VELTRON III

Pressure & Flow Transmitter
Installation and Operation Manual

Air Monitor
Precision Airflow Measurement
An ONICON Brand

SAFETY INFORMATION

The VELTRON III Pressure and Flow Transmitter was calibrated at the factory before shipment. To ensure correct use of the system, please read this manual thoroughly.

Regarding this Manual:

- This manual should be passed on to the end user.
- Before use, read this manual thoroughly to comprehend its contents.
- The contents of this manual may be changed without prior notice.
- All rights reserved. No part of this manual may be reproduced in any form without Air Monitor's written permission.
- Air Monitor makes no warranty of any kind with regard to this material, including, but not limited to, implied warranties of merchantability and suitability for a particular purpose.
- All reasonable effort has been made to ensure the accuracy of the contents of this manual. However, if any errors are found, please inform Air Monitor.
- Air Monitor assumes no responsibilities for this product except as stated in the warranty.
- If the customer or any third party is harmed by the use of this product, Air Monitor assumes no responsibility for any such harm owing to any defects in the product which were not predictable, or for any indirect damages.

SAFETY PRECAUTIONS:

The following general safety precautions must be observed during all phases of installation, operation, service, and repair of this product. Failure to comply with these precautions or with specific WARNINGS given elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Air Monitor assumes no liability for the customer's failure to comply with these requirements. If this product is used in a manner not specified in this manual, the protection provided by this product may be impaired.

The following messages are used in this manual:

WARNING
Messages identified as "Warning" contain information regarding the personal safety of individuals involved in the installation, operation or service of this product.

CAUTION
Messages identified as "Caution" contain information regarding potential damage to the product or other ancillary products.

IMPORTANT NOTE
Messages identified as "Important Note" contain information critical to the proper operation of the

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SECTION 1.0 GENERAL INFORMATION

Thank you for purchasing the VELTRON III Pressure and Flow Transmitter. As our valued customer, Air Monitor's commitment to you is to provide quality service and support while continuing to offer you accurate, reliable products to meet your flow measurement needs.

1.1 PURPOSE OF THIS MANUAL

This manual provides information regarding the installation, operation and maintenance of your differential pressure and flow transmitter. This is not an electrical or HVAC trade manual. This manual is the basic reference tool for the VELTRON III transmitter, including its main power connection and associated signal inputs and outputs. The complete system consists of the transmitter and associated airflow and temperature sensors. Please refer to supplemental documents for additional information.

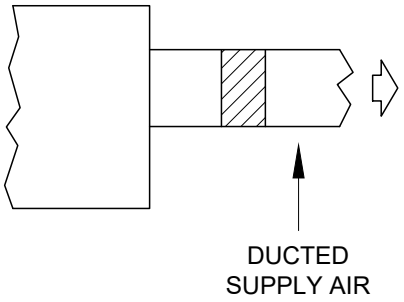
1.2 TYPICAL AIRFLOW MEASUREMENT SYSTEM INSTALLATIONS

Air Monitor's VELTRON III Pressure and Flow Transmitter accurately measures the differential pressure created by airflow entering and moving through an air flow probe.

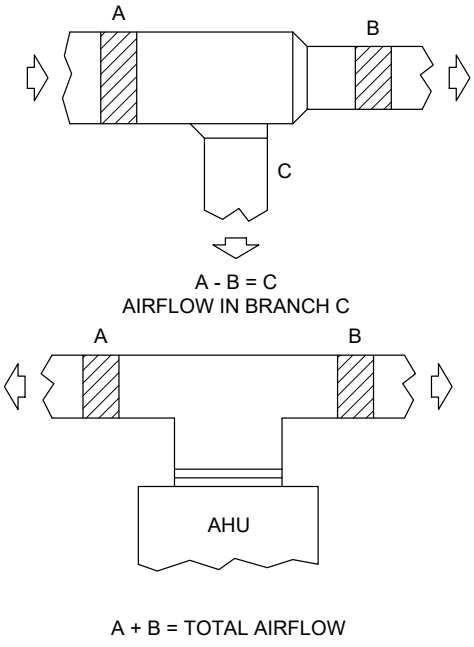
Temperature is also measured via a separate sensor. The measured pressure drop and temperature are converted to actual air flow readings utilizing proprietary algorithms that provide density compensation and signal conditioning.

The VELTRON III can be used with most single, dual, and split inlets found on air handlers and built-up systems. Depicted on the next page are the most commonly encountered inlet configurations. With larger installations multiple sensors would be connected in parallel using manifolds.

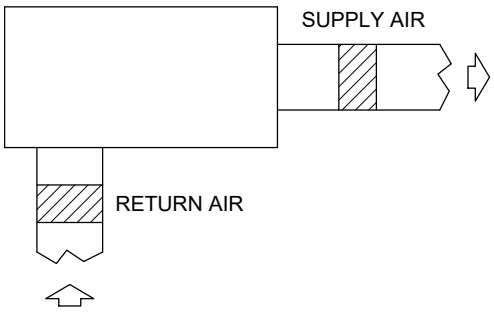
1.2 TYPICAL AIRFLOW MEASUREMENT SYSTEM INSTALLATIONS (CONTINUED)



Single Airflow Measurement System
The single channel configuration is used for one installation location in a variety of duct configurations, primarily used for supply or return airflow. Differential pressure measurement probes are paired with the VELTRON III transmitter to provide a complete airflow measurement system for each application installation.



Dual Channel – Split Duct Airflow Measurement
The split duct configuration can measure two separate ducts from the same airstream. The measurements can be summed, or the difference can be calculated. This configuration is useful where installation requirements are not ideal in the main duct or the combination of the two take-offs provide better quality data to the BAS/BMS.



Dual Channel – Dual System Airflow Measurement
The dual system configuration can measure two separate flow rates from individual airstreams. This configuration is an economical solution to minimize the number of transmitters needed. Each system will dynamically adjust the airflow density independently.

1.3 STANDARD FEATURES AND SPECIFICATIONS*

VELTRON III TRANSMITTER		
PERFORMANCE	PRESSURE ACCURACY	± 0.4% of reading from 0.10 to 5.0 In W.C. ± 0.75% of reading from 5.0 to 10.0 In W.C.
	SYSTEM ACCURACY	± 3% of reading when combined with Air Monitor Probes.
	TEMPERATURE ACCURACY	± 0.1°F at 32°F
	THERMAL OFFSET EFFECTS	± 0.2% of reading from (40-130°F)
	RESPONSE TIME	5 ms
OPERATING CONDITIONS	AMBIENT TEMPERATURE	-20°F to 180°F (storage) 0°F to 120°F without heater -40°F to 120°F with heater
	PROCESS AIR TEMPERATURE	-40°F to 120°F
	HUMIDITY	0 to 99% RH, non-condensing
INPUT POWER	24 VAC	15 VA @ 24 VAC; 40 VA with heater
	24 VDC	10 W @ 24 VDC; 35 W with heater
TRANSDUCER DESIGN	AVAILABLE OPTIONS	• Single channel, one (1) transducer pair • Dual channel, two (2) transducer pairs
I/O SIGNALS	ANALOG OUTPUTS	Four (4) analog outputs, selectable based on configuration
	SERIAL COMMUNICATION	RS485, BACnet® MS/TP or MODBUS® RTU
	TEMPERATURE INPUT(S)	One or two 100Ω 3-wire RTDs can be configured
	BAROMETRIC PRESSURE INPUT	Built-in barometric (Atmospheric) pressure sensor for automatic elevation compensation
ELECTRONICS ENCLOSURE	AVAILABLE OPTIONS	• Aluminum, NEMA 1 • Poly, NEMA 4X with window • Poly, NEMA 4X, no window • Poly, NEMA 4X, no window with heater
	DISPLAY	3.5” diagonal color graphical FTF LCD
PROGRAMMING	VIA KEYPAD	Menu driven user interface via four (4) push buttons
ELECTRICAL CONNECTIONS	POWER	Removable terminal block for use with 16 to 24 gauge wire
	COMMUNICATIONS	Removable terminal block for use with 16 to 24 gauge wire
	I/O	Removable terminal block for use with 16 to 24 gauge wire
PROCESS CONNECTIONS	AVAILABLE OPTIONS	• 1/4” compression, both High and Low signal connections • 3/16” hose barb, both High and Low signal connections

***** SPECIFICATIONS subject to change without notice.

1.4 MODEL NUMBERING CODIFICATION

VELTRON III-ABCD-EFGH

A = Model Configurations
- 2 = Single Channel, Single System
- 6 = Dual Channel, Split System
- 8 = Dual Channel, Dual (Separate) Systems

B = Enclosure
- 1 = NEMA 1 Aluminum Enclosure
- 2 = NEMA 4X Poly Enclosure with window
- 3 = NEMA 4X Poly Enclosure, no window
- 4 = NEMA 4X Poly Enclosure, no window with heater

C = Feature Set (Based on model configuration)
- 1 = 24 VAC/DC Power, Four (4) Analog Outputs, RS485 Serial Communication
- 2 = 24 VAC/DC Power, Four (4) Analog Outputs, RS485 Serial Communication and One (1) 100Ω 3 Wire RTD
- 3 = 24 VAC/DC Power, Four (4) Analog Outputs, RS485 Serial Communication and Two (2) 100Ω 3 Wire RTD

D = Process Connection
- 2 = 1/4" Compression Fittings
- 3 = 3/16" Hose Barb Fittings

E = Channel One Transducers
- A = Uni-Directional Transducer
- B = Bi-Directional Transducer (Measures Negative Pressure for static pressure measurement devices) - ***Coming Soon***

F = Channel One Pressure Range
- 1 = Maximum Operating Pressure low/high pair: 0.1" & 1" w.c.
- 2 = Maximum Operating Pressure low/high pair: 0.1" & 2" w.c.
- 3 = Maximum Operating Pressure low/high pair: 0.4" & 5" w.c.
- 4 = Maximum Operating Pressure low/high pair: 1" & 10" w.c.
- 5 = Maximum Operating Pressure low/high pair: 2" & 20" w.c. - ***Coming Soon***

G = Channel Two Transducers (requires A = 6 or 8)
- 0 = None (Requires A=2)
- A = Uni-Directional Transducer
- B = Bi-Directional Transducer (Measures Negative Pressure for static pressure measurement devices) - ***Coming Soon***

H = Channel Two Pressure Range (requires A = 6 or 8)
- 0 = None (Requires A=2)
- 1 = Maximum Operating Pressure low/high pair: 0.1" & 1" w.c.
- 2 = Maximum Operating Pressure low/high pair: 0.1" & 2" w.c.
- 3 = Maximum Operating Pressure low/high pair: 0.4" & 5" w.c.
- 4 = Maximum Operating Pressure low/high pair: 1" & 10" w.c.
- 5 = Maximum Operating Pressure low/high pair: 2" & 20" w.c. - ***Coming Soon***

1.5 CHECKING THAT YOU RECEIVED EVERYTHING

Carefully open the VELTRON III shipping container(s) and remove all equipment. Inspect equipment for any damage. If damaged, contact Air Monitor and your freight company. Verify that the following items have been shipped:

- (1) VELTRON III Transmitter
- (1) VELTRON III Installation and Operation Manual
- (1) Factory Set-Up Information Sheet
- (1) VELTRON III Quick Start Guide

Additional items included with the shipment may contain the following:

- One temperature probe with mounting hardware for use with a single channel or dual channel, split system.
- A second temperature probe with mounting hardware for use with a dual channel system.

1.6 WORKING ENVIRONMENT

VELTRON III NEMA 1 transmitter enclosures are designed for use in indoor installations that are free of condensing moisture. NEMA 4X enclosures with display windows are designed for use in wet indoor installations. Do not expose these transmitters to direct sunlight, temperature extremes or excessive vibration. The operating ambient air temperature range for both enclosures is 0°F to 120°F.

VELTRON III NEMA 4X transmitter enclosures without windows are designed for indoor or outdoor use. Do not expose these transmitters to excessive vibration. Whenever possible, avoid exposure to direct sunlight. The operating ambient air temperature range is 0°F to 120°F. When provided with a heater, the operating ambient temperature range is -40°F to 120°F.

1.7 SERIAL NUMBER

The serial number of your VELTRON III transmitter is located outside of the enclosure. The serial number is a unique identifier for your product. Please have it available when contacting Air Monitor for assistance regarding your product.

SECTION 2.0 INSTALLATION

The VELTRON III pressure & flow transmitter should be installed by experienced HVAC technicians and others with related knowledge and experience with airflow systems. Air Monitor support personnel are available to assist with technical recommendations and to provide guidance by telephone and/or e-mail. On-site field engineering, installation, and service are also available at an additional cost. The installer should use good trade practices and must adhere to all state and local building codes.

Each VELTRON III is individually calibrated, configured and programmed using customer specific application data. Configuration and programming parameters are recorded on the factory set-up information sheet provided with the unit. Review this information and verify that the VELTRON III set-up is correct for your application. If any problems or discrepancies are detected, contact Air Monitor's Customer Service Department at 727-447-6140 prior to proceeding.

2.1 TRANSMITTER

2.1.1 Site Selection

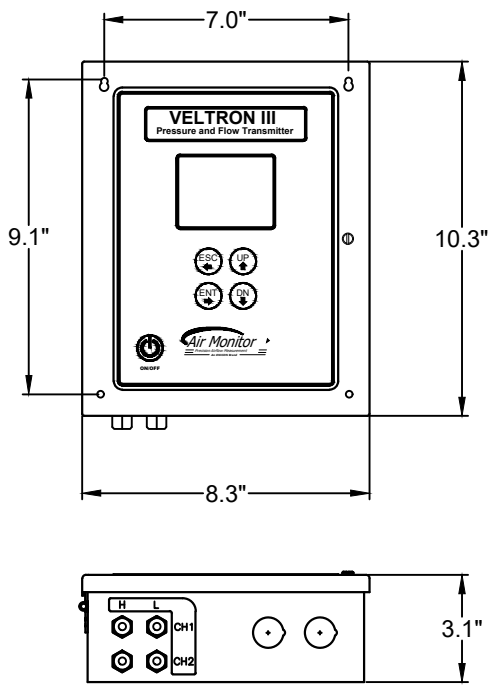
Careful attention to the site selection for the system components will help the installers with the initial installation, reduce start-up problems, and make future maintenance easier. For example, do not install the VELTRON III transmitter where it will be difficult for personnel to perform periodic maintenance. When selecting a site for mounting the system components, consider the criteria under Section 1.6 WORKING ENVIRONMENT, as well as the following:

- Find an easily accessible mounting location near the air handler to minimize sensor tubing lengths.
- Mount the enclosure slightly higher than the airflow sensors to reduce the risk of any condensation migrating into the enclosure. If this cannot be done, provisions for drip legs should be installed at the lowest point in the sensing lines.
- Use the table below to determine the appropriate sensor tubing diameter based on the distance from the enclosure to the airflow sensors. Contact Air Monitor for assistance if longer tubing lengths are required.

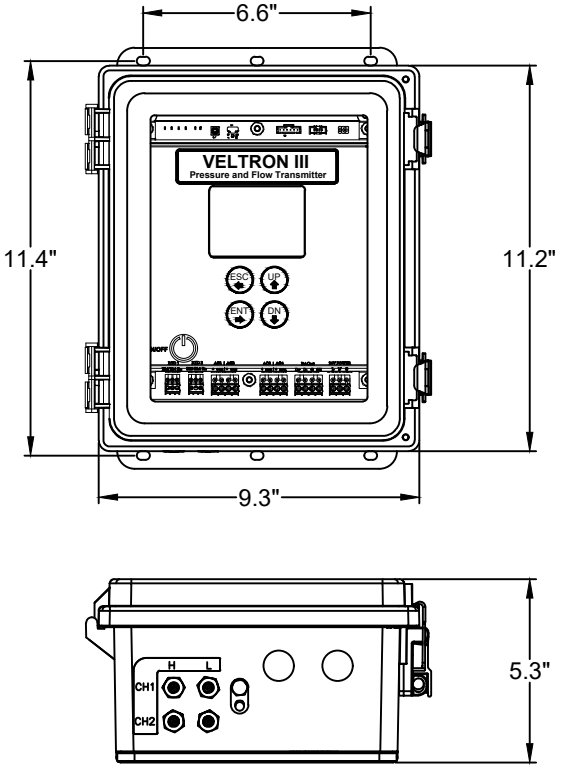
Nominal/Min Tubing Internal Diameter (in)	Tube Length Total (ft)	DP Sensor Max Distance from Transmitter (ft)
⅛ (0.125)	30	15
3⁄16 (0.1875)	200	100
¼ (0.25)	500	250
⅜ (0.375)	1000	500

2.1.2 Transmitter Dimensions

NEMA 1 ENCLOSURE



NEMA 4X ENCLOSURE



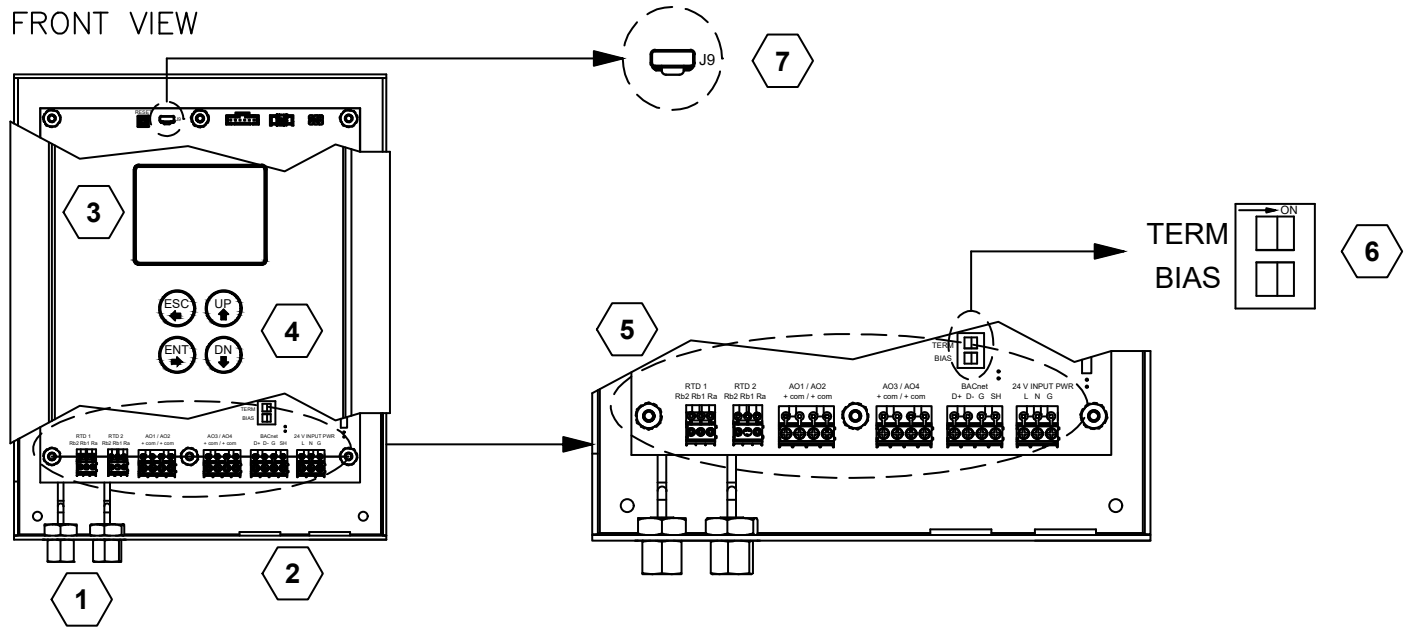
2.1.3 Transmitter Installation

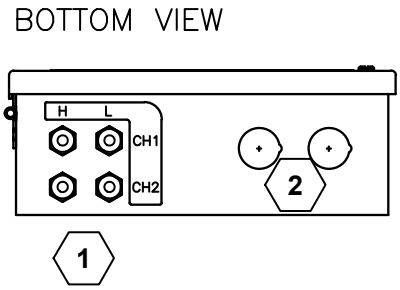
Find an easily accessible location where electrical connections can be made and display readings can be taken from the floor level. The mounting surface must be structurally sound and capable of withstanding a minimum weight of 10lbs (4.5kg). Use the following screws for mounting.

For NEMA 1 Enclosure:
- (4) Machine screws - #8-32 x 1.5″
- (4) Wood screws - #8 x 1.5″
- (4) Concrete screws - 3⁄16″ x 1.5″

For NEMA 4X Enclosure:
- (4) Machine screws - HHMS .25-20 x 1.5″
- (4) Wood screws - FHLS .25 x 1.5″
- (4) Concrete screws - HHCS .25 x 1.5″

2.1.4 Transmitter Wiring Connections





1. ⅛" FNPT connection, two (2) fittings per channel
2. Two (2) ½" conduit connection knockouts
3. Graphical LCD for user set-up, commissioning and real time data display
4. User programming and display keys
5. I/O, RTD and power input terminal block location. See page 13-16 for additional information
6. Termination resistor/bias switch location
7. Micro USB connection location

CAUTION

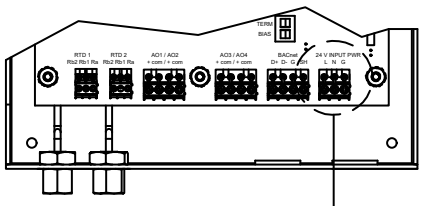
The electrical supply should be relatively clean, free of high frequency noise, large voltage transients, and protected from power surges and brown outs. Avoid installation locations that are in close proximity to strong sources of electrical interference.

2.1.4 Transmitter Wiring Connections (Continued)

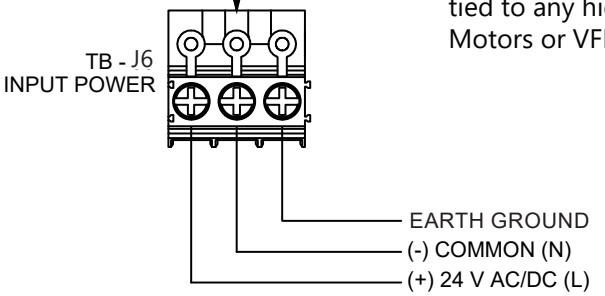
A. Power/Signal Connections

Input Power Requirements:

- 24 VAC, 15VA @ 24 VAC, 40 VA with heater
- 24 VDC, 10W @ 24 VDC, 35W with heater

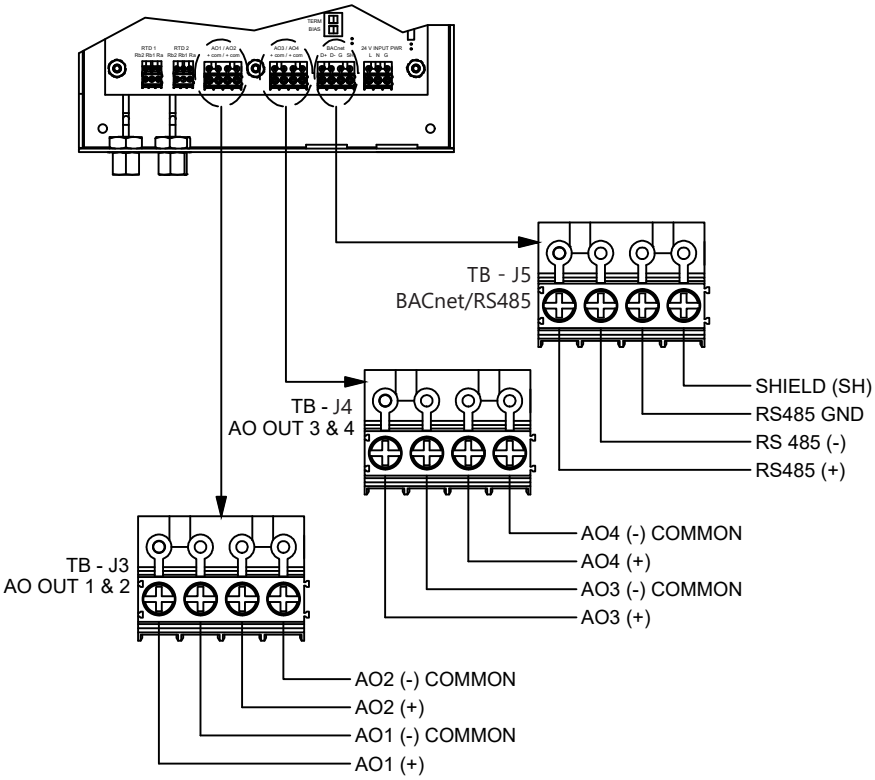


Preferably Dedicated Earth Ground for instrumentation isolated from grounds tied to any high Voltage AC devices, Motors or VFDs is to be used.



B. Analog Output & Serial Communication

Four (4) analog outputs (4-20 mA, 0-5 VDC, or 0-10 VDC) are available based on configuration. Refer to section 5.3 ANALOG OUTPUT CONFIGURATION for more information.



2.2 AIRFLOW SENSOR

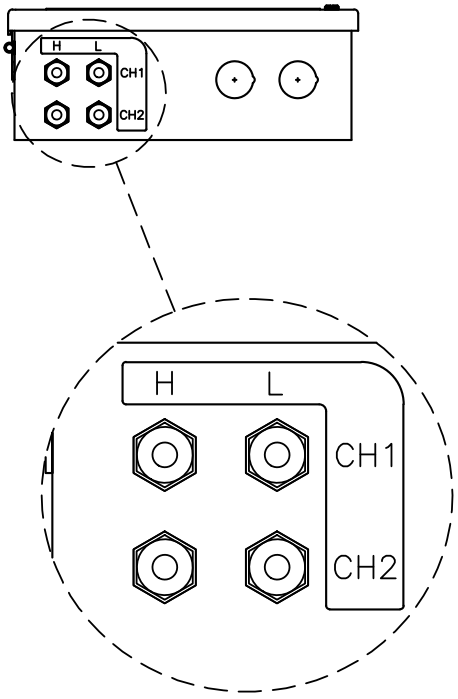
2.2.1 Airflow Sensor Process Connections

Air Monitor recommends that signal tubing between the transmitter enclosure and all sensors be stainless steel or copper of the appropriate size. Use tees or manifolds to combine multiple sensors into single high and low pressure lines running to the transmitter's channel fittings for each channel.

UV resistant, flexible, plastic tubing specifically designed for outdoor use, such as Tygon R-3400 or equivalent, may also be used. Use brass inserts with the plastic tubing as required to ensure a leak free connection.

Refer to section 2.1.1 Site Selection to determine the proper tubing dimension required based on the distance between the transmitter and airflow sensor(s).

CAUTION
Flexible plastic signal tubing used in outdoor applications must be resistant to weathering and the effects of UV exposure. When installing or removing signal tubing from either the enclosure or the sensors, a wrench should be used on the bulkhead nut to prevent it from turning.



H- High Pressure port connects to the high pressure side of a DP sensor
L- Low Pressure port connects to the low pressure side of a DP sensor
AMC Probes will be labeled TP=High Pressure, and SP=Low Pressure

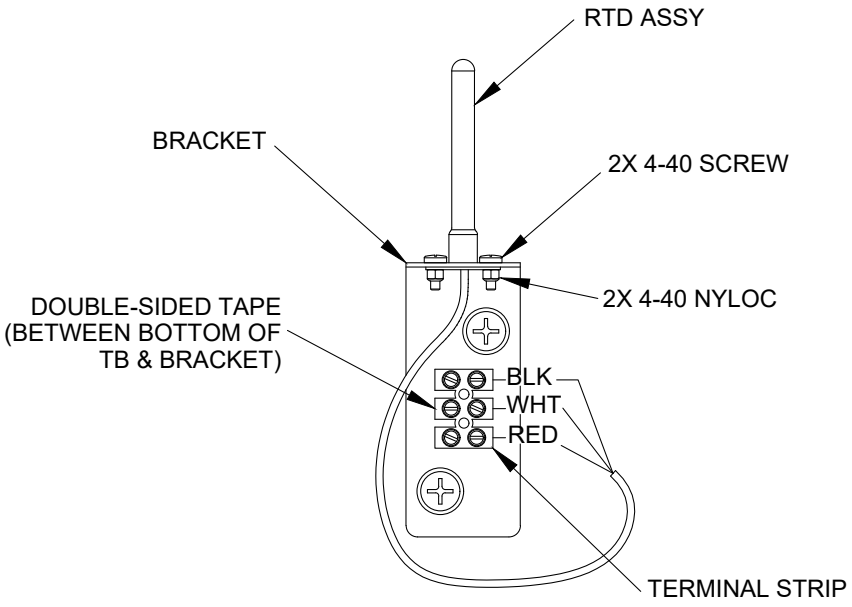
2.3 TEMPERATURE SENSORS

Temperature sensors RTD(s) provide ambient air temperature for density correction calculations. When the VELTRON III is provided with a NEMA 1 enclosure, the sensor may be installed in the airflow stream or outside the inlet in a shaded area.

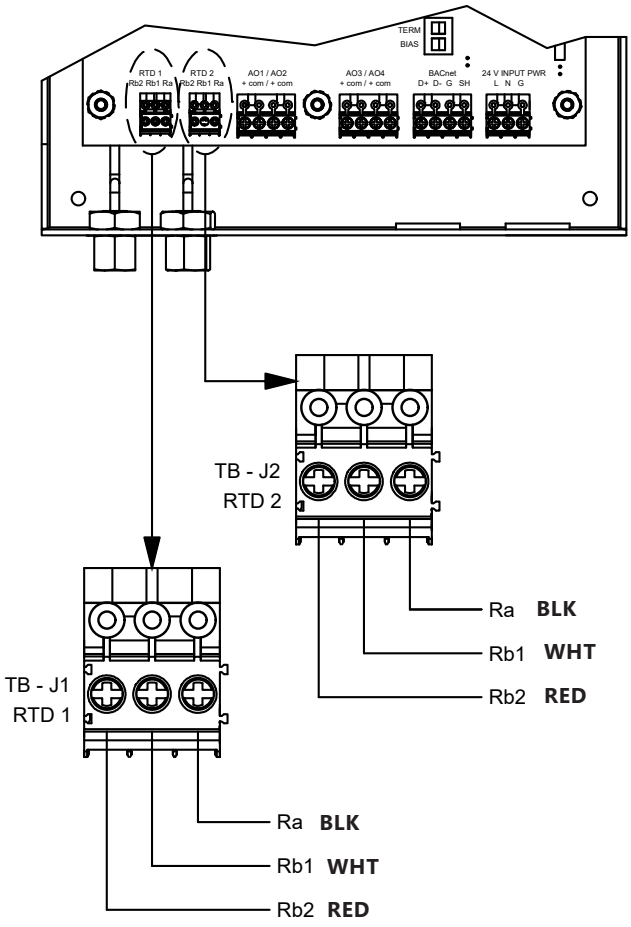
Singe channel or Dual Channel, Split system can use up to 1 RTD. Dual Channel, Dual System uses 2 RTDS, one per each channel.

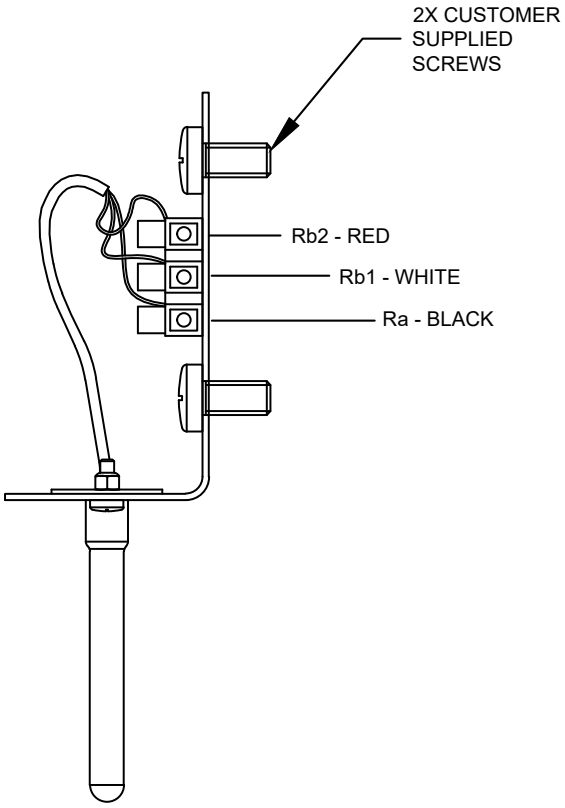
2.3.1 Temperature Sensors Installation

- Remove the RTD from the transmitter enclosure (taped in bag at bottom).
- Select a convenient mounting location(s) near the inlet or inside the air handler/duct to mount the RTD(s).
- Use the supplied sheet metal screws to mount the RTD(s).



2.3.2 Temperature Sensor (RTD) Input Connections





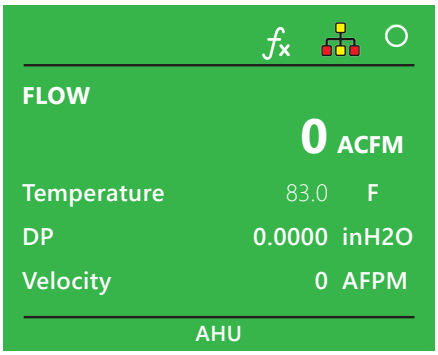
IMPORTANT NOTE
Never mount temperature sensors in direct sunlight.

SECTION 3.0 OPERATION

3.1 START-UP

Press the power button located in the lower left corner of the cover. You will see the current version of the software and the company logo displayed at power-up.

Flow data will be displayed after a brief pause. Information shown on this screen (flow, temperature, velocity, etc.) will vary based on the VELTRON III operating configuration. In addition, system status data is provided at the top of the display window and the user defined locations tag is displayed at the bottom.



Example of The Main Display for Single System

For Single Channel, Single System:

Line 1 is for Flow
Line 2 can display Velocity/Temperature/DP/Atm Pressure/Velocity Std./None
Line 3 can display Velocity/Temperature/DP/Atm Pressure/Velocity Std./None
Line 4 can display Velocity/Temperature/DP/Atm Pressure/Velocity Std/None

For Dual Channel, Split System:

Line 1 can display Flow(Ch1+Ch2)/Flow Ch1/Ch1 Vel Std
Line 2 can display Flow Ch1/Velocity Ch1/DP Ch1/Ch1 Vel Std/Atm Pressure/ Temperature/None
Line 3 can display Flow 2/ Ch2 Vel Std/Flow Subt (Ch1-Ch2)/None
Line 4 can display Flow Ch2/Velocity Ch2/DP Ch2/ Ch2 Vel Std/Atm Pressure/ Temperature/None

For Dual Channel, Dual System:
Line 1 can display Sys1 Flow/Flow Add (Sys1 + Sys2)/ Velocity Std
Line 2 can display Velocity/Temperature/DP/Atm Pressure/Velocity Std/None
Line 3 can display Sys2 Flow/Flow Subt (Sys1 - Sys2)/ Velocity Std
Line 4 can display Velocity/Temperature/DP/Atm Pressure/Velocity Std/None

3.2 CONFIGURATION

The user interface consists of 4 push-buttons used for programming the transmitter. The displayed information is dependent on the factory configuration of the VELTRON III. The transmitter configurations are:

Single Channel, Single System – Two transducers in series (stacked) to extend the range

Dual Channel, Split System - Two pairs of transducers in parallel to allow the addition or subtraction of flow rates from two branches of same airstream and output the net result.

Dual Channel, Dual System – Two pairs of transducers are physically in the same transmitter but monitor separate ducts and work autonomously from each other

Push-button Definitions:

Button	In an Editable Field	In a Selectable Field
ENT	Press once to select next character Press twice to enter the value and go to the next field	To select the value and go to the next field
ESC	Press once to delete the character to the left	Exits the menu, discards change
UP	Selects the next character (Note: Some fields support alpha or numeric or both)	Selects the next item in the list (Note: Once at the top of the list, this button has no effect)
DN	Selects the next character (Note: Some fields support alpha or numeric or both)	Selects the next item in the list (Note: Once at the bottom of the list, this button has no effect)

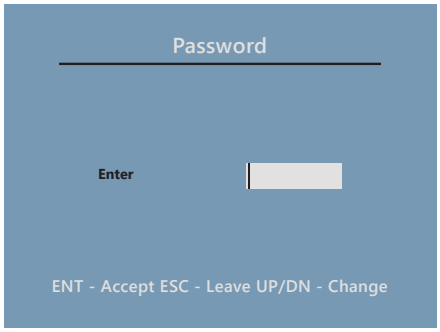
3.3 STATUS BAR

An upper status bar is always displayed indicating the general operational status of the transmitter. Messages will be displayed on the left side of the bar and icons will be displayed on the right.

Message	Description
Max Flow exceeded	Flow rate exceeds the design max flow setting
Full Scale OOR	The full scale flow range is Out Of Range
RTD OOR	The RTD temperature is Out Of Range

Icon	Description
	BACnet or MODBUS is enabled
	Field Characterization enabled (red when there is an error)
	Field Characterization enabled for both channels
	Run mode is active
	Humidity Correction active or inactive

3.4 ENTERING THE PROGRAMMING MENUS

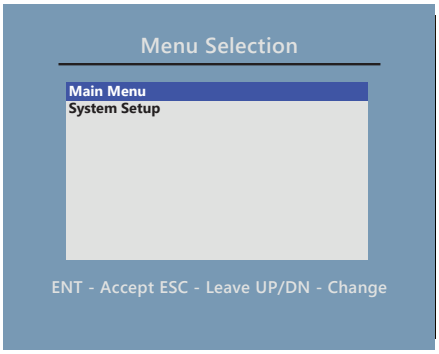


Press ENT at any time to access the programming menus. If the password has been set previously, the following screens will be displayed.

Password Menu

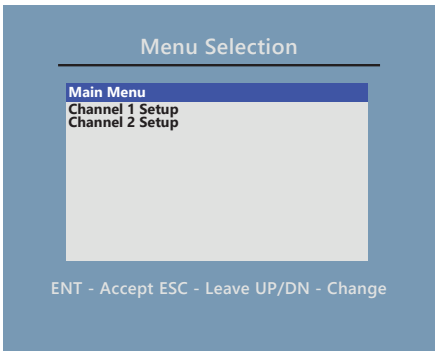
Enter the password and you will be brought to the menus selection screen. Information regarding the password settings can be found in section 4.4 SET PASSWORD.

Single



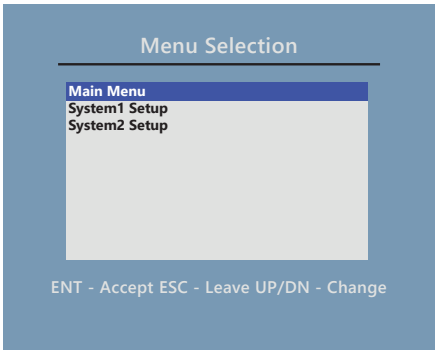
This screen provides menu selection for Single Channel, Single System Configuration.

Split



This screen provides menu selection for Dual Channel, Split System Configuration.

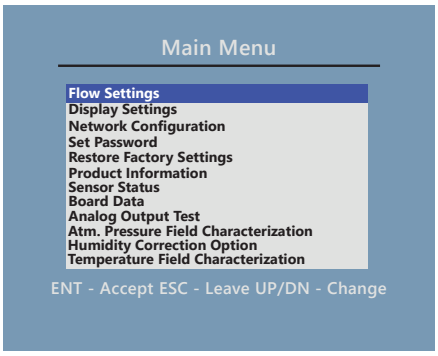
Dual



This screen provides menu selection for Dual Channel, Dual System Configuration.

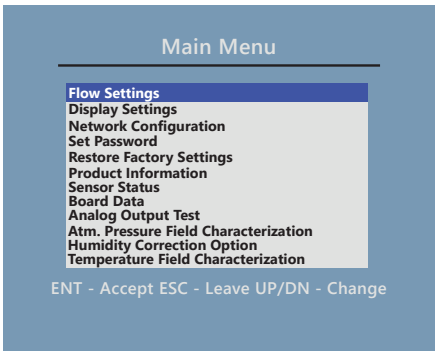
SECTION 4.0 MAIN MENU

Single



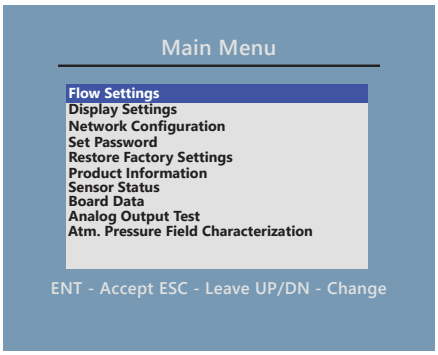
Main menu functions are used to configure transmitter settings common to Single Channel, Single System Configuration.

Split



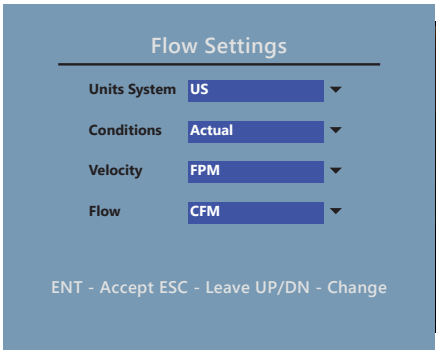
Main menu functions are used to configure transmitter settings common to Dual Channel, Split System Configuration.

Dual



Main menu functions are used to configure transmitter settings common to Dual Channel, Dual System Configuration.

4.1 FLOW SETTINGS

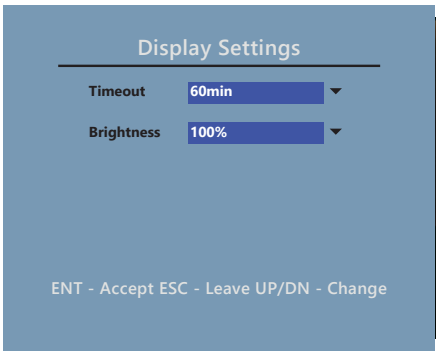


Flow settings will set the engineering units for the whole system. You cannot individually change units on other menu pages; for example, if you set the units to be in US and the velocity to be in FPM, the lockdown (low flow cut-off) settings will be in FPM.

Actual Conditions –
The transmitter calculates airflow volume based on the current temperature and atmospheric pressure.

Standard Conditions –
The transmitter calculates airflow volume based on 68°F and 29.29″ Hg.

4.2 DISPLAY SETTINGS

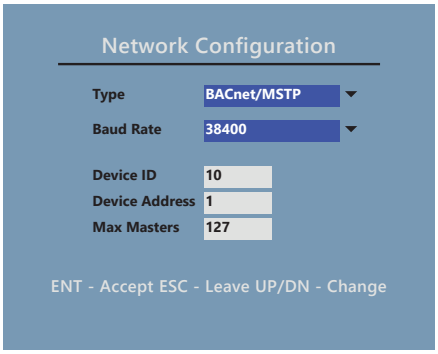


This menu provides adjustment for the display.

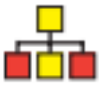
Time Out -
This refers to the time the menu system stays active. If the user leaves the system on a menu screen, it will eventually time out and return to the main display.

Brightness -
This is a real-time control of the LCD backlight. Selecting a value will immediately cause a change to the brightness.

4.3 NETWORK CONFIGURATION



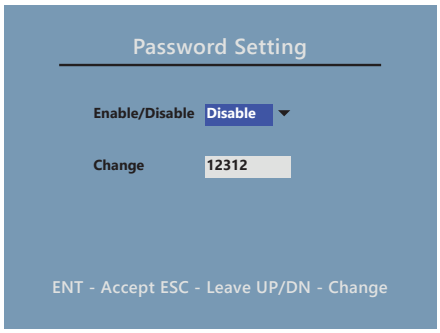
This menu allows the user to set up the serial communications network. It can be used to configure the device for BACnet MS/TP or MODBUS RTU networks. When the network is enabled, the user will see the following icon next to the "System Run" indicator



Network Type - BACnet Settings
Baud Rate - Available in 9600/19200/38400/56700/76800/115200
Device ID (Instance Number) - Enter a value between 0 – 4,194,303
Device Address - Enter an address between 0 – 127
Max Masters - Enter a number between 0 – 127

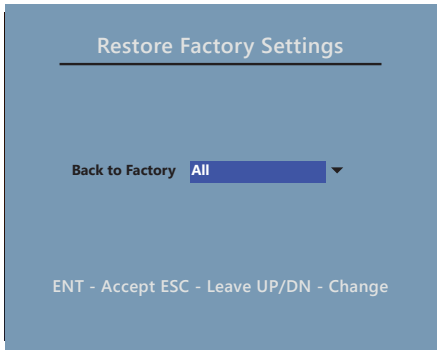
Network Type – MODBUS Settings
Baud Rate - Available in 9600/19200/38400/56700/76800/115200
Device Address - Enter an address between 1 – 254
Parity - Select from EVEN, ODD or NONE

4.4 SET PASSWORD



To change the password, enter your new password into the editable field. This overwrites the old password. The password can be up to 8 digits. Alpha and numeric characters are supported. The drop down will allow the user to disable the password if so desired.

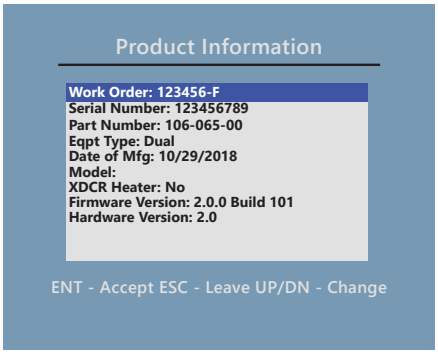
4.5 RESTORE FACTORY SETTINGS



This menu allows the user to return the system back to the factory settings.

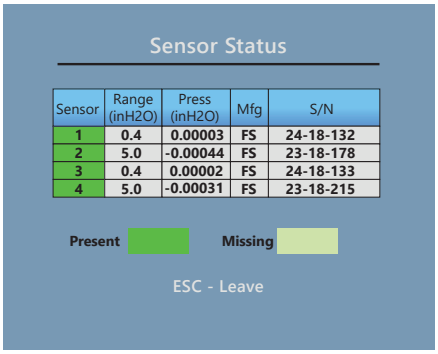
Options for restoring settings include:
- All
- Other duct coefficients
- Display
- Analog outputs
- Flow settings
- Flow configuration

4.6 PRODUCT INFORMATION



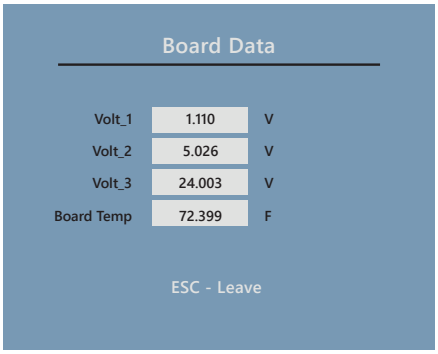
This screen provides detailed information about the transmitter hardware.

4.7 SENSOR STATUS



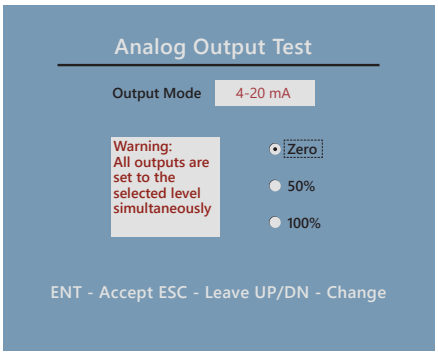
This screen provides real-time operating status for the pressure transducers.

4.8 BOARD DATA



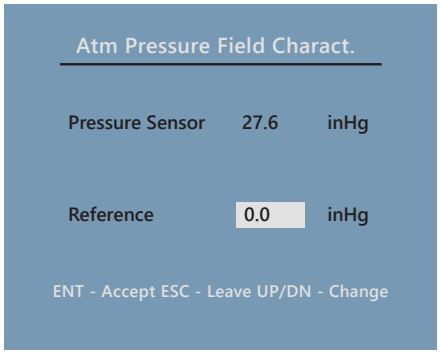
This screen provides real-time operating information for the transmitter electronics.

4.9 ANALOG OUTPUT TEST



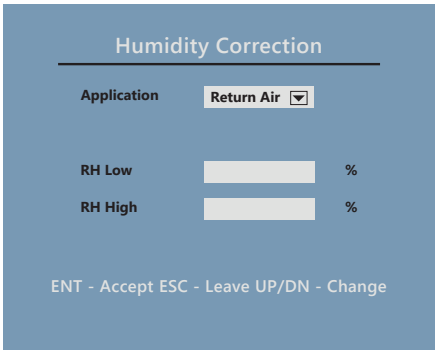
This function allows the user to test the analog outputs. The user can force the outputs to operate at 0%, 50% or 100%.

4.10 ATM PRESSURE FIELD CHARACTERIZATION



This function allows the unit to characterize the pressure readings in relation to a reference point.

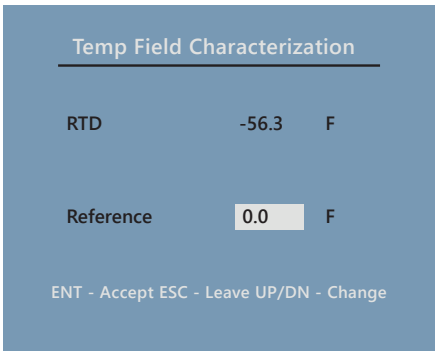
4.11 HUMIDITY CORRECTION



This function allows the user to set the air to be adjusted for Supply Air, Return Air or Custom. For Supply air if Temp is >85F, it uses RH Low correction. For Custom Air if Temp is >65F, it uses RH Low for RH correction.

*For Dual Channel, Dual System models Humidity Correction is under system set up so each channel can be configured independently.

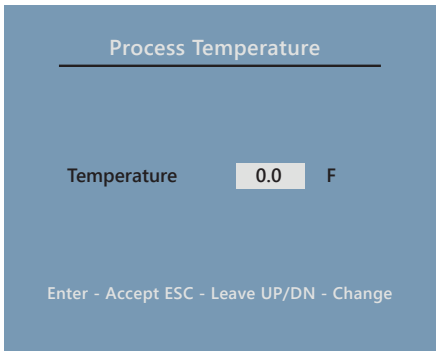
4.12 TEMP FIELD CHARACTERIZATION



This function allows the user to calibrate the temperature probe by entering in a reference temperature to the RTD.

*For Dual Channel, Dual System models Temperature Field Characterization is under system set up so each channel can be configured independently.

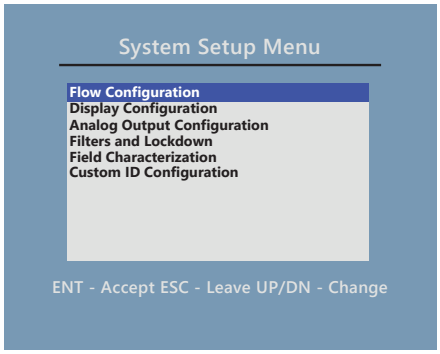
4.13 PROCESS TEMPERATURE SETTING (NO RTD)



If no RTD is selected the user will be able to manually enter the temperature in the GUI to use instead of STD conditions for air calculations.

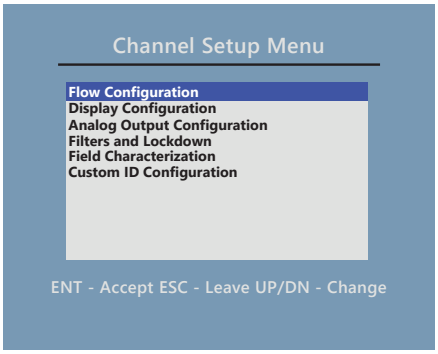
SECTION 5.0 SYSTEM SET-UP MENU

Single



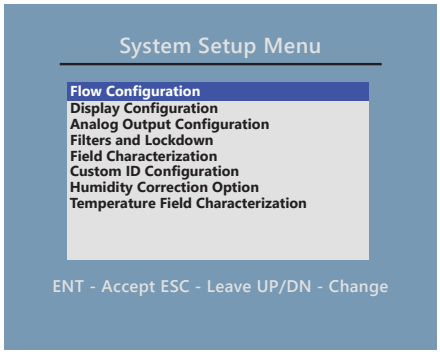
This screen provides the system set up menu for Single Channel, Single System Configuration.

Split



This screen provides the system set up menu for one of the channels on a Dual Channel, Split System Configuration.

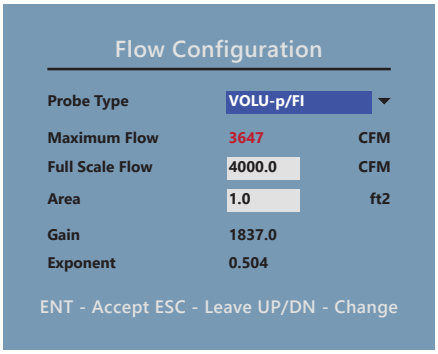
Dual



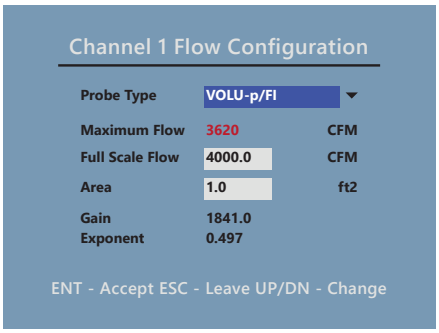
This screen provides the system set up menu for a Dual Channel, Dual System Configuration.

5.1 FLOW CONFIGURATION

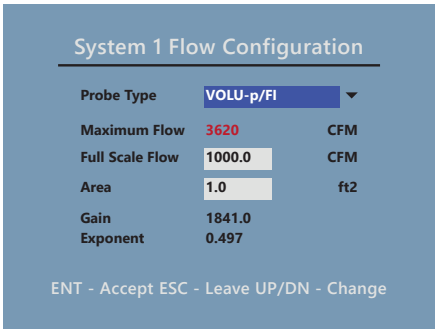
Single



Split



Dual



This menu is used to select the flow inlet type and adjust the flow settings.

Probe Type
The probe type is selected by the user based on the sensor used. The options are:

- VOLU-probe/1, 2, 3, 4
- VOLU-probe/1AS
- Fan-E
- LO-flo Stattion
- VOLU-Probe/FI
- Other

Each selection corresponds to a default gain and exponent used to calculate flow. If the user selects “Other”, a default gain of 1520 and an exponent of 0.5 is used. This can be changed based on the field characterization which is discussed later in this document.

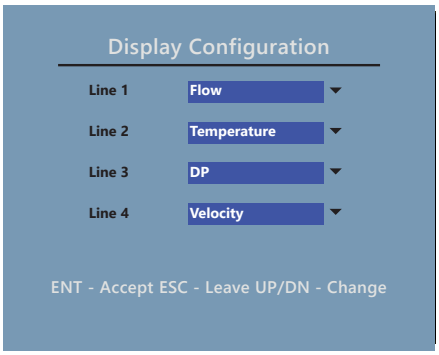
Maximum Flow
This is the upper flow limit based on the installed transducers. The Full Scale Flow setting cannot exceed this value.

Full Scale Flow
This is the full scale flow setting. The user should set this value to a range that spans the expected airflow for the duct or fan inlet. This value will set the span for the analog output. For example, if the Full Scale Flow is set to 2000 and the actual flow is 1000, the analog output will indicate 50% of scale.

Area
This is an editable field that defines the area used to calculate airflow volume. It is important for the user to make sure this is accurately entered so the system flow value is also accurate.

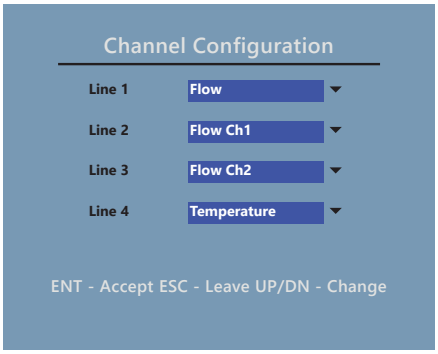
Gain and Exponent
These are read-only fields to indicate what the gain and exponent is in the system. These values will change if field characterization is turned on and the calculation modifies these values.

5.2 DISPLAY CONFIGURATION



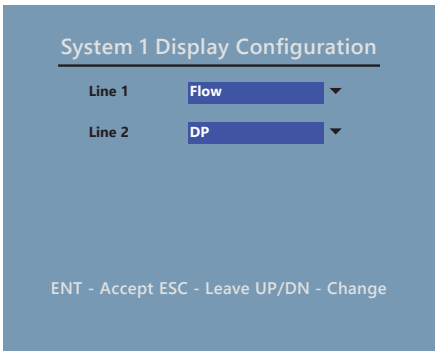
Single Channel, Single System:

Line 1 is Flow
Line 2 can display Velocity/Temperature/DP/Atm Pressure/Velocity Std./None
Line 3 can display Velocity/Temperature/DP/Atm Pressure/Velocity Std./None
Line 4 can display Velocity/Temperature/DP/Atm Pressure/Velocity Std/None

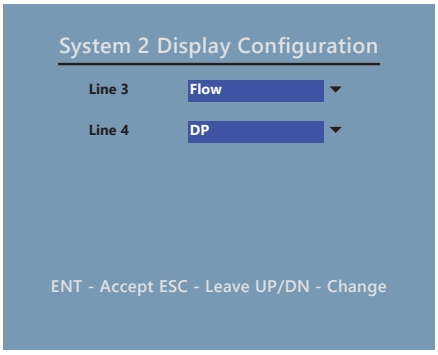


Dual Channel, Split System:

Line 1 can display Flow(Ch1+Ch2)/Flow Ch1/Ch1 Vel Std
Line 2 can display Flow Ch1/Velocity Ch1/DP Ch1/Ch1 Vel Std/Atm Pressure/ Temperature/None
Line 3 can display Flow 2/ Ch2 Vel Std/Flow Subt (Ch1-Ch2)/None
Line 4 can display Flow Ch2/Velocity Ch2/DP Ch2/ Ch2 Vel Std/Atm Pressure/ Temperature/None



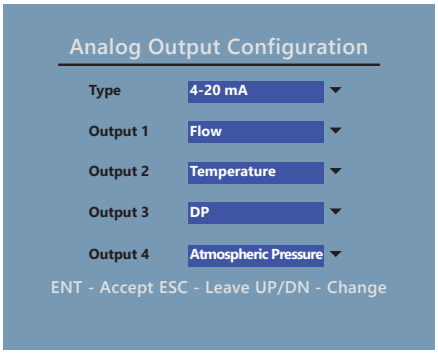
For Dual Channel, Dual System:
Line 1 can display Sys1 Flow/Flow Add (Sys1 + Sys2)/ Velocity Std
Line 2 can display Velocity/Temperature/DP/Atm Pressure/Velocity Std/None



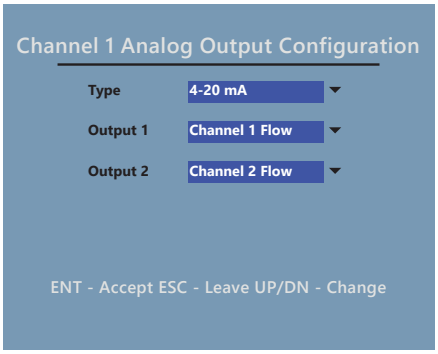
Line 3 can display Sys2 Flow/Flow Subt (Sys1 - Sys2)/ Velocity Std
Line 4 can display Velocity/Temperature/DP/Atm Pressure/Velocity Std/None

5.3 ANALOG OUTPUT CONFIGURATION

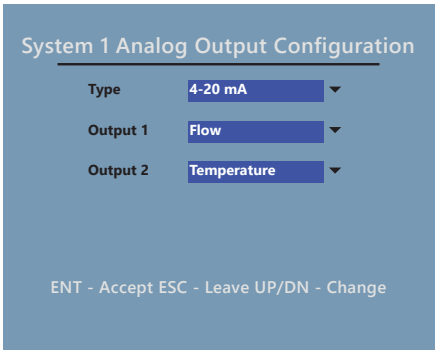
Single



Split



Dual



This menu is used to configure the analog outputs. In split and dual modes the outputs are assigned to the specific channels.

Output Type
Use this to configure the output type. The options are 4-20mA, 0-10VDC, 0-5VDC or off. All four outputs are set to the same type.

User shall have a list of choices, dependent on configuration, available for each of (4) AO's

Flow AO outputs will be at Actual or Standard Conditions according to choice in "4.1 FLOW SETTINGS"

For Single Channel System:
- Flow
- DP
- Temperature
- Atmospheric Pressure

For Dual Channel, Split System:
- Flow Channel 1
- Flow Channel 2
- Flow (Channel 1 + Channel 2)
- Subtract Flow (Channel 1 - Channel 2)
- Channel 1 DP
- Channel 2 DP
- Temperature Channel
- Atmospheric Pressure

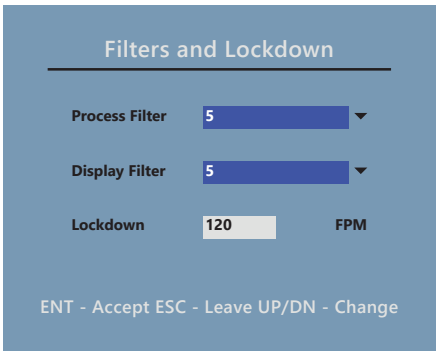
For Dual Channel, Dual System:

Output 1 & 2:
Flow (Sys1), Add Flow (Sys1+Sys2), Subtract Flow(Sys1-Sys2), DP(Sys), Temperature (Sys1), Atmospheric Pressure

Output 3 & 4:
Flow (Sys2), Add Flow (Sys 1+Sys 2), Subtract Flow(Sys 1-Sys 2), DP(Sys2), Temperature (Sys2), Atmospheric Pressure

The analog temperature output range is fixed at the factory, -40°F to 120°F

5.4 FILTERS AND LOCKDOWN



This menu function sets filtering for the analog outputs and the display. It is also used to set the lockdown (low flow cut-off).

Process Filter
The process filter is used to dampen the analog outputs. The settings are from 1-10, where 1 is the softest filter and 10 is the hardest filter. Typically, 2-4 will give a filtered signal which is responsive but provides some dampening.

Display Filter
This filter is used to dampen the flow display. The settings are from 1-10, where 1 is the softest filter and 10 is the hardest filter. Typically, 2-4 will give a filtered signal which is responsive but provides some dampening.

Lockdown Setting
The lockdown setting is a low flow cut-off. It is set in velocity units which are carried over from the Flow Settings menu page. This setting applies to the relevant inlet or duct, depending on configuration.

5.5 FIELD CHARACTERIZATION

The VELTRON III is equipped with a field characterization (K-factor) feature which allows for the introduction of gain and/or bias factors into the transmitter's flow calculations. This feature is intended to be used in two types of applications:

1. To adjust for flow measurement error as a result of highly distorted airflow induced by upstream or downstream flow disturbances.

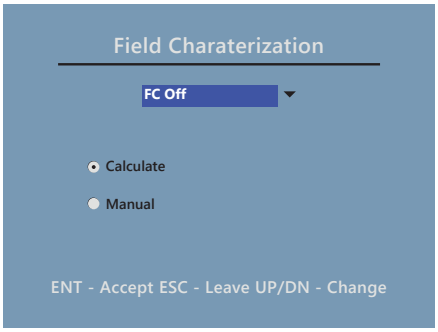
2. To adjust the transmitter's output to bring it into close correlation with field measured flow data.

The K-Factor gain and bias values can be entered directly or the VELTRON III can calculate these values based on measured and reference values from a 1, 2 or 3 point airflow traverse.

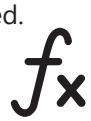
For best results, Air Monitor recommends at least 2 velocity points be used to characterize the installation, with one velocity reading taken in the bottom 1/3 of the operating range. When making this measurement, it is essential that the velocity measurement be within the operating range of the VELTRON III and airflow sensor.

The VELTRON III can simultaneously display flow velocity in actual and standard conditions. Before airflow traverse readings are taken, temporarily reconfigure the display to show both velocity readings and make sure the airflow velocity exceeds the airflow sensor cutoff before any airflow traverse readings are taken.

5.5 FIELD CHARACTERIZATION (CONTINUED)



This menu allows the user to field characterize (FC) system flow and adjust the factory calibration parameters in the VELTRON III. When FC is enabled, the icon shown below appears in the status bar of the main display. When operating in Split or Dual mode, there may be two icons shown indicating that both inlets have been characterized.

 Field Characterization has been turned on

Each mode has slightly different settings, as shown below. When operating in Single mode, FC has a single drop down option to enable or disable FC. When operating in Dual Channel, Split System or Dual Channel, Dual System modes, the options change to allow for separate characterization of each inlet. In Dual Channel, Split System mode, the options change to Channel 1 On/Off and Channel 2 On/Off. In Dual Channel, Dual System mode, the options are System1 On/Off and System2 On/Off.

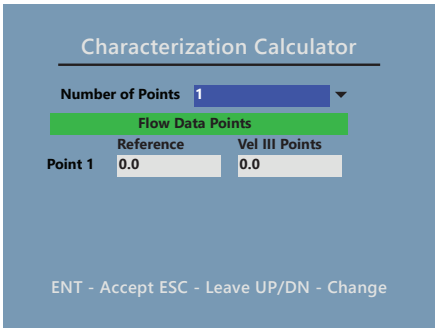
If you enable the field characterization you will have the option to select calculate or manual field characterization. Dual Channel, Split System or Dual Channel, Dual System mode the menu is used only for the selected channel or system.

Number of Points
The number of data points (1-3) to be used for field characterization.

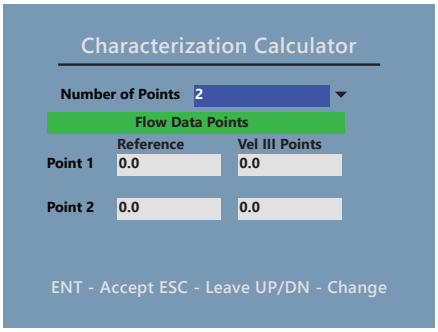
Data Points
There are two columns shown on the menu; one for Reference (the test and balancer results) and one for VELTRON III Points. Data is stored in the system's non-volatile memory. The following are general guidelines characterizing flow based on the number of data points.

IMPORTANT NOTE
Data must be entered as flow (e.g. CFM) in actual, not standard, flow conditions.

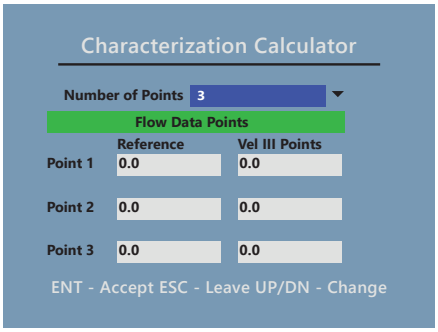
5.5 FIELD CHARACTERIZATION (CONTINUED)



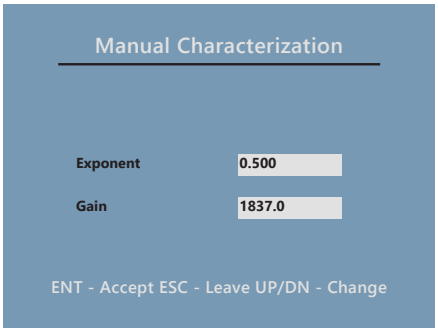
1 Point - Enter a flow rate or velocity that is at or near the top of the operating range.



2 Points - For point 1, enter a flow rate or velocity that is near the bottom of the operating range. For point 2, enter a flow value that is near the top of the operating range.

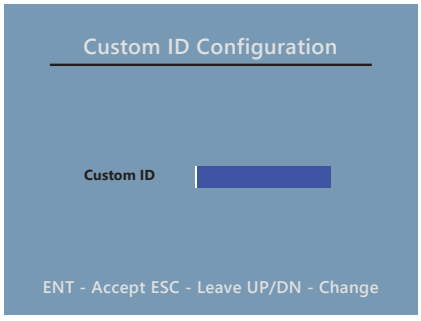


3 Points - For point 1, enter a flow rate or velocity that is in the bottom third of the operating range. For point 2, enter a flow value that is in the middle third of the operating range. For point 3, enter a flow value that is in the upper third of the operating range.



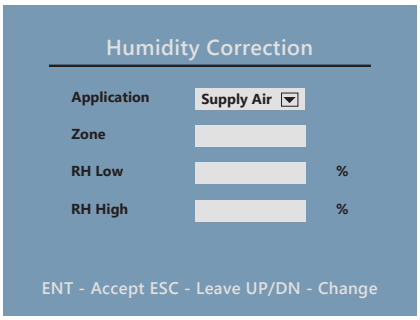
If you select the manual option in the field characterization menu, you will be provided with data entry fields for manually entering exponent and gain values. This data will be calculated and provided by the balancer or others.

5.6 CUSTOM ID CONFIGURATION



This dialog allows for a alpha-numeric entry of up to 20 characters. This entry is visible on the bottom of the main display screen and is written to the Device Name field in the BACnet device object.

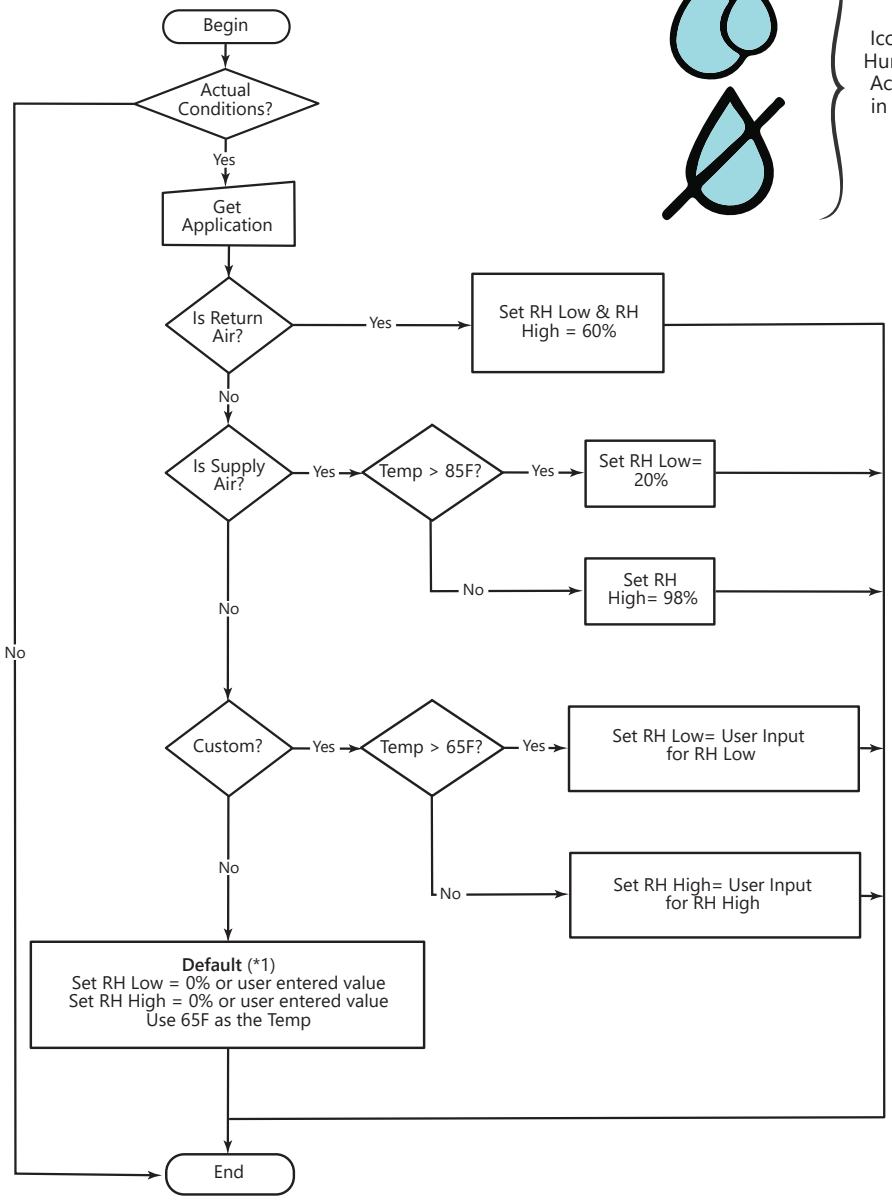
5.7 HUMIDITY CORRECTION OPTION



Once selected the instrument will present the RH Correction screen. Where Application can be one of four:

- Return Air
- Supply Air
- Custom
- Default

RH Correction Feature Algorithm in V3



Icons displayed for Humidity Correction Active and Inactive in the Main Screen status bar.

(*1) = 0% is set for RH Low and RH High **no moisture correction is applied**

SECTION 6.0 COMMUNICATIONS

The VELTRON III is provided with BACnet MS/TP and MODBUS RTU as serial communications protocol options. BACnet is the default setting. The field configurable serial communications interface is described on the following pages. Refer to section 2.1.4 Transmitter Wiring Connections for detailed information on wiring connections.

Air Monitor recommends that 3-wire systems with a separate shield be used for communications. The interface can operate on 2-wire networks with no common, but this configuration is more susceptible to noise.

CAUTION
Do not connect shield drains to the common terminal.

6.1 BACnet MS/TP

Transceiver	Isolated, 3-wire, half-duplex (⅓ unit load)
Recommended maximum units per segment	32
BACnet address range	1 - 255
BACnet device ID (Instance number)	0 – 4,194,303
Max master range	0 – 127
Baud rate	9600, 19200, 38400, 57600, 76800 or 115200

6.1.1 BACnet Object Types

BACnet Object Type and Number of Objects implemented: Device 1
Analog Input – 5, 9 or 11 depending on operating configuration See below for details.

6.1.2 Protocol Implementation Statement

BACnet Protocol Revision: 12
Device Profile (Annex L): BACnet Application Specific Controller (B-ASC)
MS/TP Master (Clause 9), Baud Rate(s): 9600, 19200, 38400, 56700, 76800, 115200
Device Address Binding: No
BBMD Support Registration By Foreign Devices: No
Character Set Supported: ANSI X3.4
BACnet Interoperability Building Blocks Supported (Annex K):
Data Sharing – Read Property-B (DS-RP-B)
Data Sharing – Read Property Multiple-B (DS-RPM-B)
Data Sharing – Write Property-B (DS-WP-B)
Device Management – Dynamic Device Binding-B (DM-DDB-B)
Device Management – Dynamic Object Binding-B (DM-DOB-B)
Device Management – Device Communication Control-B (DM-DCC-B)
Device Management – Reinitialize Device-B (DM-RD-B)

6.1.3 Standard BACnet Objects Supported

Object Identifier	1	Writeable	0 – 4,194,303
Object Name	VELTRON III	Writeable	Alpha-numeric; 20 character limits. See "Custom ID" setting in the Service Menu.
Object Type	Device	Read-only	
System Status	Operational	Read-only	
Vendor Name	Air Monitor Corporation	Read-only	
Vendor ID	58	Read-only	
Model Name	VELTRON III	Read-only	
Location	Default Location	Read-only	
Description	Airflow Measurement	Read-only	
Protocol Version	1	Read-only	
Protocol Revision	12	Read-only	
Services Supported	readProperty, readPropertyMultiple, writeProperty, deviceCommunicationControl, reinitilizeDevice, who-Has, who-is	Read-only	
Object Types Supported	Analog-input, Device	Read-only	
Object List	**Single:** (6)Total Flow, D.P., Temperature, Velocity, Velocity Std, Atm. Pressure **Dual Channel, Split System:** (12)Total Flow, Flow Ch1,D.P. Ch1, Velocity Ch1, Velocity Ch1S, Flow Ch2, D.P. Ch2, Velocity Ch2, Velocity Ch2S, Flow Subtraction, Temp, Atm. Pressure **Dual Channel, Dual System:** (13) Total Flow Sys1, Flow Total Plus D.P. Sys 1, Temperature Sys1, Velocity Sys 1, Velocity Std1, Atm. Pressure, Total Flow Sys2, Flow Total Minus, D.P. Sys2, Temperature Sys2, Velocity Sys2, Velocity Std2	Read-only	
Max ADPU Length	128	Read-only	
Segmentation Supported	No Segmentation	Read-only	
APDU Time-out	3000	Read-only	
# of APDU Retries	3	Read-only	
Max Master	127	Writeable	
Device Address Binding	{}	Read-only	
Database Revision	3	Read-only	

6.1.4 Analog Input Object

Object Identifier	Analog Input-0 to Analog Input-X1	Read-only
Object Name	Various	Read-only
Object Type	Analog-Input	Read-only
Present Value	REAL	Read-only
Status Flags	F, F, F, F	Read-only
Event State	Normal	Read-only
Out of Service	FALSE	Read-only
Description	Various	Read-only
Units	Various	Read-only

For each analog input object, there are four status flags: IN_ALARM, OUT_OF_SERVICE, FAULT and OVERRIDDEN. Only the FAULT flag is used in this product. If there is an out-of-range condition or other alarm, the FAULT flag will be set.

6.1.5 BACnet Analog Inputs

Single

Object Name	Description	Units
Analog Input 1	Total Flow	Cubic feet per minute
Analog Input 2	D.P.	Inches of Water
Analog Input 3	Temperature	Degrees Fahrenheit
Analog Input 4	Velocity	Feet per minute
Analog Input 5	Velocity Std	Feet per minute
Analog Input 6	Atm Pressure	Inches of Mercury

Dual Channel, Split System

Object Name	Description	Units
Analog Input 1	Total Flow	Cubic feet per minute
Analog Input 2	Flow Ch1	Cubic feet per minute
Analog Input 3	D.P. Ch1	Inches of Water
Analog Input 4	Velocity Ch1	Feet per minute
Analog Input 5	Velocity Ch1S	Feet per minute
Analog Input 6	Flow Ch2	Cubic feet per minute
Analog Input 7	D.P. Ch2	Inches of Water
Analog Input 8	Velocity Ch2	Feet per minute
Analog Input 9	Velocity Ch2S	Feet per minute
Analog Input 10	Flow Subtraction	Cubic feet per minute
Analog Input 11	Temp	Degrees Fahrenheit
Analog Input 12	Pressure	Inches of Mercury

6.1.5 BACnet (cont.)

Dual Channel, Dual System

Object Name	Description	Units
Analog Input 1	Total Flow Sys1	Cubic feet per minute
Analog Input 2	Flow Total Plus	Cubic feet per minute
Analog Input 3	D.P. Sys 1	Inches of Water
Analog Input 4	Temperature Sys1	Degrees Fahrenheit
Analog Input 5	Velocity Sys1	Feet per minute
Analog Input 6	Velocity Std1	Feet per minute
Analog Input 7	Atm Pressure	Inches of Mercury
Analog Input 8	Total Flow Sys2	Cubic feet per minute
Analog Input 9	Flow Total Minus	Cubic feet per minute
Analog Input 10	D.P. Sys2	Inches of water
Analog Input 11	Temperature Sys2	Degrees Fahrenheit
Analog Input 12	Velocity Sys2	Inches of Mercury
Analog Input 13	Velocity Std2	Feet per minute

6.2 MODBUS RTU

Transceiver	Isolated, 3-wire, half-duplex (1/3 unit load)
Recommended maximum units per segment	32
MODBUS address range	1 - 255
Parity	Even, Odd or None
Baud Rate	9600, 19200, 38400, 57600, 76800 or 115200

6.2.1 MODBUS Registers

Operating Mode	Register Description	Register Type	Address	Data Type
Single	Total Flow	Input register	30000	Floating point
Single	Differential Pressure	Input register	30002	Floating point
Single	Temperature	Input register	30004	Floating point
Single	Velocity	Input register	30006	Floating point
Single	Atmospheric Pressure	Input register	30008	Floating point
Dual Channel, Split System	Total flow	Input register	30000	Floating point
Dual Channel, Split System	Ch1	Input register	30002	Floating point
Dual Channel, Split System	Ch1	Input register	30004	Floating point
Dual Channel, Split System	Ch1	Input register	30006	Floating point
Dual Channel, Split System	Ch2	Input register	30008	Floating point
Dual Channel, Split System	Ch2	Input register	30010	Floating point
Dual Channel, Split System	Ch2	Input register	30012	Floating point
Dual Channel, Split System	Temperature	Input register	30014	Floating point
Dual Channel, Split System	Atmospheric Pressure	Input register	30016	Floating point
Dual Channel, Dual System	System 1 flow	Input register	30000	Floating point
Dual Channel, Dual System	Flow addition (Sys1 + Sys2)	Input register	30002	Floating point
Dual Channel, Dual System	System 1 differential pressure	Input register	30004	Floating point
Dual Channel, Dual System	System 1 temperature	Input register	30006	Floating point
Dual Channel, Dual System	System 1 velocity	Input register	30008	Floating point
Dual Channel, Dual System	Atmospheric Pressure	Input register	30010	Floating point
Dual Channel, Dual System	System 2 flow	Input register	30012	Floating point
Dual Channel, Dual System	Flow subtraction (Sys1 - Sys2)	Input register	30014	Floating point
Dual Channel, Dual System	System 2 differential pressure	Input register	30016	Floating point
Dual Channel, Dual System	System 2 temperature	Input register	30018	Floating point
Dual Channel, Dual System	System 2 velocity	Input register	30020	Floating point

6.2.1 MODBUS Registers (Continued)

Description	Register Type	Address	Data Type	Description
System Velocity Units	Read Input	30201	uint16_t	1 = FPM, 2 = FPS, 3 = MPM, 4 =MPS
System Flow Units	Read Input	30202	uint16_t	1 = CFM, 2 = CFH, 3 = L/S, 4 = L/M, 5 = M3H
System Version	Read Input	30203	uint16_t	
System Version 2	Read Input	30204	uint16_t	MSB = Major, LSB = Minor
Probe Type	Read Input	30205	uint16_t	1 = VOLU-probe/1,2,3,4 2 = VOLU-probe/1AS 3 = Fan-Evaluator 4 = LO-flo station 5 = VOLU-probe/FI 6 = Other
Design Flow Min Setting	Read Input	30206	float	
Design Flow Max Setting (Channel 1)	Read Input	30208	float	Max Flow to scale Analog Outputs
Design Flow Max Setting (Channel 2)	Read Input	30216	float	Max Flow to scale Analog Outputs
Duct Area (Channel 1)	Read Input	30210	float	Duct area size in ft^2 or m^2
Duct Area (Channel 2)	Read Input	30212	float	Duct area size in ft^2 or m^2
System Status	Read Input	30214		1= ALL_OK 2 = IN ALARM 3 = IN FAULT 4 = OOS
System Units	Read Discreet	20000	boolean	Bit 0: 1 = SI, Bit 0: 0 = US
System Conditions	Read Discreet	20001	boolean	Bit 0: 1 = Std, Bit 0: 0 = Actual
K-factor	Write Coil 1	50000	boolean	1 = ON, 0 = OFF
System Reset	Write Coil 2	50000	boolean	1 = RESET
K-factor	Write Multiple Coil	150000	boolean	1 = ON, 0 = OFF
System Reset	Write Multiple Coil	150000	boolean	1 = RESET
Read Slave ID	N/A	17000	ASCII	Returns string "VELTRON III"
K-factor	Read Coil	10000		Returns the state of the K-factor

SECTION 7.0 MAINTENANCE

The VELTRON III does not contain any parts that require scheduled maintenance.

The following information is provided, as general guidelines, if you wish to establish an inspection/maintenance program. Start with annual inspections and adjust the frequency as required to meet your needs.

Cleanliness

- Verify condensation or other sources of liquids are not present inside the VELTRON III.

Mechanical

- Verify signal connections are secure.
- Inspect signal lines for any cracks or leaks.
- Verify mounting hardware is secure.

Electrical

- Inspect wiring to the VELTRON III for good connections and absence of corrosion.

Calibration Intervals

- Air Monitor does not recommend a specific time interval between re-calibrations. Calibrations should be scheduled to meet the needs of the facility where the VELTRON III is installed. For example, critical care facilities may wish to schedule annual re-calibrations while commercial/retail buildings may only schedule re-calibrations at 3-5 year intervals.

SECTION 8.0 TROUBLESHOOTING

Problem	Solution
Display indicates 0 FPM while in Normal Mode	Verify fan is operational. Verify flow is above lockdown value.
Total Flow is greater than the Design Flow Max setting in the Flow Configuration dialog	The flow setting is too low for the actual flow in the duct. This can be simply fixed by increasing the DFM setting.
Temperature is very low (<-50°F)	RTD has a loose wire connection.
Flow seems high or low for given conditions	The transducer must be sized correctly for the flow in the duct, and the system must have the correct span value selected in the Transducer Configuration menu. If these conditions are correct, perform a transducer calibration. Verify air handler is operating correctly.
Flow is lower than expected or erratic	Check for pinched or crimped tubing.

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