AAON Airflow Signal Processor

Field Startup Guide

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

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1. INTRODUCTION

This guide is intended for field startup of the AAON Airflow Signal Processor. The full AAON Outdoor Airflow Measurement System Operation and Maintenance Manual (O&M) can be downloaded from the AAON website at www.AAON.com.

1.1. BASIC OPERATION

The AAON Airflow Signal Processor receives a differential pressure signal from the AAON Airflow Station. This signal is scaled and linearized before being displayed and transmitted out as a 4-20mA, 0-5VDC, or 0-10VDC signal.

The AutoZero feature corrects any zero offset caused by large ambient temperature changes. The Temperature Compensation feature compensates the flow signal for density changes caused by variations in the air temperature. The AAON Temperature Transmitter provides a temperature input signal to the AAON Airflow Signal Processor for air density calculations.

1.2. SPECIFICATIONS

1.2.1. Power Supply

20 to 28 VAC/DC

1.2.2. Power Consumption

250mA at 24VAC
175mA at 24VDC

1.2.3. Accuracy

±0.25% full scale

1.2.4. Temperature Input

4-20mA

1.2.5. Process Output Options

0-5VDC
0-10VDC
4-20mA (700Ω maximum load)

1.2.6. High/Low Alarm Relay Outputs

Two single (1 form C) dry contacts rated for:
5 amps at 30VAC/DC
10 amps at 120VAC

1.3. SAFETY

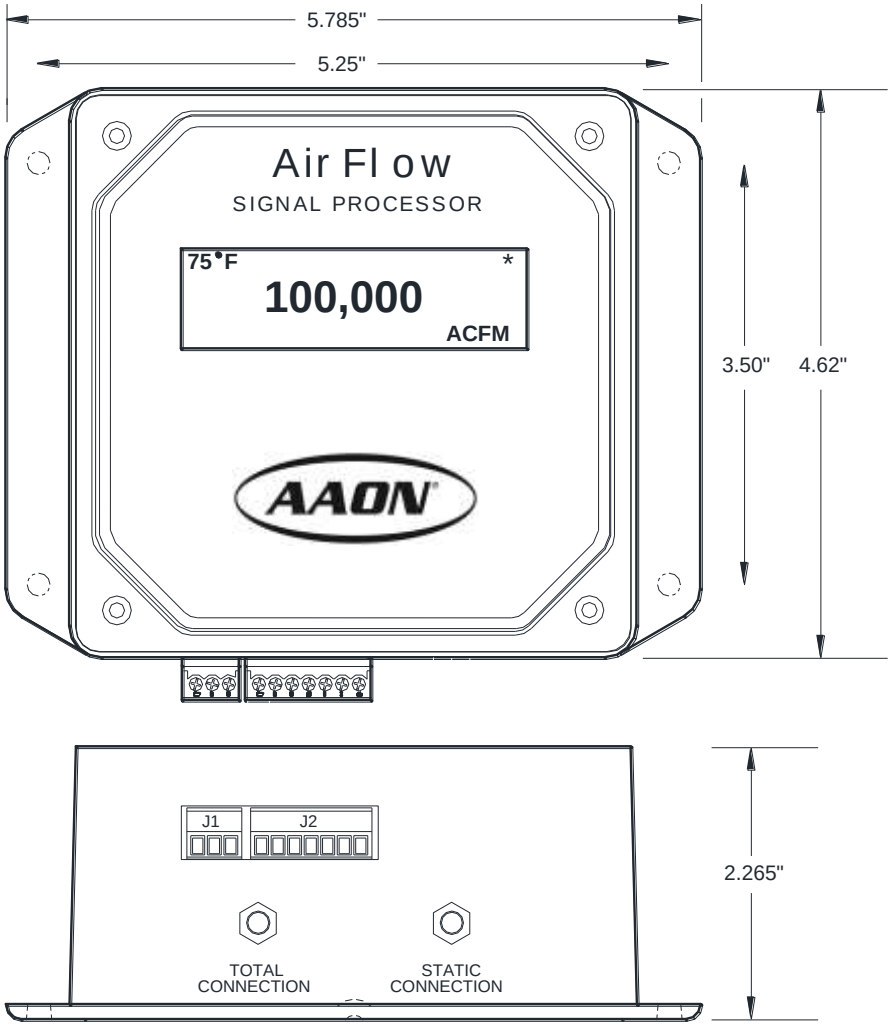
1.3.1. Electrical Connections

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

1.3.2. Static Electricity

The circuit board contains components which 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. PRODUCT DIMENSIONS



3. ELECTRICAL & PNEUMATIC CONNECTIONS

All electrical and pneumatic connections to the AAON Airflow Signal Processor have been made at the factory as shown in Figures 1 through 3 below, with the exception of the electrical connection for network communication options other than with WattMaster Controls, if applicable. The following procedure outlines the steps for installing the interface wiring for network communication and for turning ON the AAON Airflow Signal Processor. Skip Step 3 if network communication is not required or if WattMaster Controls are provided.

Caution - All electrical connections must be made with the AAON Airflow Signal Processor Power Switch in the OFF position.

Step 1. Remove the corner mounting screws on the AAON Airflow Signal Processor cover by turning each screw counter clockwise.

Step 2. Remove the cover.

Step 3. If network communication is required, verify that the Power Switch (S3) is in the OFF position and install the interface wiring for Pins 9 and 10 as shown in Figure 1. The three electrical connectors (J1, J2, and optional J3) have removable terminal blocks for ease of installing the interface wiring.

Step 4. Turn the Power Switch (S3) to the ON position; see Section 4.1 and 4.2 for display descriptions.

Step 5. Configure the required parameters as outlined in Section 5; see Section 4.3 for a description of the Key locations and functions.

Step 6. Replace the cover by turning each corner cover mounting screw clockwise.

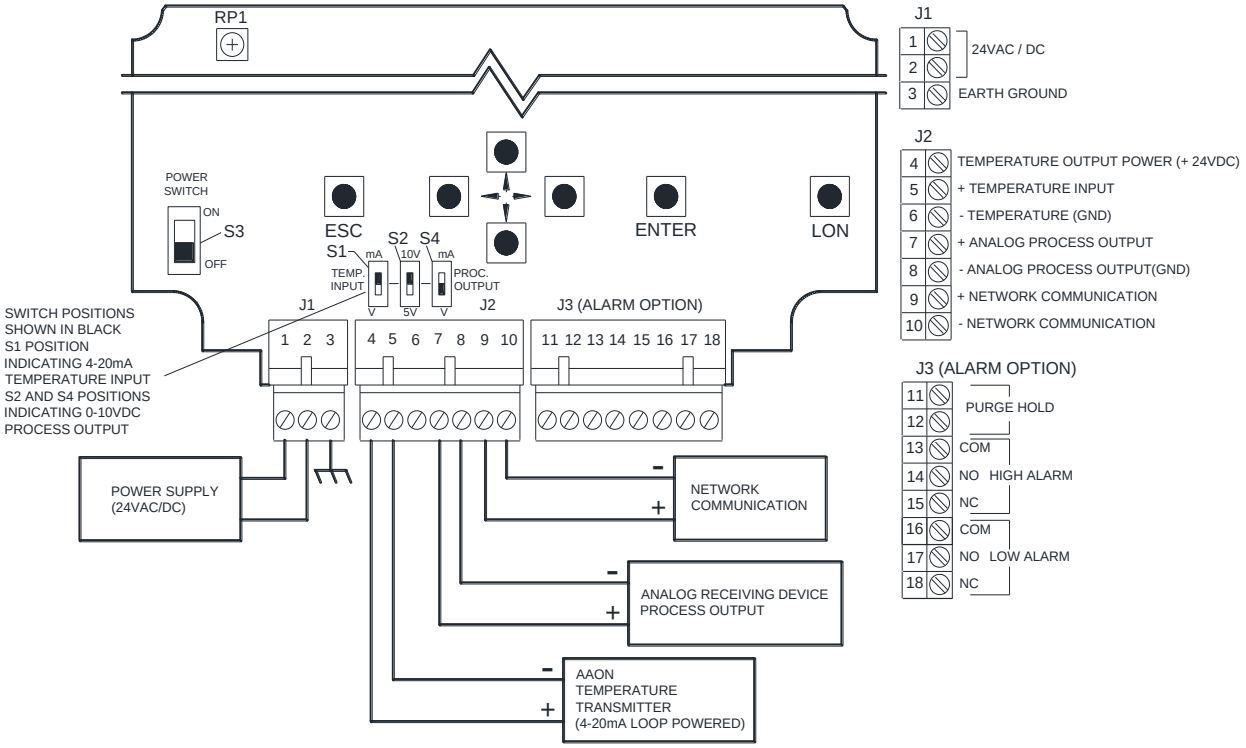


Figure 1 - Electrical Connections

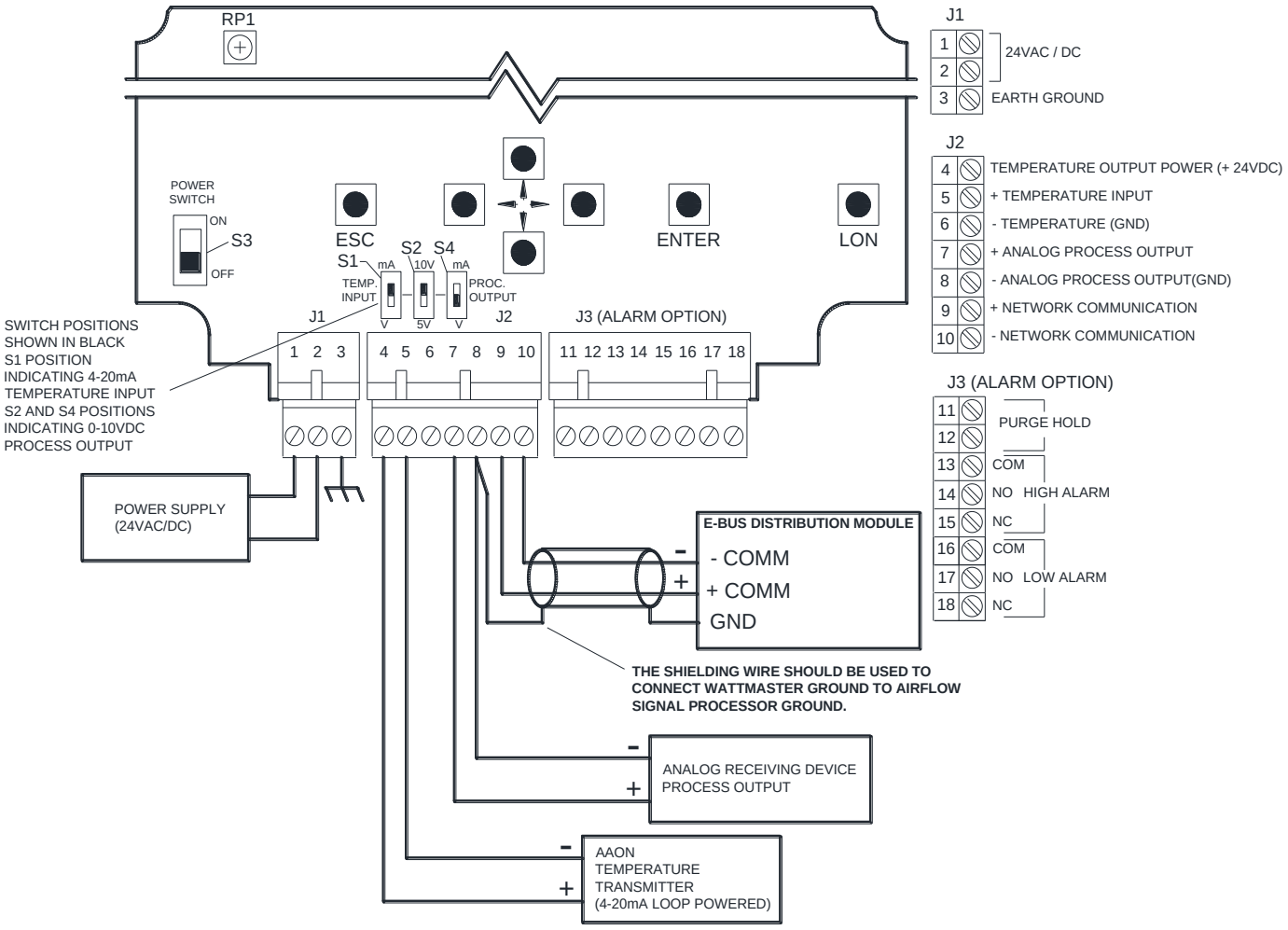


Figure 2 - Electrical Connection with Wattmaster Controls

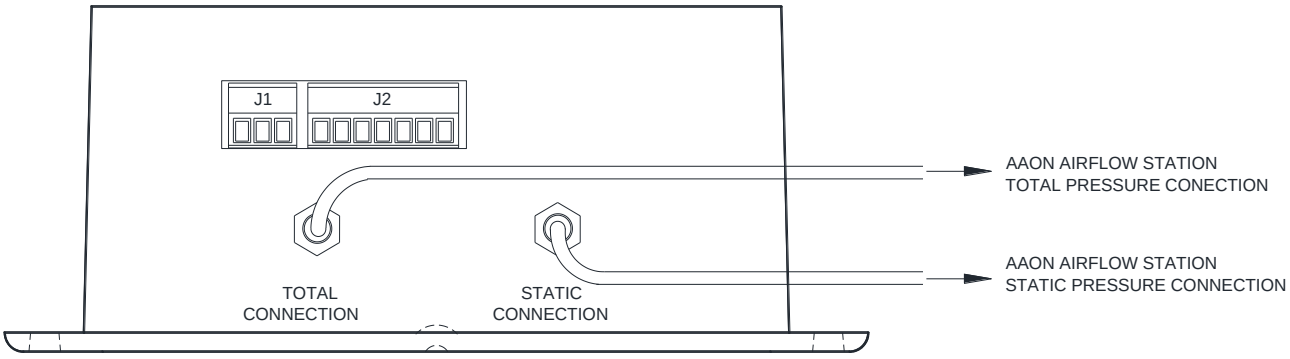


Figure 3 - Pneumatic Connections

4. ACTIVE DISPLAYS & KEY FUNCTIONS

4.1. POWER-UP INITIATION DISPLAY

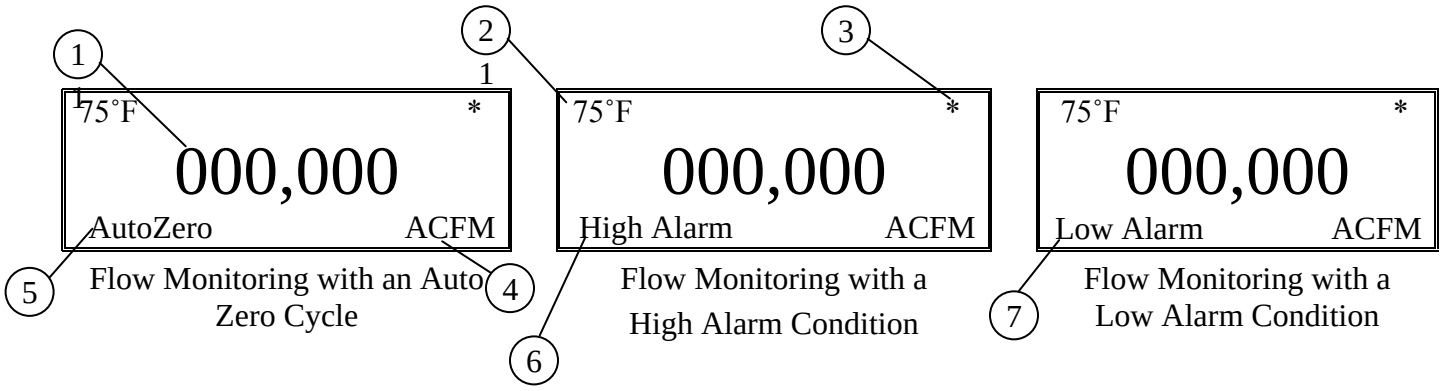
Upon initial power-up, Software Revision information will be displayed on the graphic display for approximately 5 seconds.

EQ-1
Software Rev. XX.XXX

Modbus Rev. XX.XXX

4.2. PROCESS DISPLAY DESCRIPTIONS

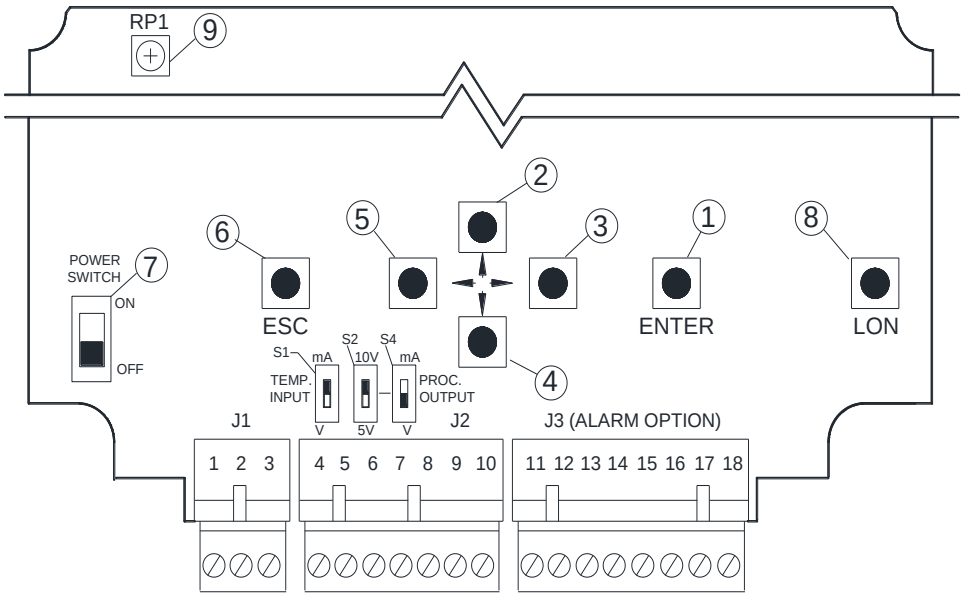
After power-up initialization, the following information will appear on the graphic display depending upon the options purchased.



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

4.3. KEY FUNCTIONS

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



Number	Description
1	**Enter Key** - 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	**Up Key** - Allows the user to scroll up in the menu list to a selected item or increase digits when making value changes.
3	**Right Key** - When making changes to user values the Right Key allows the user to scroll to the correct digit for changes.
4	**Down Key** - Allows the user to scroll down in the menu list to a selected item or decrease digits when making value changes.
5	**Left Key** - When making changes to user values the Left Key allows the user to scroll to the correct digit for changes.
6	**Escape Key** - 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.
7	**Power Switch –** Allows a user to turn power off to the AAON Signal Processor during field wiring or modifications to the device.
8	**Lon Switch –** Allows a user to send a unique Neuron device ID when connecting to a LonWorks communication network.
9	**RP1** – Allows a user to adjust the display contrast.

5. FIELD STARTUP

The AAON Airflow Signal Processor has been configured by the factory for the specific application. Therefore, the only parameters that need to be configured in the field are the network communication settings, with the exception of Modbus® Slave communication with WattMaster Controls which has been configured at the factory, and the High/Low Alarm Option if ordered. Communication settings will be configured under the Tech Configuration Menu (see Section 5.1). The High/Low Alarm Option will be configured under the Field Setup Menu (see Section 5.2).

During field startup, if the displayed value on the AAON Airflow Signal Processor does not match the reading from the Balancer, a Flow Correction (K-Factor) can also be entered under the Field Setup Menu (see Section 5.2).

If required, the AAON Factory Settings can be checked or reconfigured following procedures outlined in Section 6. If parameters are reconfigured incorrectly, all device settings can be restored to the original AAON Factory Settings (see Section 5.2.3). This guide is intended for field startup only of the AAON Airflow Signal Processor. The full AAON Outdoor Airflow Measurement System O&M can be downloaded from AAON's website at www.AAON.com.

5.1. TECH CONFIGURATION MENU

If a network communication option is ordered the associated settings will need to be configured, with the exception of Modbus® Slave communication with WattMaster Controls which has been configured at the factory. To set the parameters refer to the following procedure, below subsections, and Section 4.3 for Key functions.

Step 1. Enter the Tech Configuration Menu by pressing and holding the Up/Down Keys simultaneously for 5 seconds.

Step 2. Using the Up/Down/Left/Right Keys, enter password number 1000 and press the Enter Key.

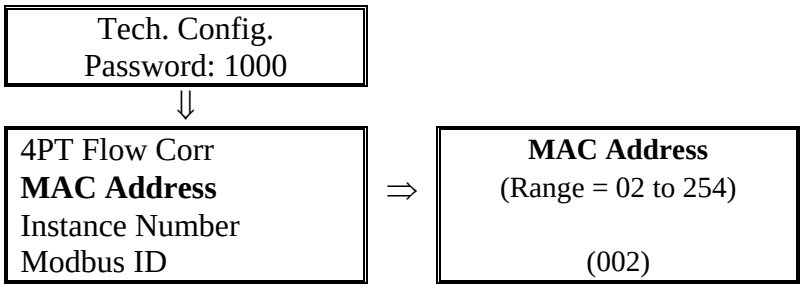
Step 3. Once in the Tech Configuration Menu, use the Up/Down Keys to highlight the required parameter for configuration as shown in Sections 5.1.1 through 5.1.4. Press the Enter Key once to access the highlighted parameter Menu.

Step 4. Once in the parameter menu, the parameter can be changed using the Up/Down/Left/Right Keys. After the parameter has been changed, press the Enter Key once. Then Press the ESC Key once to return to the Tech Configuration Menu.

Step 5. After all of the required parameters have been configured, exit the Tech Configuration Menu by pressing the ESC Key. The Process Display (see Section 4.2) will then be displayed.

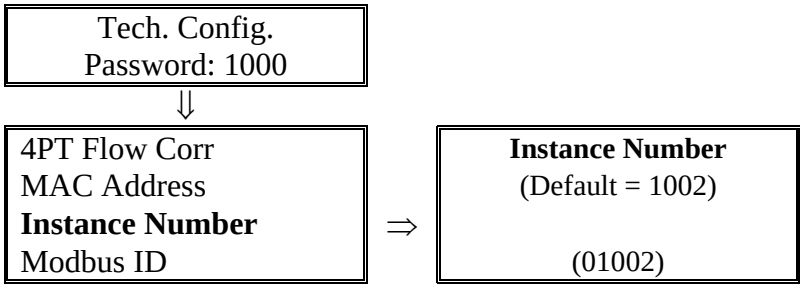
5.1.1. MAC Address (BACnet Communication Option)

When the BACnet Communication option is ordered, the MAC Address Menu allows the user to set a unique device address when connecting to a BACnet network. The default is 002. For additional information refer to the AAON Outdoor Airflow Measurement System O&M.



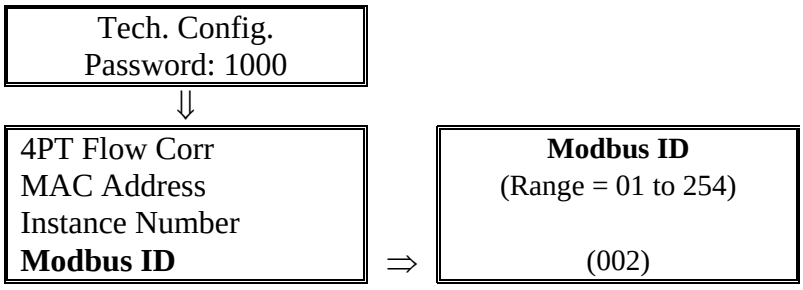
5.1.2. Instance Number (BACnet Communication Option)

When the BACnet Communication option is ordered, the Instance Number 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 AAON Outdoor Airflow Measurement System O&M.



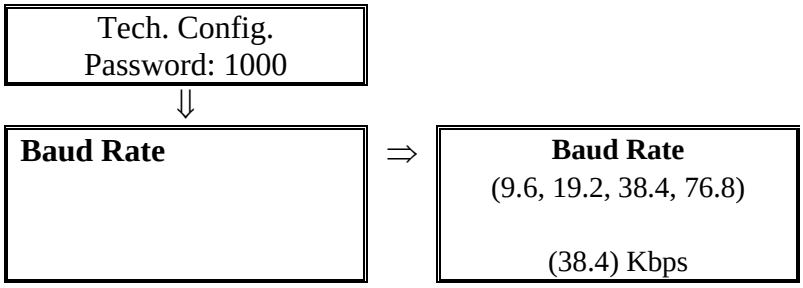
5.1.3. Modbus ID (Modbus Communication Option)

When the Modbus Communication option is ordered, the Modbus ID Menu allows the user to set a unique device address when connecting to a Modbus network. The default is 002. For communication with WattMaster Controls the Modbus ID has been set by the factory to 009 for outside airflow applications. For additional information refer to the AAON Outdoor Airflow Measurement System O&M.



5.1.4. Baud Rate (Modbus and BACnet Communication Options)

The Baud Rate Menu allows the user to set a unique network baud rate. Modbus communications supports 9.6, 19.2, 38.4, 57.6 and 115.2 Kbps baud rate. The current BACnet protocol supports 9.6, 19.2, 38.4 and 76.8 Kbps baud rate. The default is 38.4 Kbps. For communication with WattMaster Controls, the Baud Rate has been set by the factory to 9.6 Kbps. For additional information refer to the AAON Outdoor Airflow Measurement System O&M.



5.2. FIELD SETUP MENU

The High/Low Alarm Option, if ordered, and Flow Correction (K-Factor) will be configured under the Field Setup Menu. To set the parameters refer to the following procedure, below subsections, and Section 4.3 for Key functions.

Step 1. Enter the Field Setup Menu by depressing and holding the Enter Key for 5 seconds.

Step 2. Once in the Field Setup Menu use the Up/Down Keys to highlight the required parameter for configuration as shown in Sections 5.2.1 through 5.2.3. Press the Enter Key once to access the highlighted parameter Menu.

Step 3. Once in the parameter menu, the parameter can be changed using Up/Down/Left/Right Keys. After the parameter has been changed, press the Enter Key once. Then Press the ESC Key once to return to the Field Setup Menu.

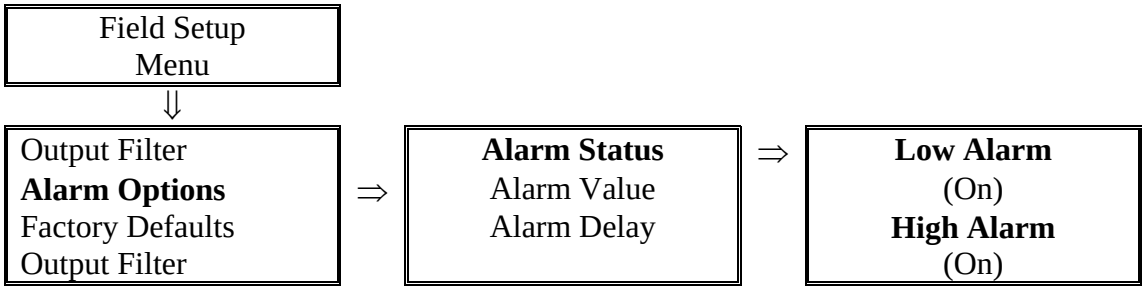
Step 4. After all of the required parameters have been configured, exit the Field Setup Menu by pressing the ESC Key. The Process Display (see Section 4.2) will then be displayed.

5.2.1. High/Low Alarm Option

The following menus for configuration of High/Low Alarms are only available if the High/Low Alarm option is purchased.

5.2.1.1. Alarm Status

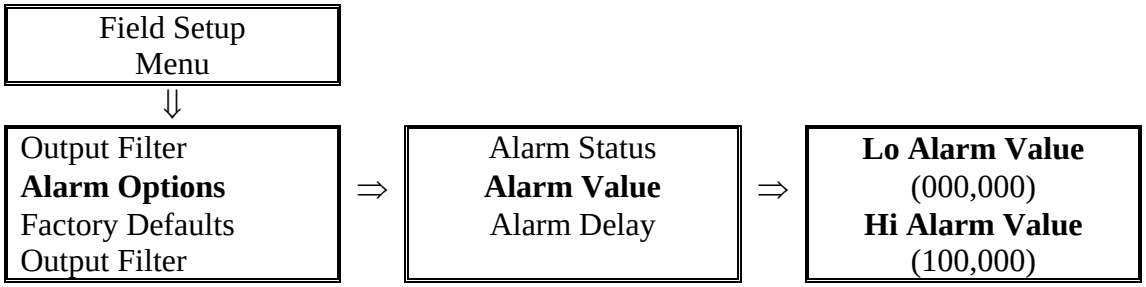
The Alarm Status allows the user to independently turn each alarm ON or OFF.



5.2.1.2. Alarm Values

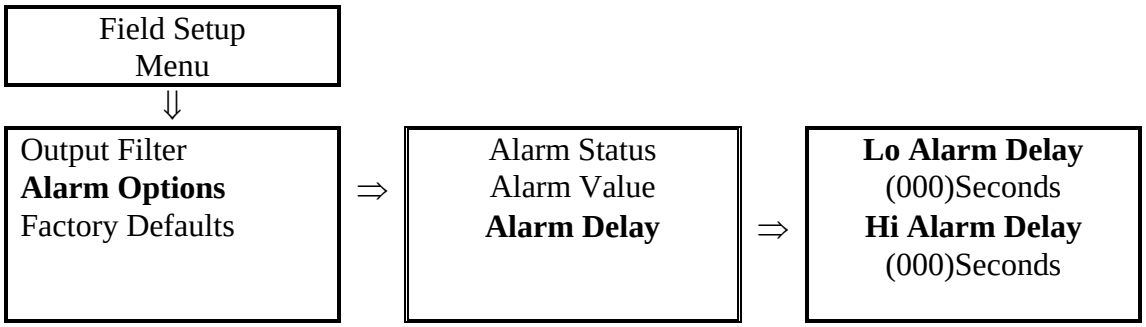
The Alarm Value Menu allows the user to enter the Low or the High flow alarm value. Alarm values will be displayed in the same engineering units selected in the Engineering Units Menu (see Section 6.2.2).

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



5.2.1.3. 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.

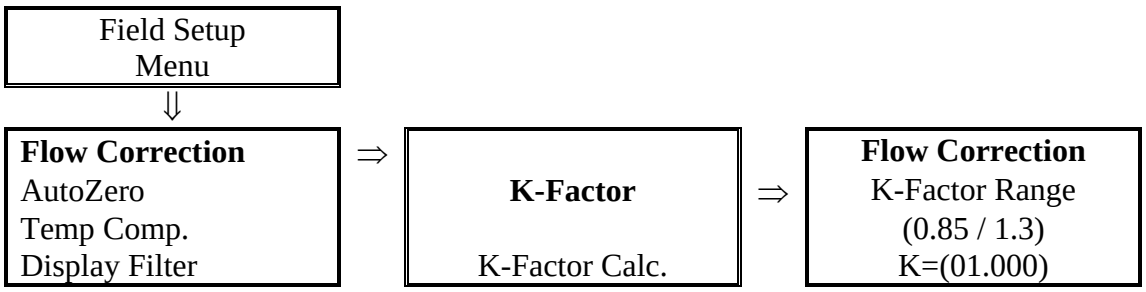


5.2.2. Flow Correction

The Flow Correction Menu was incorporated into the AAON Airflow Signal Processor to give the user an easy way to make corrections to the display and output without changing the Operating 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 Operating Range Value.

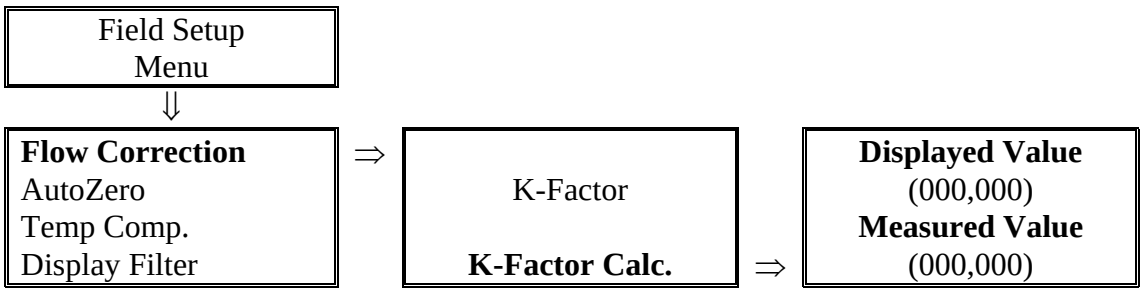
5.2.2.1. Flow Correction (K-Factor)

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.



5.2.2.2. Flow Correction (K-Factor Calculator)

If the new K-factor Value needs to be calculated, select the K-Factor Calc. Menu. Enter the Displayed Value on the AAON Airflow Signal Processor and actual Measured Value, press Enter and the % change will be calculated and stored as the new K-Factor Value.

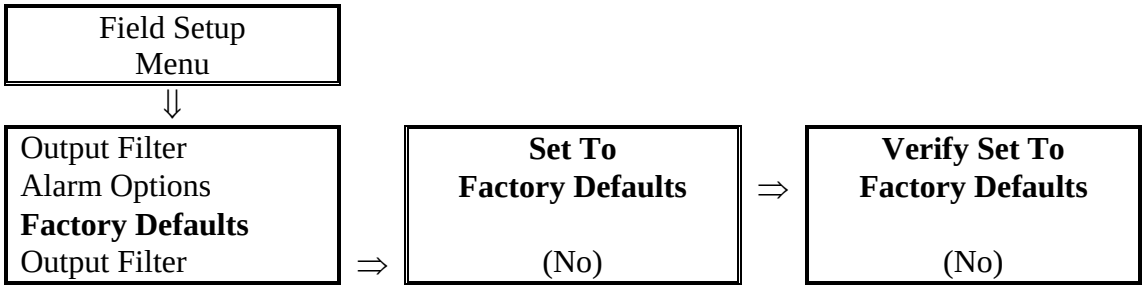


-FLOW CORRECTION EXAMPLE-

The balancer is consistently measuring a value of 9,500 CFM, which is 500 CFM less than the 10,000 CFM value on the AAON Airflow Signal Processor display. The user would then perform the following math function: Measured Value / Displayed Value = K-Factor so 9,500 CFM / 10,000 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.

5.2.3. Factory Defaults

If parameter configuration changes have been made incorrectly to the AAON Airflow Signal Processor, all device settings can be restored to the original AAON factory settings by selecting YES and pressing Enter in both the Set To Factory Defaults Menu and the Verify Set To Factory Defaults Menu (see Factory Defaults table below for a list of Saved Settings).



FACTORY DEFAULTS			
ITEM	**SAVED SETTING**	**ITEM**	**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 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

6. AAON FACTORY SETTINGS

To convert the differential pressure signal from the AAON Airflow Station to a flow value, the Area Factor associated with the AAON Airflow Station has been entered by the factory; see Figure 3 in Section 3 for proper pneumatic connection of the AAON Airflow Station. The AAON Airflow Signal Processor Operating Range has also been configured for the specific application and will display the measured flow rate in Engineering Units of actual cubic feet per minute (ACFM). For air density compensation, the AAON Airflow Signal Processor receives a temperature input from the AAON Temperature Transmitter and the job specific site altitude has been entered; see Figure 1 in Section 3 for proper electrical connection of the AAON Temperature Transmitter and Section 6.3.2 for temperature input signal configuration. If the Modbus® Slave communication option has been ordered for communication with WattMaster Controls, the associated settings have been configured at the factory. The Process Output of the AAON Airflow Signal Processor has been set to 0-10 VDC. The Process Output is also field selectable (see Section 6.3.1).

Area Factor, Altitude, and Modbus® Slave communication settings are configured under the Tech Configuration Menu (see Section 6.1). Operating Range, Engineering Units, and Temperature Compensation, are configured under the Field Setup Menu (see Section 6.2).

6.1. TECH CONFIGURATION MENU

The Area Factor, Altitude, and Modbus® Slave communication settings can be checked or reconfigured under the Tech Configuration Menu. To set the parameters refer to the following procedure, below subsections, and Section 4.3 for Key functions.

Step 1. Enter the Tech Configuration Menu by pressing and holding the Up/Down Keys simultaneously for 5 seconds.

Step 2. Using the Up/Down/Left/Right Keys, enter password number 1000 and press the Enter Key.

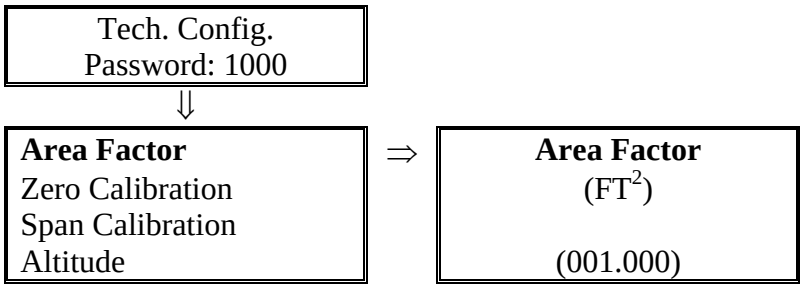
Step 3. Once in the Tech Configuration Menu, use the Up/Down Keys to highlight the required parameter for configuration as shown in Sections 6.1.1 through 6.1.4. Press the Enter Key once to access the highlighted parameter Menu.

Step 4. Once in the parameter menu, the parameter can be changed using the Up/Down/Left/Right Keys. After the parameter has been changed, press the Enter Key once. Then Press the ESC Key once to return to the Tech Configuration Menu.

Step 5. After all of the required parameters have been configured, exit the Tech Configuration Menu by pressing the ESC Key. The Process Display (see Section 4.2) will then be displayed.

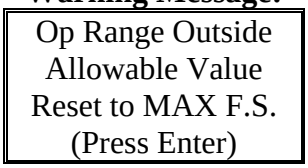
6.1.1. Area Factor

To convert the differential pressure signal from the AAON Airflow Station to a flow value, the Area Factor associated with the AAON Airflow Station has been preprogramed by the factory. If the Area Factor needs to be checked or reconfigured, the correct Area Factor for the AAON Airflow Station can be found on the AAON Airflow Station product label installed in the air handling unit.

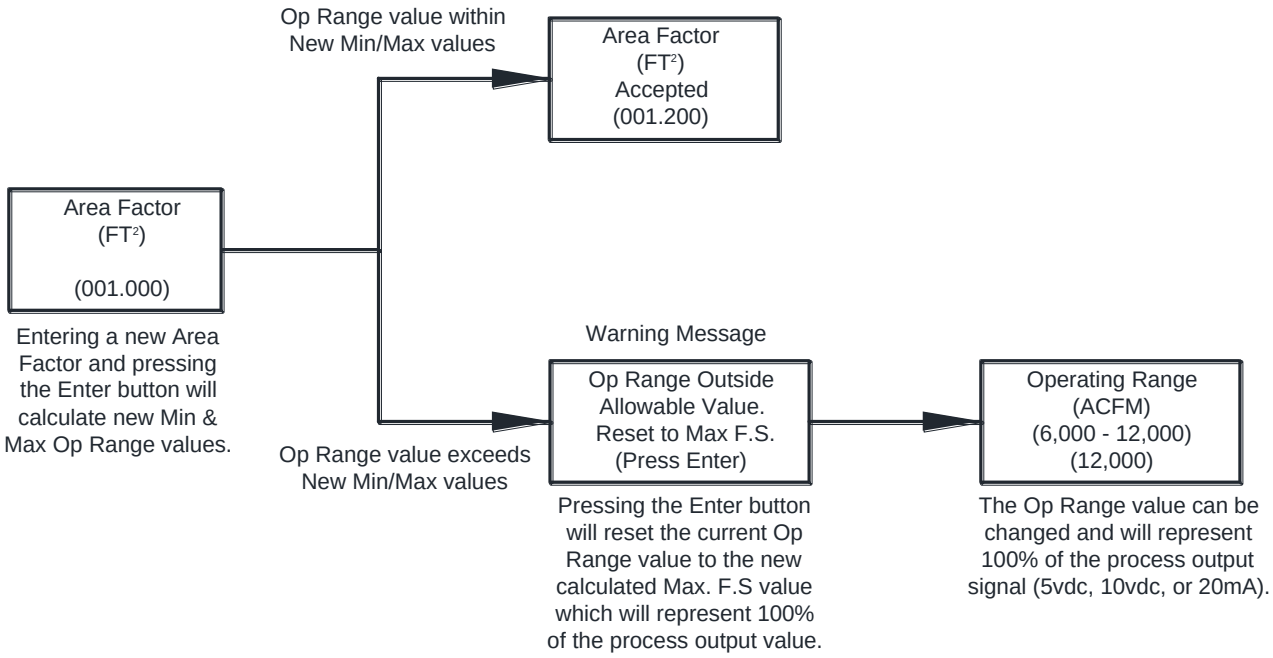


If the Area Factor is reconfigured and the new Area Factor causes the existing Operating Range Value to be outside the new calculated Minimum or Maximum Full Scale Value, the below Warning Message will appear and the Operating Range will be reset to the new Maximum Full Scale Value by pressing Enter. The display will automatically jump to the Operating Range Menu allowing the user to enter a new Operating Range Value. This can be accomplished by performing the steps under Section 6.2.1. See Area Factor Example below.

Warning Message:

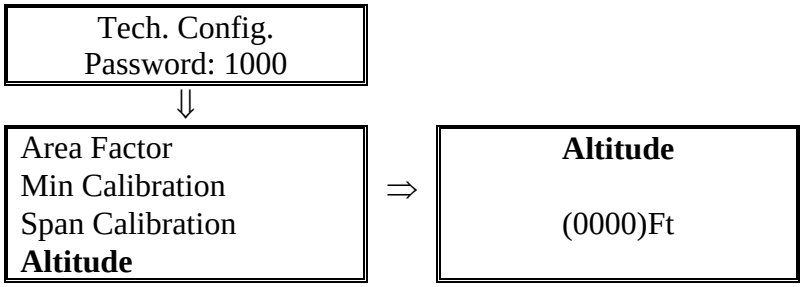


-Area Factor Example-



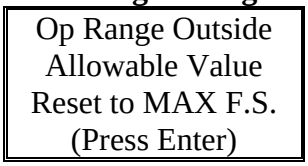
6.1.2. Altitude

The Altitude Menu allows the user to enter the specific altitude for the job for the density calculations; the job specific site Altitude has been preprogramed by the factory.

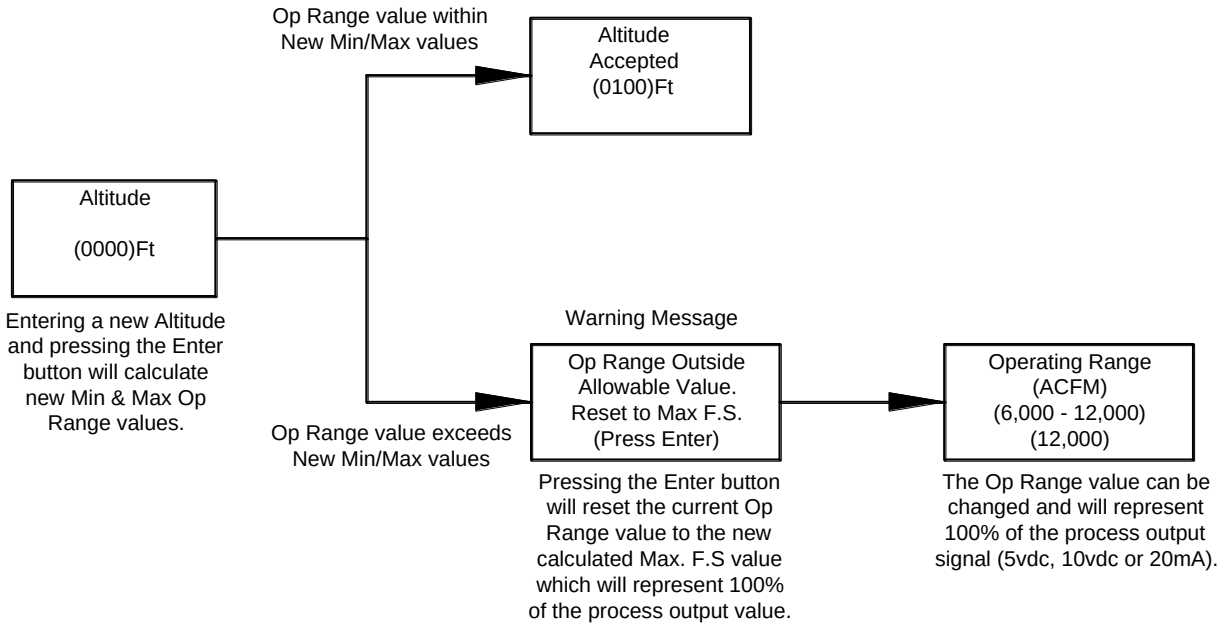


If the Altitude is changed from the factory setting and the new Altitude causes the existing Operating Range Value to be outside the new calculated Minimum or Maximum Full Scale Value, the below Warning Message will appear and the Operating Range will be reset to the new Maximum Full Scale Value by pressing Enter. The display will automatically jump to the Operating Range Menu allowing the user to enter a new Operating Range Value. This can be accomplished by performing the steps under Section 6.2.1. See Altitude Example below.

Warning Message:

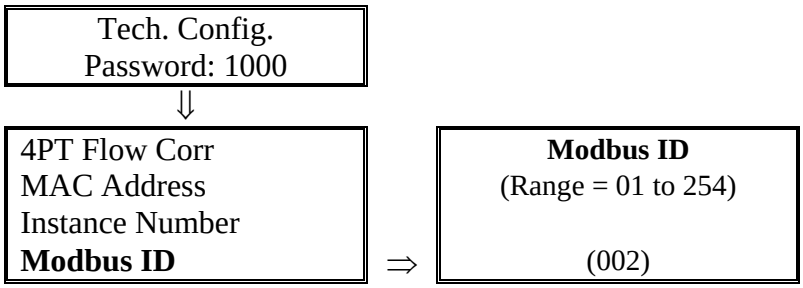


-Altitude Example-



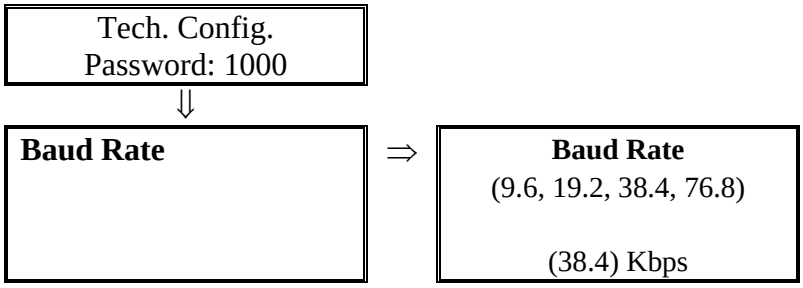
6.1.3. Modbus ID (Modbus Communication Option)

When the Modbus Communication option is ordered, the Modbus ID Menu allows the user to set a unique device address when connecting to a Modbus network. The default is 002. For communication with WattMaster Controls the Modbus ID has been set by the factory to 009 for outside airflow applications. For additional information refer to the AAON Outdoor Airflow Measurement System O&M.



6.1.4. Baud Rate (Modbus and BACnet Communication Options)

The Baud Rate Menu allows the user to set a unique network baud rate. Modbus communications supports 9.6, 19.2, 38.4, 57.6 and 115.2 Kbps baud rate. The current BACnet protocol supports 9.6, 19.2, 38.4 and 76.8 Kbps baud rate. The default is 38.4 Kbps. For communication with WattMaster Controls, the Baud Rate has been set by the factory to 9.6 Kbps. For additional information refer to the AAON Outdoor Airflow Measurement System O&M.



6.2. FIELD SETUP MENU

The Operating Range, Engineering Units, and Temperature Compensation can be checked or reconfigured under the Field Setup Menu. To set the parameters refer to the following procedure, below subsections, and the figure in Section 4.3 for Key functions.

Step 1. Enter the Field Setup Menu by depressing and holding the Enter Key for 5 seconds.

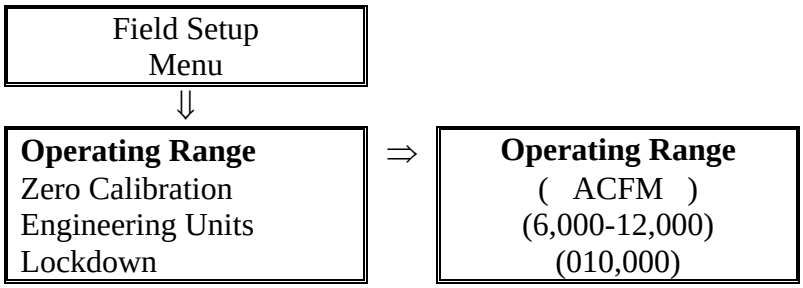
Step 2. Once in the Field Setup Menu use the Up/Down Keys to highlight the required parameter for configuration as shown in Sections 6.2.1 through 6.2.3. Press the Enter Key once to access the highlighted parameter Menu.

Step 3. Once in the parameter menu, the parameter can be changed using Up/Down/Left/Right Keys. After the parameter has been changed, press the Enter Key once. Then Press the ESC Key once to return to the Field Setup Menu.

Step 4. After all of the required parameters have been configured, exit the Field Setup Menu by pressing the ESC Key. The Process Display (see Section 4.2) will then be displayed.

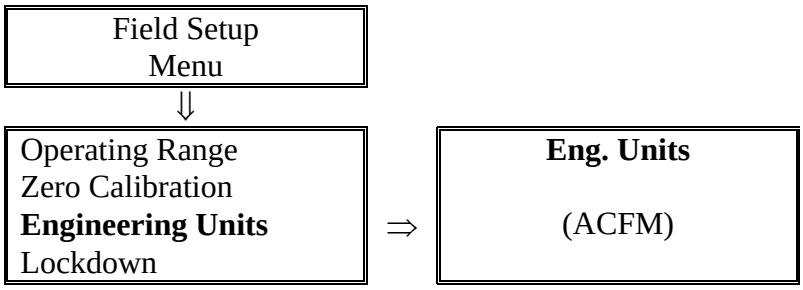
6.2.1. Operating Range

The Operating Range allows the user to enter a value which will represent 100% of the process output signal (5VDC, 10VDC, or 20mA). The Operating Range Value has been set by the factory to equal 110% of the design supply flow rate, unless this value is less than the Minimum Full Scale Value allowed for the AAON Airflow Signal Processor. The menu will display the Minimum Full Scale Value allowed which is then entered as the Operating Range.



6.2.2. 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. The default setting is ACFM.



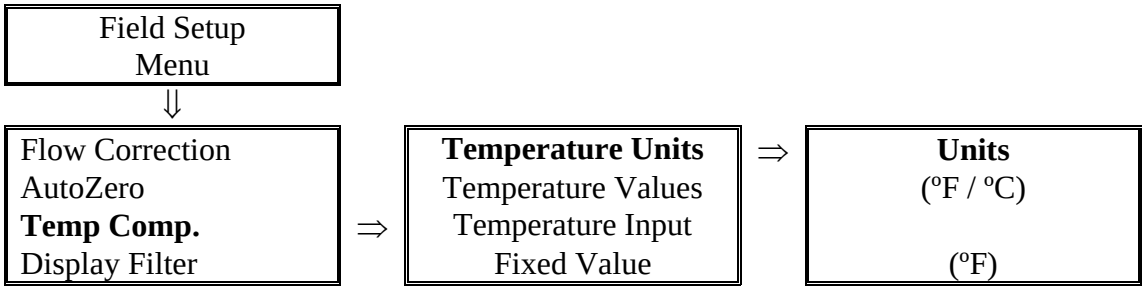
Standard Flow Units	Actual Flow Units	Standard Velocity Units	Actual Velocity Units	Pressure Units
SCFM	ACFM	SFPM	AFPM	Inch w.c.
SCFH	L/S	Sm/s	Am/s	Pa
SL/S	Am^3/S	%	%	KPa
Sm^3/S	Am^3/M			mm w.c.
Sm^3/M	Am^3/HR			%
Sm^3/HR	%			
%				

6.2.3. Temperature Compensation

Temperature Compensation corrects the flow signal for density changes caused by variations in the air temperature. An input signal from the AAON Temperature Transmitter is required; see Figure 1 in Section 3 for proper temperature transmitter connection and Section 6.3.2 for temperature input signal configuration.

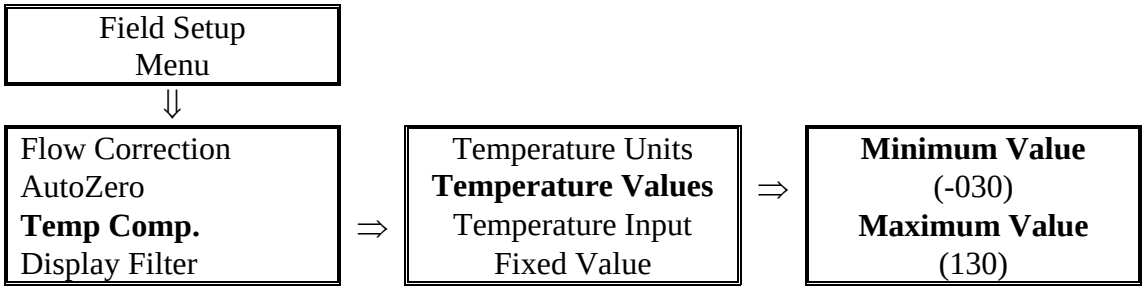
6.2.3.1. Temperature Units

The Temperature Units Menu allows the user to select the appropriate temperature units for the job. The default setting is ºF.



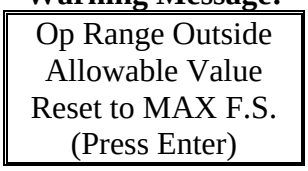
6.2.3.2. Temperature Values

The Temperature Values Menu allows the factory or user to set the minimum and maximum temperature range values that represent the input signal from the external temperature transmitter or the building automation system. Since the AAON Temperature Transmitter has been supplied the minimum and maximum temperature range values of -30°F to 130°F have been preprogramed.

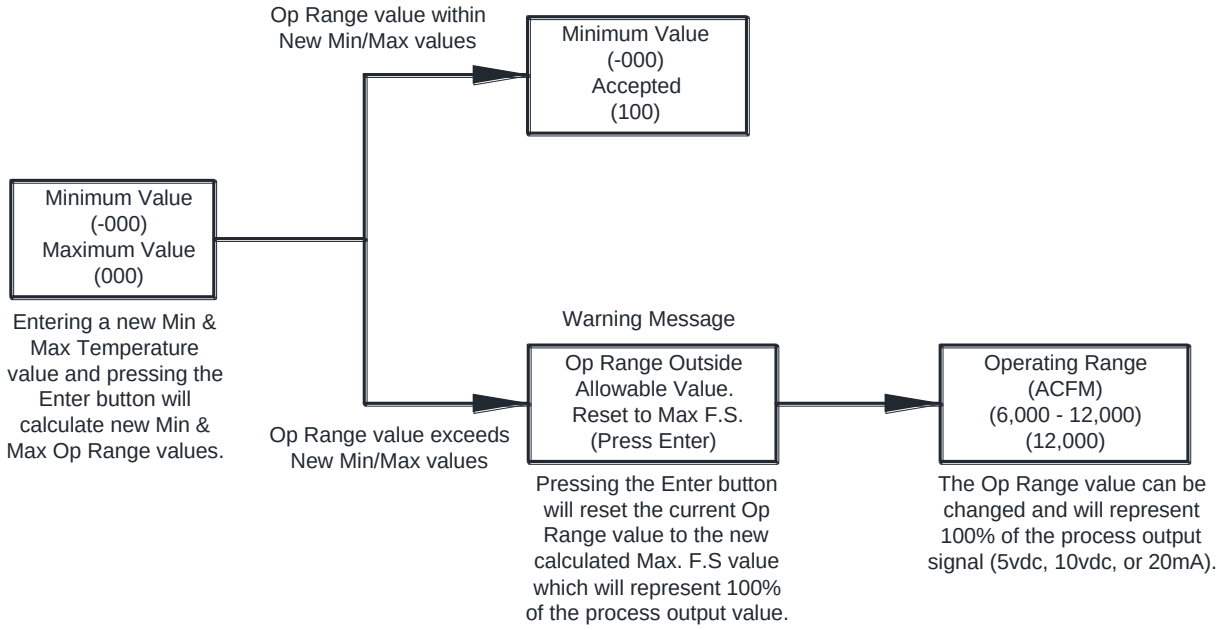


If the temperature values are changed from the factory settings and the new temperature values cause the existing Operating Range Value to be outside the new calculated Minimum or Maximum Full Scale Value, the below Warning Message will appear and the Operating Range will be reset to the new Maximum Full Scale Value by pressing Enter. The display will automatically jump to the Operating Range Menu allowing the user to enter a new Operating Range Value. This can be accomplished by performing the steps under Section 6.2.1. See Temperature Range Example below.

Warning Message:

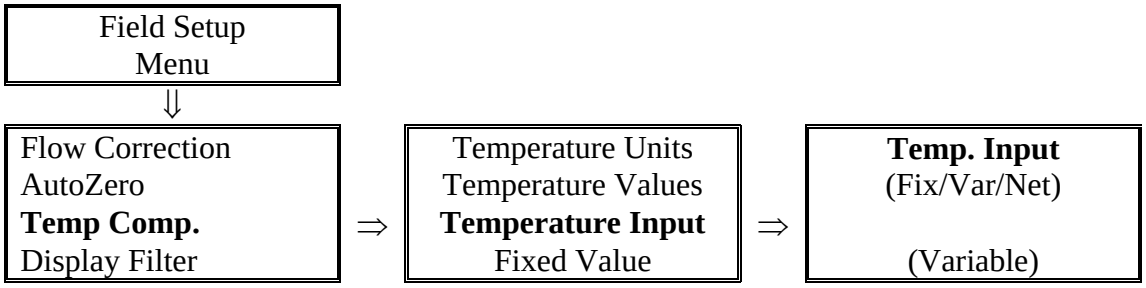


-Temperature Range Example-



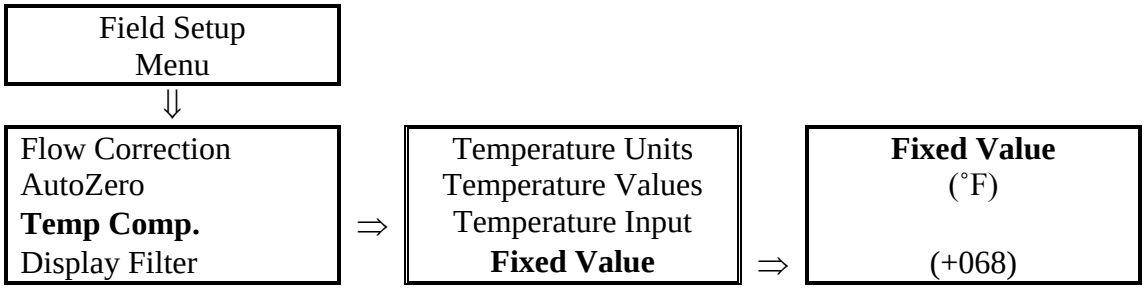
6.2.3.3. Temperature Input

The Temperature Input Menu allows the user to select between three temperature input options (Fixed, Variable, and Network) for the flow calculations. Since the AAON Temperature Transmitter has been supplied, Variable has been selected. If Fixed is selected, the default temperature value entered in the Fixed Value Menu (see Section 6.1.2.4) is used. If Net is selected, the temperature input signal is obtained through network communications. The Net option is only available if one of the communication options is ordered. The temperature value is only displayed on the LCD screen, if the Temperature Input is set to Variable or Network.



6.2.3.4. Fixed Value

The Fixed Value Menu allows the user to enter a temperature value for the flow calculations. This value will not be displayed on the LCD screen.



6.3. INPUT/OUTPUT SET-UP

If input or output configuration changes are required refer to the tables in the sections below and the Figure 1 in Section 3.

6.3.1. Process Output

If controls are provided, the process output has been set by the factory for input to the specific controller; otherwise the default is 0-10VDC. 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

6.3.2. Temperature Input

Since the AAON Temperature Transmitter has been provided, the temperature input has been set by the factory for 4-20mA. To change the input configuration, set the S1 switch as follows:

Temperature Input	S1 Switch Selection
4-20mA	mA
0-10VDC	V

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AAON Airflow Signal Processor
Field Startup Guide
V35000 · Rev. A · 160929

Factory Technical Support: 918-382-6400

Note: Before calling Technical Support, please have the model and serial number of the unit available.

Parts: For replacement parts please contact your local AAON Representative.

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