



Fan Inlet Airflow Monitors



Manufactured by:



21 Commerce Drive
Danbury, CT 06810
USA

Accutrol Representative:



Contents of this Manual are Subject to Change Without Notification

VTF MANUAL REV E ECN 3074

© 2025 ACCUTROL LLC

LIMITED WARRANTY

Accutrol LLC, having its principal place of business at 21 Commerce Drive, Danbury, CT USA ("Manufacturer") warrants its VorTek™ Products (the "Products") as follows:

1. Limited Warranty.

Manufacturer warrants that the Products sold hereunder will be free from defects in material and workmanship for a period of thirty-six (36) months from the date of purchase. If the Products do not conform to this Limited Warranty during the warranty period (as herein above specified), Buyer shall notify Manufacturer in writing of the claimed defects and demonstrate to Manufacturer's satisfaction that said defects are covered by this Limited Warranty. If the defects are properly reported to Manufacturer within the warranty period, and the defects are of such type and nature as to be covered by this warranty, Manufacturer shall, at its own expense, furnish, replacement Products or, at Manufacturer's option, replacement parts or services for the defective Products. Shipping and installation of the replacement Products or replacement parts shall be at Buyer's expense.

2. Other Limits.

THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Manufacturer does not warrant against damages or defects arising out of improper or abnormal use or handling of the Products; against defects or damages arising from improper installation (where installation is by persons other than Manufacturer), against defects in products or components not manufactured by Manufacturer, or against damages resulting from such non-Manufacturer made products or components. Manufacturer passes on to Buyer the warranty it received (if any) from the maker thereof of such non-Manufacturer made products or components. This warranty also does not apply to Products upon which repairs have been affected or attempted by persons other than Manufacturer or pursuant to written authorization by Manufacturer. This warranty also does not apply to any product provided by the Buyer and mounted by the Manufacturer to Products.

3. Exclusive Obligation.

THIS WARRANTY IS EXCLUSIVE. The sole and exclusive obligation of Manufacturer shall be to repair or replace the defective Products in the manner and for the period provided above. Manufacturer shall not have any other obligation with respect to the Products or any part thereof, whether based on contract, tort, and strict liability or otherwise. Under no circumstances, whether based on this Limited Warranty or otherwise, shall Manufacturer be liable for incidental, special, or consequential damages.

4. Other Statements.

Manufacturer's employees or representatives' ORAL OR OTHER WRITTEN STATEMENTS DO NOT CONSTITUTE WARRANTIES, shall not be relied upon by Buyer, and are not a part of the contract for sale or this limited warranty.

5. Entire Obligation.

This Limited Warranty states the entire obligation of Manufacturer with respect to the Products. If any part of this Limited Warranty is determined to be void or illegal, the remainder shall remain in full force and effect.

TABLE OF CONTENTS

LIMITED WARRANTY ii

TABLE OF CONTENTS..... iii

SECTION 1 - INTRODUCTION 1

SECTION 2 - SPECIFICATIONS 3

SECTION 3 – VT INSIGHT - USER INTERFACE SOFTWARE & CONFIGURATION 5

SECTION 4 – BACNET OPTION 15

SECTION 5 – MAINTENANCE AND TROUBLESHOOTING 18

APPENDIX A: DOCUMENT REVISION HISTORY A

APPENDIX B: SENSOR INSTALLATION INSTRUCTIONS.....B

APPENDIX C: TRANSMITTER INSTALLATION INSTRUCTIONSC

APPENDIX D: OPTIONS D

SECTION 1 - INTRODUCTION

The VorTek (VT) airflow measurement system is the only true digital airflow velocity sensing system on the HVAC market. Unlike pressure-based and temperature-based airflow measurement sensors, the vortex shedding airflow sensor provides a direct measurement of the airflow velocity rate. The measurement provided by the vortex shedding sensor is immune to the effects of temperature, pressure and humidity. Also, the measurement signal is not amplitude-based and cannot drift over time, therefore recalibration is never required.

1.1 Theory of Operation

The vortex shedding digital airflow sensor contains a small shedder bar which generates vortex shedding pressure pulses as air flows through the sensor. The pressure pulses are converted to electronic pulses by detectors located at the end of each sensor. Because the vortex shedding frequency is directly proportional to the airflow velocity; regardless of temperature, pressure, or humidity, the VT sensor is capable of providing an extremely accurate and repeatable signal over a wide operating range. Figure 1 illustrates the sensor signal path.

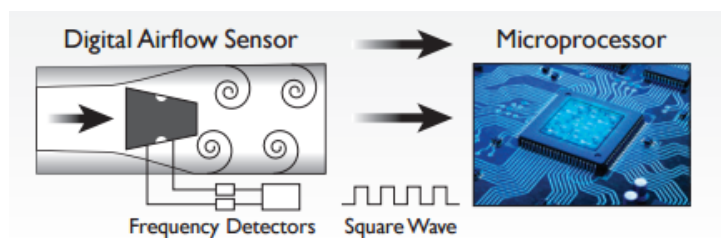


Figure 1

Each VTF sensor is mounted on a small airfoil shaped pedestal which is designed to not impede fan performance while providing an accurate and repeatable measurement of the airflow velocity at the fan inlet. The individual signals are sent from each sensor to the VTF transmitter where they are processed to provide an average airflow velocity rate for the fan inlet. The transmitter calculates the average airflow volume rate based on the fan inlet size, and provides an analog output signal for connectivity to any BAS control device. For network communications an optional EIA-485 port supporting BACnet MS/TP is provided.

1.2 Operating Range

The full-scale range of the VTF Fan Inlet Airflow Transmitter is factory-configured for 12000 FPM (60.9m/s), which is appropriate for the majority of fan inlet measurement applications. If a different full-scale range is required, it can be configured using VT Insight. The full-scale airflow volume range for the transmitter analog output can be configured to any value using the VT Insight software.

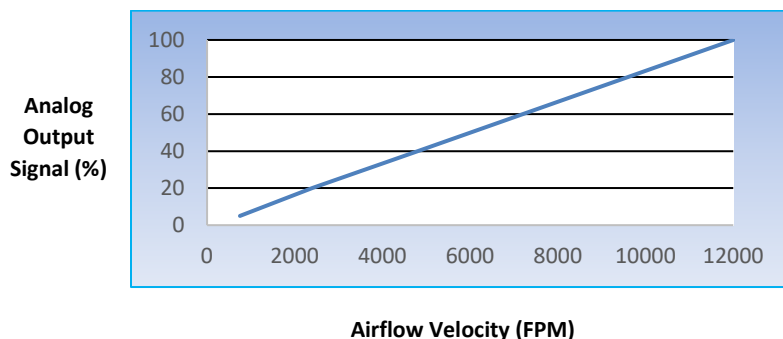
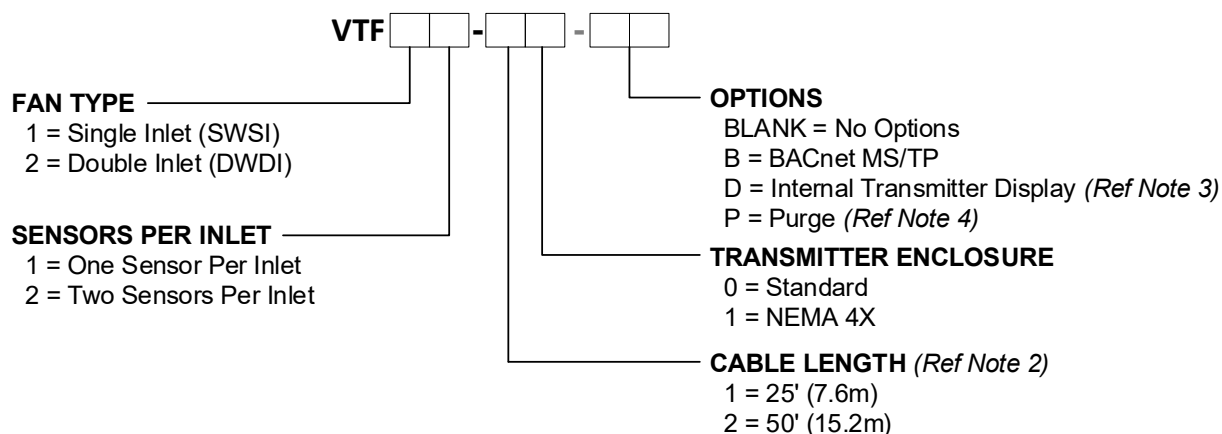


Figure 2

1.3 Model Code



1.4 Model Code Notes:

- The following information should be provided with order so the Transmitter can be factory-configured:
 - Device Tag Number
 - Analog Output Full Scale Range
 - Analog Output Signal Type
 - Fan Inlet Size (measured at the smallest diameter of the inlet)
- One cable is provided with each probe. Max length of Outdoor Rated cable is 50'. Contact factory if cables longer than 50' are required. Cable type provided is based on the Transmitter Enclosure Type per table below.

Transmitter Enclosure Type	Cable Terminations	
	Transmitter End	Sensor Electronics End
0	Standard RJ45	Weatherproof RJ45
1	Weatherproof RJ45	Weatherproof RJ45

- When Option D (Internal Transmitter Display) is selected, the Remote Display cannot be used.
- PURGE option requires connection to a clean and dry instrument air supply 20psi $\pm$ 2psi.

Model Code Example:

Model Shown Below: VTF11-10-P

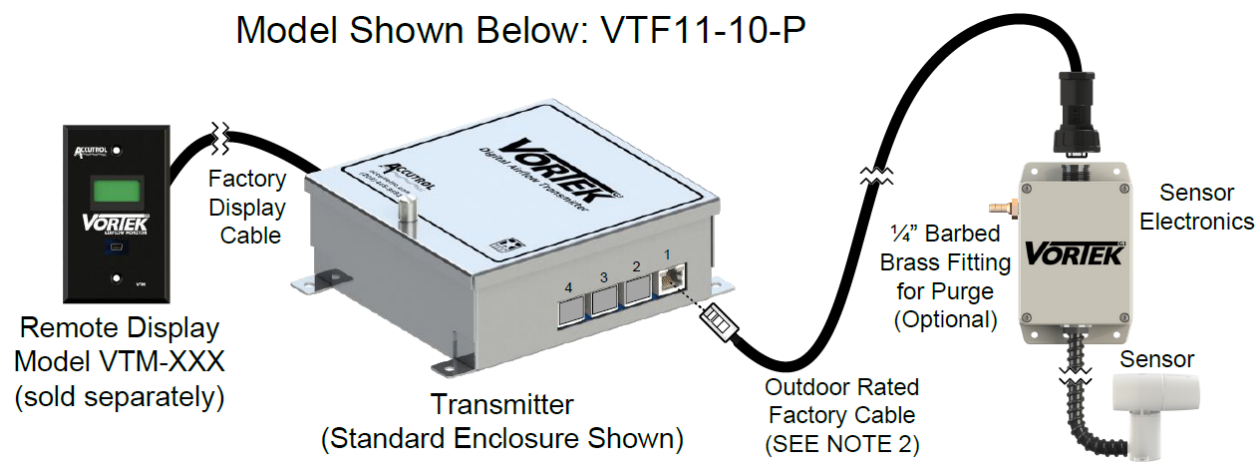


Figure 3

SECTION 2 - SPECIFICATIONS

PERFORMANCE

Accuracy	
Individual Sensors	+/-2% of reading
System Accuracy	+/-5% of reading (installed accuracy expected when installation meets guidelines)
Repeatability	+/- 0.1% of reading
Sensor Range	FS: Factory Default is 12,000 FPM (60.69 m/s) (software configurable) Minimum: 350 FPM (1.78 m/s)

ENVIRONMENTAL

Operating Temperature	
Sensor	-40° to 165° F (-40° to 74° C)
Transmitter	-20° to 150° F (-29° to 66° C)
Display (optional)	-4° to 158° F (-20° to 70° C)
Storage Temperature	-22° to 165° F (-30° to 74° C)
Humidity	0 to 95% (non-condensing)

ELECTRICAL

Input Power	24VAC +/- 20% 50-60Hz, 2.4 VA with no options, 4.8 VA with display & BACnet options 24VDC +/-10%, 1 W with no options, 3 W with display & BACnet options
Inputs	2 Sensor Input Channels with up to 2 Sensors per Input (4 Sensors Max)
Output	0-20mA, 4-20mA, 0-10v, 2-10v, 0-5v or 1-5v (software configurable) 12-bit Resolution, Capable of driving 1K ohm load
Configuration Port	USB 2.0, Isolated, USB C Connector
USB Power Switch	Selects alternate power source for configuration when main power is not available Draws 5v power from USB configuration port
Status Indicators	LED Status Indicators for; Power, Output, Configuration Port, Power Source Switch, Display and BACnet Communications
I/O Terminal Block	3 position vertical pluggable screw terminal block, screw access on top, 12-30 AWG
Cables	
Standard	Outdoor rated shielded cables with watertight plug on sensor end
Optional	NEMA 4X Transmitter; IP67 Outdoor rated shielded cables with watertight plug on both ends
Network Com Port (Optional)	EIA 485 2-wire BACnet MS/TP Galvanically Isolated Data Rates 9600, 19200, 38400, 76800 and 115200 1/8 Unit Load Receiver Input Impedance Network bias and EOL Termination not provided within the Transmitter
Display (Optional)	Remote mount or transmitter mount Liquid Crystal Display, 2 lines x 8 characters with white LED backlight Includes USB Configuration Port

MATERIALS OF CONSTRUCTION

Sensor	Polycarbonate Plastic UL94 V-0
Mounting Hardware	
Sensor Rivet Nuts	Neoprene rubber-coated brass with 304ss screws
Conduit Clamp	Zinc-plated steel over EPDM rubber with stainless steel Tek-screw
Sensor Tubing	Ether-based polyurethane
Flexible Conduit	UV resistant flexible PVC, VW1 Flammability Rating
Conduit Fittings	Nylon 6/6, 94V-2 Flammability Rating
Enclosures	Transmitter: Aluminum Alloy 5052-H32, 16 Gauge Sensor Electronics: NEMA 4X (IP66) Polycarbonate Plastic, UL94-V0 Optional Transmitter: NEMA 4X (IPX6) Polycarbonate Plastic, UL94-V0

EMC AND SAFETY

Emissions	EN 55011:2009+A1:2010, FCC Part 15:2017, ICES-003 Issue 6, EN61000-3-2:2014, EN61000-3-3:2013
Immunity	EN61326-1:2013, EN61000-4-2:2009, EN61000-4-3:2006+A1:2008+A2:2010 EN61000-4-4:2012, EN61000-4-5:2006, EN61000-4-6:2009, EN61000-4-8:2010 EN61000-4-11:2004
Safety	EN61010-1:2010

2.1 Materials Installed at the Fan Inlet

Item	Description	Material
1	VorTek Sensor	Polycarbonate
2	Flexible Conduit	PVC
3	Mounting Hardware	Plated Steel
4	Gasket	Neoprene/EPDM
5	Well-Nuts	Neoprene Rubber-Coated Brass

Table 1

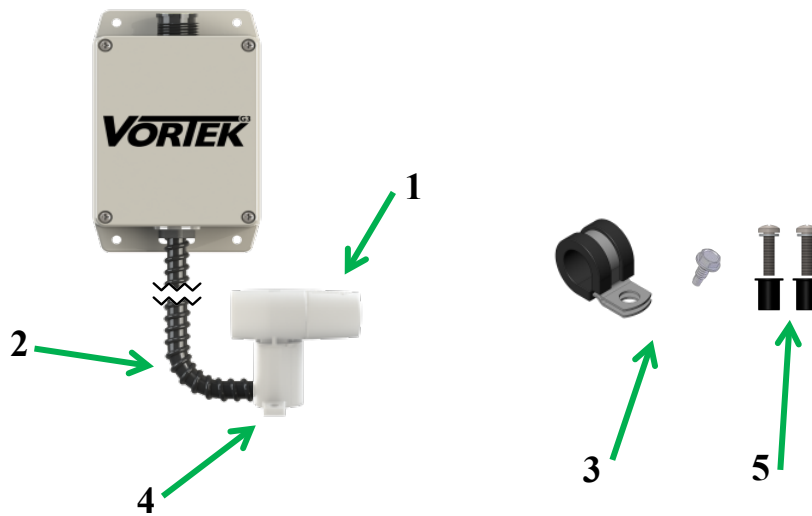


Figure 4

SECTION 3 – VT INSIGHT - USER INTERFACE SOFTWARE & CONFIGURATION

Using a PC, you can communicate directly with the transmitter using the VT Insight Configuration Software. All that's required is a Windows PC or Tablet with a USB Port, a USB Cable and the VT Insight Software.

3.1 Minimum Requirements for PC

- PC or Tablet with Windows Version 10 or greater
- USB 2.0 Port
- Screen Resolution 1280 x 768 or greater suggested
- USB to USB-Type C Cable

3.2 Installing the VT Insight Software

Before starting the installation process, close any programs running on the computer.

1. Download the **Accutrol Software Manager (ASM)** from <https://www.accutrolllc.com/accuvalve-software-downloads/>. If the **ASM** is already installed, skip to step 3.
2. Go to the downloads folder in the File Explorer app of your PC and Extract All contents from the folder. Once done, install the **ASM** by executing the Setup File within the extracted **AccutrolSoftwareSuite.zip** file. A desktop icon will appear.
3. Once installed, launch the **ASM** using the Desktop Icon.
4. Click on the **VT Insight Software** Icon to download the install folder to your PC. This will launch the user's Default Browser.
5. Extract All contents from the install folder. Once done, execute the Setup File to install the program.
6. When the **VT Insight Software** is installed, start **VT Insight** from inside the **ASM** to run the application. A registration window will open, select "Click to Go to Website" to complete the Product Registration Form, then select "submit".



Please Register Your Copy of VT Insight

VT™ Insight Product Registration

Insight has been installed. Your Insight serial number is:

To request a product key, please register your serial number at |

Click to Go to Website

Please allow 1 business day to receive an email reply with your product key.

To activate your software, copy and paste your product key into the box below and select activate.

Enter Product Key:

Click to Activate

(IMPORTANT-READ CAREFULLY: The End-User License Agreement ("EULA") which can be found within the Software Help About Dialog box, is a legal agreement between you (either an individual or a single entity) and Accutrol, LLC for the software, which includes associated media and Internet-based services ("Software"). You agree to be bound by the terms of the EULA by installing, copying, or using the software. If you do not agree, do not install, copy, or use the software.

Mandatory Activation: There are technological measures in this software that are designed to prevent unlicensed use of the software. You may need to reactivate the Software if you modify your computer hardware or alter the Software. Accutrol, LLC will use those measures to confirm you have a legally licensed copy of the Software. If you are not using a licensed copy of the Software, you are not allowed to install the Software or future Software updates. Accutrol, LLC will not collect any personally identifiable information from your device during this process.

The Software is protected by intellectual property laws and treaties. Accutrol, LLC or its suppliers own the title, copyright, and other intellectual property rights in the Software. The Software is licensed, not sold.

Without prejudice to any other rights, Accutrol, LLC may terminate this Product Key and Software if you fail to comply with the terms and conditions of the EULA. In such event, you must destroy all copies of the Software and all its component parts.

VT Insight is a product of Accutrol, LLC. - 21 Commerce Drive, Danbury CT 06810 - TEL: 203-445-9991

Request for Accutrol Insight Software Key

Please complete the information below, then click Submit. All items with an * are required.

First Name*

Last Name*

Company*

Fill in all fields required on the blank form.



Note: The Installation Serial Number is unique to the computer which it was installed on. Therefore, the Registration Key will only function on this one computer. If you require the software to be installed on more than one computer, a request for each computer must be generated separately.

3.3 Insight Software Product Registration

Once you have received the Product Key from Accutrol, you will need to do the following to activate the software.

1. Open the VT Insight application by opening the Accutrol Software Manager and clicking on the VT Insight Icon or go to the Start Menu -> All Apps -> Accutrol LLC -> VT Insight.
2. Copy the Product Key provided on the email from Accutrol, paste it into the "Product Key" field provided at the bottom of the form, then click on the "Register Product Key" button that appears. You must be connected to internet during first launch of VT Insight after a valid Product Key has been submitted.



Please Register Your Copy of VT Insight

VT™ Insight Product Registration

Insight has been installed. Your Insight serial number is:

To request a product key, please register your serial number at |

[Click to Go to Website](#)

Please allow 1 business day to receive an email reply with your product key.

To activate your software, copy and paste your product key into the box below and select activate.

Enter Product Key:

[Click to Activate](#)

IMPORTANT-READ CAREFULLY: The End-User License Agreement ("EULA") which can be found within the Software Help About Dialog box, is a legal agreement between you (either an individual or a single entity) and Accutrol, LLC for the software, which includes associated media and Internet-based services ("Software"). You agree to be bound by the terms of the EULA by installing, copying, or using the software. If you do not agree, do not install, copy, or use the software.

Mandatory Activation: There are technological measures in this software that are designed to prevent unlicensed use of the software. You may need to reactivate the Software if you modify your computer hardware or alter the Software. Accutrol, LLC will use those measures to confirm you have a legally licensed copy of the Software. If you are not using a licensed copy of the Software, you are not allowed to install the Software or future Software updates. Accutrol, LLC will not collect any personally identifiable information from your device during this process.

The Software is protected by intellectual property laws and treaties. Accutrol, LLC or its suppliers own the title, copyright, and other intellectual property rights in the Software. The Software is licensed, not sold.

Without prejudice to any other rights, Accutrol, LLC may terminate this Product Key and Software if you fail to comply with the terms and conditions of the EULA. In such event, you must destroy all copies of the Software and all its component parts.

VT Insight is a product of Accutrol LLC. - 21 Commerce Drive, Danbury CT 06810 - TEL: 203-445-9991

Paste
Product
Key Here

3. You will now be able to use the VT Insight Software on your computer. If you have any problems, contact Accutrol LLC at 203-445-9991.



Note: VT Insight will attempt to update itself with the latest released version of software each time it is initiated when the computer is connected to the internet. If you do not wish to update, you will be given a choice to not update each time.

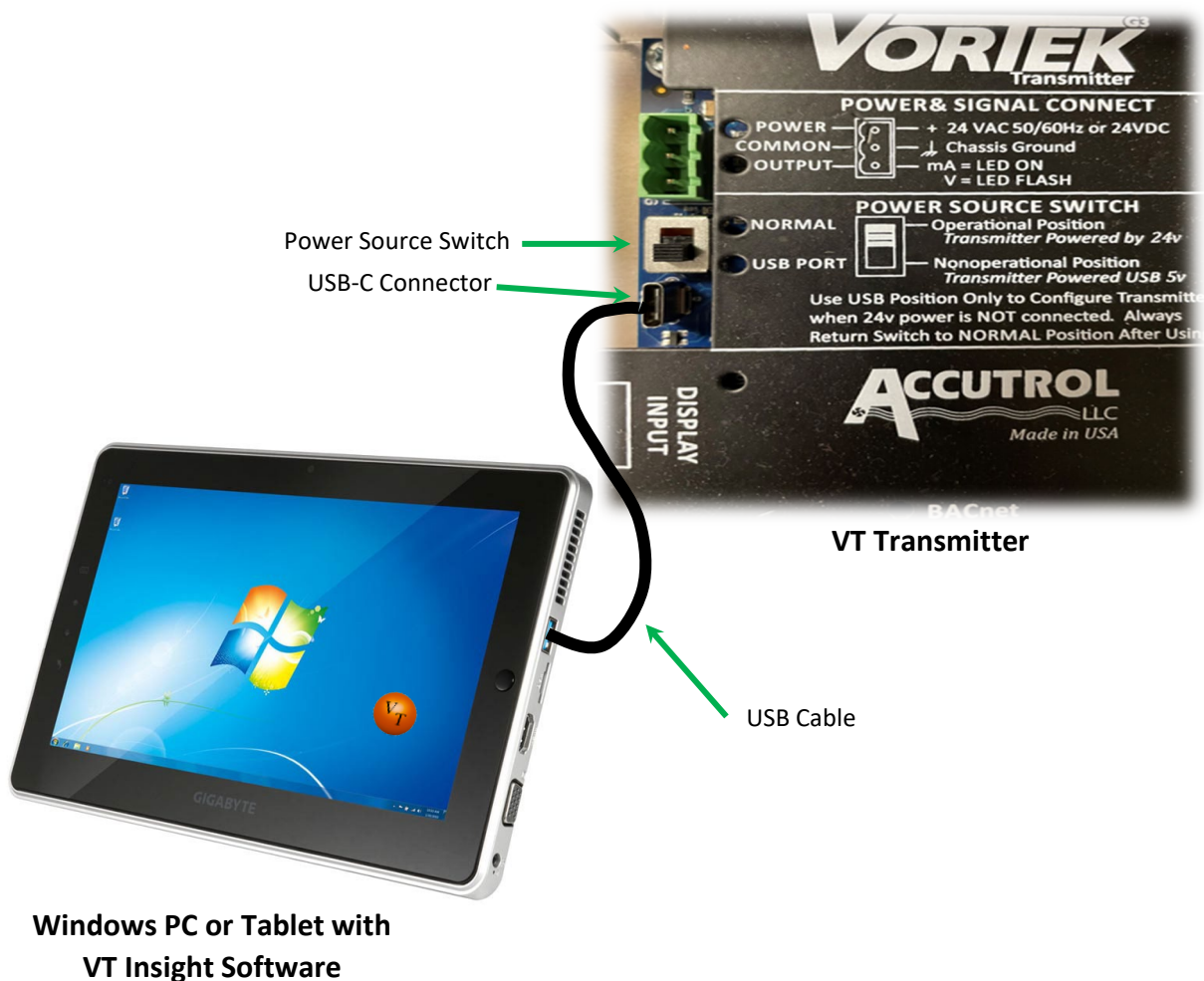
3.5 Connecting the PC to the Transmitter

If the transmitter is wired and powered by an external 24v power source, simply connect the USB cable from the computer to the transmitter USB port.

If the transmitter is not yet powered by the external 24v power source, the transmitter can be temporarily powered by the 5 VDC supplied from the USB port of the computer. This is a convenient feature for configuring the VT BACnet parameters or checking the transmitter configuration prior to having the 24v power source connected. To power the transmitter from the 5 VDC USB supply, move the Power Source Switch to the “USB Port” position and attach the USB cable from the computer to the transmitter USB port. The “USB Port” LED should be illuminated to indicate the transmitter is being powered from the 5 VDC USB port. Open the VT Insight Program and you will have access to view the configuration and make any changes required. After completing the configuration, save any changes that have been made and then close Insight. Now disconnect the USB cable from the transmitter then return the Power Source Switch to the “Normal” position.



Note: If the Power Source Switch is left in the “USB Port” position, the transmitter will not operate properly when power is supplied by the BMS 24v input power connection. Therefore, it's important to return the Power Source Switch to the “NORMAL” position.

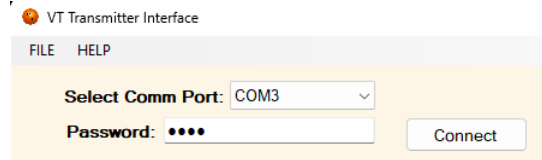


3.6 Using VT Insight Software

To open the VT Insight application, double click on the VT Insight Icon from within the Accutrol Software Manager or select VT Insight from the Start Menu.



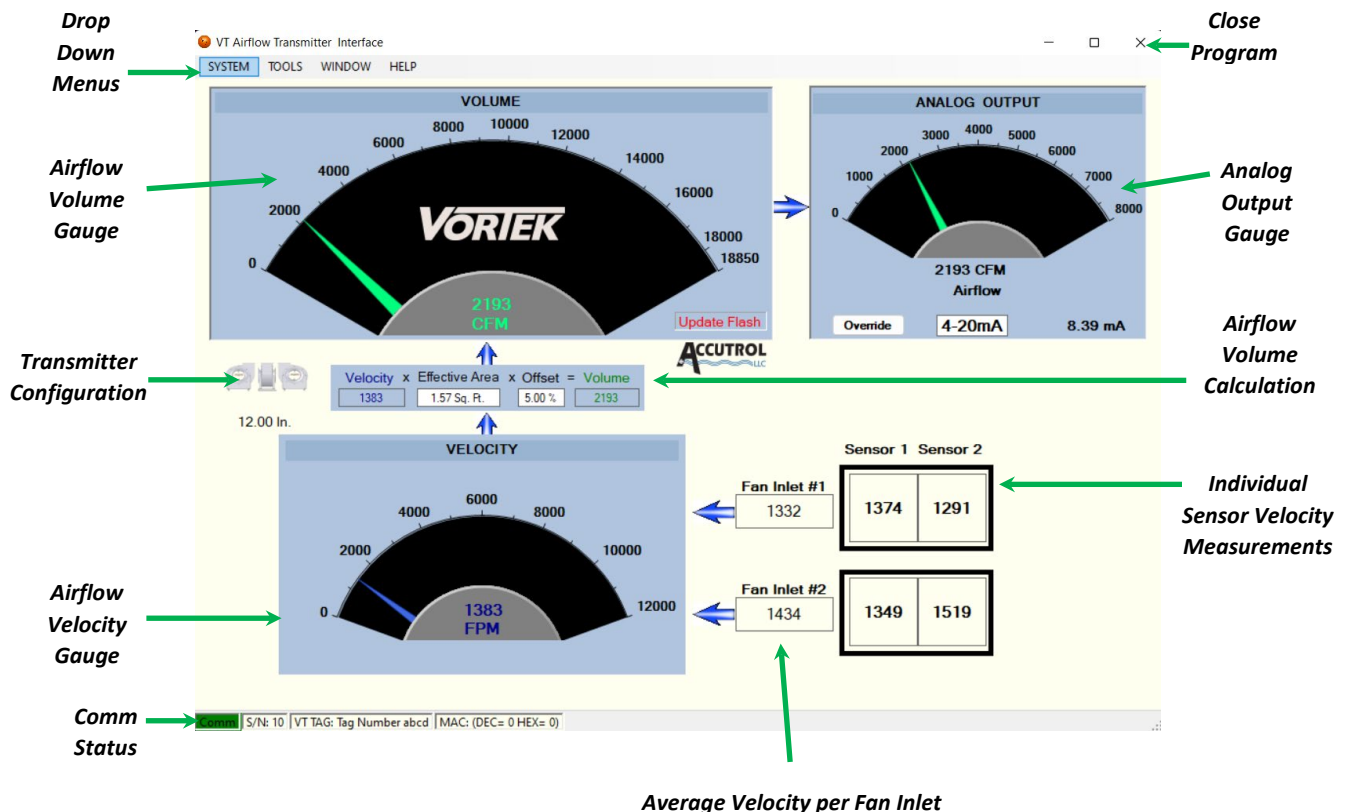
Select the appropriate COM port for the transmitter then select Connect.



Note: If you're not sure which COM port your computer is using for the VT transmitter, then disconnect the USB cable and view the drop-down list noting the COM ports that are included in the list. Now reconnect the USB cable and view the drop-down list. The new COM port added to the bottom of the list is the correct COM port.

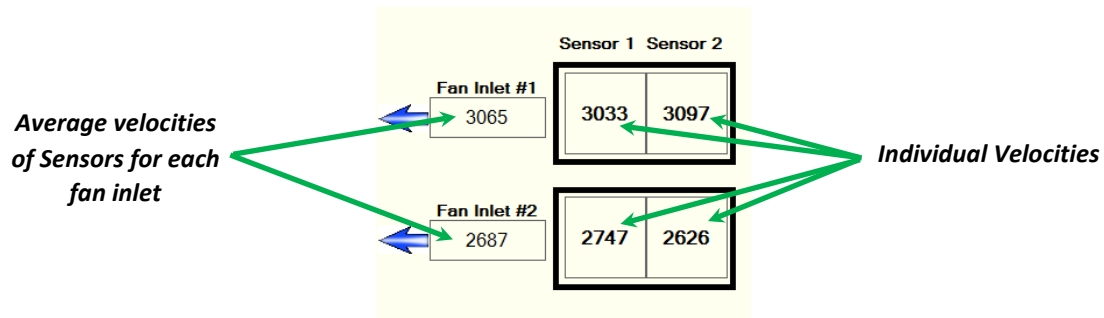
3.6.1 VT Insight Dashboard

The VT Insight Dashboard is the primary screen for accessing the parameters and viewing the real-time performance of the VT airflow monitor. The Dashboard provides an intuitive graphical user interface that is easy to understand and provides access to the majority of field-configurable parameters with one click. The diagram below identifies the different objects of the dashboard followed by brief descriptions of each provided on the following pages.



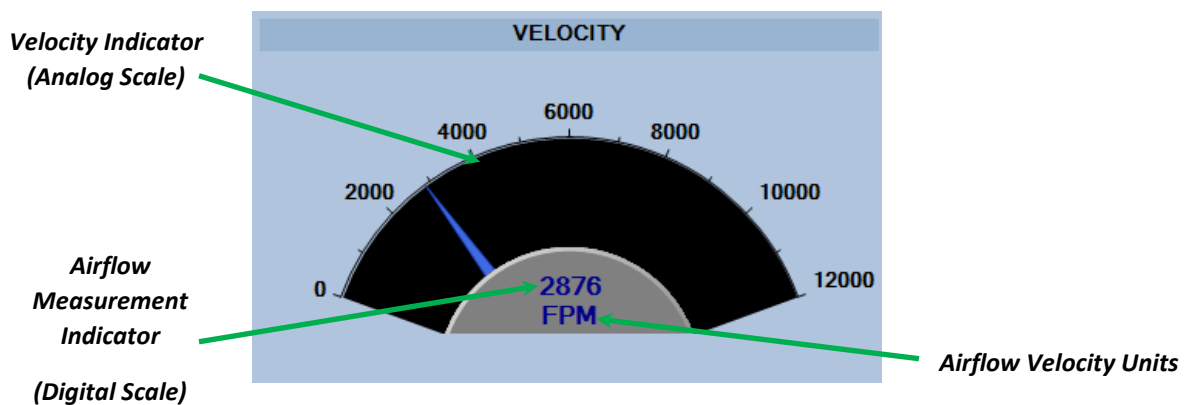
3.6.2 Sensor Velocity Measurements

This area of the dashboard displays the real-time sensor velocity measurement of each sensor and the average velocity measurement of each fan inlet. The example shown below is an application with 2 fan inlets, each with 2 sensors, which is a 2x2 VTF configuration.



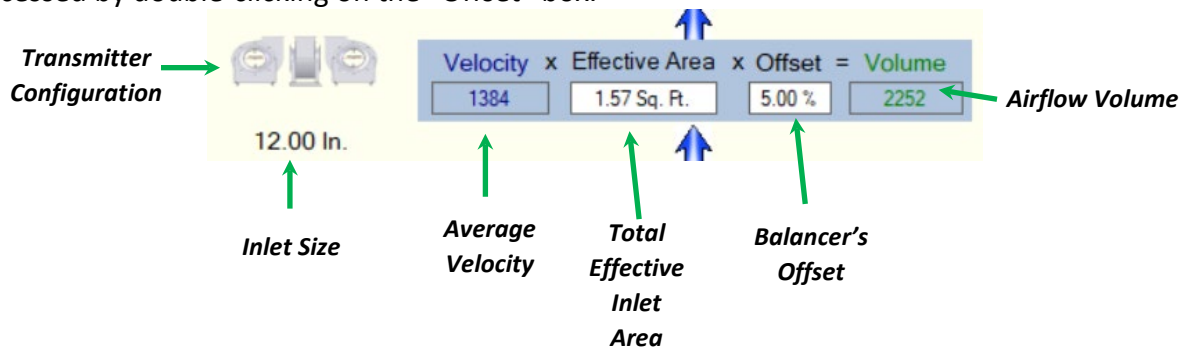
3.6.3 Velocity Gauge

The Velocity Gauge provides an indication of the average velocity for all the fan inlet sensors.



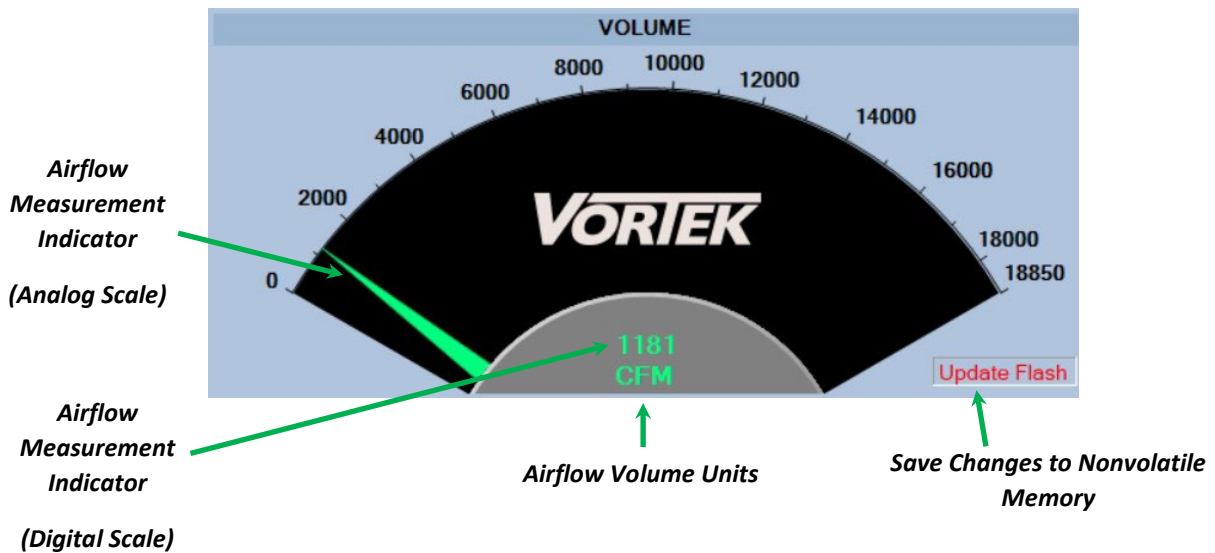
3.6.4 Volume Calculation Block

The Volume Calculation Block shows the real-time data that are used to derive the Airflow Volume measurement. The "Transmitter Configuration" window can be accessed by double-clicking on the "Configuration" or "Area" box. The "Balancer Volume Offset" window can be accessed by double-clicking on the "Offset" box.



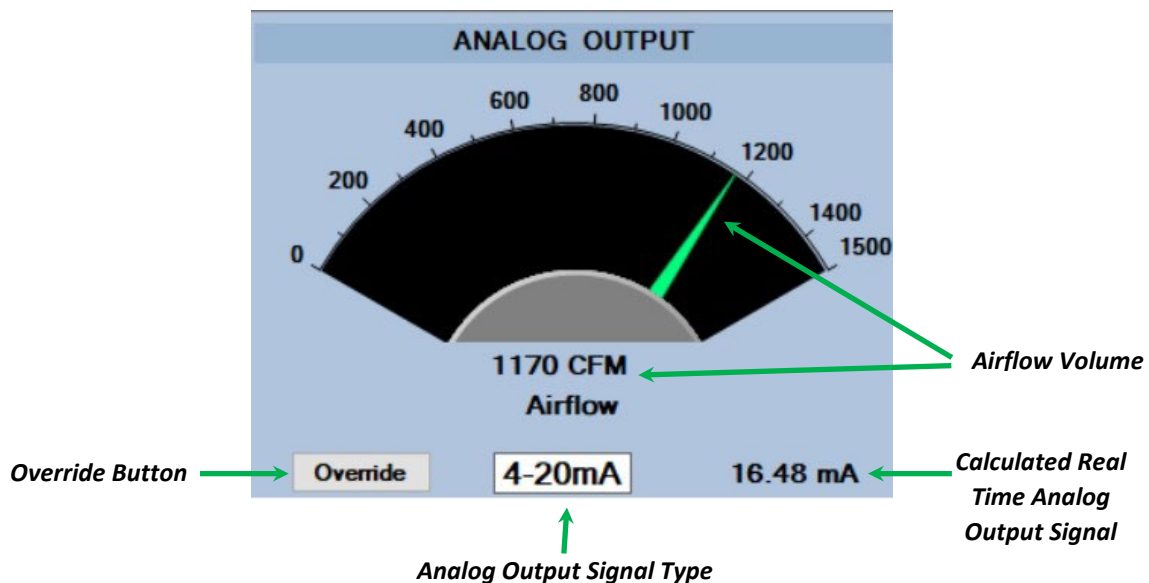
3.6.5 Airflow Volume Gauge

The Airflow Volume Gauge provides an indication of the real-time airflow volume measurement in the fan. This reading is derived from the average sensor velocity, fan inlet area(s) and Balancer offset.



3.6.6 Analog Output Gauge

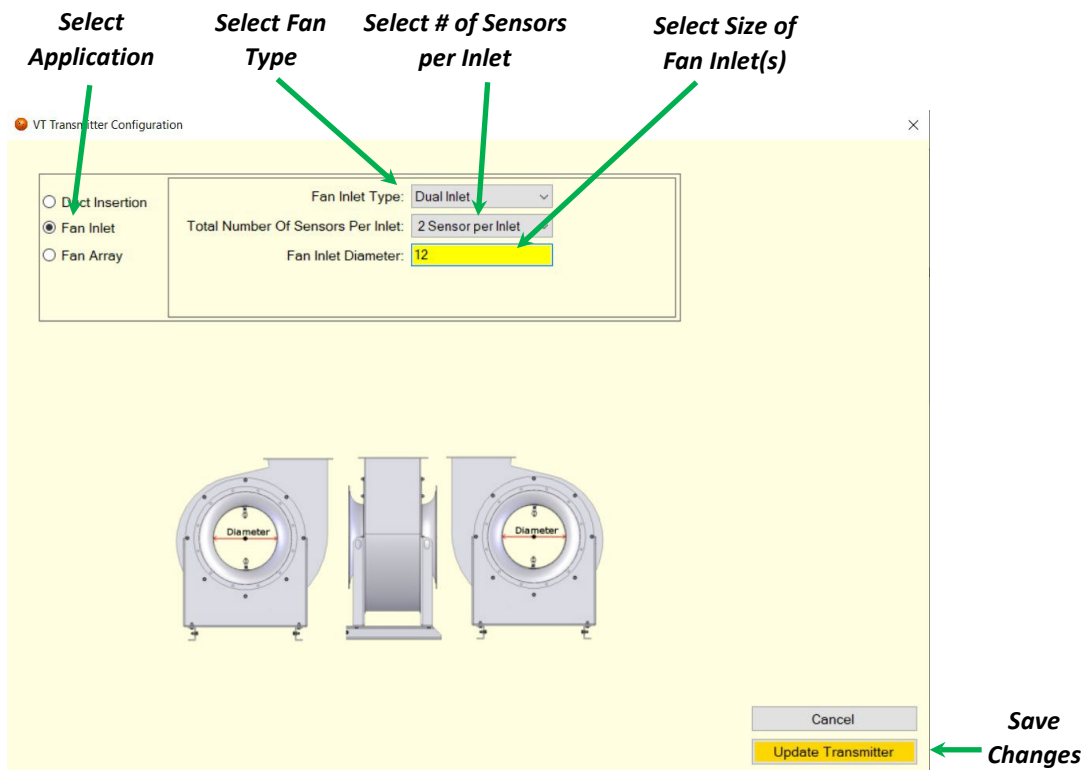
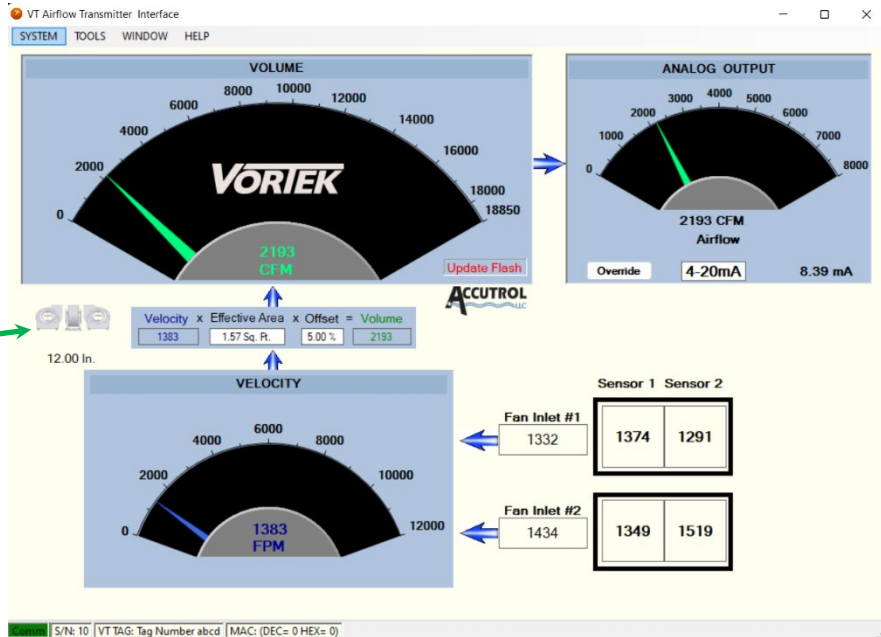
The Analog Output Gauge displays the airflow volume on a gauge that has the same full-scale range as the Analog Output Signal. In addition to displaying the airflow volume, this gauge also shows the signal type and the calculated real time output signal that corresponds to the airflow volume. Double-clicking on the gauge will open the Analog Output Configuration window.



3.6.7 Configuration Window

Each transmitter is factory-configured; therefore, field configuration should not be required. However, if for some reason the transmitter configuration needs to be modified, it can be done using the VT Insight Configuration Window.

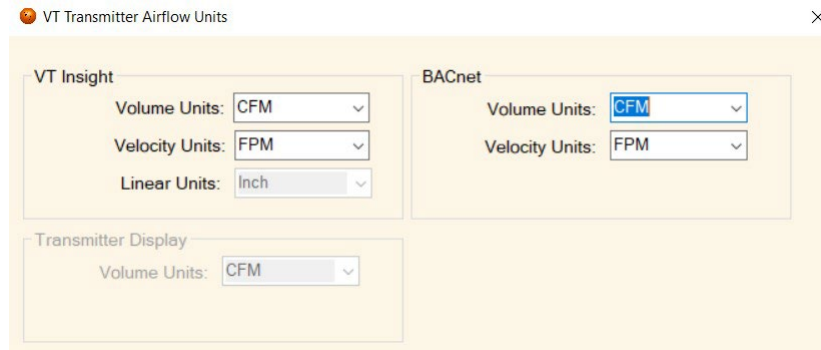
- 1 Apply power and connect the USB cable per Section 3.5.
- 2 Select the Com port.
- 3 If the transmitter configuration shown on the dashboard does not match your application, move the cursor to the fan inlet figure and double click to select.



- 4 After saving changes, close the window and verify your changes appear on the Dashboard.
- 5 When the fan is turned on, one should see the sensors reporting velocity values.

3.6.8 Units of Measurement

To change the Units of Measurement, double-click on the bottom of the Airflow Volume Gauge to open the window shown below. Select the appropriate units for the application and save changes before closing the window.



VT Transmitter Airflow Units

VT Insight

Volume Units: CFM

Velocity Units: FPM

Linear Units: Inch

BACnet

Volume Units: CFM

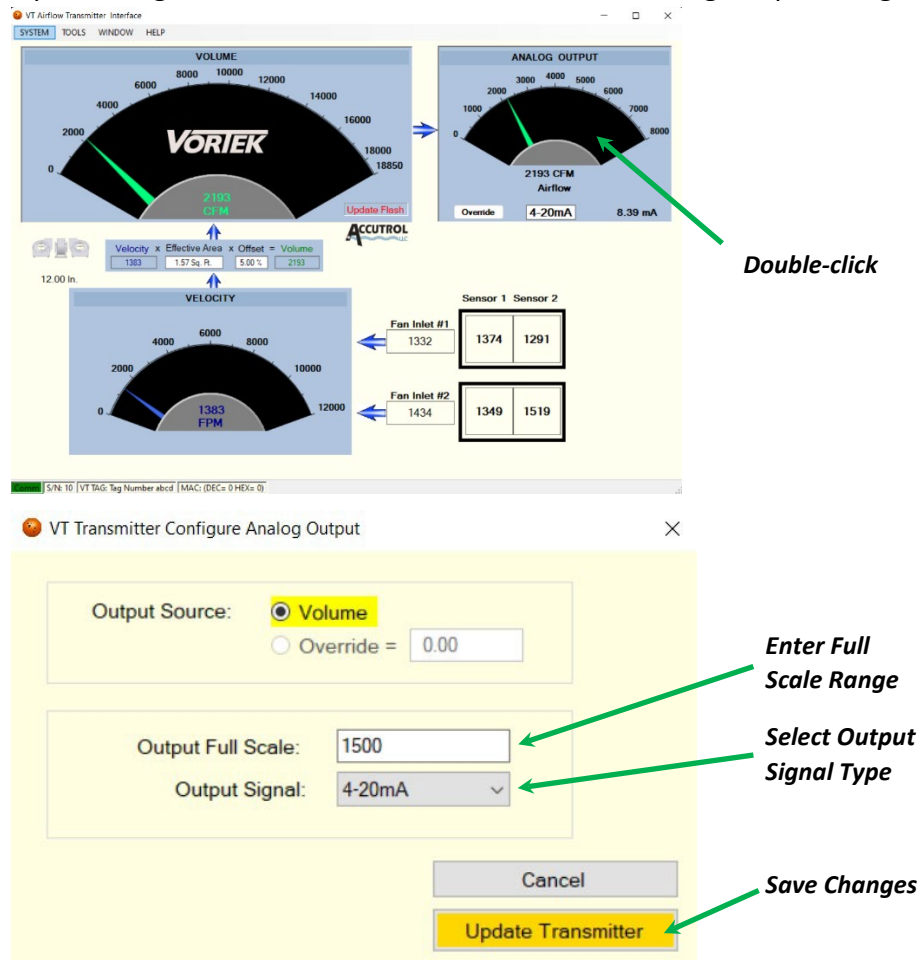
Velocity Units: FPM

Transmitter Display

Volume Units: CFM

3.6.9 Analog Output Configuration

To open the Analog Output Configuration Screen, double-click on the Analog Output Gauge.



The process involves two windows. The first window, 'VT Airflow Transmitter Interface', shows three gauges: VOLUME (0-18850 CFM), VELOCITY (0-12000 FPM), and ANALOG OUTPUT (0-8000 mA). A green arrow points to the ANALOG OUTPUT gauge with the label 'Double-click'. The second window, 'VT Transmitter Configure Analog Output', shows the configuration options. A green arrow points to the 'Output Source' dropdown with the label 'Enter Full Scale Range'. Another green arrow points to the 'Output Signal' dropdown with the label 'Select Output Signal Type'. A third green arrow points to the 'Update Transmitter' button with the label 'Save Changes'.

VT Airflow Transmitter Interface

SYSTEM TOOLS WINDOW HELP

VOLUME

0 2000 4000 6000 8000 10000 12000 14000 16000 18000 18850

2193 CFM

Update Flash!

VELOCITY

0 2000 4000 6000 8000 10000 12000

1383 FPM

ANALOG OUTPUT

0 2000 4000 6000 8000

2193 CFM Airflow

Override 4-20mA 8.39 mA

Velocity x Effective Area x Offset = Volume

1383 x 1.57 Sq. Ft. x 5.00 % = 2193

12.00 In.

Sensor 1 Sensor 2

Fan Inlet #1 1332 1374 1291

Fan Inlet #2 1434 1349 1519

VT Transmitter Configure Analog Output

Output Source: ☒ Volume ☐ Override = 0.00

Output Full Scale: 1500

Output Signal: 4-20mA

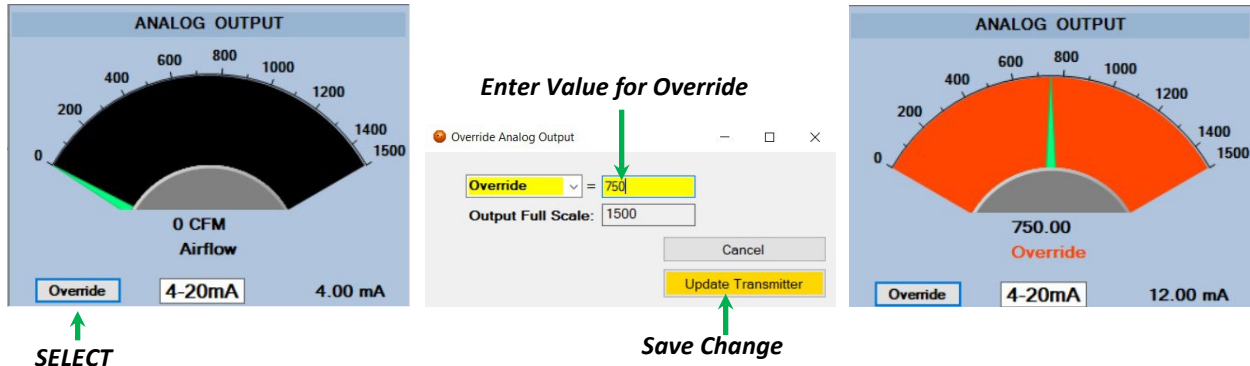
Cancel

Update Transmitter

Enter the appropriate Full Scale and Output Signal Type required for the application, then save changes when complete.

3.6.10 Analog Output Override

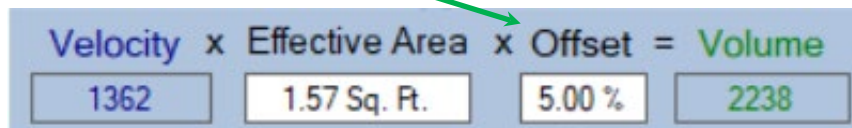
The transmitter's Analog Output can be overridden, which is a useful feature to verify the analog output signal is reaching the receiving device (BMS controller) at the expected signal level. To open the Override window, select the "Override" button located at the lower left of the Analog Output Gauge. Enter the value you would like the analog output signal to be driven to. Select Update Transmitter to save change.



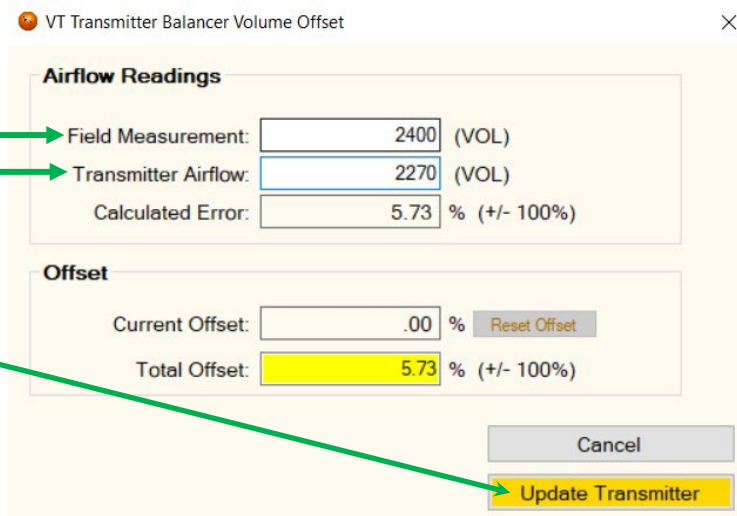
The example shown above will result in the Analog Output Signal reading 12.00 mA which is 50% of the full-scale output signal, as indicated on the Analog Output Gauge above on the right. Note that the gauge face is orange to indicate that the analog output signal is being overridden. Be sure to release the Analog Output to "Normal" before disconnecting from the transmitter.

3.6.11 Balancer Volume Offset

Adjustments can be made when working with the Balancing contractor to correlate the measured airflow volume with an external field measurement device. To open the Balancer Offset Window, double-click on the "Offset" box located in the Volume Calculation Block on the Dashboard.

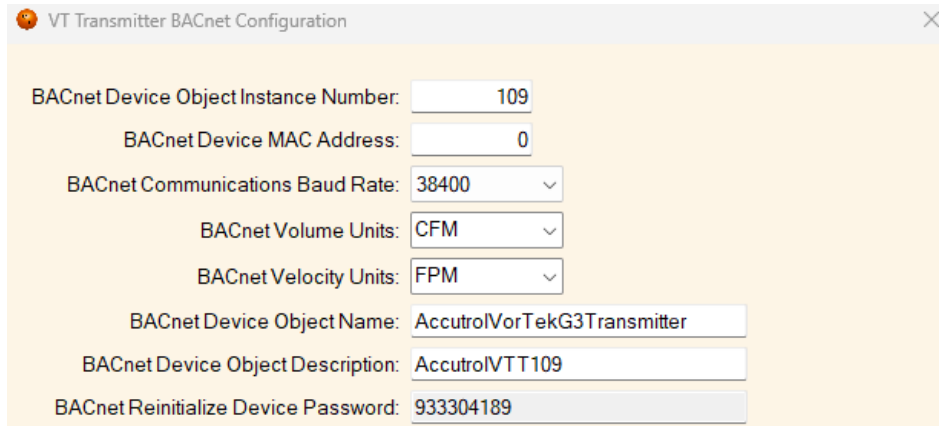


Enter the field measurement and the transmitter airflow volume measurements in the appropriate boxes. To commit the offset to memory, select "Update Transmitter".



3.6.12 BACnet Configuration

The BACnet selection is only available when a BACnet card is installed on the IO Module. The BACnet window shown below is used to configure the BACnet communication settings for the unit.



The image shows a software window titled "VT Transmitter BACnet Configuration". It contains several input fields and dropdown menus for configuring BACnet settings. The fields are as follows:

Field Name	Value
BACnet Device Object Instance Number	109
BACnet Device MAC Address	0
BACnet Communications Baud Rate	38400
BACnet Volume Units	CFM
BACnet Velocity Units	FPM
BACnet Device Object Name	AccutrolVorTekG3Transmitter
BACnet Device Object Description	AccutrolVTT109
BACnet Reinitialize Device Password	933304189

Device Configuration: Enter the BACnet Instance Number, MAC Address and Baud Rate. A BACnet Baud Rate of zero (0) will disable BACnet Communications, preventing conflicts on a working BACnet Network.

Volume & Velocity Units: Using the drop-down menu, select the volume and velocity units required for the application.

Device Object Name & Device Object Description: The default name and description can be change to meet the requirements of the BMS network.

Reinitialize Device Password: Each VTF transmitter has a unique password which is stored in non-volatile memory. This password is required when issuing a "controller reinitialization command over BACnet.

SECTION 4 – BACNET OPTION

BACnet® is a standard data communication protocol designed specifically for building automation and control networks. The Accutrol VT Transmitter uses the BACnet MS/TP (Master-Slave/Token Passing) protocol which is a type of MAC layer implemented using the EIA-485 signaling standard. The performance of the MS/TP network is heavily influenced by the network traffic load, the assignment of MS/TP node addresses and the network configuration parameter *Nmax_info_frames*. Additionally, it is imperative the physical network layer is properly configured (cabling, EOL terminations, bias, etc...) and is verified to be reliable otherwise the network performance can be compromised.

4.1 BACnet Objects

The Accutrol VT Transmitter product family supports a collection of BACnet-visible objects. The table on the following page defines the visible objects for each model of the VT Transmitter Product Family which includes models; VTD for Duct Applications, VTF for Fan Inlet Applications, and VTFA for Fan Array Applications.



All objects discovered may not be active in every application.

			Parameter By Model Type		
Point	Object Description	Present Value Type	VTD	VTF	VTFA
DE ###	Device Instance	Write	###	###	###
AI1	Airflow Volume	Read	Volume	Volume	Volume
AI2	Airflow Velocity	Read	Velocity	Velocity	N/A
AI3	Flash Writes Remaining	Read	Note 1	Note 1	Note 1
AI4	Airflow Channel 1 – Sensor 1	Read	Velocity	Velocity	Volume
AI5	Airflow Channel 1 – Sensor 2	Read	Velocity	Velocity	Volume
AI6	Airflow Channel 1 – Sensor 3	Read	Velocity	Velocity	Volume
AI7	Airflow Channel 1 – Sensor 4	Read	Velocity	Velocity	Volume
AI8	Airflow Channel 2 – Sensor 1	Read	Velocity	Velocity	Volume
AI9	Airflow Channel 2 – Sensor 2	Read	Velocity	Velocity	Volume
AI10	Airflow Channel 2 – Sensor 3	Read	Velocity	Velocity	Volume
AI11	Airflow Channel 2 – Sensor 4	Read	Velocity	Velocity	Volume
AI12	Airflow Channel 3 – Sensor 1	Read	Velocity	Velocity	Volume
AI13	Airflow Channel 3 – Sensor 2	Read	Velocity	Velocity	Volume
AI14	Airflow Channel 3 – Sensor 3	Read	Velocity	Velocity	Volume
AI15	Airflow Channel 3 – Sensor 4	Read	Velocity	Velocity	Volume
AI16	Airflow Channel 4 – Sensor 1	Read	Velocity	Velocity	Volume
AI17	Airflow Channel 4 – Sensor 2	Read	Velocity	Velocity	Volume
AI18	Airflow Channel 4 – Sensor 3	Read	Velocity	Velocity	Volume
AI19	Airflow Channel 4 – Sensor 4	Read	Velocity	Velocity	Volume
AI20	Number of Fans	Read	N/A	N/A	Value
AV1	Unsubscribed COV Interval	Write	Sec	Sec	Sec
AV2	Airflow Volume Measurement Adjust	Write	%	%	%
BV1	Write to Flash	Write	Note 1	Note 1	Note 1
MSI1	Airflow Volume Units	Write	1=CFM 2=CMS 3=CMM 4=CMH 5=LPS 6=LPM	1=CFM 2=CMS 3=CMM 4=CMH 5=LPS 6=LPM	1=CFM 2=CMS 3=CMM 4=CMH 5=LPS 6=LPM
MSI2	Airflow Velocity Units:	Write	1=FPM 2=MPM 3=MPS	1=FPM 2=MPM 3=MPS	N/A

Notes:

1: Writing a value of (1) to the BACnet Object BV1 will cause the transmitter to copy the active configuration stored in volatile memory (RAM) and write it to nonvolatile memory (FLASH). Reference Section 4.1.1 for a detailed description.

⚠ CAUTION: Nonvolatile Flash memory has a limited number of Lifetime Write Cycles, therefore writing to Flash memory should be used only when necessary.

In general the standard AI, AV, BV and MSI objects support required properties for those object types. Object_Name is writable with provision for 64-character maximum length names. BV Inactive_Text and Active_Text, and MSI State_Text are writable.

Standard object property values other than Present_Value shall respond as follows:

- Object_Identifier: generated automatically from request
- Object_Type: generated automatically from request
- Object_Name: writable
- Polarity: always NORMAL
- Units: Reference Table above, MSI1 and MSI2
- State_Text, Inactive_Text, Active_Text: writable
- Status_Flags: always {FALSE,FALSE,FALSE,FALSE}
- Event_State: always NORMAL
- Out_Of_Service: always FALSE

Objects; AI and AV shall support the COV_INCREMENT property which shall also be writable.

4.1.1 Save Active Configuration to Nonvolatile Flash Memory

The Accutrol VT Transmitter has both volatile (RAM) and nonvolatile (Flash) memory. RAM memory does not have a limitation on the number of times it can be written, whereas Flash memory does. RAM memory is used by the transmitter to store and retrieve active values which are not retained when the power to the transmitter is lost. Values stored in Flash memory are copied to RAM memory during the power up sequence of the transmitter.

Writing a value of one (1) to the BACnet Object BV1 will cause the transmitter to copy the active configuration stored in volatile memory (RAM) into nonvolatile memory (Flash). Once values have been saved to nonvolatile memory, they will retain their value through power cycles. Nonvolatile Flash memory has a limited lifetime number of write cycles which can be monitored via the BACnet Object AI3.

4.2 Unsubscribed COV

The AV1 object Present_Value shall specify an interval in whole seconds at which the transmitter shall periodically issue Unsubscribed COV Notifications as local segment broadcasts. An AV1 value of zero shall disable this behavior. When non-zero, the Unsubscribed COV shall also be issued if the Present_Value of any AI object changes by more than the COV_INCREMENT for the corresponding object. If COV_INCREMENT is zero for a given object, it shall also disable Unsubscribed COV for that object, even if AV1 is non-zero.



The VT Transmitter includes a USB port which provides local connectivity for programming the Transmitter using the PC based software tool “VT Insight” described in Section 3. For BACnet operation, the PC must be disconnected from the local USB port to avoid conflicts.

SECTION 5 – MAINTENANCE AND TROUBLESHOOTING

There is no recommended scheduled maintenance required for this product. Below are some useful notes and troubleshooting tools.



Notes:

- *If you have more than one application operating on your PC along with Insight, the Insight Dashboard will appear to freeze until your cursor is within the frame of the dashboard and something is selected within the Insight frame.*
- *If some of the sensors don't show flow when the Insight window is active, it may be because the velocity is too low, too many sensors were chosen in the configuration window for what is installed, or you may have a sensor that is not functioning due to a blockage or erratic flow pattern. If everything is configured correctly, extract the Sensor from the fan inlet and inspect.*



Note: *When all desired changes are made, it is good practice to select “Update Flash” as this will save all changes to the transmitter.*

APPENDIX A: DOCUMENT REVISION HISTORY

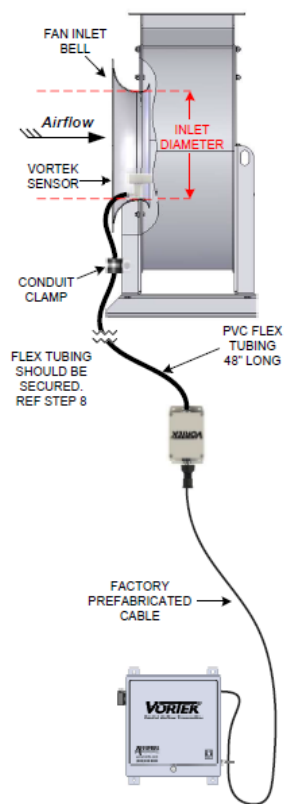
Revision History		
ECN #	New Rev.	New Filename
2272	A	VTF Installation and Operation Manual
Section	Description of Change	
Entire Document	First release	
2312	B	VTF Installation and Operation Manual
Section	Description of Change	
Appendix B-C	UPDATED TO MATCH SUBMITTAL DOC	
2602	C	VTF Installation and Operation Manual
Section	Description of Change	
Front Cover	Updated manual version to C	
Page 2	Added section on purge mode	
Page 3	Added EMC and safety section	
Appendix D	Added options section for units	
Appendix B	Added note about when to apply second VTF based on fan dia	
2870	D	VTF Installation and Operation Manual
Section	Description of Change	
Cover	Updated version up from C to D.	
Throughout IOM	Removed all mention of 'G3'. Renamed VTG3 Insight to VT Insight. Updated Images of VT Insight.	
Page ii	Added [™] to VorTek.	
Pages 2 & 3	Updated Submittal Documentation.	
Page 4	Updated List of Materials and VTF Probe Image.	
Pages 5 & 6	Updated download and registration process for VT Insight. Includes VT Insight Icon and Images.	
Appendix B-D	Updated Submittal Documentation.	
3074	E	VTF Installation and Operation Manual
BACnet Configuration	Added BACnet Configuration section, included Reinitialization password.	

APPENDIX B: SENSOR INSTALLATION INSTRUCTIONS

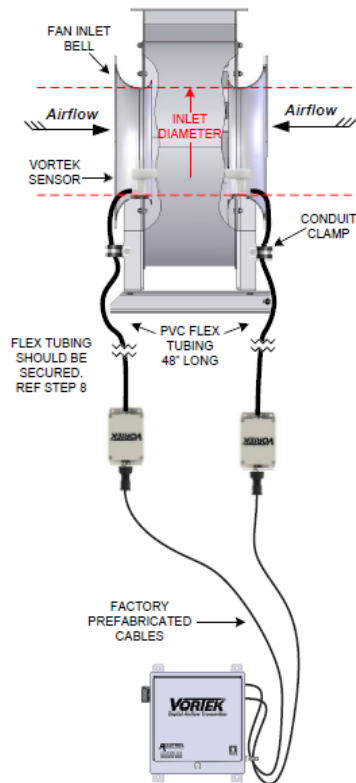
SENSOR INSTALLATION

NOTE: When using a fan with an Inlet Diameter greater than 24", a second Vortek probe may be used depending on inlet conditions. There is no minimum fan size.

SWSI FAN



DWDI FAN



CAUTION: Only use the mounting hardware provided with the sensors and follow the instructions below, otherwise damage to the fan may result. If hardware is missing contact the factory.

MOUNTING HARDWARE PROVIDED WITH EACH SENSOR:

- (2) #10-32 Well-Nuts with Threaded Inserts
- (2) #10-32 x 1/4" Long Phillips Screws
- (2) #10 Split Lock Washers
- (1) Drilling Template Label
- (1) Conduit Clamp
- (1) Screw, #10x1/2", SS, TEK

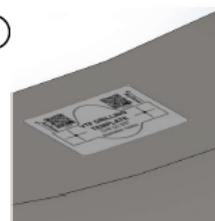
WARNING: Use safety glasses and cut-resistant gloves when installing sensors. Verify the circuit providing power to the fan is turned off and there is no power at the fan motor.

TOOLS REQUIRED:

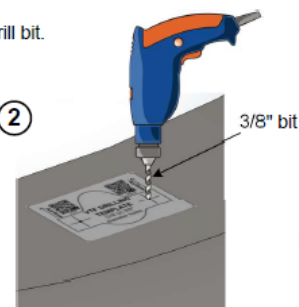
- Drill with a 3/8" Drill Bit
- #2 Phillips Screwdriver with Torque Indicator

1. Position the drilling template label into the throat of the fan inlet bell (smallest diameter) with airflow direction indicator facing towards the fan blades. Verify the fan blades will not come in close contact with the sensor and there are no obstructions in front of the sensor.
2. Drill a hole at each location using a 3/8" diameter drill bit.

1

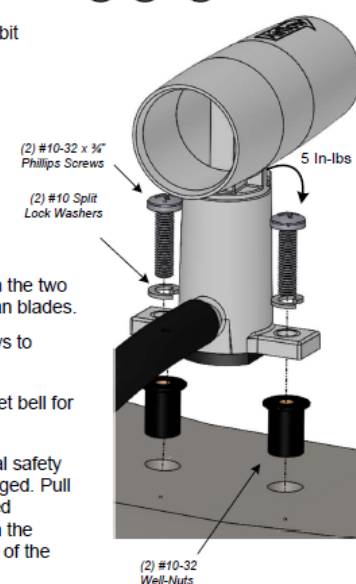


2



3. Insert the 2 well-nuts into the 3/8" diameter holes.
4. Place the sensor into the fan inlet bell and align the two holes in mounting bracket with the two well-nuts. Verify the airflow direction indicator on the sensor is pointing towards the fan blades.
5. Secure the sensor in place using mounting hardware supplied. Tighten the two screws to 5 inch-pounds.
6. For applications with two sensors, select mounting location on the opposite side of inlet bell for the second sensor and repeat above steps.
7. In addition to serving as a signal conduit, the flexible tubing also provides a mechanical safety connection to prevent the sensor from getting pulled into the fan if it becomes disengaged. Pull the flexible conduit away from the fan inlet and secure it to a surface using the provided Conduit Clamp so it is not in the air stream and there is no slack in the tubing between the sensor and mounting hardware. Secure the Sensor Electronics Enclosure in place out of the airstream.
8. For dual inlet applications, repeat above steps for other inlet side.

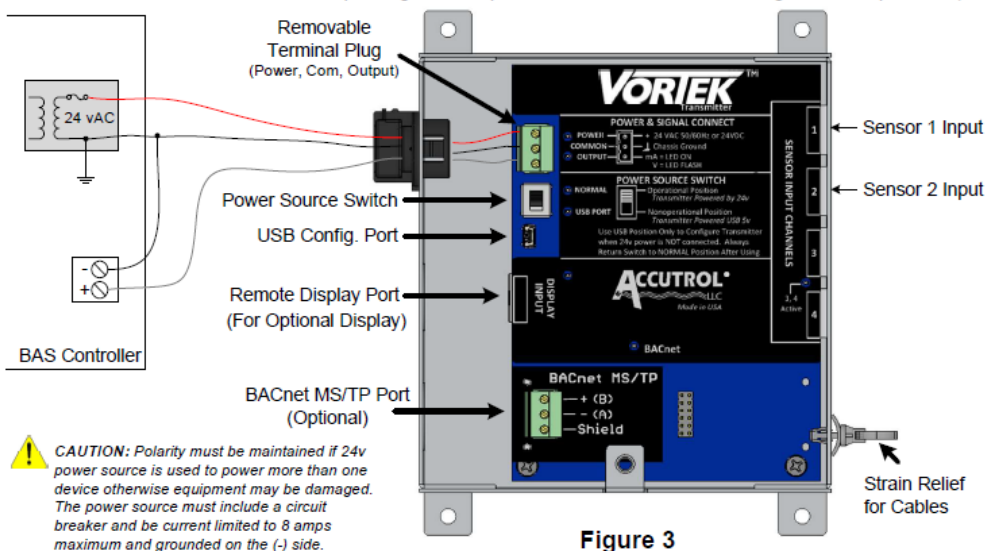
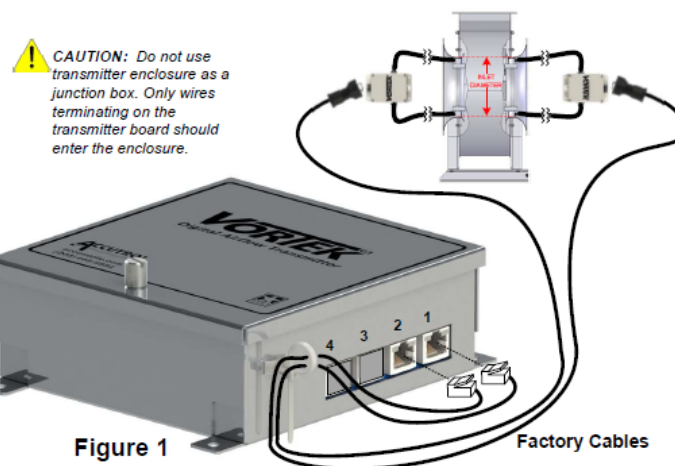
3 4 5



APPENDIX C: TRANSMITTER INSTALLATION INSTRUCTIONS

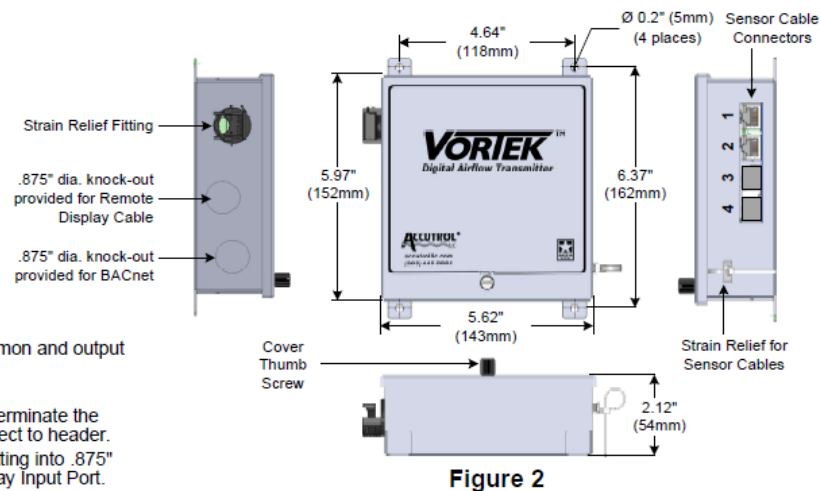
TRANSMITTER INSTALLATION

1. Select an easily accessible location to install the transmitter within the range of the sensor cables that have been provided. Provide clearance to remove the cover and easily access the connectors and field connections.
2. Using the four 0.20" diameter holes located on the transmitter enclosure, secure the transmitter to mounting surface using (4) #8 or #10 Pan Head Screws. For sheet metal mounting surface, use sheet metal or tek screws, for plywood surface use coarse thread wood screws, for drywall surface, use drywall anchors with the appropriate screws.
3. Connect each sensor to the corresponding sensor input channel on the transmitter using the cables provided (Reference Figure 1)



TRANSMITTER WIRING

1. Loosen the thumb screw located on the transmitter enclosure cover and remove cover.
2. Run 3-conductor cable from the field controller to the transmitter through the strain relief fitting.
3. Remove the terminal block from the power/signal header, loosen the three screws and terminate the power, common and output signal wires in the terminal block per markings.
4. Tighten the terminal block screws, verify wires are secure and reconnect to the header.
5. If BACnet is required; run BACnet MS/TP cable into enclosure, remove terminal block from BACnet header and terminate the BACnet wires in the appropriate terminals. Tighten the terminal block screws, verify wires are secure and reconnect to header.
6. If Remote Display is required; remove knock-out located directly in line with the Display Port, install strain relief fitting into .875" dia. hole, run the factory cable provided with the Remote Display into the enclosure and plug cable into the Display Input Port.



Contents of this Manual are Subject to Change Without Notification

Figure 1: Dimensions of the Vortek transmitter.

Dimensions shown:

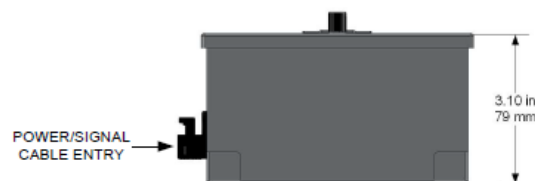
- Top width: 5.62 in (143 mm)
- Distance between probe cable connectors: 4.65 in (118 mm)
- Height: 6.37 in (162 mm)
- Height of internal display area: 5.97 in (152 mm)

Labels:

- PROBE CABLE CONNECTORS
- INTERNAL DISPLAY

Device features:

- VORTEK™ Digital Airflow Transmitter
- Accutrol logo and contact information: accutrol.com, (303) 445-9992
- CE mark
- UL mark



Front View Dimensions:

- Top Width: 11.35 in (288 mm)
- Bottom Width: 9.17 in (233 mm)
- Left Height: 8.58 in (218 mm)
- Right Height: 7.50 in (190 mm)

Front View Labels:

- VORIEK** (Logo)
- ACCUTROL** (Logo)
- INTERNAL DISPLAY (OPTIONAL)** (Label pointing to the screen)
- POWER/SIGNAL CABLE ENTRY** (Label pointing to the top connector)
- BACNET** (Label pointing to the top connector)

Rear View Dimensions:

- Top Right Height: 5.60 in (142 mm)
- Bottom Right Height: 5.91 in (150 mm)
- Bottom Width: 1.00 in (25.4 mm)

Rear View Labels:

- EXTERNAL LAY CONNECTOR PROVIDED WITH OPTIONAL INTERNAL DISPLAY** (Label pointing to the left connector)
- NEMA 4X PROBE CABLE CONNECTORS** (Label pointing to the bottom connectors)
- 1, 2, 3, 4** (Labels for the NEMA 4X probe cable connectors)

Diagram Description: The diagram shows a rectangular, light-colored VORIEK™ Air/Low Probe unit. A black cable is connected to the top of the unit. A dimension line indicates a distance of 1.00 in (25.4 mm) from the top of the unit to the cable connection point. A note with a yellow triangle icon states: "Note: If the factory cable is not long enough, a 52' (16m) long M/F extension cable (p/n 23-0115) can be connected to the factory cable to extend the length. Extension cable is sold separately. See 'Weatherproof Extension Cable - VorTek' Submittal drawing for details." A 1/4" Barbed Brass Fitting for Purge (Optional) is shown connected to the side of the unit. A dimension line on the left indicates a distance of 91 in (2300 mm) from the bottom of the unit to the cable connection point. A black corrugated cable is shown connected to the bottom of the unit, and a white cable connector is shown separately.

Diagram Labels:

- 1.00 in 25.4 mm
- 1/4" Barbed Brass Fitting for Purge (Optional)
- 91 in 2300 mm
- VORIEK™**
AIR/LOW PROBE

Note: If the factory cable is not long enough, a 52' (16m) long M/F extension cable (p/n 23-0115) can be connected to the factory cable to extend the length. Extension cable is sold separately. See "Weatherproof Extension Cable - VorTek" Submittal drawing for details.

Note: If cable is to be run through conduit, be sure to size the conduit to accommodate the cable connectors.