EASTERN INSTRUMENTS

CentriFlow® Meter

CENTRIFLOW® ELECTRONICS INSTALLATION & OPERATION MANUAL

REV 01/11

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Installation Guidelines

REQUIREMENTS

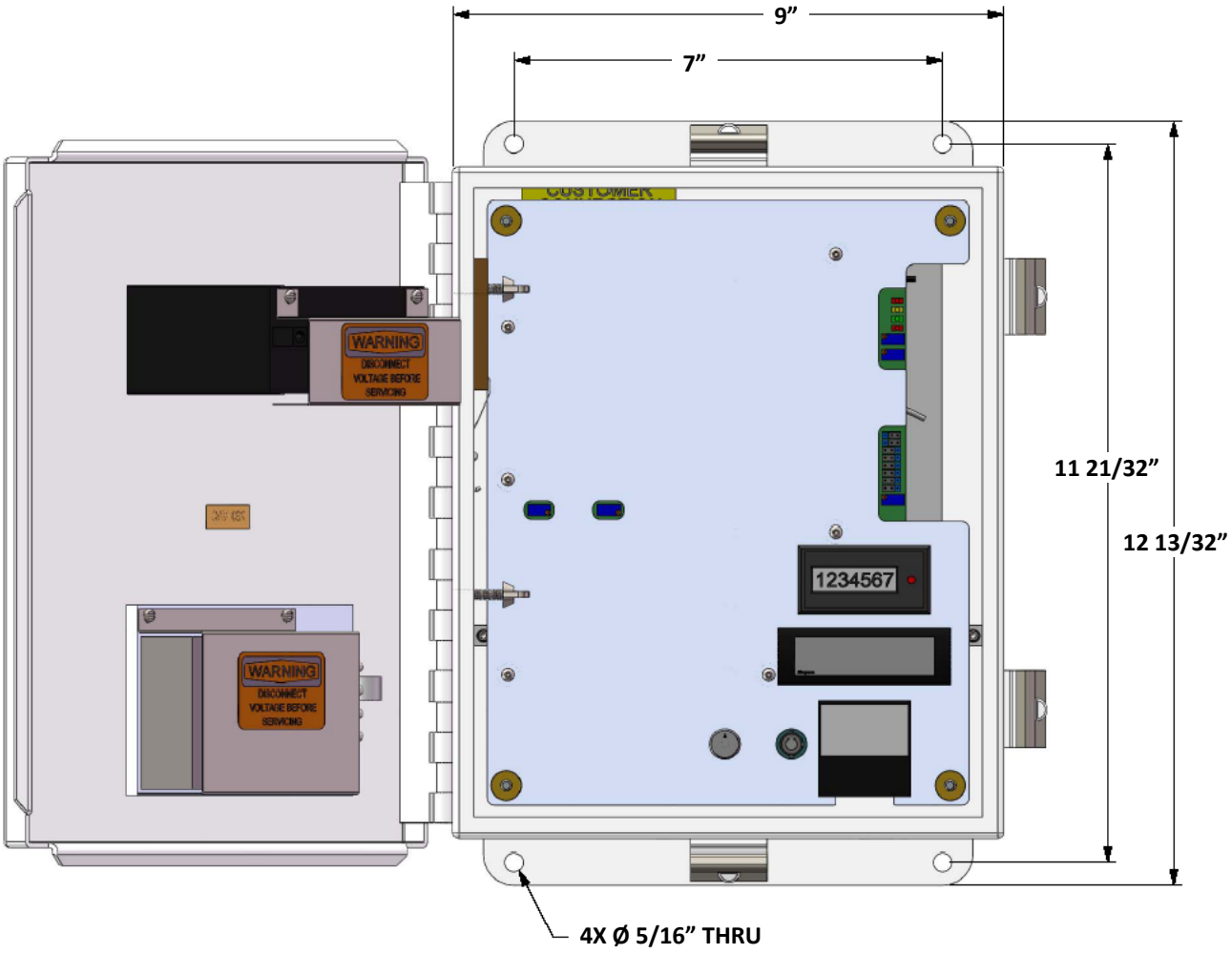
- The meter is to be used in a location where the product can be dropped from a fixed height such as a conveyer, or any type of feed system, which will give a reasonably constant initial vertical velocity. The design of the meter requires the product to contact the Tangential Plate and have some vertical 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.

SPECIAL REQUIREMENTS

- 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

(shown with door open)



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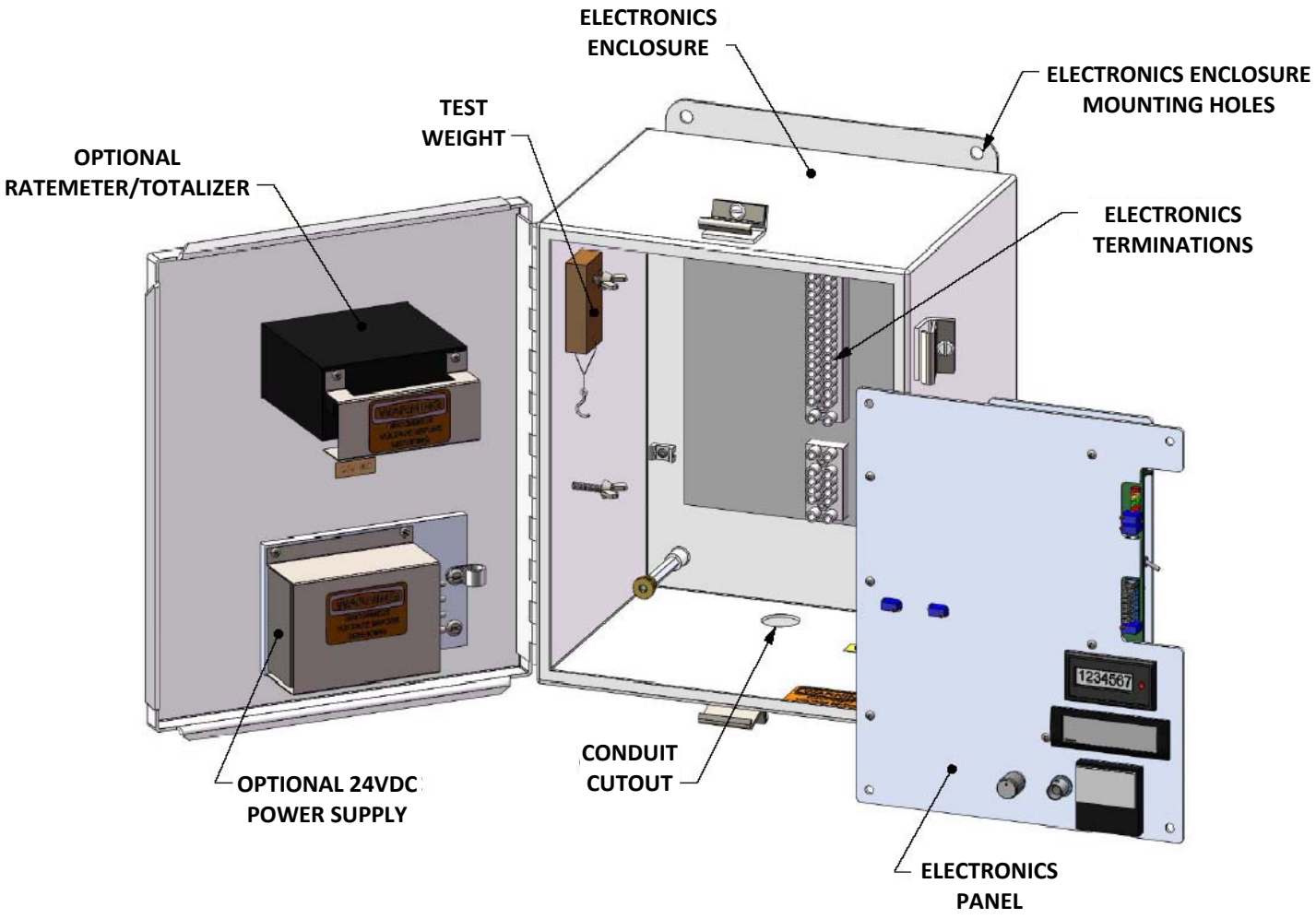
Basic Wiring

Basic Electronics Enclosure



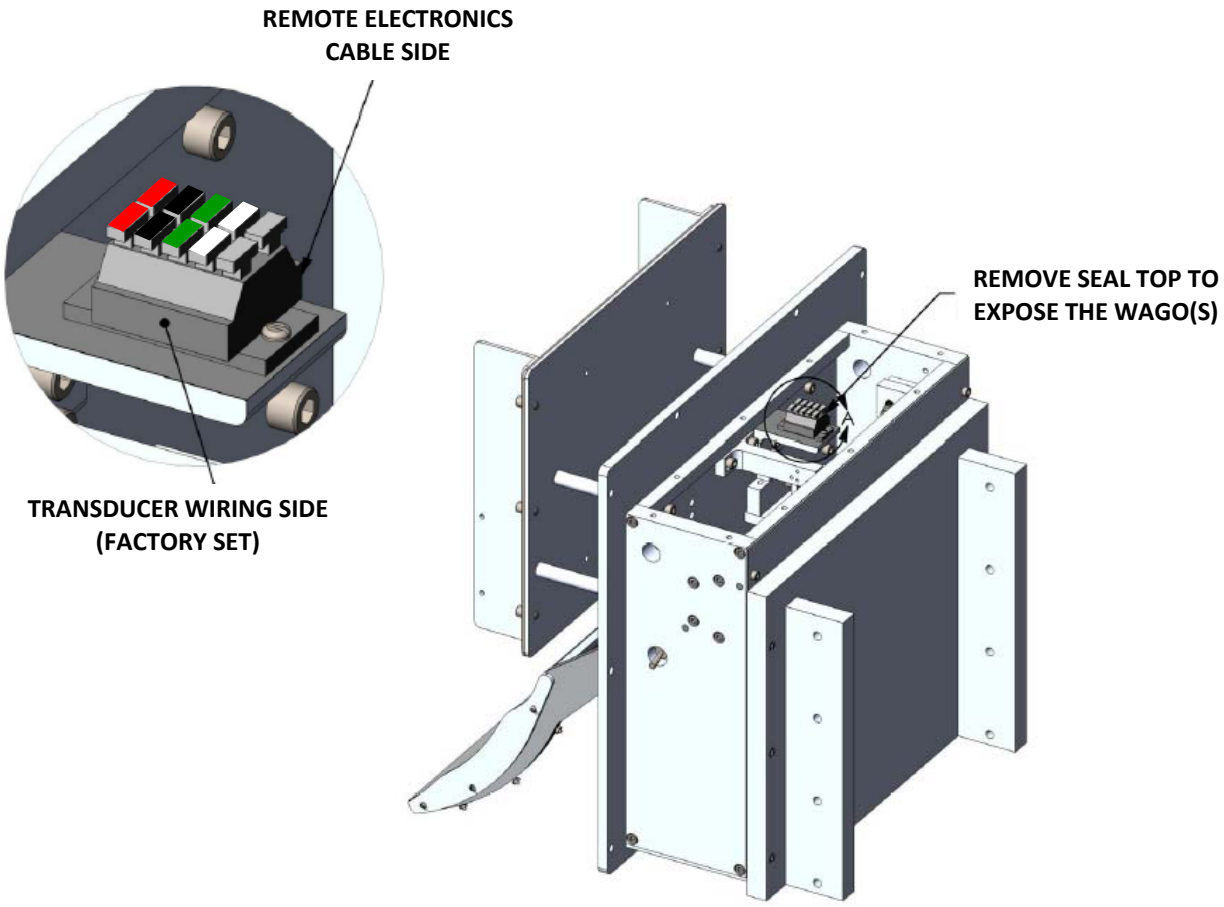
Wiring of the CentriFlow® Meter can be broken down to the following three categories:

- Remote Electronics Cable
- Power
- Outputs

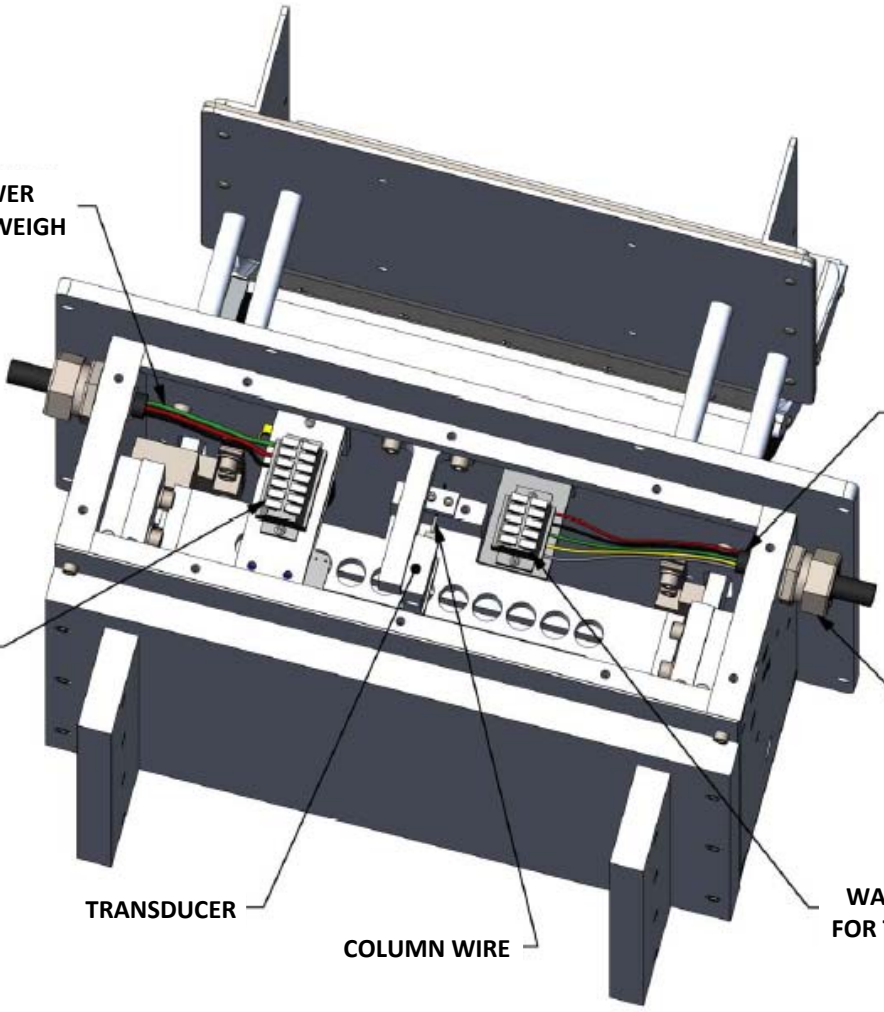
**** A full wiring diagram is provided at the end of the manual.***

REMOTE ELECTRONICS CABLE

The Remote Electronics Cable is a four-conductor cable with a shield that attaches the CentriFlow® Meter Module to the Electronics Enclosure. It sends the measurement signal from the Transducer inside the Module to the Electronics Panel inside the Electronics Enclosure. The standard length is 50' long, but it should be cut to the exact length needed. If the distance from the CentriFlow® Meter Module to the Electronics Enclosure is more than 50', then the optional 250' cable should also be cut to fit. Excess cable should never be coiled up and placed into the CentriFlow® Meter Module. Each end of the cable has been precut and labeled for the appropriate end connection. The cable MUST be run through grounded metallic conduit connected at both the Module and the Enclosure. Upon removing the Seal Top, the connector will be seen mounted toward the conduit connection point. All of the four conductors and the shield must be connected here. The shield should also be connected to the CFM electronics TB2-1 Ground. All connectors are designed so that when the push buttons are depressed, the wire crimp will open on the side. Under the connector is a label that will aid in connecting the wires to the correct position. The colors should be matched to the label.



Basic Wiring Components Drawing



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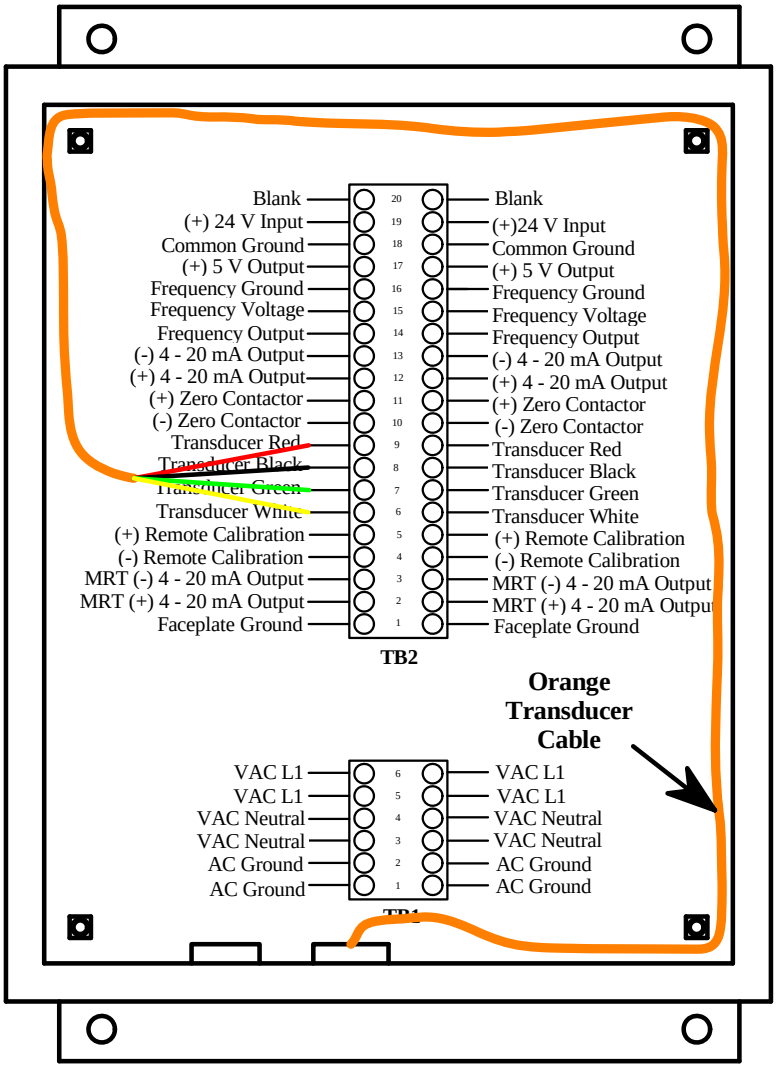
The opposite end of the cable should be routed through the conduit and into the Electrical Enclosure. Inside it will be routed around the standoffs as seen in the figure below. Again, as with the connection at the Module, the four conductors and the shield are connected according to color. The wires will be connected to CTB1 according to the Label placed inside the Enclosure as follows:

Red Wire	–	TB2 #9
Black Wire	–	TB2 #8
Green Wire	–	TB2 #7
White Wire	–	TB2 #6
Shield	–	TB2 #1

All Connections are made to the Left side of the Terminal Blocks



***Full Wiring Diagram in back.**

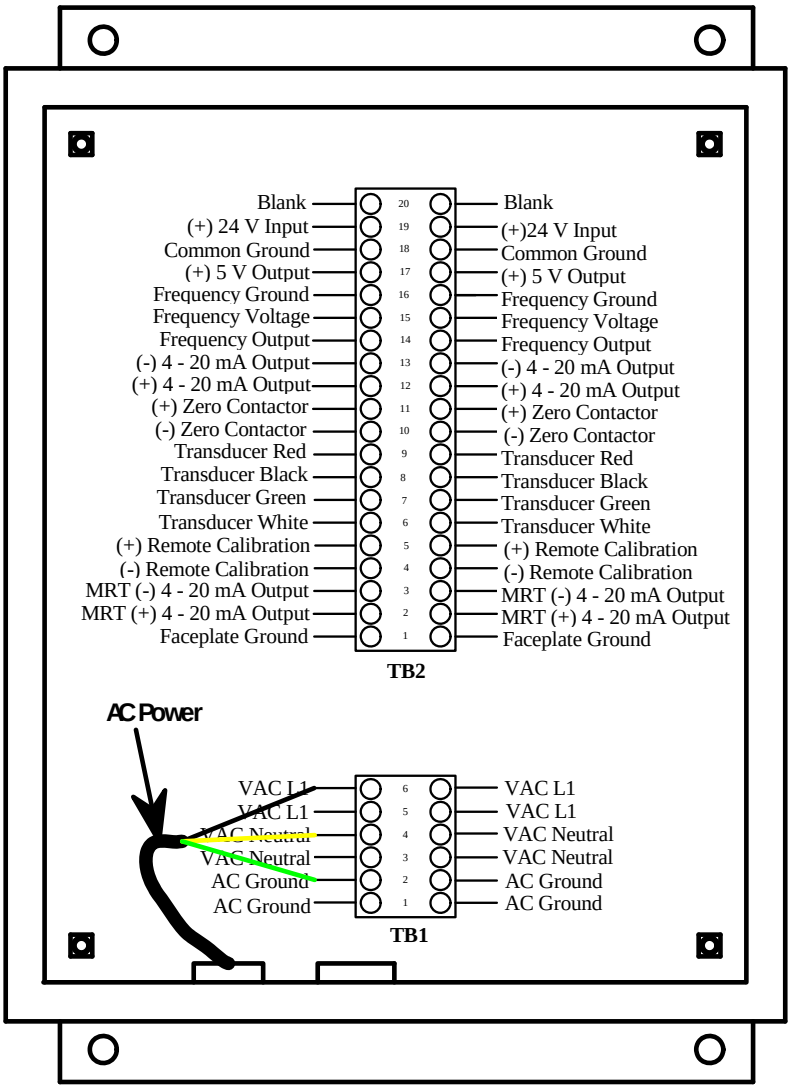
Power

The CentriFlow® Meter requires 24 Vdc to power the Electronics. This can be accomplished in two ways, either to directly power the electronics with 24 Vdc or with VAC. If the VAC option has been chosen, then there would be a 24 Vdc Power Supply that would be factory wired to power the electronics with 24 Vdc. The wiring connections for the two options are as follows:

VAC DIRECT

AC Ground	-	TB1 #1 or #2
VAC Neutral	-	TB1 #3 or #4
VAC Line	-	TB1 #5 or #6

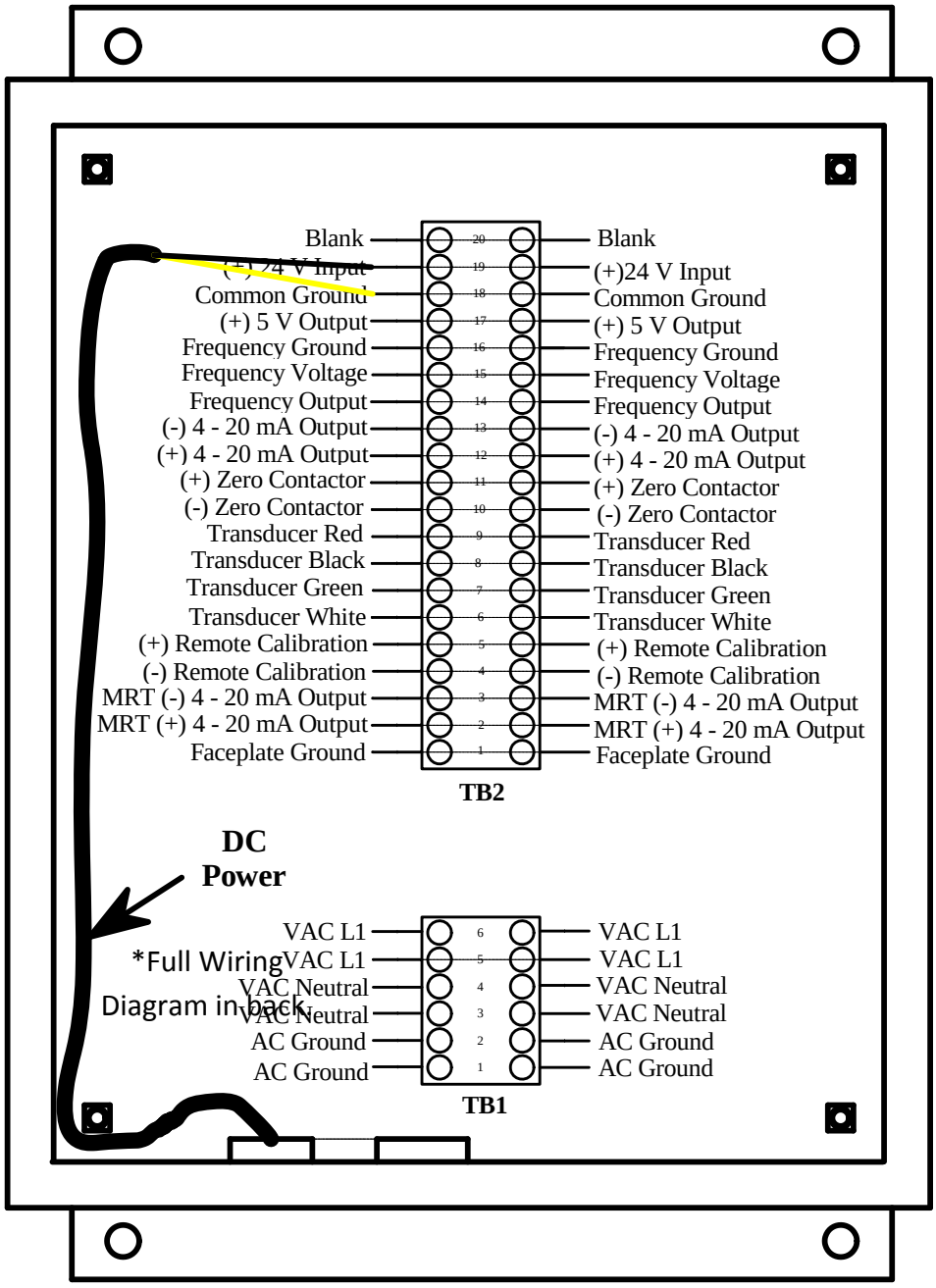
*Full Wiring Diagram in back.



All Connections are made to the Left side of the Terminal Blocks

24 VDC DIRECT

+24 Vdc	-	TB2 #19
P.S. Ground	-	TB2 #18



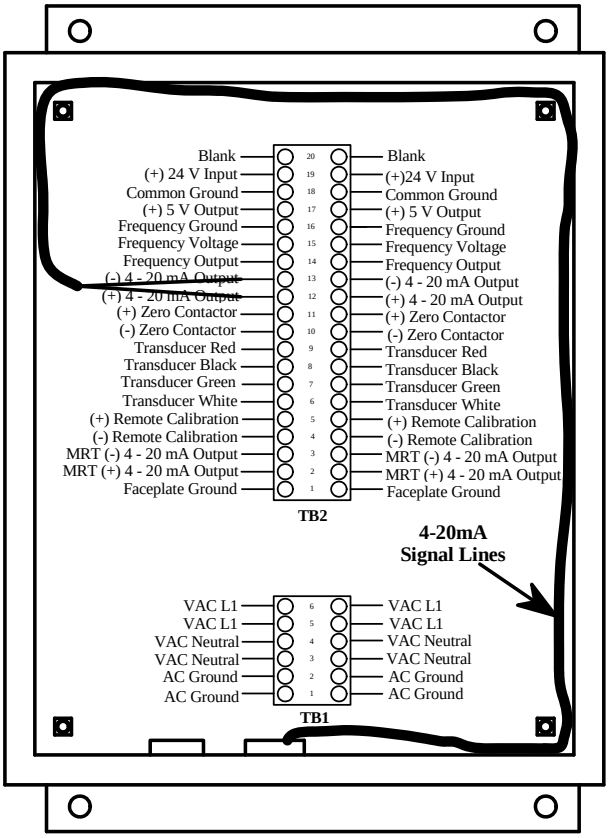
All Connections are made to the Left side of the Terminal Blocks

Wiring Outputs

Analog Output (Instantaneous)
No Loop Power Required

The CentriFlow® Meter Electronics is capable of outputting an analog signal. This signal is a 4-20 mA instantaneous isolated signal. The signal output is proportional to the Electronic Full Scale Flow Rate. For example, if the Electronic Full Scale Flow Rate were calibrated to be 300 lb/min, then an output of 12 mA would correspond to a Flow Rate of (12-4)/(20-4) x 300 = 150 lb./min or 50% of the Electronic Full Scale Flow Rate. Since this output is directly related to the Electronic Full Scale Flow Rate any change in Calibration to change the Electronic Full Scale Flow Rate would result in a change in the signal so as to retain the proportionality. Thus, if the Electronic Full Scale Flow Rate were changed from 300 lb./min to 500 lb./min, then a 20 mA output would correspond to the 500 lb/min flow rate. Connection to this output signal would be made via the Terminal Block TB2 in the back of the Electrical Enclosure. It is recommended that the wires for this signal be routed through the conduit housing the power connection. It is recommended that this Analog Output be used for Control purposes and not for Trending due to its instantaneous nature. The connection for this signal would be as follows:

(+) 4-20 mA - TB2 #12
(-) 4-20 mA - TB2 #13

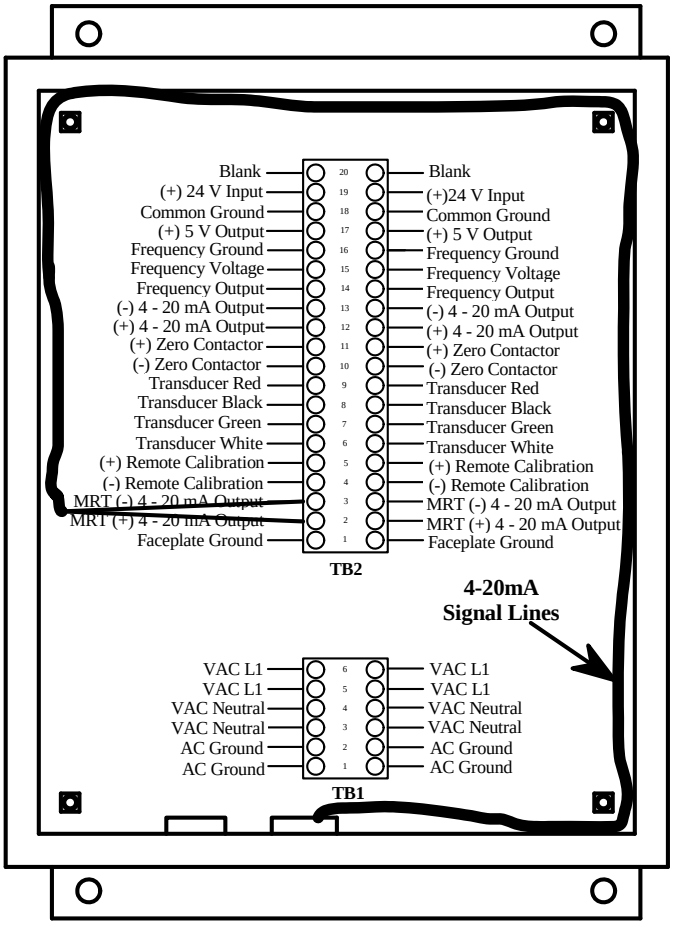


*Full Wiring Diagram in back.

Averaged Analog Output (Optional)

The CentriFlow® Meter can be equipped to output an averaged analog signal. This requires the optional Ratemeter/Totalizer with an analog output. This is used to help the customer receive a readable and clean signal in special cases. Some PLC's are not fast enough to keep up with the instantaneous signal and need this additional filtering. If you are not sure which signal is right for the application, consult the factory for suggestions. Wiring for the Averaged Analog Output is connected as shown below.

(+) 4-20mA (Averaged) - TB2 #2
(-) 4-20mA (Averaged) - TB2 #3



*Full Wiring Diagram in back.

All Connections are made to the Left side of the Terminal Blocks

Totalizing Pulse Output

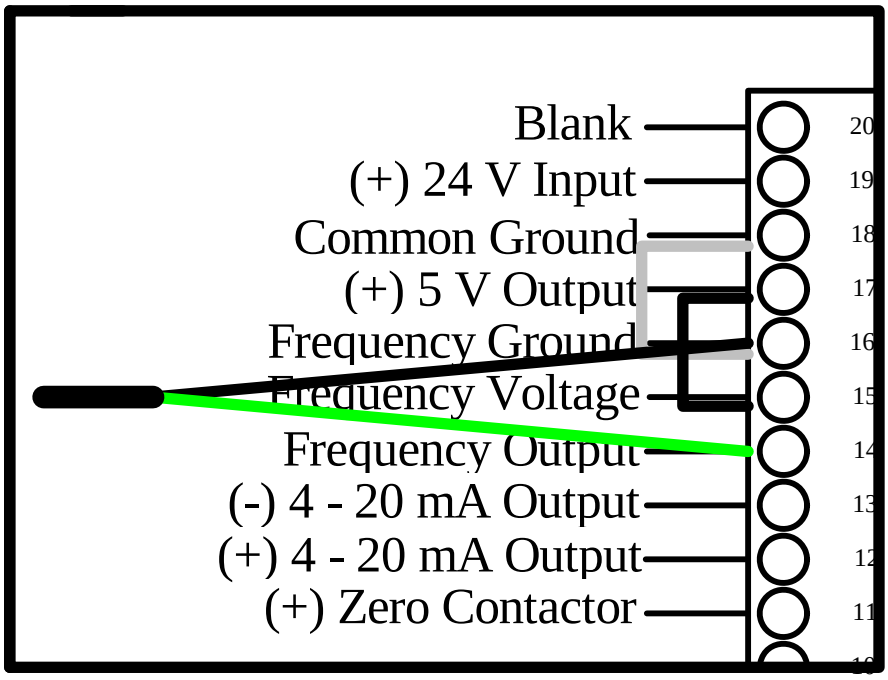
The CentriFlow® Meter Electronics is capable of outputting a Totalizing Pulse Output signal. This signal is a pulse signal, or Frequency Signal, that is connected to a Frequency Voltage and will output 0 to 500 pulses per second. The Frequency Voltage can be 5 Volts, 24 Volts, or a customer supplied voltage in the range of 5 – 30 Volts. The Frequency Voltage is setup at the factory using a 12V supply from the Ratemeter/Totalizer by default and should not be changed without consulting the factory. The Frequency Ground is connected to the Common or Power Supply Ground. This Totalizing Pulse Output will output a Voltage Pulse that is related to the Electronic Full Scale Flow Rate. For example, if the Electronic Full Scale Flow Rate were calibrated to be 300 lb./min, then a flow rate of 150 lb./min would correspond to a pulse of 250, or 50% of Electronic Full Scale Flow Rate. The 5 Volt and 24 Volt Frequency Voltage can be pulled from the Terminal Block TB2 in the back of the Electronics Enclosure. The configurations for these would be as follows:

5 Volt Frequency Voltage

Jumper between: 5 Volts (TB2 #17) and Frequency Voltage (TB2 #15)
Jumper between: Common Ground (TB2 #18) and Frequency Ground (TB2 #16)

Pulse Output: Frequency Out (TB2 #14)
Frequency Ground (TB2 #16)

*Full Wiring Diagram in back.



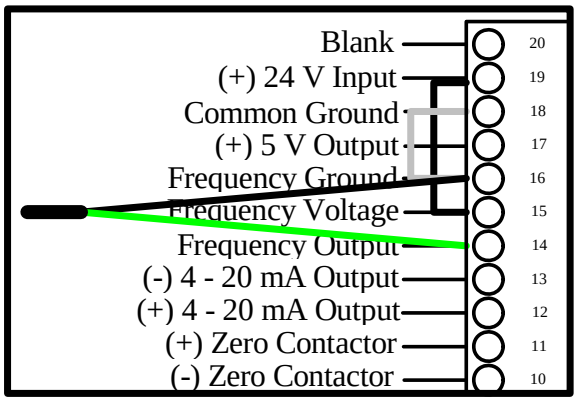
All Connections are made to the Left side of the Terminal Blocks

24 Volt Frequency Voltage

Jumper between: 24 Volts (TB2 #19) and Frequency Voltage (TB2 #15)
Jumper between: Common Ground (TB2 #18) and Frequency Ground (TB2 #16)

Pulse Output: Frequency Out (TB2 #14)
Frequency Ground (TB2 #16)

*Full Wiring Diagram in back.

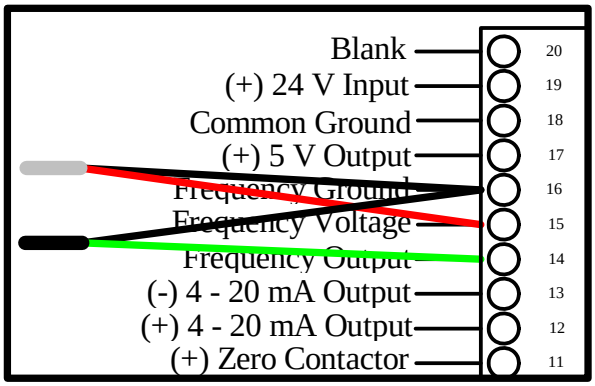


Customer Supplied Frequency Voltage (5-30 Volts)

Customer Voltage: Frequency Voltage (TB2 #15)
Customer Ground: Frequency Ground (TB2 #16)

Pulse Output: Frequency Out (TB2 #14)
Frequency Ground (TB2 #16)

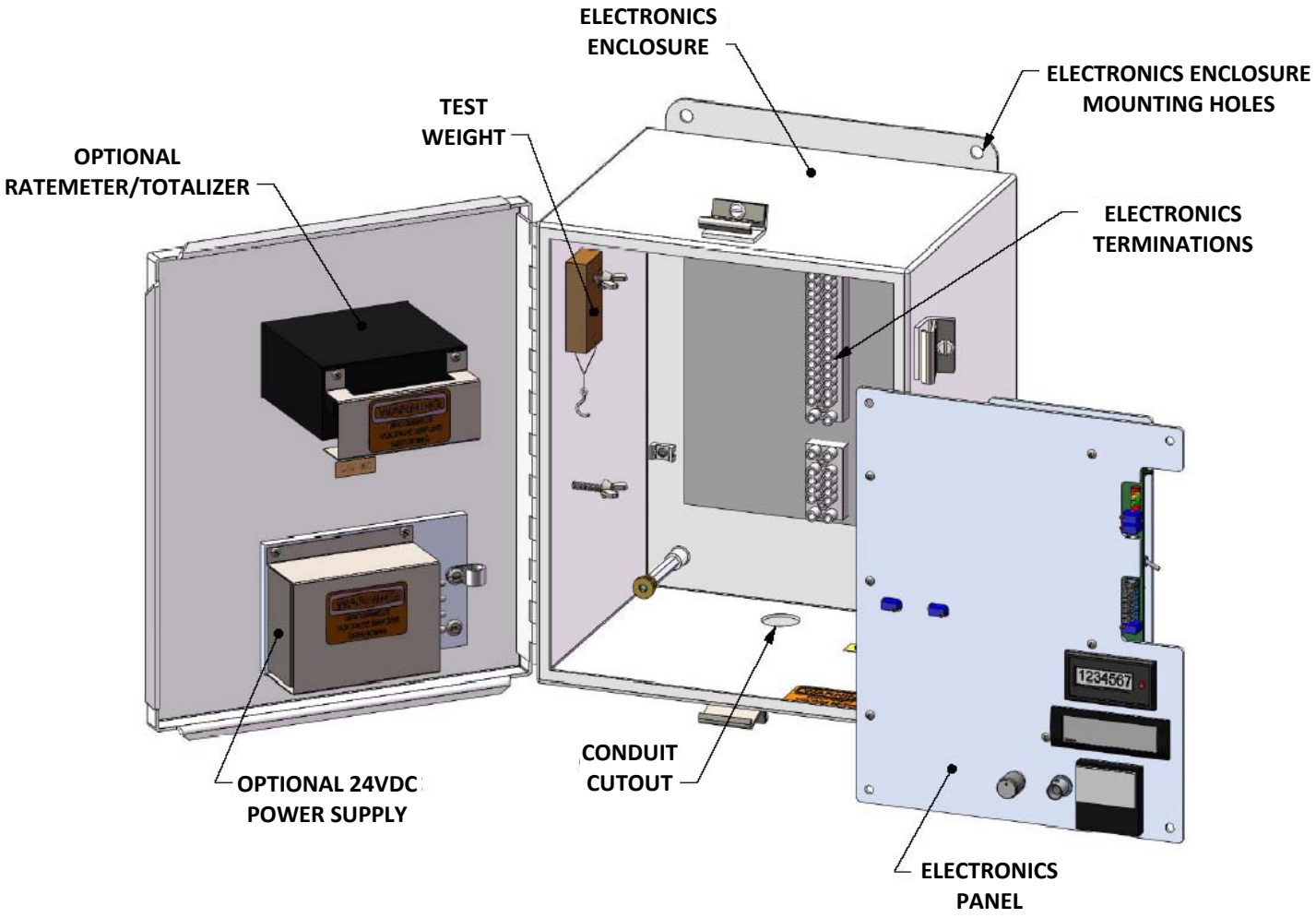
*Full Wiring Diagram in back.



All Connections are made to the Left side of the Terminal Blocks

Operation and Calibration

Using Your Electronics



The Remote Electronics Enclosure contains the Electronics Panel, Termination Connection for Power, Termination Connection for Remote Electronics Cable, Termination Connection for Output, and Test Weight(s). The Electronics Panel is a removable Panel attached to the Enclosure with four (4) screws in the upper and lower corners. Once the Electronics Panel is unfastened from the Enclosure, it is connected to the Termination Connectors with four (4) cables (connections shown on page 24). These cables are:

- Power Cable
- Transducer Cable
- Remote Calibration Wires & Connector
- Faceplate Ground Wire

Removal of these cables will result in completely releasing the Electronics Panel from the Enclosure.

Displays

Upon inspection of the Electronics Panel it can be seen that there are three displays and four optional LED's present on the front panel. The three displays on the front panel of the Electronics Panel are for measurement of the output of the Electronics. They are as follows:

Analog Meter: This gives an analog representation of the output of the Electronics and is tied to the *0 – 10 Volt Output* position on the Rotary Selector Switch. On the meter, 10 Volts corresponds to the 100% Output of the Electronics or the Electronic Full Scale Flow Rate. An example of this would be if the Electronic Full Scale Flow Rate were calibrated to 300 lb./min, then 10 Volts would be 300 lb./min. Additionally, 3 Volts would be 30% of Electronic Full Scale or 90 lb./min. Since this Analog Meter is ultra-fast, it will visually display the real-time flow rate. It should not be used for anything other than a visual representation of the Electronics output.

Digital Meter: This gives a digital voltage reading of the output of the Electronics. It will also display the voltage settings of all of the positions on the Rotary Selector Switch. So, when the Rotary Selector Switch is in the *Calibration Voltage* position, it will display the setting for this adjustment. When it is in the *0 – 10 Volt Output* position is will display the digital version of the output that the Analog Meter displays. Although at the *Manual Zero / Static Cal* position on the Rotary Selector Switch it is meant to display the Manual Zero and Static Cal settings, this is a 0 – 6 Volt output and will modulate similarly to the 0 – 10 Volt Output while the CentriFlow® Meter is in use. However, this does not correspond to the Analog Meter since it is tied directly to the 0 – 10 Volt Output. Thus, it is recommended that the Rotary Selector Switch not be set to anything other than the *0 – 10 Volt Output* position when the CentriFlow® Meter is in use.

Counter: This 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.

Optional LED's

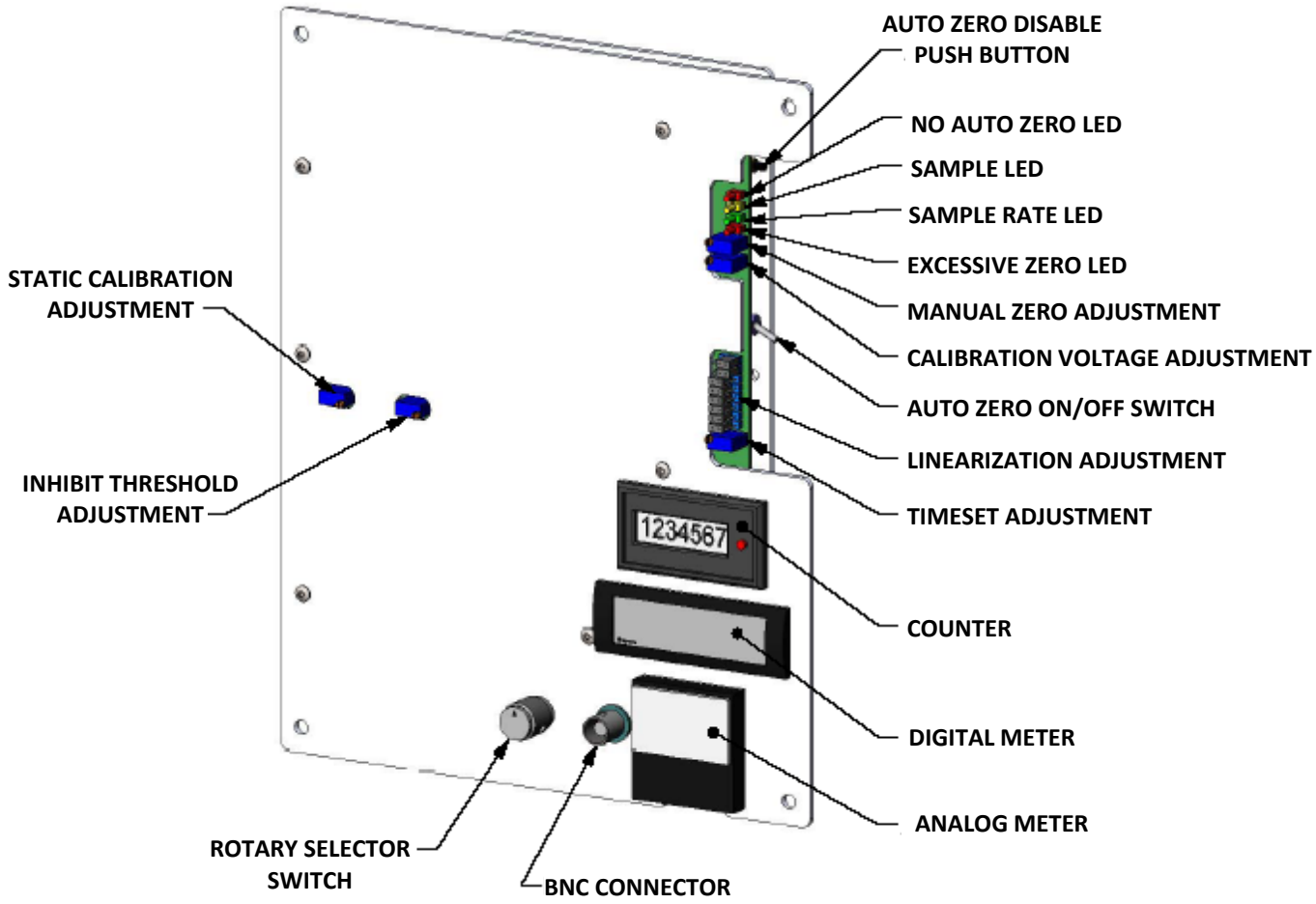
No Auto Zero: Red LED indicating that the Auto Zero Mode is inactive.

Sample: Yellow LED indicating Sample Mode of Electronics. Steady LED indicates Active or Live Mode and Flashing indicates Sample Mode.

Sample Rate: Green LED indicates the Rate at which Sample Mode is set. Flash visually displays time of Sample Mode.

Excessive Zero: Red LED indicating that the output exceeds the allowable adjustment of Manual Zero or Auto Zero. This LED will be steady when the product is flowing through meter during normal operation.

Also available on the front panel of the Electronics Panel is a BNC connector for connecting an external voltmeter or oscilloscope to read the output of the Electronics. This is connected similarly to that of the Digital Meter and will display the same voltages.



Transducer Zero Balance

The Transducer Zero Balance is an adjustment of the Electronics that allows any offset of the Transducer to be adjusted out to allow a ±2 Volt Adjustment of Manual Zero, thus placing the Manual Zero in the mid-range of its adjustment. An offset of the Transducer is possible from a dramatic temperature difference from the condition at which is was balanced, a slight offset of meter balance due to meter not being installed level, or mechanical shift of assembly. Although adjusting the Transducer Zero Balance is not absolutely necessary, it will help to minimize the interaction between the Manual Zero Adjustment and the Static Calibration Adjustment. Since this adjustment needs to be made after the meter is in its permanent installation, under the conditions that it will be operating, this adjustment can only be estimated by the factory. This adjustment is made through an opening on the back plate covering the Electronics Panel. This is positioned on the back so as to eliminate the risk of misadjusting another of the adjustments accessible on the front panel of the Electronics Panel, because it does not have a direct readable output to show the adjustment. The procedure for this is as described below. If the meter is equipped with any options, ex: VibraWeigh, make sure to turn their power on for the following. With the meter installed and all wiring terminated, follow this procedure:

Step 1: Set the Rotary Selector Switch to the *Manual Zero / Static Cal* position. With an adjustment screwdriver, adjust the Manual Zero Adjustment on the Front Panel all the way counterclockwise. Read the voltage on the Digital Panel Meter.

Step 2: Adjust the Manual Zero Adjustment all the way clockwise. Again, read the volt age on the Digital Panel Meter. There should be a 4 Volt span between the two.

Step 3: Remove the four screws holding Electronics Panel in Enclosure Box.

Step 4: Rotate the Panel so you can see the back

Step 5: Find the small hole exposing a potentiometer (figure on pg 33). Now, adjust the Transducer Zero Balance potentiometer on the back of the Electronics Panel. To adjust the Transducer Zero Balance, turn the potentiometer until the Digital Panel Meter reads HALF of the span from Step 2.

> *Example: Consider the lower limit found in step 1 is –2.3 and the upper limit found in step 2 is 1.6. The difference (span) between the two is 3.9. Take half of this span, which is 1.95, and set the Transducer Zero Balance to this 1.95V setting.*

This will put the Manual Zero Adjustment in the mid-range position and make the interaction between the Manual Zero and Static Cal much less.

Step 6: Place the Electronics Panel back into the Enclosure Box and reattach the four (4) screws holding Electronics Panel in Enclosure Box. Now, the Manual Zero should be reading somewhere around 2.00V ± 0.1V, its upper limit. Adjust the Manual Zero to read 0.00V.

Step 7: It is now necessary to reestablish the Static Calibration setting.

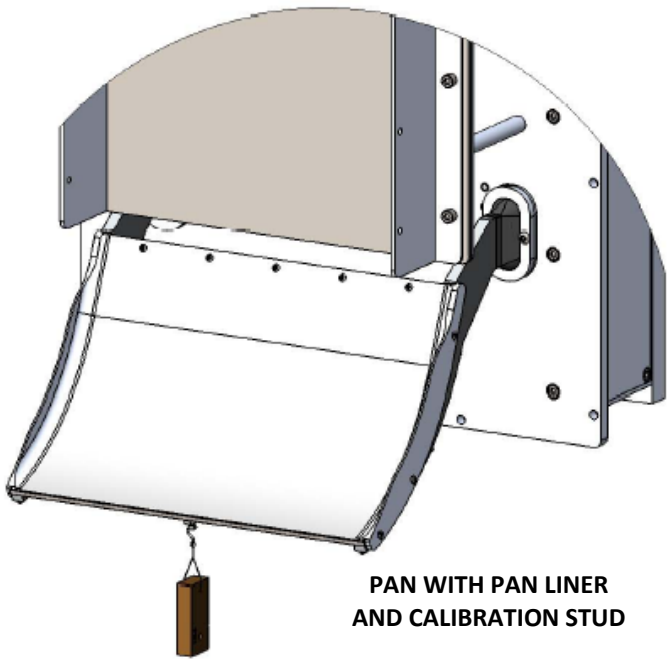
Static Calibration (Static Cal.)

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 Zero Balance adjustment has been made or the Transducer has been replaced. The procedure for setting or checking the Static Calibration is as follows:

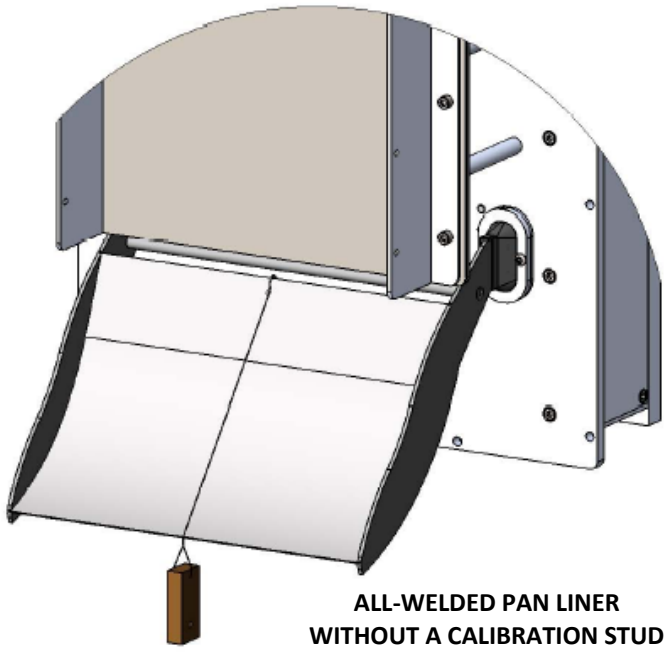
Step 1: With no product on the pan and the meter in a STATIC STATE, turn the Rotary Selector Switch to *Manual Zero / Static Cal*. The Digital Panel Meter should be reading 0.00 Volts. It is recommended that an external voltmeter be used for more numerical accuracy. This external voltmeter would be connected to the BNC connector on the front panel of the Electronics.

Step 2: If the voltage reading is not equal to 0.00 Volts, adjust the Manual Zero Adjustment until it is 0.00 Volts.

Step 3: Hang the Test Weight provided with the Electronics Enclosure from the Calibration Stud located under the bottom edge of the Pan. 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.



PAN WITH PAN LINER AND CALIBRATION STUD



ALL-WELDED PAN LINER WITHOUT A CALIBRATION STUD

Step 4: Adjust the Static Calibration Adjustment to the factory set voltage to give the appropriate Transducer Value. This value is set by the Factory and is noted on the Factory Calibration Log on the Front Panel of the Electronics.

The following table will help to show the Voltage vs. Transducer Size:

Transducer Size	Test Weight (gm)	MINIMUM Transducer Value Static Cal = 6V	REDUCED Transducer Value Static Cal = 3V	STANDARD Transducer Value Static Cal = 1.5V	EXTENDED Transducer Value Static Cal = 0.75V
2.5	74.3	0.625	1.25	2.5	5
5	148.5	1.25	2.5	5	10
10	297	2.5	5	10	25
25	594	5	10	25	50
2x25 or 1x50	1188	10	25	50	100

Step 5: Remove the Test Weight from the Calibration Stud. The voltage should return to 0.00 volts. If the voltage is not 0±0.02 volts, repeat Step 2 through Step 5, as necessary. This is due to some interaction of the Manual Zero Adjustment and the Static Calibration Adjustment. This procedure may need to be performed several times.

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 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. For a Type II Configuration the material can be collected from a Calibration Chute Access in the front of the meter enclosure. The door should be removed, and the material captured as it leaves the Pan Section. 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. Included in the Appendix is a Site Calibration Worksheet to facilitate this procedure. It is recommended that this sheet be reviewed before proceeding on to the Site Calibration procedure. The procedure is explained as follows:

Step 1: Determine Electronic Full Scale Flow Rate. This is the Flow Rate that will output 100% or 10 Volts from the Electronics. This value is determined by the Factory and is logged on the Factory Calibration Log on the Front Panel of the Electronics. It is important to note that under normal flow conditions, the Electronics should never reach this 100% output. If for any reason this occurs, the Electronic Full Scale Flow Rate needs to be raised. If the output were to reach over 100% it would cutoff out put over full scale and cause inaccuracy due to saturation of the Electronics.

Step 2: Determine the Count Per Weight Ratio. This value is determined by the Factory and is logged on the Factory Calibration Log on the Front Panel of the Electronics. This value is the number of counts that the Electronics Counter will display per weight of material that is run through the meter. To calculate this, use the following formula:

Count/Weight Ratio = 500 / Electronic Full Scale Flow Rate (In Weight/second Units)

Step 3: Determine Current Calibration Voltage Value. This is done by adjusting the Rotary Selector Switch on the Front Panel of the Electronics to *Calibration Voltage*. The value can then be read from the Digital Meter or through the use of a Voltmeter and the BNC Connector.

Step 4: Ensure that the Pan is empty so that the Electronics does not measure material that is not part of the Site Calibration run.

Step 5: Make sure that the Auto Zero ON/OFF Switch is set to OFF if equipped. Depress the Disable Auto Zero Push-Button to release any previously set Auto Zero value.

Step 6: Switch Rotary Selector Switch to *0 – 10 Output*. The value on the Digital Meter should read 0 Volts. If value is not 0 Volts, then the Static Calibration needs to be performed. It is important to note that this value does not go over 10 Volts.

Step 7: Reset the Counter to Zero. This is done by pressing the Button on the face of the Counter.

Step 8: Run a sample of material flow through meter and collect for weighing. *This should be a minimum of 10 seconds and should be a simulation of normal everyday flow.*

Step 9: Note Counter value on the Calibration Worksheet. This is the actual number of counts for the material collected. Alternatively, you may use the Metered Value on the optional Ratemeter/Totalizer.

Step 10: Weigh the sample of material. Note the weight on the Calibration Worksheet. 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 11: Calculate Count/Actual Weight value on the Calibration Worksheet. This is done by, dividing the number of counts by the actual weight of the sample material. Again, you may use the Metered Weight from the Ratemeter/Totalizer per the Actual Weight.

Step 12: Repeat **Step 8 through Step 12** for a total of five times.

Step 13: Calculate the average of the Count/Actual Weight values for the five sample runs on the Calibration Worksheet.

Step 14: Calculate the Calibration Voltage Adjustment Ratio on the Calibration Worksheet. To calculate this, use the following formula:

Calibration Voltage Adjustment Ratio = (Count/Weight Ratio) / (Average of Count/Actual Weight Values)

Step 15: Calculate Adjusted Calibration Voltage on the Calibration Worksheet. To calculate this, use the following formula:

Adjusted Calibration Voltage = (Current Calibration Voltage) x (Calibration Voltage Adjustment Ratio)

Step 16: Adjust Calibration Voltage. Turn Rotary Selector Switch to Calibration Voltage and turn the Calibration Voltage Adjustment potentiometer, on the front of the Electronics Panel, to the Adjusted Calibration Voltage. The value can be read from the Digital Meter or through the use of a Voltmeter and the BNC Connector.

It is possible that in order to fine-tune the Calibration of the Electronics the procedure might need to be repeated more than once. As a general rule it can be seen that when the Count/ Actual Weight value is less than the Count/Weight Ratio, then the number of counts is seen to be too low. This would denote an increase in the Calibration Voltage is necessary. Conversely, when the Count/Actual Weight value is more than the Count/Weight Ratio, then the number of counts is seen to be too high. This would denote a decrease in the Calibration Voltage is necessary. When the Site Calibration is complete the values should be noted on the Site Calibration Log on the Front Panel of the Electronics.

It should be noted that the Calibration Voltage has a maximum and minimum value. The maximum is 9.5 Volts and the minimum is 4.25 Volts. If the Calibration Voltage is determined to be above the maximum, then the Static Calibration will have to be adjusted so that the Transducer Value is set to the Reduced Static Calibration. This is a Static Calibration setting of 3.0 Volts. Conversely, if the Calibration Voltage is determined to be below the minimum, then the Static Calibration will have to be adjusted so that the Transducer Value is set to the Extended Static Calibration. This is a Static Calibration setting of 0.75 Volts. If the setting of the Static Calibration is already set to either the Reduced or Extended Static Calibration and the Calibration Voltage is determined to be above the maximum or below the minimum values, then the Transducer Size will have to be changed. This requires a different Transducer and the Factory should be notified for assistance.

To determine the error between the actual flow rate of the material to the measured flow rate the following has been provided. This is not the only way to calculate this error, it is provided as an example.

%Error = |(Count/Actual Weight) - (Count/Weight Ratio)| / (Count/Weight Ratio) x 100

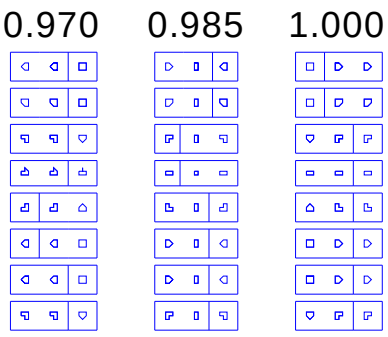
*Worksheets available starting on page 36

Electronic Options

ELECTRONICS PANEL ADJUSTMENTS

The Electronics Panel has four (4) different types of adjustments that can be made, which will affect the calibration, and operation of the Electronics. The different types can be broken up into PCB Jumper Positioning, Potentiometer Adjustments, Toggle Switch, and Rotary Switch.

The use of the PCB Jumper Positioning is for a Linearization Adjustment. The Linearization Adjustment is used under special circumstances. There are three Linearization settings. To set these, move the PCB Jumpers for different positions according to the figure below.



The default factory setting is 1.000

Linearization is determined by the factory and should not be changed unless the factory is consulted. Changing this incorrectly will result in inaccuracy in the output of the Electronics. The use of the Linearization Adjustment is to correct inaccuracy that might occur due to material buildup and non-standard circumstances.

The Toggle Switches are used for the Auto Zero (Tare) ON/OFF Switch and the Push Button Toggle for Disabling the Auto Zero Value from the Electronics.

The Rotary Selector Switch is used to change the setting voltages displayed by the Digital Meter. The output can be seen through the BNC Connector. There are five selectable positions. They are as follows:

0 – 10 Volt Output: Displays the Output of the Electronics during CentriFlow® Meter operation. A 10V output corresponds to the Electronic Full Scale Flow Rate. An example would be if the Electronic Full Scale Flow Rate were calibrated to 300 lb./min, then 5 volts would correspond to 50% or 150 lb./min.

Calibration Voltage: Displays the setting of the Calibration Voltage. This Voltage is the setting used to adjust the Electronic Full Scale Flow Rate to the appropriate value. This Voltage can range from a minimum of 4.25 Volts to a maximum of 9.5 Volts.

Manual Zero / Static Cal.: Displays the ZERO Voltage, the Voltage with no product on the running through the meter, and the Static Cal. Voltage, which ranges the Transducer. This voltage can be one of four voltages when the Test Weight, which is included with the Electronics Enclosure, is hung from the bottom of the Pan. These voltages are 0.75, 1.5, 3.0, and 6.0 Volts.

Inhibit Threshold: Displays the setting at which 0 – 10 Volt Output must rise above in order for the Electronics to begin counting. It is related to the 0 – 10 Volt Output such that it ranges from ½ % of Electronic Full Scale to 15% of Electronic Full Scale. An example would be if the Inhibit Threshold were set to 0.5 Volts and the Electronic Full Scale Flow Rate were 300 lb./min, then the Inhibit Threshold would be 5% of Electronic Full Scale or 15 lb/min. The Factory Default for this setting is 0.2 Volts or 2% of Electronic Full Scale.

Timeset: Displays the setting for the Sample Rate at which Electronics will Sample the ZERO Voltage when the Auto Zero (Tare) is activated and the Electronics is in Sample Mode (optional setting pertaining only to AutoZero).

POTENTIOMETER ADJUSTMENTS

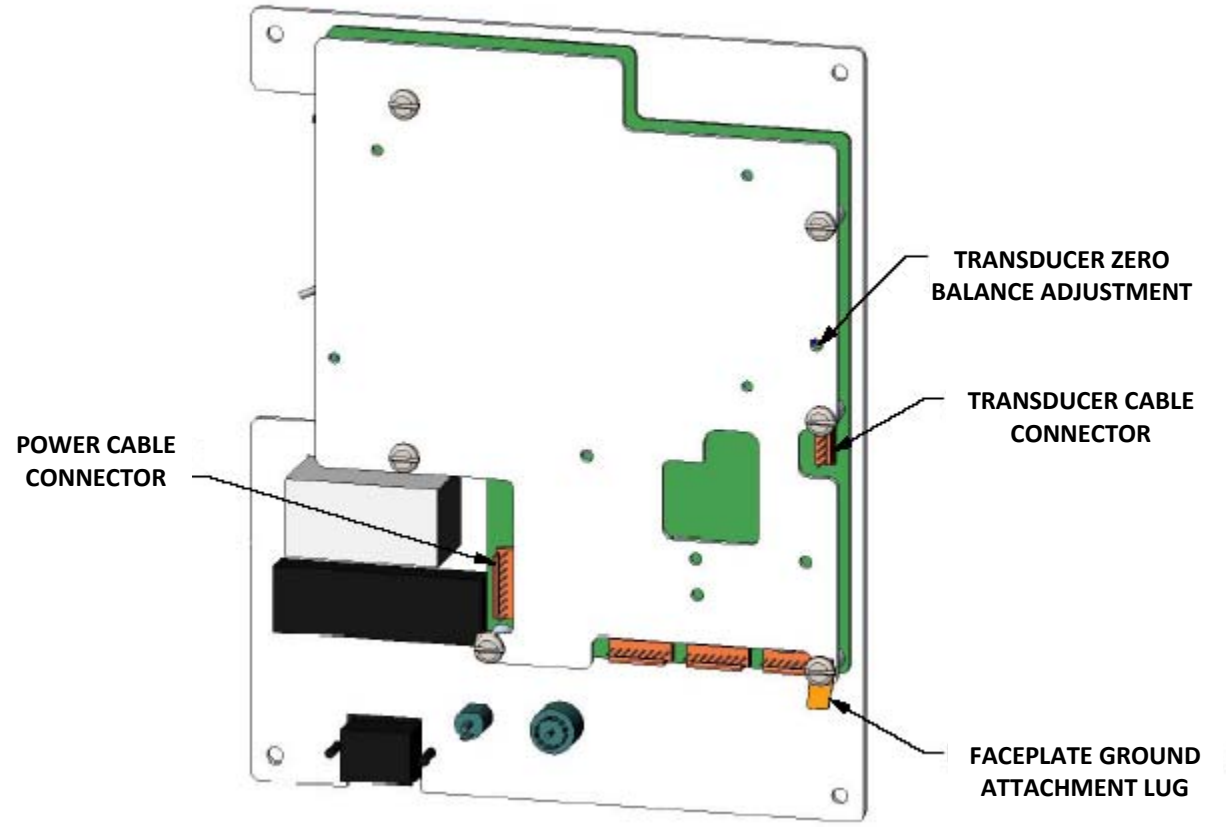
There are six (6) Potentiometer Adjustments available on both the front panel and back panel of the Electronics Panel. Please reference the drawings on pages 26 and 27 as these adjustments are described. The adjustments are as follows:

Calibration Voltage: Used to adjust the Electronics so that the Electronic Full Scale Flow Rate is set to appropriate value. **This voltage can range from a minimum of 4.25 Volts to a maximum of 9.5 Volts**. The setting can be read when the Rotary Selector Switch is in the *Calibration Voltage* position.

Inhibit Threshold: Used to adjust the voltage at which Electronics output must rise above before it will begin to register totalizing counts. This Voltage can range from a minimum of 0.05 Volts to a maximum of 1.5 Volts. It is usually set in increments of 0.05 Volts and is expressed in terms of Electronic Full Scale. For example, if the Electronic Full Scale was 300 lb./min and the Inhibit Threshold was set to 0.65 Volts, it would be 6.5% of Electronic Full Scale or 19.5 lb./min. The setting can be read when the Rotary Selector Switch is in the *Inhibit Threshold* position.

Timeset: Used to adjust the Sample Rate time only when the AutoZero Function is present. There is no default setting, however, a 6 second Sample Rate time is recommended. The Voltage can range from 0.1 Volts to 10 Volts. The setting can be read when the Rotary Selector Switch is in the *Timeset* position.

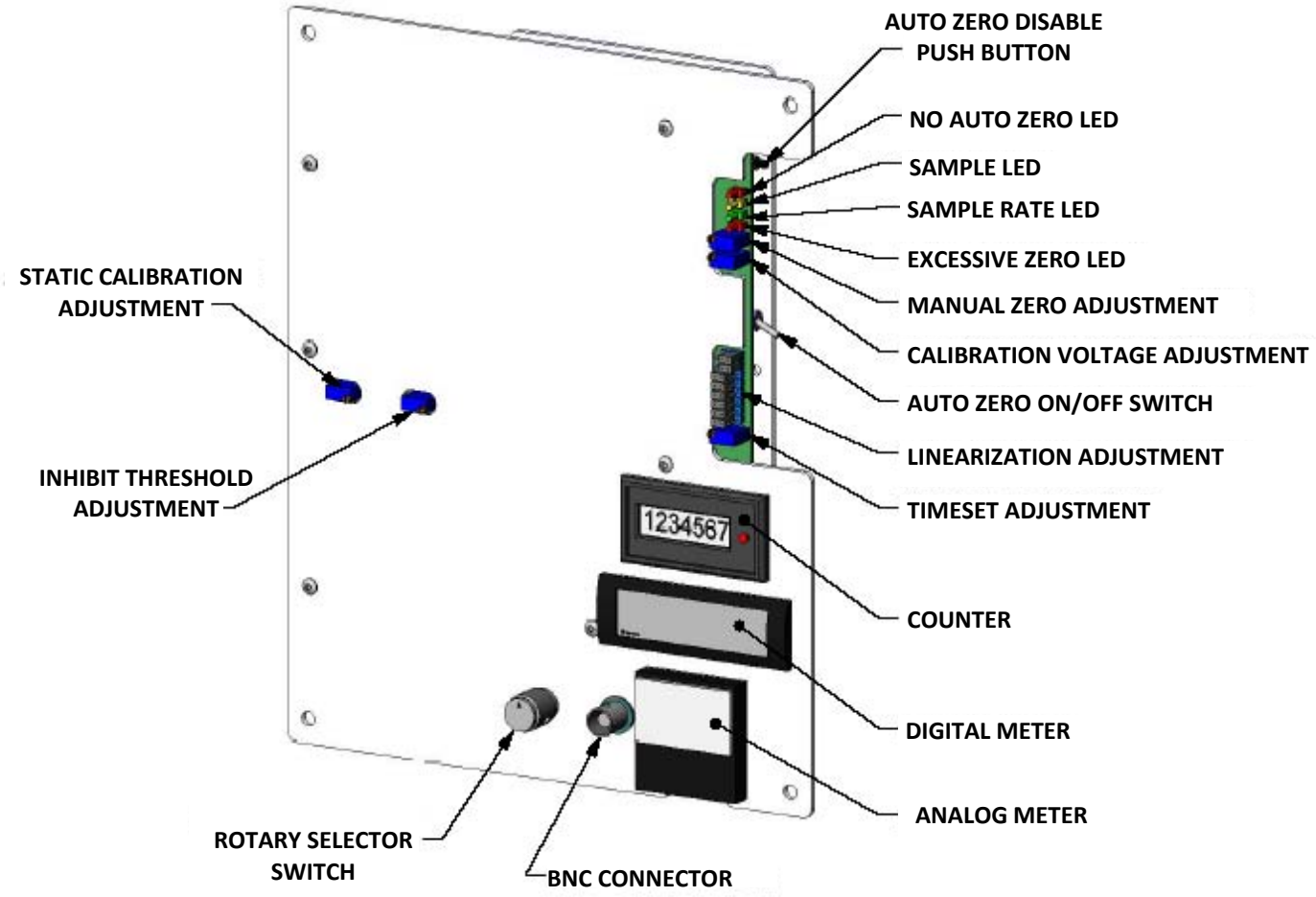
Back Panel Drawing



Transducer Zero Balance: Accessible through cutout in back panel. This allows adjustment to balance the ±2 Volt range of the Manual Zero Adjustment.

Manual Zero: Used to Adjust ZERO Voltage with no product flowing through CentriFlow® Meter. If the Transducer Zero Balance has been performed, there should be ±2 Volt range. The voltage can be read when the Rotary Selector Switch is in the *Manual Zero / Static Cal.* position.

Front Panel Drawing



Static Calibration (Static Cal.): Used to range the Transducer when the Test Weight is hung from the bottom of Pan. The voltage can be adjusted to one of four values: 0.75, 1.5, 3.0, and 6.0 Volts. The setting can be read when the Rotary Selector Switch is in the *Manual Zero / Static Cal* position.

Auto Zero (Tare)

*This is an **optional Electronics board** and is only used when absolutely necessary*. After the CentriFlow® Meter has been installed, the Electronics has been configured for Static Calibration, and a Site Calibration has been achieved, the CentriFlow® Meter should run with limited change to the Electronic Calibrations. Due to the various characteristics of different materials that the CentriFlow® Meter could measure, some electronics have been equipped with a few Functions that will allow any material induced problems with the measurement of the flow to be eliminated.

One such problem could come from material that would build up on the parts of the CentriFlow® Meter that are in the flow path. Since this material could be recognized by the Electronics as measurable flow it could cause inaccuracy in the actual measured material. In order to eliminate this material from being measured, the Electronics has an Auto Zero or Tare Function. This would work similarly to a static scale, in which material that would remain on the measurement section of the meter when flow is stopped would be "zeroed out" or tarred. It is important to note that this function will ONLY be advisable to use to tare material that REMAINS on the meter when the flow is STOPPED and WILL NOT be swept away when the flow resumes.

In order for this Function to be activated, the Electronics must be in Sample Mode and the Auto Zero switch must be flipped to the ON position. In order for the Electronics to be put into a Sample Mode, the material flow should be stopped and the Zero Contactor must be closed. There is a connection point for this in the Electronics Enclosure on the terminal behind the Electronics Panel. This could be wired to a switch, computer, or to the feed system from which the material being measured originates. The connection for the Zero Contactor is to TB2 according to the Label inside the Enclosure as follows:

Zero Contactor (+)	-	TB2 #11
Zero Contactor (-)	-	TB2 #10

It is important to note that when the Electronics is in Sample Mode, the Electronics is considered not LIVE and will NOT be measuring flow. The Auto Zero is a static or non-flow Function. While in the Auto Zero ON and Sample Mode the LED Bank will be different. The Red No Auto Zero LED will not be on, the Green Sample Rate LED will be blinking according to the Sample Rate Time and the Yellow Sample LED will light ONLY when the Sample of Zero is taken. It is at this time that the Electronics will Auto Zero or Tare. When the Zero Contactor is then opened, the Electronics will return to LIVE Mode and it will show a Zero Value of 0 Volts. In the LIVE Mode, the Yellow Sample LED will be on and the Green Sample Rate LED will be off.

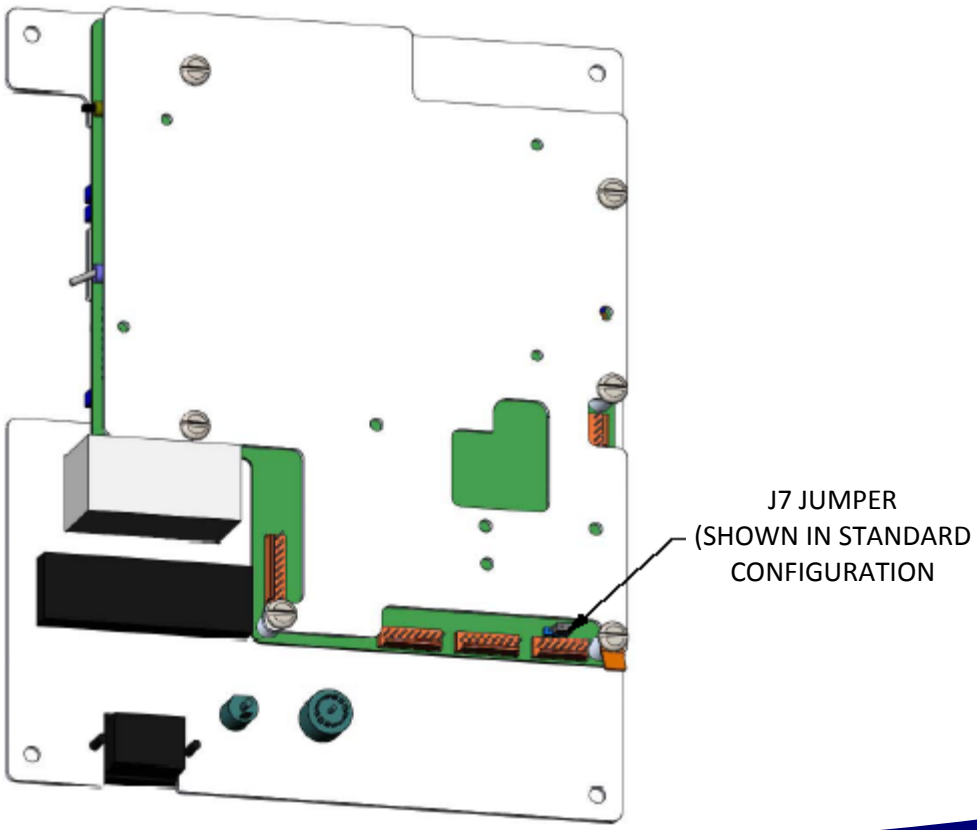
To Disable the Auto Zero Function, first the material flow should be stopped and the Zero Contactor closed. Then, the Auto Zero switch must be flipped to the OFF position. To actually Deactivate or Release the Auto Zero value stored in the Electronics, the Auto Zero Disable Push-Button needs to be pressed. This will light the Red No Auto Zero LED in the LED Bank. When the Zero Contactor is then opened the Electronics will return to LIVE Mode and the Non-Zero Value will be displayed corresponding to the material that remains on the measurement section of the meter.

Remote Calibration

Another problem that could arise from material properties would be in a case in which one CentriFlow® Meter would be used to measure two or more different materials. Since it is possible for the Calibration Voltage to be different for each of the different materials, an adjustment of the Calibration Voltage may be necessary every time the material being run through the meter were to be changed. There are two possible solutions to this case. The first would be to determine the Calibration Voltages for the different materials and then actually set the Electronics up so as to use a setting between the different values. This would eliminate the need for constant adjustment, and give a small error in accuracy between the different materials.

The second solution to this problem is called Remote Calibration. With Remote Calibration a Calibration Voltage can be sent to the Electronics from an outside source. This source can be a computer, switch box, or any other system that can output a voltage to the Electronics. Since there are possible problems with this sort of system, it is to be used only when necessary, and the Factory should be consulted to ensure that the voltage would be satisfactory. The connection for the Remote Calibration is through TB2 in the back of the Electronics Enclosure, and is as follows, as shown below:

Remote Calibration Voltage (+)	-	TB2 #5
Remote Calibration Voltage (-)	-	TB2 #4



Along with the connection of the Remote Calibration to the Electronics Enclosure, a change must be done to the Electronics to allow the Remote signal to be accepted. This change is one of changing a PCB jumper on the Electronics. To access the Jumper the Back Panel covering back of the Electronics Panel must be removed. This is done by removing the six screws holding the plate. The Jumper J7 is located near the Faceplate Ground Attachment Lug in the lower right hand corner of the Electronics Panel. To switch it to accept the Remote Calibration, the Jumper is removed from the Center (2) and Right (1) Pins to the Center (2) and Left (3) Pins. It is important to note that the Calibration Voltage Adjustment Potentiometer will be inactive when the Remote Calibration Function is active. However, the Digital Meter will be able to read the Remote Calibration value.

Inhibit Threshold

The last remaining Function of the Electronics that can be used to eliminate material induced problems with the measurement of the flow is the Inhibit Threshold Setting. The Inhibit Threshold is a setting that stops the Electronics from taking measurement. It is expressed as a percent of the Electronic Full Scale Flow Rate. The following table will show the Inhibit Threshold Setting and percent of Full Scale:

Setting	% F.S.
0.05	0.50%
0.10	1.00%
0.15	1.50%
0.20	2.00%
0.25	2.50%

Setting	% F.S.
0.30	3.00%
0.35	3.50%
0.40	4.00%
0.45	4.50%
0.50	5.00%

Setting	% F.S.
0.55	5.50%
0.60	6.00%
0.65	6.50%
0.70	7.00%
0.75	7.50%

Setting	% F.S.
0.80	8.00%
0.85	8.50%
0.90	9.00%
0.95	9.50%
1.00	10.00%

Setting	% F.S.
1.05	10.5%
1.10	11.0%
1.15	11.5%
1.20	12.0%
1.25	12.5%

Setting	% F.S.
1.30	13.0%
1.35	13.5%
1.40	14.0%
1.45	14.5%
1.50	15.0%

The minimum value for the Inhibit Threshold is 0.05 Volts, while the maximum is 1.5 Volts. The Factory setting is 0.2 Volts or 2% of Electronic Full Scale. To adjust this setting, first the Rotary Selector Switch must be turned to *Inhibit Threshold*. Then the Digital Meter will display the value, and adjusting the Inhibit Threshold Adjustment Potentiometer on the Front Panel can change it. It is important that the value of the Inhibit Threshold be below the output expected during normal operation of the meter. If the flow rate should go below the setting of the Inhibit Threshold, then the Electronics will not measure that portion of the flow and inaccuracy in the measurement will result.

The Inhibit Threshold can be used for flow that dribbles at the end or beginning of the flow application or any other flow measurement deemed undesirable that does not remain on the measurement section of the meter. An example of the latter would be vibration-induced measurement. Since the CentriFlow® Meter is very sensitive; it would see vibration or airflow across the meter as possible measurement. The Inhibit Threshold would be a good solution to this type of mismeasurement.

Setting Up the Optional Ratemeter/Totalizer

Use the PRGM button to toggle the menu or submenu, ENTER to select, and the buttons under the digits to manipulate the numbers. Refer to the Start-Up Calibration Log on your Electronics Panel for some of the settings. For more information reference pg 48.

1. Set the Rate
    A. Press PRGM – 3 times, ENTER.
    B. Set to SCALE always.
    C. Select a time unit, whether you are using minutes *(60)* or hours *(3600)*.
    D. Set the normalizing (averaging) factor or leave as *nor ##* (default is 02).
    E. Set the number of Significant Digits to be displayed.
    F. Set the delay time to *2.*
2. Set the Counter
    A. Press PRGM – 2 times, ENTER.
    B. Set to *RST 0*.
    C. Select the decimal point location for the A & B counters.
    D. Choose *A SEP b* to view A & B as separate counters.
    E. Choose *Hi CPS* for high counts per second.
3. Set the Factor
    A. Press PRGM, ENTER.
    B. dP FA sets the decimal for factor A.
    C. Enter the factor #.
    D. dP FB sets the decimal for factor B.
    E. Enter the factor #.
4. Set the Lock
    A. Press PRGM – 4 times, ENTER.
    B. LC PG, locks program but presets and reset are accessible.
    C. Enter the *code 1000*, unless the customer requests something else.
5. Set the Relay
    A. Press PRGM – 5 times, ENTER.
    B. Choose *A rAtE*, instead of *A tot*.
    C. Choose *B rAtE*, instead of *B tot*.
6. Set the Pre-Outs
    A. Preset A
    B. Preset B

Using the Ratemeter/Totalizer

MRT Basic Functions

Function	Button	Options	Press Buttons
Change Views	View	Rate	View
		A Counter Total	View
		B Counter Total	View
Lock/Unlock	Lock	Lock	Lock, Enter Code #,
Programming		Unlock	Enter
Change Pre A Value	Pre A	0-99999	Pre A, Enter #, Enter
Change Pre B Value	Pre B	0-99999	Pre B, Enter #, Enter
Change Programming	Program	See MRT Setup	
Reset A or B Counters	View/RST	Reset or Not	View Counter to Reset,
			A or B, RST (ENTER)

Reestablishing Original (Factory) Calibration Settings

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. If the Electronics were maladjusted, the meter moved, or the meter or Electronics damaged and the Calibration seems to be incorrect, these settings can be reset to the Factory Settings. The Factory Settings are recorded on the Factory Calibration Log on the Front Panel of the Electronics. Also, if necessary, the Calibration Voltage can be set to 5.0 Volts and the Site Calibration Procedure followed to bring the Calibration back to the necessary settings. And, if there are any questions about the settings or the Calibration, these values are also kept at the Factory along with the history of each CentriFlow® Meter. To reestablish these setting the following procedure should be followed:

STEP 1: Follow Static Calibration Procedure in Section 2.5 setting the Static Cal. to the value noted on the Factory Calibration Log.

STEP 2: Set Rotary Selector Switch to *Calibration Voltage* position.

STEP 3: Adjust the Calibration Voltage Adjustment Potentiometer to the setting noted on the Factory Calibration Log.

STEP 4: Set Rotary Selector Switch to *Timeset* position.

STEP 5: Adjust the Timeset Adjustment Potentiometer to the setting noted on the Factory Calibration Log.

STEP 6: Set Rotary Selector Switch to *Inhibit Threshold* position.

STEP 7: Adjust the Inhibit Threshold Adjustment Potentiometer to the setting noted on the Factory Calibration Log.

STEP 8: Set Rotary Selector Switch to *0 – 10 Volt Output* position. Lightly press the Pan and ensure the Analog Meter will reach 100% or 10 Volts without the Pan contacting a hard stop. Ensure that both the Digital Meter and the Analog Meter return to 0 Volts when the Pan is released. This ensures that the Pan movement is not restricted and in most instances determines that there is no physical damage to the meter. If this is not the case then the Factory should be consulted.

Quick Reference

RATEMETER/TOTALIZER SPECIFICATIONS	
DISPLAY:	6 digit, 0.55" High LED
INPUT POWER:	110 VAC ± 15% or 11 to15 VDC
	220 VAC ± 15% or 11 to 15 VDC
CURRENT:	250 mA DC maximum or 6.5 VA AC
OUTPUT POWER:	(AC powered units only)
	+12 VDC @ 50 mA, unregulated -10 + 50%
TEMPERATURE:	
Operating:	32°F (O°C) to 130°F (54°C)
Storage:	- 40°F (-40°C) to 200°F (93°C)
MEMORY	EEPROM stores data for 10 years if power is lost.
INPUTS:	High Impedance DC pulse input Open or 0-1 VDC (low), 4-30 VDC (high), 10 KW impedance. 10 KHz maximum speed. Accepts simultaneous inputs.
RESET:	
Front Panel:	Resets displayed value and control output
Remote:	4-30 VDC negative edge resets COUNTER "A" and control output.

The MRT is a dual input (channel A and B) counter/ ratemeter, each with its own 5-digit dividing scale factor. The two 10 AMP preset relay outputs can be programmed by the user to apply to the "A" total counter, the "A" ratemeter, or the "B" counter or the net total of A and B inputs. The user can view the Net Total of "A+B", the Net Total of "A-B", the rate of A, or A and B counters separately.

K FACTOR/SCALING

A fixed K-Factor is used to convert the input pulses to engineering units. The 5 digit K-Factor dividers, with decimal keyed into any position, allow easy direct entry of any K-Factor from 0.0001 to 99999. Separate factors may be entered for the 2 separate input channels.

CONTROL OUTPUTS

Relays: 2 each N.O. Relay; 10 Amps 120 / 240 VAC or 28 VDC. (N.C. relay contacts and NPN transistor output available with solder jumpers. Transistor output is internally pulled up to 10 VDC through relay coil, sinks from 10 VDC to 0.5 V@100 mA)

Analog Output: An optional 4-20 mA (0-20mA) output is available. The output can be programmed to track rate or total. Connections are via a 2 terminal pluggable screw connector. Programming is accomplished by using the front panel in conjunction with rear dipswitches.

Compliance Voltage: 3 to 30 VDC non-inductive.

Accuracy: 50mA worst case.

Calibrating the Meter

1. Zero Balance *
   a. Set the Rotary Selector Switch to the Manual Zero / Static Cal position. With an adjustment screwdriver, adjust the Manual Zero Adjustment on the front panel all the way counterclockwise. Read the voltage on the digital panel meter. This will give you the lower limit of the Zero's span.
   b. Now, adjust the Manual Zero Adjustment all the way in the clockwise direction. Note the voltage on the digital meter and make sure that it is 4±0.3 volt span. Leave at this setting.
   c. Remove the four screws holding the Electronics Panel to the box. Rotate the panel forward until you can find the adjustment for the Transducer Zero Balance.
   d. Adjust the potentiometer on the back panel until the digital meter on the front reads ½ the total span. Replace the panel and screws to their original format.
   e. Adjust the Manual Zero adjustment to 0.00. Now there should be a » 2.0 V adjustment both positive and negative.
2. Static Calibration *
   a. With no product on the pan and the meter in the static state, turn the Rotary Selector Switch to the Manual Zero / Static Cal. position. The digital meter should still be reading 0.00 V. If the meter does not read 0.00, then readjust the Manual Zero before proceeding. For greater accuracy, an external meter may be attached to the BNC connector on the front of the electronics panel.
   b. Hang the test weight(s) provided with the electronics enclosure from the calibration stud(s) located under the bottom edge of the pan, as shown in the figure. For pans that don't have a stud, there should be a test weight with a longer wire that is to be attached at the top edge of the pan and hung over the front edge. Be sure that the weight hangs freely and doesn't make contact with anything else.
   c. Set the digital meter reading to the Static Calibration Value that is on your Factory Calibration Log using the Static Calibration Adjustment.
   d. Remove the weight from the stud and check to see if the voltage now reads 0.0. If not, repeat steps a – d.
3. Complete Site Calibration if necessary. Use the Calibration Worksheets on the following pages to complete the calibration.

* Turn on VibraWeigh if equipped.

CentriFlow® Meter Calibration Worksheet

To Calibrate the CentriFlow® Meter use the variables below.

Note the Current Calibration Voltage X= _____

Note the Count/Weight Ratio from the Electronics Panel Y= _____

Run 3-5 samples at the same flow rate. The calibration may be completed using raw counts from the Counter located on the Electronics Panel inside the Electronic Enclosure or by using the Metered Value from the Totalizer on the Ratemeter/Totalizer if equipped. The Counter method is more accurate and is preferred. Pick a method and fill in the charts below to perform the calculations to determine the new Calibration Voltage. Repeat if necessary.

Note: Use New Calibration Voltage for next sampling X= _____

Reference:	A		B	Calculate C =	
Sample	Counts	Metered Weight	Actual Weight	Counts / Actual	Actual / Metered
1					
2					
3					
4					
5					
Calculate the Average of C					
If using Counter, Calculate: **Adjustment Ratio = Y / Average C** If using Ratemeter/Totalizer : **Adjustment Ratio = Average C**					
New Calibration Voltage = X * Adjustment Ratio					

Reference:	A		B	Calculate C =	
Sample	Counts	Metered Weight	Actual Weight	Counts / Actual	Actual / Metered
1					
2					
3					
4					
5					
Calculate the Average of C					
If using Counter, Calculate: **Adjustment Ratio = Y / Average C** If using Ratemeter/Totalizer: **Adjustment Ratio = Average C**					
New Calibration Voltage = X * Adjustment Ratio					

CentriFlow® Meter Calibration Worksheet

To Calibrate the CentriFlow® Meter use the variables below.

Note the Current Calibration Voltage X= _____

Note the Count/Weight Ratio from the Electronics Panel Y= _____

Run 3-5 samples at the same flow rate. The calibration may be completed using raw counts from the Counter located on the Electronics Panel inside the Electronic Enclosure or by using the Metered Value from the Totalizer on the Ratemeter/Totalizer if equipped. The Counter method is more accurate and is preferred. Pick a method and fill in the charts below to perform the calculations to determine the new Calibration Voltage. Repeat if necessary.

Note: Use New Calibration Voltage for next sampling X= _____

Reference:	A		B	Calculate C =	
Sample	Counts	Metered Weight	Actual Weight	Counts / Actual	Actual / Metered
1					
2					
3					
4					
5					
Calculate the Average of C					
If using Counter, Calculate: **Adjustment Ratio = Y / Average C** If using Ratemeter/Totalizer : **Adjustment Ratio = Average C**					
New Calibration Voltage = X * Adjustment Ratio					

Reference:	A		B	Calculate C =	
Sample	Counts	Metered Weight	Actual Weight	Counts / Actual	Actual / Metered
1					
2					
3					
4					
5					
Calculate the Average of C					
If using Counter, Calculate: **Adjustment Ratio = Y / Average C** If using Ratemeter/Totalizer: **Adjustment Ratio = Average C**					
New Calibration Voltage = X * Adjustment Ratio					

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Fax: (910) 392-2123

CentriFlow® Meter Calibration Worksheet

To Calibrate the CentriFlow® Meter use the variables below.

Note the Current Calibration Voltage X= _____

Note the Count/Weight Ratio from the Electronics Panel Y= _____

Run 3-5 samples at the same flow rate. The calibration may be completed using raw counts from the Counter located on the Electronics Panel inside the Electronic Enclosure or by using the Metered Value from the Totalizer on the Ratemeter/Totalizer if equipped. The Counter method is more accurate and is preferred. Pick a method and fill in the charts below to perform the calculations to determine the new Calibration Voltage. Repeat if necessary.

Note: Use New Calibration Voltage for next sampling X= _____

Reference:	A		B	Calculate C =	
Sample	Counts	Metered Weight	Actual Weight	Counts / Actual	Actual / Metered
1					
2					
3					
4					
5					
Calculate the Average of C					
If using Counter, Calculate: **Adjustment Ratio = Y / Average C** If using Ratemeter/Totalizer : **Adjustment Ratio = Average C**					
New Calibration Voltage = X * Adjustment Ratio					

Reference:	A		B	Calculate C =	
Sample	Counts	Metered Weight	Actual Weight	Counts / Actual	Actual / Metered
1					
2					
3					
4					
5					
Calculate the Average of C					
If using Counter, Calculate: **Adjustment Ratio = Y / Average C** If using Ratemeter/Totalizer: **Adjustment Ratio = Average C**					
New Calibration Voltage = X * Adjustment Ratio					

CentriFlow® Meter Calibration Worksheet

To Calibrate the CentriFlow® Meter use the variables below.

Note the Current Calibration Voltage X= _____

Note the Count/Weight Ratio from the Electronics Panel Y= _____

Run 3-5 samples at the same flow rate. The calibration may be completed using raw counts from the Counter located on the Electronics Panel inside the Electronic Enclosure or by using the Metered Value from the Totalizer on the Ratemeter/Totalizer if equipped. The Counter method is more accurate and is preferred. Pick a method and fill in the charts below to perform the calculations to determine the new Calibration Voltage. Repeat if necessary.

Note: Use New Calibration Voltage for next sampling X= _____

Reference:	A		B	Calculate C =	
Sample	Counts	Metered Weight	Actual Weight	Counts / Actual	Actual / Metered
1					
2					
3					
4					
5					
Calculate the Average of C					
If using Counter, Calculate: **Adjustment Ratio = Y / Average C** If using Ratemeter/Totalizer : **Adjustment Ratio = Average C**					
New Calibration Voltage = X * Adjustment Ratio					

Reference:	A		B	Calculate C =	
Sample	Counts	Metered Weight	Actual Weight	Counts / Actual	Actual / Metered
1					
2					
3					
4					
5					
Calculate the Average of C					
If using Counter, Calculate: **Adjustment Ratio = Y / Average C** If using Ratemeter/Totalizer: **Adjustment Ratio = Average C**					
New Calibration Voltage = X * Adjustment Ratio					

Definition of Terms

Auto Zero (Tare): Function of the Electronics that allows an offset in Manual Zero to be removed when the Electronics is in Sample Mode. This is used when there is a buildup of product that is usually present under normal operating conditions.

Calibration Voltage: Voltage Setting that adjusts the Calibration of the Electronics so that 100% Output is equal to the Electronic Full Scale Flow Rate (Mass). This Voltage ranges from an absolute minimum of 4.25 Volts to an absolute maximum of 9.5 Volts on the *Calibration Voltage* position on the Rotary Selector Switch.

Electronic Full Scale Flow Rate (Mass): Flow Rate that Electronics is calibrated at such that the Electronics output is 100%. This would correspond to a 10-Volt output on the *0 – 10 Volts Output* position on the Rotary Selector Switch.

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 Voltage setting for this is 0.75 Volts on the *Manual Zero / Static Cal* position on the Rotary Selector Switch.

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 0.2 Volts would be 2% of the Electronic Full Scale Flow Rate, or 6 lb./min.

Manual Zero: Voltage setting when the Pan is in a STATIC State. This is after the meter is securely installed, the environment is stable, and no product is on the Pan. This should be 0 Volts on the *Manual Zero / Static Cal* position on the Rotary Selector Switch.

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 on the *Manual Zero / Static Cal* position on the Rotary Selector Switch. (This is used only under special circumstances).

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 on the *Manual Zero / Static Cal* position on the Rotary Selector Switch.

Remote Calibration: Calibration Voltage that can be changed by a remote source, non-associated with the CentriFlow Electronics. This allows the Calibration Voltage to be changed without adjustment to the Calibration Voltage Adjustment on the front of the Electrical Panel. This Remote Calibration Voltage can still be read from the *Calibration Voltage* position on the Rotary Selector Switch.

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. The default setting is 1.5 Volts on the *Manual Zero / Static Cal* position on the Rotary Selector Switch.

Transducer Zero Balance: Adjustment on the back of the Electrical Panel that allows any offset of Transducer to be adjusted out to allow a ±2 Volt Adjustment of Manual Zero. This will also minimize the interaction of the Manual Zero and Static Calibration Adjustments.

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Frequently Asked Questions

1. **I don't have any output from the meter, why?**
    a. No power.
        i. Check the power supply.
        ii. Make sure the 4 electronics board interface connectors are firmly attached.
        iii. Check the fuse on the electronics board.
    b. Analog or frequency signal not interfaced to the PLC.
    c. Transducer problems
        i. Make sure that the wire insulation is not pinched at the terminations.
        ii. Check for 10.00Vdc at the transducer on the black and green wires.
        iii. Inspect the column wire and the security of the column cap.
    d. MRT problems
        i. Check the programming for errors.
        ii. Check the input and output connections.
        iii. Make sure you are not in the programming mode.
        iv. Check optional relay status to make sure that you don't have an open contact. This is an option and the relays will be closed if the programming is setup correctly.
    e. Obstructions
        i. The meter's pan assembly is unable to move because of product or other obstruction making contact.
        ii. Inspect the flexures.
        iii. Make sure the overtravel gaps are properly set.
        iv. Make sure that there is nothing between the extraweight and the back seal plate.
        v. Shipping Locks
    f. Calibration issues
        i. Check the manual zero and static calibration.
        ii. Check the inhibit level.
        iii. Check the optional Auto-Zero circuit for sampling mode.

2. **Why can't I get a stable manual zero at 0.00V?**
    a. The zero balance method is not complete.
    b. Pan obstructions
        i. Check for pan obstructions.
        ii. Check for product buildup on the pan assembly.
        iii. Make sure the overtravel gaps are properly set.
        iv. Make sure that there is nothing between the extraweight and the back seal plate.
        v. Shipping Locks
        vi. Eliminate vibration from other instruments.
    c. Inspect the flexures.

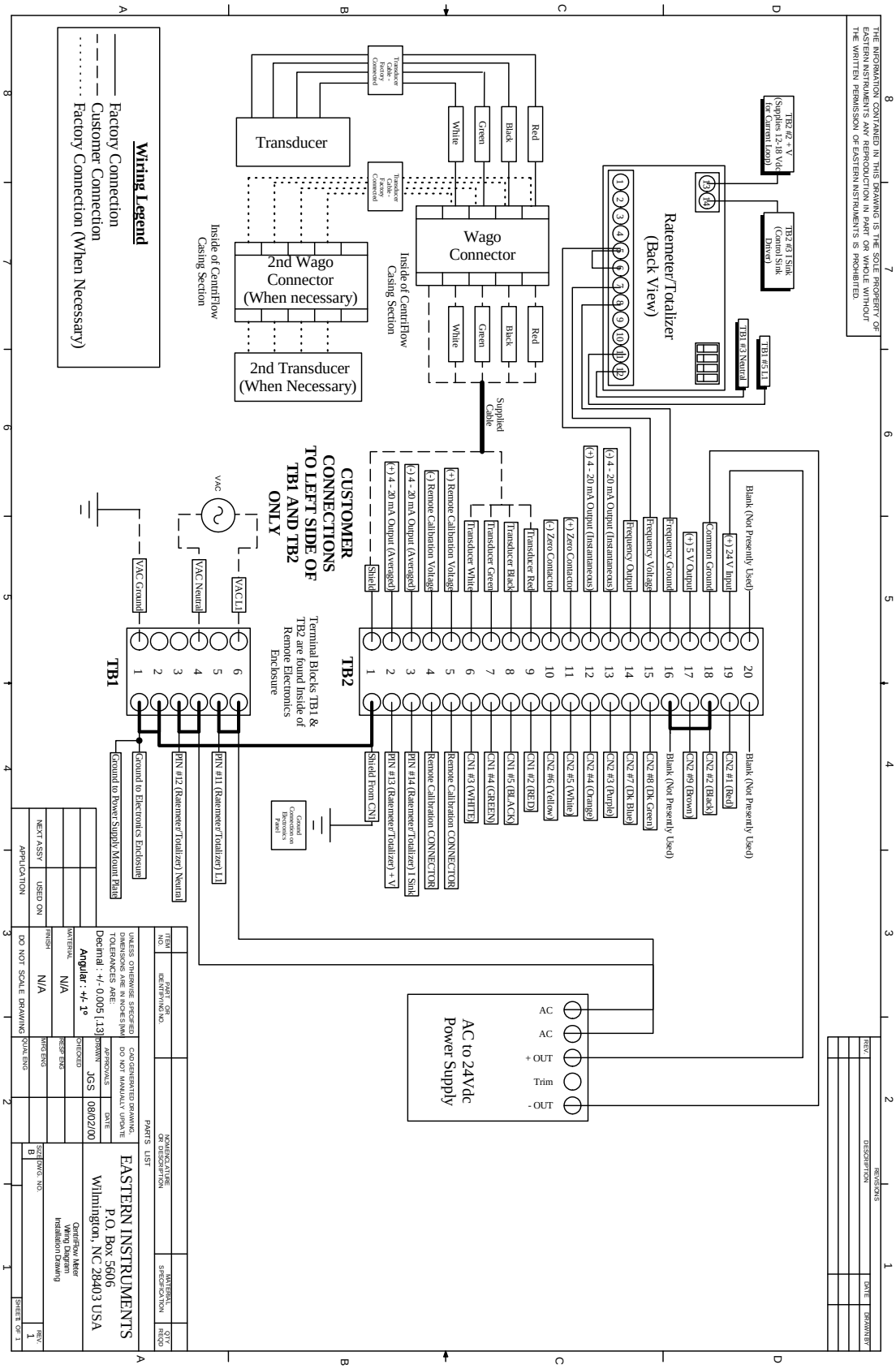
d. Transducer problems
    i. Make sure that the wire insulation is not pinched at the terminations.
    ii. Check for 10.00Vdc at the transducer on the black and green wires.
    iii. Inspect the column wire and the security of the column cap.
e. Electrical noise
    i. Make sure all components are grounded properly.
    ii. Isolate the power and output lines from all other devices and each other.
    iii. Find the source of noise and remove/filter/suppress it.
f. Air movement around the pan.
    i. Shield the meter from air blowing directly on the Pan Assembly. (Air is mass and the CentriFlow® Meter will weight it.)
g. VibraWeigh® Calibration (Option)
    i. Check to make sure the optional VibraWeigh® is turned on and operating with a smooth and constant vibration.

3. Why does the meter show output when there is no product flow?

a. Manual Zero
    i. Check the manual zero and static calibration to ensure proper setup.
b. Transducer problems
    i. Inspect the column wire.
c. Electrical noise
    i. Make sure all components are grounded properly.
    ii. Isolate the power and output lines from all other devices and each other.
    iii. Find the source of noise and remove/filter/suppress it.
d. Air movement around the pan.
    i. Shield the meter from air blowing directly on the Pan Assembly. (Air is mass and the CentriFlow® Meter will weight it.)
e. VibraWeigh® Calibration (Option)
    i. Check to make sure the optional VibraWeigh® is turned on and operating with a smooth and constant vibration.
f. Pan obstructions
    i. Check for pan obstructions.
    ii. Check for product buildup on the pan assembly.
    iii. Make sure the overtravel gaps are properly set.
    iv. Make sure that there is nothing between the extraweight and the back seal plate.
    v. Shipping Locks
    vi. Eliminate vibration from other areas.

4. **Why is my accuracy not to specification?**
    a. Incorrect site calibration
        i. Perform static calibration and site calibration methods.
    b. Manual zero shift
        i. Check for buildup on the pan assembly.
    c. Check for electrical noise.
        i. Make sure all components are grounded properly.
        ii. Isolate the power and output lines from all other devices and each other.
        iii. Find the source of noise and remove/filter/suppress it.
    d. Check for air movement around the pan.
        i. Shield the meter from air blowing directly on the Pan Assembly. (Air is mass and the CentriFlow® Meter will weight it.)
    e. Check the flowability of your product to make sure that it is not varying.
        i. Decrease pulsations and give the meter a continuous product presentation.
        ii. Use optional liners for decreased product resistance.
    f. Check for physical damage on the meter.

5. **Why do the CentriFlow® Meter Electronics and the PLC rates not agree?**
    a. MRT programming
        i. Check the programming for errors.
        ii. Check the wiring for good connections.
        iii. Check to make sure that the electronic full scale, proportional to the 4-20mA signal, is set up the same in the PLC.
    b. Loop power is required when the optional Isolator is installed
        i. If you don't have an analog Isolator, the analog wires should not have loop power coming from the PLC.
    c. Analog signal is not calibrated
        i. Contact the factory for assistance.
    d. The PLC scan time is too slow.
        i. If the scan time of the PLC is more than 50mS, it may lose too many data points.
            1. Use the optional MRT's output and increase the normalizing factor, averaging function, to smooth the 4-20mA signal.
            2. Increase the scan time.
            3. Switch to the frequency output and use a counter card in the PLC.
    e. Wiring
        i. Check all wiring from the meter to the PLC.

** Always disconnect the power and inspect for visible physical damage before servicing.

Wiring Diagram