EASTERN INSTRUMENTS

CentriFlow® Meter

CENTRIFLOW® DIGITAL ELECTRONICS INSTALLATION & OPERATION MANUAL

REV 10/14

VERSION 2.1.5 SOFTWARE

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416 Landmark Drive
Wilmington, NC 28412

www.easterninstruments.com

Phone:(910) 392-2490
Fax: (910) 392-2123

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INSTALLATION

INSTALLATION REQUIREMENTS

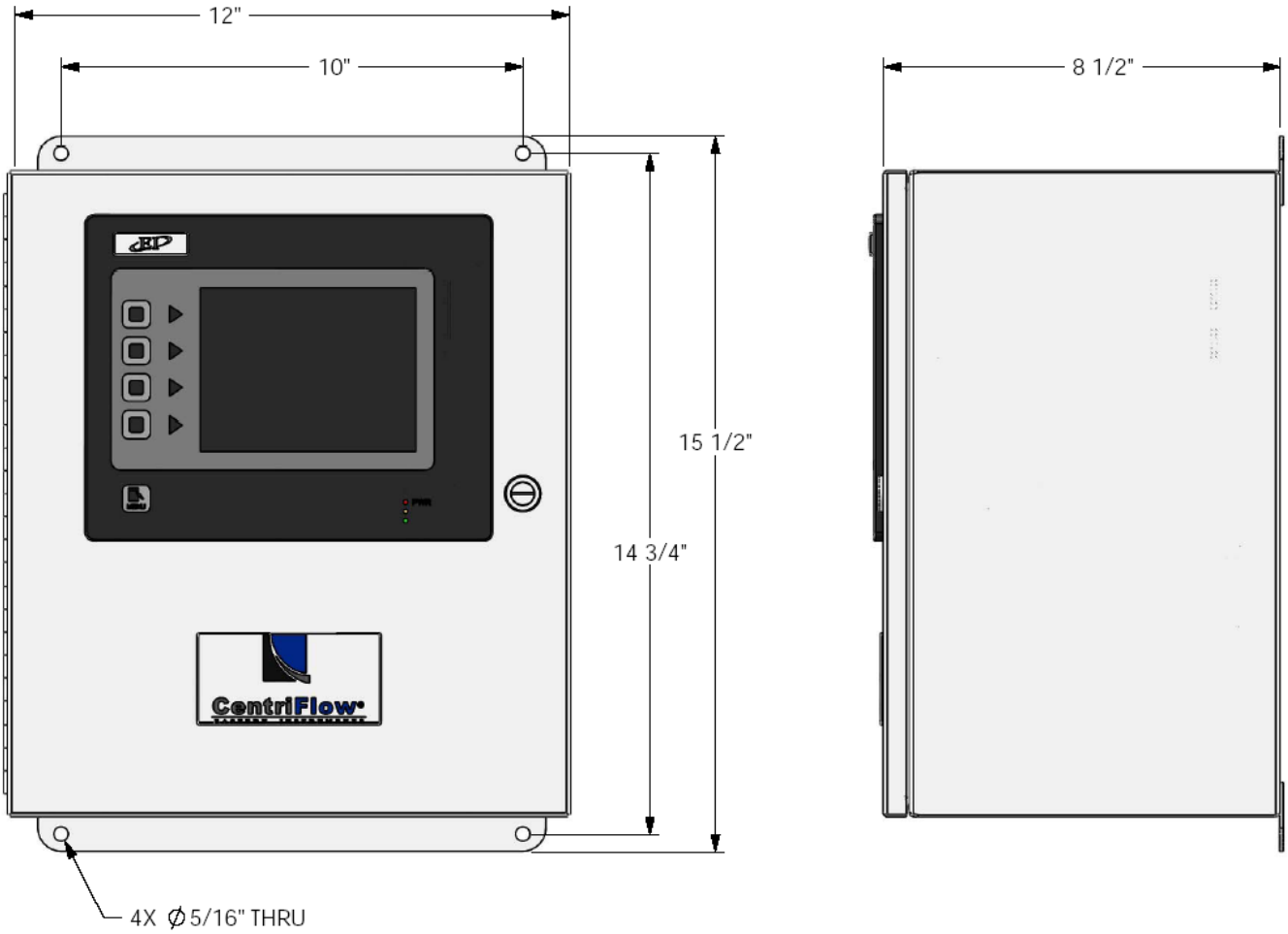
- The meter is to be used in a location where the product can be dropped from a fixed height such as a conveyer, or any type of feed system, which will give a reasonably constant initial vertical velocity. The design of the meter requires the product to contact the Tangential Plate and have some vertical 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 (this is not applicable for meters that are installed at a 10° or 20° angle) .
- The meter should be mounted using the mount holes only. The mounting method should minimize vibration and any movement. With a Type II Configuration mounting should not be done using the flange.
- Guides to reduce product stream to the meter Pan width are required if the conveyer/ feed system is wider than the meter Pan. Conversely, if the conveyer/feed system is considerably less than the width of the meter Pan, a spreader is required to widen the product stream to the width of the meter Pan.
- 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 should be wired using only the factory cable. There is a standard 50' Remote Electronics Cable supplied with the CentriFlow® Meter. The Electronics Cable should be cut to the exact length required. Do not coil the cable.
- It is required that the Remote Electronics Cable be run through 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. This is noted both in this manual and on the Enclosure itself.

INSTALLATION TROUBLE AREAS

- The CentriFlow® Meter's 4-20mA signal is self-powered and does not require any additional voltage.
- DO NOT RUN 480V, 240V, 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 CentriFlow® 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



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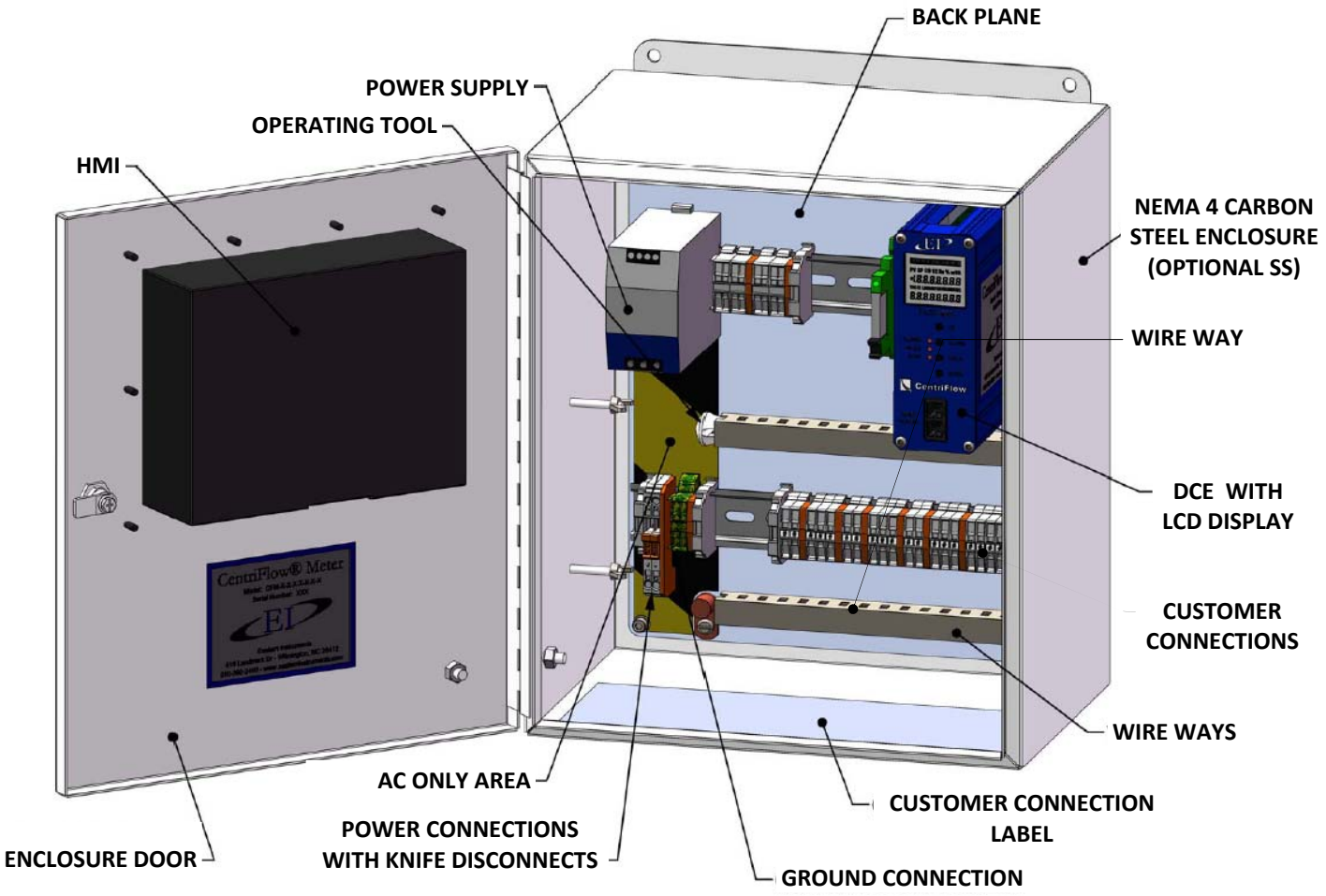
Fax: (910) 392-2123

OPERATION

Identifying Your Components



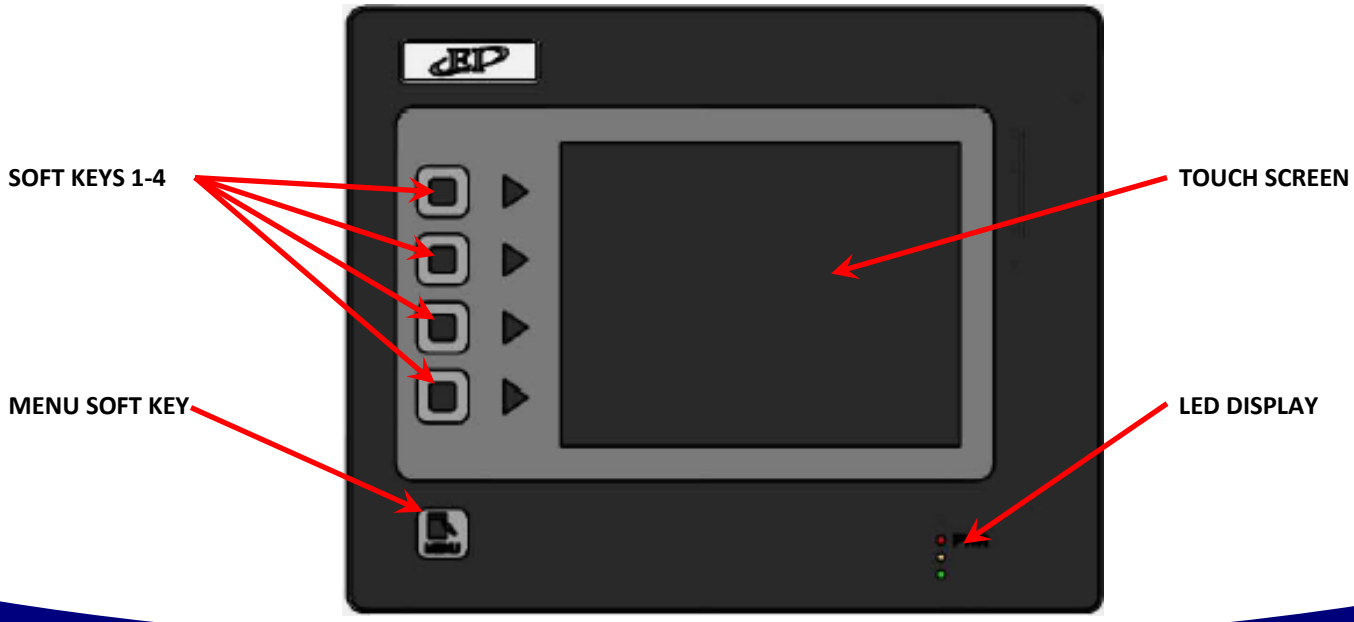
The Digital Electronics Enclosure contains the HMI, the Digital CentriFlow® Electronics (DCE), Power Supply, Alarm Relay, Power Connections with Knife Disconnects, and the Customer Connections.

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.

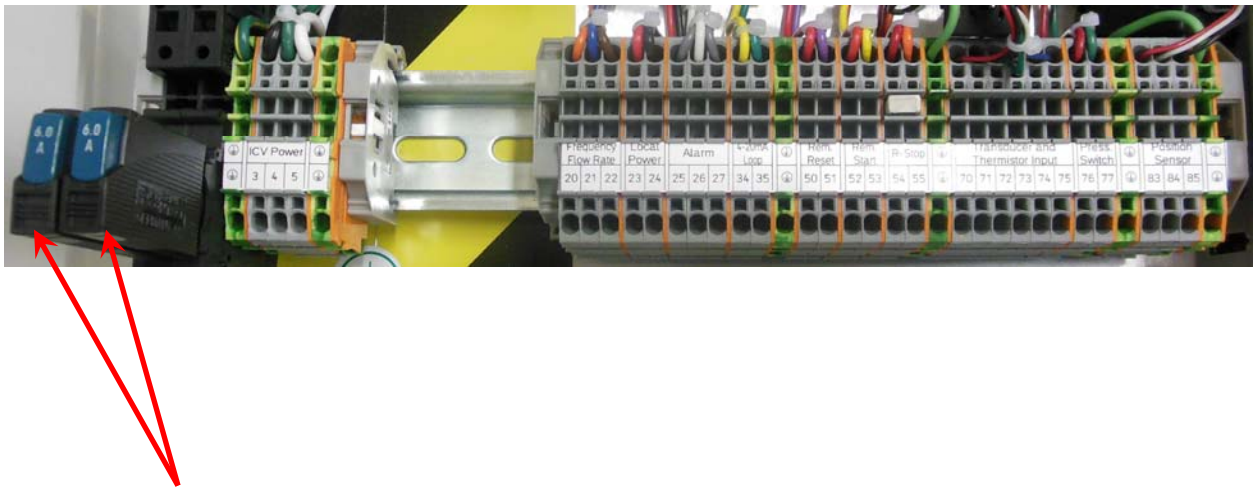
LED DISPLAY CHART

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



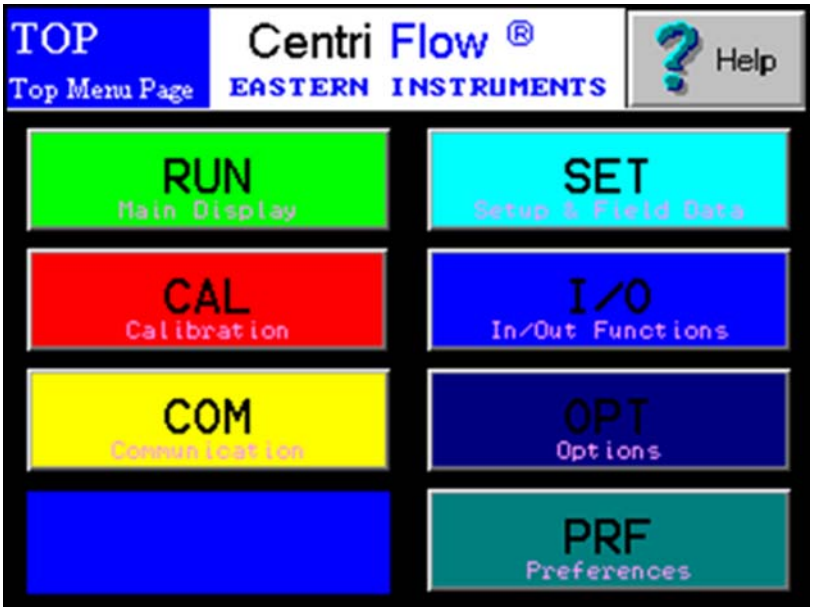
Powering On

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.



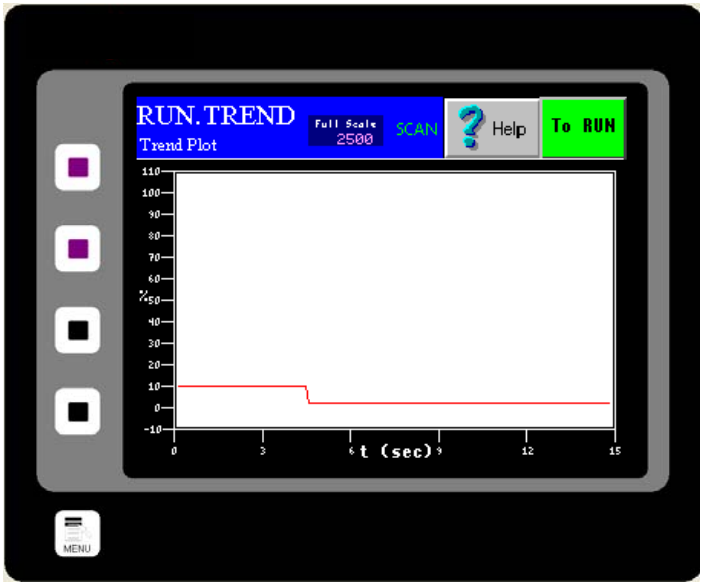
Circuit Breakers

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



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

From the TOP.RUN page, the Plot Button can be pressed in order to access the Plot page which will display the standard trend plot screen, pictured below. Another plot screen called an oscilloscope plot can also be accessed.



For more information on the Oscilloscope page, the TOP page and the TOP.RUN page please see the HMI Screen Guide within this manual. Before running product through the meter, it is recommended that a Static Calibration and a Dynamic (Product) Calibration be run. Please see the appropriate sections within this manual for each procedure as well.

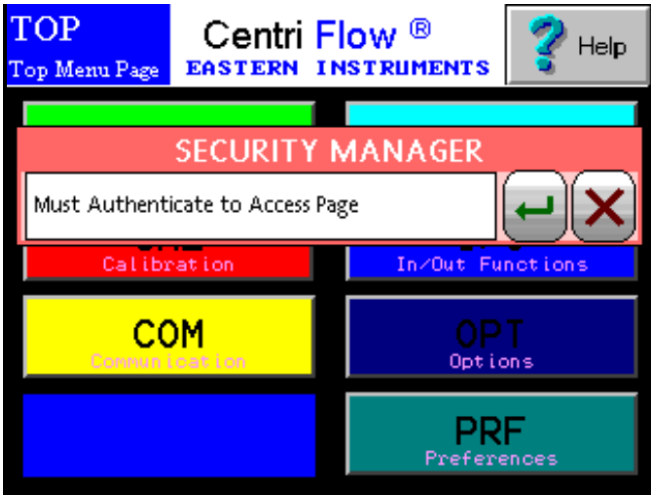
Security Features

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

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

Logging On

When accessing any page other than the three mentioned above, an orange "SECURE ACCESS CONTROL" dialog box will appear. Press the LOGON button to enter your username. Enter your username into the security dialog box, and press the Enter Button. You can then, enter your password into the security dialog box and press the Enter Button. Pressing the Symbol Button allows you to toggle between letters and numbers on the keypad. Please note that a default username and password have been entered. The default username and password are listed below:



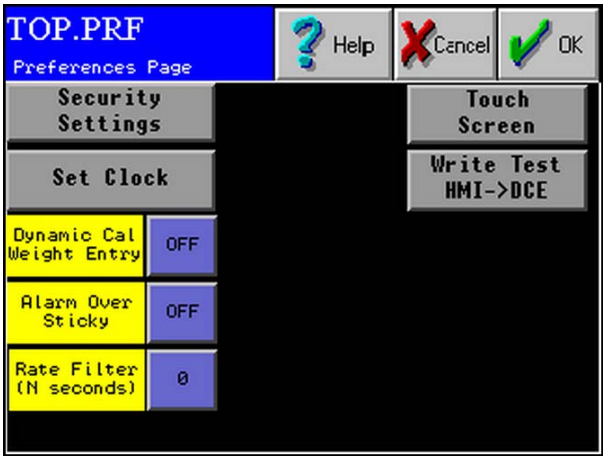
Username: **admin**
Password: **345**

After correctly entering your username and password, you will be logged on to the system. Please note that the HMI security system is configured to time out after 10 minutes of inactivity, at which time you will be required to login again. You will also be required to login any time the HMI unit is powered up.

Changing Your Password

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

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



PROCEDURES

Static Calibration (Static Cal.)

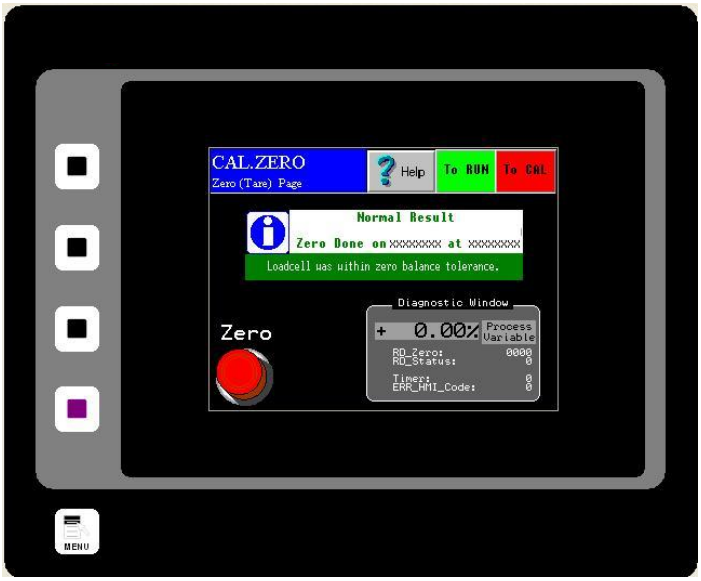
Static Calibration sets the Range of the Transducer in the CentriFlow Meter. This allows the meter to be versatile in a way such that it can be ranged up, known as Extended Static Calibration, or it can be ranged down, known as Reduced Static Calibration. The Static Calibration is a Factory Setting and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

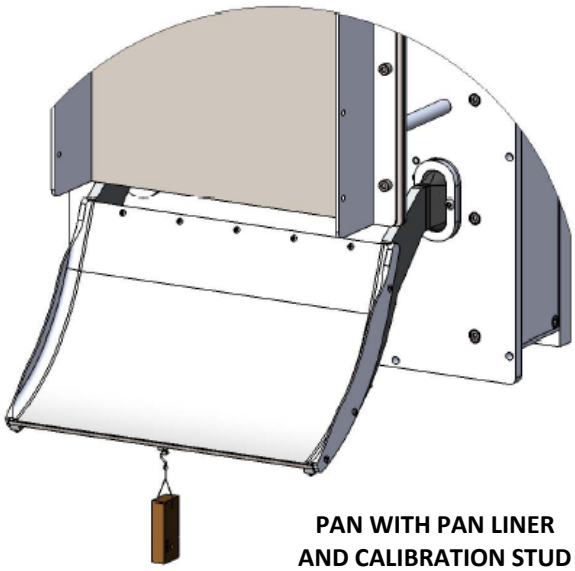
Step 5: Press the CALs Button. You should now be on the CAL.CALs page as seen on the next page.

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.

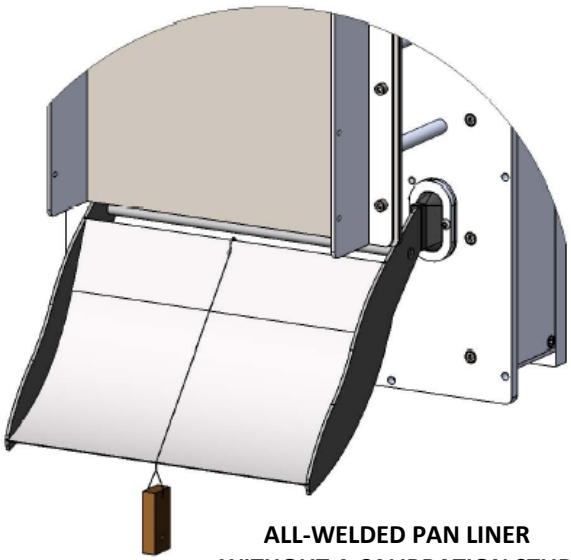
Step 7: Press the CALs Button located on the lower left side of the screen. Note the % Volts reading displayed in the Diagnostic Window. Verify the reading is correct for the selected range. For example, 25% is the correct value for the Standard Range setting. Please see the table below for the correct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



PAN WITH PAN LINER AND CALIBRATION STUD



ALL-WELDED PAN LINER WITHOUT A CALIBRATION STUD

Site Calibration

When the CentriFlow® 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.

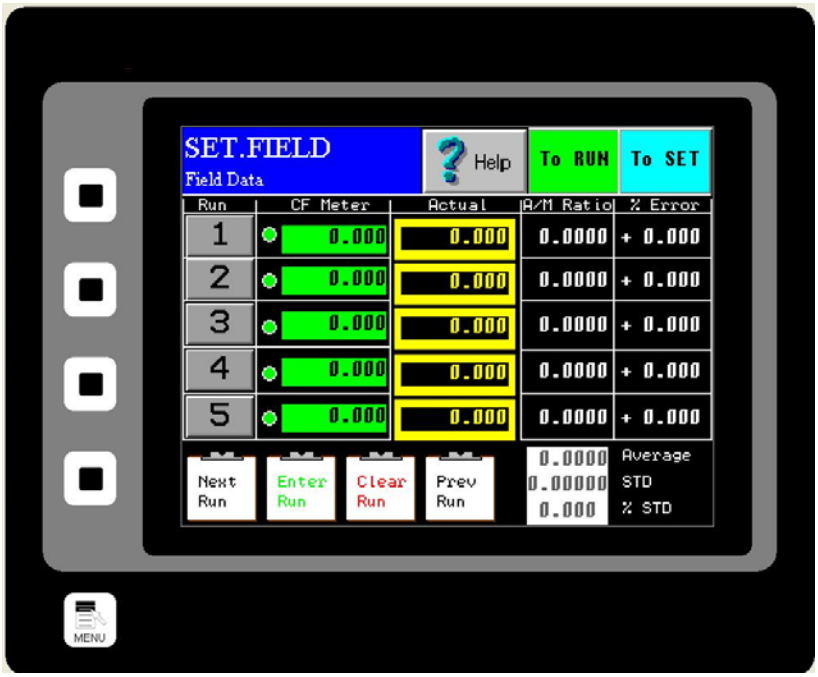
The Calibration Voltage, however, is the adjustment that is made to Calibrate or Site Calibrate the Electronics to a particular application. Although the Factory setting may be quite accurate, it is likely due to differences in installation, feed systems, and material being measured, that an adjustment be made after the CentriFlow® 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 CentriFlow® 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.

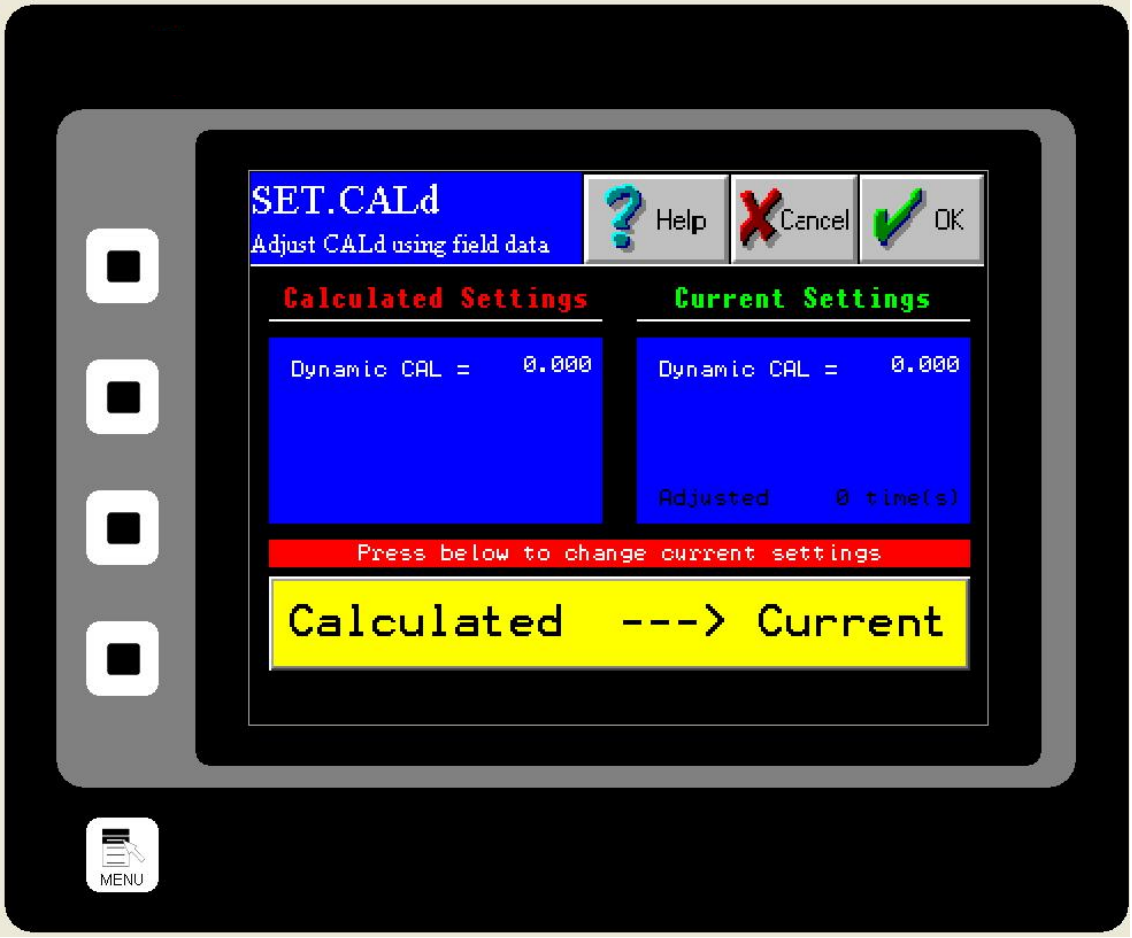
Step 6: Return to the TOP.RUN page and press the RED RESET Button on the bottom left.

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 CACULATED to CURRENT Button and press the OK Button. A pop up screen will appear, asking if you are sure you would like to accept this value. Press YES.

Setting the 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.

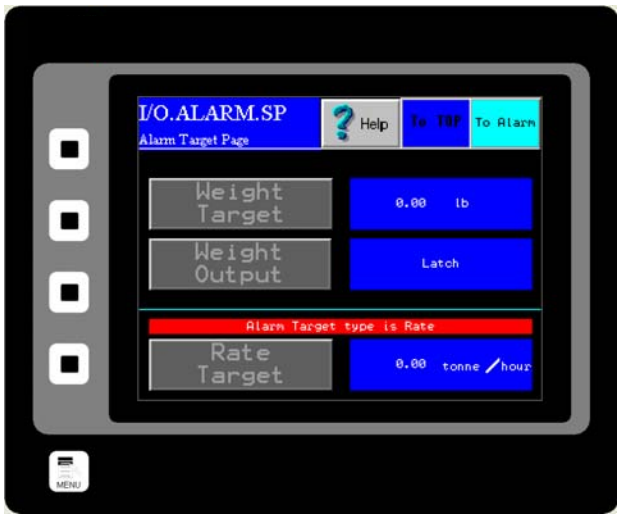
Step 1: From the TOP.I/O page press the ALARM Button. Details of this page can be found in the HMI Screen Guide in this manual.

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: Based on your selection of 'Type" the Target Value will either be in units of weight or units or rate. 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 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.

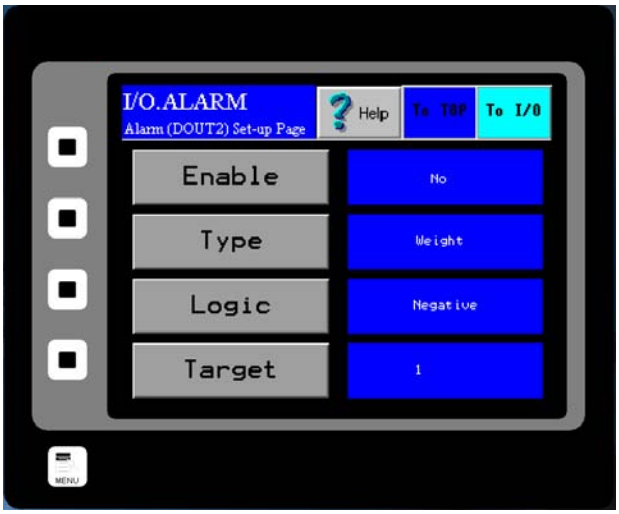
Step 8: Return to the I/O.ALARM page once more. To turn the alarm on, press the ENABLE Button until "YES" is displayed in the blue display box to the right of the ENABLE Button.

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.

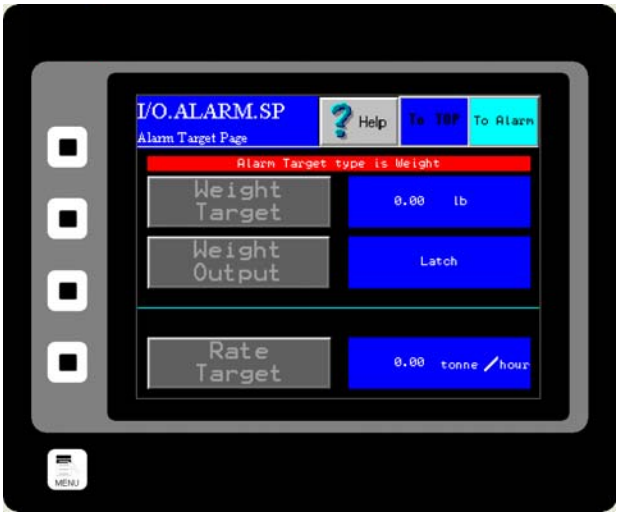
Step 1: From the TOP.I/O page press the ALARM Button. Details of this page can be found in the HMI Screen Guide in this manual.

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.

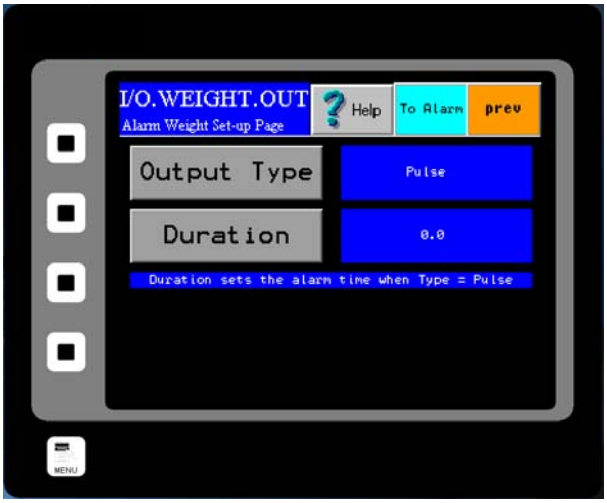
Step 4: You have chosen to set the alarm based on Weight, or Totalization. Now you must select a target value that will trigger the alarm. Select a Target Value by first pressing the TARGET Button.



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 & Zero Capability

What is Remote Reset?

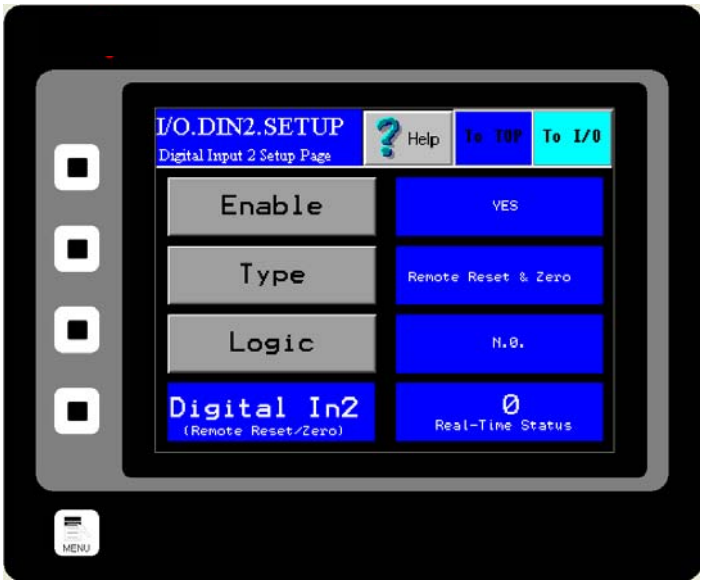
Remote Reset allows you to remotely trigger a reset of the Totalization on your Digital Electronics. This feature is similar to pressing the RESET Button from the TOP.RUN page. The Remote Reset can be utilized by installing a remote push button on/off switch (customer supplied). To properly wire the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

When to Perform Zero

Zeroing should be performed after initial installation and after any mechanical procedures or replacement of parts, such as Loadcells or Measurement Pans. Once properly calibrated, the meter may be zeroed periodically if deemed necessary. Recommendations of whether to zero the meter or not and how often to zero the meter are application specific. Typically, zeroing is recommended in the case that zero drift contributes sufficient error to prevent the desired accuracy. Zero drift may occur due to product buildup on the pan, temperature changes, and other factors. Generally, this is not a problem since the user may zero the meter in order to remove the offset before the reintroduction of product flow through the meter.

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.



Selecting Remote Reset, Zero or Both

Pressing the TYPE Button will allow you to choose the function of pressing your Remote Push Button. It will either function as a Remote Reset, to Zero the meter, or can function as both simultaneously.

Logic

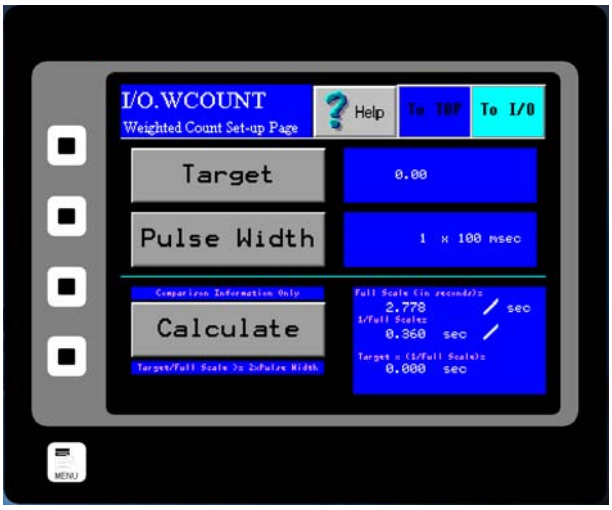
The logic of the Remote Reset Capability can also be manipulated. If the LOGIC Button is pressed, a dialog box will prompt you to chose from two options, "NC" or "NO". The option "NC" is Normally Closed, while "NO" is Normally Open.

Setup of Weighted Count Output (Optional)

What is Weighted Count?

Weighted Count is an output option that will allow you to generate a count much slower than the 500 Hz Frequency, flow rate proportional signal. It is derived mathematically by dividing the totalization output by a scale factor. Once a target weight is selected, a pulsed output signal is generated by the electronics each time the target weight is reached. This signal can be used by a PLC or counter to digitally record the total weight based on the number of pulses. This option may eliminate the need for a costly High-Speed Counter Card for your PLC.

Enabling the Weighted Count



Step 1: Please ensure that the Weighted Count option is wired properly. Please see the appropriate section of the Wiring Customer Connections section of Chapter 1.

Step 2: Once wired properly, you must enable the Weighted Count option. To enable the Weighted Count, access the I/O Menu from the TOP.MENU page and click on the WEIGHTED COUNT Button. You should now see the page shown to the right.

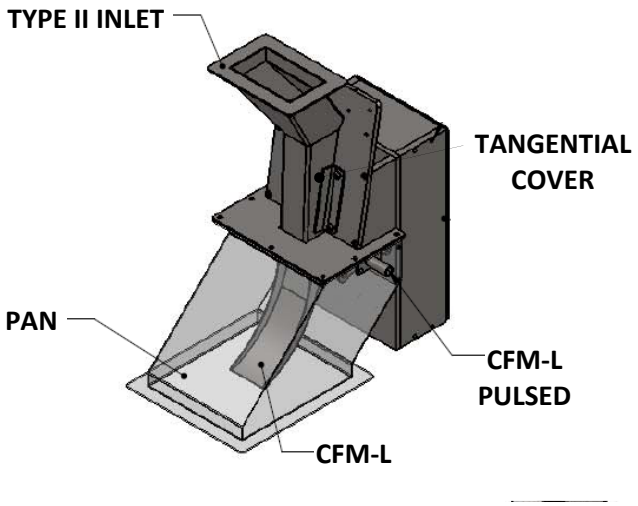
Step 3: Press the TARGET Button. The current Target value for the Weighted Count option will be displayed. Double click on the value and a numeric keypad will appear. You can enter your value now. Press the OK Button in the Upper Right corner of your screen when finished.

Step 4: You can also select the duration of the pulse sent after each time the target weight passes through the meter. To do so, press the PULSE WIDTH Button and select your desired value. Press the OK Button in the Upper Right corner of your screen when finished.

Step 5: Please note that the values entered for Target and for Pulse Width take effect immediately and there is no need to press the CALCULATE Button. For more information on the CALCULATE Button and its function, please see the I/O.WCOUNT page in the Screen Guide in Chapter 4.

Pulsed Air System (Optional)

If the CentriFlow® Meter was shipped with the Pulsed Air option please continue with the following directions.



PURPOSE:

The Pulsed Air System was designed to deliver a pulsed blast of air to the area in front of the Backplate and behind the Tangential Cover, as well as across the Measurement Pan. The use of this air is intended to aid in reducing product buildup on the Pan, Pan Arms and behind the Tangential Plate. The blast of dry air should reduce buildup and greatly reduce miscalculations caused by buildup on and around the Pan without adversely affecting measurement.

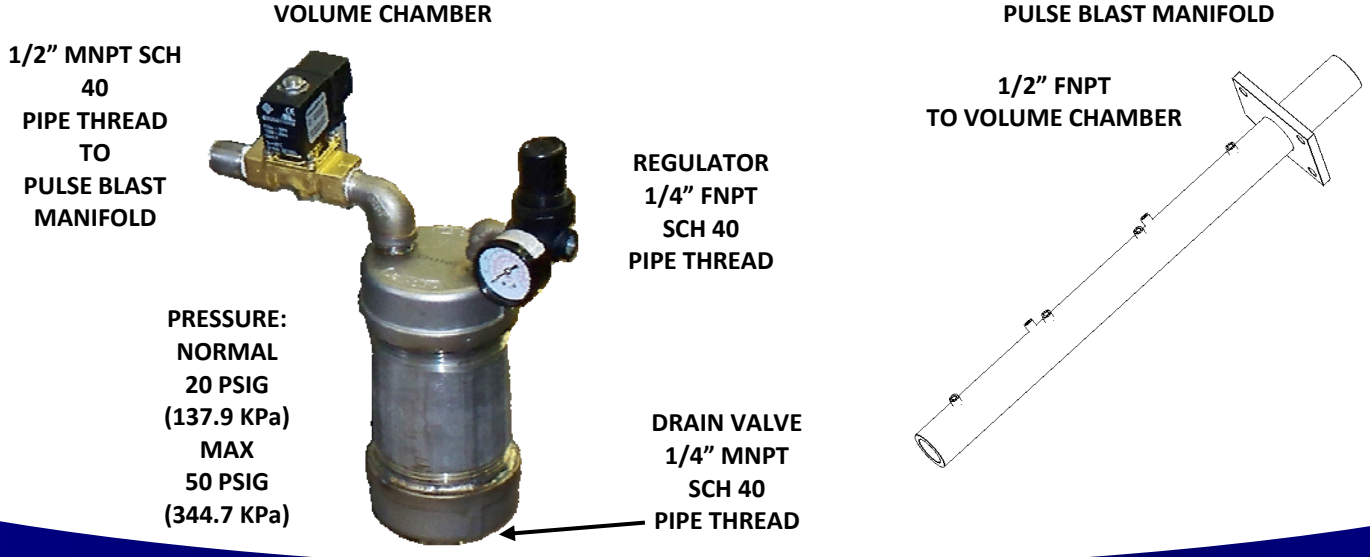
REQUIREMENTS:

Included Components:
- Pulse Blast Manifold
- Pulsed Blast Air Chamber
- Pressure Regulator & Gauge

Also Required, Not Supplied:
- Air Tubing (Metal or Plastic – see below)
- Air Fittings with 1/4" NPT thread
- Pipe Tape

COMPRESSED AIR LINE SIZES:

All tubing should be Stainless Steel 3/4" Schedule 40 NPT whenever possible.



INSTALLATION DIRECTIONS

1. Install the Pulsed Air Manifold into the CentriFlow® Pan Cover so that the Flange on the Pulsed Air Manifold lines up with the Cut Out on the Pan Cover. If the meter was shipped with the Pulsed Air System, the Pulsed Air Manifold will already be installed.
2. Mount the Pulsed Air Volume Chamber to the Pulsed Air Manifold by connecting the 1/2" Male Pipe Thread Connection on the Volume Chamber to the 1/2" Female Pipe Thread Connection on the Pulsed Air Manifold. If the meter was shipped with the Pulsed Air System, the Pulsed Air Volume Chamber will already be installed.
3. Connect an air supply to your Pulsed Air System by tubing the regulator with clean dry instrument air of at least 20 psig (137.9 KPa). The inlet line can be ¼" tubing.
4. Run a power cable between the solenoid valve and the CFM Electronics. The normal operation of the solenoid valve is 120 VAC at 15V, but it can be equipped with a 240 V coil for use in areas where 120 VAC is not available. The valve is powered by the CentriFlow® Meter's electronics and does not need outside power, however a power cord to connect the solenoid valve to your digital electronics is required. The cord should be at least 18 Gauge, 3 Conductor Cable. Please see local requirements for whether Conduit or SO Cable is required. For normal use, do not exceed 250 ft of cable between the solenoid valve and your electronics enclosure.

OPERATION

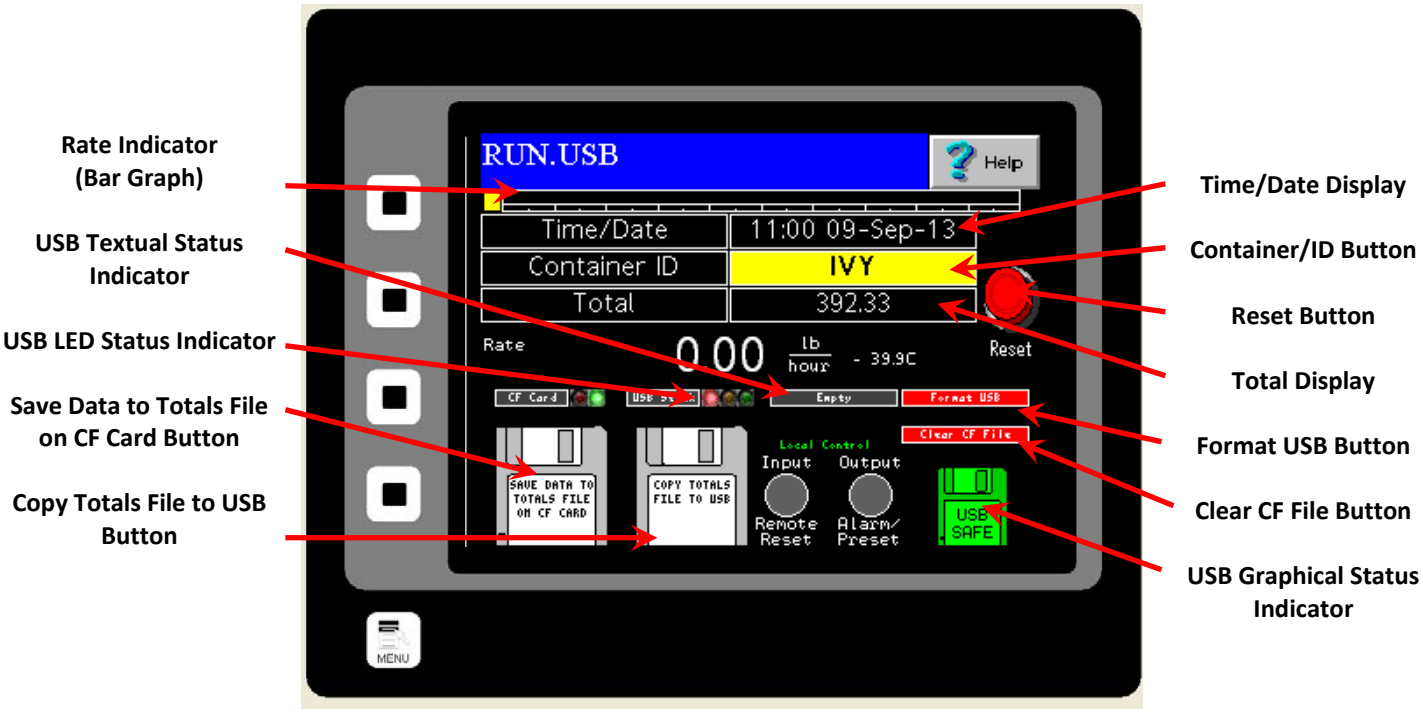
1. The Pulsed Air duration, or time that each blast of air lasts is a constant that is factory set at 100 ms and can not be changed. The Pulsed Air Frequency, or the duration of time between pulsed blasts of air can be changed, however. For more information on the Pulsed Air Frequency, please see the OPT. PULSEDAIR page in the HMI Screen Guide for more information.
2. The Lock Out Time, also found on the OPT.PULSEDAIR Page is also factory set and should typically not be modified in the field. If modification is required, please contact Eastern Instruments.
3. Reduce the pressure on the regulator to the lowest pressure that will still ensure the proper cleaning of the measurement area. The lower the value of the pressure, the longer the life of the solenoid valve.

MAINTENANCE

1. Periodically check the operation by observing the pressure gauge located on the regulator. It will drop to ½ or more of the set pressure during the blast. If the pressure drop is not observed as the associated LED in the control box is lighting, then replace/clean the solenoid valve.
2. Drain the water from the Volume Chamber periodically until some pattern is established. If water is consistently found, consider adding an automatic drain to the volume chamber or improving the supply air quality. DO NOT allow water to fill the volume chamber and then spray into the meter measurement section.

USB (Optional)

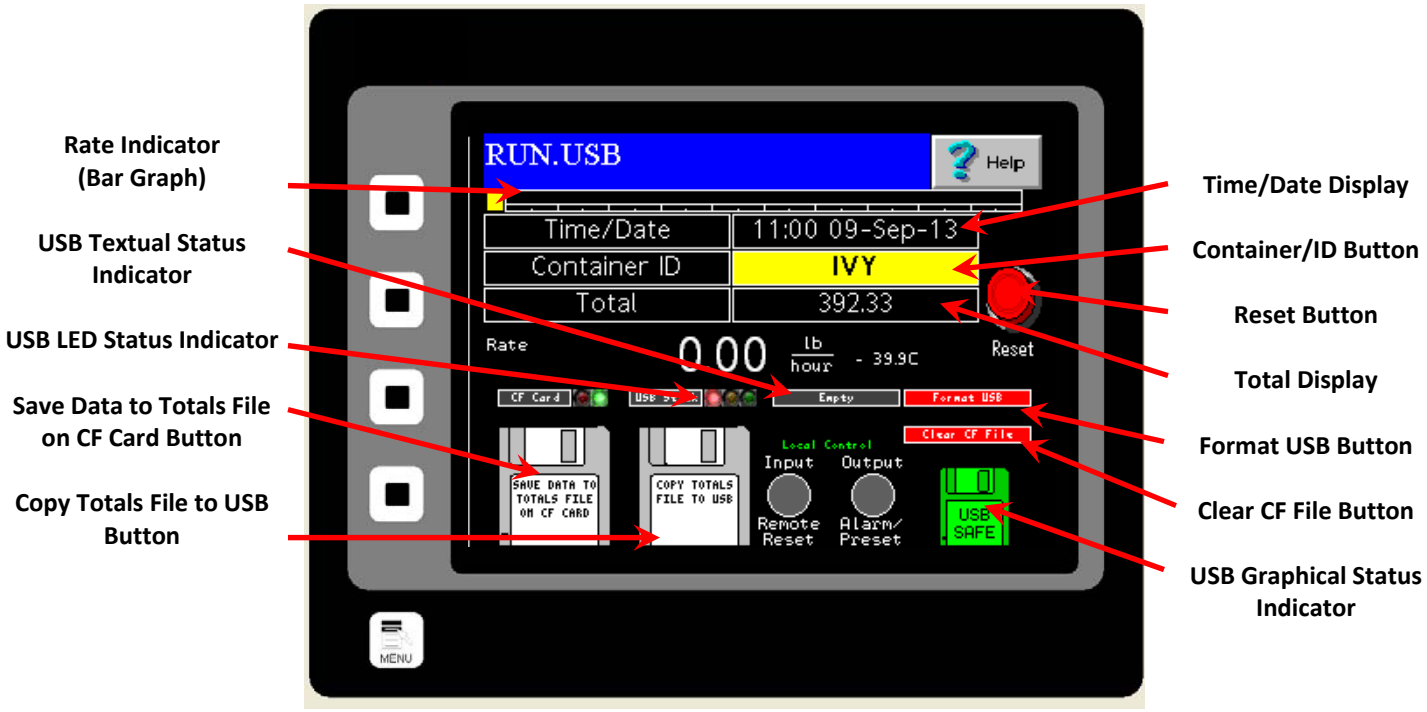
The USB Option allows users to save a variety of run data (this data is customizable) to a USB drive as well as the standard Compact Flash Card. Custom Run Screens are also available and the data from the custom run screens can be written to the USB as well.



The RUN.USB Page

The RUN.USB page is designed to be your fully functional RUN page. Values seen from this page (and written to the Compact Flash Card and USB) include Rate, Total, Date/Time and Container ID (Press the Yellow Container ID Button to input both letters and numbers). The status of various aspects of the compact flash card and USB stick can also be seen on this Run Page. Visual indicators in the bottom center of the page indicate the status of remote reset/ zero (by-wire), alarm and local/remote control as well.

After completing a batch, enter the identifying number/letter of the container that correlates to the batch and press the *Save Data to Totals File on CF Card* Button (Left most Disk icon). Once completed, the word "DONE" will appear in blue briefly to let you know the write occurred. At this point, you can reset the total by pressing the Reset Button.



PLEASE NOTE

Each time batch data is written to the Compact Flash Card, a new line is written to a file called 'totals.csv'. This file contains Time, Date, Container ID and Total Weight. Copying files to the USB will leave the original file on the Compact Flash Card intact and creates a copy of it on the USB stick. If you wish to clear out the logs after copying to the USB stick, you can press the Clear CF File Button. Please note that writing files to a USB is not required after each run.

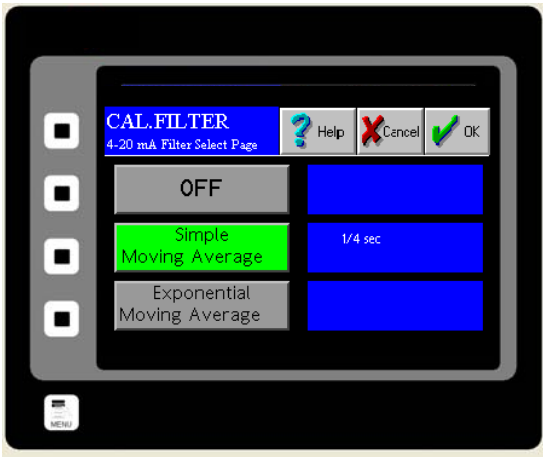
To copy files to a USB Stick, a properly formatted (FAT16) USB stick must be inserted into the receptacle located on the bottom of the enclosure. This will cause the USB LED Status Indicator to turn Red, indicating that the USB stick has been mounted by the system. DO NOT REMOVE THE USB STICK WHILE THE INDICATOR IS RED OR YOU MAY LOSE DATA!

You can format a USB card directly from the RUN.USB page by inserting it, then pressing the Format USB Button. Several indicators of a properly formatted and mounted USB stick include that the USB LED Status Indicator is GREEN, "Mounted" is displayed in the USB Textual Status Indicator and the USB Graphical Status Indicator turns RED and reads "Eject USB". At this time, the USB is ready to receive the copied files. Press the Copy Totals File to USB Button to copy the file to the USB stick. The word "DONE" will appear in blue to let you know the copy was successful.

Now that you have copied your data to the USB stick, simply press the red disk labeled "Eject USB" to safely remove the storage disk. Once this icon turns green and reads "USB Safe" it is safe to remove the USB stick.

4-20 mA Filtering

Filtering of the 4-20 mA signal allows smoothing of the otherwise instantaneous output delivered by the CentriFlow Meter's electronics. The 4-20 mA signal can be filtered from 1/4s up to 10s increments, however the mathematical method of filtering differs depending on the desired increment. For filtering under 3s, a simple moving average filter is used. For filtering of 3s or higher, an exponential moving average is utilized.



Simple Moving Average:

The formula for a simple 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.

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

X[ ] = input signal
Y[ ] = output signal
M = number of points
Filter = 1/4, 1/2, 1, 2, 3 s

Exponential Moving Average:

The formula for an exponential moving average filter is shown below. The time increment selected determines the value of the smoothing coefficient constant as seen in the following formula.

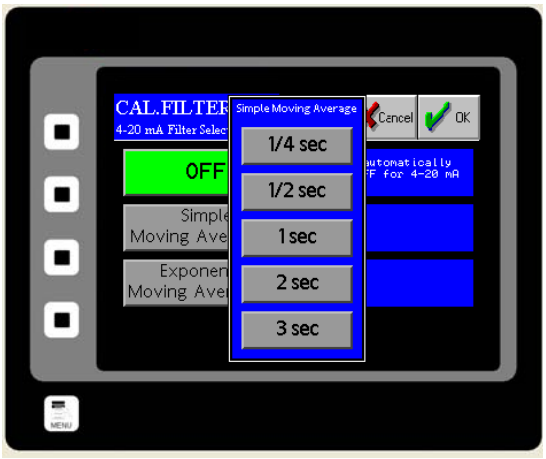
$$S_t = \alpha \times Y_t + (1 - \alpha) \times S_{t-1}$$

S_t = Exponential Moving Average at time (t)
α = Constant Smoothing Coefficient
Y_t = Sample at time (t)
Filter = 3, 4, 5, 6, 7, 8, 9, 10s

*** Please note that the 4-20 mA filtering option will not be visible via the HMI plot screen. Any 4-20 mA filtering will also not function if transmitting data via Ethernet or another internet protocol.**

Software Setup of the 4-20 mA Filter

The 4-20 mA filter allows local filtering of the 4-20 mA flow rate signal and can be filtered in 1/4s up to 10s increments. Please note that the 4-20 mA Filter can not be transmitted via Remote Communications Protocol. The settings for enabling your 4-20 mA filter are found on the CAL.FILTER page, accessed by first pressing the CAL Button from the Main Menu, and then pressing the FILTER Button from the TOP.CAL page. The procedure below describes how to set the 4-20 mA filter of the flow rate signal locally.



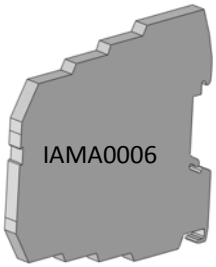
1. The 4-20 mA filter is automatically set to OFF. To enable the filter, you must select either the SIMPLE MOVING AVERAGE or the EXPONENTIAL AVERAGE filter for the appropriate filter.
2. The different options for filtering are listed below. Press the appropriate button and a pop-up menu as seen to the right, will be displayed.
3. Click the desired filtration increment.
4. Press the OK Button in the top right hand corner to accept this value.

Filter Options

Simple Moving Average	Exponential Moving Average
1/4s	3s
1/2s	4s
1s	5s
2s	6s
3s	7s
	8s
	9s
	10s

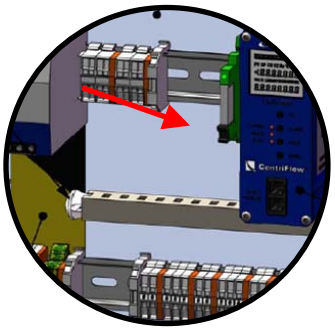
Rate Filtering (Optional)

Filtering of the rate, as seen on the TOP.RUN allows smoothing of the otherwise instantaneous output delivered by the CentriFlow Meter's electronics. The filtering method is similar to the 4 -20 mA Simple Moving Average filter with some specific differences. Whereas the 4-20 mA filter is a local filter only, the Rate Filter allows filtering of the output that is transmitted via Ethernet or any other Internet Protocol. The Rate filter can be implemented in two distinct ways. The Rate Filter can be fixed, filtering in anywhere from 0s to 10s at .1 second intervals. The Rate filter can also be adaptive so that it changes or adapts to changes in your process. The filter takes in information from your VFD as well as the 4-20 mA signal that instructs it and uses this data to adapt the time interval of the filter to the specific dynamic system.



Field Installation of the Adaptive (Rate) Filter

Installation of the Adaptive (Rate) Filter requires the purchase of the Adaptive (Rate) Filter option. Once purchased, successful installation requires both a mechanical installation as well as a software configuration.



Hardware Requirements: IAMA0006 - Provided upon purchase

1. Mount the IAMA0006 on the upper DIN rail between the power terminals and the mechanical relay(s).

2. Open the upper, the center and right hand wire ways within the Digital Electronics by removing the tops of the wire ways.

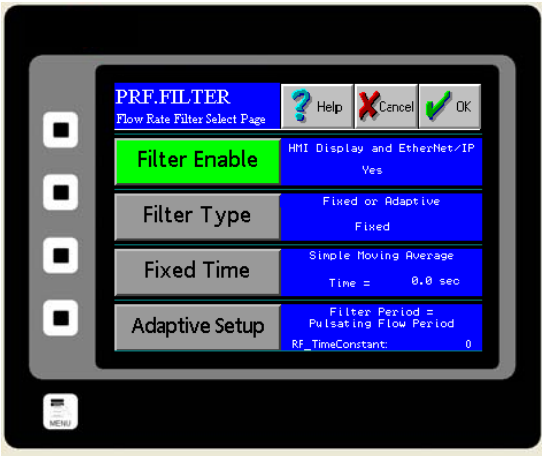
3. Route the 4 (four) wires from the top side of the IAMA0006 into the top wire way, over to the right and down to the center wire way. The yellow and white wires are pre-terminated with a TBB connector. This will plug in to the bottom center connector of the DCE (blue box), and is labeled TBB on both the connector and receptacle. The red and black wires should continue to the left through the center wire way, and will terminate at +24VDC and 0VDC, Customer Connections #1 and #2.

4. On the bottom side of the IAMA0006, there are 4 terminals. Terminals 1 (one) and 2 (two) are the input for the device. Terminal 1 (one) is the positive current loop input and should connect to the positive terminal of the current loop source. Terminal 2 (two) is the negative current loop input and should connect to the negative terminal of the VFD/Controller.

*** Please note that the Adaptive (Rate) filter will be visible via the HMI plot screen. The adaptive (Rate) filter functions if transmitting CentriFlow output via Ethernet or another internet protocol, but will not function if using 4-20 mA output.**

Configuration of Fixed (Rate) Filter

The Fixed Rate Filter must both be enabled and must also be configured by entering a time interval in the appropriate location. To enable the Fixed Rate Filter, please follow the below instructions from the PRF.FILTER page. The PRF.FILTER Button is found by pressing the PREFRENCES Button from the Main Menu.



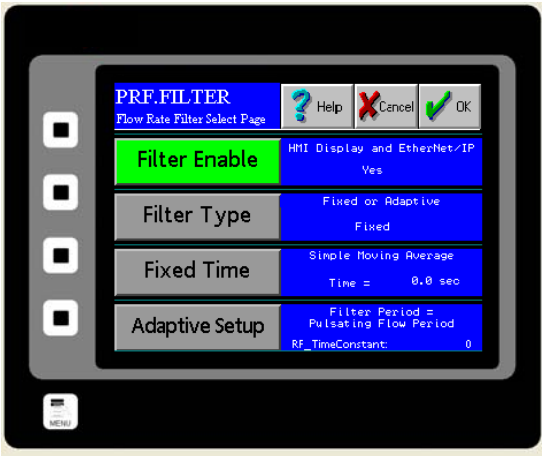
1. Press the FILTER ENABLE Button so that “Yes” is displayed to the right of the button.
2. Press the FILTER TYPE Button and choose “Fixed” from the pop-up menu.

Now you must enter a fixed time interval for the Fixed Rate Filter. Begin this process by pressing the FIXED TIME Button. You can enter any value from 0s to 10s in .1s intervals. Once the time interval has been selected, press the OK Button in the top right hand corner.

Please note that you will not need to enter any information under the ADAPTIVE SETUP if the Fixed Rate Filter is currently enabled.

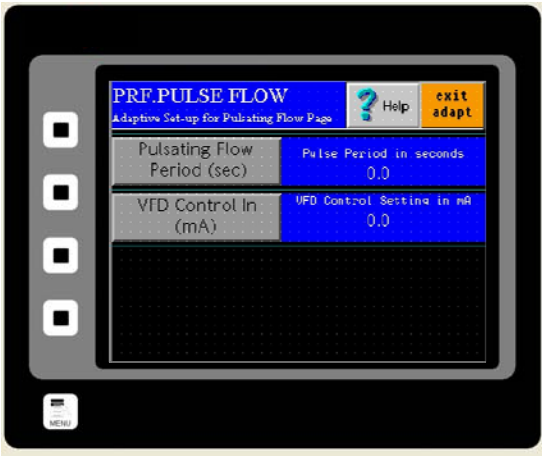
Configuration of Adaptive (Rate) Filter

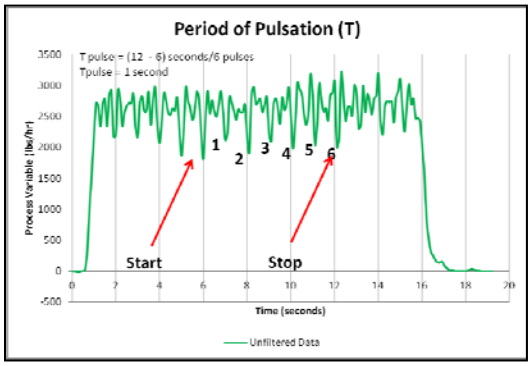
The Adaptive Rate Filter must both be enabled and must also be configured to your specific installation. In order to do so, a single calibration point (the length of pulsations at a specified VFD output) must be entered. To enable the Adaptive Filter, please follow the below instructions from the PRF.FILTER page.



1. Press the FILTER ENABLE Button so that "Yes" is displayed to the right of the button.
2. Press the FILTER TYPE Button so that "Adaptive" is displayed to the right of the button.
3. Press the ADAPTIVE SETUP Button in order to begin configuration of the adaptive filter.

Pressing the ADAPTIVE SETUP Button will take you to the PRF.PULSE FLOW page (right). In order to use the adaptive filter feature it must be configured to the specific site installation using the calibration point mentioned above. The calibration point involves both the Pulsating Flow Period and the VFD Control In value, as seen on the PRF.PULSE FLOW page. One method to determine these values is to run your VFD at a known setting and measure the pulses on the RUN.SCOPE plot. The plot type is selected from the TOP.PRF page. The Scope plot has a fixed time of 20 seconds with gridlines at 2 seconds. Identify the pulse minimums (or maximums, whichever is more repeatable) and count how many pulses occur per a given time interval. Then calculate the filter period (T_F) which is equal to the time divided by the number of minimums. An example of this can be seen (right). As 6 pulsations occur within a 6s timeframe, the pulse period of a single pulse will be 1s/pulse. After pressing the PULSATING FLOW PERIOD Button, enter this value and press "OK". Record your VFD's Control In value after pressing the VFD CONTROL IN (mA) Button. And press "OK" once again.





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

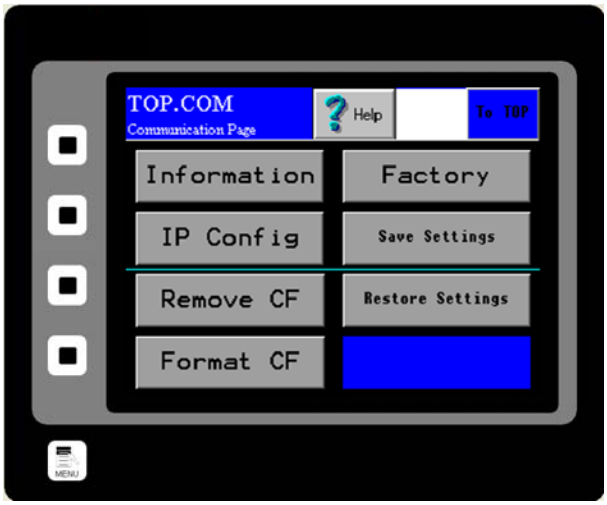
The process for removing the Compact Flash card is called Hot Swapping. Hot Swapping is not the preferred method of transferring data from the flash card to an external source due to the possibility of data files being corrupted if the Flash card is removed improperly. Please remember that the Compact 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.

You will now be on the COM.REMOVE page. 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.

Save Settings



You can also save your settings and configurations to your Flash Card and restore them if your settings have been unintentionally changed. To save your HMI settings to a Flash Card (provided you have one installed), press the COM Button from the TOP Menu to enter the TOP.COM page (seen on right). Now, press the Save Settings Button. You will be prompted with "Do you want to save the HMI configuration to flash?" Press "Yes" to save the configuration settings.

Restore Settings

This allows you to restore the saved configuration settings in the event that your settings have been changed on the HMI. From the TOP.MENU page, press the COM Button to enter the TOP.COM page. Press the Restore Settings Button. Again, you will be prompted with "Do you want to load the HMI configuration from flash?" Press "Yes" to load the settings from the flash card. This procedure will fail if no flash card is present, or previous HMI settings have not been saved to the Flash Card currently installed in the HMI.

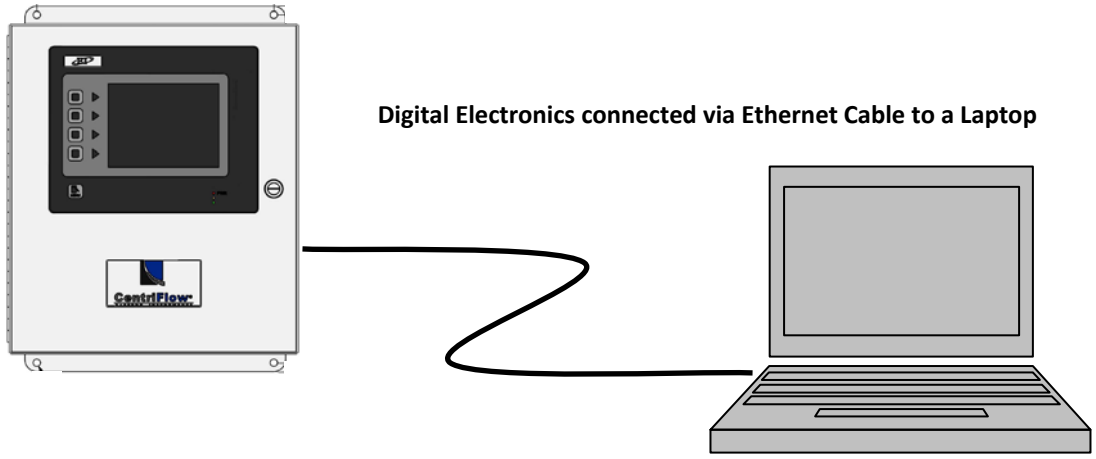
Please note that as data is saved on your Compact Flash Card and the Card reaches its data storage capacity, the HMI will begin overwriting the oldest data as the newest data is saved to the Compact Flash Card.

Format Flash Card

To format your Compact Flash Card ensure that your it is securely inserted into the HMI. Press the COM Button from the Main Menu and then press the FORMAT CF Button. Next, press the large Yellow FORMAT COMPACT FLASH CARD Button. Your Compact Flash Card should now be formatted. Please note that all data will be erased from the Compact Flash Card and so if you would like to preserve the data, you will need to save the data to another location.

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.



Digital Electronics connected via Ethernet Cable to a Laptop

Establishing Communication

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

IP Address: 192.168.1.90
Mask: 255.255.255.0

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

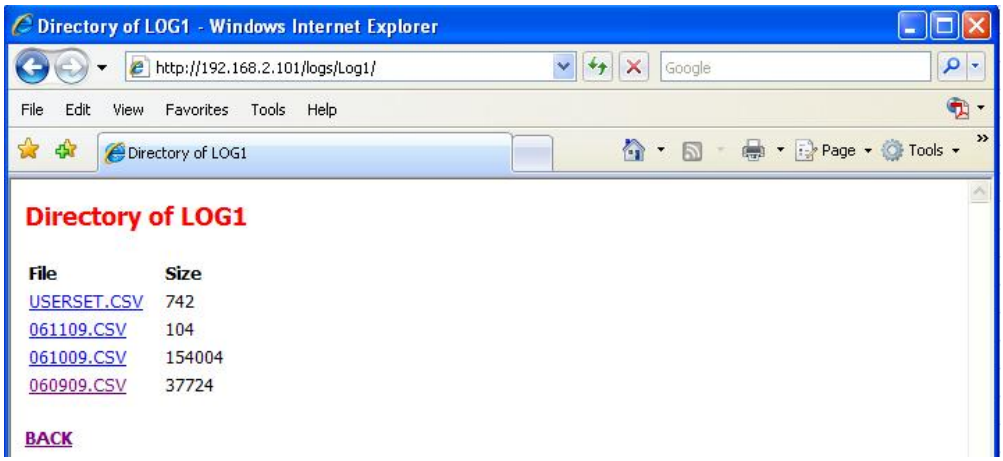
Entering the Digital Electronics IP Address will bring up a web page entitled “G3 Web Server”. This page will allow you access to three options, View Data, View Logs, and Remote View.

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 ENGINEERINING 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 is 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	

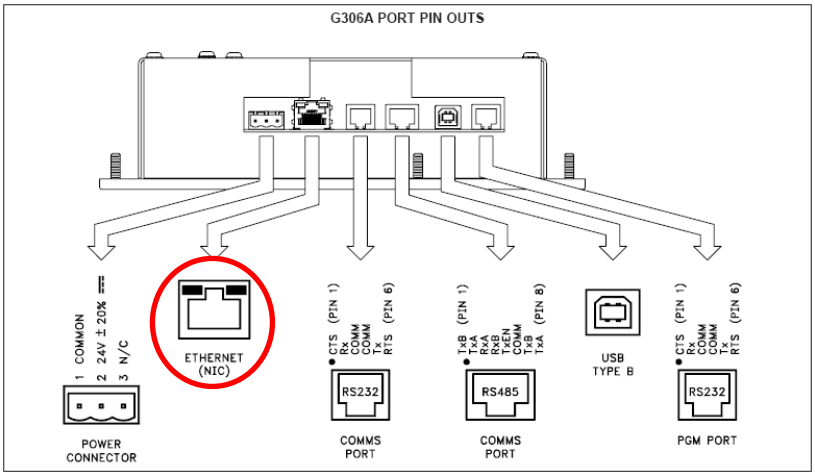
View Data

This option is not used.

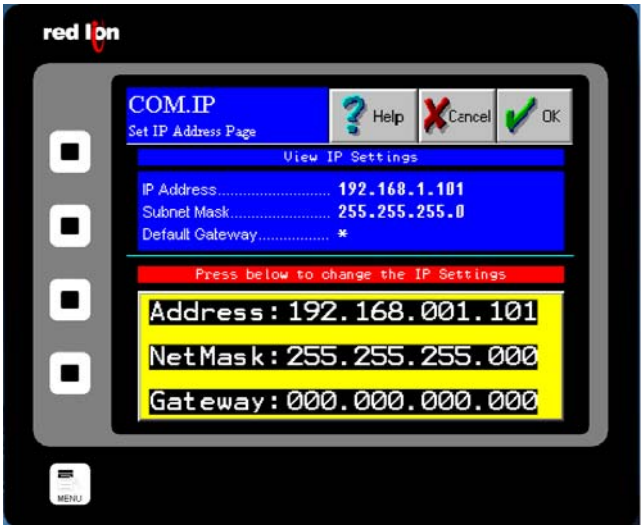
Changing the Ethernet/IP Address (Optional)

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 flow rate and the totalization signals via an Ethernet connection, directly to your PLC. The main tasks involved to successfully enable this option are to physically connect your HMI to your PLC, to assign an appropriate IP Address to your HMI and then, to instruct your PLC to accept the signal through your Ethernet connection.

Step 1: Install your Ethernet Cable into the RJ45 connection 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.

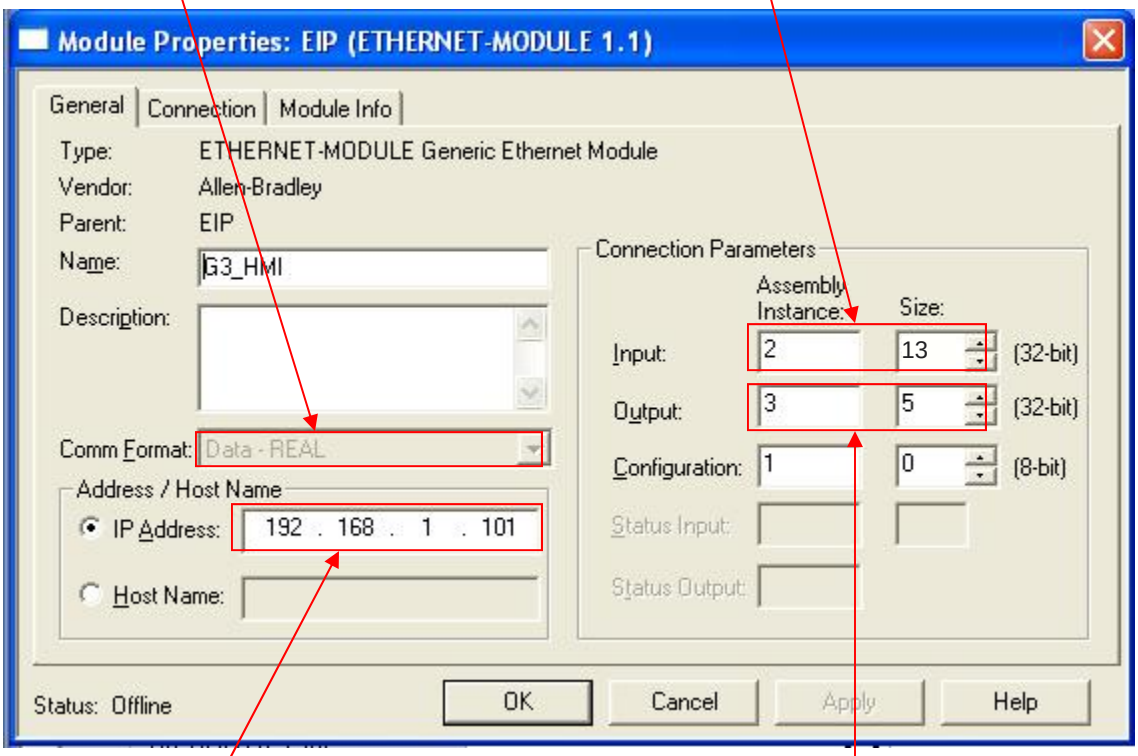
Step 4: After entering the IP Address for your HMI, press the ENTER key and then, press the OK Button located in the Upper Right hand corner. A pop up will prompt you to save the IP Address changes to your Flash. Pressing the YES Button will refresh the HMI and will implement the changes made.

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

Example of Establishing Communication To PLC: ControlLogix Unit

Set Comm Format to "Data-Real"

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



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

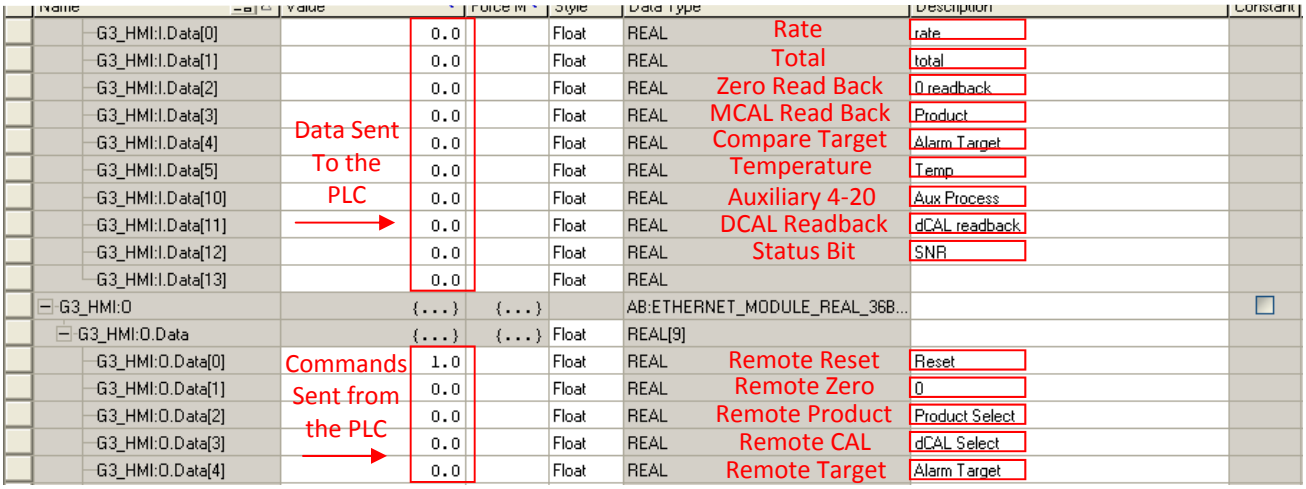
Output Assembly Instance must be set to 3.
Output Size must be set to 5.

The diagram above is a screen capture from RSLogix 5000 software. See Red Lion Technical Note TNOI17 for a description of the ControlLogix configuration steps. Note that the Module Properties as shown above and on page 3 of the technical note differ. Please set the Comm Format to Data-Real, Input Size to 6, and Output Size to 5, as shown above.

Set the Comm Format, IP Address, and Connection Parameters as shown in the diagram. Configuration data is not supported by the HMI. However, enter 1 for the Configuration Assembly Instance and 0 for the Configuration Size.

For more detailed instructions, please contact Eastern Instruments for Technical Note TNOI17.

Tag Mapping



Name	Value	Force Mask	Style	Data Type		Description	Constant
G3_HMI:I.Data[0]	0.0		Float	REAL	Rate	rate	
G3_HMI:I.Data[1]	0.0		Float	REAL	Total	total	
G3_HMI:I.Data[2]	0.0		Float	REAL	Zero Read Back	0 readback	
G3_HMI:I.Data[3]	0.0		Float	REAL	MCAL Read Back	Product	
G3_HMI:I.Data[4]	0.0		Float	REAL	Compare Target	Alarm Target	
G3_HMI:I.Data[5]	0.0		Float	REAL	Temperature	Temp	
G3_HMI:I.Data[10]	0.0		Float	REAL	Auxiliary 4-20	Aux Process	
G3_HMI:I.Data[11]	0.0		Float	REAL	DCAL Readback	dCAL readback	
G3_HMI:I.Data[12]	0.0		Float	REAL	Status Bit	SNR	
G3_HMI:I.Data[13]	0.0		Float	REAL			
G3_HMI:O	{...}	{...}		AB:ETHERNET_MODULE_REAL_36B...			
G3_HMI:O.Data	{...}	{...}	Float	REAL[9]			
G3_HMI:O.Data[0]	1.0		Float	REAL	Remote Reset	Reset	
G3_HMI:O.Data[1]	0.0		Float	REAL	Remote Zero	0	
G3_HMI:O.Data[2]	0.0		Float	REAL	Remote Product	Product Select	
G3_HMI:O.Data[3]	0.0		Float	REAL	Remote CAL	dCAL Select	
G3_HMI:O.Data[4]	0.0		Float	REAL	Remote Target	Alarm Target	

Data Received by PLC from HMI (Optional)

I.Data[0]: Flow Rate
I.Data[1]: Totalization
I.Data[2]: Read back register for the Remote Zero command
I.Data[3]: Read back for Remote Product (Number of Product: Multiple Cal. Option)
I.Data[4]: Read back register for Remote Target
I.Data[5]: Temperature of CentriFlow Meter near Transducer
I.Data[10]: Auxiliary 4-20 mA Output
I.Data[11]: Dynamic Cal. Value Readback (Value of dCal: Multiple Cal. Option)
I.Data[12]: System Not Ready Status Bits

Commands Transmitted by the PLC to HMI (Optional)

O.Data[0]: Remote Reset
O.Data[1]: Remote Zero
O.Data[2]: Remote Product (Number of Product: Multiple Cal. Option)
O.Data[3]: Dynamic Cal. Value (Value of dCal: Multiple Cal. Option)
O.Data[4]: Remote Target (Remote Alarm)

NOTE: *Reset output functions similarly to pressing the Reset Button on the TOP.RUN page, while the Multiple Cal output functions similarly to using the multiple calibration option detailed in the Setup of Multiple Calibration section of this manual.*

PLC Programming Note:

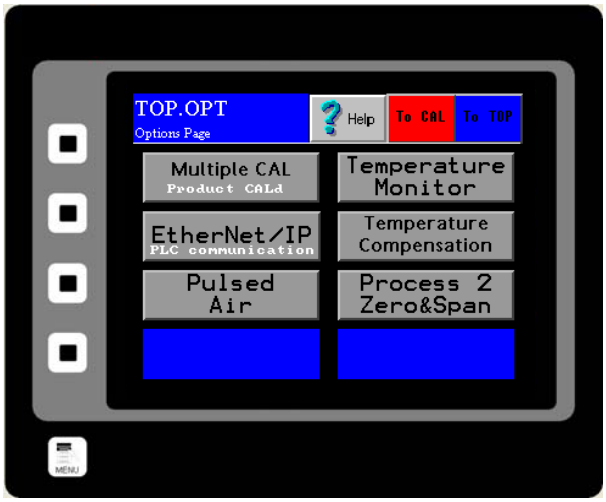
RESET: Valid values (0 for normal operation); (1 to reset the total) Reset can be programmed for level or edge triggered from the HMI OPT.PLC page.

REMOTE ZERO: Valid values (0 for None); (1 Success-Normal Result); (2 Failure-Abnormal Result); (3 Prohibited-Local Zero not completed); (4 Abnormal Prohibited-Local Zero); (5 Prohibited-PV% greater than inhibit)

REMOTE PRODUCT: Valid Values (1 through 8 which select products 1 thru 8 respectively)

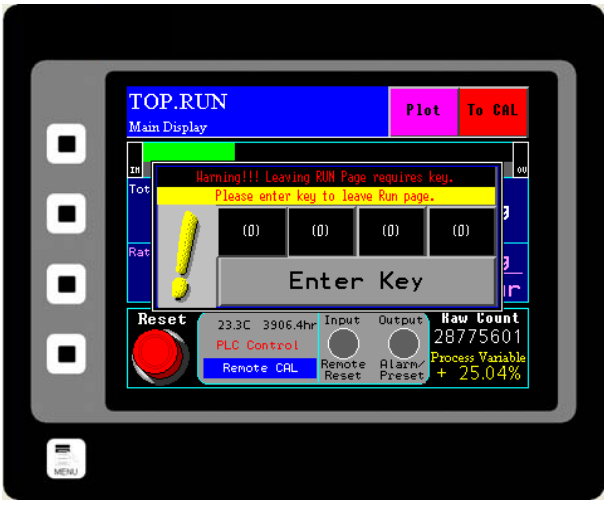
SYSTEM NOT READY: Bit 0 (0 while current PV is greater than the negative equivalent of current inhibit thresh old); Bit 1 (0 while current PV is less that the current inhibit threshold); Bit 2 (0 while HMI is on RUN page); Bit 3 (0 when Zero Cal. Successfully performed); Bit 4 (0 when Static Cal. Successfully performed); Bit 5 (0 when Modbus link between HMI and DCE is good); Bit 6 (0 when RB_ERROR_CODE and ERR_HMI_CODE are not met) ***NOTE:*** *A non-zero value for any of the Bits indicates that something may not be ready for operation. The Calibration Bits (3 and 4) will be reset to non-zero values upon power cycle.*

Once the option has been unlocked that allows data to be transmitted both from the HMI to the PLC and from the PLC to the HMI, the communication can be toggled from the PLC control page. This page can be accessed from the options page, TOP.OPT (right), accessed from the TOP page, or Main Menu. Press the PLC Button in order to access the OPT.PLC page (below) where the HMI/ PLC Communication can be toggled between local control or Remote Control via the PLC.



Please note that if PLC Communication is enabled, data is only transmitted via Ethernet while on the Main Run screen or TOP.RUN page (bottom right). The TOP.RUN Screen is accessed, either by travelling to the page or by automatically being sent there after the standard timeout period (see the “Powering On” section of this manual). Please note that while the Ethernet Communication is on, you can not leave the TOP.RUN page without first entering a password. This security feature is included so that Ethernet Communication cannot be interrupted accidentally. The password for leaving the TOP.RUN menu while Ethernet Communication is can be entered by clicking on each of the 4 boxes. The password is below:

I II III IV

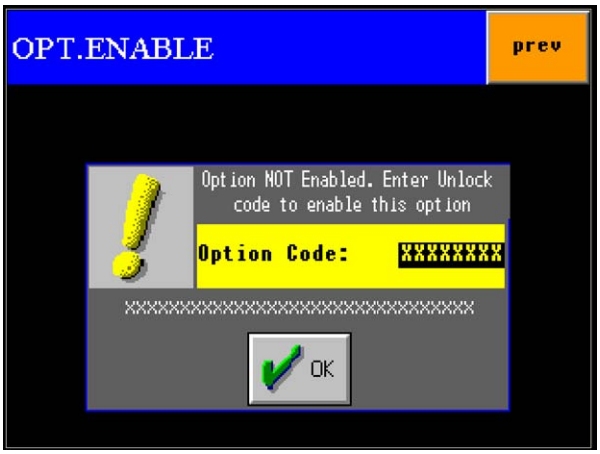


Setup of Multiple Calibration Screens (Optional)

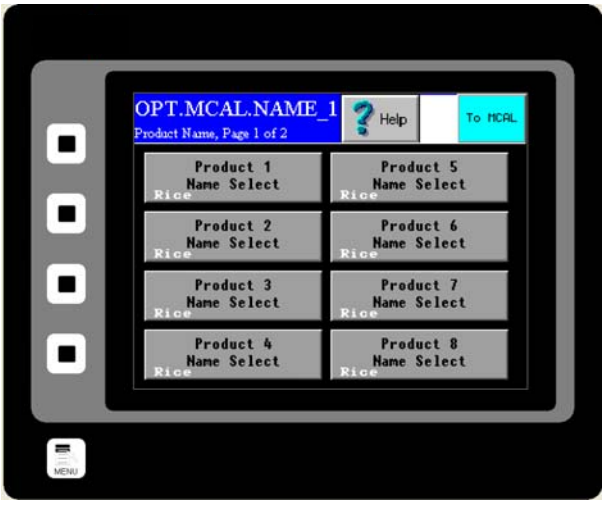
The Multiple Calibration Screens option allows you to run more than one product through your meter without having to recalibrate each time the product is switched. This option allows you to store up to 8 product calibrations at one time. To access the option once it has been purchased, press the MULTIPLE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

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

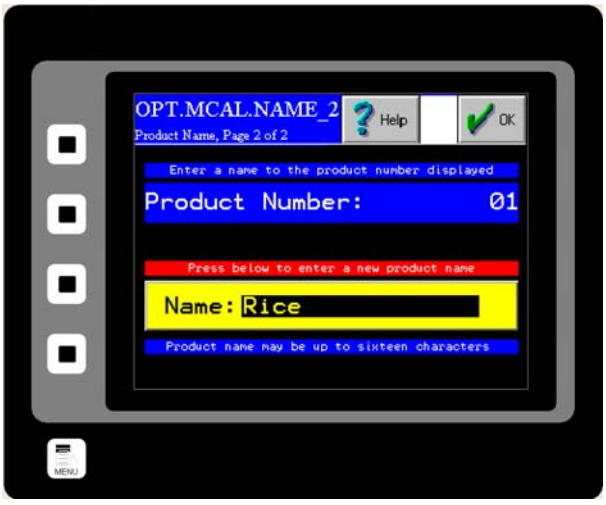
Please note that the first time the Multiple Calibration Option is selected, the screen to the right may be displayed unless the option was ordered prior to shipment in which case the option would be unlocked at the factory. If you have purchased the option, you will receive a 7-digit password. Enter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



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



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



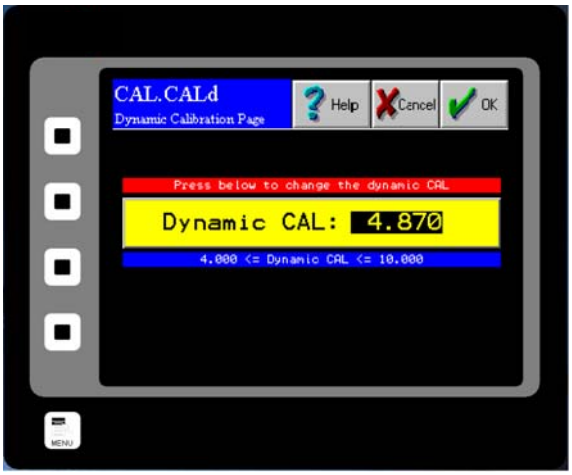
Step 2: You can now assign the product calibration a name. Often, the name of the product itself is used, but any name can be used. Double click the presently entered value for Name and you will be prompted to enter your product's name. When finished, press the ENTER Button and then, press the OK Button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

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

Continued on next page

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

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



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

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

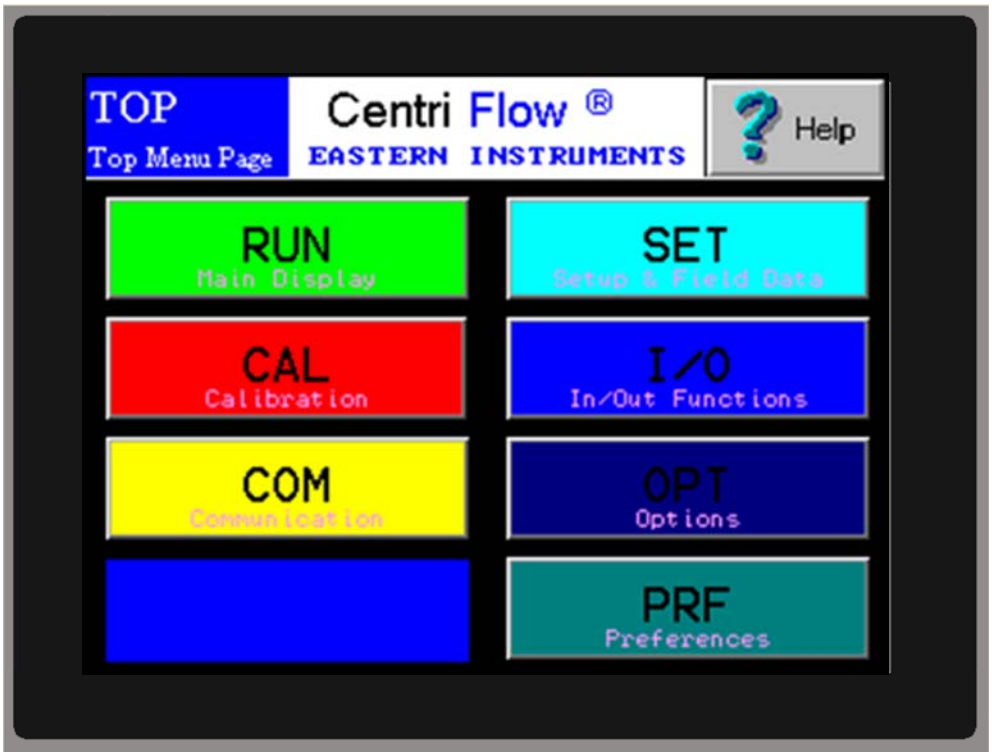
Step 7: To access any of your saved Dynamic Calibrations for running your process, simply click the SELECT Button from the OPT.MCAL page and chose the product that is currently running. Press the OK Button located in the Upper Right hand corner.

SCREEN GUIDE

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

TOP

TOP is the Main Menu Screen. There are seven buttons on the TOP page. They are RUN, CAL, COM, SET, I/O, OPT and PRF. 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 OPT Button to access various options. Press the PRF Button to go to the TOP.PRF page. This page allows the security settings clock and other features to be set to your desired preferences. In the upper right corner you can access a Help Menu.



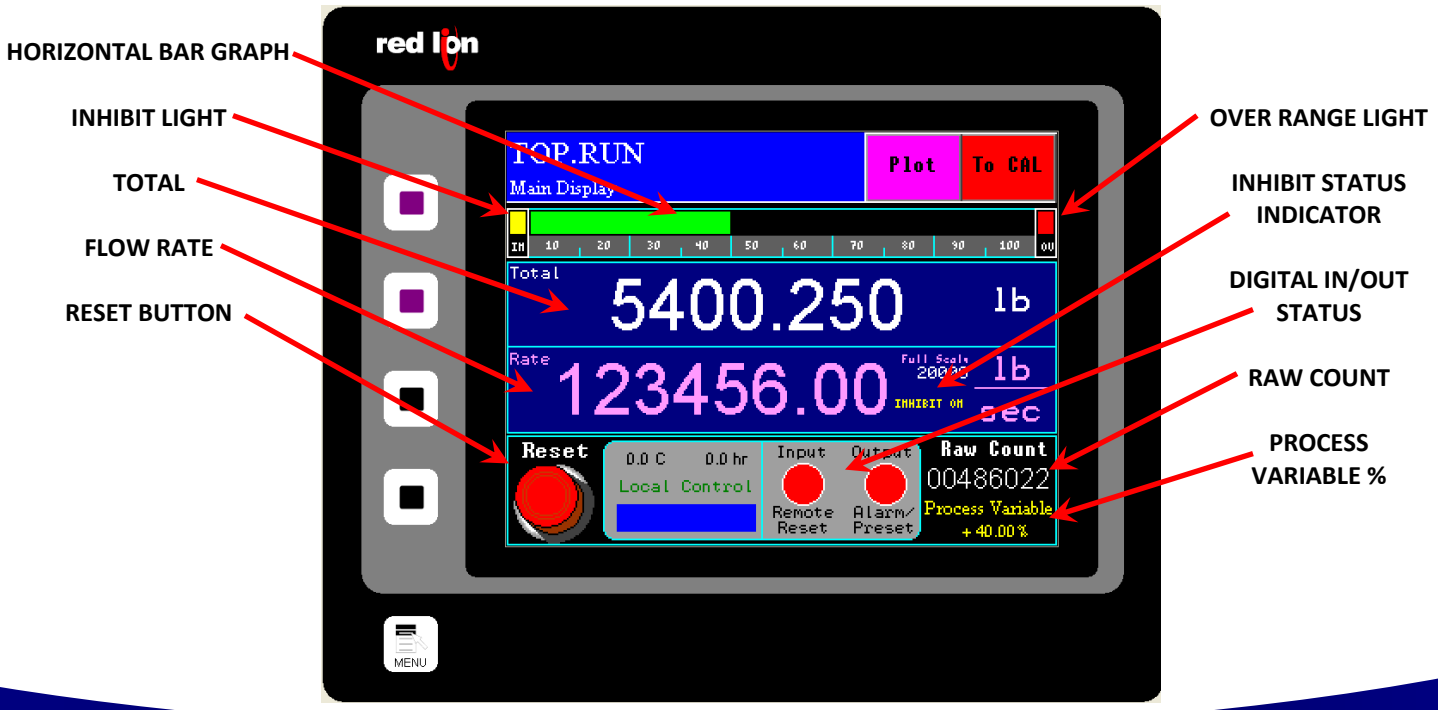
TOP.RUN

TOP.RUN is the main display mode. Access this screen by pressing the RUN Button from the TOP screen. A Horizontal Bar Graph is used for a graphical indication of flow rate. The length of the green colored horizontal bar is proportional to the flow rate. To determine the flow rate use the scale just below the horizontal bar. The scale units are percent (%) and the scale resolution is 10.

At either end of the bar graph array there is a color coded indicator. The indicator labeled IN is the inhibit light. It will turn on when the flow rate is less than the inhibit setting. The display color for the IN light is yellow. The Inhibit Status Indicator will indicate the ON/OFF status of the inhibit logic for the flow rate display and 4-20 mA output. The indicator labeled OV is the over range light. It will turn red when the flow rate is greater than full scale. Note that the Horizontal bar graph is only used for an approximate visual representation of the flow rate.

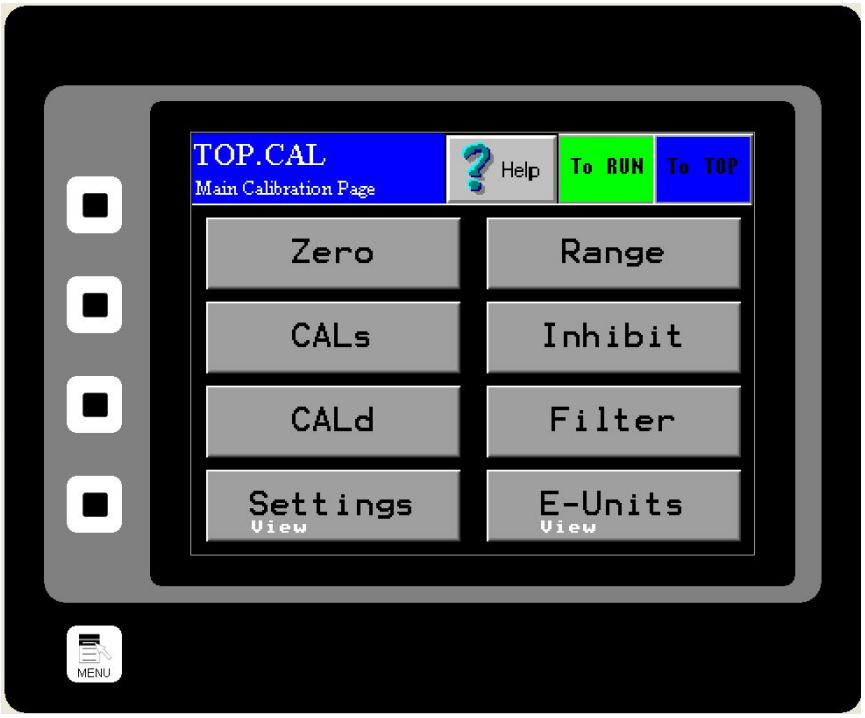
Under the Horizontal Bar Graph is a digital display of both the Flow Rate and the Total weight of product flowing through the meter. Pressing the Reset Button will reset the Total displayed to 0.00.

The Input and Output Status indicators are tri-colored. The colors have the following meaning: grey equals not enabled, green equals enabled but not active (low), and red equals enabled and active (high). These indicators include the Remote Reset and Alarm/Preset functions.
Raw Count displays the number of counts that the Electronics is calibrated to display based on the Calibration Voltage. Its primary usage is during the Calibration of the Electronics so that the desired Electronic Full Scale Flow Rate is correct. The counter is set to display 500 counts per second. Thus, if the Electronic Full Scale Flow Rate is to be calibrated to 300 lb./min, then the counter should display 100 counts per lb. of product.



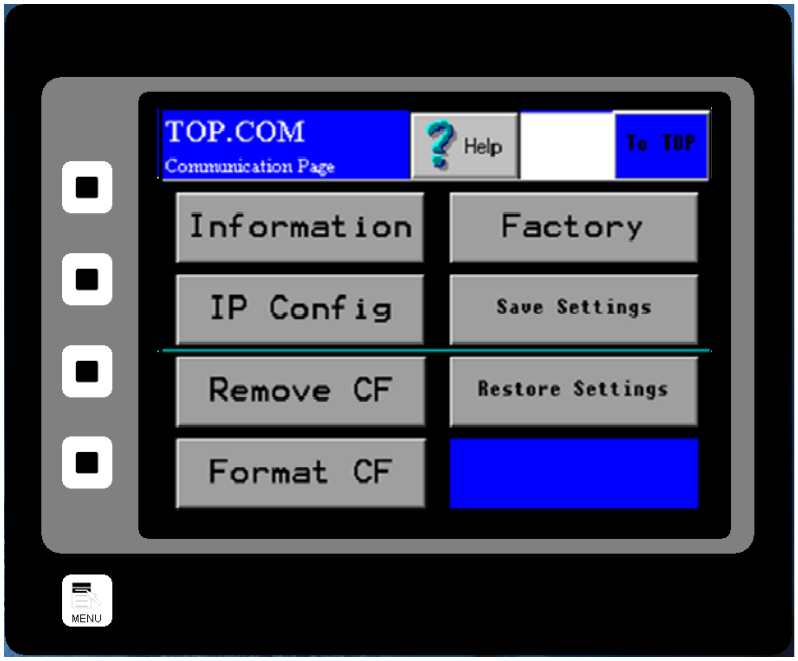
TOP.CAL

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.



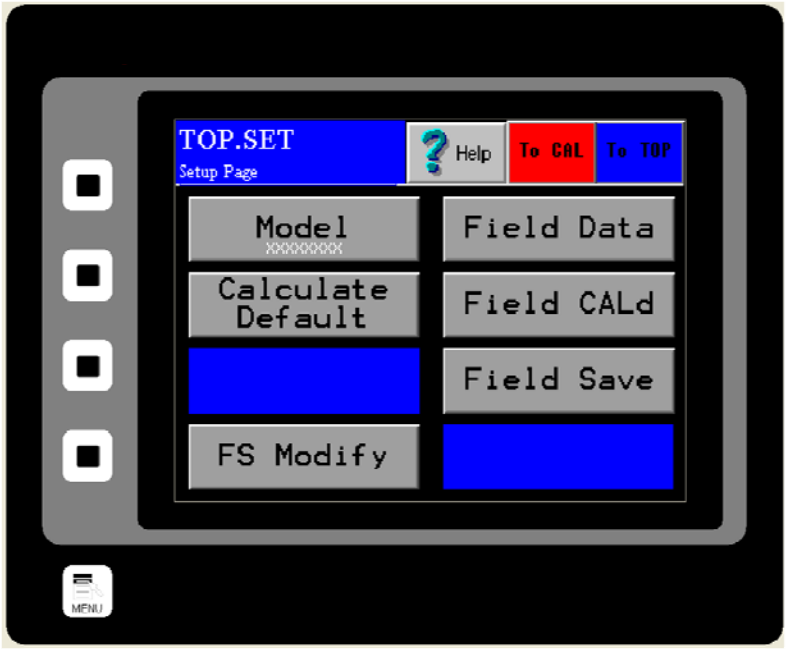
TOP.COM

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, whether you have a Compact Flash Card installed and how much Free Space your Compact Flash currently has. Press the IP CONFIG Button to edit your IP Settings. Press the FACTORY Button to be able to restore Factory Settings. Please note that pressing the FACTORY Button will send you to the COM.FACTORY page which will then further prompt you from there. 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.



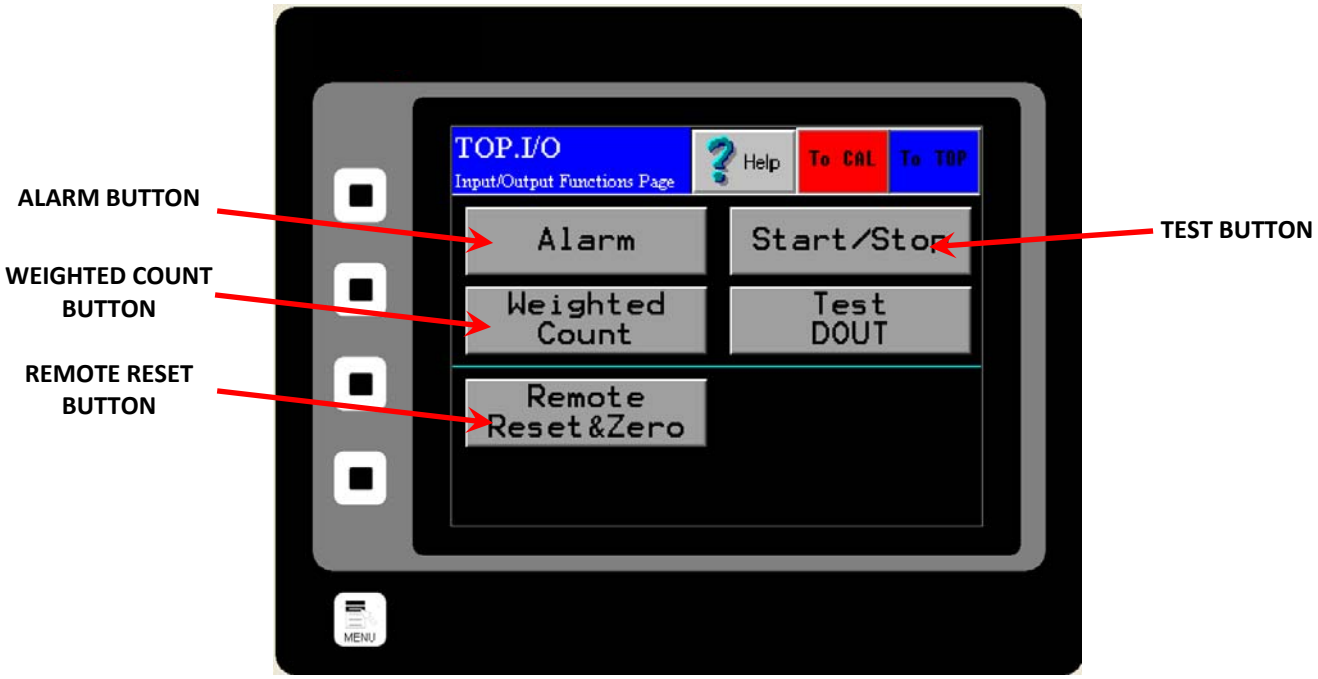
TOP.SET

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 (Calculate Default Button), enter Field Data such as is taken during Site Calibration (FIELD DATA Button), change your Dynamic Calibration Settings based on your Dynamic Calibration data (FIELD CALd Button), modify your Full Scale value (FS MODIFY Button), or save calibration data to your Flash Card (FIELD SAVE Button).



TOP.I/O

TOP.I/O is the Main Input/Output Menu page. Access this screen by pressing the I/O Button from the TOP page. This page is for accessing all options associated with setting all inputs and outputs in your process including the Alarm, Weighted Count, Remote Reset and Zero and Start and Stop Logic.



TOP.PRF

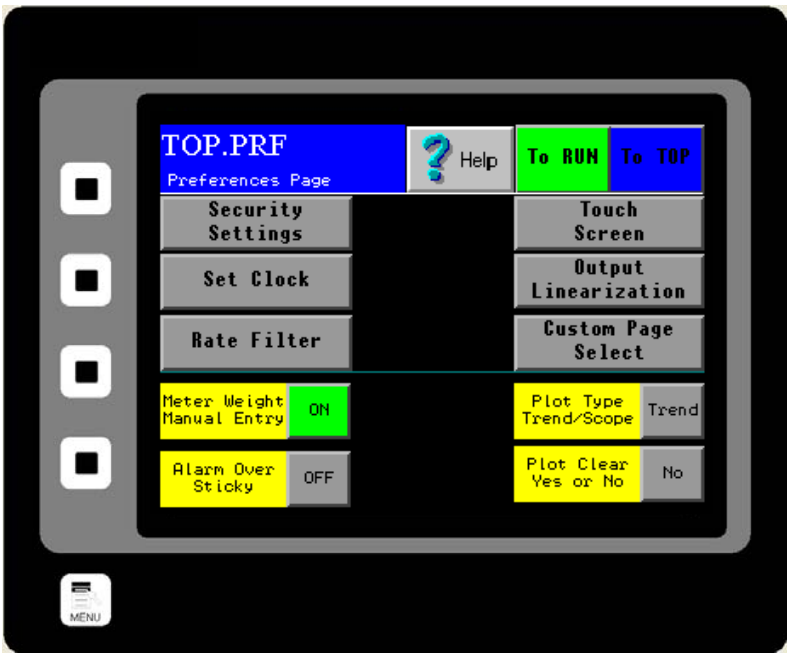
The TOP.PRF page allows access to several features that offer greater flexibility during the operation of the CentriFlow® HMI. From the Top Menu page, select the PRF Button (Preferences) to go to the TOP.PRF (Preferences) page. The features accessed from this page are listed below.

Press the Security Settings Button to access the security settings. Please see the Security Features section of this manual for more information on the Security Settings.

Press the Set Clock Button to modify the current time used and displayed by your HMI. After pressing the Set Clock Button, you will be on the PRF.CLOCK page. Double-Click on the time or date values to modify them. The Time keypad will appear. Press the Enter Button on the Time keypad. The hour field will be highlighted and pressing the Up or Down Arrows will change your entry value. Please note that the HMI is set to a 24 hour clock. Pressing either the Next Button or the Previous Button will cycle you through the various editable fields. Press OK to save your changes.

Pressing the Dynamic Cal Weight Entry Button allows the user to manually enter the CentriFlow® Meter weight on the SET.FIELD page while performing a Dynamic Calibration. Press the Dynamic Cal Weight Entry Button so that "On" appears. You may now manually enter metered weight values on the SET.FIELD page during a Dynamic Calibration.

Pressing the Alarm Over Sticky Button enables the maximum flow rate alarm LED to remain lit in the event that the Maximum flow rate has been exceeded during a run. This appears on the TOP.RUN page. When this feature is enabled the LED that says "OVR" on the right hand side of the scale (just to the right of the "100") will remain RED if the maximum flow rate is exceeded. When the run has completed, the LED will be turned off once the Reset button is pressed.



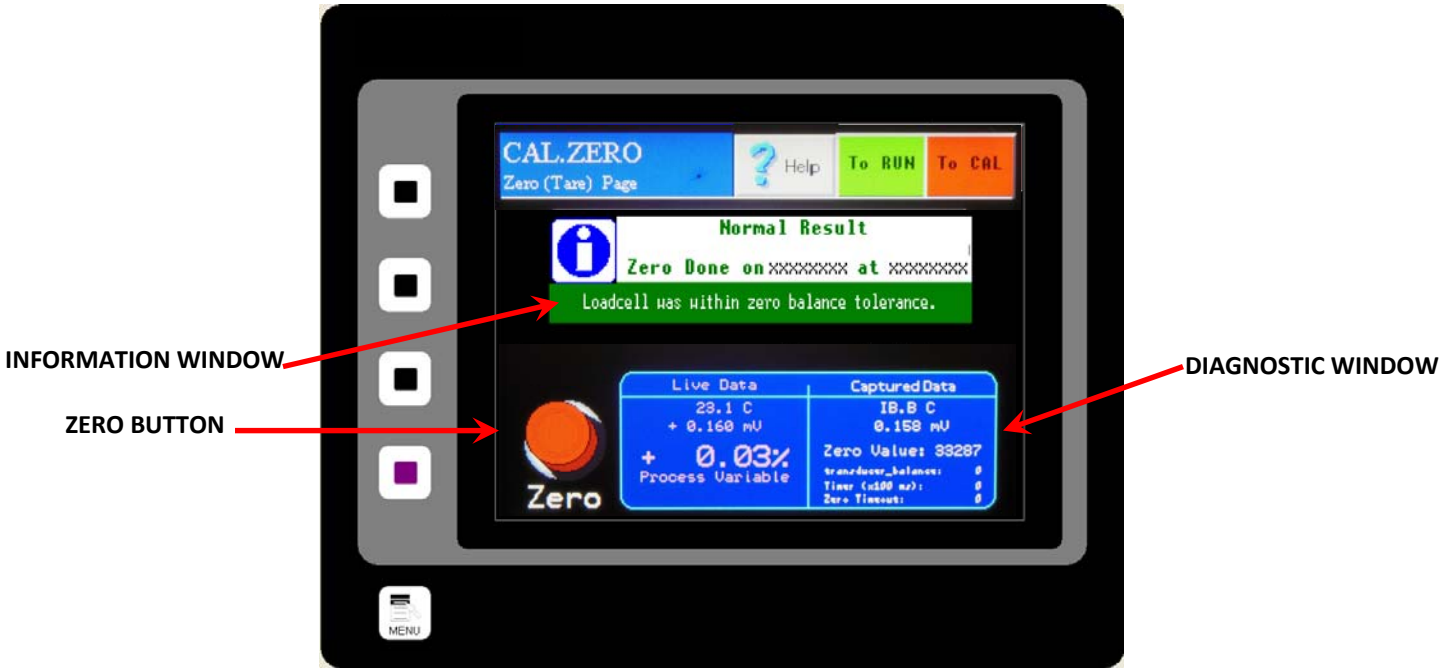
CAL.ZERO

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.

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.

Ensure there is no flow prior to performing a zero!

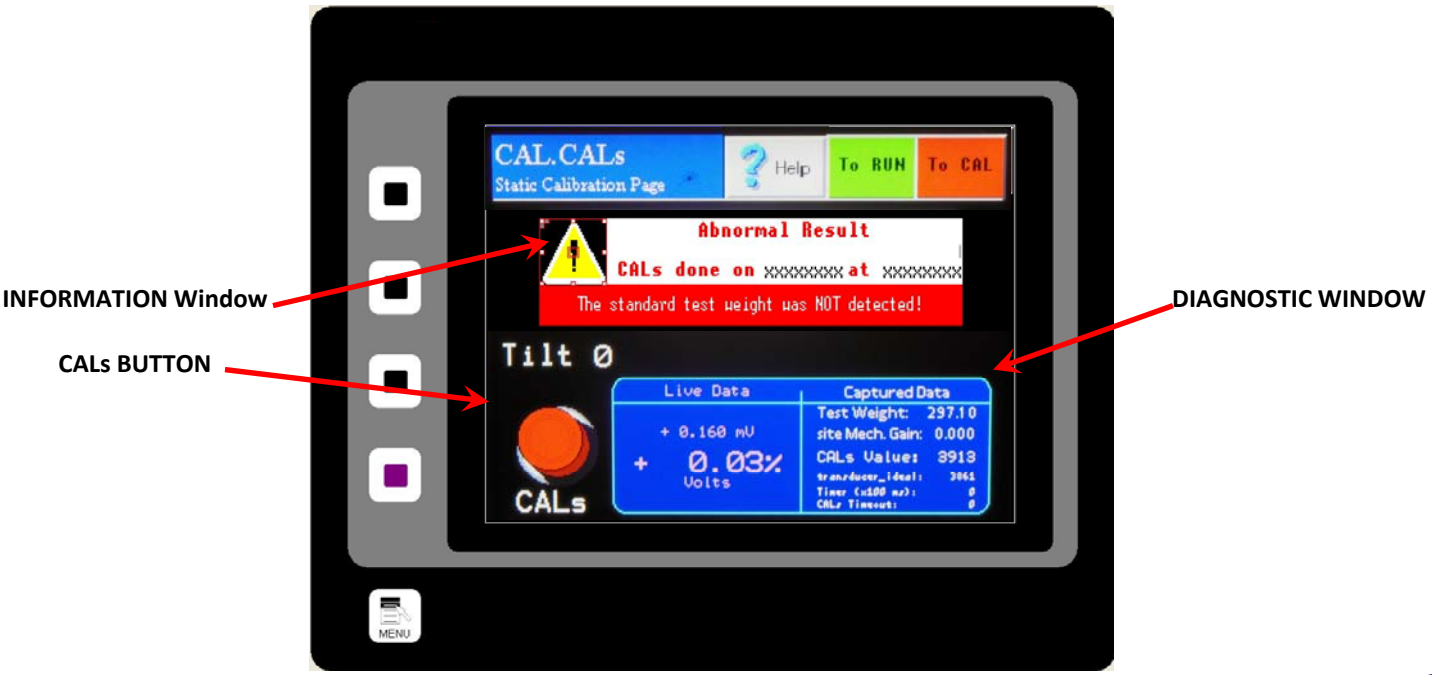


CAL.CALs

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 section 8)

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.

Tilt is the meter tilt angle and is typically set at the factory using the SET.SIZE page.

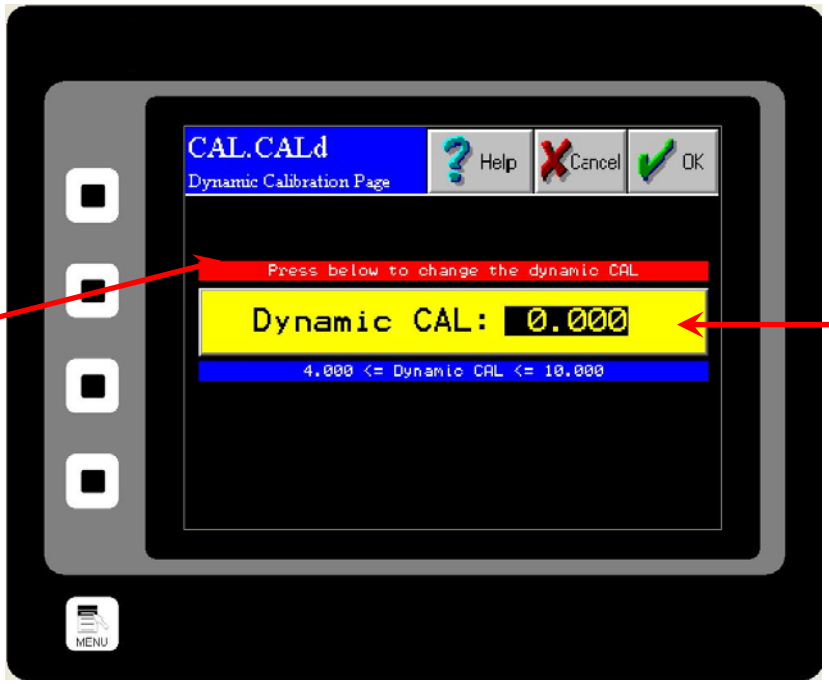


CAL.CALd

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. Please see the Dynamic Calibration (or Site Calibration) procedure in this manual.

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.



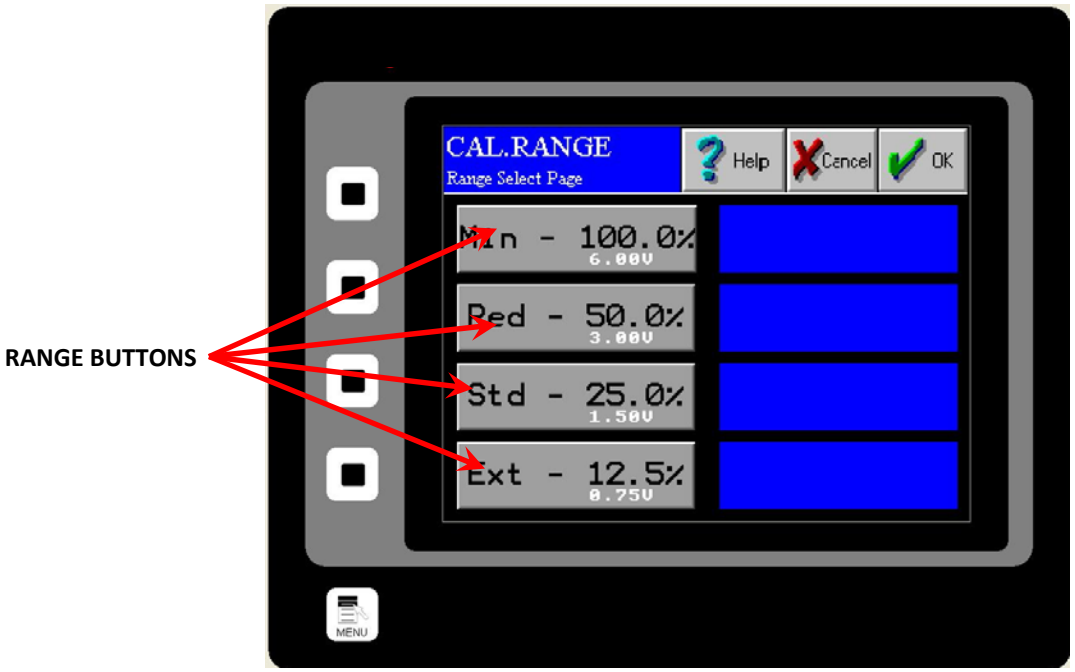
INFORMATION WINDOW

DYNAMIC CALIBRATION BUTTON

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.

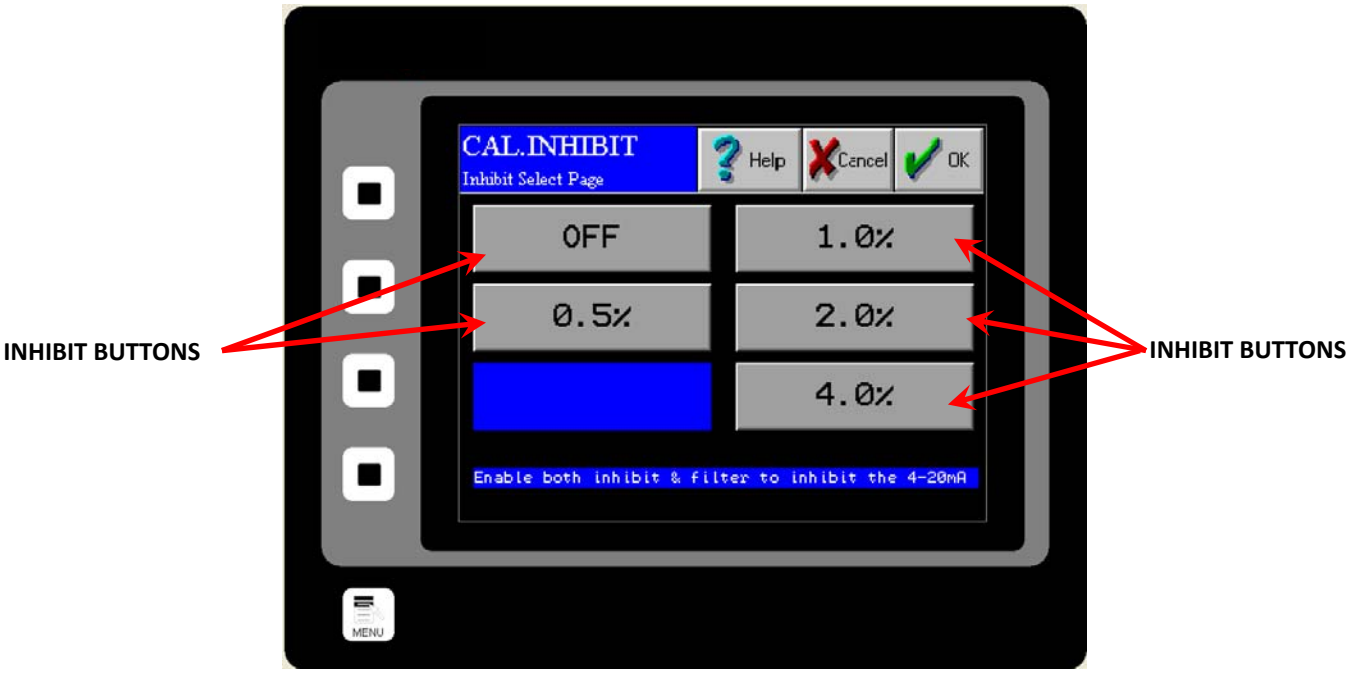


CAL.INHIBIT

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.

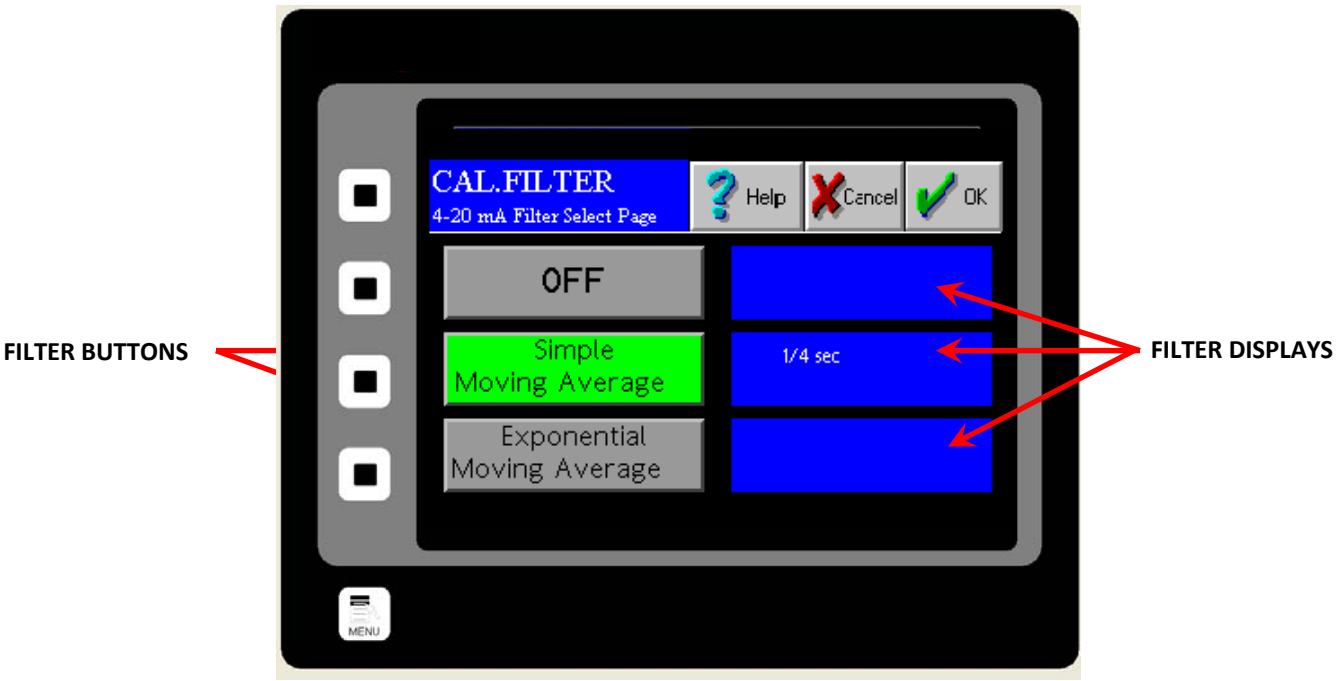


CAL.FILTER

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 filter will be a simple moving average filter for filtering up to three seconds and will be an exponential moving average for filtering three seconds or over.

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. The moving average filter can also be turned off from this page.

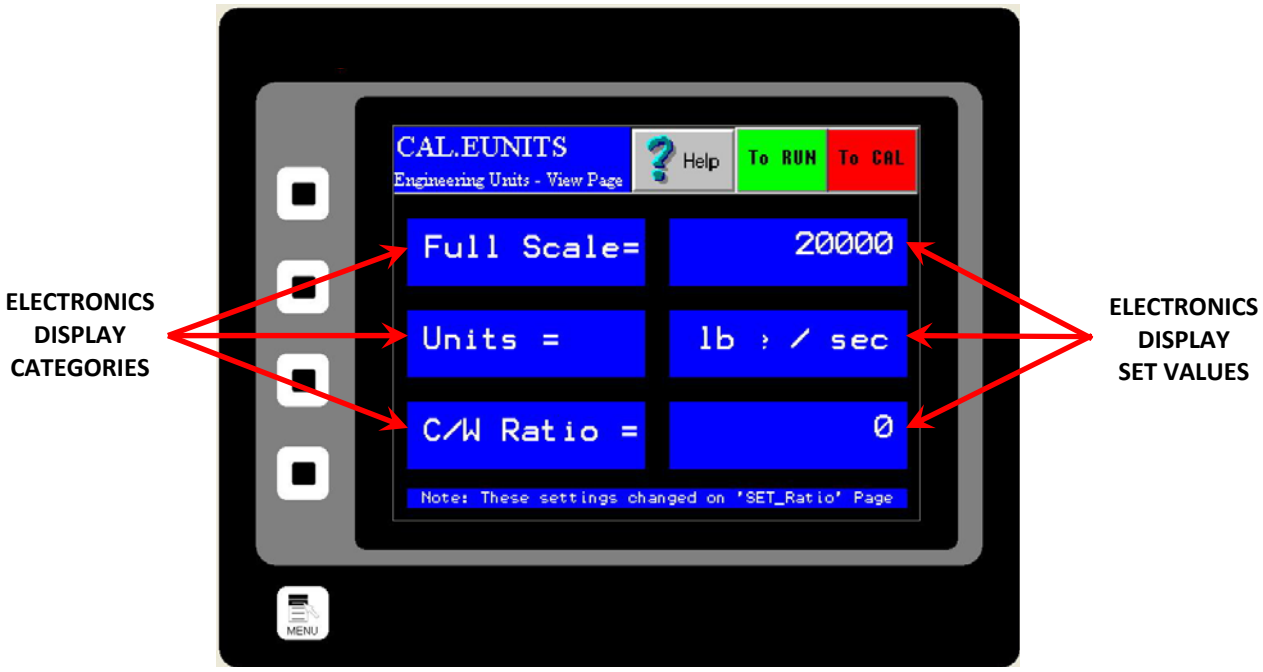
Please note that the inhibit is automatically turned OFF when the Filter is set to OFF.



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.

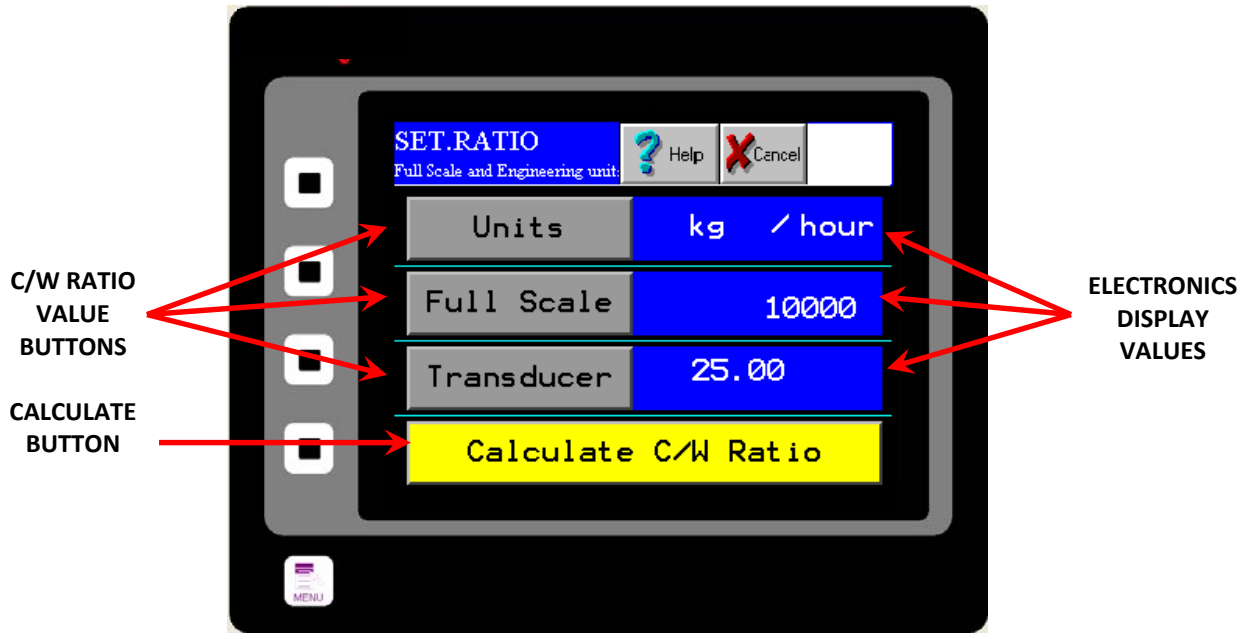


SET.RATIO

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.

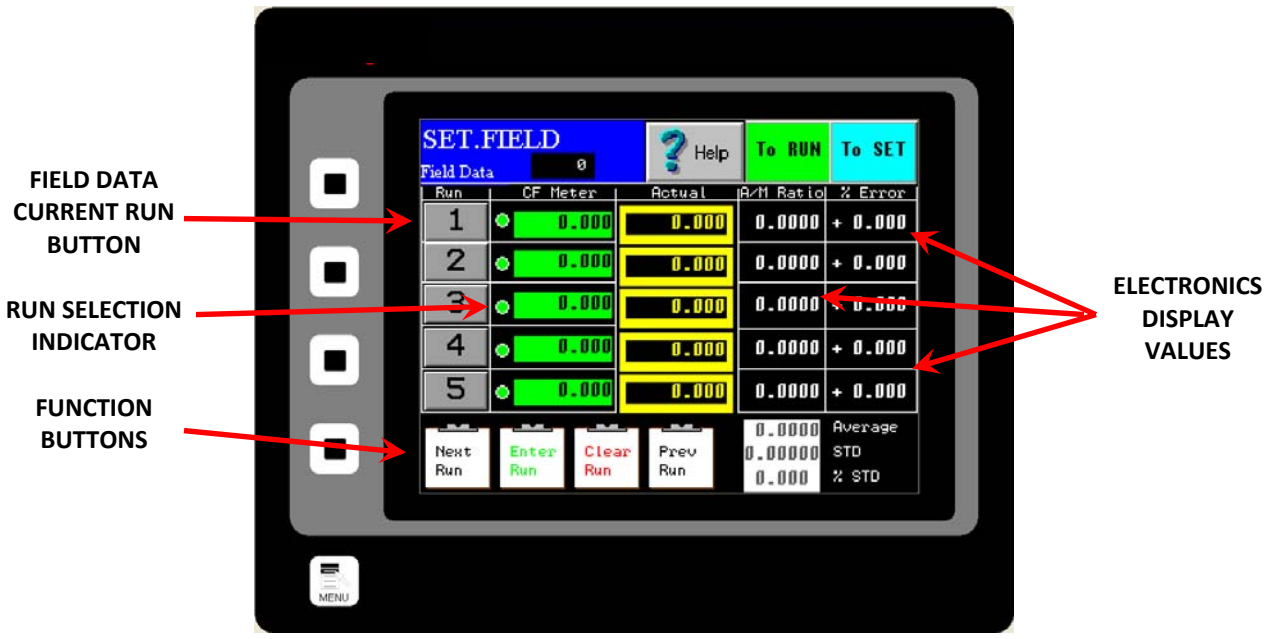
Engineering Count = Raw Count / Count per Weight Ratio

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



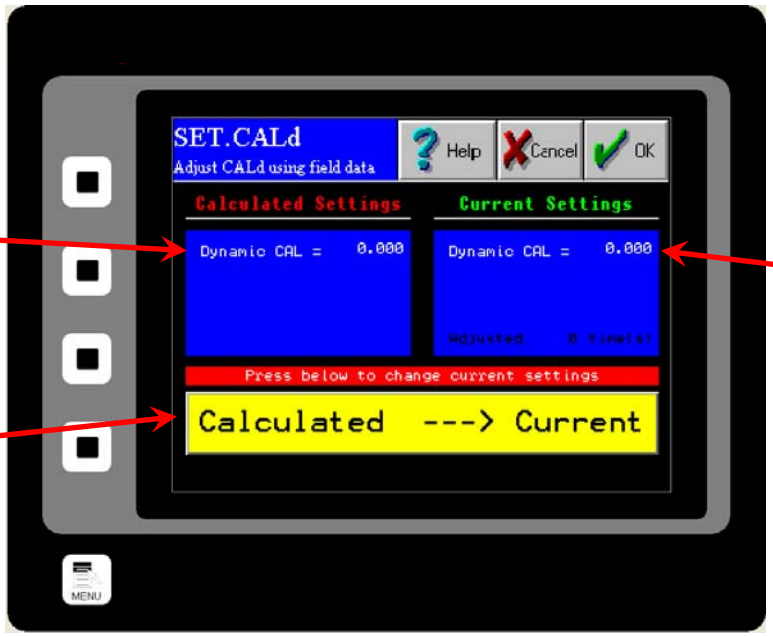
SET.FIELD

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



SET.CALd

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



CALCULATED DYNAMIC CALIBRATION SETTINGS

CURRENT DYNAMIC CALIBRATION SETTINGS

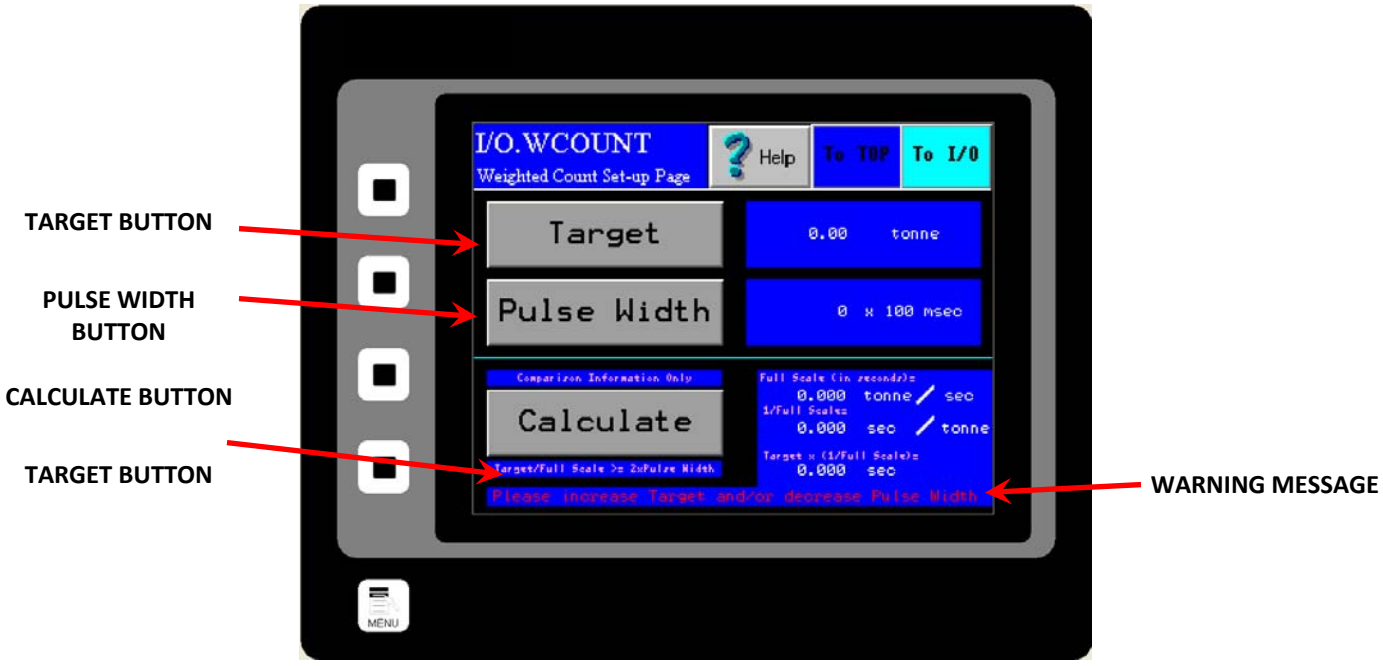
CALCULATED TO CURRENT BUTTON

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

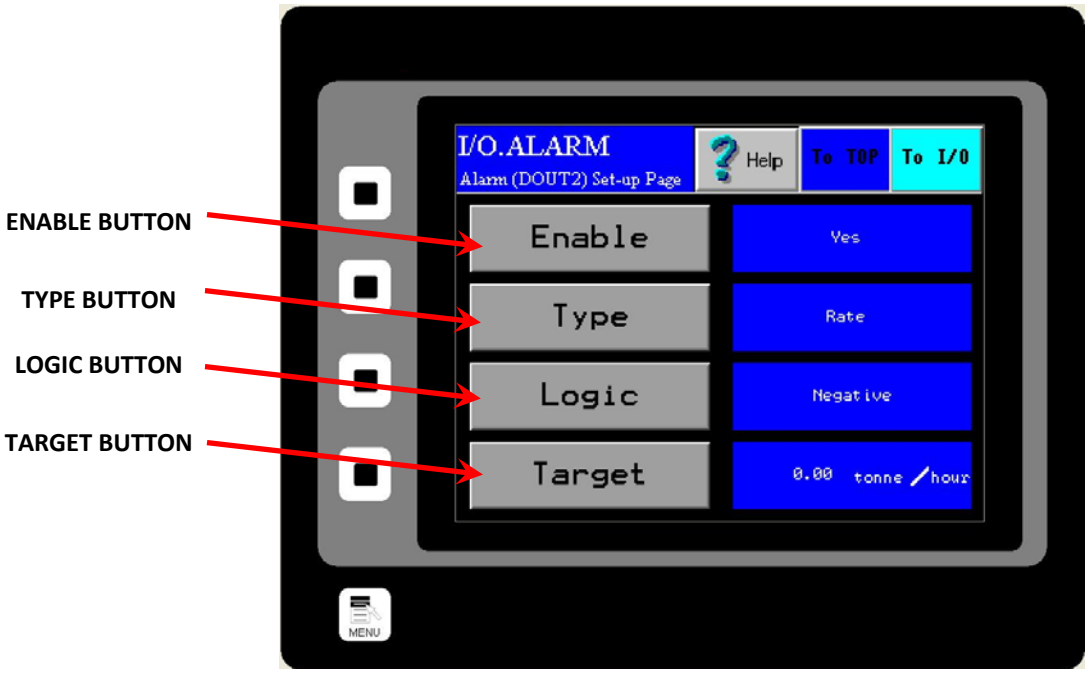
I/O.ALARM is the Alarm page. Access this screen by pressing the ALARM Button from TOP.I/O page. This page is for changing the options of the alarm. The alarm can be turned on and off using the ENABLE Button. Press the ENABLE Button until the desired result is displayed in the Blue display box to the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

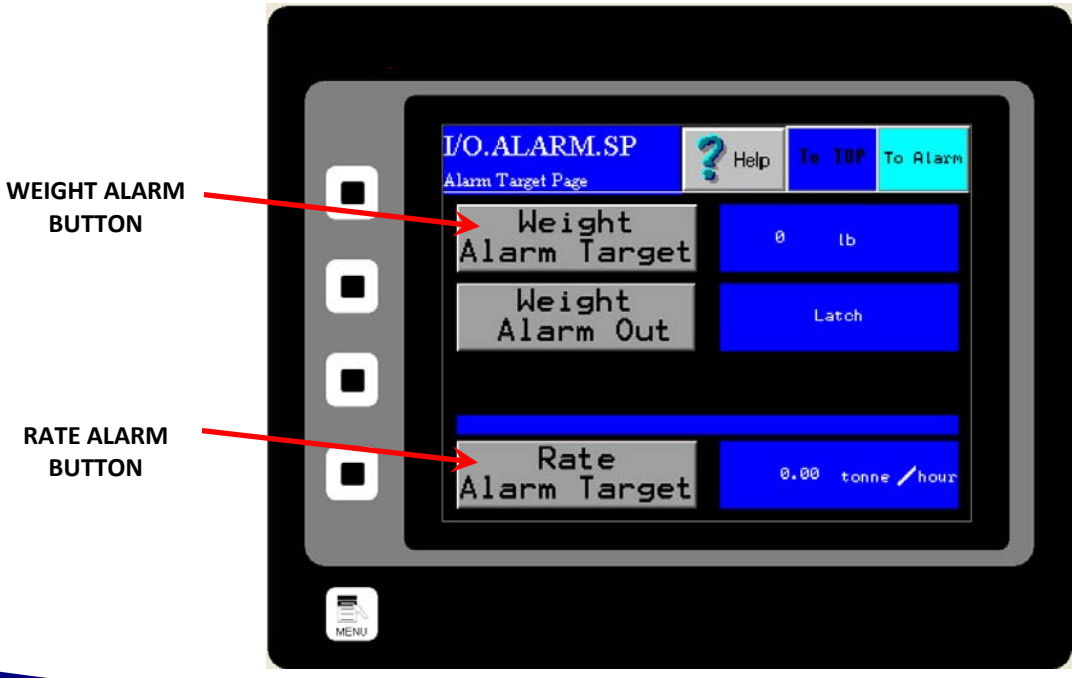
The alarm can be set as either a High Alarm or a Low Alarm. Use the LOGIC Button to choose which type of alarm you would like to use. Press the LOGIC Button until the desired result is displayed in the Blue display box to the right of the LOGIC Button.

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.

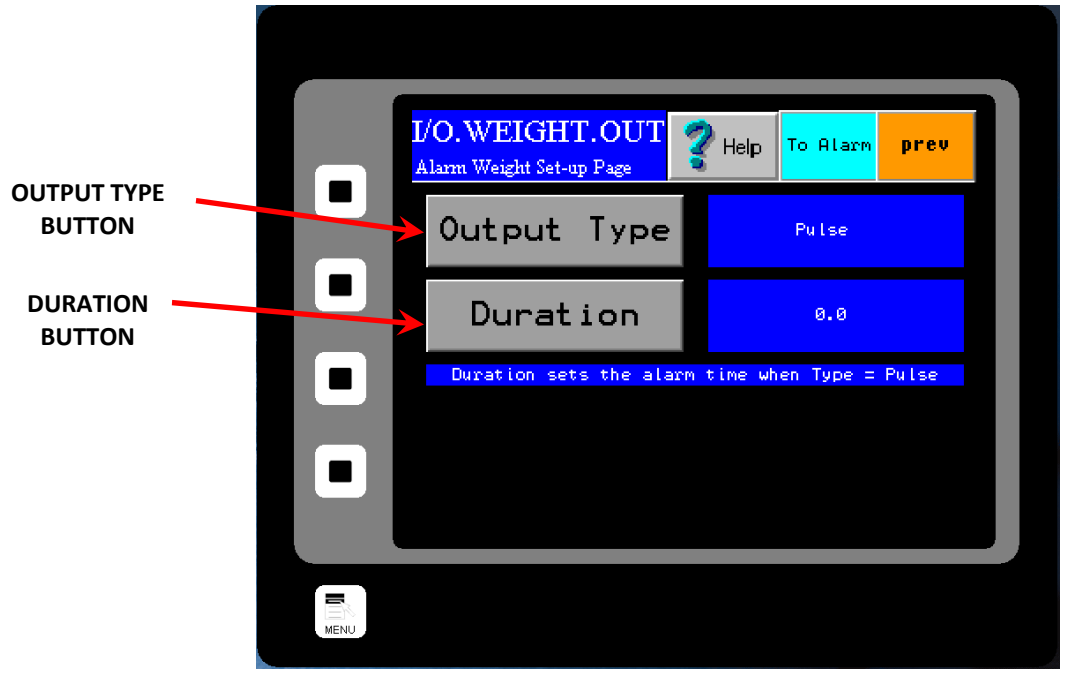


I/O.WEIGHT.OUT

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.

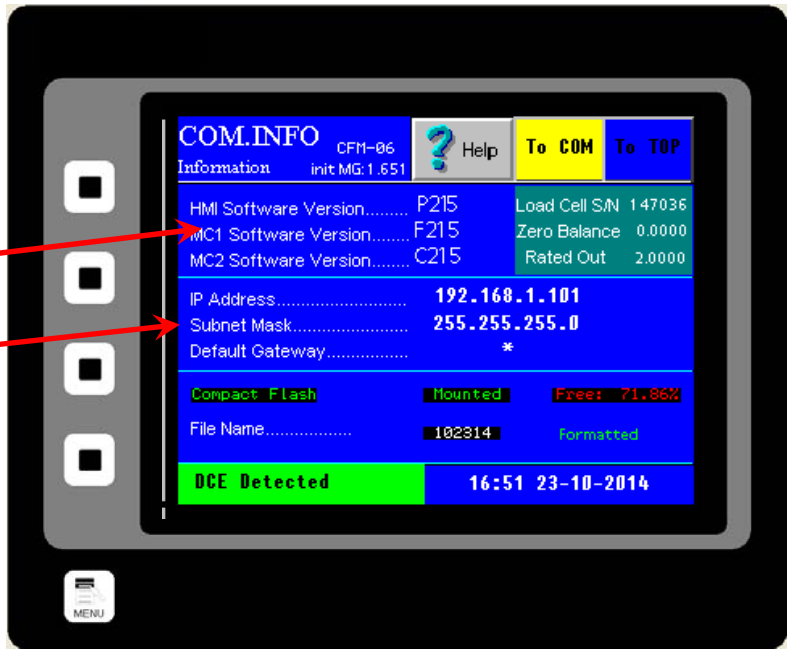
Pressing the OUTPUT Button will allow you to choose between a Pulsed Weight Alarm or a Latch Weight Alarm. If a Pulsed Weight Alarm is chosen, a duration for the Pulsed Alarm can be chosen as well. This is accomplished by pressing the DURATION Button and entering an alarm duration in seconds. The Totalization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



COM.INFO

This screen is accessed when the INFORMATION Button is pushed from the TOP.COM page. This page can be accessed to view information regarding the software version for your particular unit as well your current communication protocol information. You will also notice an indicator displaying whether you currently have a Flash Card Installed. On the lower left is an indicator that displays the status of the communication to your DCE.



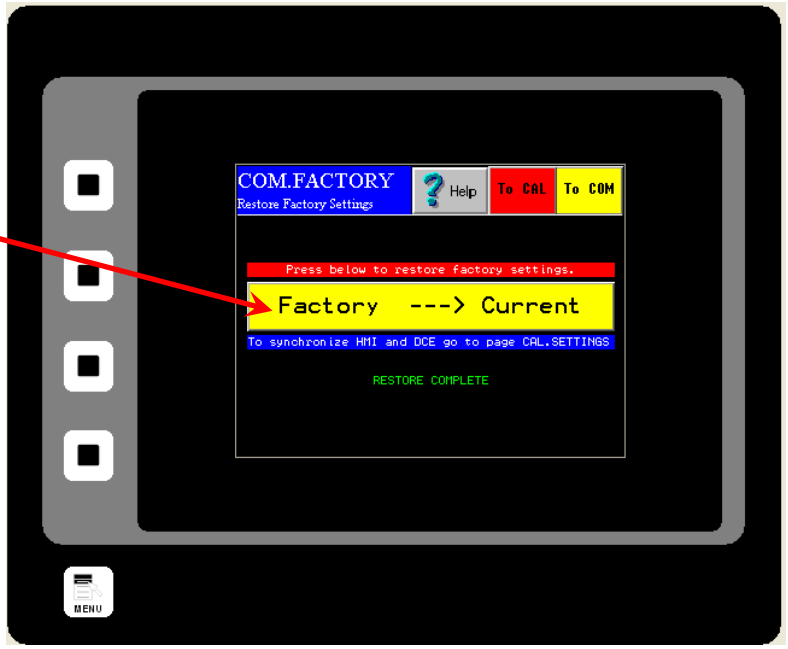
Software Versions

Communications Protocol Information

COM.FACTORY

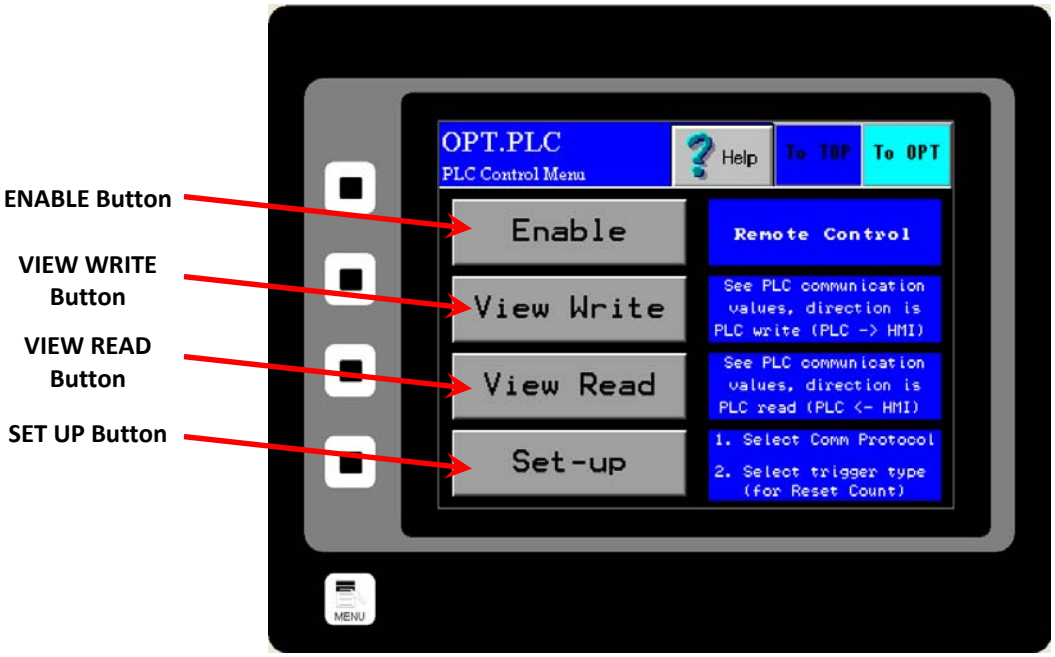
This screen is accessed when the FACTORY Button is pushed from the TOP.COM page. To revert back to factory settings, press the FACTORY/CURRENT Button and you will be prompted to press “Yes” or “No” if you would like to proceed. Press the YES Button to revert to the factory settings.

FACTORY/CURRENT Button



OPT.PLC (Optional)

This screen is accessed when the PLC button is pushed from the TOP.OPT page. The TOP.OPT page is accessed by pushing the OPTIONS Button from the Main Menu. Pushing the buttons on this menu allow you to Enable or Disable local control of the electronics and allows you to both set up and view the data that is both transmitted to the HMI by a PLC and to a PLC from the HMI.

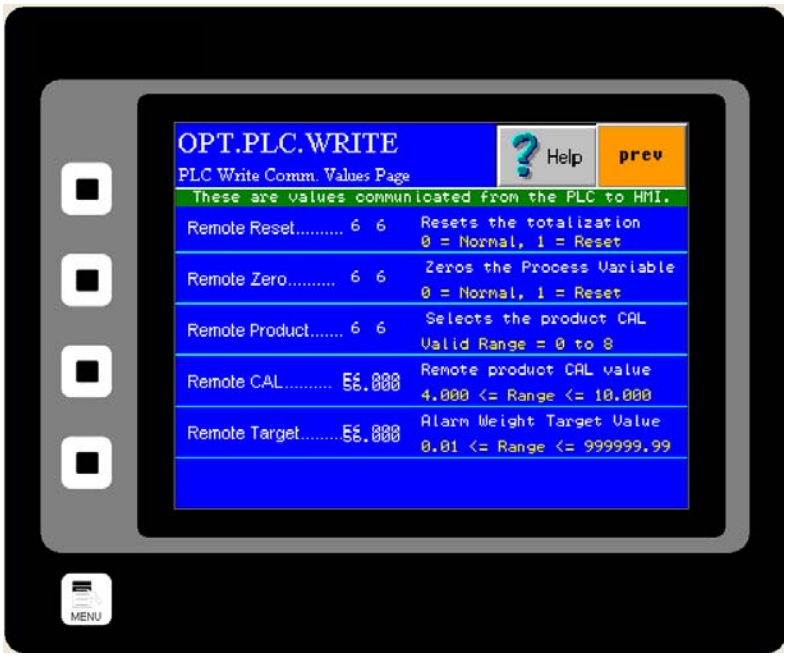


OPT.PLC.WRITE (Optional)

This screen is accessed when the VIEW WRITE Button is pushed on the OPT.PLC page. The OPT.PLC page is accessed when the PLC button is pushed from the TOP.OPT page. The TOP.OPT page is accessed by pushing the OPTIONS Button from the Main Menu. This page allows you to view the information regarding PLC to HMI communication. Only the PLC to HMI communication is active. The remote functions such as Zero, CAL, etc. are not active. To enable functions, please go to the TOP.RUN page. Please note that the help screen, accessible from your HMI, contains the below information as well.

Notes on PLC Remote Control

- Reset is also available locally when the PLC is enabled
- Zero is also available locally when the PLC is enabled
- Local product select is overwritten when PLC is enabled
- Remote Calibration is only valid when PLC is enabled
- Local alarm target is overwritten when PLC is enabled

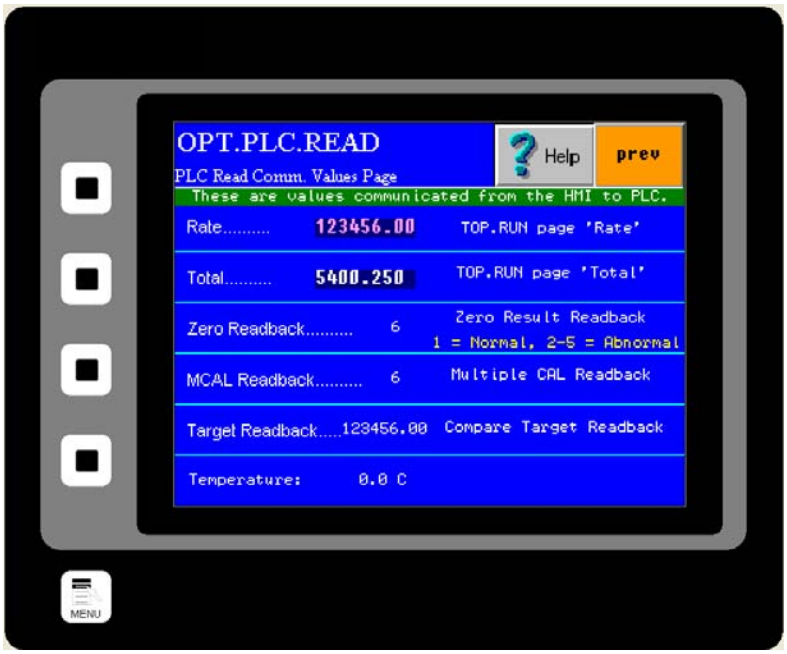


OPT.PLC.READ (Optional)

This screen is accessed when the VIEW READ Button is pushed on the OPT.PLC page. The OPT.PLC page is accessed when the PLC button is pushed from the TOP.OPT page. The TOP.OPT page is accessed by pushing the OPTIONS Button from the Main Menu. This page allows you to view the information regarding PLC to HMI communication. Only the PLC to HMI communication is active. The Rate, Total and other values are fixed and not live. To update the PLC "read" values, please go to the TOP.RUN page.

Return Codes from Zero request

[0] None
[1] Success, normal result
[2] Failure, abnormal result
[3] Prohibited, local zero not completed
[4] Prohibited, local zero is abnormal
[5] Prohibited, PV% is greater than inhibit



OPT.PULSEDAIR (Optional)

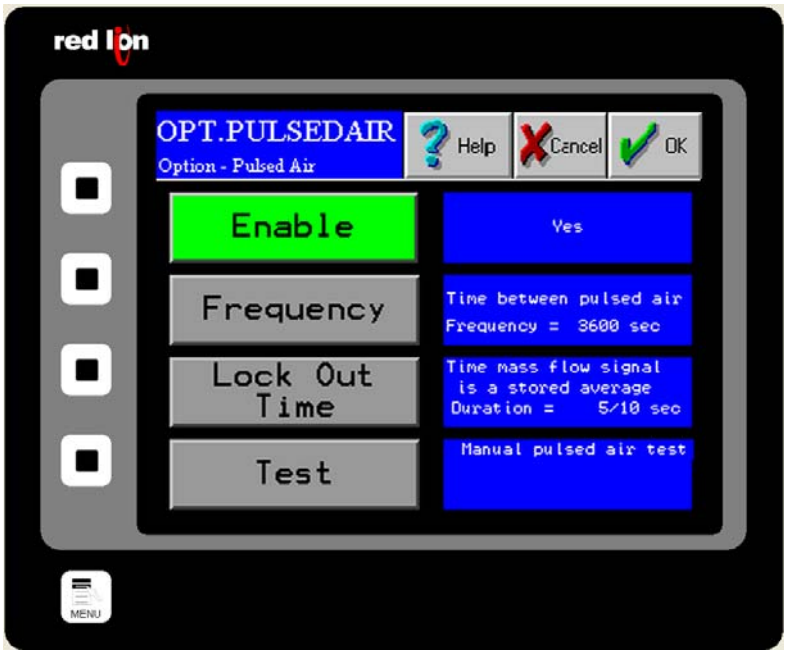
This screen is accessed when the PULSED AIR Button is pushed from the TOP.OPT page. The TOP.OPT page is accessed by pushing the OPTIONS Button from the Main Menu. This screen enables you to able and disable the pulsed air option, change the frequency of the blasts of air, set Lock Out Time and to perform a manual test of the Pulsed Air System.

ENABLE: Turns on and off the Pulsed Air Option.

FREQUENCY: The duration of time between blasts of air. This duration is input in seconds and can be changed as appropriate. The recommended Frequency is once per hour or once every 3600 seconds.

LOCK OUT TIME: The Digital Electronics averages the real time flow rate during normal operation and locks the mass flow signal at this value during an air blast. The amount of time that the Mass Flow Signal is locked during the blast can be changed here.

TEST: Allows manual operation of the Pulsed Blast System.



REFERENCE

Definition of Terms

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.

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

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.

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

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.

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).