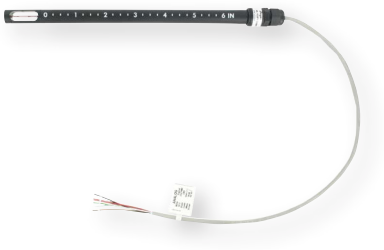
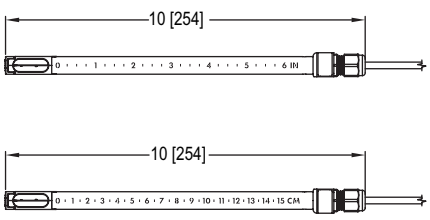
Series AVPT Pencil Style Air Velocity Transmitter

Specifications - Installation and Operating Instructions





6˝ probe length **12˝ probe length**

The **Series AVPT Pencil Style Air Velocity Transmitter** uses thermal anemometer technology to provide high accuracy and stable air velocity measurements in imperial and metric units. The Series AVPT can be configured with either a voltage output or BACnet MS/TP communication to provide universal inputs to a variety of monitoring equipment. Models are available with fixed cable lengths of 20 or 78 inches with flying leads or a 5-pin M12 connector on a 24 inch cable. Probes are available in lengths of 6 or 12 inches. A mounting flange included with the product provides the ability to vary insertion depth.

Models are available in 3% or 5% accuracy to suit a variety of applications, while the optional BACnet MS/TP communication protocol allows units to be daisy-chained to provide access to all of the velocity and temperature measurements.

MODEL CHART

Example	AVPT	-S	03	C1	A	06	127	-FC	AVPT-S03C1A06127-FC
Series	AVPT								Pencil style air velocity transmitter
Accuracy		S H							Standard ±5% of reading +40 FPM High accuracy ±3% of reading +40 FPM
Velocity Range			01 02 03 04 05 10 15 20						1000 FPM 2000 FPM 3000 FPM 4000 FPM 5 m/s 10 m/s 15 m/s 20 m/s
Electrical Connection				C1 C2 M1					Cable whip 20˝ (0.5 m) Cable whip 78˝ (2 m) M12 24˝ (0.6 m)
Output Type					A B				Analog 0-5 V and 0-10 V BACnet MS/TP
Probe Length						06 12			6˝ 12˝
BACnet Address							127		000-127 whole integer with BACnet output
Options								FC NIST	Factory calibration certificate NIST traceable certificate

SPECIFICATIONS

Service: Clean air.
Ranges: 1000, 2000, 3000, or 4000 FPM (5, 10, 15, or 20 m/s); Model specific.
Accuracy: Standard: ±(5% reading +40 FPM); High accuracy: ±(3% reading +40 FPM); Model specific.
Power Requirements: 24 VAC/VDC ±20%.
Current Consumption: < 50 mA.
Outputs: Analog: 0-10 V (0-5 V configurable).
BACnet MS/TP: Selectable at time of order.
Supported Baud Rate: 9600, 19200, 38400, 57600, 76800, and 115200.
Voltage Output Load Resistance: 10k Ω minimum (10 V output with AC supply); 1k Ω minimum all other conditions.
Electrical Connection: Cable: Plenum rated cable with 22 AWG conductors.
5-Conductor Cable whip: 20˝ (0.5 m) or 78˝ (2 m).
5-pin M-12: 24˝ (0.6 m); model specific.
Response Time (90%): 4 s, typical.
Operational Temperature Limits: -4 to 140 °F (-20 to 60 °C).
Storage Temperature Limits: -40 to 140°F (-40 to 60°C).
Probe Length: 6˝ or 12˝; model specific.
Enclosure Rating: NEMA 3.
Mounting Orientation: Flow direction must be parallel to the sensor tip; See Installation section for details.
Weight: 1.4 oz (40 g); based on M12 connection with 12˝ probe length.
Agency Approvals: CE, RCM, BTL, UL plenum rated (UL tested).

INSTALLATION

Included Duct Mount Flange:
The transmitter should be mounted away from fans, corners, heating and cooling coils, and other equipment that will affect the measurement of the air velocity. It is recommended that the AVPT is mounted at least 10 duct diameters downstream of any disturbances and 5 duct diameters upstream of any disturbances, if possible.

1. Mark and drill a 0.750-0.938˝ (20-24 mm) diameter hole into the duct.
2. Insert and center the duct mount flange in the previously drilled hole and mark location of the three mounting screw holes.
3. Remove the mounting flange and drill or punch the mounting holes in the marked locations.
4. Fasten the flange to the duct using three #8 x 1/2˝ pan head sheet metal screws. Do not over tighten screws.
5. Insert the AVPT probe into the duct mount flange and set the desired insertion depth.
6. Note the flow direction and unit alignment as shown on sensor tip and product label, tighten probe retention set screw on the duct mount flange to affix the probe in place.

Electrical Connection:
The cable supplied with the BACnet version of the Series AVPT allows access to the device power and the BACnet MS/TP communication signals. An additional signal is also provided to recover the default BACnet communication settings based on the ordered configuration.

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Power Supply:
Choose a power supply with a voltage and current rating sufficient to meet the power specifications under all operating conditions. If the power supply is unregulated, make sure the output voltage remains within the required voltage range under all power line conditions. Ripple on the supply should not exceed 100 mV.

CAUTION DO NOT EXCEED SPECIFIED SUPPLY VOLTAGE RATINGS. PERMANENT DAMAGE NOT COVERED BY WARRANTY WILL RESULT.

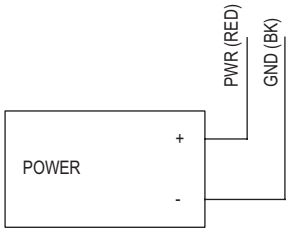

Figure 1: Power supply wiring

BACnet MS/TP Operation:

NOTICE Sensor is sensitive to Electro-Static Discharge (ESD). Follow industry standard practice for control and protection against ESD. Failure to exercise good ESD practices may cause damage to the sensor.

NOTICE Wiring should comply with ANSI/ASHRAE Standard 135-2010 BACnet A Data Communication Protocol for Building Automation and Control Networks, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 2010.

NOTICE Communications wiring should be in a daisy-chain whenever possible. Star connections are not recommended.

NOTICE Cable shield must be connected to earth ground at one location only.

BACnet MS/TP Setup:
BACnet MS/TP Common Power Supply:
To connect the AVPT in a network containing a common power supply, follow wiring diagram provided in Figure 2. Use a cable containing two twisted pairs. One pair is to be used for D1(+) and D0(-). The other pair is to be used for power and common. This configuration is not suitable for AC supplies. Use a DC supply only. Care should be taken that there are not too many devices powered from the same supply as voltage drops will occur in the wiring. If you have many devices, or have long cable runs, the local supply configuration may be a better choice.

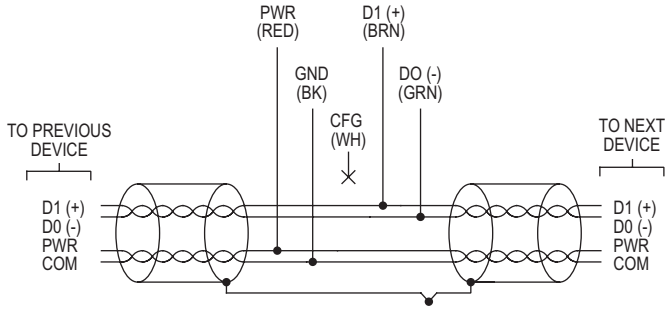

Figure 2: BACnet common power supply wiring

BACnet MS/TP Individual Power Supply:
To connect the AVPT in a network containing individual local supplies, follow the wiring diagram provided in Figure 3. Use a cable containing a twisted pair and a single conductor. The pair is to be used for D1(+) and D0(-). The single conductor is to be used for common. Both AC and DC supplies are suitable for this configuration.

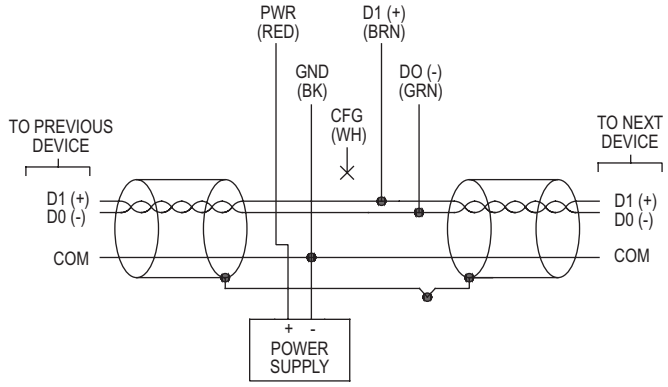

Figure 3: BACnet individual power supply wiring

In either configuration you must use shielded cable. Connect the shield to earth ground at one location only to prevent ground loops.

All devices in the network should be daisy chained. Star connections and T connections are not permitted.

The D1(+) and D0(-) lines must be terminated at both ends with a 120 ohm resistor

The network must be biased properly. No more than two sets of bias resistors should be enabled in the network.

For models ordered with optional M-12 electrical connections. Reference Table 1 for wiring color and pinout designation.

Wire Color	M-12 Pin
White	1
Black	2
Green	3
Brown	4
Red	5

Table 1: M-12 wiring pinout

BACnet MS/TP Settings
Valid addresses range from 000 to 127. By default, the device is shipped with the address 127. A valid and unused address should be set before connecting to an existing network. The device address is set by writing to the “Device Address” (PIV1) object. A power cycle or reset of the device is required for the new address to take affect.

Auto Baud Serial Configuration
Auto Baud serial configuration enables the device to determine the Baud rate directly from the serial traffic. This allows a device to be quickly and easily deployed on a BACnet MS/TP network.

Auto Baud serial configuration is enabled by default, and will begin examining the serial bus for communication at power up. Supported Baud Rates can be found in Table 1.

Supported Baud Rates	Data Size	Parity	Stop Bits
9600	8	None	1
19200			
38400			
57600			
76800			
115200			

Table 2: Supported baud rates

Note that while serial configuration is in progress, the device may not respond to requests.

The Auto Baud serial configuration process will complete once a WhoIs or ReadProperty command is successfully received and processed.

The Auto Baud serial configuration procedure is started after a power-cycle (if enabled).

Object Type	Dynamically Creatable	Dynamically Deletable	Object Identifier	Object Name
Device	No	No	607xxx	AVPT Velocity
Analog Input	No	No	AI1 AI2 AI3 AI4	Velocity FPM Velocity MPS Temperature F Temperature C
Positive Integer Value	No	No	PIV1	Device Address
Multi-State Value	No	No	MSV1	Serial Baud Rate
Binary Value	No	No	BV1	Restore Factory Defauls

Table 3 : BACnet MS/TP communication protocol object overview

Device Information
The default device object identifier is 607xxx, where xxx is replaced by the MS/TP device address set by the "Device Address" object's present value. The object identifier value will change as the device address changes. However, if a specific object identifier is written via BACnet MS/TP Communication Protocol, then that value is stored and changes to the device address address will no longer affect the object identifier. See Appendix VI for the device object property tables.

NOTICE Changes to Max Master require a power cycle/reset to take effect.

Accessing the Measurements
The analog input object AI1 through AI4 are for viewing Air Velocity or Temperature in the desired engineering units. The object property tables for these analog input objects can be found in Appendix VI.

Device Address
This object provides the means to configure the BACnet MS/TP device address. The valid range of the present value property is 000 – 127. A device reset is required for a new value to take affect. Default value: 127

Serial Baud Rate
This object allows the serial communication speed to be configured from the set of supported rates. If "Auto Baud" (7) is set (default), then the auto serial configuration is performed each time the device resets/powers on. If any other value is set, auto serial configuration is disabled and only that Serial Baud Rate is used.

Value	Serial Baud Rate
1	9600
2	19200
3	38400
4	57600
5	76800
6	115200
7	Auto Baud

Table 4: Serial Baud Rate

Reset Factory Defaults
Resets all settings to factory default values. Writing the present value to ACTIVE(1) will reset the device address, device instance, device name, max master, etc. A device reset is required to complete the factory reset procedure.

Reset Factory Defaults - Via Wiring Method
A physical reset of factory defaults can also be performed using the following sequence:
1. Connect and power the unit.
2. Disconnect Config.(WH) wire from power supply GND(BK) for 2 seconds.
3. Reonnect Config.(WH) wire to power supply GND(BK) for 10 seconds.
4. Cycle power to the unit, waiting at least 5 seconds to reapply power to the unit. The device communication settings should now be reset to factory default values.

BACnet MS/TP Communication Protocol Services

Device Communication Control Service (DM-DCC-B)
This device supports the Device Communication Control Service BIBB. The optional time duration in minutes is also supported. This device is configured with a password that must be provided to successfully execute this command. The password is "Dwyer".

Reinitialize Device Service (DM-RD-B)
This device supports the Reinitialize Device Service BIBB. The supported device states are COLDSTART and WARMSTART. All other states return error. This device is configured with a password that must be provided to successfully execute this command. The password is "Dwyer".

MAINTENANCE/REPAIR
Upon final installation of the Series AVPT, no routine maintenance is required; though sensor should be kept clean and free of dirt or debris.

This symbol indicates waste electrical products should not be disposed of with household waste. Please recycle where facilities exist. Check with your Local Authority or retailer for recycling advice.

WARRANTY/RETURN
Refer to "Terms and Conditions of Sale" in our catalog and on our website. Contact customer service to receive a Return Goods Authorization number before shipping the product back for repair. Be sure to include a brief description of the problem plus any additional application notes.

OBJECT TABLES

Property	Default Value	Property Data Type	Access
Object Identifier	607xxx	BACnetObjectOdentifier	Read/Write
Object Name	"AVPT Velocity"	CharacterString(32)	Read/Write
Object Type	DEVICE(8)	BACnetObjectType	Read
System Status	Operational(0)	BACnetDeviceStatus	Read
Vendor Name	"Dwyer Instruments, Inc."	CharacterString	Read
Vendor Identifier	607	Unsigned	Read
Model Name	"AVPT"	CharacterString	Read
Firmware Revision	"x.x"	CharacterString	Read
Application Software Version	"x.x.x"	CharacterString	Read
Location		CharacterString(32)	Read/Write
Description	"Thermal Anemometer"	CharacterString(32)	Read/Write
Protocol Version	1	Unsigned	Read
Protocol Revision	14	Unsigned	Read
Protocol Services Supported	See PICS	BACnetServices Supported	Read
Protocol Object Types Supported	See Table 3	BACnetObject TypesSupported	Read
Object List	See Table 3	BACnetArray	Read
Maximum APDU Length Accepted	480	Unsigned	Read
Segmentation Supported	NO_ SEGMENTATION(3)	BACnetSegmentation	Read
APDU Timeout	0	Unsigned	Read
Number of ADPU Retries	0	Unsigned	Read
Max Master	127	Unsigned	Read/Write
Max Info Frames	1	Unsigned	Read
Device Address Binding	Empty	BACnetAddressBinding	Read
Database Revision	0	Unsigned	Read
Property List		BACnetARRAY[n] of BACnetPropertyIdentifier	Read
Serial Number	"xxxxxxxx"	CharacterString	Read
Sensor Firmware Version (1002)	"x.x.x"	CharacterString	Read
Sensor Hardware Version (1004)	"x.x"	CharacterString	Read

Table 5 : Device object

OBJECT TABLES (CONTINUED)

Property	Default Value	Property Data Type	Access
Object Identifier	AI1	BACnetObjectOdentifier	Read
Object Name	"Velocity FPM"	CharacterString	Read
Object Type	ANALOG_INPUT (0)	BACnetObjectType	Read
Present Value	Current reading	Real	Read
Status Flag	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_ DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read/Write
Units	Feet-per-minute (77)	BACnetEngineeringUnits	Read
Property List		BACnetARRAY[n] of BACnetPropertyIdentifier	Read

Table 6 : Analog input - Velocity FPM

Property	Default Value	Property Data Type	Access
Object Identifier	AI2	BACnetObjectOdentifier	Read
Object Name	"Velocity MPS"	CharacterString	Read
Object Type	ANALOG_INPUT (0)	BACnetObjectType	Read
Present Value	Current reading	Real	Read
Status Flag	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_ DETECTED (0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read/Write
Units	Meters-per-second (74)	BACnetEngineeringUnits	Read
Property List		BACnetARRAY[n] of BACnetPropertyIdentifier	Read

Table 7 : Analog input - Velocity MPS

Property	Default Value	Property Data Type	Access
Object Identifier	AI3	BACnetObjectOdentifier	Read
Object Name	"Temperature F"	CharacterString	Read
Object Type	ANALOG_INPUT (0)	BACnetObjectType	Read
Present Value	Current reading	Real	Read
Status Flag	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_ DETECTED(0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read/Write
Units	Degrees-fahrenheit (64)	BACnetEngineeringUnits	Read
Property List		BACnetARRAY[n] of BACnetPropertyIdentifier	Read

Table 8: Analog input - Temperature F

Property	Default Value	Property Data Type	Access
Object Identifier	AI4	BACnetObjectOdentifier	Read
Object Name	"Temperature C"	CharacterString	Read
Object Type	ANALOG_INPUT (0)	BACnetObjectType	Read
Present Value	Current reading	Real	Read
Status Flag	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_ DETECTED(0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read/Write
Units	Degrees-celsius (206)	BACnetEngineeringUnits	Read
Property Li		BACnetARRAY[n] of BACnetPropertyIdentifier	Read

Table 9: Analog input - Temperature C

Property	Default Value	Property Data Type	Access
Object Identifier	PIV1	BACnetObjectOdentifier	Read
Object Name	"Device Address"	CharacterString	Read
Object Type	POSTIVE_INTEGER_ VALUE(48)	BACnetObjectType	Read
Present Value	127	Unsigned	Read/Write
Status Flag	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_ DETECTED(0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read/Write
Units	No-units (95)	BACnetEngineeringUnits	Read
Property List		BACnetARRAY[n] of BACnetPropertyIdentifier	Read

Table 10: Positive integer value - Device address

Property	Default Value	Property Data Type	Access
Object Identifier	MSV1	BACnetObjectOdentifier	Read
Object Name	"Serial Baud Rate"	CharacterString	Read
Object Type	MULTI_STATE_ VALUE(19)	BACnetObjectType	Read
Present Value	7	Unsigned	Read/Write
Status Flag	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_ DETECTED(0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read/Write
State Text	{"9600", "19200", "38400", "57600", "76800", "115200", "Auto Baud"}	BACnetARRAY[N] of CharacterString	Read
Property List		BACnetARRAY[n] of BACnetPropertyIdentifier	Read

Table 11: Multi-state value - Serial baud rate

Property	Default Value	Property Data Type	Access
Object Identifier	BV1	BACnetObjectOdentifier	Read
Object Name	"Restore Factory Defaults"	CharacterString	Read
Object Type	BINARY_VALUE (5)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read/Write
Status Flag	0	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Reliability	NO_FAULT_ DETECTED(0)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read/Write
Property List		BACnetARRAY[n] of BACnetPropertyIdentifier	Read

Table 12: Binary value - Restore factory default values

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