

## Room Unit for ATEC



**Figure 1. QAA1181.FWSC Temperature Room Unit.**

The Room Unit for ATEC offers a range of features and functionality that work in connect with ATEC to deliver comfort in the demanding application environments. The product includes a segment Liquid Crystal Display (LCD) display and 4 buttons for interactive operation. The room unit incorporates precision temperature sensing elements to measure room temperature accurately and reliably. The compact, slim, low profiles design results in an attractive appearance and harmonious sense with other square switches on the wall.

This unit can only be used with Actuator Terminal Equipment Controllers (ATEC) 550-44X series.

### Applications

The room unit with RJ11 Jack can be connected to the ATEC controller via a six-wire cable, to enable it work automatically. The cable transmits temperature, communication with the HMI, optional setpoint and override signals.

A micro USB-like HMI (WCIS) port located on the bottom of the cover can be used by WCIS tools with a special cable (part no. 540-143U, DB9 connector to Micro USB).

ATEC controller can also be setup directly by WCIS tools without going through room unit, in this case, 540-143 cable is needed.

### Available Features

- Large LCD Display: the display allows simultaneous digital display of room temperature.
  - Standard Display Features:
    - Display of operating mode: Icon symbols are displayed to indicate the controller's operating mode. A person in the house indicates occupied mode operation. No icon indicates unoccupied operation.
    - Easy-to-read digital display.
    - Room temperature value to 1 decimal place.
  - Configurable Display Features:
    - Degrees Fahrenheit or Celsius.
    - Room temperature display on or off.
    - Occupancy status display on or off.
- Digital setpoint adjustment: The room unit's keypad allows error-free digital setpoint adjustments in 1°F or 0.5°C increment. Setpoint values display momentarily as changes are made.
- Override button: The override button allows an occupant to change to an occupied control schedule during the unoccupied cycle for a predetermined time period as defined by the controller. Occupancy icon is shown on the display during occupied time periods.
- Maintenance-free: The room unit draws a small amount of power directly from the controller.
- Compatibility: The room unit is compatible with ATEC controller 550-440, 550-441, 550-445 and 550-446 of the APOGEE building system.
- The room unit is wired with six-conductor phone cables and standard RJ-11 connectors to connect ATEC.
- HMI port: Micro USB-like connection port allows laptop connection for commissioning and servicing the controller.

## Specifications

Temperature Range	
Setpoint	12.5°C to 35°C (55°F to 95°F)
Operating Ambient	0°C to 50°C (32°F to 122°F)
Output Signals	Proprietary digital protocol p1
Sensing Element Type	NTC 10k $\Omega$ at 25°C Thermistor
Accuracy	
0°C to 50°C (32°F to 122°F)	$\pm 1^\circ\text{C}$ ( $\pm 2^\circ\text{F}$ )
Field Temperature Offset	Adjustable to $\pm 3^\circ\text{C}$ ( $\pm 5^\circ\text{F}$ )
Installation ATEC	100 ft. Maximum cable length 6C #24 AWG, Belden 1228 A or equal, NEC Class 2
Installation Adjustments	None required
Cover	
Dimensions	86 mm X 86 mm X 16 mm
Color	White
Power Supply	Supplied by ATEC

## Product Ordering Information

Product Number	Comm Type	Comm Type	Logo	Display	Setpoint/ Occupancy	Temp	SSN
QAA1181.FWSC	Digital	P1	SIEMENS	•	•	•	S55622-H107

## Accessories Ordering Information

Description	Product Part Number
7.6 m cable with connections	588-100A
15.2 m cable with connections	588-100B
30.5 m cable with connections	588-100C
HMI connection cable (DB9 connector to Micro USB)	540-143U
HMI connection cable (DB9 connector to RJ11)	540-143

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## TECHNICAL SPECIFICATIONS

The VAV Terminal Box DVS is a pressure independent terminal unit, designed for volume flow control of primary air in variable air volume systems.

The terminal units are designed with a circular inlet spigot to ensure an uniform airflow over the pressure measurement grid so as to provide an accurate measurement of effective pressure.

The outlet is rectangular to provide a larger discharge area and consequent lower discharge velocity resulting in considerably reduced noise levels.

The multiple options offered permit appropriate selection of the terminal unit to meet project specific control needs.

The terminal unit is constructed out of high quality galvanized sheet steel with a circular spigot connexion on the high pressure side (inlet) and a rectangular (or optionally a circular) connexion on the low pressure side (Outlet). The inlet is provided with a cross flow, multi-point pressure sensor and a motorized control damper.

The entire unit is internally lined with nitrile rubber to provide effective thermal and acoustic insulation.

The controller-transducer-actuator package, together with a transformer is mounted on the outside of the casing. The terminal unit is internally wired, tested and calibrated at the factory, prior to shipment. Unit casing leakage does not exceed 0.6% at 4 inch wg (1000 pa) inlet static pressure.

The air volume flow generates an effective pressure at the multi-point pressure sensor. This effective pressure is transmitted to the transducer via the plastic control tubing. The transducer converts the effective pressure into an electronic signal (0-2V DC to 10V DC). This signal is relayed to the controller which then compares it to the set point value from the room sensor. Any variance in the two will result in a signal from the controller to the actuator to adjust the control damper appropriately.

The control damper is constructed out of galvanized sheet steel with gaskets. Shafts are of carbon steel. The gasket and seals are designed for the operating temperatures to minimize shaft seal heat transfer. The air leakage of the control damper is less than 1% at 4 inch WG (1000 pa) inlet static pressure.

The control enclosure is made of high quality galvanized sheet steel with double face plate design and multiple wire conduit opening. This control enclosure is suitable for all controllers.

Reheat coils are available as an option. Where supplied, it shall be encased in a modular housing design. offers two options : Hot water coil and Electric re-heat coil.

DVS	-	SIZE	-	CASING	-	OUTLET	-	CONN	-	CNT	-	REHEAT
SIZE	-	125, 150, 175, 200, 225, 250, 300, 350, 400										
CASING	-	S, X (Standard, Extended)										
OUTLET	-	I, M (Single, Multiple)										
CONN	-	L, R (Left Side, Right Side) (Facing the outlet)										
CNT	-	1,2,3 (1 - Stand Alone, 2-DDC, 3- Bare Box)										
REHEAT	-	HW, EC, ( Hot water coil, Electric Reheat)										

Example : DVS -06-S-I-L-2-00

VAV Terminal Box, Size 06, with standard casing, single outlet with left side control assembly with DDC control and no reheat.

## MODEL SELECTION PROCEDURE - MODEL DVS

Determine the minimum ventilation airflow rate and maximum airflow rate to meet the zone cooling load (based on load calculations).

Refer to the AIR FLOW TABLE to select the appropriate unit for the application.

### EXAMPLE :

Min Air Flow Rate = 280 CFM

Max Air Flow Rate = 800 CFM

Pr Drop Not to exceed 60 Pa.

NC not to exceed 40.

Static Pr 1.5 Inch WG

Refer to engineered performance data

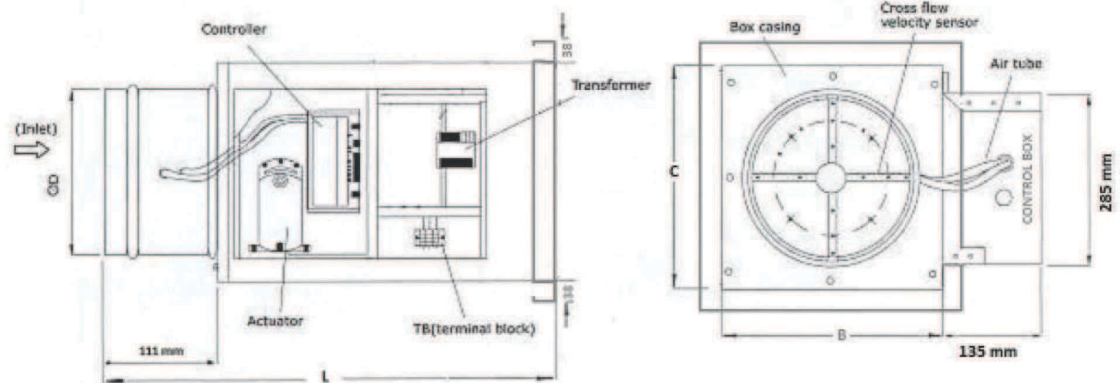
You will note that Model DVS 175 cannot meet the maximum air flow rate. Model DVS 200 can meet both minimum and maximum air flow rate value.

Interpolate pressure drop values or maximum air flow rate of 800 CFM. Pressure drop is 50 pa. case radiated NC is 25 and discharge sound is NC 35, both within specified limits.

## PHYSICAL DATA

VAV terminals are designed for use in low or medium pressure duct system. They are available with several available accessories. Optional accessories include hot water reheat, electric reheat., extended casing and multiple outlet plenums. Controls can be factory fitted and wired by our trained personal.

Wiring schematics are affixed inside the control enclosure for field reference. The DVS VAV terminals are widely used in many HVAC system in all types of buildings.



Airflow Table

MODEL	INLET	'L' (mm)	'B' (mm)	'C' (mm)	Rated Flow CFM MIN~MAX
	'A' (mm)				
DVS100	100	511	305	203	45 ~ 225
DVS125	125	511	305	203	70 ~ 350
DVS150	150	511	305	203	120 ~ 600
DVS200	200	511	305	254	180 ~ 900
DVS250	250	511	356	318	270 ~ 1350
DVS300	300	511	406	381	440 ~ 2200
DVS350	350	600	508	445	640 ~ 3200
DVS400	400	600	610	457	800 ~ 4000

## ENGINEERED PERFORMANCE DATA

### Airflow Pressure Drop

Model	Airflow CFM (CMH)	Air Pressure Drop inchs Wg (PA)			
		Standad VAV Box	With 1 row coil	With 2 row coil	With electric heating coil
125	76 (129)	0.01 (2)	0.03 (8)	0.06 (14)	0.01 (2)
	108 (183)	0.02 (5)	0.05 (13)	0.07 (18)	0.02 (5)
	216 (367)	0.07 (17)	0.12 (30)	0.17 (43)	0.07 (17)
	324 (550)	0.13 (33)	0.23 (58)	0.33 (81)	0.13 (33)
	432 (734)	0.22 (54)	0.37 (92)	0.51 (128)	0.22 (54)
150	216 (366)	0.03 (8)	0.08 (21)	0.12 (31)	0.03 (8)
	324 (550)	0.07 (18)	0.17 (43)	0.27 (66)	0.07 (18)
	432 (733)	0.12 (31)	0.28 (69)	0.42 (105)	0.12 (31)
	540 (917)	0.21 (51)	0.43 (106)	0.62 (153)	0.21 (51)
	648 (1101)	0.31 (77)	0.58 (143)	0.74 (184)	0.31 (77)
175	324 (550)	0.04 (9)	0.06 (14)	0.08 (19)	0.04 (9)
	432 (733)	0.10 (25)	0.14 (35)	0.17 (43)	0.10 (25)
	540 (917)	0.14 (34)	0.22 (54)	0.29 (72)	0.14 (34)
	680 (1155)	0.17 (42)	0.30 (75)	0.56 (139)	0.17 (42)
	756 (1284)	0.22 (55)	0.43 (106)	0.62 (154)	0.22 (55)
200	324 (550)	0.04 (9)	0.06 (14)	0.08 (19)	0.04 (9)
	540 (917)	0.06 (16)	0.14 (36)	0.22 (54)	0.06 (16)
	648 (1101)	0.10 (24)	0.23 (57)	0.35 (88)	0.10 (24)
	756 (1284)	0.17 (42)	0.37 (93)	0.57 (141)	0.17 (42)
	865 (1469)	0.25 (61)	0.47 (117)	0.70 (173)	0.25 (61)
225 & 250	324 (550)	0.02 (4)	0.07 (17)	0.11 (27)	0.02 (4)
	540 (917)	0.04 (11)	0.12 (31)	0.20 (49)	0.04 (11)
	756 (1284)	0.10 (24)	0.22 (54)	0.34 (85)	0.10 (24)
	973 (1653)	0.16 (40)	0.33 (83)	0.50 (124)	0.16 (40)
	1189 (2020)	0.25 (63)	0.50 (124)	0.73 (182)	0.25 (63)

## ENGINEERED PERFORMANCE DATA

### Airflow Pressure Drop

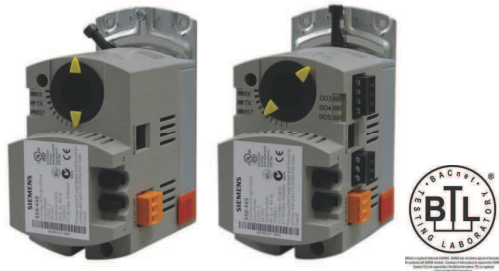
Model	Aiflow CFM (CMH)	Airflow Pressure Drop Inch Wg (PA)			
		Standad VAV Box	With 1 row coil	With 2 row coil	With electric heating coil
300	648 (1101)	0.02 (4)	0.06 (14)	0.09 (22)	0.02 (4)
	1081 (1836)	0.04 (10)	0.14 (35)	0.23 (58)	0.04 (10)
	1513 (2570)	0.05 (13)	0.26 (64)	0.45 (112)	0.05 (13)
	1945 (3305)	0.08 (21)	0.45 (112)	0.80 (199)	0.08 (21)
	2377 (4039)	0.13 (33)	0.71 (176)	1.25 (311)	0.13 (33)
350	865 (1469)	0.02 (6)	0.08 (21)	0.14 (34)	0.02 (6)
	1729 (2937)	0.06 (15)	0.25 (61)	0.42 (104)	0.06 (15)
	2403 (4083)	0.12 (29)	0.38 (94)	0.65 (161)	0.12 (29)
	3077 (5228)	0.19 (47)	0.62 (153)	1.05 (261)	0.19 (47)
	3509 (5962)	0.24 (60)	0.80 (200)	1.37 (341)	0.24 (60)
400	1081 (1836)	0.02 (5)	0.06 (15)	0.09 (23)	0.02 (5)
	1945 (3305)	0.06 (15)	0.17 (43)	0.25 (63)	0.06 (15)
	2810 (4774)	0.12 (29)	0.32 (80)	0.52 (129)	0.12 (29)
	3674 (6242)	0.20 (49)	0.56 (138)	0.99 (246)	0.20 (49)
	4323 (7345)	0.27 (68)	0.76 (189)	1.36 (338)	0.27 (68)

#### Notes

1. The Air Flow Pressure Drop is the pressure difference between inlet and outlet when delivering the air flow shown with the primary damper in fully open position.
2. Damper leakage of series DVS is less than 1% at 4.0"wg (1000pa) inlet static pressure. Leakage rate is the ratio of air volume through the damper when it is fully closed to air volume at damper fully open position and face velocity is at 3000 FPM (15 m/s)
3. Pressure drop through the electric heaters is low, hence can be ignored.



## Siemens BACnet ATEC



The Siemens BACnet Actuating Terminal Equipment Controller (ATEC) provides high performance direct digital control (DDC) of pressure-independent, variable-air-volume zone-level routines. The BACnet ATEC can operate stand-alone or can be networked to perform complex HVAC control, monitoring and energy management functions and is designed to reside on any BACnet control system.

### Features

- Controller integrated with actuator for ease of installation.
- PID control of HVAC systems to minimize offset and maintain tighter setpoint control.
- Communicates using BACnet MS/TP protocol for open communications on BACnet MS/TP networks.
- Siemens BACnet VAV Actuator requires only 5 VA, an advantage when sizing electrical capacity.
- Unique control algorithms for specific applications.
- Plenum rated controller.
- Suitable for installation in plenum areas.
- Setpoints and control parameters assigned and changed locally or remotely.
- Electrically Erasable Programmable Read Only Memory (EEPROM) used for storing setpoints and control parameters—no battery backup required.

- Return from power failure without operator intervention. No calibration required, thereby reducing maintenance costs.
- No calibration required, thereby reducing maintenance costs.

### Applications

Operating independently, or as part of a BACnet System, the BACnet ATEC can control the following VAV pressure-independent zone applications:

- Slave Mode (Application 2897)
- VAV Cooling Only (Application 2860)
- VAV Cooling or Heating (Application 2861)
- VAV with Electric Reheat or Baseboard Radiation (Application 2862)
- VAV with Hot Water Reheat (Application 2863)
- VAV Series Fan Powered with Electric Reheat (Application 2864)
- VAV Series Fan Powered with Hot Water Reheat (Application 2865)
- VAV Parallel Fan Powered with Electric Reheat (Application 2866)
- VAV Parallel Fan Powered with Hot Water Reheat (Application 2867)

Control algorithms are preprogrammed. The controller is ready to operate after selecting the application and assigning the unit's controller address. If desired, the operator may adjust the air volume setpoints in cfm (lps), room temperature setpoints and other parameters. The controller is designed for operation and modification without vendor assistance.

# Hardware

## Controller Board

The Siemens BACnet Actuating Terminal Equipment Controller (ATEC) consists of an electronic controller, a differential pressure transducer and a damper actuator assembly.

This controller provides all wiring terminations for system and local communication and power. The cable from the room sensor (purchased separately) connects to an RJ-11 jack on the controller. All other connections are removable terminal blocks.

The BACnet ATEC Cooling only model has no external I/O and the full-feature has 2 UIs and 3 DOs.

In addition to controlling the integrated damper actuator, the controller interfaces with the following external devices (purchased separately):

- Room temperature sensor with optional setpoint dial and night override button
- Service and commissioning tools
- Building Automation System from Siemens Industry, Inc.

## Room Sensor

The room sensor connection to the controller board consists of a quick-connect RJ-11 jack. This streamlines installation and reduces controller start-up time.

## Differential Pressure Sensor

The differential pressure sensor is easily connected to the box's air-velocity sensing elements to provide measurement of the differential pressure. The measured value is converted to actual airflow in cfm (lps) by the controller.

### Differential Pressure Sensor Specifications

Temperature Range	32°F to 122°F (0°C to 50°C)
Measurement Range	0 to 5200 fpm (0 to 26 m/s)

## ATEC Specifications

Dimensions	5-7/16"H × 2-15/16"W × 4"D (138 mm × 75 mm × 102 mm)
Weight	approx. 1.26 lbs (.572 kg)

Power Requirements	
Operating Range	24 Vac +/- 20%, 50 or 60 Hz
Power Consumption ATEC DOs	5 VA max (12 VA per DO/40 VA max)

Inputs	
2 Universal	10K Ω Thermistor, DI (Dry Contact), Voltage (0 – 10V), Current (4 – 20 mA)

Outputs	
3 Triacs, 12 VA each	Requires 24 Vac source to allow switching; phase or neutral

Ambient Conditions	
Storage Temperature	-13°F to +158°F (-25°C to +70°C)
Operating Temperature	+32°F to +122°F (0°C to +50°C)
Humidity Range	5 to 95% rh (non-condensing)

## Actuator Specifications

Actuator Torque	
550-440/550-445	44 lb-in. (5Nm)
550-441/550-446	88 lb-in (10Nm)

Actuator Run Time for 90°	
GDE	90 sec. at 60 Hz (108 sec. at 50 Hz)
GLB	125 sec. at 60 Hz (150 sec. at 50 Hz)

Angle of Rotation	
Nominal	90°
Maximum	95°

Actuator Shaft Size and Length	
Shaft Size	3/8" to 5/8" (8 to 16 mm) Dia. 1/4" to 1/2" (6 to 13 mm) Sq.
Minimum Shaft Length	3/4" (20 mm)

## Transformer Requirements and Recommended Voltages

Transformer Requirements and Recommended Voltages	
Type	Class 2, SELV, PELV
Voltages	24 Vac, 50/60 Hz

## Product Ordering Information

Description	Product Number
BACnet ATEC Model 0001, cooling only (GDE)	550-440
BACnet ATEC Model 0001, cooling only (GLB)	550-441
BACnet ATEC Model 2301, full feature (GDE)	550-445
BACnet ATEC Model 2301, full feature (GLB)	550-446
<b>Room Unit</b>	
ROOM UNIT - ATEC 550-44X, Display with Setpoint Override	QAA2281.FWSC
ROOM UNIT - ATEC 550-44X, Display with Ssetpoint Override, No Logo	QAA2281.FWNC
ROOM UNIT - ATEC 550-44X	QAA2281.EWSC
ROOM UNIT - ATEC 550-44X, No Logo	QAA2281.EWNC
LC ATEC RU Standard	QAA1181.FWSC

## Document Information

Documentation	Product Number
Siemens BACnet Actuator Owner's Manual	125-5050

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Document No.149-825  
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 Page 3 of 5

# BACnet Protocol Implementation Conformance Statement

## Products

Product	Model Number	Protocol Revision	Software Revision	Firmware Revision
Siemens BACnet Actuating Terminal Equipment Controller	550-440 550-441 550-445 550-446	135-2001b	1.2	BZ30 1.0

Date Tested: April 2010 – B-ASC

## Vendor Information

<p><b>Siemens Industry, Inc.</b>          Building Technologies Division          1000 Deerfield Parkway          Buffalo Grove, IL 60089  <a href="http://www.buildingtechnologies.siemens.com/bt/us">www.buildingtechnologies.siemens.com/bt/us</a></p>
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## Product Description

<p>The controller is an integral part of Siemens controls system. The controller can operate stand-alone or can be networked to perform complex HVAC control, monitoring, and energy management functions. This controller communicates using BACnet MS/TP.</p>
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## BACnet Standardized Device Profile

Product	Device Profile	Tested
BTEC	BACnet Application Specific Controller (B-ASC)	✓

## Supported BACnet Interoperability Building Block (BIBBs)

Product	BIBB	Name	Tested
BTEC	DS-RP-B	Data Sharing-ReadProperty-B	✓
	DS-RPM-B	Data Sharing-ReadPropertyMultiple-B	✓
	DS-WP-B	Data Sharing-WriteProperty-B	✓
	DM-DDB-B	Device Management-Dynamic Device Binding-B	✓
	DM-DOB-B	Device Management-Dynamic Object Binding-B	✓
	DM-DDC-B	Device Management-DeviceCommunicationControl-B	✓

## Standard Object Types Supported

Product	Object Type	Creatable	Deletable
BTEC	Analog Input	No	No
	Analog Output	No	No
	Binary Input	No	No
	Binary Output	No	No
	Device	No	No

## Data Link Layer Options

Product	Data Link and Options
BTEC	MS/TP master (Clause 9), baud rate(s): 9600 bps, 19200 bps, 38400 bps, 76800 bps
	MS/TP slave (Clause 9), baud rate(s): 9600 bps, 19200 bps, 38400 bps, 76800 bps

## Segmentation Capability

Product	Segmentation Type	Supported	Window Size: 32 (MS/TP product limited to 1)
BTEC	Able to transmit segmented messages	No	
	Able to receive segmented messages	No	

## Device Address Binding

Product	Static Device Binding Supported
BTEC	Yes

## Networking Options

Product	Static Device Binding Supported
BTEC	No

## Character Sets

Product	Character Sets Supported
BTEC	ANSI X3.4