

## BACnet Terminal Box (VAV) Controller



Figure 1. BACnet Terminal Equipment Controller.

The Terminal Box Controller (Figure 1) is an integral part of Siemens Building Technologies, Inc. controls system. The controller provides high performance Direct Digital Control (DDC) of pressure-independent, variable-air-volume zone-level routines. The Terminal Box Controller can operate stand-alone or can be networked to perform complex HVAC control, monitoring and energy management functions. This controller communicates with the Siemens controls system using BACnet MS/TP.

### Features

- Communicates using BACnet MS/TP protocol for open communications on BACnet MS/TP networks
- BTL listed as B-ASC
- PID control of HVAC systems to minimize offset and maintain tighter setpoint control
- Unique control algorithms for specific applications

- Reports airflow in cfm (lps)
- 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
- Returns from power failure without operator intervention
- Meets low duct static pressure requirements
- No calibration required, thereby reducing maintenance costs
- Separate minimum and maximum air volume setting for heating and cooling modes
- Applications in P/Ns 550-788A include a user-adjustable temperature offset for the room temperature reading when required for validation purposes.

### Applications

- VAV Cooling Only
- VAV Cooling or Heating
- VAV with Hot Water Reheat (proportional)
- VAV with Electric Reheat (one-, two-, or three-stage)
- VAV Fan Powered Series or Parallel with Hot Water Reheat
- VAV Fan Powered Series or Parallel with Electric Reheat (one-, two-, or three-stage)

Control algorithms are preprogrammed. The controller is ready to operate after selecting the application. 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 Terminal Box Controller consists of an electronic controller assembly and a differential pressure transducer. 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 controller assembly is mounted on a plastic track that mounts directly on the terminal box. An optional enclosure (P/N 550-002) protects the controller assembly. An Autozero Module is available for mounting on the controller for those applications where uninterrupted airflow is necessary. A Pneumatic Transducer provides control of pneumatic damper and valve actuators.

The controller interfaces with the following external devices:

- Averaging air velocity sensors provided by VAV terminal unit manufacturers
- Floating control valve and damper actuators
- Temperature sensors (room, duct, immersion, and outside air)
- Service and commissioning tools
- Digital input devices (dry contacts from motion sensors, alarm contacts)
- Digital output devices (fan, stages of electric heat)

## 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. See the *Room Temperature Sensors Technical Specification Sheet* (149-312P25), for more information.

# Terminal Box Controller Specifications

Power Requirements	
Operating Range	
Power Consumption	19.2 to 27.6 Vac, 50 or 60 Hz 10 VA (plus 12 VA per DO)
Inputs	
Analog	1 room temperature sensor 1 velocity sensor 1 setpoint (optional) 1 auxiliary temperature sensor
Digital	2 dry contacts
Outputs	
Controlled Temperature	6 DO 24 Vac optically isolated solid state switches @ 0.5 amp
Accuracy, Heating or Cooling	±1.5°F (0.9°C)
Dimensions	4-1/8" W x 11-1/4" L x 1-1/2" H (105 mm x 197 mm x 38 mm)
Weight	approx. 3 lbs. (1.35 kg)
Communications	
Remote	BACnet MS/TP (EIA 485), 9600 bps to 76800 bps FLN Trunk WinCIS
Local	
Ambient Conditions	
Storage Temperature	-40°F to 167°F (-40°C to 75°C)
Operating Temperature	32°F to 122°F (0°C to 50°C)
Humidity Range	0% to 92% (non-condensing)
Agency Listings	
UL Listing	UL 916, PAZX,
cUL Listed	Canadian Standards C22.2 No. 205-M1983, PAZX7
FCC Compliance	47 CFR Part 15

## 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)

## Optional Accessories

### Autozero Module

The optional Autozero Module (Figure 2) is required when continuous operation at occupied flow is required for an area. The Autozero Module is connected to the air velocity inlet ports of the Terminal Box Controller and provides periodic recalibration of the air velocity transducer without changing air volume being delivered to a room. This recalibration ensures long-term precise airflow delivery.

## Autozero Module Specifications

Power Consumption	1.5 VA @ 24 Vac max.
Dimensions	2-1/2" W x 2-1/2" H x 1" D (64 mm x 64 mm x 32)
Weight	0.5 lb. (0.2 kg)



Figure 2. Autozero Module.

## Pneumatic Transducer

The PTS Pneumatic Transducer provides the signal conversion from electronic to pneumatic. The module is piped to the pneumatic actuator and wired to the Terminal Box Controller. This transducer provides for accurate control of pneumatic actuators for precise temperature and air volume control.

## Pneumatic Transducer Specifications

Maximum Input Pressure	30 psi (207 kPa)
Air Consumption	0 SCIM
Power Consumption	4 VA @ 24 Vac max.
Dimensions	3-1/2" L x 2-1/4" W x 1-1/2" H (87 mm x 57 mm x 38 mm)
Weight	9 oz (0.3 kg)

## Product Ordering Information

Description	Product Part Numbers
BACnet Terminal Box Controller	550-788A
Pneumatic Transducer	PTS4
Autozero Module	540-378

## Document Ordering Information

Specification Sheet/Application Bulletin	Document Part Number
Duct Temperature Sensor	149-134P25
Electronic Damper Actuator	155-188P25 (GDE 131.1P)
Siemens Valves and Electronic Actuators:	
Flowrite 599 Series – Valve and Actuator Assembly Selection	155-304P25
Powermite 599 Series – MT Series Terminal Unit Valve and Actuator Assembly Selection	155-306P25
Powermite 599 Series – MZ Series Zone Control Valve and Actuator Assembly Selection	155-307P25

# BACnet Protocol Implementation Conformance Statement

## Products

Product	Model Number	Protocol Revision	Software Version	Firmware Version
BACnet Terminal Box Controller (BTEC)	550-788A	135-2001b	1.2	BV13 1.0

Date Tested: August 2005 – B-ASC

## Vendor Information

Siemens Building Technologies  
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## Product Description

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.

## BACnet Standardized Device Profile

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

## Supported BIBBs

Product	Supported BIBBs	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-DynamicDeviceBinding-B	✓
	DM-DOB-B	Device Management-DynamicObjectBinding-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	Options
BTEC	MS/TP Master	9600, 19200, 38400, 76800
	MS/TP Slave	9600, 19200, 38400, 76800

### Segmentation Capability

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

### Device Address Binding

Product	Static Binding Supported
BMEC	Yes

### Networking Options

Product	Static Binding Supported
BTEC	No

### Character Sets

Product	Character Sets supported
BTEC	ANSI X3.4

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