



# KOAMS

*Kele Outdoor Airflow Measurement System*

## *Operation & Maintenance Manual*

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*Engineered for accuracy, applicability,  
durability and simplicity in HVAC air systems*

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# 1. INTRODUCTION

## 1.1. DESCRIPTION

The **KOAMS** is an outdoor airflow measurement system with integral signal processor that is capable of producing an overall  $\pm 0.5\%$  accuracy through the velocity range of 200 to 1,200 fpm and  $\pm 5\%$  accuracy at 100 fpm.

The airflow measurement station consists of multiple airflow elements, factory mounted and pre-piped in a casing designed for flanged connection to ductwork, control dampers, louvers, etc. An optional inlet bell is available for plenum applications. Standard materials consist of a G90 galvanized casing and 6063-T5 anodized aluminum flow sensors, suitable for most HVAC applications. The airflow averaging elements are head type devices, which generate a differential (velocity) pressure signal similar to the orifice, venture, and other head producing primary elements. The airflow measurement station is constructed so as to comply with ASHRAE Standard 111 for equal area traversing of an airflow measurement plane. Multiple elements are manifolded together for connection to the integral airflow signal processor.

The signal processor utilizes current state-of-the-art digital microprocessor technology capable of producing unequalled 24-bit (16,777,216 steps) A/D and 12 bit (4,096 steps) D/A signal conversion resolution. Having a twelve-point linearization capability, the signal processor can be field calibrated to accurately determine true airflow rates even when the primary airflow measurement stations do not meet their minimum installation requirements. The ultra low operating ranges and the auto zeroing function of the signal processor provides accurate airflow measurement down to 100 fpm. The signal processor accepts a temperature input signal for air temperature indication, temperature signal transmission for remote readout, and air density compensation for standard or actual airflow calculations. Simple field configuration of engineering units, operating range, process noise filtering, alarm set points, etc, are performed via password protected intuitive menus that are accessed through the integral six button touch pad. Device monitoring and configuration can also be performed by a building management system through a LonWorks®, BACnet®-MS/TP Master or MODBUS communication network. Optional features include AutoZeroing; High & Low Remote Alarms; Temperature Compensation, LonWorks®, BACnet®-MS/TP and MODBUS communication.

An optional temperature transmitter with 4 to 20mA output and temperature range of -30 to 130°F is available to provide a temperature input signal to the signal processor for air density compensation.

## 1.2. BASIC OPERATION

The airflow measuring station produces pneumatic output signals referred to as total (high) and static (low) pressure. These two pressures are piped to the signal processor where the static pressure is subtracted from the total and the result indicated as velocity pressure. This measured differential pressure is equal to the average velocity of the air stream moving through the plane that the airflow measuring station is located in. This signal can be converted to air velocity and flow using the following equations:

$$\rho_a = 1.325 \times \frac{29.921}{460 + T_a} \qquad V = 1096.7 \sqrt{\frac{P_V}{\rho_a}} \qquad Q = V \times A$$

Where:

- |  |                              |
|--|------------------------------|
| $\rho_a$ = Actual density of air, in lb/ft <sup>3</sup> (0.075 lb/ft <sup>3</sup> at sea level and 68°F) | V = Velocity, in fpm         |
| $T_a$ = Actual temperature, in °F (default value is 68°F)  | Q = Flow, in cfm             |
| $P_V$ = Velocity pressure, in inches H <sub>2</sub> O  | A = Area, in ft <sup>2</sup> |

This signal is scaled and linearized before being displayed and transmitted out as a 4-20ma, 0-5vdc, or 0-10vdc signal.

The AutoZero option detects and corrects any zero offset caused by large ambient temperature changes. The Temperature Compensation option compensates the flow and velocity signal for density changes caused by variations in the process air temperature; the optional temperature transmitter is required.

### **1.3. SAFETY**

#### **1.3.1. Electrical Connections**

Before any electrical connections are made, ensure the signal processor **POWER SWITCH** is in the **OFF** position.

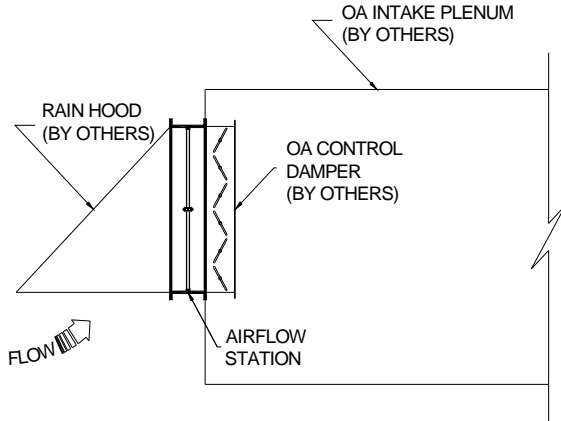
#### **1.3.2. Static Electricity**

The signal processor circuit board contains components that are susceptible to damage caused by static electrical discharge. Should it be necessary to remove the circuit board from the enclosure, appropriate precautions must first be taken to ensure that the operator and the circuit board are at the same electrical potential.

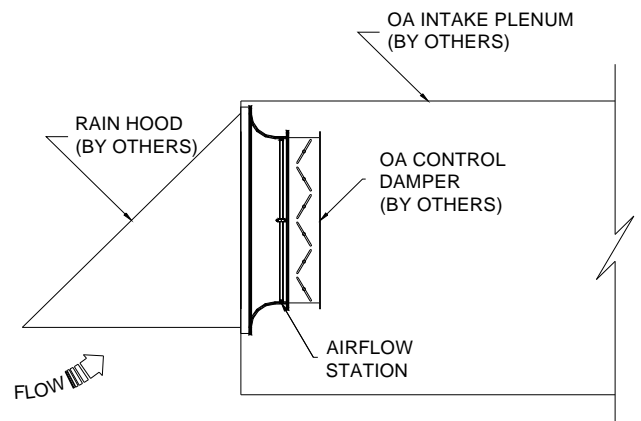
## 2. AIRFLOW MEASUREMENT STATION

### 2.1. TYPICAL INSTALLATIONS

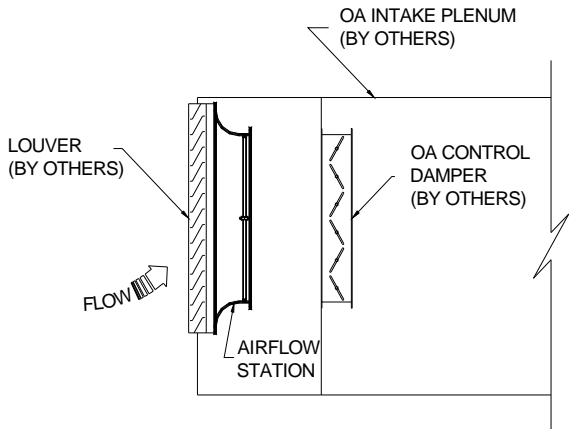
**ROOFTOP AHU WITH RAIN HOOD  
EXTERIOR MOUNTED AIRFLOW STATION**



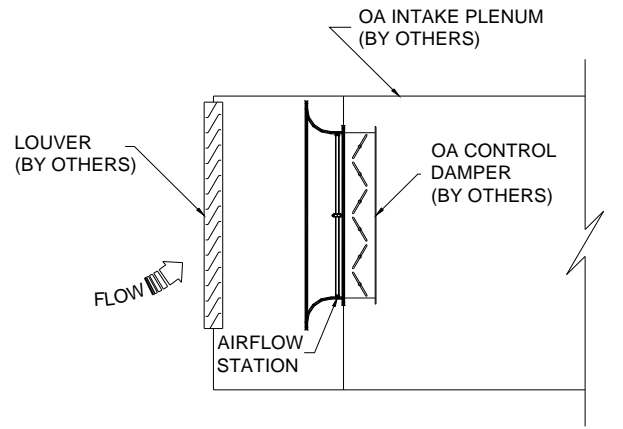
**ROOFTOP AHU WITH RAIN HOOD  
INTERIOR MOUNTED AIRFLOW STATION**



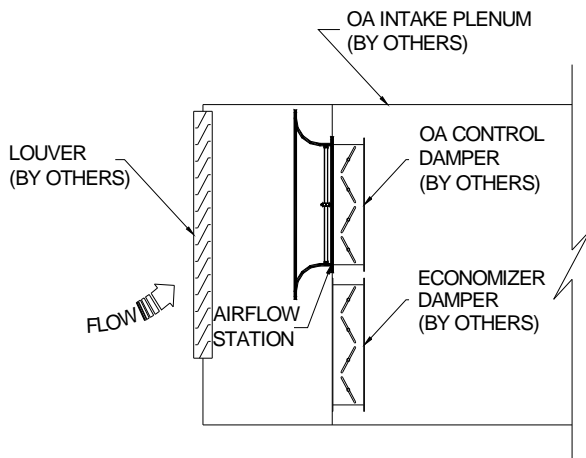
**OUTDOOR AIR PLENUM MOUNTED AIRFLOW STATION**



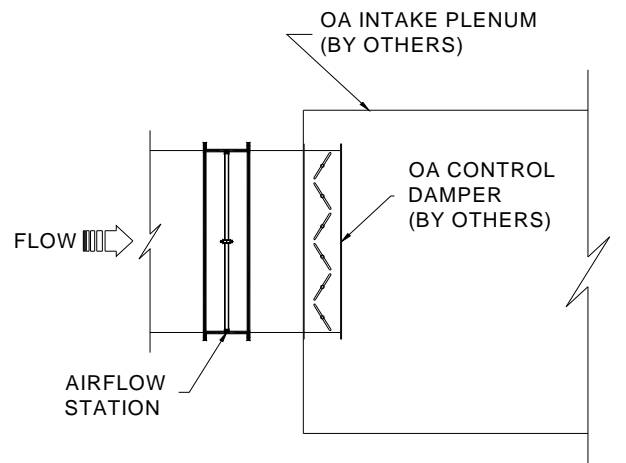
**OUTDOOR AIR PLENUM MOUNTED AIRFLOW STATION**



**PLENUM MOUNTED MINIMUM OUTDOOR  
AIRFLOW STATION**

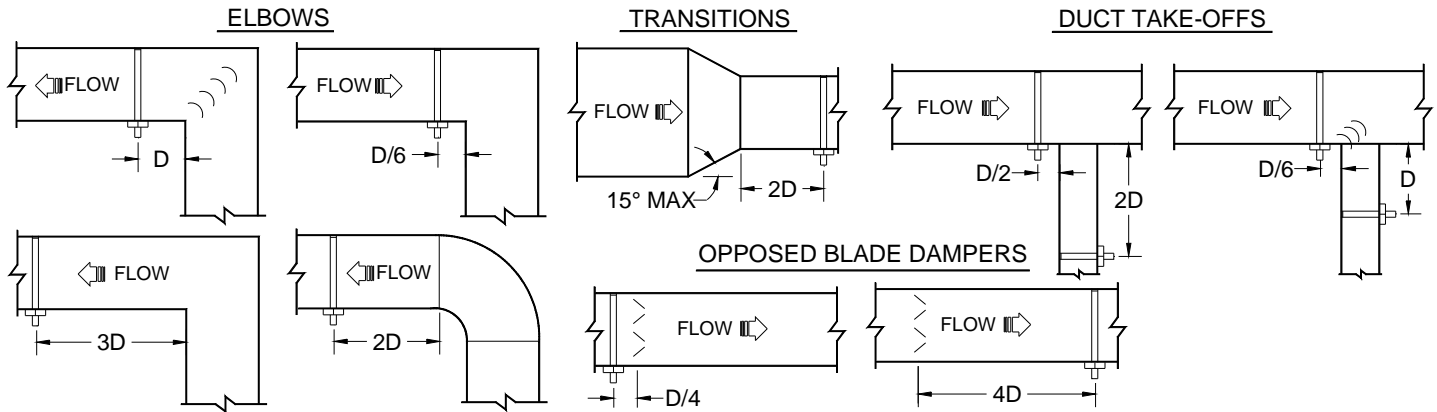


**DUCTED OUTDOOR AIRFLOW STATION**



## 2.2. INSTALLATION GUIDELINES FOR DUCTED APPLICATIONS

The station may be installed in any duct configuration. However, the accuracy of the installation is dependent on the flow conditions in the duct. The minimum installation requirements based upon a uniform velocity profile approaching the duct disturbance for flow rates less than 2,500 fpm are shown below. These are not ideal locations. It is always best to locate the station as far as possible from all duct disturbances, with upstream disturbances being the most critical consideration.



Notes:

Rectangular Ducts:

$$D = \sqrt{\frac{4HW}{\pi}} \quad H = \text{Duct height} \quad W = \text{Duct width}$$

## 2.3. MAINTENANCE

Since the sensing elements have no moving parts, only periodic cleaning may be required. The sensing elements should be inspected for fouling of the sensing holes as part of an annual preventative maintenance program. Installations having viscous airborne particles may require more frequent inspection. If the sensing holes on the elements have become fouled or plugged, the following procedure is recommended. **Caution, all instruments must be isolated (removed) from the sensing lines prior to performing the following cleaning procedure.**

- **Backpurging:** Connect clean/dry compressed air, set at a maximum pressure of 25 psi, to the output pressure ports (total and/or static) of the sensing element being cleaned. While purging the sensing element, wipe the surface of the cylinder with a cloth or brush to loosen and remove all contaminant buildup.
- **Cleaning:** In applications where the sensing elements are subject to viscous contaminants it is recommended that the surface be washed with a cleaning agent. The cleaning agent used must be suitable for use on the type of material the sensing element is constructed of (i.e. aluminum, stainless steel, etc.)

## 2.4. SITE STORAGE, HANDLING, AND SPARE PARTS

The sensing elements must be stored indoors, in the original shipping package, and in a dry place. Failure to do so may result in internal blockage of averaging chambers due to dust migration and/or insect infestation. Although the sensing elements are not fragile by design, care must be taken not to damage or disfigure the cylinder surface when handling and installing. Particular attention must be given to the surface areas in which sensing ports are located. The sensing elements come as a complete fabricated assembly. **No spare parts are required.**

### 3. SIGNAL PROCESSOR INSTALLATION

#### 3.1. MECHANICAL INSTALLATION

Refer to Figure 3.0 for installation clarification.

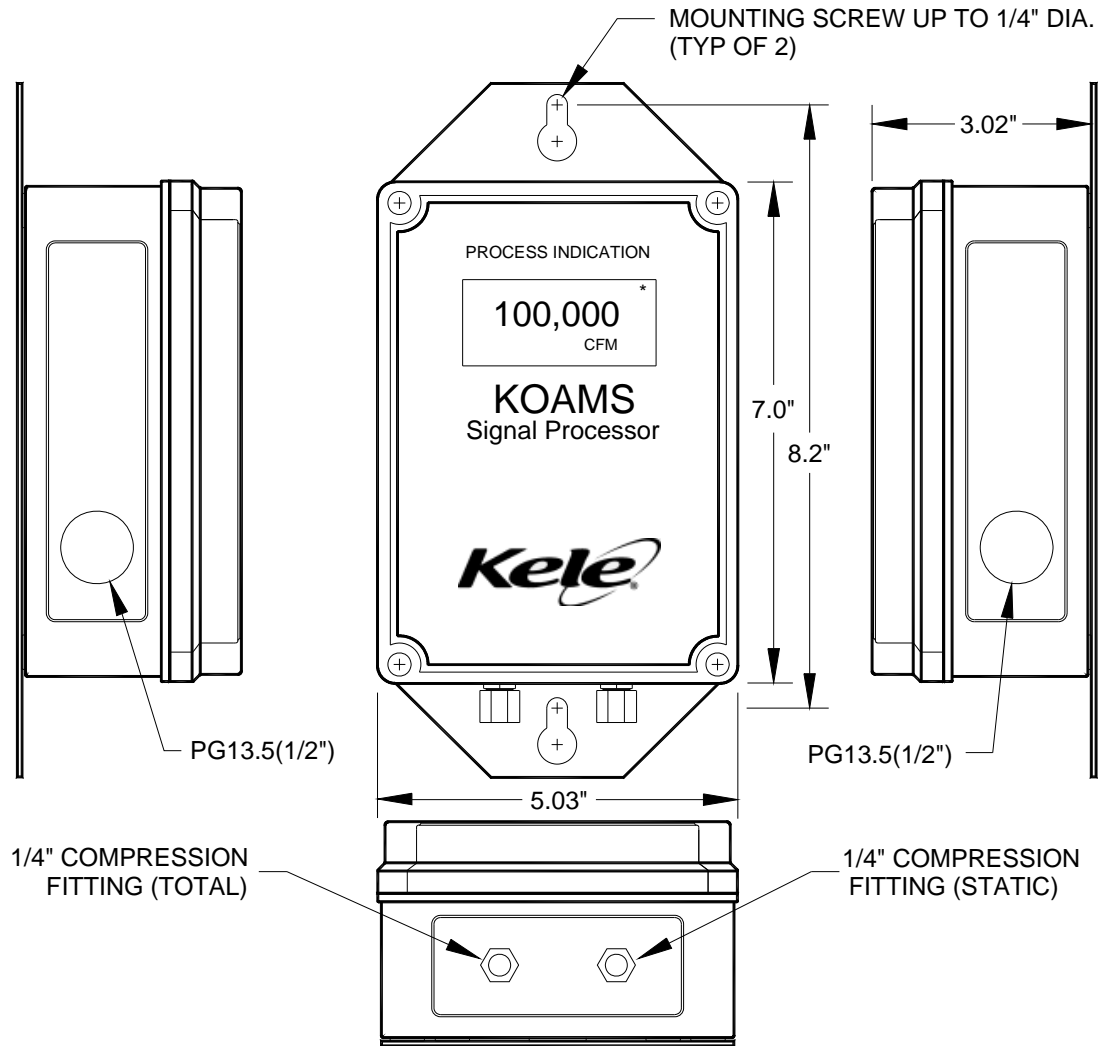


FIGURE 3.0



### 3.2. ELECTRICAL & PNEUMATIC INSTALLATION

Refer to Figure 3.1 for electrical and pneumatic installation clarification.

- Remove the signal processor cover by turning each corner cover mounting screw counter clockwise.
- The signal processor enclosure incorporates three 1/2" conduit connections and one 3/4" conduit connection to interface all electrical wiring and pneumatic tubing to the device. Determine which conduit connection will be used and remove the black plug and install the appropriate conduit fitting (By Others).
- The three electrical connectors located on the signal processor board have removable plugs for ease of installing the interface wiring. (**Caution - All electrical connections must be made with the signal processor power switch in the OFF position**)

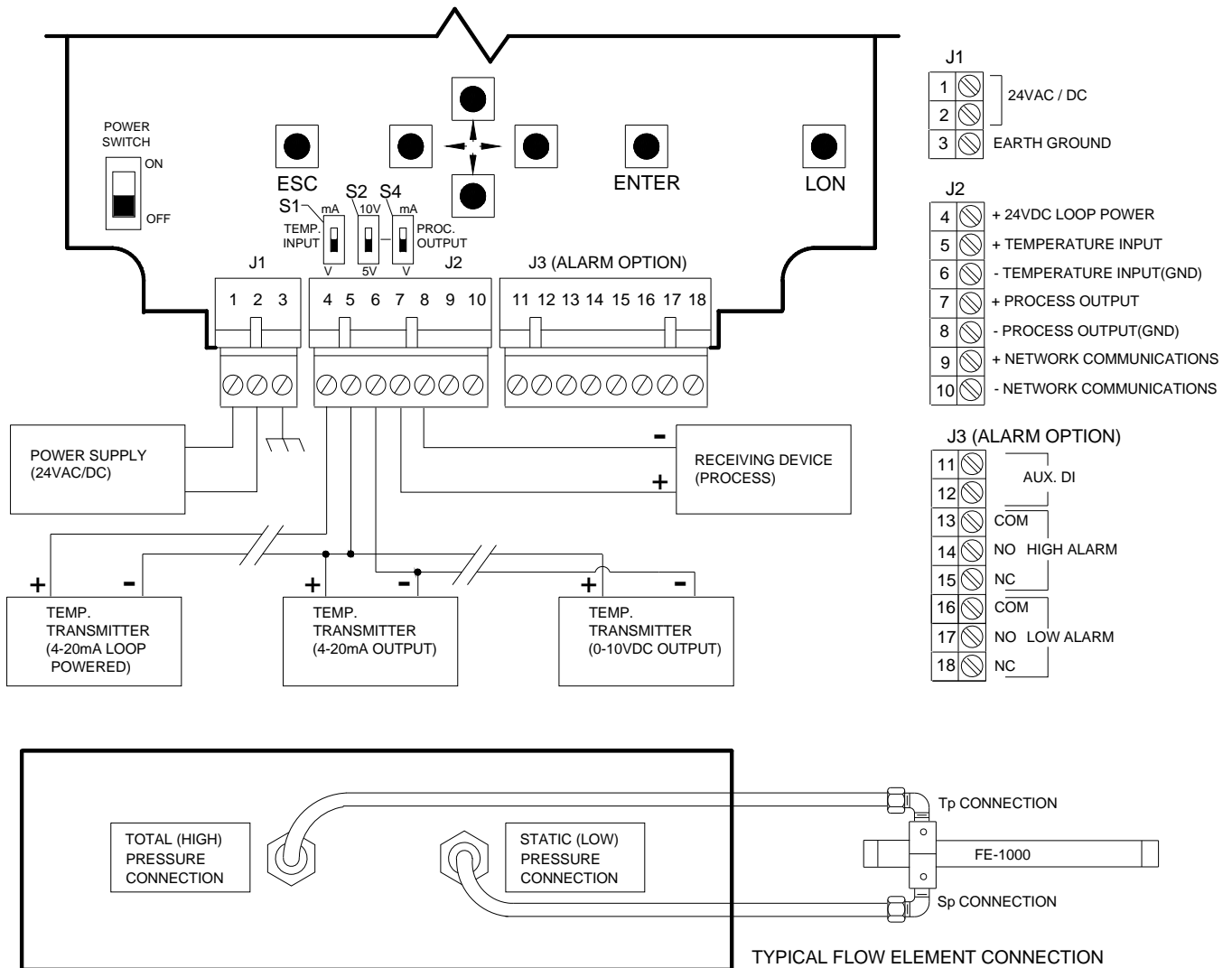


FIGURE 3.1

### 3.3. INPUT/OUTPUT SET-UP

The signal processor has been configured and calibrated at the factory for your specific requirements. Refer to signal processor Set-Up label located on the left side of unit to verify correct Input/Output configuration for the application. Refer to chart and Figure 3.1 above if input or output configuration changes are required.

#### 3.3.1. Process output

To change the output configuration, set the S2 & S4 switches as follows:

Process Output	Range	S2	S4
Current	4-20mA	NA	mA
Voltage	0-10vdc	10V	V
Voltage	0-5vdc	5V	V

#### 3.3.2. Temperature Input (Option)

To change the input configuration, set the S1 switch as follows:

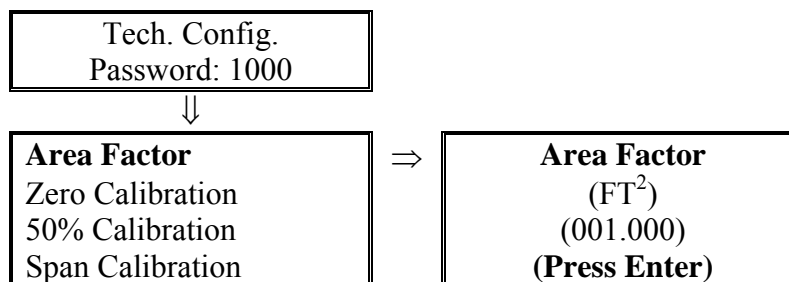
Temperature Input	J8 Jumper Selection
4-20mA	mA
0-10VDC	V

### 3.4. COMMON CONFIGURATION CHANGES

#### 3.4.1. Area Factor

Allows user to enter or modify an existing Area Factor. The area factor can be entered or modified as follows:

- Step 1. From the active display, enter the Tech. Config. menu by pressing the Up/Down buttons simultaneously.
- Step 2. Enter password number 1000 and press Enter button.
- Step 3. Press the Enter Button once to access the Area Factor menu.
- Step 4. Enter new Area Factory using Up/Down/Left/Right buttons.
- Step 5. Press Enter button once.
- Step 6. Press ESC button once.
- Step 7. The active display should now be displayed.



**Warning Message:**

Op Range Outside allowable Value

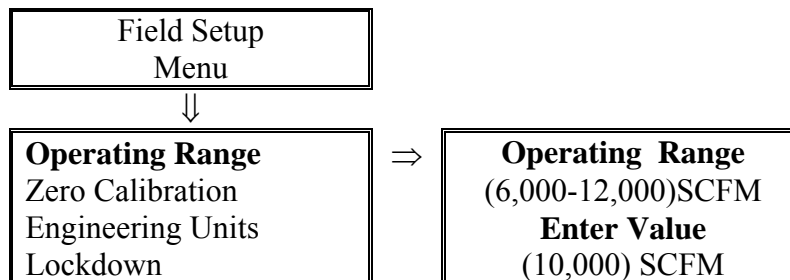
Op Range will be reset to the MAX F.S. value

If the new Area Factor causes the existing Operating Range value to be outside the new calculated Min. or Max Full Scale value, the Operating Range will be reset to the new Max Full Scale value. The display will automatically jump to the Op Range menu allowing the user to enter a new Operating Range value. This can be accomplished by performing the steps under Section 3.4.2 Operating Range.

### 3.4.2. Operating Range

The Operating Range allows the user to enter a value which will represent 100% of the process output signal. The menu will display the Maximum Full Scale value possible for the user to enter as the Operating Range. The Operating Range can be changed by using the following steps:

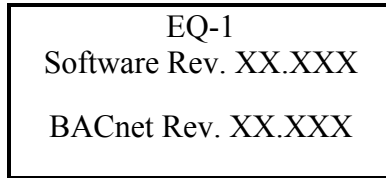
- Step 1. From the active display, enter the Field menu by pressing and holding the Enter button for 3 seconds.
- Step 2. Press the Enter button once to access the Operating Range menu.
- Step 3. Enter new Operating Range using Up/Down/Left/Right buttons.
- Step 4. Press the Enter button once.
- Step 5. Press ESC button twice.
- Step 6. The active display should now be displayed.
- Step 7. Process Output is automatically rescaled to the new Operating Range.



## 4. SIGNAL PROCESSOR POWER-UP CONFIGURATION

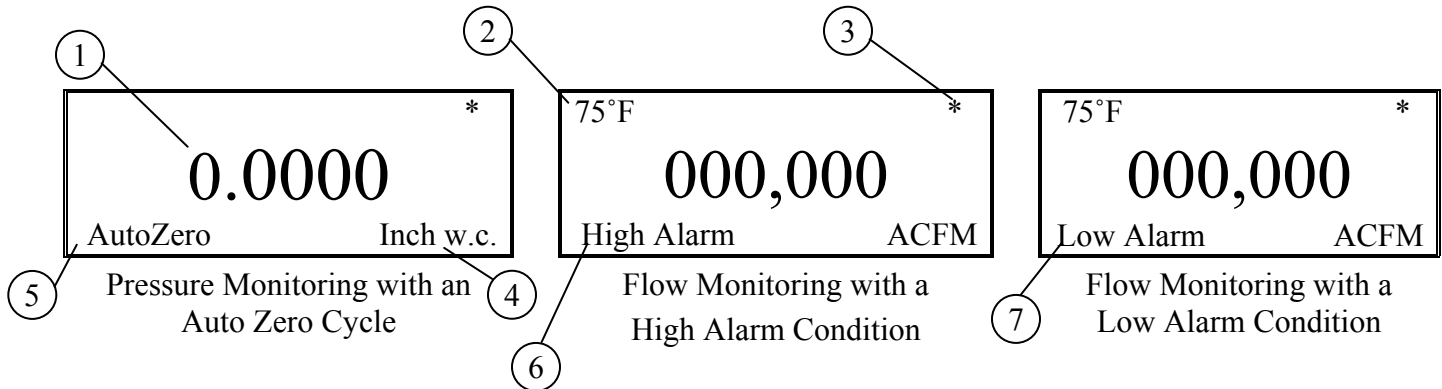
### 4.1. ACTIVE POWER-UP DISPLAY

Upon initial power-up, Software Revision information will be displayed on the graphic display for approximately 5 seconds.



#### 4.1.1. Active Display Descriptions

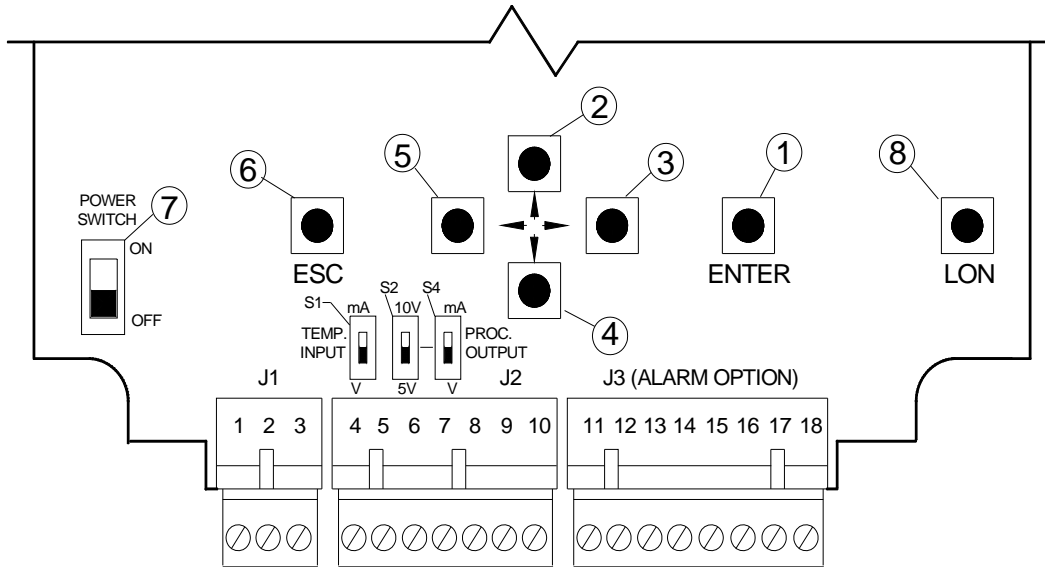
After power-up initialization, the following information will appear on the graphic display depending upon the options purchased.



Number	Description
1	Process units
2	Air Flow temperature units in °F or °C (Temperature Compensation Option)
3	Flashing Asterisk indicates the CPU is functioning
4	Engineering units
5	Displayed during an AutoZero cycle (AutoZero Option)
6	Indicating High Alarm value has been exceeded (Hi/Lo Alarm Option)
7	Indicating Low Alarm value has been exceeded (Hi/Lo Alarm Option)

## 4.2. KEY FUNCTIONS

The following figure and description identify the function of each button.



Number	Description
1	<b>Enter Key</b> - Allows a user to enter into the Field Menu, enter into a selected menu item or store into memory changes made to the program.
2	<b>Up Key</b> - Allows the user to scroll up in the menu list to a selected item or increase digits when making value changes.
3	<b>Right Key</b> - When making changes to user values the right key allows the user to scroll to the correct digit for changes.
4	<b>Down Key</b> - Allows the user to scroll down in the menu list to a selected item or decrease digits when making value changes.
5	<b>Left Key</b> - When making changes to user values the left key allows the user to scroll to the correct digit for changes.
6	<b>Escape Key</b> - The Escape key allows the user to back out of the menu to the active display. If a user starts to make a change and decides to cancel the change, the Escape key will allow the user to return to the Active Display without making the change (see Section 3.1 Active Display).
7	<b>Power Switch</b> – Allows a user to turn power off to the Signal Processor during field wiring changes or modifications to the device.
8	<b>Lon Switch</b> – Allows a user to send a unique Neuron device ID when connecting to a LonWorks communication network.

## 5. SIGNAL PROCESSOR DISPLAY MENUS

### 5.1. FIELD & TECH CONFIG MENUS

The following table shows the Field and Tech. Config menus for devices set to monitor Flow, Velocity and Pressure. The display will vary depending upon the options purchased.

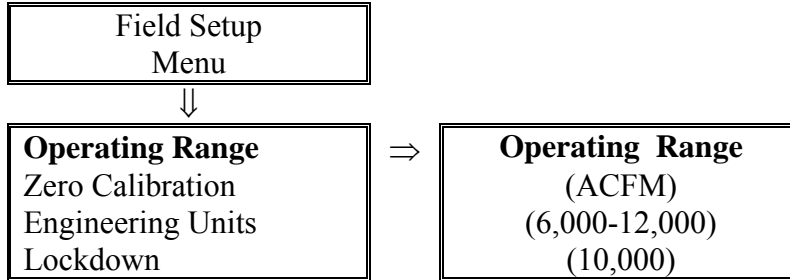
<b>Signal Processor Setup for Flow or Velocity</b>	
<b>Field Setup Menu</b> (Press <b>ENTER</b> button)	<b>Tech. Config. Menu</b> (Press <b>UP/DOWN</b> buttons simultaneously) (Enter Password number 1000) (Press <b>ENTER</b> button)
Operating Range	Area Factor (FT <sup>2</sup> )
Zero Calibration	Min Calibration
Engineering Units	Span Calibration
Lockdown	Altitude
Flow Correction	Output Calibration
AutoZero	Correction Coefficient
Temp. Comp.	4PT Flow Correction
Display Filter	Pre-Filter
Output Filter	MAC Code
Alarm Options	Instance Number
Factory Defaults	Modbus ID
	Baud Rate
<b>Signal Processor Setup for Pressure</b>	
<b>Field Setup Menu</b> (Press <b>ENTER</b> button)	<b>Tech. Config. Menu</b> (Press <b>UP/DOWN</b> buttons simultaneously) (Enter Password number 1000) (Press <b>ENTER</b> button)
Operating Range	Min Calibration
Zero Calibration	50% Calibration
Engineering Units	Span Calibration
AutoZero	Output Calibration
Display Filter	MAC Code
Output Filter	Instance Number
Alarm Options	Modbus ID
DP Display Format	Baud Rate
Factory Defaults	

## 6. SIGNAL PROCESSOR FIELD MENUS

To enter the Field Setup Menu; depress and hold the Enter button for 5 seconds.

### 6.1. OPERATING RANGE

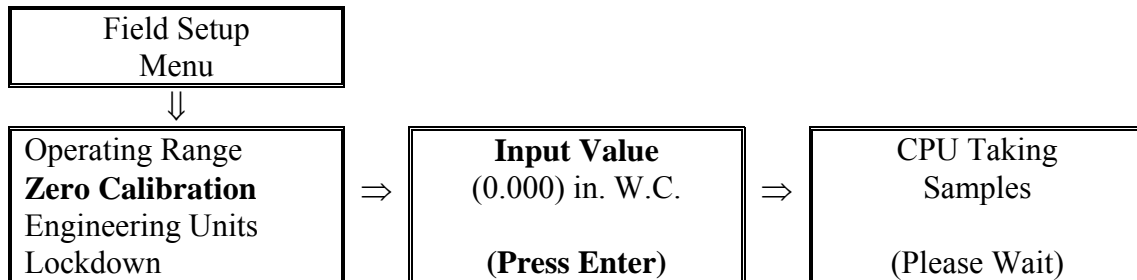
This menu allows the user to view the range of values possible for the user to enter as the Operating Range. The Operating Range value entered will represent 100% process output signal (5vdc/10vdc or 20mA).



### 6.2. ZERO PRESSURE CALIBRATION

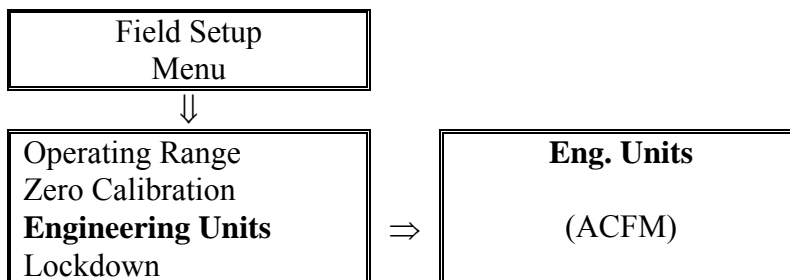
The Zero Calibration menu allows the user to perform a zero transducer calibration to eliminate any transducer zero shift.

**(Caution: Before performing a zero calibration, disconnect the Total (High) and Static (Low) pressure connections, perform a zero calibration and then reconnect the Total and Static pressure connections).**



### 6.3. ENGINEERING UNITS

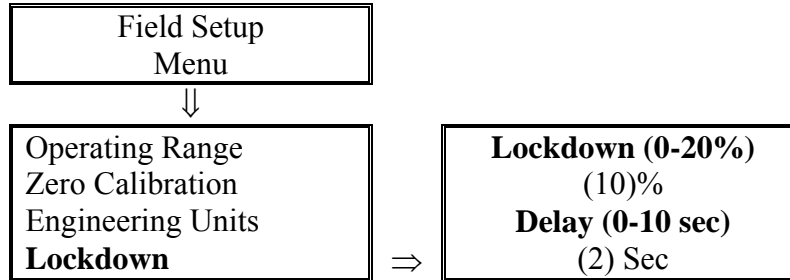
A list of engineering units are available for the user to select from for display purposes to meet customer requirements. Changing the engineering units will affect the process display and the alarm value menus.



Standard Flow Units	Actual Flow Units	Standard Velocity Units	Actual Velocity Units	Pressure Units
SCFM	ACFM	SFPM	AFPM	Inch w.c.
SCFH	L/S	Sm/s	Am/s	Pa
SL/S	Am <sup>3</sup> /S	%	%	KPa
Sm <sup>3</sup> /S	%			mm w.c.
Sm <sup>3</sup> /HR				%
%				

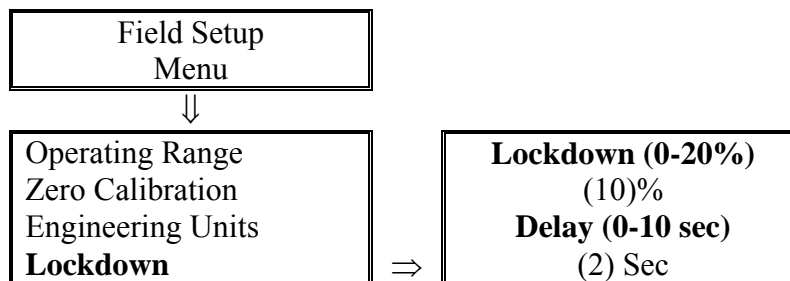
## 6.4. LOCKDOWN

Due to the high square root gain associated with very low delta p values, the output is locked to zero output value until the output value reaches the specified LockDown value entered. Above the LockDown value the output is linear to air flow. The LockDown value can be changed from 0 to 20% of Operating Range value. Lock-down values can be changed in 1% increments. The recommended standard is 10%.



## 6.5. LOCKDOWN DELAY

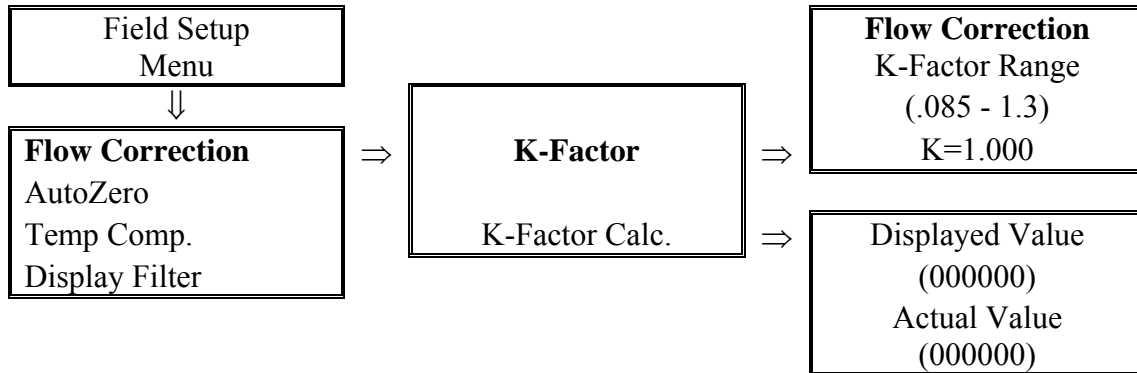
The Lockdown Delay menu allows the user to enter a lockdown time delay (0-10 seconds) that will delay the display and output lockdown from occurring until the flow value or output value has remained below the lockdown value for that duration.





### 6.6. FLOW CORRECTION

The Flow Correction menu was incorporated into the Signal Processor to give the user an easy way to make corrections to the display and output without changing the Op. Range value entered by the factory or user. The Flow Correction menu would be used to correct for a constant error from zero to the entered Op Range value. If the user knows the % change required to match the balancers reading, select the K-Factor menu and enter this value for the K-Factor. The minimum and maximum allowable K-Factor value is displayed in the K-Factor menu. If the new K-factor value needs to be calculated, select the K-Factor Calc. Menu, enter the Signal Processor Displayed value and Actual measured Value, press Enter and the % change will be calculated and stored as the new K-Factor value. The Signal Processor will multiply the entered area factor value by the new K-Factor value.

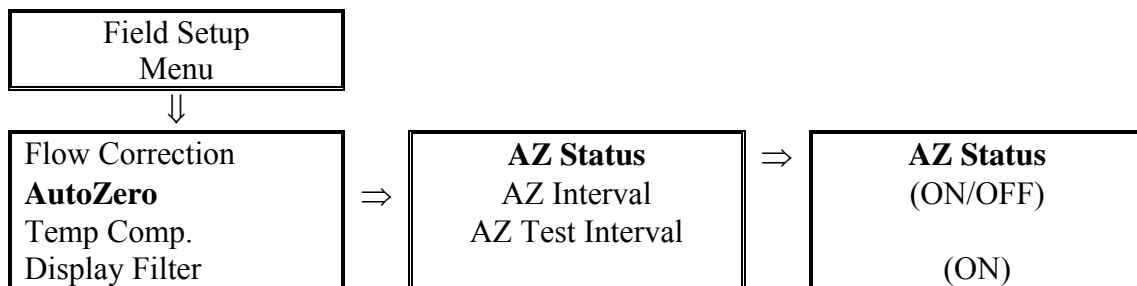


#### EXAMPLE OF FLOW CORRECTION

The balancer is consistently measuring an **Actual Value** that is 500 CFM less than the 10,000 CFM **Displayed Value** on the Signal Processor display. The user would then perform the following math function:  $\text{Actual Value} / \text{Displayed Value} = \text{K-Factor}$  so  $9,500 \text{ CFM} / 10,000 \text{ CFM} = 0.950$ . The user would enter 0.950 for the K-Factor Flow Correction. If the K-Factor Calculator is used, the K-Factor Flow Correction would automatically update the K Factor.

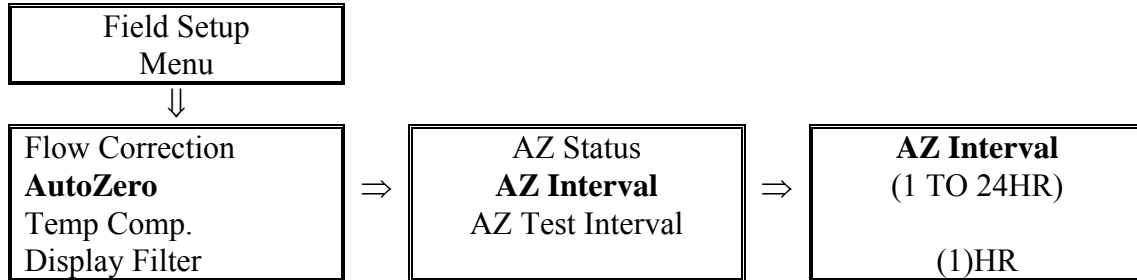
### 6.7. AUTOZERO (OPTIONAL) - STATUS

The AZ Status menu allows the user to turn the AutoZero function ON or OFF. This menu is available only if the AutoZero option is purchased.



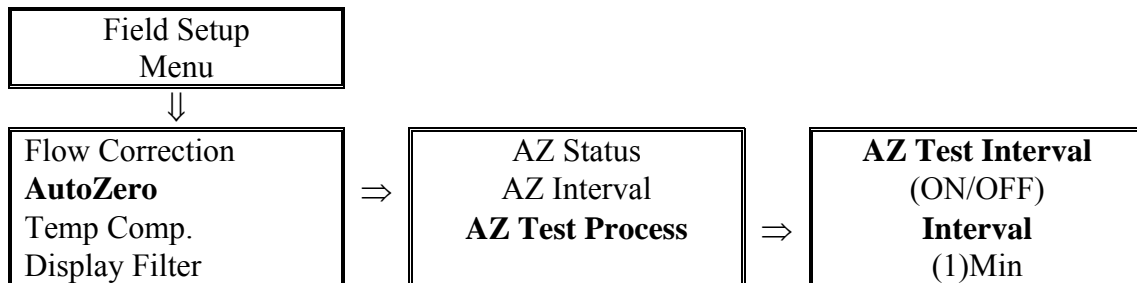
### 6.8. AUTOZERO (OPTIONAL) - INTERVAL

The AZ Interval menu allows the user to select the AutoZero Interval from once an hour to once a day in 1 hour increments. Use the UP/DOWN keys to select the interval value. Upon device power up, an AutoZero cycle will occur after 20 seconds. This menu is displayed only if the AutoZero option is purchased.



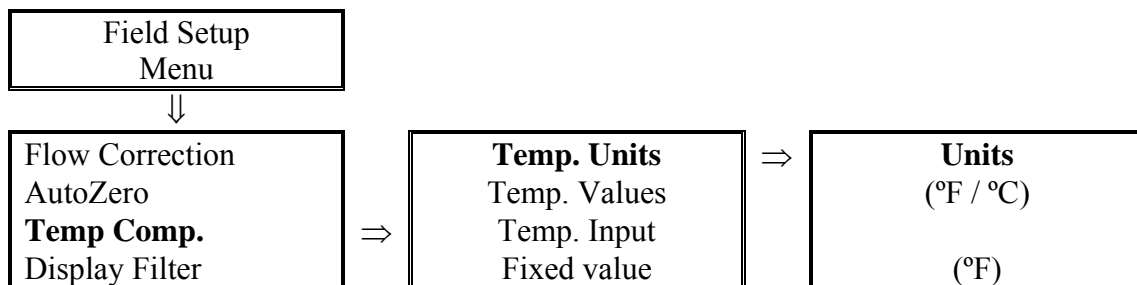
### 6.9. AUTOZERO (OPTIONAL) - TEST INTERVAL

The AZ Test Interval menu allows the user to select an Auto Zero test frequency of once a minute to once every 30 minutes in 1 minute increments. Use the UP/DOWN keys to select the interval value. This menu is available only if the AutoZero option is purchased. If AZ Test is turned ON for more than 60 minutes, it will automatically default to OFF and the AutoZero Interval (section 4.1.8) will be reactivated.



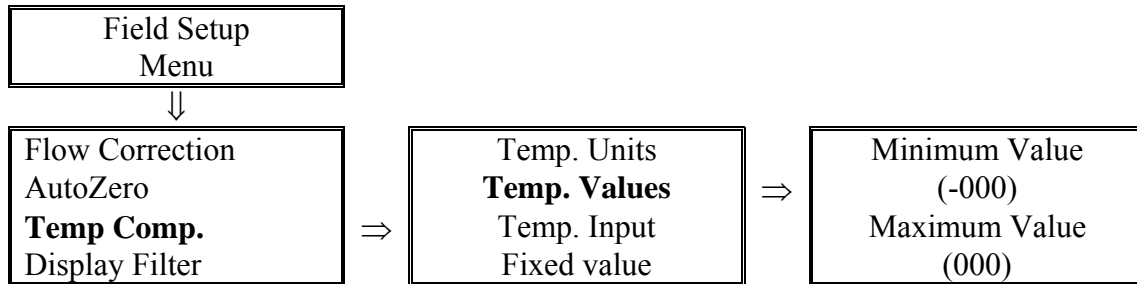
### 6.10. TEMP. COMP. (OPTIONAL) - TEMP. UNITS

The Temperature Units menu allows the user to select the appropriate temperature units for the job. This menu is available only if the Temp Comp. option is purchased.



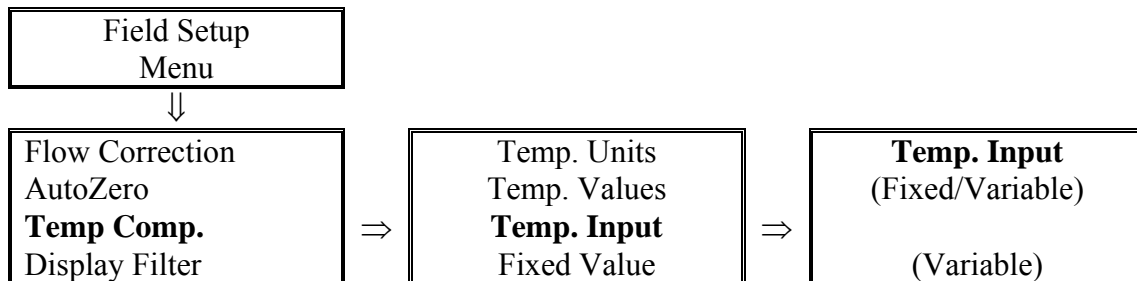
### 6.11. TEMP. COMP. (OPTIONAL) - TEMP. VALUES

The Temperature Values menu allows the factory or user to select the minimum and maximum temperature range values. The minimum value can be a plus or minus value. This menu is available only if the Temp Comp. option is purchased.



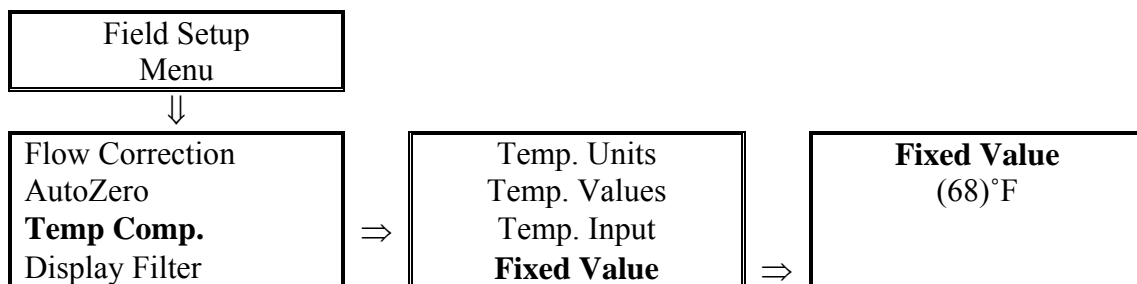
### 6.12. TEMP. COMP. (OPTIONAL) - TEMP. INPUT

The Temperature Input menu allows the user to select between the temperature input signal or the default temperature value entered in the Default Value menu (Standard value is 68°F) for the flow calculations. If Temp. Input is set to Variable, the temperature value is displayed on the LCD screen. If Temp. Input is set to Fixed, the temperature is not displayed on the LCD screen. This menu is available only if the Temp Comp. option is purchased.



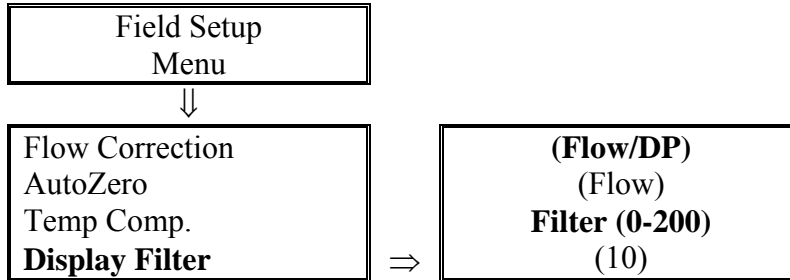
### 6.13. TEMP. COMP. (OPTIONAL) - FIXED VALUE

The Fixed Value menu allows the user to enter a temperature value other than the standard value of 68°F for the flow calculations. This value will not be displayed on the LCD screen. This menu is available only if the Temp Comp. option is purchased.



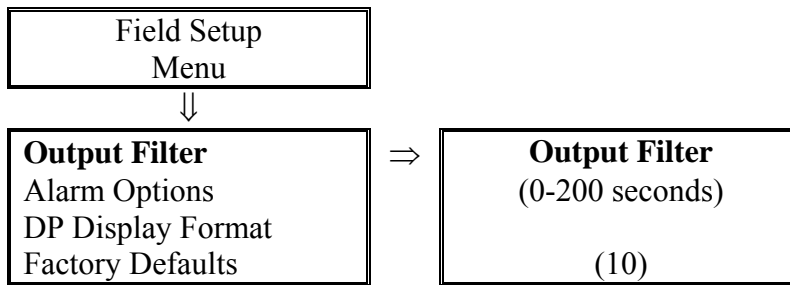
### 6.14. DISPLAY FILTER

The Display Filter menu allows the user to select between two display filter algorithms and the filter rate. Selecting “Flow” (default setting) applies a modified rolling average algorithm to the display value. Selecting “DP” applies a true rolling average algorithm to the display value. The user can also vary the display filter rate from 0 to 200 seconds to reach 95% of step a change. The display filter is independent of the output filter value.



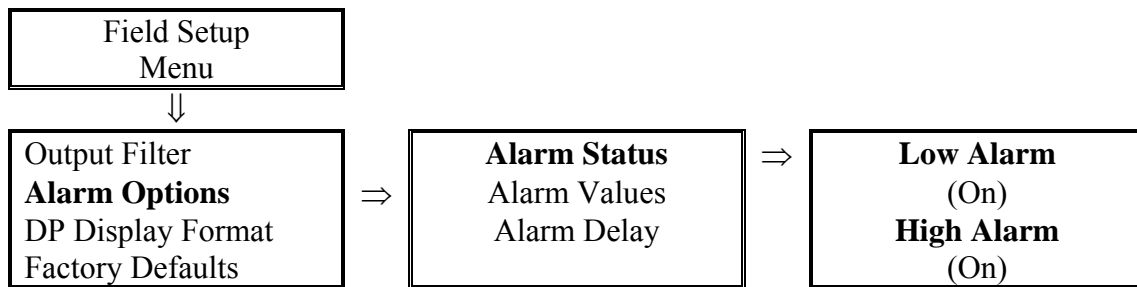
### 6.15. OUTPUT FILTER - PROCESS

The Process Filter menu allows the user to vary the process output filter rate from 0 to 200 seconds to reach 95% of a step change. The Output filter is independent of the Display filter value.



### 6.16. ALARM OPTIONS (OPTIONAL) - ALARM STATUS

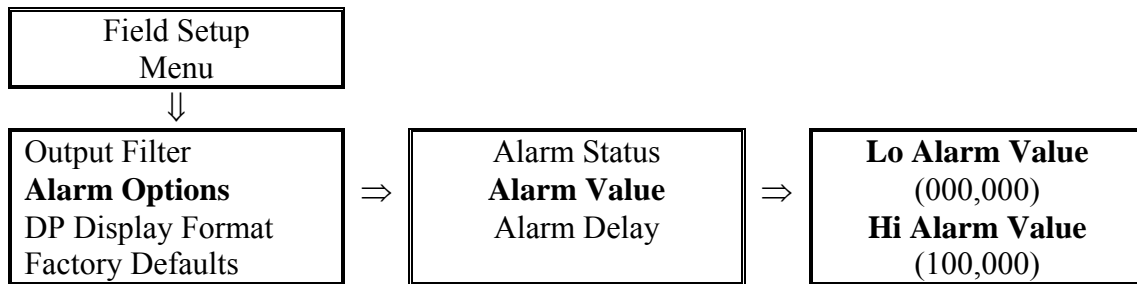
The Alarm Status allows the user to independently turn each alarm ON or OFF. This menu is available only if the Alarm option is purchased.



### 6.17. ALARM OPTIONS - ALARM VALUES

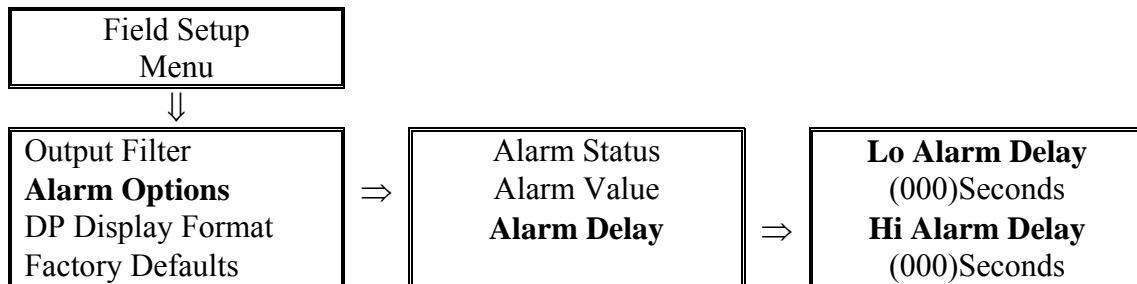
The Alarm Values menu allows the user to enter the Low or the High flow or pressure alarm value. Alarm values will be displayed in the same Eng Units selected in Eng. Units menu. This menu is available only if the Alarm option is purchased.

- **High Alarm Function:** The High Alarm activates if the flow or pressure exceeds the High Alarm value and resets when the flow or pressure drops below the High Alarm value.
- **Low Alarm Function:** The Low Alarm activates if the flow or pressure drops below the Low Alarm value and resets when the flow or pressure exceeds the Low Alarm value.



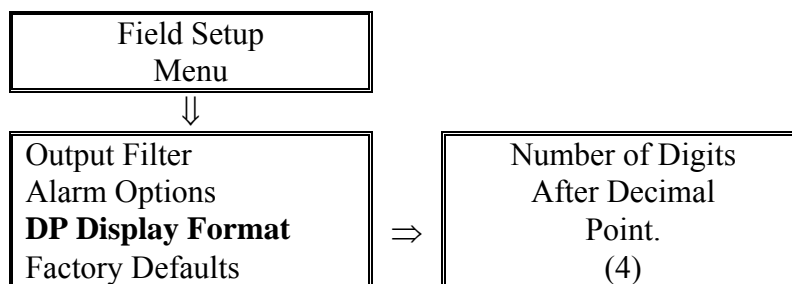
### 6.18. ALARM OPTIONS (OPTIONAL) - ALARM DELAY

The Alarm Delay menu allows the user to enter an alarm delay of 0 to 999 seconds before an alarm will be activated. The alarm will be reset without a delay. This display is available only if the Alarm option is purchased.



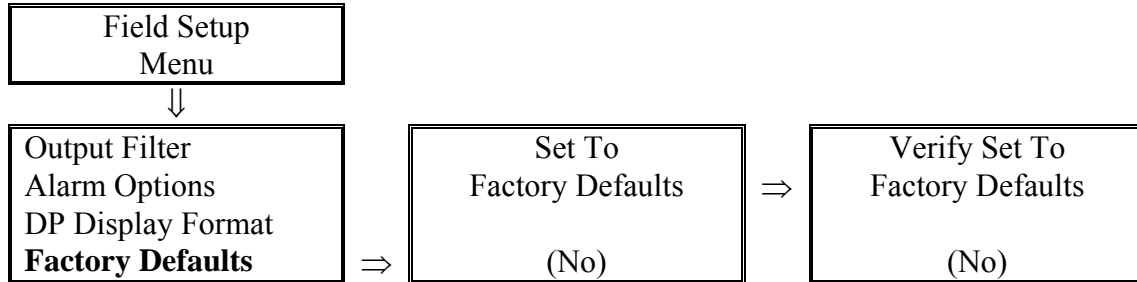
### 6.19. DP DISPLAY FORMAT - DISPLAYED ONLY IN PRESSURE MONITOR MODE

The DP Display Format allows user to change number of digits shown to the right of the decimal point. Selections are 0 to 4.



## 6.20. FACTORY DEFAULTS

If pressure calibration changes are made to the Signal Processor program and it is determined that they were made incorrectly, by selecting YES and pressing enter in both of the Set To Factory Default menus, the device will return all pressure calibration values and device settings to the original factory settings (See Factory Defaults table below for a list of saved data points and settings).



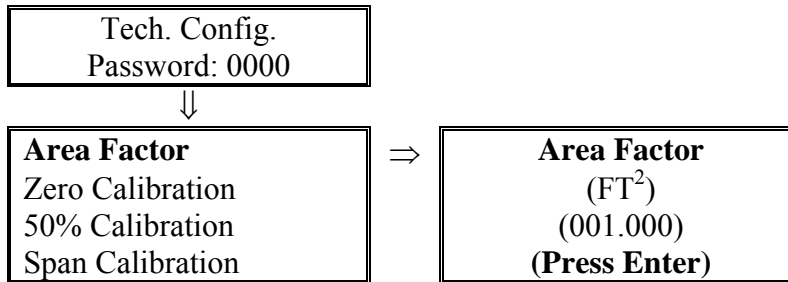
Item	Factory Saved Setting	Item	Factory Saved Setting
1	All Factory Calibration Points (12)	14	MAC Address
2	Area Factor	15	Instance Number
3	Operating Range	16	Engineering Units
4	4 Pt Flow Correction	17	Display Filter & Pre-filter values
5	Altitude	18	Output Filter
6	K-Factor	19	DP Display Format
7	Lockdown & Delay values	20	Output Calibration
8	Flow Correction	21	AutoZero Status
9	Flow Coefficient	22	AutoZero Interval
10	Min. & Max. Temp Range values	23	Temp. Units
11	Alarm Status	24	Temp. Input
12	Alarm Values	25	Temp. Fixed value
13	Alarm Delay	26	Baud Rate

## 7. SIGNAL PROCESSOR TECH. CONFIGURATION MENUS

To enter the Tech Configuration Menu, press **UP/DOWN** buttons simultaneously, enter password number 1000 and press the enter button.

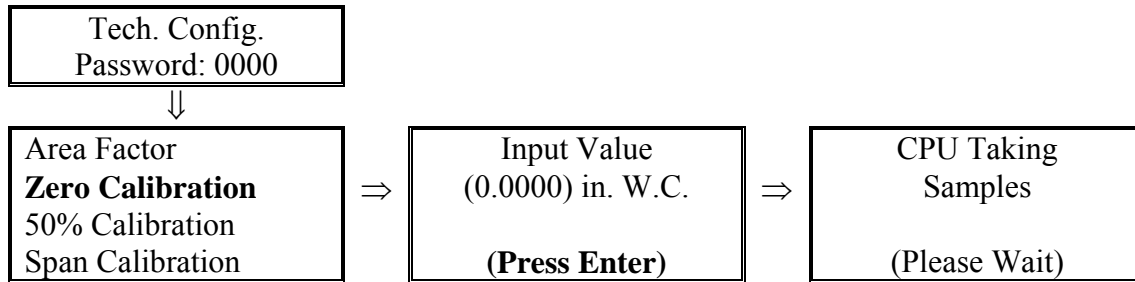
### 7.1. AREA FACTOR

Allows user to enter or modify an existing Area Factor. If a new Area Factor value is entered and causes the previous entered Op. Range value to exceed the new minimum and maximum calculated Full Scale range, the message shown in section 2.5.1 will appear.



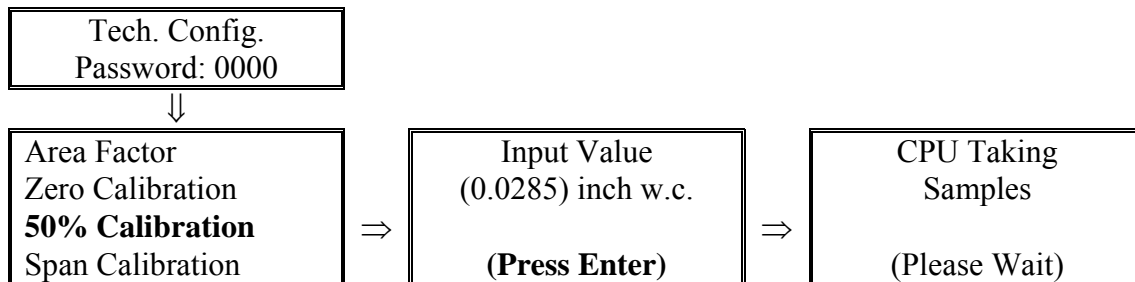
### 7.2. MIN. CALIBRATION

The Min. Calibration menu allows a user to perform a min. transducer calibration. This value will be placed in a different memory location and used until a Return to Factory Defaults is selected (section 4.1.20).



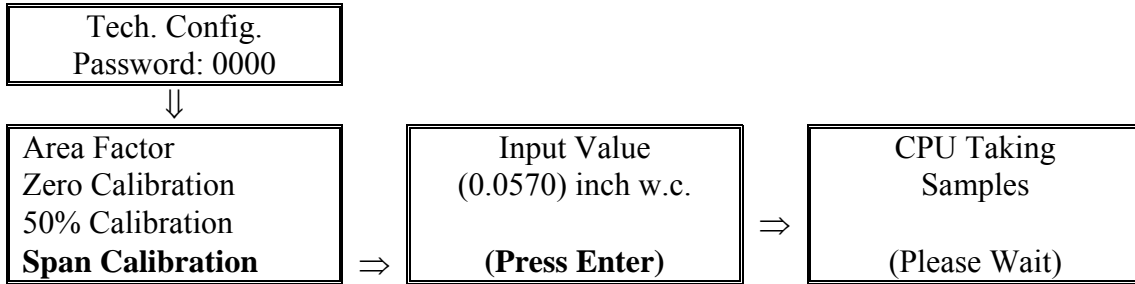
### 7.3. 50% CALIBRATION - DISPLAYED ONLY IN PRESSURE MONITOR MODE

The 50% Calibration menu allows a user to perform a 50% transducer calibration to eliminate zero drift in a bipolar transducer. This value will be placed in a different memory location then the factory zero memory location (section 4.1.20).



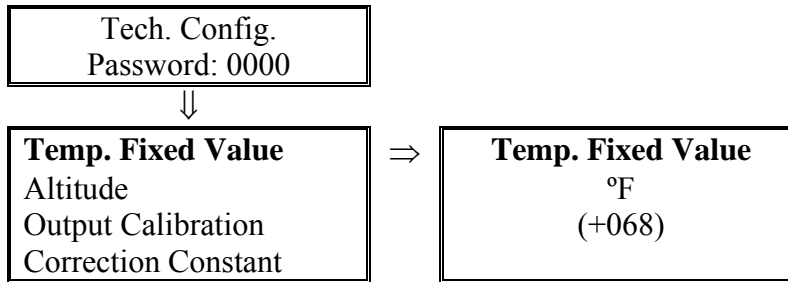
### 7.4. SPAN CALIBRATION

The Span Calibration menu allows user to perform a span transducer calibration to eliminate any possible transducer drift. This value will be placed in a different memory location then the Factory Span memory location and used until a Return to Factory Defaults is selected (section 4.1.20).



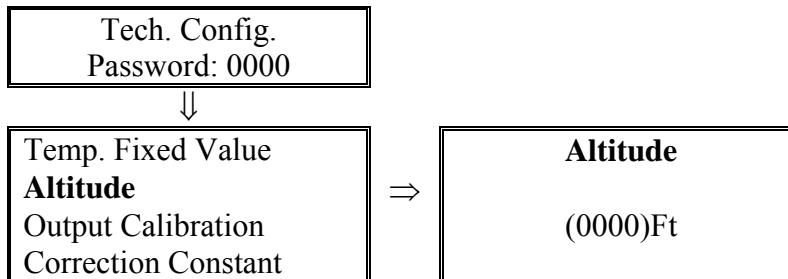
### 7.5. TEMP. COMP. (NO TEMP. COMP OPTIONAL) - FIXED VALUE

The Fixed Value menu allows the user to enter a temperature value other then the standard value of 68°F for the flow calculations. This value will not be displayed on the LCD screen.



### 7.6. ALTITUDE

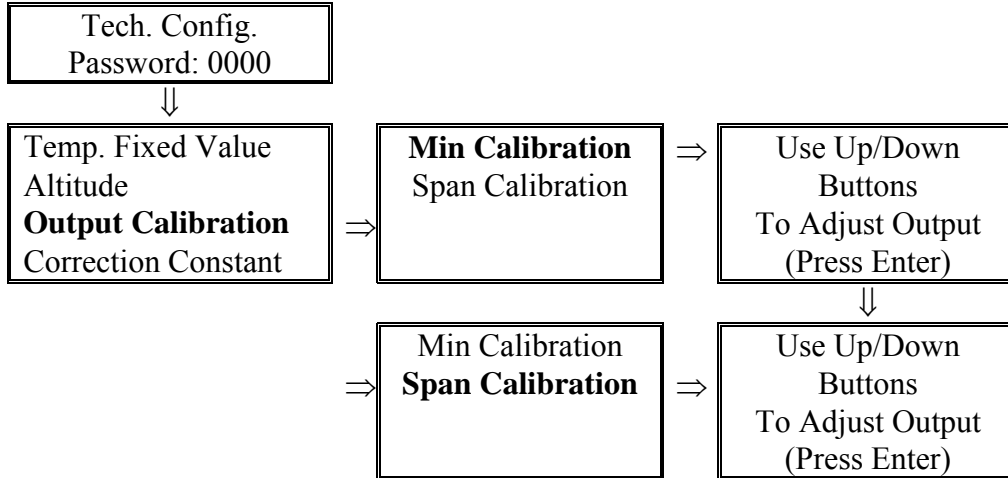
The Altitude menu allows user to enter the specific altitude for the job.





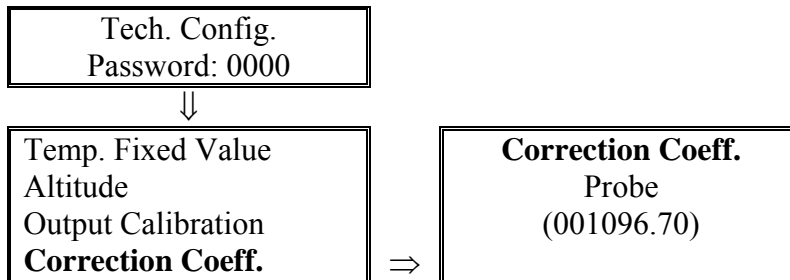
### 7.7. PROCESS OUTPUT CAL

The Process Output Cal menu allows the user to make output zero and span adjustments. Span adjustments require a low pressure air source adjusted to the Full Scale value shown on the side label. Monitor the output and with each Up or Down button depression, the output will increment or decrement 0.01vdc or 0.01mA depending on output selection.



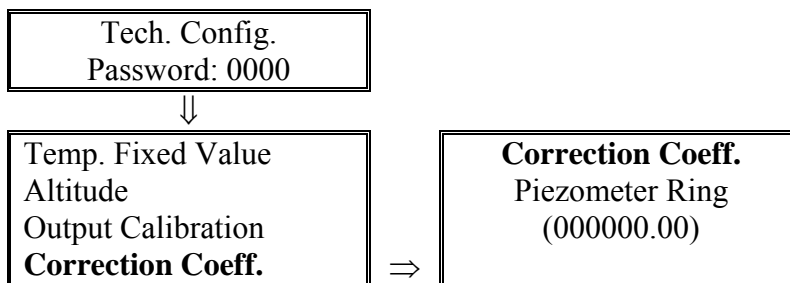
### 7.8. CORRECTION COEFFICIENT – PROBE CALCULATION COEFFICIENT

The Correction Constant menu allows the user to modify the formula constant of 1096.70.



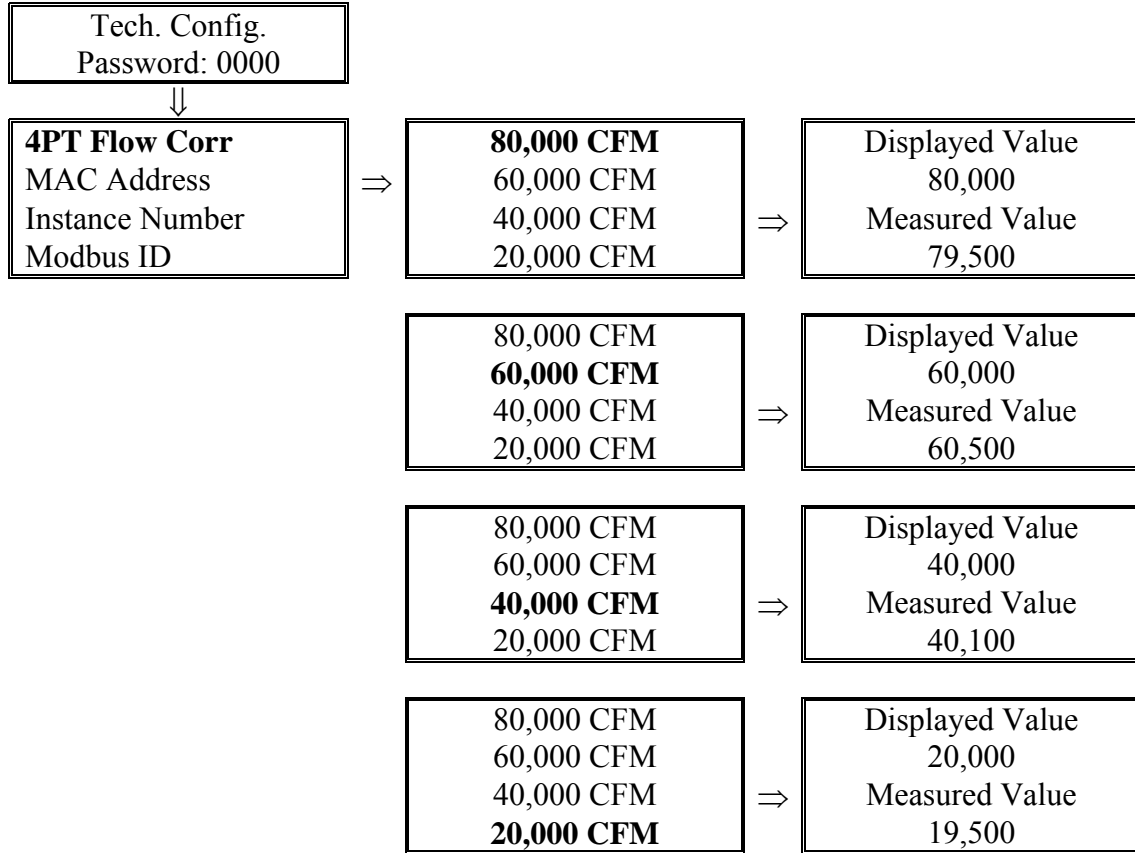
### 7.9. CORRECTION COEFFICIENT - PIEZOMETER RING CALCULATION COEFFICIENT

The Piezometer Correction Constant allows a user to enter a correction constant value when connected to a Pizometer Ring fan.



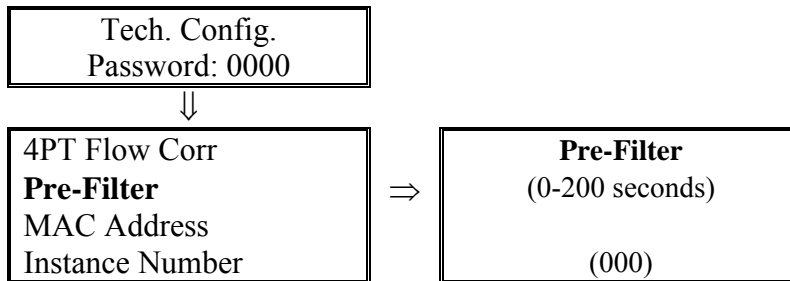
### 7.10. 4PT FLOW CORRECTION

The 4 PT Flow Correction menu allows the user to make corrections to the display and output signal at 20% increments between 20% and 80% of Operating Range value entered. The Displayed Value is a fixed value determined by the percentage of Operating Range. The Measured Value is the entered value determined by an independent balancers reading.



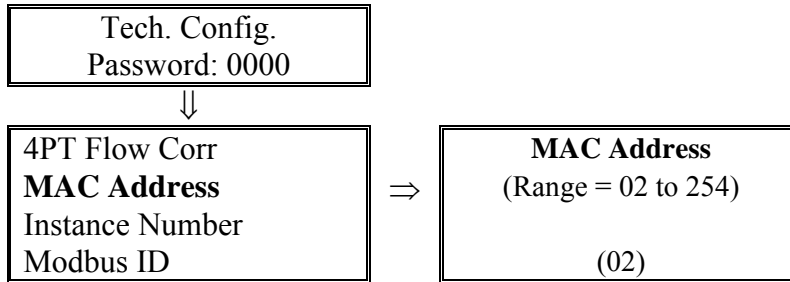
### 7.11. PRE-FILTER

The Pre-Filter menu allows the user to add a pre-filter to the process signal before it goes to the final filter.



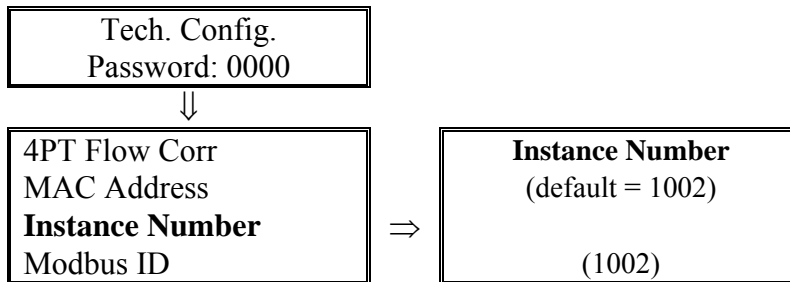
### 7.12. MAC ADDRESS (BACNET COMMUNICATION OPTION)

The MAC Address menu allows the user to set a unique device address when connecting to a BACnet network. The default is 02. For additional information refer to the Communication O&M.



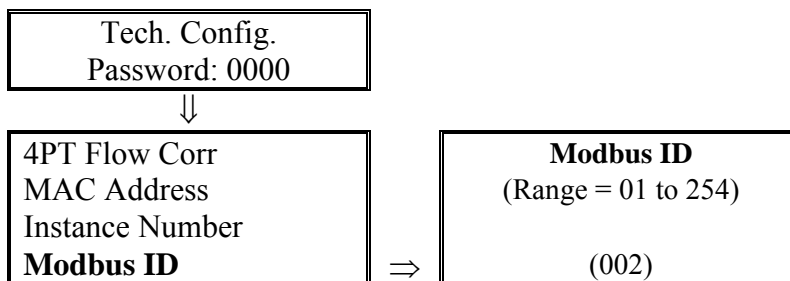
### 7.13. INSTANCE CODE (BACNET COMMUNICATION OPTION)

The Instance Code menu allows the user to set a unique device address when connecting to a BACnet network. The default is 1002. For additional information refer to the Communication O&M.



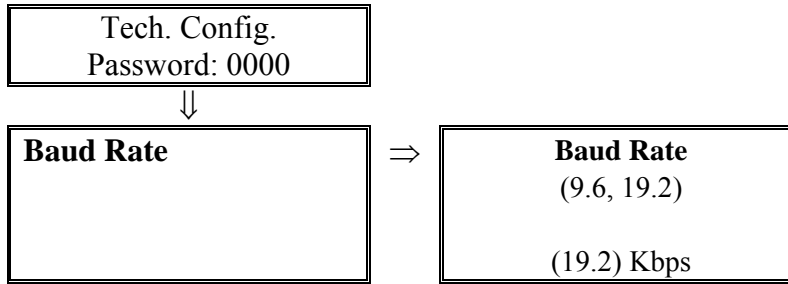
### 7.14. MODBUS ID (MODBUS COMMUNICATION OPTION)

The Modbus ID menu allows the user to set a unique device address when connecting to a Modbus network. The default is 02. For additional information refer to the Communication O&M.



### 7.15. BAUD RATE

The Baud Rate menu allows the user to set a unique network baud rate; BACnet 9.6K / 19.2K, Modbus 9.6K / 19.2K / 38.4K / 57.6K / 115.2K. The default is 19.2K. For additional information refer to the Communication O&M.



## 8. WARNING MESSAGES

### 8.1. INPUT PRESSURE OVERRANGE MESSAGE

If the input pressure exceeds the entered Op. Range value, the following message will appear on the display. It will alternate between the process display and the error message until the input falls below the Op. Range value.

- Caution -  
Input Beyond  
Operating Range  
Selected

### 8.2. TRANSDUCER CALIBRATION MESSAGE

If during a transducer zero or span calibration process, the transducer output pressure value measured exceeds  $\pm 20\%$  of the expected value, the following message will appear on the display. Once the Enter button is pressed, the display returns to the previous calibration menu.

Value entered is  
Outside Factory  
set limits  
(Press Enter)

### 8.3. AREA FACTOR MESSAGE

If the new value entered for Area Factor causes the Op. Range value to exceed the new calculated Max. Full Scale value, the following message will appear on the display.

Op Range Outside  
Allowable Value.  
Will be Reset  
to MAX F.S.

## 9. SIGNAL PROCESSOR TROUBLESHOOTING GUIDE

TROUBLESHOOTING TABLE	
SYMPTOM	SOLUTION
1. No Display or Back Light	1. Verify ON/OFF switch is in ON position
	2. Verify correct input power and connection at 3 pin connector J1
	3. Contact Factory
2. Display background is too dark or characters are too light.	1. Adjust Display potentiometer located in the upper left hand corner of the board.
3. Display does not respond to input pressure changes and Key pad functions.	1. Reset the unit by turning the ON/OFF switch OFF and back ON.
	2. Contact Factory
4. Display does not respond to input pressure changes but does respond to Key pad functions.	1. Verify pneumatic input lines are not reversed at the Signal Processor ports or the sensing element.
	2. Use a pneumatic gauge to measure the pneumatic signal input to the Signal Processor. Verify the signals are within the Op. Range value shown on the label located on the side of the enclosure.
	3. Contact Factory
5. Display does not respond to Key Pad functions	1. Reset the unit by turning the ON/OFF switch to OFF and then ON.
	2. Contact Factory
6. <b>CAUTION INPUT OVERRANGE</b> message on Display	1. Verify data on ID Label located on side of Signal Processor is correct for the application.
	2. Remove pneumatic signal lines. If display returns to 0 reading, use a pneumatic gauge to measure the pneumatic signal. Verify input signal is equal to or less then the Op. Range D.P. value on the ID Label. If the display does not return to 0, a pneumatic tube may be plugged by moisture underneath the PC board. Consult the factory.

<b>TROUBLESHOOTING TABLE</b>	
<b>SYMPTOM</b>	<b>SOLUTION</b>
6. Continued	3. Verify menu selections are set correctly: Op. Range, Flow Correction, Temp. Comp., Area Factor and Barometric Pressure.
	4. If Temp. Comp. Option is installed, verify correct temperature input signal. Verify temperature input connected correctly.
	5. Contact Factory
7. Incorrect Temperature Reading	1. Verify Temperature Transmitter specifications match with Signal Processor ID Label (Current/Voltage, Temperature Range)
	2. Verify Temperature Transmitter is connected correctly to the Signal Processor.
	3. Verify Temperature Transmitter signal at the Signal Processor connector J2 is correct.
	4. Contact Factory
8. No Output or Incorrect Output. Display is reading correct value.	1. Verify Output selection current (I)/ voltage (V) is correct for the application.
	2. Disconnect Output signal wires and verify output signal at Signal Processor connector J2 is correct.
	3. Verify correct Operating Range - Section 4.1.1
	4. Perform Output Cal – Section 5.1.6
	5. Contact Factory
9. Incorrect Process Output values after changing Area Factor, Barometric Pressure or Temperature. Display readings are correct.	1. Re-Enter Operating Range Value in Field Menu (Section 4.1.1)
	2. Contact Factory
10. Unstable Display and Process Output at very low flow.	1. Increase Display and Process Filter
	2. Decrease Lockdown value
	3. Increase Lockdown delay value

<b>TROUBLESHOOTING TABLE</b>	
<b>SYMPTOM</b>	<b>SOLUTION</b>
10. Continued	4. Contact Factory
11. "AZ Error" text on display	1. Turn Power Switch S3 Off and On to reset AZ valve
	2. Check for a pinched tube beneath the main board. (Caution: Remove power before removing board)
	3. Contact Factory





*Kele, Inc., 3300 Brother Boulevard, Bartlett, TN 38134  
USA 888-397-5353, International 901-382-6084  
IOM: KOAMS8/11*