

*as easy as...*

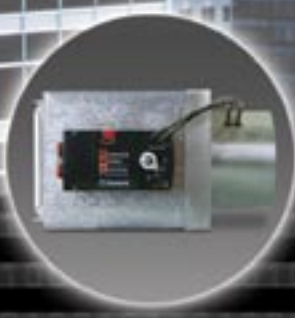
**A**nemostat

**B**ACnet

**C**ontrollers

*Direct Digital Controls  
for Air Terminals*

*by Anemostat*



**Anemostat**  
A MESTEK COMPANY

*The First Name in Air Diffusion*

# Go Digital with Anemostat Air Terminal BACnet Controllers

## Application

When designing your HVAC system with digital control automation, consider specifying Anemostat air terminals (“VAV boxes”) with Anemostat’s BACnet Controllers (ABCs) – a turnkey solution that is easily implemented. Or if you intend to install a stand-alone DDC system today that can provide a network solution tomorrow, ABCs should be considered.

## What is BACnet?

- Based on ANSI/ASHRAE Standard 135 Building Automation and Control Networking protocol. Building management, users, and manufacturers collaborative effort!
- A non-proprietary, open data communications protocol using an agreed-upon set of rules for creating interoperable networks of building systems. It was developed by the American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) but has become a worldwide standard (ISO-16484-5).
- The protocol encompasses all building systems from HVAC and building automation to lighting, security, fire and life safety, etc. It defines the messages that various devices exchange and how those messages are delivered.
- BACnet controllers do NOT use proprietary chipsets
- Interoperability of all BACnet control devices on a system – eliminates “owner lock-in” issues with proprietary systems, increases competitiveness, and provides significant hardware and software choices

## Benefits of Anemostat Supplied DDC Hardware

- Application expertise – extensive knowledge of both air terminal boxes and controls to assist in developing control strategies to minimize energy use.
- Reduce building costs – factory provided & commissioned controls cost less!!
- BACnet open protocol affords “plug-n-play” network interoperability
- In-stock digital controls and wall sensors for all VAV air terminals – no more delays due to consignment controls that arrive late or never
- Eliminates coordination delays and integration “finger pointing”
- Single source responsibility:
  - “Turnkey” means our engineering group integrates the controller with the air terminal for a complete, functioning assembly as specified and ready to install
  - Factory Commissioning - controls are programmed, addressed, and tested “right on the air terminal” – not possible with consignment controls provided to the factory by other control manufacturers
  - Entire assembly factory warranted including wiring, relays, controls, sensors, and other miscellaneous hardware required to meet your specifications
- Virtually unlimited sequencing strategies shave energy use while maintaining comfort in the space



Model EZT Single Duct shown, BACnet Controllers available for all air terminal types.

Velocity Wing Air Flow Sensor

# Control Strategies

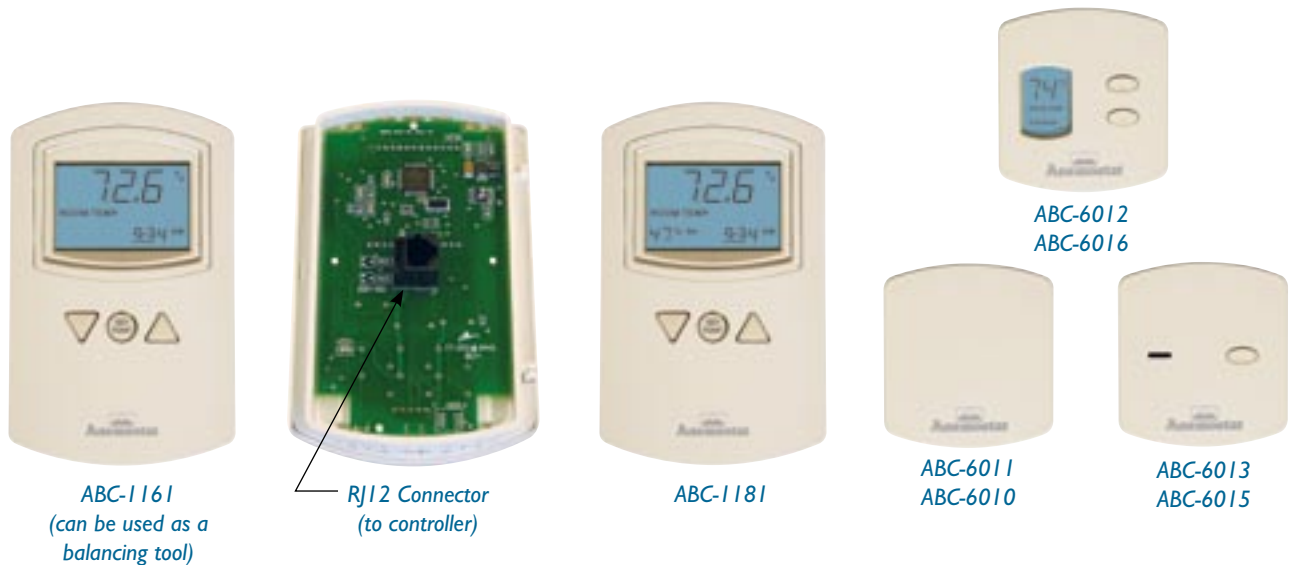
## Wall / NetSensors

Anemostat offers various wall/space sensors that connect directly to the air terminal ABC controller:

- A** **ABC-1161** – NetSensor monitors space temperature. Large, 4-character LCD display. Includes EIA-485 data port to allow computer access to the air terminal controller or any of our other BACnet controllers on the network. Includes a “balancers” routine to change airflow setpoints and “tweak” flows as specified. Can be used as a portable balancing tool for ABC-6000 series wall sensors.
- B** **ABC-1181** – Same as the ABC-1161 AND includes humidity sensing and display.
- C** **ABC-6010** – Wall sensor with 10k  $\Omega$  Thermistor. Includes EIA-485 data port to allow computer access to the air terminal controller or any of our other BACnet controllers on the network.

- D** **ABC-6011** – Wall sensor with 10k  $\Omega$  Thermistor.
- E** **ABC-6013** – Wall sensor with override button and LED indicator.
- F** **ABC-6015** – Wall sensor with override button and LED indicator. Includes EIA-485 data port.
- G** **ABC-6012** - Wall sensor with LCD display for room temperature and setpoint adjustment
- H** **ABC-6016** - Wall sensor with LCD display for room temperature and setpoint adjustment. Includes EIA-485 data port to allow computer access to the air terminal controller or any of our other BACnet controllers on the network.

Contact your local Anemostat Representative to learn more about many other sensors available for your specific applications, including CO2 sensors. Standard color is almond.

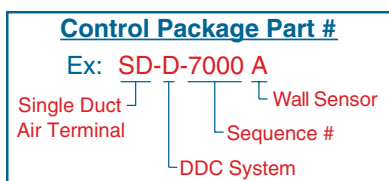


		Control Package #	
<b>EZT</b>	Single Duct Control Packages	SD - D - 7000	Cooling Only
		SD - D - 7001	Cooling w/ Proportional Wet Reheat
		SD - D - 7002	Cooling w/ On-Off Wet Reheat
		SD - D - 7003	Cooling w/ Step Electric Heat (1 or 2 steps)
		SD - D - 7004	Cooling w/ Step Electric Heat (3 steps)
		SD - D - 7005	Cooling w/ Proportional Electric Heat
		SD - D - 7006	Cooling w/ Proportional Electric Heat - Disch Temp Limit
		SD - D - 7007	Cooling w/ Auto Heating-Cooling Changeover

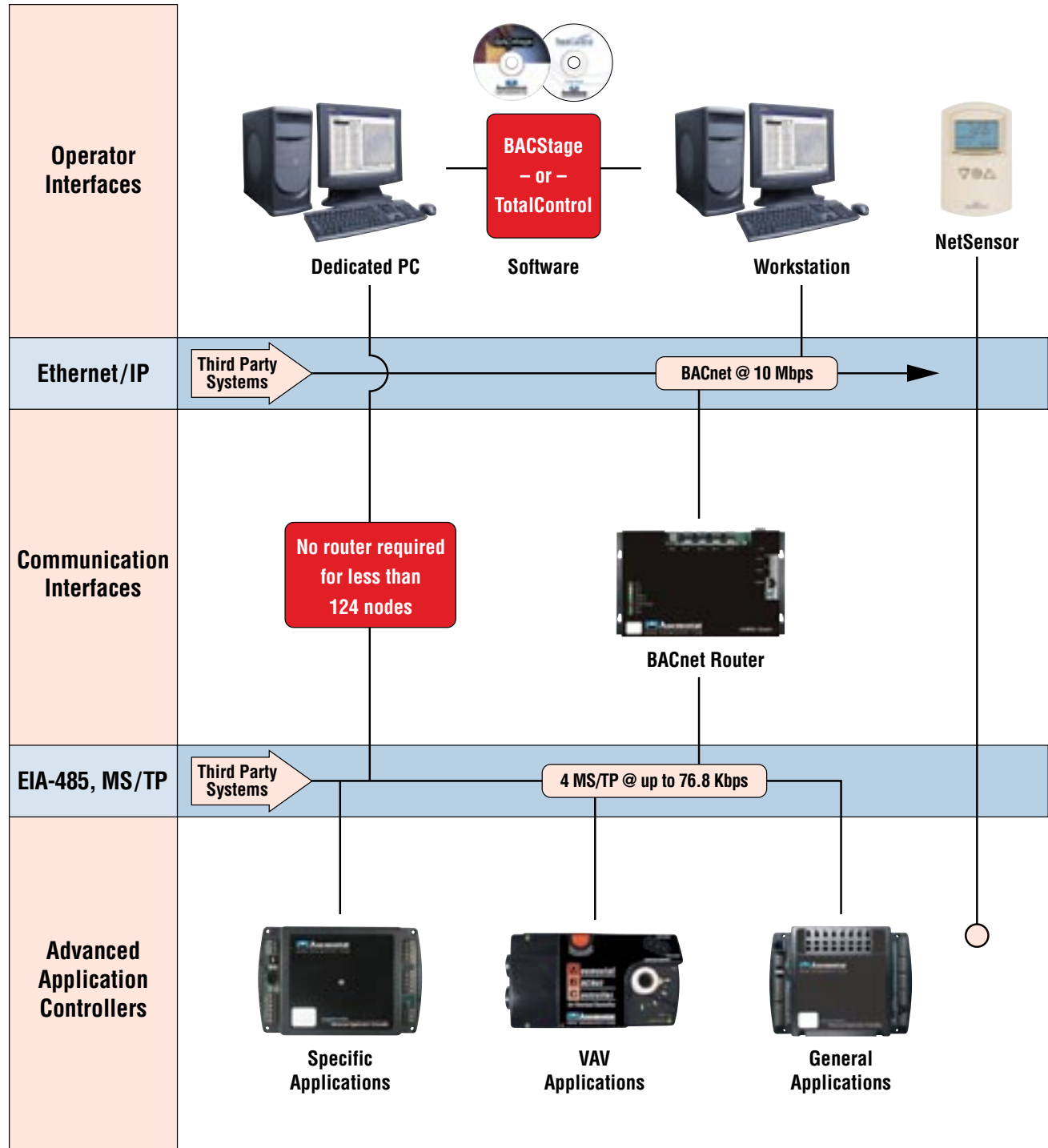
		Control Package #	
<b>EST</b>	Series Fan (ECM) Control Packages	FSE - D - 7000	Cooling Only
		FSE - D - 7001	Cooling w/ Proportional Wet Reheat
		FSE - D - 7002	Cooling w/ On-Off Wet Reheat
		FSE - D - 7003	Cooling w/ Step Electric Heat (1 or 2 steps)
		FSE - D - 7004	Cooling w / 3 Stages EDH
		FSE - D - 7005	Cooling w/ Proportional Electric Heat
		FSE - D - 7006	Cooling w/ Proportional Electric Heat - Disch Temp Limit
		FSE - D - 7007	Cooling w/ Auto Heating-Cooling Changeover

		Control Package #	
<b>QST</b>	Series Fan Control Packages	FS - D - 7000	Cooling Only
		FS - D - 7001	Cooling w/ Proportional Wet Reheat
		FS - D - 7002	Cooling w/ On-Off Wet Reheat
		FS - D - 7003	Cooling w/ Step Electric Heat (1 step)
		FS - D - 7004	Cooling w/ Step Electric Heat (2 or 3 steps)
		FS - D - 7005	Cooling w/ Proportional Electric Heat
		FS - D - 7006	Cooling w/ Auto Heating-Cooling Changeover

		Control Package #	
<b>QPT</b>	Parallel Fan Control Packages	FP - D - 7000	Cooling Only
		FP - D - 7001	Cooling w/ Proportional Wet Reheat
		FP - D - 7002	Cooling w/ On-Off Wet Reheat
		FP - D - 7003	Cooling w/ Step Electric Heat (1 step)
		FP - D - 7004	Cooling w/ Step Electric Heat (2 steps)
		FP - D - 7005	Cooling w/ Step Electric Heat (3 steps)
		FP - D - 7006	Cooling w/ Proportional Electric Heat
		FP - D - 7007	Cooling w/ Auto Heating-Cooling Changeover



# Anemostat BACnet Architecture



**Notes:**

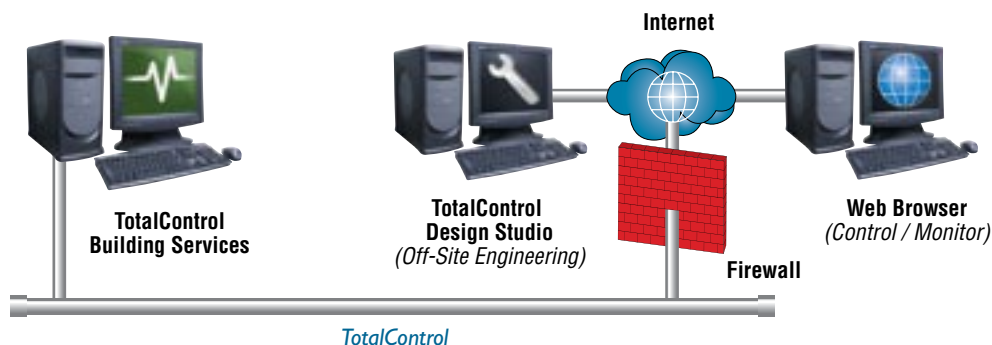
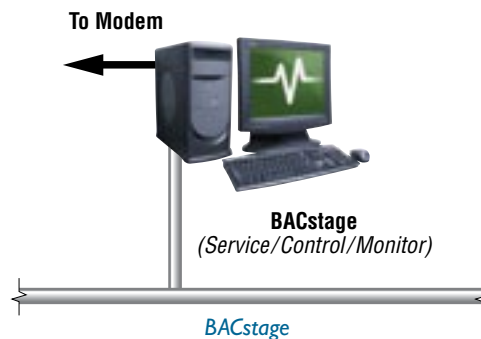
1. ABC-5050 routers supports four MS/TP networks, four BACnet IP subnetworks and one BACnet 8802-3 network.
2. MS/TP units can operate standalone or may be networked (up to 124 units - repeaters required).

# Anemostat BACnet Architecture

## Operator Workstation Software

Connect to your network and/or access BACnet control devices using PC software. Anemostat offers 2 software solutions based on your requirements:

- BACstage – essential tool to configure ABCs and our other BACnet controllers and create an operator workstation for your BACnet system
- TotalControl – a powerful, leading edge, building automation software using a web interface to communicate and manage remote or local networks in multiple locations



## Advanced Application BACnet Controllers

**Native BACnet controllers** are available for: air terminals, specific applications and general use. They are installed in stand-alone environments or networked with other BACnet devices.

### ABC-7001 / 7003 Air Terminal Controllers

The 2 available models of ABCs are distinguished by their different output configurations used for various single duct, dual duct, and fan-powered air terminal applications:

#### Description

The ABC-7001 and ABC-7003 are native BACnet, direct digital controllers designed for VAV air terminal units. An integrated actuator and the supplied programs make this an ideal controller for adding temperature setback, overrides, and other HVAC sequences. Install this versatile controller in stand-alone environments or networked to other BACnet devices. As part of a complete facilities management system, the ABC-7001 & ABC-7003 controllers provide precise monitoring and control of connected points.

- BACnet MS/TP compliant
- VAV control sequences are incorporated to provide pressure independent control of single duct, dual duct, and fan-powered units. Programmed sequences are stored in the controller.
- Controller includes a platinum-ceramic flow-through, on-board sensor. When coupled with the patented Velocity Wing inlet air flow sensor, expect a high degree of primary flow control accuracy even with significant turn-down rates.
- Highly programmable sequencing using control basic – virtually unlimited control strategies to meet comfort needs while maintaining a high level of energy efficiency. Cooling, heating, proportional or step heat, setback, temperature limiting control loops are all easily configured.



# Anemostat BACnet Architecture

## Specifications

### ABC-7001/7003 Inputs

- 3 universal inputs each of which is programmable as an analog, binary or accumulator objects. A fourth input is dedicated to the airflow sensor.
- Standard units of measure
- Pull-up resistors for switch contacts and other un-powered equipment. Switch select none or 10k  $\Omega$ .
- Removable screw terminal block, wire size 14–22 AWG
- 10-bit analog-to-digital conversion
- Pulse counting to 16 Hz
- 0–5 volts DC analog input range
- Over-voltage input protection
- Compatible with ABC-1161/81 and ABC-6000 Series Wall / NetSensors

### ABC-7001 Outputs

- 3 universal outputs each of which is programmable as an analog or binary object.
- 1 output dedicated to the actuator
- Standard and custom units of measure
- Removable screw terminal block, wire size 14–22 AWG
- 0–10 volts DC for analog objects
- 0–12 volts DC for binary objects
- Output current limited to 100mA per output.

### ABC-7003 Outputs

#### Universal

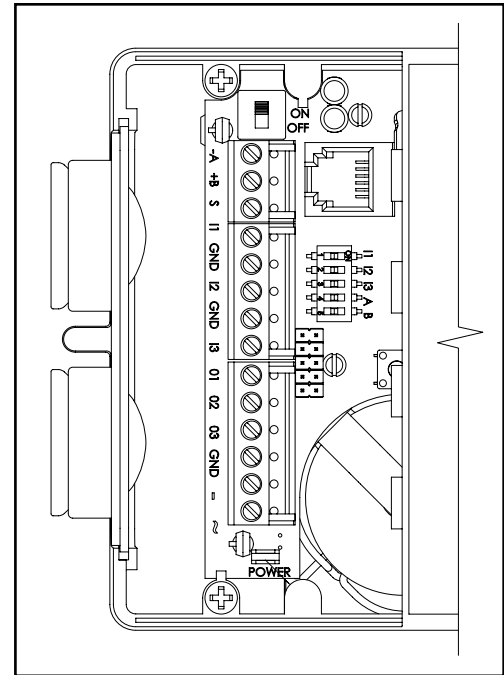
- 1 universal output that is programmable as an analog or binary object.
- 1 output dedicated to the actuator
- Standard and custom units of measure
- Removable screw terminal block, wire size 14–22 AWG
- 0–10 volts DC for analog objects
- 0–12 volts DC for binary objects
- Output current limited to 100mA per output.

#### Triac Output

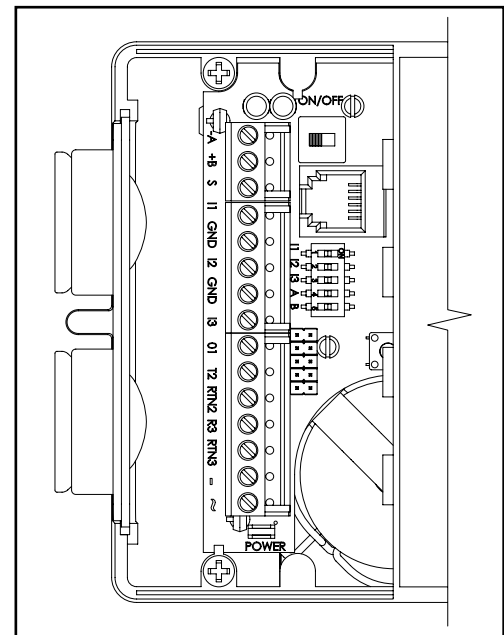
- 1 optically isolated triac output. Programmable as a binary object.
- Maximum switching 30 volts AC at 1 ampere
- Removable screw terminal block, wire size 14–22 AWG

#### Relay Output

- 1 normally open relay contact
- Maximum switching 30VAC/VDC, 2A Max
- Removable screw terminal block, wire size 14–22 AWG



ABC-7001 Terminal Strip



ABC-7003 Terminal Strip

# Anemostat BACnet Architecture

## Programmable features

- 10 Control Basic program areas
- 4 PID loop objects
- 40 analog and 40 binary value objects
- See Pic statement for supported BACnet objects

## Schedules

- 8 Schedule objects
- 3 Calendar objects

## Alarms and events

- Supports intrinsic reporting
- 8 Notification class objects

## Trends

- 8 Trend objects

## Memory

- Programs and program parameters are stored in nonvolatile memory.
- Auto restart on power failure

## Communications

- EIA-485 operating up to 76.8 kilobaud
- NetSensor Models ABC-1161/81 are compatible through RJ-12 connector

## Actuator Features

### Torque

- 50 in-lb. minimum
- 70 in-lb. maximum

### Motor Timing

- 18°/minute at 60 Hz.

## Specific Application Controllers

Native BACnet job-specific controllers are fully programmable and designed for a variety of applications. As part of a complete facilities management system, these controllers provide precise monitoring and control for roof top units, air handlers, and heat pump applications.



## FullBAC Router

Use this multi-port BACnet router to manage BACnet building automation data between BACnet/IP, BACnet Ethernet, and MS/TP networks. This router conforms to ANSI/ASHRAE Standard 135.



## General Use Controllers

Native BACnet general use controllers are fully programmable and designed for general applications. Programmable inputs / outputs and user defined Control Basic programs allow for unlimited applications as part of a complete facilities management system.



## ABC-5575 Repeater

Use this Repeater-Isolator to extend and recondition EAI-485 network communications or for enabling "T" or branch networks. This repeater is required after every 31 consecutive controllers on a BACnet subnetwork or if cumulative wiring distance exceeds 4,000 feet. 24 vac power supply required.



## Typical Specification

- A. The air terminal unit manufacturer (ATUM) shall provide and factory install native BACnet direct digital controllers (DDC) on the air terminal units, as manufactured by Anemostat or approved equal. Supply and discharge air temperature sensors, and wall thermostats/sensors associated with the air terminal unit controls, as applicable, shall be provided by the ATUM. Each ATU shall include a 120 or 277/24vac transformer, control enclosure, and disconnect switch. The electrical contractor (Div. 16) shall furnish all power wiring to the ATU's.
- B. The digital controllers shall be Advanced Application type (B-AAC) designed specifically for use with VAV terminals and shall be BTL listed. Controllers must be programmed and tested at the factory on the air terminal unit prior to shipment to verify operation for the desired control strategy. Field installed controllers are not acceptable. Where networked, controllers shall incorporate automatic MAC addressing capability to allow automatic addressing in the field. Controllers requiring manual addressing shall be factory addressed prior to shipment. The controller shall be a fully programmable MS/TP master controller, integrated with an actuator, for pressure independent air flow and temperature control of the space it serves. The controller will operate independently in a stand-alone mode or jointly in a peer-to-peer BACnet MS/TP LAN network sharing system data and/or programs. Each controller shall have an onboard flow-thru sensor for use with the ATU inlet flow sensor. The sensor shall utilize twin platinum ceramic resistance temperature sensors for control accuracy to within 3% of set point.
- C. Supply air temperature sensors shall be wired, and factory installed in the inlet of the ATU, as applicable for the sequence of operation. Sensors shall be thermistor type (10k Ohm).
- D. Discharge air temperature sensors shall be flange mounted type, pre-wired to the controller, with 10' min of plenum rated cable, as applicable for the sequence of operation. Sensors shall be thermistor type (10k Ohm). The sheet metal contractor shall uncoil and install the discharge air temperature sensor in the downstream duct, a minimum of 3 duct diameters after the heating coil, and shall secure any excess lead length.
- E. Wall sensors shall be provided by the ATUM and installed and wired to the DDC by the controls contractor.

(Option 1) The wall sensor (Model ABC-1161 or approved equal) shall be microprocessor based and shall include a thermistor type temperature sensor with an accuracy of  $\pm .36^{\circ}$  F, and a data port for access to all devices on that network (via a computer). Sensors shall have a 4 character LCD display and include programmable buttons that include a balancing routine to allow airflow setpoint changes and adjustments, without the need for a computer or hand held operator interface device. The sensor shall include the following user inputs and outputs: Space Temp Input, Current Temp Output, Actual CFM, Min and Max CFM Setpoints, Flow Sensor Correction factor (for balancing).

(Option 2) The wall sensor (Model ABC-1181 or approved equal) shall be microprocessor based and shall include a temperature sensor with an accuracy of  $\pm .9^{\circ}$  F, a humidity sensor with an accuracy of  $\pm 2\%$  RH, and a data port for access to all devices on that network (via a computer). Sensors shall have a 4 character LCD display and include programmable buttons that include a balancing routine to allow airflow setpoint changes and adjustments, without the need for a computer or hand held operator interface device. The sensor shall include the following user inputs and outputs: Space Temp Input, Current Temp Output, Actual CFM, Min and Max CFM Setpoints, Flow Sensor Correction factor (for balancing).

(Option 3) The wall mini-sensor (Model ABC-6012) shall include a thermistor type temperature sensor with an accuracy of  $\pm .36^{\circ}$  F. The sensor shall include an LCD display for room temperature and setpoint adjustment. (Optional) The sensor shall include a data port (Model ABC-6016) providing access to all devices on that network (via a computer). The sensor buttons shall allow the user to increase or decrease the room temp setpoint, and initiate an override mode, if applicable. (Optional) Provide (1) ABC-1161 sensor and cable to be used as a balancing tool to allow the balancer to plug into each digital controller to make flow adjustments. This shall be turned over to the owner after completion of balancing.

(Option 4) The wall mini-sensor (Model ABC-6011, Model ABC-6013 w/ override button and LED indicator) shall include a thermistor type temperature sensor with an accuracy of  $\pm .36^{\circ}$  F. The sensor shall not allow user setpoint adjustment or provide temperature readout. (Optional) The sensor shall include a data port (Model ABC-6010, Model ABC-6015 w/ override button and LED indicator) providing access to all devices on that network (via a computer). (Optional) Provide (1) ABC-1161 sensor and cable to be used as a balancing tool to allow the balancer to plug into each digital controller to make flow adjustments. This shall be turned over to the owner after completion of balancing.

- F. Hot water coil zone control valves, where applicable, shall be provided by the ATUM. Valves to be 2-way or 3-way pattern (threaded body) as shown constructed for tight shutoff and shall operate satisfactorily against system pressures and differentials. Two-position or proportional control as scheduled for the sequence of operation. Valves shall be provided to the mechanical contractor for installation. Wiring from the valve actuator to the ATU controller shall be the responsibility of the controls contractor. Balancing & isolation valves, drains, vents, etc for coils shall be as specified in Section \_\_\_\_\_.
- G. Division / Coordination of responsibility:

The Controls Contractor shall be responsible for materials and labor to integrate the ATU's into the building automation system, including networking of the ATU controllers. This contractor shall also be responsible for installation of wall sensors and interconnecting wiring to the respective ATU controller. The ATU manufacturer shall provide all relevant documentations related to controller BACnet PIC statements, addressing, analog and binary values, operating and installation manuals, and technical details related to the controller and sensor. Coordination of all controls items with other trades shall be the responsibility of the Controls Contractor.



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