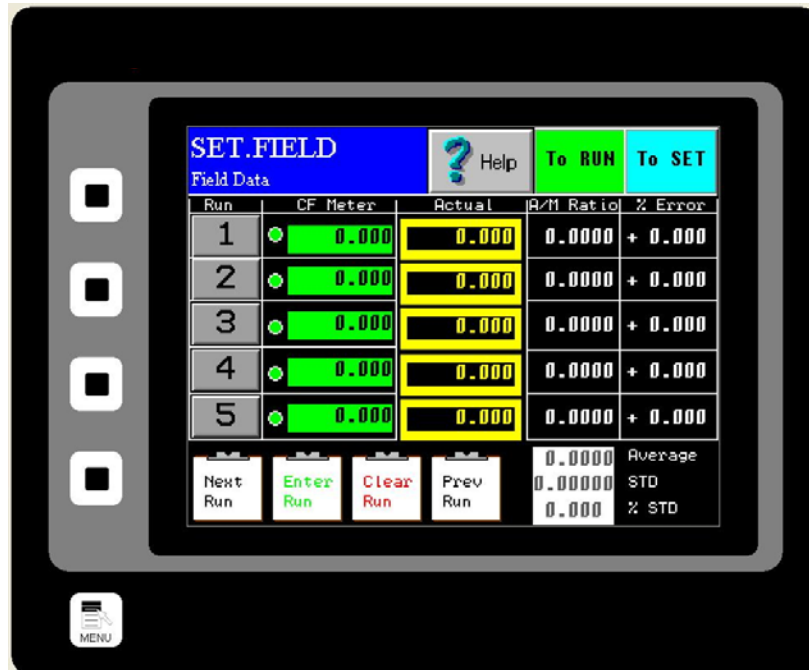
When the CentriFeeder™ Meter is sent from the Factory it is set with Default values for the Static Calibration and the Calibration Voltage, which were chosen for the particular material being measured with the meter. As described in the previous Section, the Static Calibration is an adjustment that ranges 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: Press the MENU softkey, then press SET, and finally, FIELD DATA.**



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.

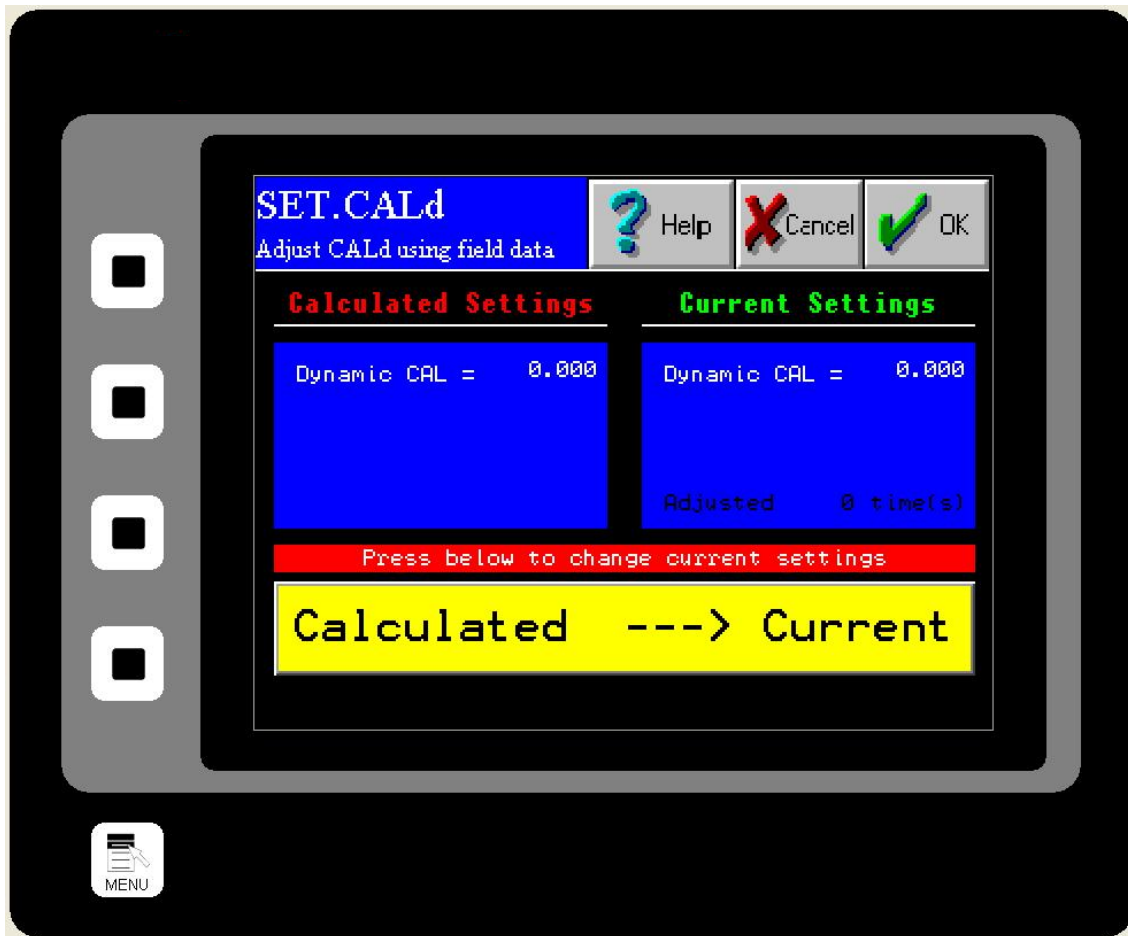
Step 5: Weigh the collected material on a static scale and record the weight in the YELLOW block (Actual) next to the value automatically entered in STEP 4. Press the YELLOW box to bring up a numeric keypad. After entering the value, press the NEXT RUN Button to prepare for the next run. It is important 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.



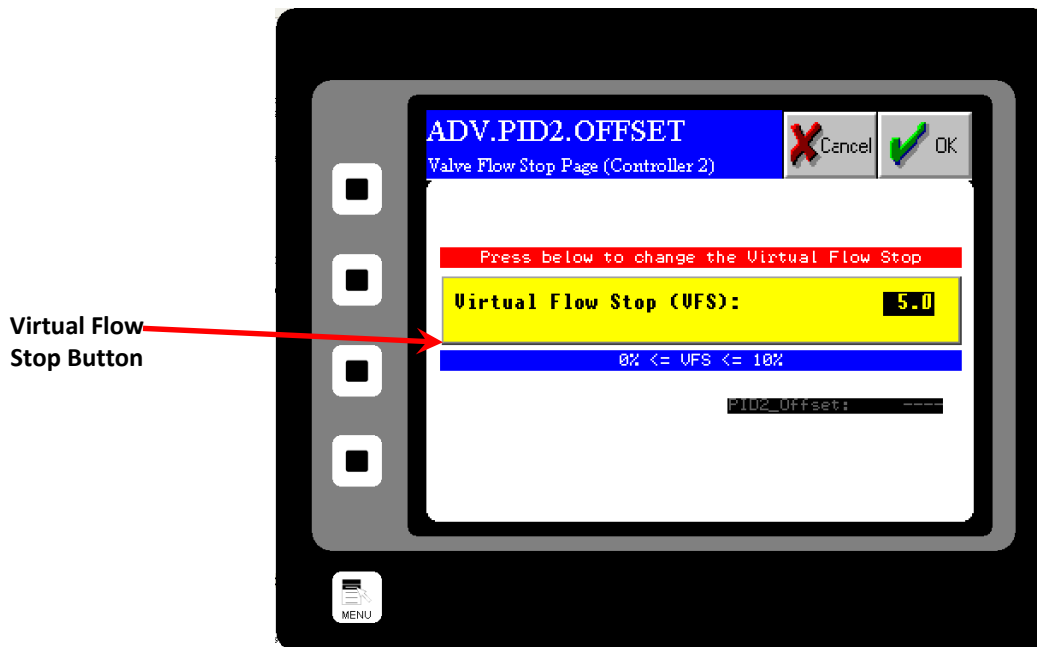
- Step 11:** To accept the new Dynamic Calibration press the YELLOW CALCULATED to CURRENT Button and press the OK Button. A pop up screen will appear, asking if you are sure you would like to accept this value. Press YES.



Setting the 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.

To Set the Virtual Flow Stop™ press the ADV Button from the TOP (Main Menu) page. Press the PID #2 Tuning Button and from this page, press the Virtual Flow Stop Button. You should now be on the ADV.PID2.OFFSET page as shown below. Press twice 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™.

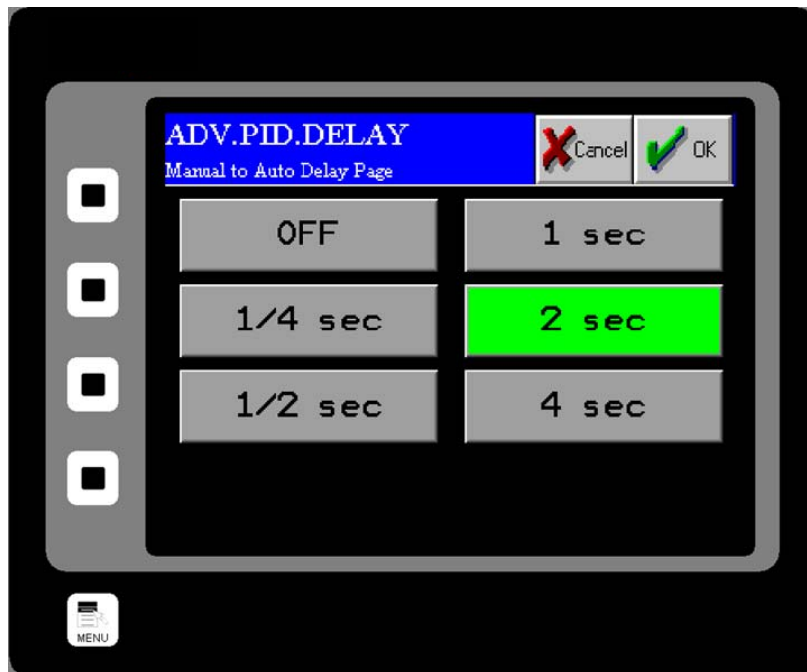


The Virtual Flow Stop™ is typically set by increasing the Manual Valve until flow just begins to trickle from the valve and then, set the Virtual Flow Stop™ to 2/3 of that value. This value is, of course, dependant on the particle size and characteristics of your product.

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 Auto Delay

Typically, the Integrated Control Valve, while in Automatic Mode, will take several seconds to “tune” in order to reach your set throughput value upon startup. In order to avoid a large overshoot the optimal method for startup is to either start in Manual Mode and enter a remembered Manual Out value, gathered through prior runs and then switch to Automatic Mode once the tuning has occurred for several seconds, or to set the Auto Delay which accomplishes this automatically. Auto Delay is a method of preventing control overshoot. The retained Auto Output value is held constant (Run in Manual Mode) for the amount of time set in the Auto Delay time upon start before entering Automatic Mode and can be disabled by setting the time to Off.



Setting the Auto Delay

From the TOP page (Main Menu) press the ADV Button and then press the PID #1 Tuning Button. Now press the Auto Delay Button, revealing the screen above. Pressing one of the values will enable the Auto Output to be held constant for the indicated time period. The Auto Delay indicator can be seen by looking at the Run page (pressing the Run Button from the TOP page). Red indicates that the Auto Delay is enabled and active, and gray indicates that it is not currently active. To learn more about the Run page, please see the HMI Screen Guide section of this manual.

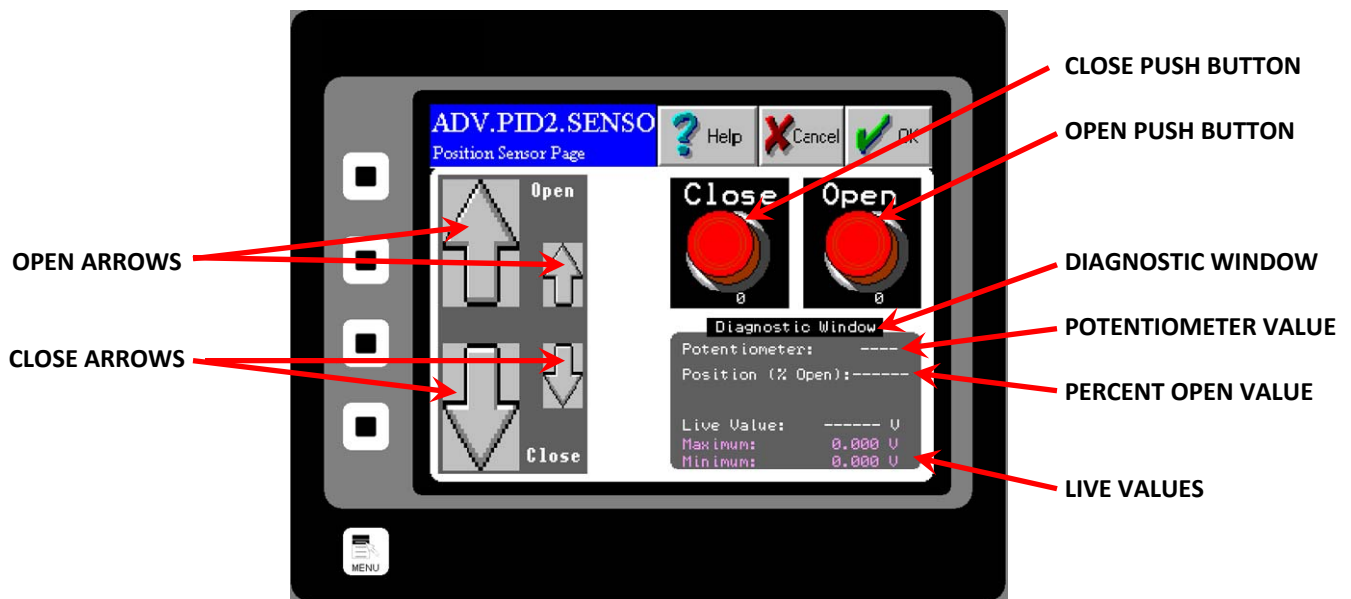
Please note that if the Set Point is changed while in a stopped state, the Auto Delay Indicator on the Run page will remain lit, but the value will be incorrect for a fast start. However, after the Auto Delay has timed out, the process value will proceed smoothly to the new Set Point value.

Stroking the Valve

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 2.5". 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% ($\pm 0.4\%$)** against the open stops and **-1% ($\pm 0.2\%$)** against the closed stops. The Maximum Live Value should be 2.0V, $\pm 0.25V$ the Minimum Live value should be 0.5V, $\pm 0.25 V$.
- 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 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

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 $K_p=50$; $K_i=0$; and $K_D= 35$

	K_p	K_i	K_D
Conservative	0.087	0.087	0
Normal	0.167	0.167	0
Aggressive	0.332	0.332	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:

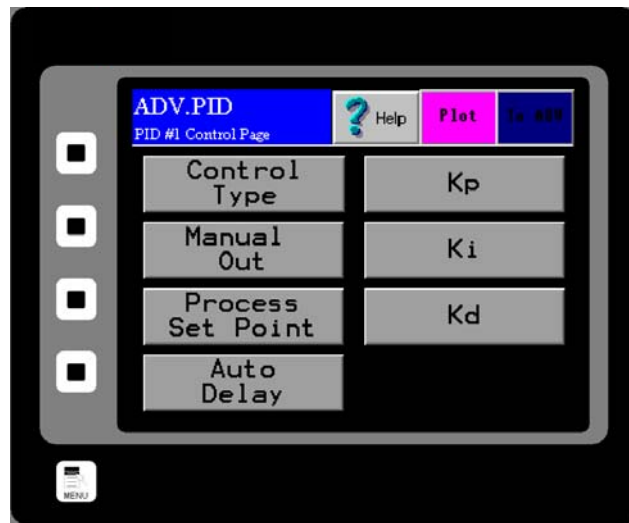
$$K_p = 0.167 \times 1.5 = 0.25$$

$$K_i = 0.167 \times 1.5 = 0.25$$

$$K_D = 0$$

Setting the PID 1

From the TOP.MENU page, press the “ADV Advanced Control” 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.

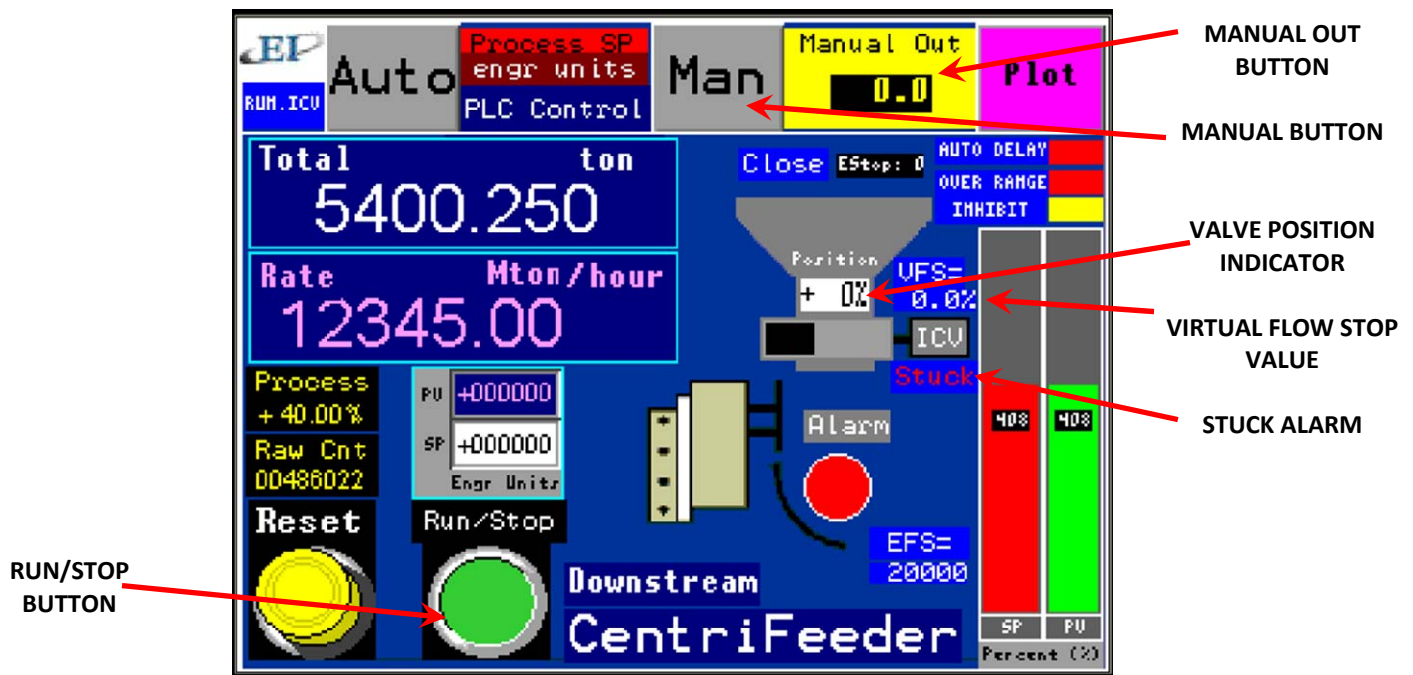


Do not change the PID values for #2 PID. Leave them at $K_p=50$; $K_i=0$; and $K_D= 35$
 These values are determined by the speed of the valve and are for a valve which will stroke 2.5 inches in 2.0 seconds.



Running the CentriFeeder™

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 valve 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 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

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

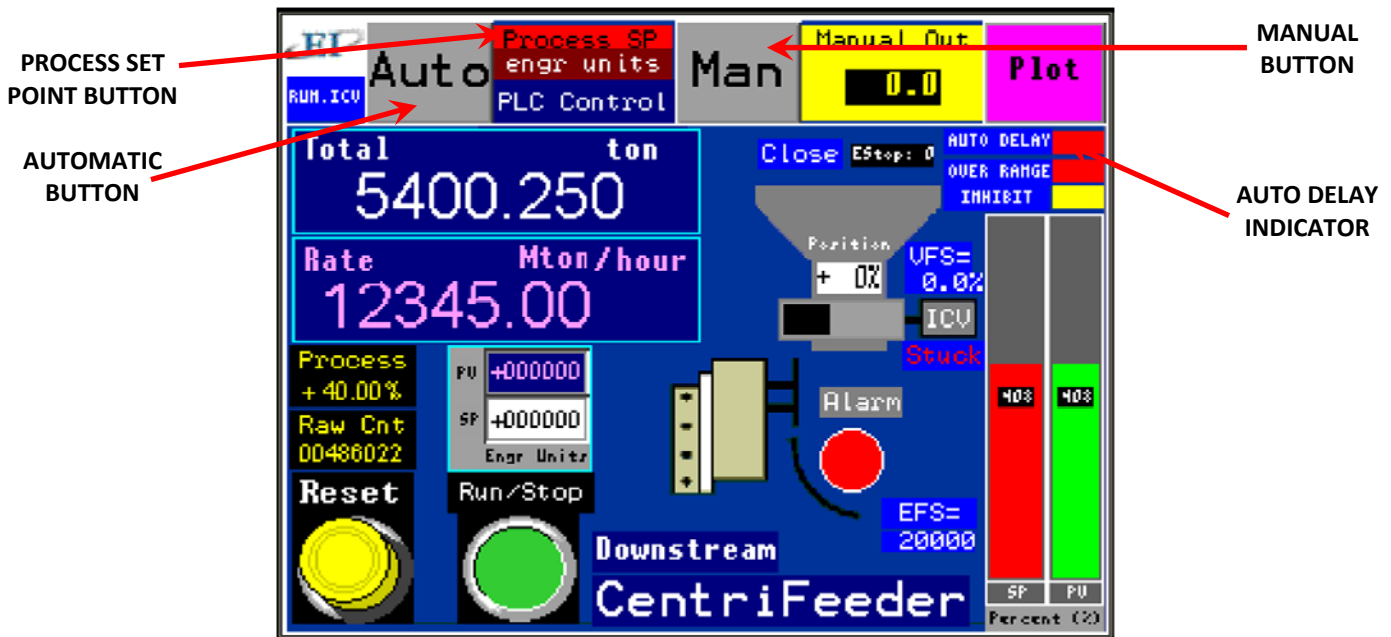
To stop flow while it is running, (the Run/Stop Button is Green) press the Run/Stop Button. The Button should now be Red. Pressing this button will cause the valve to close to the Virtual Flow Stop value indicated above the Integrated Control Valve actuator icon.

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 Section 2.7.



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.



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 Auto Delay Indicator. 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 twice 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.

Setting the Alarm - Rate

To successfully utilize the alarm function of your Digital Electronics Package, please make sure that the alarm relay is wired according to the diagram in the Wiring Customer Connections-Alarm Outputs section of this manual. The relay can be used to trigger alarms which warn the operator that a batch is complete or that the rate has exceeded a set speed. The outputs are programmable to be assigned for rate or count. Below is a step by step procedure for setting a High Alarm for a Rate of 20 ton/hr.

Step 1: From the TOP.I/O page press the ALARM Button. Details of this page can be found in the HMI Screen Guide in this manual.

Step 2: You will now be on the I/O.ALARM page. Details of this page can be found in the HMI Screen Guide in this manual.

Step 3: Press the TYPE Button. Select 'Rate' from the pop up menu. Check the Blue display box to the right of the TYPE Button to make sure that "Rate" is displayed.

Step 4: You have chosen to set the alarm based on Rate. Now you must select a target value that will trigger the alarm. Select a Target Value by first pressing the TARGET Button.

Step 5: You should now be on the I/O.ALARM.SP page. Press the RATE ALARM TARGET Button. Details of this page can be found in the HMI Screen Guide in this manual.



Step 6: You should now see the I/O.RATE.SP page. The Rate Target Button is highlighted in Yellow. You can change the Rate Target by pressing the current Rate Target value twice. The first press will outline the value in black, as shown. The second press will bring up a numeric keypad and the Target Rate can be changed. The maximum value that can be used is Full Scale, which is displayed in a dark Blue highlight.



Step 7: Now return to the I/O.ALARM page. Make sure that the blue display box to the right of the LOGIC Button says Positive. If it does not, press the LOGIC Button until it does. Details on the LOGIC Button can be found in the HMI Screen Guide for the I/O ALARM PAGE.

Step 8: Return to the I/O.ALARM page once more. To turn the alarm on, press the ENABLE Button until "YES" is displayed in the blue display box to the right of the ENABLE Button.

Setting the Alarm - Totalization

To successfully utilize the alarm function of your Digital Electronics Package, please make sure that the alarm relay is wired according to the diagram in the Wiring Customer Connections-Alarm Outputs section in Chapter 1 of this manual. The relay can be used to trigger alarms which will either hold for a period of time after a set Total has been reached, or will latch indefinitely until the Total is reset. Below is a step by step procedure for setting a Totalization Alarm.

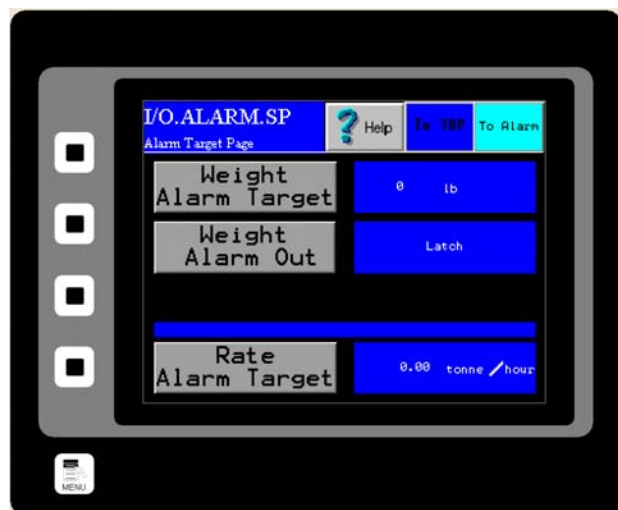
Step 1: From the TOP.I/O page press the ALARM Button. Details of this page can be found in the HMI Screen Guide in this manual.

Step 2: You will now be on the I/O.ALARM page. Details of this page can be found in the HMI Screen Guide in this manual.

Step 3: Press the TYPE Button. Select 'WEIGHT' from the pop up menu. Check the Blue display box to the right of the TYPE Button to make sure that "Weight" is displayed.

Step 4: You have chosen to set the alarm based on Weight, or Totalization. Now you must select a target value that will trigger the alarm. Select a Target Value by first pressing the TARGET Button.

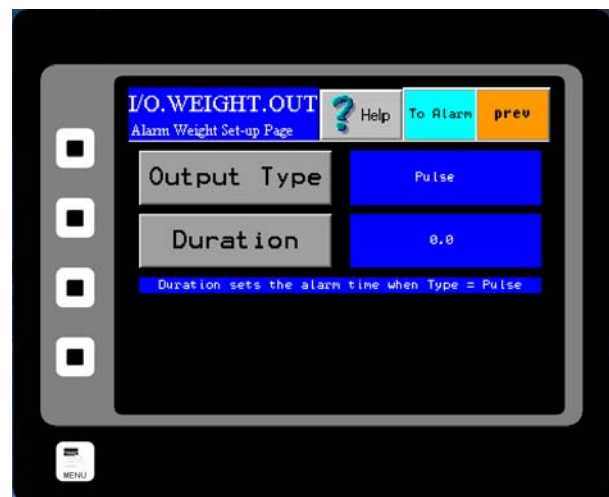
Step 5: You should now be on the I/O.ALARM.SP page. Press the WEIGHT TARGET Button. Details of this page can be found in the HMI Screen Guide in this manual.



Step 6: You should now see the I/O.WEIGHT.SP page. The WEIGHT TARGET Button is highlighted in Yellow. You can change the Weight Target by pressing the current Weight Target value twice. The first press will outline the value in black, as shown. The second press will bring up a numeric keypad and the Target Weight can be changed. The acceptable range for a Weight Target is displayed at the bottom of the WEIGHT TARGET Button.



Step 7: Now return to the I/O.ALARM.SP page by pressing the OK Button in the upper right hand corner of the screen. You must now choose which type of Weight Output you would like to utilize. Press the WEIGHT OUTPUT Button for your options. You should now be on the I/O.WEIGHT.OUT page. More information on the two types of Weight Output, Pulse and Latch, can be found on the I/O.WEIGHT.OUT page in the Screen Guide section of the manual.



Step 8: If a Pulsed Weight Output is chosen, you should enter a duration for the Pulsed Alarm. This is accomplished by pressing the DURATION Button, double clicking on the old duration value and entering your new duration value via the numeric keypad as before and press the OK Button.

Step 9: Return to the I/O.ALARM page by pressing the TO ALARM Button on the upper right hand corner of the screen. You must now select your logic. Press the LOGIC Button and select your logic. Details on the LOGIC Button can be found in the HMI Screen Guide for the I/O ALARM PAGE.

Step 10: Return to the I/O.ALARM page once more. To turn the alarm on, press the ENABLE Button until "YES" is displayed in the blue display box to the right of the ENABLE Button.

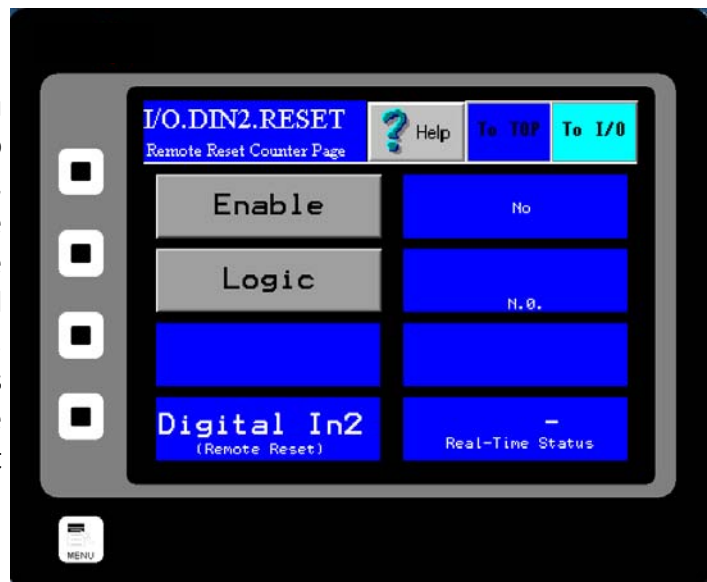
Setup of Remote Reset Capability

What is Remote Reset?

Remote Reset allows you to remotely trigger a reset of the Totalization on your Digital Electronics. This feature is similar to pressing the RESET Button from the TOP.RUN page. The Remote Reset can be utilized by installing a remote push button on/off switch (customer supplied). To properly wire the push button on/off switch for Remote Reset Capabilities, please see the Wiring Customer Connections section of Chapter 1.

Enabling the Remote Reset Capability

Once the switch is wired properly, you must enable the Remote Reset. To enable the Remote Reset Capability, access the I/O Menu from the TOP.MENU page and click on the REMOTE RESET Button. You should now see the page shown to the right. To enable Remote Reset, simply press the ENABLE BUTTON. If enabled, the word "Yes" will be displayed to the right of the button.



The logic of the Remote Reset Capability can also be manipulated. If the LOGIC Button is pressed, a dialog box will prompt you to choose from two options, "NC" or "NO". The options are described below.

NC - Normally Closed

NO - Normally Open

Using the Compact Flash

Using the Compact Flash Card

A 2 Gigabyte Compact Flash card is pre-installed inside the Digital Electronics Enclosure and is located inside the enclosure on the reverse side of the HMI touch screen. Run data is stored on the Flash Drive but only when the TOP.RUN page is currently displayed. The internal data logger operates using two separate processes. The first samples each data point at the rate specified by the factory (1/second), and places the logged data into a buffer within the RAM of the panel. The second process executes every minute, and writes the data from RAM to the Compact Flash card. Note that because data is not committed to the Compact Flash for a minute, this amount of log data may be lost when the terminal is powered-down. Further, if the terminal is powered-down while a write is in progress, the Compact Flash card may be corrupted. Data is being written to the Compact Flash card when the middle yellow LED light on the front of the HMI panel is flashing. Do not turn the power off or remove the Compact Flash while the yellow LED is blinking!

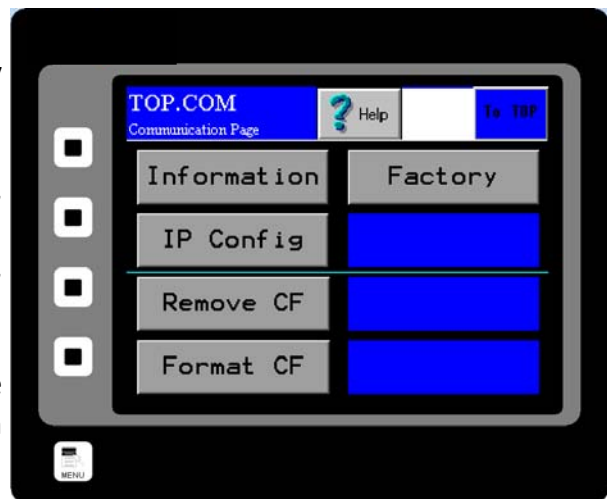
Removing the Flash Card

The process for removing the Compact Flash card is called Hot Swapping. Hot Swapping is not the preferred method of transferring data from the flash card to an external source due to the possibility of data files being corrupted if the Flash card is removed improperly. Please remember that the Compact Flash card cannot be removed while data is being written to the Flash card, or when the yellow LED is flashing.

To Hot Swap, go to the TOP.COM page by pressing the COM button from the main menu.

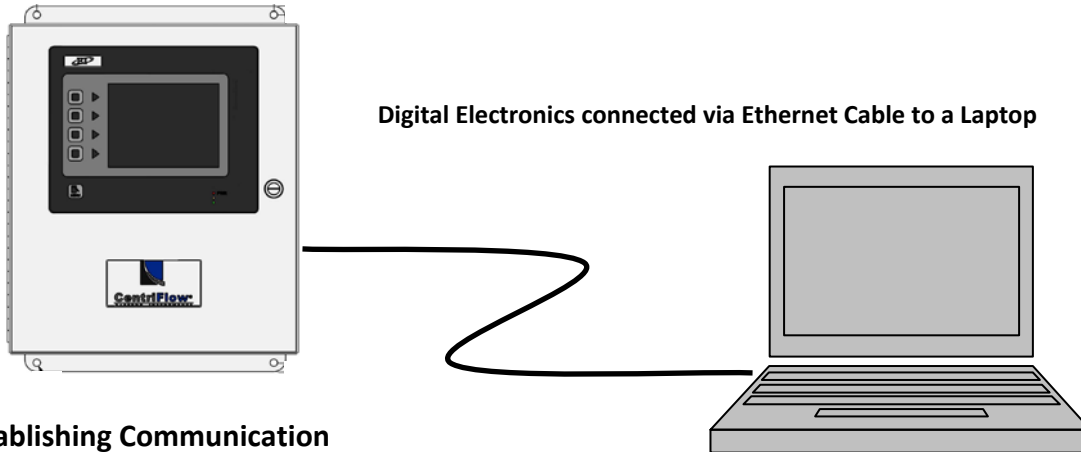
Next, press the Remove CF button and finally, press the SAFELY REMOVE COMPACT FLASH button. When the 'Safe' prompt is indicated, you may safely remove the Compact Flash card.

Open the Electronics Enclosure and remove the Flash card from the back of the HMI panel in the door of the Electronics Enclosure.



Remote Ethernet Access Capabilities

The preferred method for transferring data from the Compact Flash card is to link the Digital Electronics to a PC or Laptop using an Ethernet Cable. The main advantage of the remote viewing capability is that run histories can be viewed and saved from the Electronics itself to a hard drive or other desired external storage device.



Establishing Communication

The IP address and Subnet Mask for the Digital Electronics has been factory set as:

IP Address: 192.168.2.101
Mask: 255.255.255.0

NOTE: IF YOUR CENTRIFEEDER™ WAS SUPPLIED AS PART OF A LARGER SYSTEM OR MULTIPLE UNIT SYSTEM, THE IP ADDRESS MAY BE DIFFERENT THAN SHOWN ABOVE.

In order to enable communication, the Local Area Connection Properties of the PC/Laptop must be set appropriately.

Please read the following if you are using Internet Explorer as your Internet Browser. Make sure that in your Advanced Internet Options Menu, under Tools, under the Phishing Filter option, that the "Automatic Website Checking" is off.

Once TCP/IP settings are complete and the Ethernet Cable linkage is made, your Internet Browser can be used to access the Digital Electronics by entering the IP address into the Address Bar. When entering the IP address please enter in the format illustrated below:

http://###.###.#.###

Entering the Digital Electronics IP Address will bring up a web page entitled “G3 Web Server”. This page will allow you access to three options, View Data, View Logs, and Remote View.

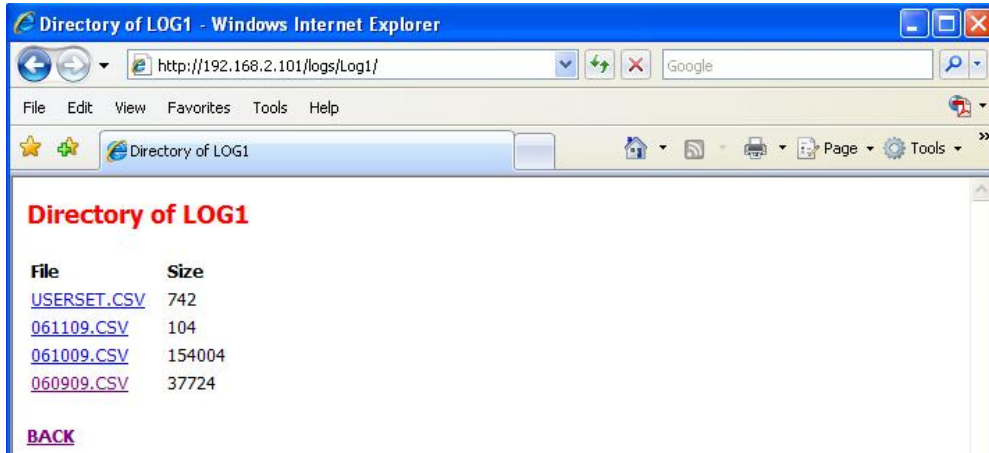


Remote View

Selecting the Remote View option will allow you to access the various pages of the HMI touch screen from a remote location. Upon clicking the Remote View link, a screen that looks identical to the HMI touch screen will appear in the Web Browser window. Clicking on the various options works similarly to using the touch screen on the Digital Electronics itself. In this way, all of the features of the HMI can be accessed and used remotely.

View Logs

Selecting the View Logs option allows access to the log files stored on the Compact Flash. Three files are created when the compact flash is formatted— MMDDYY.csv, UserSet.csv, and MTR.csv. They are all comma separated variable files. The MMDDYY file store the run data. One run data history file is created upon startup of the Digital Electronics and a new file is subsequently created every 24 hour period. The names of the files themselves indicate the date upon which the file was created and the data therein was collected. The UserSet file records a history of changes to the meter calibration. The MTR file records the site calibration data. MTR is an abbreviation for Material Test Report.



Clicking on any of the file names will open up the data file. These files are CSV files and typically open into an Excel spreadsheet. Once open, the spreadsheet can be saved to another location such as a hard drive. A typical entry would look like the file below.

TIME (HR:MIN:SEC)	RAW (Count)	ENGR (Count)	Volts (%)	PV (%)	RATE (Mass/Time)	ALARM (Over)
14:55:30	50	0.27778	18.18	1817	1817	0
14:55:31	183	1.0167	27.46	2745	2745	0
14:55:32	318	1.7667	23.9	2390	2390	0
14:55:33	435	2.4167	25.52	2551	2551	0
14:55:34	560	3.1111	25.13	2512	2512	0
14:55:35	673	3.7389	24.97	2497	2497	0
14:55:36	823	4.5722	25.49	2548	2548	0
14:55:37	935	5.1944	24.98	2497	2497	0
14:55:38	1061	5.8944	25.13	2513	2513	0
14:55:39	1199	6.6611	25.41	2540	2540	0

The TIME column indicates the specific time, using a 24 hr clock, the count data was taken. The second column indicates the RAW COUNT, while the third column is the ENGINEERING COUNT. The RAW COUNT divided by the C/W RATIO equals the ENGINEERING COUNT. The next two columns are both measurements of the full scale, but shown in different units. The unit (% Volts) is used in the Static Calibration procedure. The units (% PV) or Process Variable, is the calibrated full scale measurement. The two units, (% Volts) and (% PV) are mathematically related by the CALd multiplier. The RATE column indicates the flow rate in the mass and time units chosen. The final column, ALARM, indicates whether or not the alarm has been triggered. (Note: The (% PV) column is recorded as an integer with an implied decimal point. Divide the (% PV) column by 100 in order to get the correct real number.)

The User Settings Log indicates each time that the user settings have been changed and what the new settings are. A typical Userset page can be seen below.

DATE	TIME	EVENT	ZERO	CALs	CALd	RANGE	INHIBIT	FILTER	CWratio	Full Scale
6/2/2009	14:47:54	Power On	7FEF	10D0	2710	4	2	14	180	10000
6/2/2009	14:49:08	zero	7FDC	10D0	2710	4	2	14	180	10000
6/2/2009	14:49:30	CALs	7FDC	10F2	2710	4	2	14	180	10000
6/2/2009	14:55:11	Power On	7FDC	10F2	2710	4	2	14	180	10000

The MTR Setup Sheet allows data to be loaded to it and to calculate the Standard Deviation and the Percent Error of the Electronics' readings. This file stores site calibration data to the compact flash from the SET.SAVE page. A standard MTR Setup Sheet can be seen below.

MM-DD-YY:	5/21/2009	TIME:	15:11:47		
Material:	rice shortcb				
Technician:	sjt				
Location:	wh				
Type:	Type I	Reverse			
Model:	CFM-12				
Feed:	Belt				
Full Scale:	1000				
Zero:	7F5C				
CALs:	0C5D				
CALd:	3198				
RUN	ACTIVE	METER WEIGHT	ACTUAL WEIGHT	ACTUAL/METER	%ERROR
1	1	30.267	30.46	1.0064	-0.63
2	1	30.567	30.72	1.005	-0.5
3	1	26.433	26.56	1.0048	-0.48
4	1	30.567	30.72	1.005	-0.5
5	1	28.233	28.42	1.0066	-0.66
			Average:	1.0056	
			STD:	0.0009	
			%STD:	0.0857	

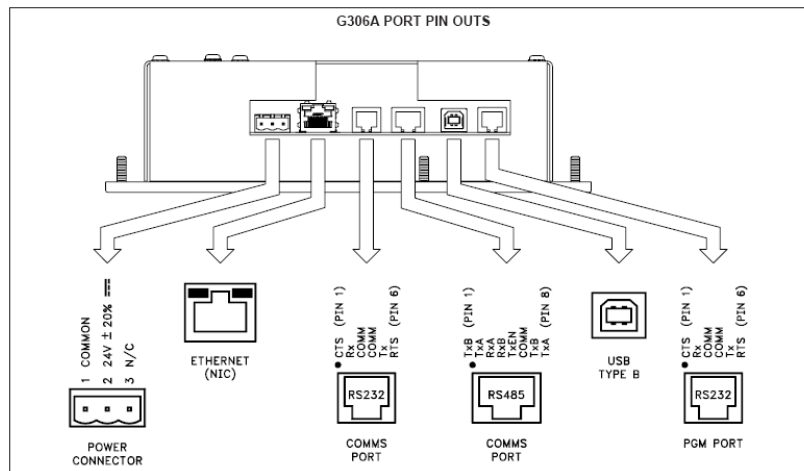
View Data

This option is not used.

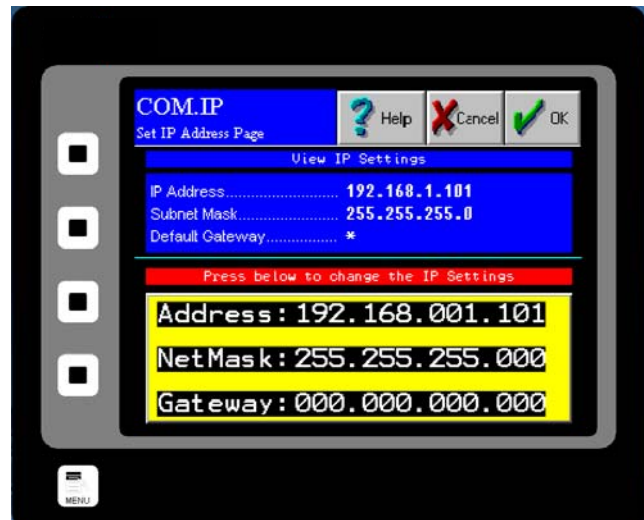
Changing the Ethernet/IP Address (Optional)

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 flowrate 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 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. You should now see this screen (right).





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.

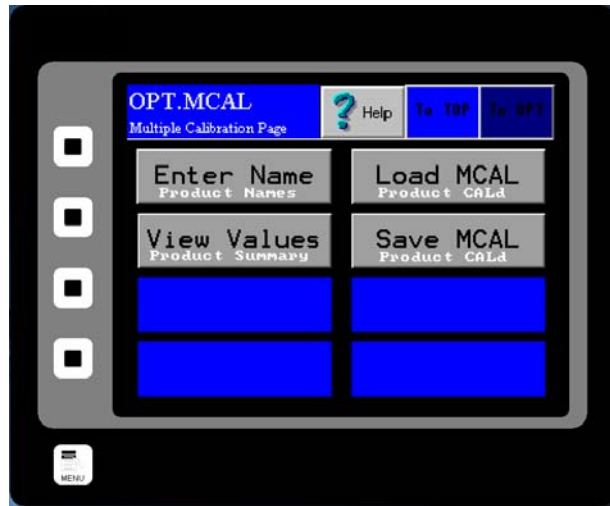
Step 4: After entering the IP Address for your HMI, press the ENTER key and then, press the OK Button located in the Upper Right hand corner. A pop up will prompt you to save the IP Address changes to your Flash. Pressing the YES Button will refresh the HMI and will implement the changes made.

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 page offers an example of setting up a ControlLogix PLC. For more detailed instructions, please see the accompanying Technical Note TNOI17.

Setup of Multiple Calibration Screens (Optional)

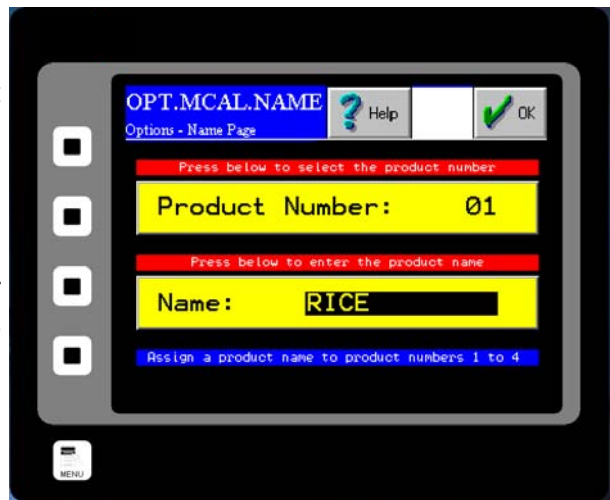
The Multiple Calibration Screens option allows you to run more than one product through your meter without having to recalibrate each time the product is switched. This option allows you to store up to 4 product calibrations at one time. To access the option once it has been purchased, press the MULTIPLE 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.



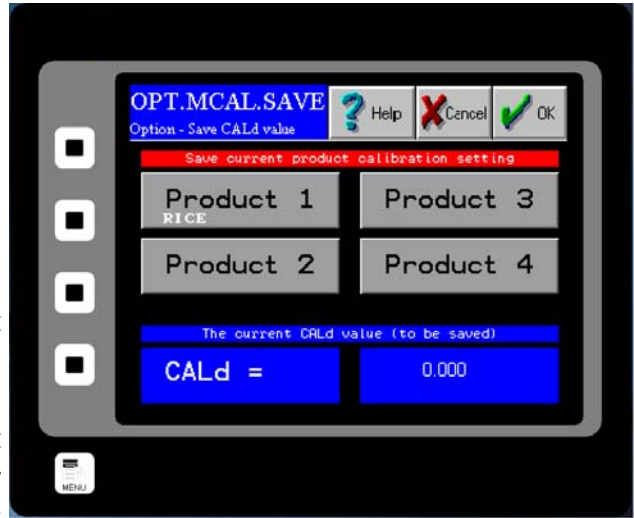
Step 1: The first step is to enter names and positions for each of your products. To do so, press the ENTER NAME Button. You should now see this screen (Right). Double click the presently entered value for Product Number and you will be prompted to enter your new product number. Pressing the RAISE and LOWER Buttons will allow you to change this value. You can choose numbers 1-4 for the 4 separate product calibrations that can be entered. Press the ENTER Button once you have entered your value.

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.



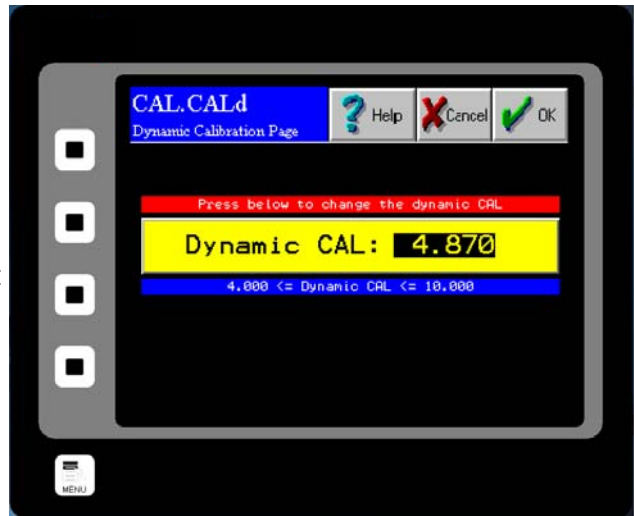
****Please note that it is important to choose the product number before pressing the OK Button or you will continue to over write the last products' information that you entered.***

Step 3: Now you should 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 SAVE MCAL Button. You should now see this screen (Right). Your Digital Electronics' current Dynamic Calibration value is displayed in the lower right hand corner. If this is the correct dynamic calibration for your particular product press that product's corresponding button and 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 this 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 enter a Dynamic Calibration manually, 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 Upper Right hand corner.



Step 6: Once the value is entered return to the OPT.MCAL.SAVE as described above and save the new current Dynamic Calibration to the selected product. Repeat this process for all of your products, up to 4.

Step 7: To access any of your saved Dynamic Calibrations for running your process, simply click the LOAD MCAL 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.

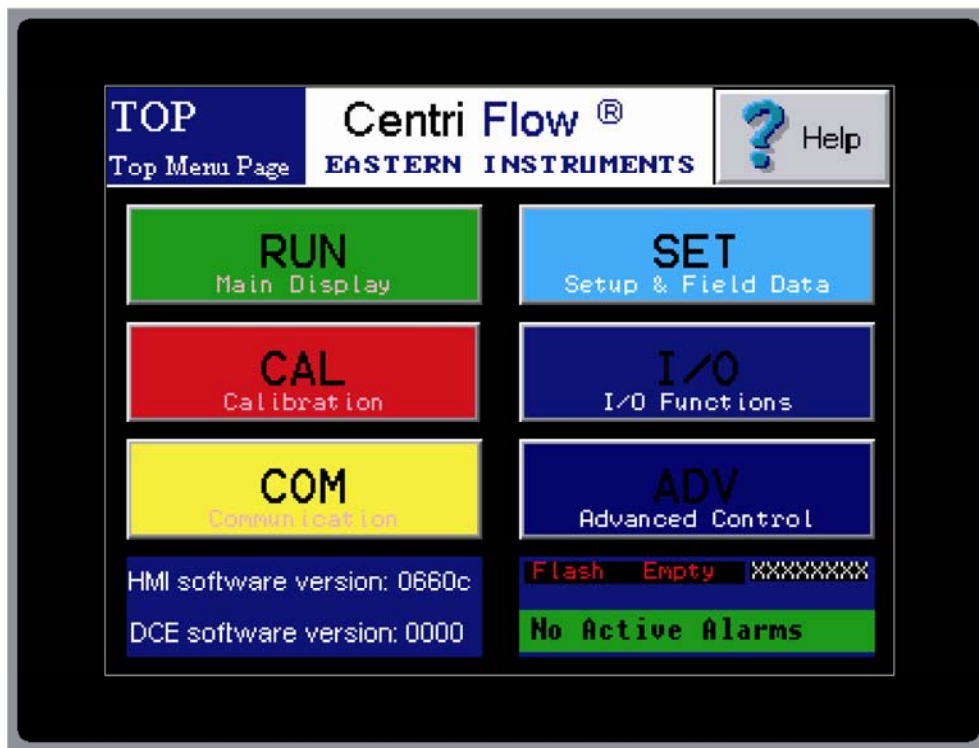


SCREEN GUIDE

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

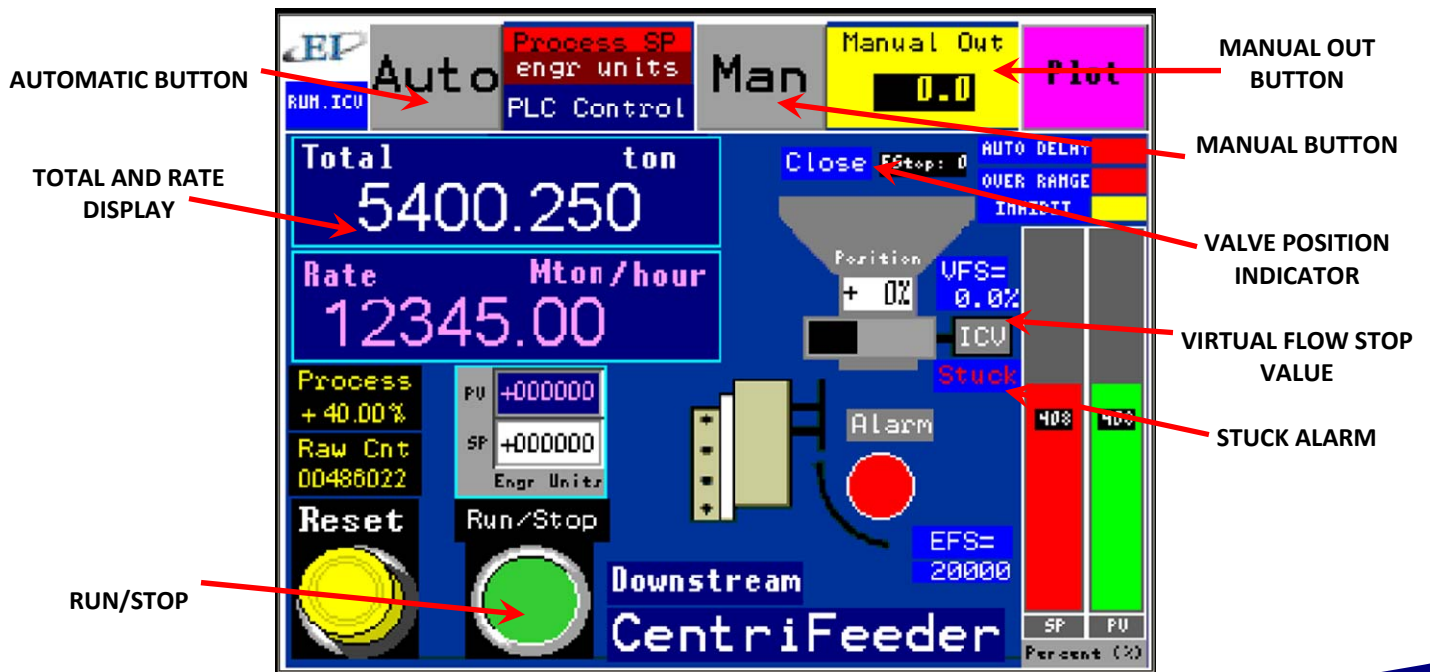
TOP.RUN is the main display mode. Access this screen by pressing the RUN Button from the TOP screen. The customer can choose between Automatic Mode and Manual Mode from this screen as well as view data in real time.

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.

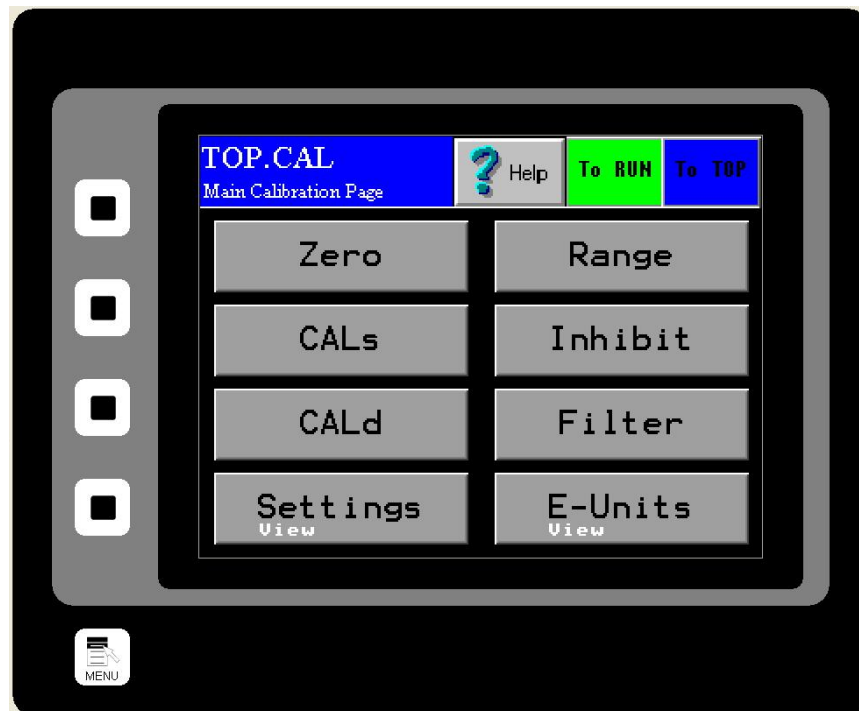
Total/Rate Indicator: In the top left corner under the Auto and Man Buttons are the numerical values of the calculated Total and Rate values for your process as well as the units of these values.





TOP.CAL

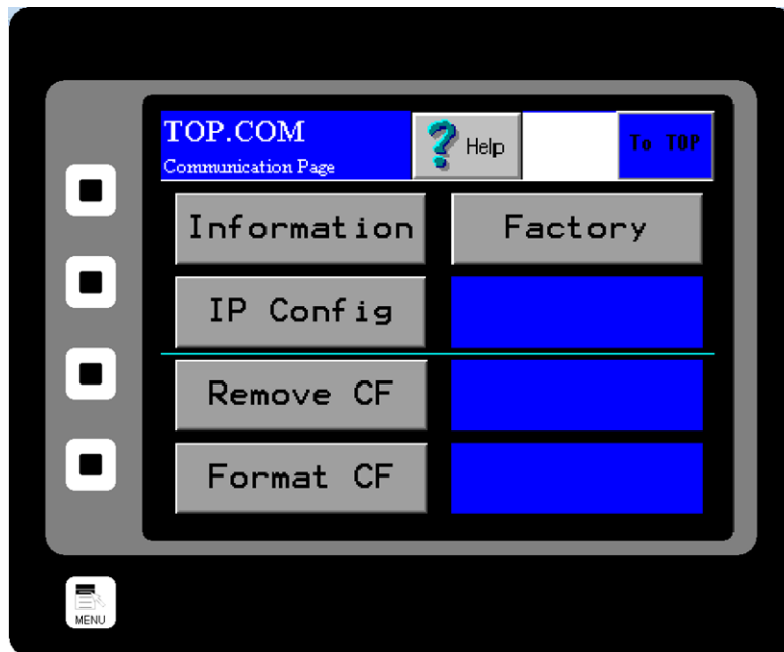
TOP.CAL is the Main Calibration Page. Access this screen by pressing the CAL Button from the TOP page. There are eight buttons on the TOP.CAL page. They are ZERO, CALs, CALd, SETTINGS, RANGE, INHIBIT, FILTER, and E-UNITS. Press the ZERO button to go to the CAL.ZERO page. This is where you can perform 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

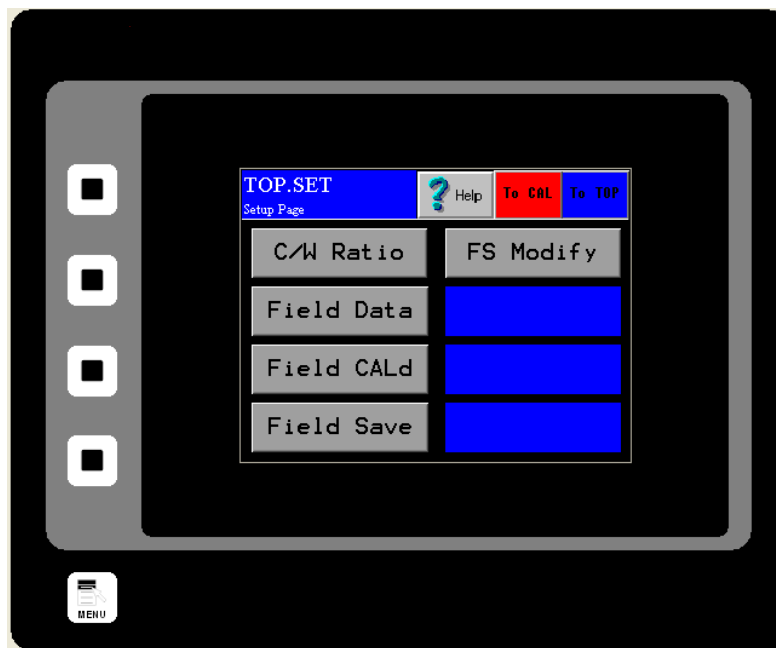
TOP.COM is the Main Communication Page. Access this page by pressing the COM Button from the TOP page. There are five buttons on the TOP.COM page. They are INFORMATION, IP CONFIG, FACTORY, REMOVE CF and FORMAT CF. Press the INFORMATION Button to view information concerning your Software's version, your IP Address and whether you have a Compact Flash Card installed. Press the IP CONFIG Button to edit your IP Settings. Press the FACTORY Button to be able to restore Factory Settings. Press the REMOVE CF to be able to remove your Compact Flash in a safe manner. Press the FORMAT CF Button in order to format your Compact Flash Card.





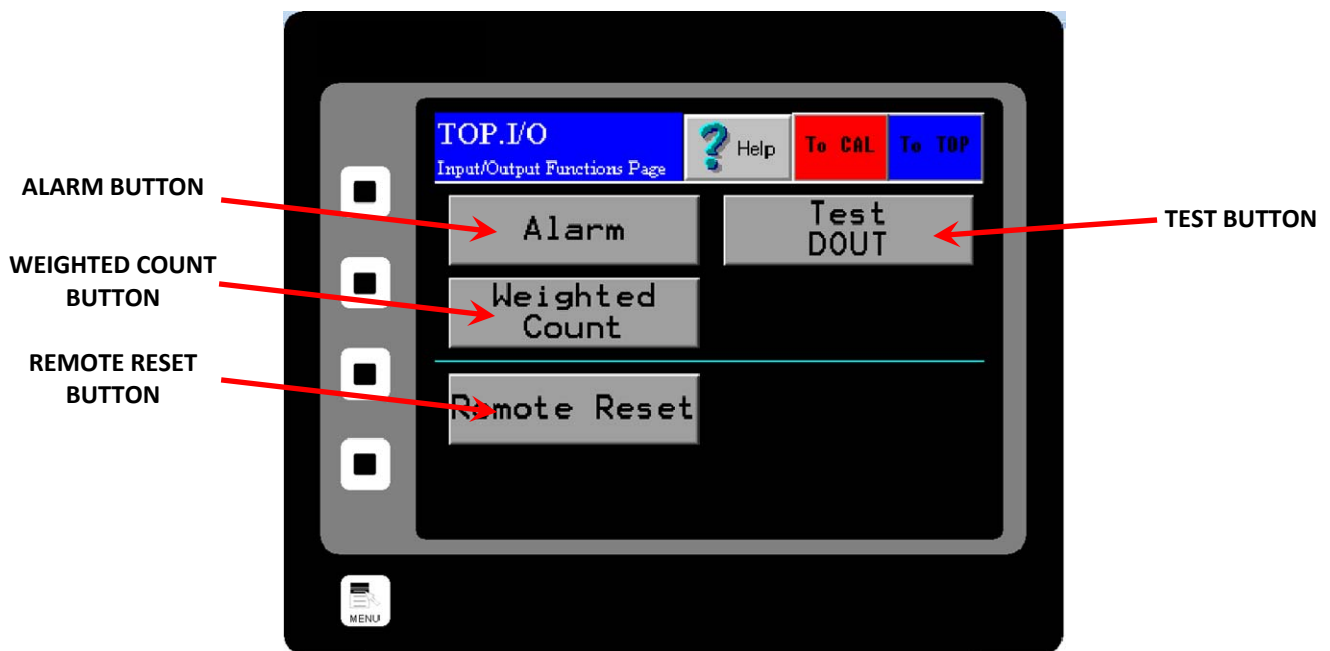
TOP.SET

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 C/W RATIO, 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 (C/W RATIO 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.



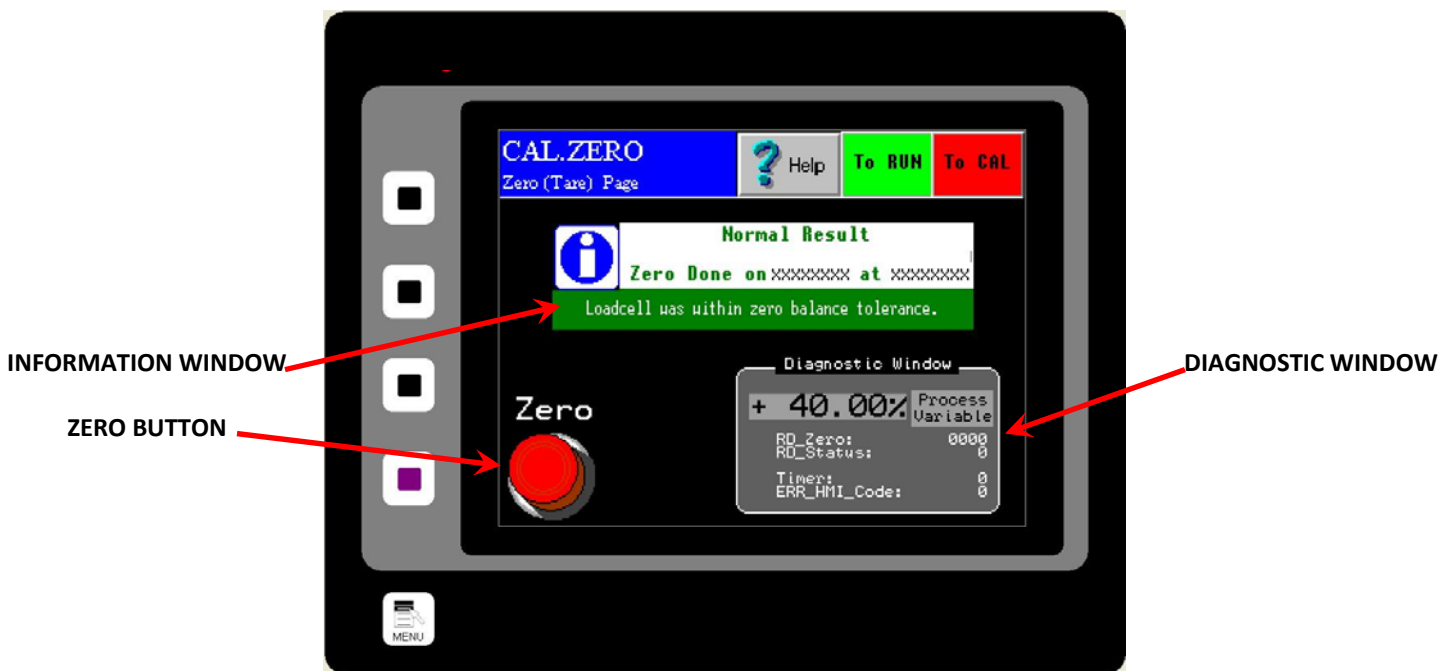
CAL.ZERO

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.)

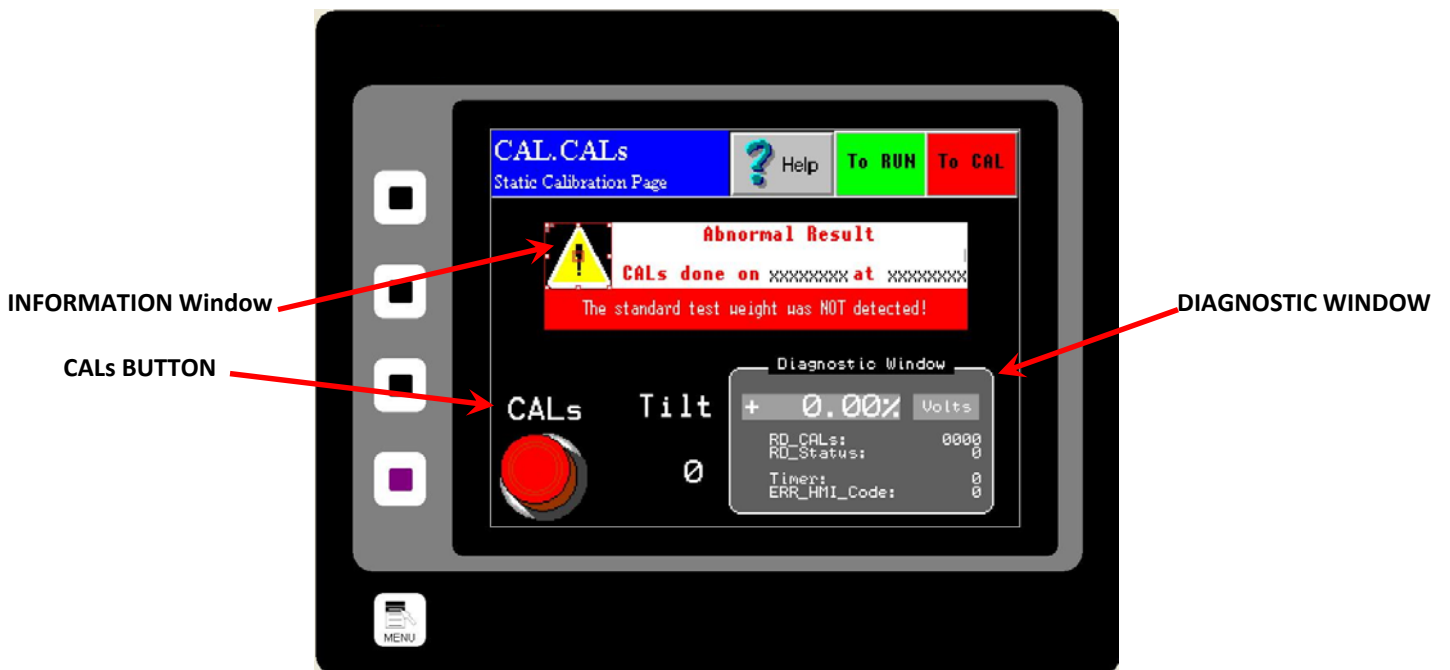
Ensure there is no flow prior to performing a zero!



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.

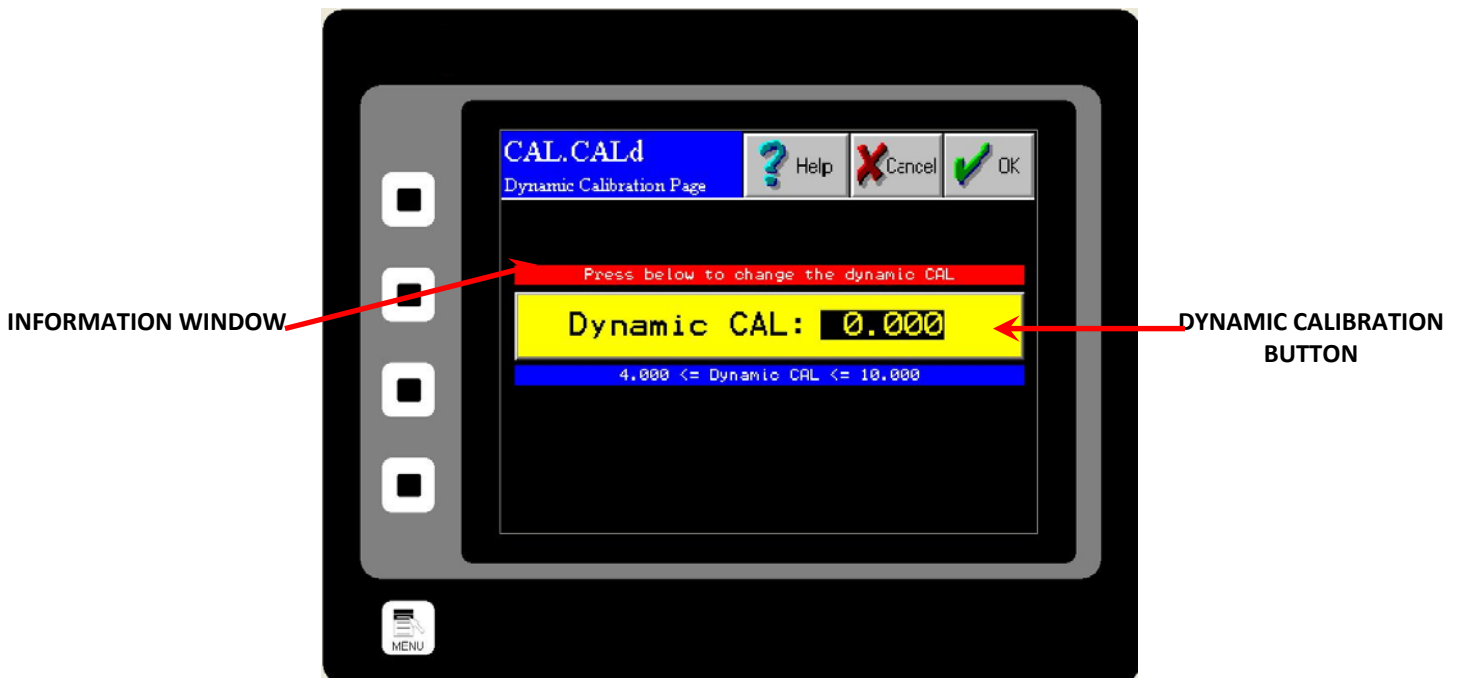


CAL.CALd

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.

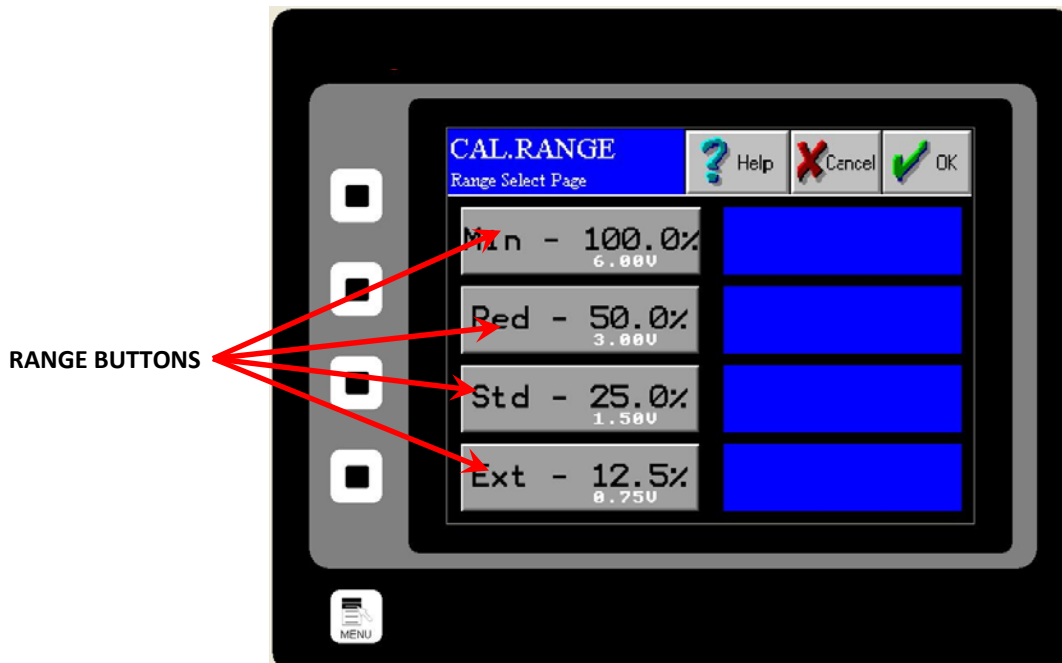




CAL.RANGE

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.

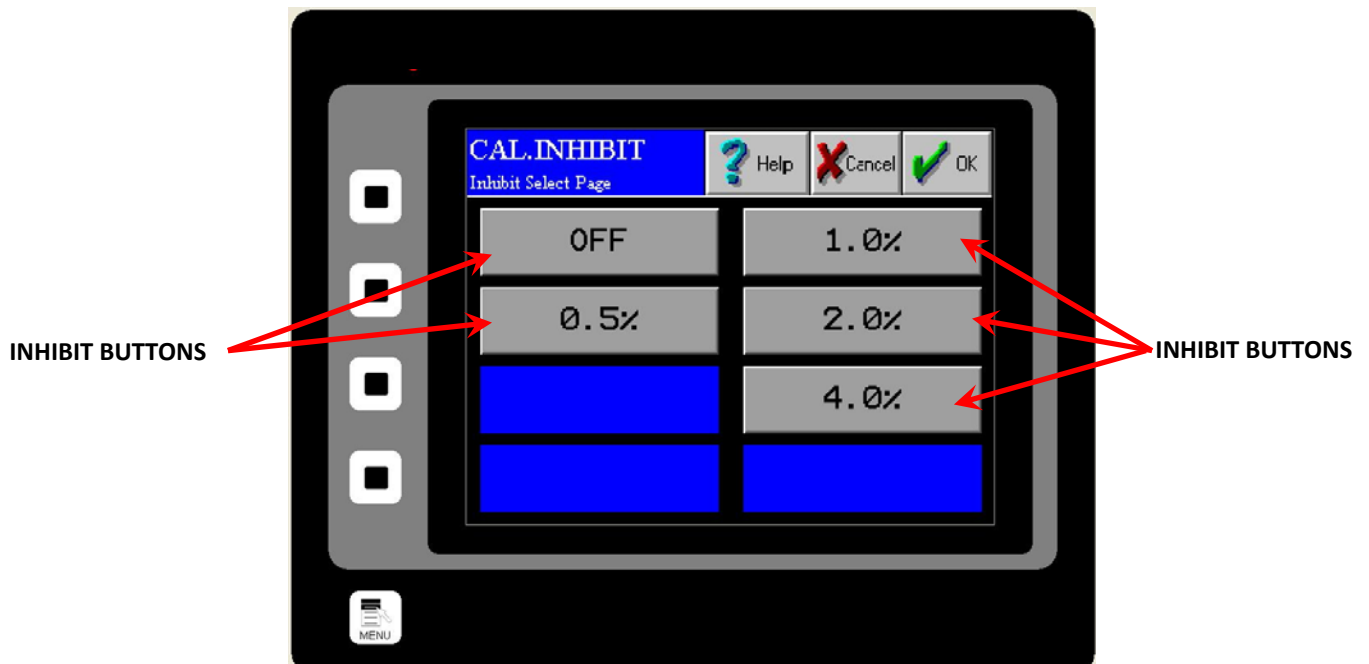


CAL.INHIBIT

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 0.5% 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.



CAL.FILTER

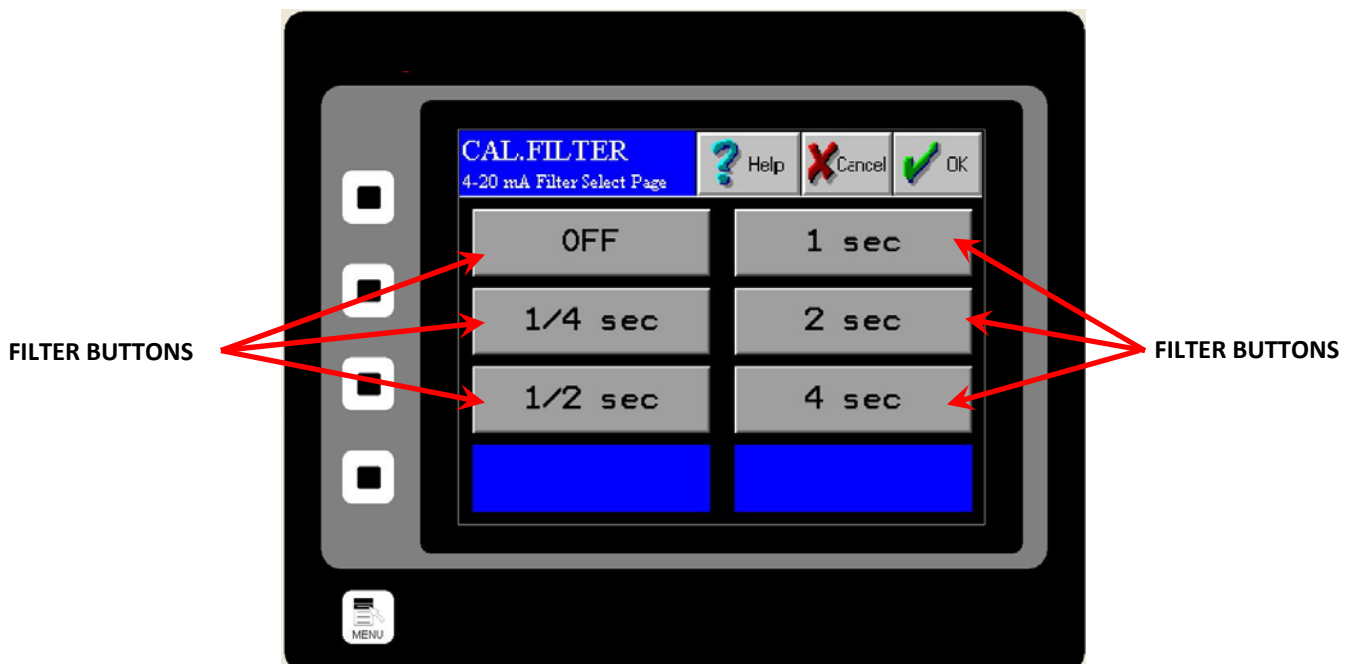
CAL.FILTER is the Filter page. Access this screen by pressing the FILTER Button on the TOP.CAL page after pressing the CAL Button from the TOP page. This page is for selecting the number of points used in the 4-20mA moving average filter. The formula for a moving average filter is shown below. Press 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.

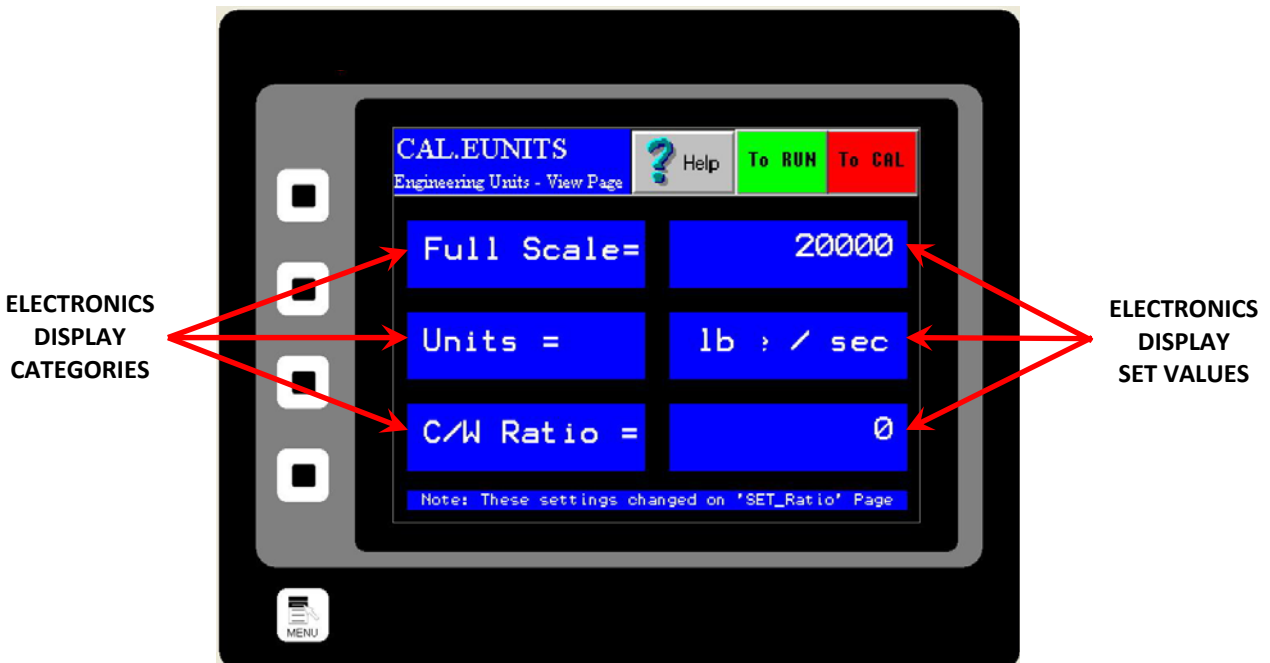




CAL.EUNITS

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.



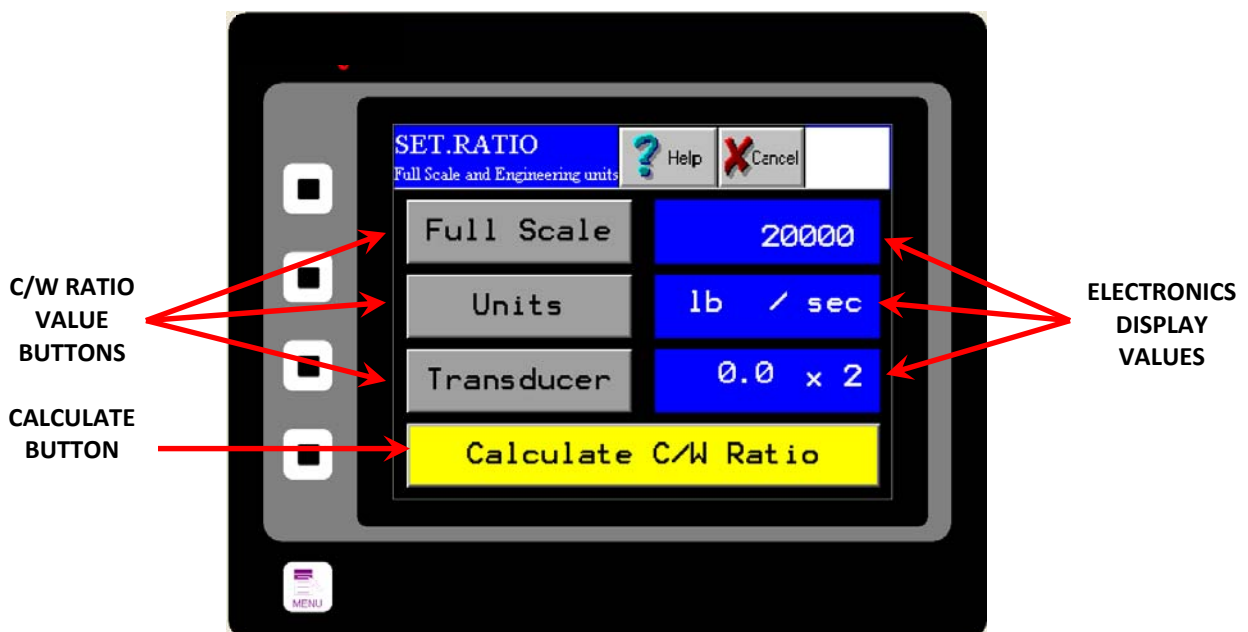


SET.RATIO

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.

$$\text{Engineering Count} = \text{Raw Count} / \text{Count per Weight Ratio}$$

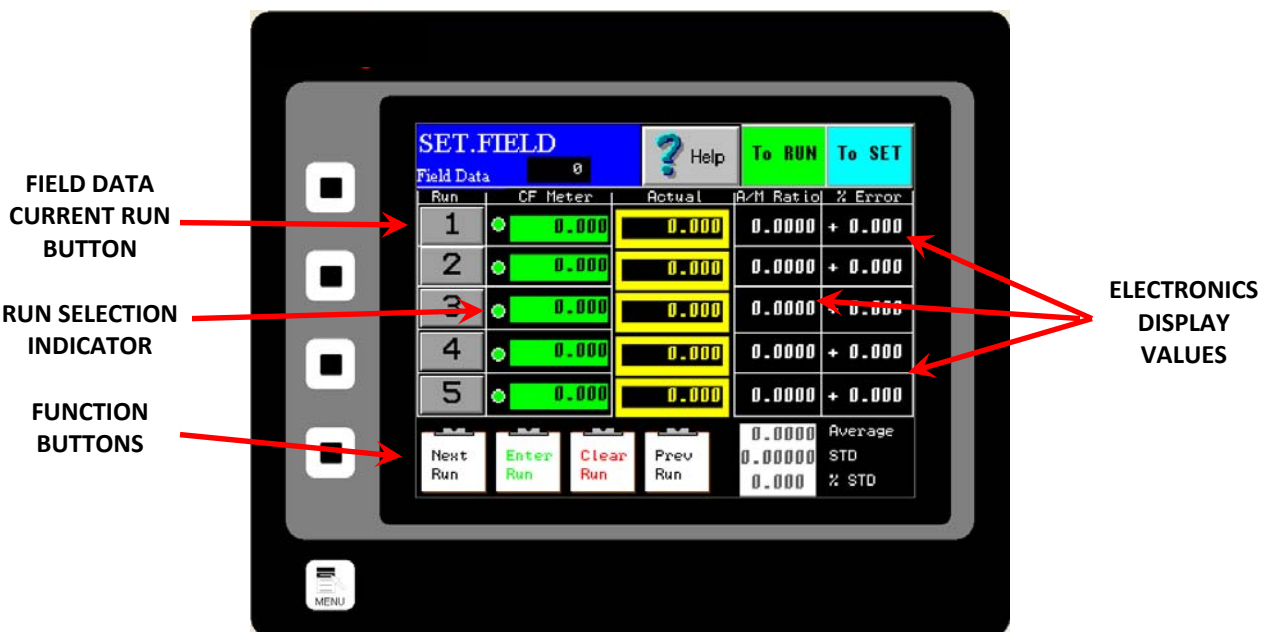
This data is set by the factory and should not be changed by the customer.





SET.FIELD

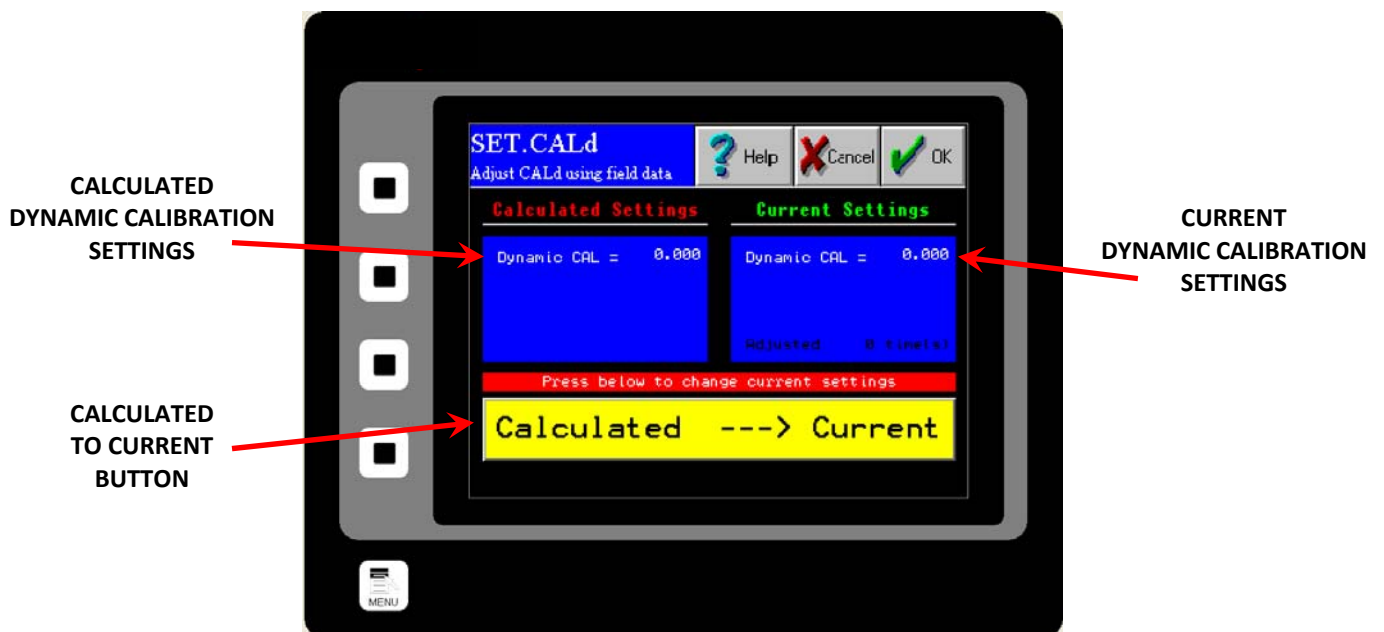
SET.FIELD is the page that allows you to collect and verify your site calibration data. This page is used extensively in Site Calibration as shown in the Site Calibration section of Chapter 3 of this manual. This screen allows you to compare the metered weight of material run through the meter versus 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.



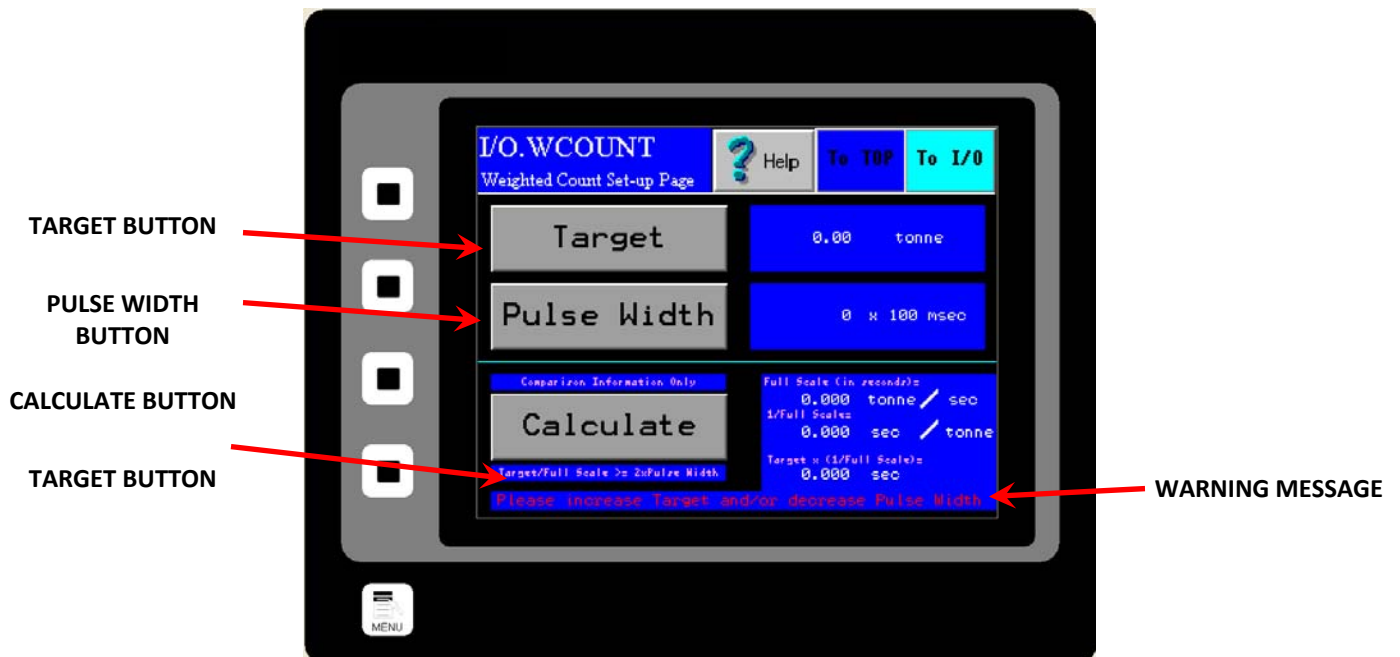


I/O.WCOUNT (Optional)

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.





I/O.ALARM

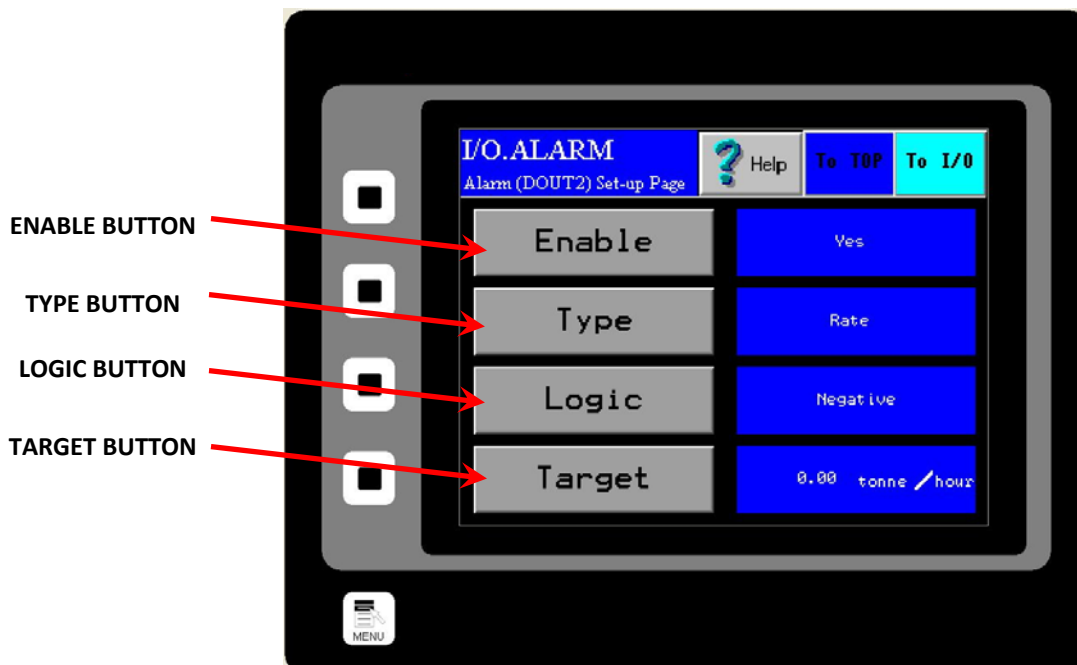
I/O.ALARM is the Alarm page. Access this screen by pressing the ALARM Button from TOP.I/O page. This page is for changing the options of the alarm. The alarm can be turned on and off using the ENABLE Button. Press the ENABLE Button until the desired result is displayed in the Blue display box to the right of the ENABLE Button.

The alarm can be used to monitor either flow rate or weight using the TYPE Button. Press the TYPE Button until the desired result is displayed in the Blue display box to the right of the TYPE Button.

The Target Value for both rate and weight alarms can be set by pressing the TARGET Button and entering an appropriate value. Pressing the TARGET Button will take you to the I/O.ALARM.SP page. For more information on this page, please turn to the next page.

The alarm can be set as either a High Alarm or a Low Alarm. Use the LOGIC Button to choose which type of alarm you would like to use. Press the LOGIC Button until the desired result is displayed in the Blue display box to the right of the LOGIC Button.

NOTE: POSITIVE LOGIC INDICATES THAT THE ALARM HAS BEEN SET AS A HIGH ALARM AND WILL TRIGGER WHEN FLOW (OR WEIGHT) GOES ABOVE THE TARGET VALUE. NEGATIVE LOGIC INDICATES THAT THE ALARM HAS BEEN SET AS A LOW ALARM AND WILL TRIGGER WHEN FLOW (OR WEIGHT) GOES BELOW THE TARGET VALUE.





I/O.ALARM.SP

I/O.ALARM.SP is the Alarm Target Entry page. Access this screen by pressing the TARGET Button from the I/O.ALARM page. This page is for changing the values that will trip the alarm. You can enter a weight by pressing the WEIGHT ALARM Button or enter a rate by pressing the RATE ALARM Button. The value entered will display to the right of the button.



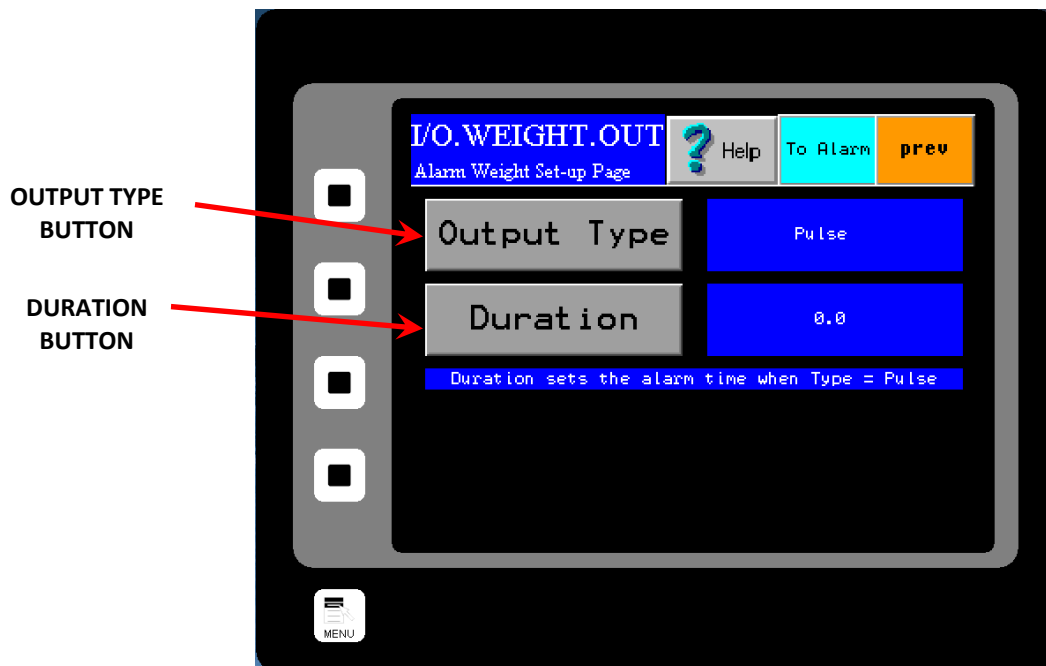


I/O.WEIGHT.OUT

I/O.WEIGHT.OUT is the page that allows you to define the type of Weight of Totalization alarm that you will be utilizing. Access this screen by first pressing the I/O Button from the TOP.MENU page. Then, press the ALARM Button, followed by the TARGET Button, and finally, the WEIGHT OUTPUT Button. The two types of Weight Alarms to choose from are Pulsed Weight Alarms, or Latch Weight Alarms. A Pulsed Weight Alarm will allow you to choose a Weight Target and when that amount of weight, or Total Weight, passes through the meter, the alarm will be tripped for a set duration of time. A Latch Weight Alarm will trip as soon as the Target Weight is reached and will remain tripped, or “latched”, until the Totalization count is reset. For instructions on Totalization reset, please see the TOP.RUN page in the Screen Guide section of Chapter 4.

Pressing the OUTPUT Button will allow you to choose between a Pulsed Weight Alarm or a Latch Weight Alarm. If a Pulsed Weight Alarm is chosen, a duration for the Pulsed Alarm can be chosen as well. This is accomplished by pressing the DURATION Button and entering an alarm duration in seconds. The Totalization Count is reset once the Pulse Alarm time expires.

*Please note that while a duration can be entered even while a Latch Weight Alarm is selected, the duration entered will have no effect unless a Pulse Weight Alarm is chosen.





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 Out: The resultant output of either Manual or Automatic Control. It is usually represented as a percentage of Electronic Full Scale.

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 $\frac{1}{4}$ 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 ($K_p * E$), integral ($K_i * E_{sum}$), and derivative ($K_d * E_{delta}$) 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 (K_p), integral gain (K_i), and derivative gain (K_d) 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 $\frac{1}{2}$ 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.

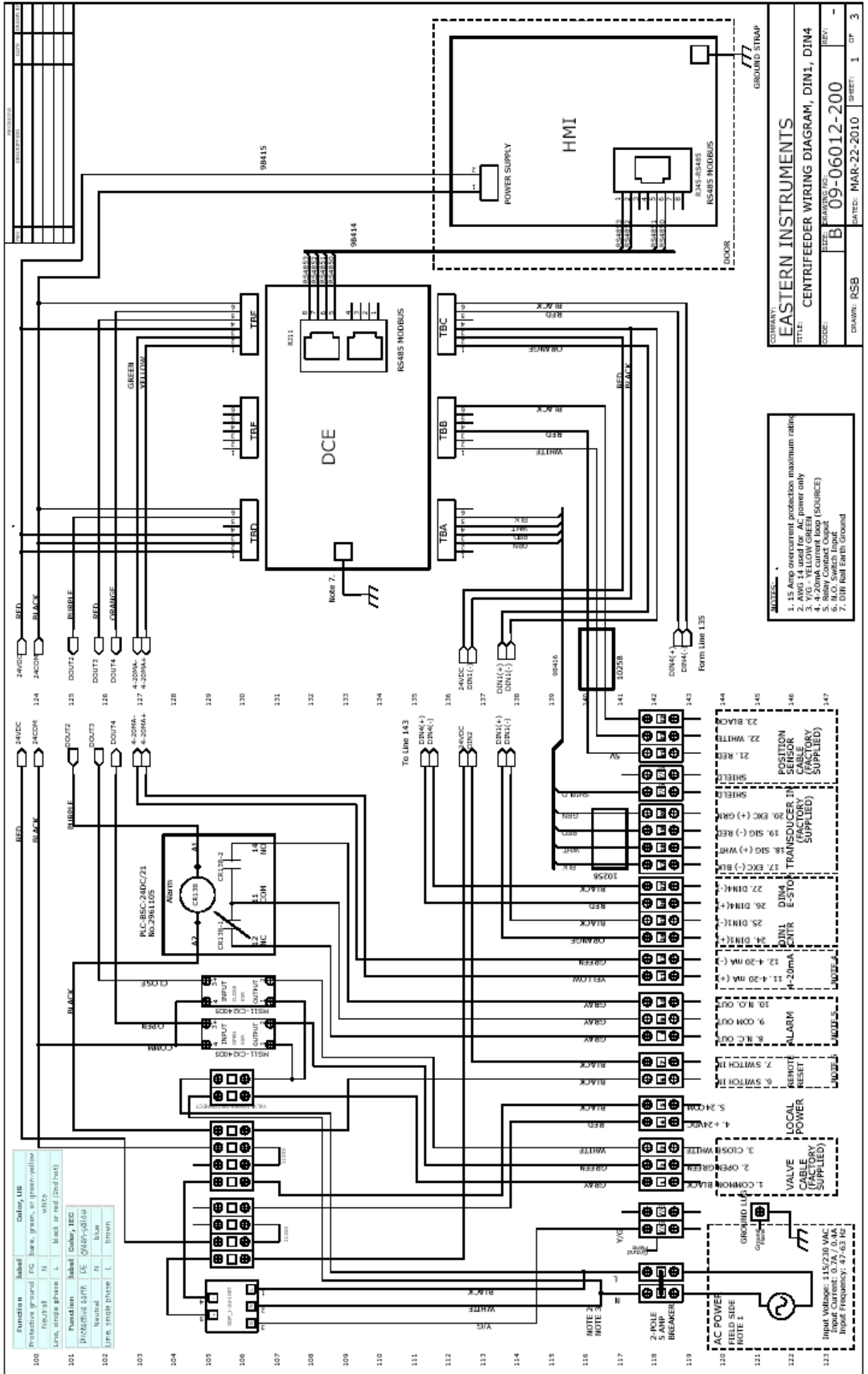
Set Point: The desired value of the process under automatic control, in engineering units or percent of Electronic Full Scale

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).

Wiring Diagram 1

CENTRIFEEDER™ ELECTRONICS



Wiring Diagram 1

CENTRIFEEDER™ CUSTOMER WIRING

