

Constant Volume Controller



Figure 1. Constant Volume Controller.

The Constant Volume Controller (Figure 1) is an integral part of APOGEE® Automation System. The controller provides high performance Direct Digital Control (DDC) technology for room pressure and temperature control of constant volume systems. The Constant Volume Controller can operate stand-alone or can be networked to perform complex HVAC control, monitoring and energy management functions. This controller is designed to reside on the Siemens Building Technologies APOGEE Building Automation System.

Features

- PID control of HVAC systems to minimize offset and maintain tighter volume and temperature control
- Unique control algorithms for specific applications;
- Reports airflow in CFM (l/s)
- Separate air velocity setpoints for occupied and unoccupied modes
- HVAC diagnostic capability at the BLN level using the TBC Test Tool in CT
- Setpoints and control parameters assigned and changed locally or remotely

- Electrically Erasable Programmable Read Only Memory (EEPROM) used for storing set points and control parameters—no battery backup required
- Returns from power failure without operator intervention
- Meets low duct static pressure requirements
- Uses APOGEE Automation System proven DDC architecture
- Secure Mode (P/Ns 540-103C and 540-104C) prevents unauthorized users from making changes to the TEC through the MMI port or room sensor (supports FDA 21 CFR Part 11 compliance - guidelines for protection of electronic records)
- Applications in P/Ns 540-103C and 540-104C include a user-adjustable offset for the room temperature reading when required for validation purposes
- UL and cUL Listed for Smoke Control

Applications

Operating independently or as part of a system, the Constant Volume Controller can control a variety of pressure independent terminal box applications, including:

- CV Cooling Only
- CV with Hot Water Reheat (proportional)
- CV with Electric Reheat (one-, two- or three-stage)

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

Secure Mode Features

Secure Mode

The Constant Volume Controller is also offered with an optional feature, Secure Mode (P/Ns 540-103C and 540-104C). Secure Mode prevents unauthorized users from making any changes to the TEC through the MMI port or room sensor. This functionality allows the TEC to support FDA 21 CFR Part 11 compliance - guidelines for protection of electronic records.

Hardware

Controller Board

The Constant Volume 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 protects the controller assembly.

An Autozero Module is available for those applications where uninterrupted airflow at a constant volume 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 terminal box manufacturers
- Floating control valve and damper actuators
- Temperature sensors (room, duct, immersion, and outside air)
- Service and commissioning tools
- APOGEE Automation System
- Digital input devices (dry contacts from motion sensors, alarm contacts, etc.)
- 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 the installation and reduces the TEC's start-up time. See the *Room Temperature Sensors Technical Specification Sheet* (149-312), for more information.

Constant Volume Controller Specifications

Power Requirements:	
Operating Range	19.2 to 27.6 Vac 50 or 60 Hz
Power Consumption	5 VA (plus 12 VA per DO)
Inputs	
Analog	1 room temperature sensor 1 velocity sensor 1 set point (optional) 1 auxiliary temperature sensor
Digital	2 dry contacts
Outputs	
	6 DO 24 Vac optically isolated solid state switches @ 0.5 Amp (0.25 Amp for Smoke Control)
Dimensions	
	4-1/8" W x 7-3/4" L x 1-1/2" H (105 mm x 197 mm x 38 mm)
Weight	
	approx. 3 lbs. (1.35 kg)
Controlled Temperature	
Accuracy, Heating or Cooling	±1.5°F (0.9°C)
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	CE, C-tick
cUL Listed	UL 916, PAZX
CSA Certified	UL 864, UUKL
FCC Compliance	
Communications	
Remote	FLN Trunk
Local	Portable Operator's Terminal

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 (l/s) by the TEC.

Specifications

Temperature Range	32°F to 122°F (0°C to 50°C)
Measurement Range	0 to 4000 fpm (0 to 20 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 Constant Volume 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.

Specifications

Power Consumption	.75 VA @ 24 Vac max.
Dimensions	2" W x 1.51" H x 1.89"D (58 mm x 78 mm x 29mm)
Weight	1.3 oz. (36.9 g)



Figure 2. Autozero Module.

Pneumatic Transducer

The PTS Pneumatic Transducer (Figure 3) contains the transducers that provide the signal conversion from electronic to pneumatic. The module is piped to the pneumatic actuator and wired to the Constant Volume 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	3.6 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 Number
Constant Volume Controller	540-103
Constant Volume Controller with Secure Mode	540-103C
Constant Volume Controller with Autozero Module	540-104
Constant Volume Controller with Autozero Module with Secure Mode	540-104C
Smoke Control Listed Constant Volume Controller	540-103K
Smoke Control Listed Constant Volume Controller with Secure Mode	540-103CK
Smoke Control Listed Constant Volume Controller with Autozero Module	540-104K
Smoke Control Listed Constant Volume Controller with Autozero Module with Secure Mode	540-104CK
Smoke Control Listed Large Equipment Controller Enclosure	550-002K
Smoke Control Listed Small Equipment Controller Enclosure	540-155K
UL Listed Class 2 transformer with 120/240/277/480 Vac 50/60 HZ 0.4A primary w/ hub and 24Vac 50VA secondary w/ hub and circuit breaker for use with Smoke Control Listed Equipment Controllers	5041MWCB (SBT P/N MUC0240502TFCB)
UL Listed Class 2 transformer with 120/240/277/480 Vac 50/60 HZ 0.5A primary w/ hub and 24Vac 96VA secondary w/ hub and circuit breaker for use with Smoke Control Listed Equipment Controllers	10041MWCB (SBT P/N MUC0241002TFCB)
Pneumatic Transducer	PTS4

Document Ordering Information

Specifications Sheet/Application Bulletin	Document Part Number
Room Temperature Sensor s– Series 1000	149-312P25
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

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