Quality People. Building Solutions.

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Date: 4/21/2022
Return Request: 4/30/2022
Project: JLM VA – Medical Media Relocation
Supplier: Powers of Arkansas
Manufacturer: Various
Submittal: Controls
Submittal Number: 23 09 23-01
Drawing # and Installation: Mechanical Drawings

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Notes:

CSUSA PROJECT NO.
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Submittal Comment Sheet

Project Name: Renovate Medical Media

Project Number:19-030
Date Received:6/2/2022
Date Returned:6/15/2022
Reviewed By: KCK

Comments for 23 09 23 – HVAC General Insulation and Controls:

1. HVAC Identification
    a. Approved
2. Hangers & Supports
    a. Approved
3. HVAC Insulation
    a. Approved as Noted – Heating Water Piping Insulation shall be 1.5” thick per specifications
4. Controls
    a. Approved

End of Comments

THE CONSULTANTS OF RECORD FOR THIS PROJECT HAVE REVIEWED THESE SHOP DRAWINGS. THE CONSULTANTS’ COMMENTS AND REVIEW STAMP ARE APPLICABLE FOR THEIR PORTION OF THE WORK. THE REVIEW AND CHECKING OF THE REFERENCED SUBMITTED DOCUMENTS IS FOR GENERAL CONFORMANCE WITH THE DESIGN INTENT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. REVIEW IS NOT CONDUCTED FOR THE PURPOSE OF DETERMINING THE ACCURACY AND COMPLETENESS OF OTHER DETAILS, SUCH AS DIMENSIONS AND QUANTITIES, FOR SUBSTANTIATING INSTRUCTIONS FOR INSTALLATION OR PERFORMANCE OF EQUIPMENT OR SYSTEMS, OR FOR COORDINATION OF THE WORK OF ALL TRADES, ALL OF WHICH REMAIN THE RESPONSIBILITY OF THE CONTRACTOR AS REQUIRED BY THE CONTRACT DOCUMENTS. CONTRACTOR IS RESPONSIBLE FOR ALL QUANTITIES.

Independent field office for
Siemens Building Technologies

PROJECT #22CNEB3069

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O&M's
For Control Systems For:

SPEC. SECTION: 23 09 23
DIRECT DIGITAL CONTROL SYSTEM FOR HVAC

JLM VA MEDICAL MEDIA RELOCATE

LITTLE ROCK, AR

Mechanical Contractor:
COMFORT SYSTEMS USA

OCTOBER 23, 2023

5440 Northshore Drive – North Little Rock, Arkansas 72118 – Tel: 501.374.5420 Fax: 501.370.9298

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IV. OWNERS MANUALS

Controls Division | **Order Variance** | **Date:** 04/21/22

Job Name: JLM VA Medical Media Relocate | **Job Number:** 22CNEB3069 | **Page:** 1

Product Number	Product Description	System Quantity	Order Quantity
171A-10300S	0.5" 2W 0.4CV SS BALL VLV+GDE131.1P	2	0
171A-10301S	0.5" 2W 0.63CV SS BALL VLV+GDE131.1P	1	0
171A-10302S	0.5" 2W 1CV SS BALL VLV+GDE131.1P	1	0
536-811	DCT PT TMP, 100K OHM, 4", BRACKET MNT	4	0
540-100N	TERM BOX CTLR ELEC OUT	4	0
GDE131.1P	ACT NSR PLENUM 24/108L 5Nm	4	0
QAA2280.FWSC	RTS, TEC/RJ-11, FULL HMI	4	0

SIEMENS

Submittal Sheet
Document No. 154-038
February 4, 2016

599 Series 2-Way Ball Valves

Description

The 599 Series 2-Way Ball Valves are coupled with OpenAir™ actuators to provide equal percentage flow control. The Ball Valves are 1/4-turn rotary control valves.

Product Numbers

Use the product numbers in Table 1 through Table 11 to order a valve and actuator assembly. The product number consists of a 4-character actuator prefix code, a hyphen, and a 5-digit valve body suffix code. Stainless steel product numbers have an "S" suffix in Table 6 through Table 11.

Features

- 200 psi close-off with ANSI Class IV leakage for all line sizes and actuators.
- Available with chrome-plated brass ball and brass stem or stainless steel ball and stem.
- Blow-out proof stem withstands high pressure.
- Universal mounting plate.
- Actuator and plate can be rotated (90 degree increments).
- Standoffs provide a thermal barrier between the actuator and the mounting plate.
- Operating handle for manual operation.

Table 1. Fail-In-Place Assemblies: Chrome-Plated Ball with Brass Stem (1/2-Inch and 3/4-Inch)

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-Off ΔP in psi (kPa)	Fail-in-Place			
				Floating		0 to 10 Vdc	
				GDE 131.1P	GDE 131.1Q	GDE 161.1P	GDE 161.1Q
				3 foot (.9m) Wires	Conduit Adapter & 6-foot (1.8m) Wires	3 foot (.9m) Wires	Conduit Adapter & 6-foot (1.8m) Wires
				Actuator Prefix Code			
				171A	173A	171C	173C
599-10300	1/2 (15)	0.4 (0.34)	200 (1379)	171A-10300	173A-10300	171C-10300	173C-10300
599-10301		0.63 (0.54)		171A-10301	173A-10301	171C-10301	173C-10301
599-10302		1.0 (0.9)		171A-10302	173A-10302	171C-10302	173C-10302
599-10303		1.6 (1.4)		171A-10303	173A-10303	171C-10303	173C-10303
599-10304		2.5 (2.2)		171A-10304	173A-10304	171C-10304	173C-10304
599-10305		4.0 (3.4)		171A-10305	173A-10305	171C-10305	173C-10305
599-10306		6.3 (5.4)		171A-10306	173A-10306	171C-10306	173C-10306
599-10307*		10 (8.6)		171A-10307*	173A-10307*	171C-10307*	173C-10307*
599-10308	3/4 (20)	6.3 (5.4)		171A-10308	173A-10308	171C-10308	173C-10308
599-10309		10 (8.6)		171A-10309	173A-10309	171C-10309	173C-10309
599-10310		16 (14)		171A-10310	173A-10310	171C-10310	173C-10310
599-10311*		25 (22)		171A-10311*	173A-10311*	171C-10311*	173C-10311*

*Denotes a full-port valve without flow characterizers insert.

Table 2. Fail-In-Place Assemblies: Chrome-Plated Ball with Brass Stem (1-Inch to 2-Inch)

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-Off ΔP in psi (kPa)	Fail-in-Place							
				Floating				0 to 10 Vdc			
				GDE 131.1P	GLB 131.1P	GDE 131.1Q	GLB 131.1Q	GDE 161.1P	GLB 161.1P	GDE 161.1Q	GLB 161.1Q
				3 foot (.9m) Wires		Conduit Adapter & 6-foot (1.8m) Wires		3 foot (.9m) Wires		Conduit Adapter & 6-foot (1.8m) Wires	
				Actuator Prefix Code							
				171A	171B	173A	173B	171C	171D	173C	173D
599-10312	1 (25)	10 (9.0)	200 (1379)	171A-10312		173A-10312		171C-10312		173C-10312	
599-10313		16 (14)		171A-10313		173A-10313		171C-10313		173C-10313	
599-10314		25 (22)		171A-10314		173A-10314		171C-10314		173C-10314	
599-10315		40 (34)		171A-10315		173A-10315		171C-10315		173C-10315	
599-10316*		63 (54)		171A-10316*		173A-10316*		171C-10316*		173C-10316*	
599-10317	1 1/4 (32)	16 (14)		171A-10317		173A-10317		171C-10317		173C-10317	
599-10318		25 (22)		171A-10318		173A-10318		171C-10318		173C-10318	
599-10319		40 (34)		171A-10319		173A-10319		171C-10319		173C-10319	
599-10320		63 (54)		171A-10320		173A-10320		171C-10320		173C-10320	
599-10321*		100 (90)		171A-10321*		173A-10321*		171C-10321*		173C-10321*	
599-10322	1 1/2 (40)	25 (22)		171B-10322		173B-10322		171D-10322		173D-10322	
599-10323		40 (34)		171B-10323		173B-10323		171D-10323		173D-10323	
599-10324*		63 (54)		171B-10324*		173B-10324*		171D-10324*		173D-10324*	
599-10325		100 (90)		171B-10325		173B-10325		171D-10325		173D-10325	
599-10326*		160 (140)		171B-10326*		173B-10326*		171D-10326*		173D-10326*	
599-10327	2 (50)	40 (34)		171B-10327		173B-10327		171D-10327		173D-10327	
599-10328		63 (54)		171B-10328		173B-10328		171D-10328		173D-10328	
599-10329*		100 (90)		171B-10329*		173B-10329*		171D-10329*		173D-10329*	
599-10330*		160 (140)		171B-10330*		173B-10330*		171D-10330*		173D-10330*	

***Denotes a full-port valve without flow characterizers insert.**

Table 3. Fail-Safe Assemblies: Chrome-Plated Ball with Brass Stem (1/2-Inch and 3/4-Inch).

Valve Body Product Number*	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔP in psi (kPa)	Fail-Safe					
				2-Position		Floating		2 to 10 Vdc	
				GQD121.1P		GQD131.1P		GQD151.1P	
				N.O.	N.C.	N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code					
				171H	172H	171J	172J	171K	172K
599-10300	1/2 (15)	0.4 (0.34)	200 (1379)	171H-10300	172H-10300	171J-10300	172J-10300	171K-10300	172K-10300
599-10301		0.63 (0.54)		171H-10301	172H-10301	171J-10301	172J-10301	171K-10301	172K-10301
599-10302		1.0 (0.9)		171H-10302	172H-10302	171J-10302	172J-10302	171K-10302	172K-10302
599-10303		1.6 (1.4)		171H-10303	172H-10303	171J-10303	172J-10303	171K-10303	172K-10303
599-10304		2.5 (2.2)		171H-10304	172H-10304	171J-10304	172J-10304	171K-10304	172K-10304
599-10305		4.0 (3.4)		171H-10305	172H-10305	171J-10305	172J-10305	171K-10305	172K-10305
599-10306		6.3 (5.4)		171H-10306	172H-10306	171J-10306	172J-10306	171K-10306	172K-10306
599-10307*		10 (8.6)		171H-10307*	172H-10307*	171J-10307*	172J-10307*	171K-10307*	172K-10307*
599-10308	3/4 (20)	6.3 (5.4)		171H-10308	172H-10308	171J-10308	172J-10308	171K-10308	172K-10308
599-10309		10 (8.6)		171H-10309	172H-10309	171J-10309	172J-10309	171K-10309	172K-10309
599-10310		16 (14)		171H-10310	172H-10310	171J-10310	172J-10310	171K-10310	172K-10310
599-10311*		25 (22)		171H-10311*	172H-10311*	171J-10311*	172J-10311*	171K-10311*	172K-10311*

*Denotes a full-port valve without flow characterizer insert.

Table 4. Fail-Safe Assemblies: Chrome-Plated Ball and Brass Stem (1-Inch to 2-Inch).

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-ff ΔP in psi (kPa)	Fail-Safe					
				2-Position		Floating		0 to 10 Vdc	
				GMA121.1P		GMA131.1P		GMA161.1P	
				N.O.	N.C.	N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code					
				171E	172E	171F	172F	171G	172G
599-10312	1 (25)	10 (9.0)	200 (1379)	171E-10312	172E-10312	171F-10312	172F-10312	171G-10312	172G-10312
599-10313		16 (14)		171E-10313	172E-10313	171F-10313	172F-10313	171G-10313	172G-10313
599-10314		25 (22)		171E-10314	172E-10314	171F-10314	172F-10314	171G-10314	172G-10314
599-10315		40 (34)		171E-10315	172E-10315	171F-10315	172F-10315	171G-10315	172G-10315
599-10316*		63 (54)		171E-10316*	172E-10316*	171F-10316*	172F-10316*	171G-10316*	172G-10316*
599-10317	1 1/4 (32)	16 (14)		171E-10317	172E-10317	171F-10317	172F-10317	171G-10317	172G-10317
599-10318		25 (22)		171E-10318	172E-10318	171F-10318	172F-10318	171G-10318	172G-10318
599-10319		40 (34)		171E-10319	172E-10319	171F-10319	172F-10319	171G-10319	172G-10319
599-10320		63 (54)		171E-10320	172E-10320	171F-10320	172F-10320	171G-10320	172G-10320
599-10321*		100 (90)		171E-10321*	172E-10321*	171F-10321*	172F-10321*	171G-10321*	172G-10321*
599-10322	1 1/2 (40)	25 (22)		171E-10322	172E-10322	171F-10322	172F-10322	171G-10322	172G-10322
599-10323		40 (34)		171E-10323	172E-10323	171F-10323	172F-10323	171G-10323	172G-10323
599-10324*		63 (54)		171E-10324*	172E-10324*	171F-10324*	172F-10324*	171G-10324*	172G-10324*
599-10325		100 (90)		171E-10325	172E-10325	171F-10325	172F-10325	171G-10325	172G-10325
599-10326*		160 (140)		171E-10326*	172E-10326*	171F-10326*	172F-10326*	171G-10326*	172G-10326*
599-10327	2 (50)	40 (34)		171E-10327	172E-10327	171F-10327	172F-10327	171G-10327	172G-10327
599-10328		63 (54)		171E-10328	172E-10328	171F-10328	172F-10328	171G-10328	172G-10328
599-10329*		100 (90)		171E-10329*	172E-10329*	171F-10329*	172F-10329*	171G-10329*	172G-10329*
599-10330*		160 (140)		171E-10330*	172E-10330*	171F-10330*	172F-10330*	171G-10330*	172G-10330*

* Denotes a full-port valve without flow characterizer insert.

Table 5. Fail-Safe Assemblies: Full-Port, Chrome-Plated Ball and Brass Stem, 120V.

Valve Body Product Number*	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔP in psi (kPa)	Fail-Safe, 120V			
				2-Position			
				GQD221.1U		GMA221.1U	
				N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code			
				171L	172L	171M	172M
599-10307*	1/2 (15)	10 (9)	200 (1379)	171L-10307*	172L-10307*	—	—
599-10311*	3/4 (20)	25 (22)		171L-10311*	172L-10311*	—	—
599-10316*	1 (25)	63 (54)		—	—	171M-10316*	172M-10316*
599-10321*	1-/14 (32)	100 (90)		—	—	171M-10321*	172M-10321*
599-10326*	1-1/2 (40)	160 (140)		—	—	171M-10326*	172M-10326*
599-10330*	2 (50)			—	—	171M-10330*	172M-10330*

* Denotes a full-port valve without flow characterizers insert.

Table 6. Fail-In-Place Assemblies: Stainless Steel Ball and Stem (1/2-Inch and 3/4-Inch).

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-Off ΔP in psi (kPa)	Fail-in-Place			
				Floating		0 to 10 Vdc	
				GDE 131.1P	GDE 131.1Q	GDE 161.1P	GDE 161.1Q
				3 foot (.9m) Wires	Conduit Adapter & 6-foot (1.8m) Wires	3 foot (.9m) Wires	Conduit Adapter & 6-foot (1.8m) Wires
				Actuator Prefix Code			
				171A	173A	171C	173C
599-10300S	1/2 (15)	0.4 (0.34)	200 (1379)	171A-10300S	173A-10300S	171C-10300S	173C-10300S
599-10301S		0.63 (0.54)		171A-10301S	173A-10301S	171C-10301S	173C-10301S
599-10302S		1.0 (0.9)		171A-10302S	173A-10302S	171C-10302S	173C-10302S
599-10303S		1.6 (1.4)		171A-10303S	173A-10303S	171C-10303S	173C-10303S
599-10304S		2.5 (2.2)		171A-10304S	173A-10304S	171C-10304S	173C-10304S
599-10305S		4.0 (3.4)		171A-10305S	173A-10305S	171C-10305S	173C-10305S
599-10306S		6.3 (5.4)		171A-10306S	173A-10306S	171C-10306S	173C-10306S
599-10307S*		10 (8.6)		171A-10307S*	173A-10307S*	171C-10307S*	173C-10307S*
599-10308S	3/4 (20)	6.3 (5.4)		171A-10308S	173A-10308S	171C-10308S	173C-10308S
599-10309S		10 (8.6)		171A-10309S	173A-10309S	171C-10309S	173C-10309S
599-10310S		16 (14)		171A-10310S	173A-10310S	171C-10310S	173C-10310S
599-10311S*		25 (22)		171A-10311S*	173A-10311S*	171C-10311S*	173C-10311S*

*Denotes a full-port valve without flow characterizer insert.

Table 7. Fail-In-Place Assemblies: Stainless Steel Ball and Stem (1-Inch to 2-Inch).

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-Off ΔP in psi (kPa)	Fail-in-Place							
				Floating				0 to 10 Vdc			
				GDE 131.1P	GLB 131.1P	GDE 131.1Q	GLB 131.1Q	GDE 161.1P	GLB 161.1P	GDE 161.1Q	GLB 161.1Q
				3 foot (.9m) Wires		Conduit Adapter & 6-foot (1.8m) Wires		3 foot (.9m) Wires		Conduit Adapter & 6-foot (1.8m) Wires	
				Actuator Prefix Code							
				171A	171B	173A	173B	171C	171D	173C	173D
599-10312S	1 (25)	10 (9.0)	200 (1379)	171A-10312S		173A-10312S		171C-10312S		173C-10312S	
599-10313S		16 (14)		171A-10313S		173A-10313S		171C-10313S		173C-10313S	
599-10314S		25 (22)		171A-10314S		173A-10314S		171C-10314S		173C-10314S	
599-10315S		40 (34)		171A-10315S		173A-10315S		171C-10315S		173C-10315S	
599-10316S*		63 (54)		171A-10316S*		173A-10316S*		171C-10316S*		173C-10316S*	
599-10317S	1-1/4 (32)	16 (14)		171A-10317S		173A-10317S		171C-10317S		173C-10317S	
599-10318S		25 (22)		171A-10318S		173A-10318S		171C-10318S		173C-10318S	
599-10319S		40 (34)		171A-10319S		173A-10319S		171C-10319S		173C-10319S	
599-10320S		63 (54)		171A-10320S		173A-10320S		171C-10320S		173C-10320S	
599-10321S*		100 (90)		171A-10321S*		173A-10321S*		171C-10321S*		173C-10321S*	
599-10322S	1-1/2 (40)	25 (22)			171B-10322S		173B-10322S		171D-10322S		173D-10322S
599-10323S		40 (34)			171B-10323S		173B-10323S		171D-10323S		173D-10323S
599-10324S*		63 (54)			171B-10324S*		173B-10324S*		171D-10324S*		173D-10324S*
599-10325S		100 (90)			171B-10325S		173B-10325S		171D-10325S		173D-10325S
599-10326S*		160 (140)			171B-10326S*		173B-10326S*		171D-10326S*		173D-10326S*
599-10327S	2 (50)	40 (34)			171B-10327S		173B-10327S		171D-10327S		173D-10327S
599-10328S		63 (54)			171B-10328S		173B-10328S		171D-10328S		173D-10328S
599-10329S*		100 (90)			171B-10329S*		173B-10329S*		171D-10329S*		173D-10329S*
599-10330S*		160 (140)			171B-10330S*		173B-10330S*		171D-10330S*		173D-10330S*

*Denotes a full-port valve without flow characterizer insert.

Table 8. Fail-Safe Assemblies: Stainless Steel Ball and Stem (1/2-Inch and 3/4-Inch).

Valve Body Product Number*	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔP in psi (kPa)	Fail-Safe					
				2-Position		Floating		2 to 10 Vdc	
				GQD121.1P		GQD131.1P		GQD151.1P	
				N.O.	N.C.	N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code					
				171H	172H	171J	172J	171K	172K
599-10300S	1/2 (15)	0.4 (0.34)	200 (1379)	171H-10300S	172H-10300S	171J-10300S	172J-10300S	171K-10300S	172K-10300S
599-10301S		0.63 (0.54)		171H-10301S	172H-10301S	171J-10301S	172J-10301S	171K-10301S	172K-10301S
599-10302S		1.0 (0.9)		171H-10302S	172H-10302S	171J-10302S	172J-10302S	171K-10302S	172K-10302S
599-10303S		1.6 (1.4)		171H-10303S	172H-10303S	171J-10303S	172J-10303S	171K-10303S	172K-10303S
599-10304S		2.5 (2.2)		171H-10304S	172H-10304S	171J-10304S	172J-10304S	171K-10304S	172K-10304S
599-10305S		4.0 (3.4)		171H-10305S	172H-10305S	171J-10305S	172J-10305S	171K-10305S	172K-10305S
599-10306S		6.3 (5.4)		171H-10306S	172H-10306S	171J-10306S	172J-10306S	171K-10306S	172K-10306S
599-10307S*		10 (8.6)		171H-10307S*	172H-10307S*	171J-10307S*	172J-10307S*	171K-10307S*	172K-10307S*
599-10308S	3/4 (20)	6.3 (5.4)		171H-10308S	172H-10308S	171J-10308S	172J-10308S	171K-10308S	172K-10308S
599-10309S		10 (8.6)		171H-10309S	172H-10309S	171J-10309S	172J-10309S	171K-10309S	172K-10309S
599-10310S		16 (14)		171H-10310S	172H-10310S	171J-10310S	172J-10310S	171K-10310S	172K-10310S
599-10311S*		25 (22)		171H-10311S*	172H-10311S*	171J-10311S*	172J-10311S*	171K-10311S*	172K-10311S*

*Denotes a full-port valve without flow characterizer insert.

Table 9. Fail-Safe Assemblies: Stainless Steel Ball and Stem (1-Inch to 2-Inch).

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔPin psi (kPa)	Fail-Safe					
				2-Position		Floating		0 to 10 Vdc	
				GMA121.1P		GMA131.1P		GMA161.1P	
				N.O.	N.C.	N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code					
				171E	172E	171F	172F	171G	172G
599-10312S	1 (25)	10 (9.0)	200 (1379)	171E-10312S	172E-10312S	171F-10312S	172F-10312S	171G-10312S	172G-10312S
599-10313S		16 (14)		171E-10313S	172E-10313S	171F-10313S	172F-10313S	171G-10313S	172G-10313S
599-10314S		25 (22)		171E-10314S	172E-10314S	171F-10314S	172F-10314S	171G--0314S	172G-10314S
599-10315S		40 (34)		171E-10315S	172E-10315S	171F-10315S	172F-10315S	171G-10315S	172G-10315S
599-10316S*		63 (54)		171E-10316S*	172E-10316S*	171F-10316S*	172F-10316S*	171G-10316S*	172G-10316S*
599-10317S	1-1/4 (32)	16 (14)		171E-10317S	172E-10317S	171F-10317S	172F-10317S	171G-10317S	172G-10317S
599-10318S		25 (22)		171E-10318S	172E-10318S	171F-10318S	172F-10318S	171G-10318S	172G-10318S
599-10319S		40 (34)		171E-10319S	172E-10319S	171F-10319S	172F-10319S	171G-10319S	172G-10319S
599-10320S		63 (54)		171E-10320S	172E-10320S	171F-10320S	172F-10320S	171G-10320S	172G-10320S
599-10321S*		100 (90)		171E-10321S*	172E-10321S*	171F-10321S*	172F-10321S*	171G-10321S*	172G-10321S*
599-10322S	1-1/2 (40)	25 (22)		171E-10322S	172E-10322S	171F-10322S	172F-10322S	171G-10322S	172G-10322S
599-10323S		40 (34)		171E-10323S	172E-10323S	171F-10323S	172F-10323S	171G-10323S	172G-10323S
599-10324S*		63 (54)		171E-10324S*	172E-10324S*	171F-10324S*	172F-10324S*	171G-10324S*	172G-10324S*
599-10325S		100 (90)		171E-10325S	172E-10325S	171F-10325S	172F-10325S	171G-10325S	172G-10325S
599-10326S*		160 (140)		171E-10326S*	172E-10326S*	171F-10326S*	172F-10326S*	171G-10326S*	172G-10326S*
599-10327S	2 (50)	40 (34)		171E-10327S	172E-10327S	171F-10327S	172F-10327S	171G-10327S	172G-10327S
599-10328S		63 (54)		171E-10328S	172E-10328S	171F-10328S	172F-10328S	171G-10328S	172G-10328S
599-10329S*		100 (90)		171E-10329S*	172E-10329S*	171F-10329S*	172F-10329S*	171G-10329S*	172G-10329S*
599-10330S*		160 (140)		171E-10330S*	172E-10330S*	171F-10330S*	172F-10330S*	171G-10330S*	172G-10330S*

* Denotes a full-port valve without flow characterizer insert.

Table 10. Fail-Safe Assemblies: Full-Port, Stainless Steel Ball and Stem, 120V.

Valve Body Product Number*	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔP in psi (kPa)	Fail-Safe, 120V			
				2-Position			
				GQD221.1U		GMA221.1U	
				N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code			
				171L	172L	171M	172M
599-10307S*	1/2 (15)	10 (9)	200 (1379)	171L-10307S*	172L-10307S*	—	—
599-10311S*	3/4 (20)	25 (22)		171L-10311S*	172L-10311S*	—	—
599-10316S*	1 (25)	63 (54)		—	—	171M-10316S*	172M-10316S*
599-10321S*	1-/14 (32)	100 (90)		—	—	171M-10321S*	172M-10321S*
599-10326S*	1-1/2 (40)	160 (140)		—	—	171M-10326S*	172M-10326S*
599-10330S*	2 (50)			—	—	171M-10330S*	172M-10330S*

* Denotes a full-port valve without flow characterizer insert.

Table 11. Fail-Safe Assemblies: Full-Port, Stainless Steel Ball and Stem, 24V with Dual Auxiliary Switches.

Valve Body Product Number*	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔP in psi (kPa)	Fail-Safe, 24V			
				2-Position			
				GQD126.1P		GMA126.1P	
				N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code			
				171N	172N	171P	172P
599-10307S*	1/2 (15)	10 (9)	200 (1379)	171N-10307S*	172N-10307S*	—	—
599-10311S*	3/4 (20)	25 (22)		171N-10311S*	172N-10311S*	—	—
599-10316S*	1 (25)	63 (54)		—	—	171P-10316S*	172P-10316S*
599-10321S*	1-/14 (32)	100 (90)		—	—	171P-10321S*	172P-10321S*
599-10326S*	1-1/2 (40)	160 (140)		—	—	171P-10326S*	172P-10326S*
599-10330S*	2 (50)			—	—	171P-10330S*	172P-10330S*

* Denotes a full-port valve without flow characterizer insert.

Typical Specifications

Ball valves shall have female NPT type fittings and shall be 1/2-inch to 2-inch (15 mm to 50 mm) line and ball sizes. The valves shall have a forged brass body; chrome-plated brass ball with brass stem or stainless steel ball and stem; and EPDM O-ring seals. Valves shall contain glass-filled PTFE ball valve seals or integral seals and flow characterizers to provide an equal percentage control characteristic where required. Ball valves shall utilize a 90-degree rotation for control. They shall provide automated flow control of hot or chilled water and up to 50% water-glycol solution for HVAC control applications.

Technical Data

Pressure Rating	600 WOG/ANSI 250	**Ball Seals**	Glass-filled PTFE with EPDM O-rings
Media Temperature	35°F to 250°F (2°C to 120°C)	**End Connections**	Female NPT
Controlled Medium	Water, 50% water-glycol solution	**Stem**	Brass or stainless steel
Body	Brass: ASTM B283, C37700	**Stem Seals**	EPDM O-rings
Ball	Chrome-plated brass or Stainless steel	**Angle of Rotation**	0° to 90°
Flow Characterizer	Glass-filled PTFE		

Table 12. Full-Port (No Flow Characterizer) Ball Valve Product Numbers and Flow Coefficients.

Valve Product Number	Valve Line Size in Inches (mm)	Effective (Installed) Cv (Kvs)										
		Supply Line Size in Inches (mm)										
		1/2 (13)	3/4 (20)	1 (25)	1-1/4 (32)	1-1/2 (38)	2 (51)	2-1/2 (63)	3 (76)	4 (102)	5 (127)	6 (152)
599-10307 or 599-10307S	1/2 (15)	**10.00 (8.62)**	**6.94 (5.93)**	**6.19 (5.29)**	—	—	—	—	—	—	—	—
599-10311 or 599-10311S	3/4 (20)	—	**25.00 (21.55)**	**18.66 (15.95)**	**15.35 (13.12)**	—	—	—	—	—	—	—
599-10316 or 599-10316S	1 (25)	—	—	**63.00 (54.31)**	**39.78 (34.00)**	**33.56 (28.69)**	—	—	—	—	—	—
599-10321 or 599-10321S	1-1/4 (32)	—	—	—	**100.00 (86.21)**	**69.19 (59.13)**	**51.45 (43.98)**	—	—	—	—	—
599-10324 or 599-10324S	1-1/2 (40)	—	—	—	—	**63.00 (54.31)**	**55.34 (47.30)**	**51.00 (43.59)**	—	—	—	—
599-10326 or 599-10326S		—	—	—	—	**160.00 (137.93)**	**93.80 (80.17)**	**76.34 (65.25)**	—	—	—	—
599-10329 or 599-10329S	2 (50)	—	—	—	—	—	**100.00 (86.21)**	**94.30 (80.60)**	**86.12 (73.61)**	—	—	—

= Valve may be oversized. = Optimal valve size. = Valve may be undersized

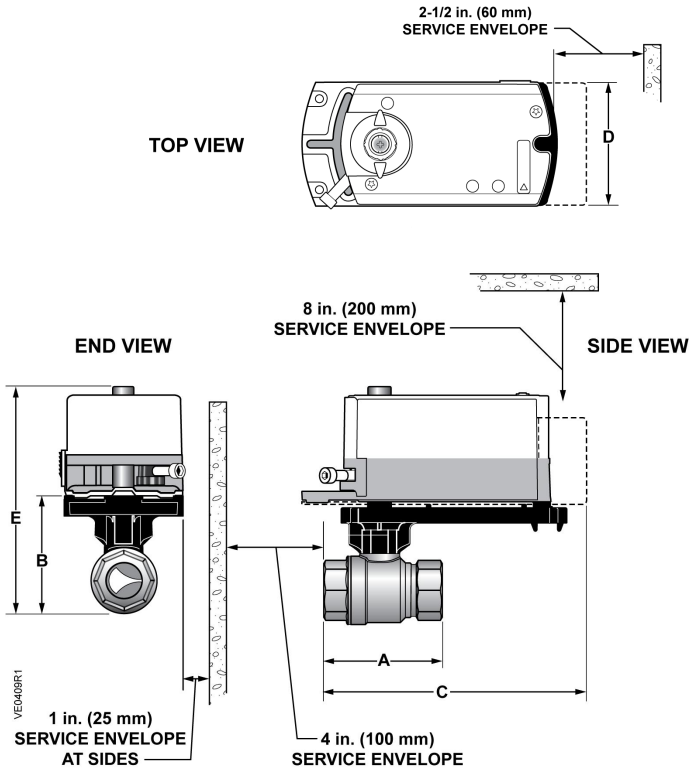

Figure 1. Two-Way Ball Valve and Low Profile Bracket with Actuator Dimensions in Inches (Millimeters).

Line Size Inches (mm)	Cv Range	A Length	B Height	C Length Actuator Codes			D Width	E Height	Valve and Bracket Weight lbs (kg)
				GDE		GQD			
				171A-D	173A-D	171H, J, K, L, N			
1/2 (15)	0.4 to 10	2-7/16 (61)	2-1/4 (57)	5-1/4 (133)	5-3/4 (146)	5-1/4 (133)	2-3/4 (70)	4-13/16 (123)	1 (0.45)
3/4 (20)	6.3 to 25	2-3/4 (70)	2-5/8 67)	5-3/8 (136)	6 (153)	5-3/8 (136)		5-1/4 (133)	1.3 (0.60)

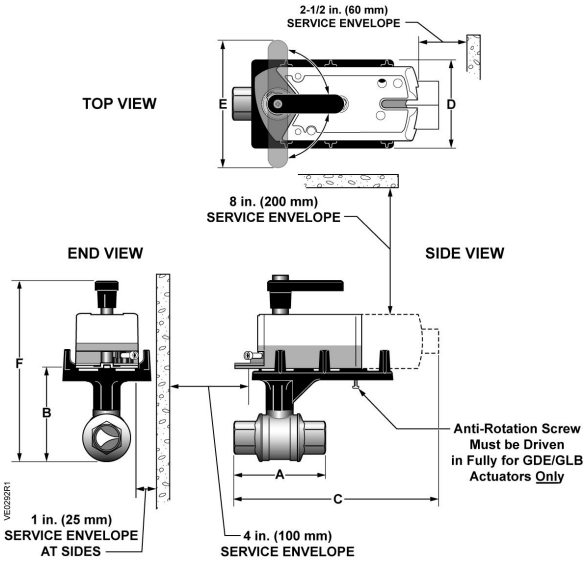

Figure 2. 2-Way Ball Valves.

- All dimensions are in inches (mm).
- Dimension “D”, Depth, is 3.7 inches (94.5) “E”, Handle, is 5.3 inches (135.9).
- Dimension weights are in pounds (kg).

Table 13. Two-Way Ball Valve and Bracket with Actuator Dimensions in Inches (Millimeters).

Line Size Inch (mm)	Cv Range	A Length	C Length * Actuator Codes 171A-D, 173A-D GDE/GLB	C Length * Actuator Codes 171H,J,K GQD	C Length* Actuator Codes 171E,F 172E,F Fail Safe GMA	F Height	Valve and Bracket Weight lbs (kg)
1 (25)	10	3 (77)	6-11/16 (170)	—	8 (203)	8 (203)	1.6 (0.73)
	16, 40, 63	3-1/4 (82)		—	8-3/8 (213)	8-5/16 (212)	1.8 (0.82)
	25	3-7/8 (98)	7 (178)	—	8-11/16 (221)	8-13/16 (223)	
1-1/4 (32)	16	3-3/8(86)	6-11/16 (170)	—	8-7/16 (214)	8-3/8 (213)	2.0 (0.91)
	25 to 100	3-11/16 (94)	6-15/16 (176)	—	8-11/16 (221)	8-13/16 (223)	2.5 (1.1)
1-1/2 (40)	25, 63	3-5/8 (92)		—	8-7/16 (214)	8-13/16 (223)	1.8 (0.82)
	40, 100, 160	3-15/16 (100)	7-1/16 (180)	—	8-3/4 (223)	9-1/4 (235)	3.3 (1.50)
2 (50)	40, 100	4 (102)		—		9-3/8 (238)	3.1 (1.41)
	63	4-5/8 (118)	7-1/2 (190)	—	9-1/8 (223)	10-1/16 (255)	5.25 (2.38)
	160			—			5.3 (2.40)

*Dimension C is the maximum length, measured from actuator, end fitting, or mounting plate, whichever extends the furthest.

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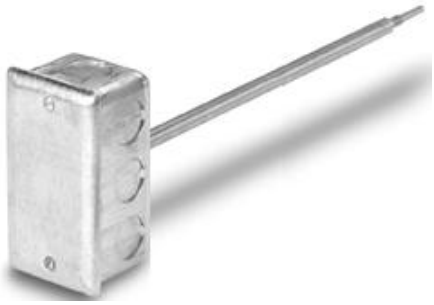
SIEMENS

Technical Specification Sheet
Document No. 149-915
February 19, 2018

Duct Temperature Sensors



Rigid Probe

Rigid Probe – Bracket Mount

Flexible Probe

Description

Siemens Duct Temperature Sensors monitor and transmit changes in duct air temperature to the HVAC control system. They provide an accurate, reliable indication of duct air temperature. The sensor resistance varies proportionally to the actual temperature being measured.

Sensors are offered with a variety of probe lengths to fit almost any size duct. Longer probes are typically flexible for easier handling and installation (see *Product Ordering Information* on the following page for details).

Multiple output signals are available to ensure compatibility with most common HVAC control systems.

Features

- Variety of sensing elements.
- Suitable for multiple duct applications.
- Responsive to temperature change.
- Accurate and reliable indication of duct temperature.
- Familiar installation process does not require special tools.

Specifications

Output Signals	100K Ω Thermistor 10K Ω Type 2 Thermistor 10K Ω Type 3 Thermistor 1K Ω @ 32°F Ni RTD 1K Ω @ 70°F Ni RTD 1K Ω Pt RTD (375a) 1K Ω Pt RTD (385a) 4 to 20mA · -4°F to 122°F · 20°F to 120°F · 30°F to 250°F 10K Ω Matched Pair Thermistor · (For use with Siemens TEC only)
Probe Material	0.028 Wall SAE J526 ZTEW or Galfan steel tubing
Housing*	Standard NEC approved 2 × 4 inch (5 × 10 cm) utility box with 1/2-inch (13 mm) knockouts
Screw Head Type	Standard slotted

* Bracket-mounted units do not include housing.

Disposal

The devices are considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the devices through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Product Ordering Information

Output Signal	Type	Probe Length	Measuring Range	Accuracy	PN
100K Ω Thermistor	Point	18 inches (rigid)	-40°F to 180°F (-40°C to 82°C)	±0.50°F (±0.28°C) @ 77°F (25°C)	535-741-18
		4 inches (rigid)			535-741-4
		8 inches (rigid)			535-741-8
		4 inches (rigid), Bracket			536-811
	Averaging	18 inches (rigid)		±0.36°F (±0.2°C) @ 77°F (25°C)	540-244-18
		36 inches (flexible)			540-245-36
		72 inches (flexible)			540-246-72
10K Ω Type II Thermistor	Point	4 inches (rigid)		±0.4°F (±0.2°C) @ 77°F (25°C)	QAM2030.010
		8 inches (rigid)			QAM2030.020
		18 inches (rigid)			QAM2030.045
	Averaging	8 feet (flexible)			QAM2030.250
		16 feet (flexible)			QAM2030.500
		24 feet (flexible)			QAM2030.750
10K Ω Type III Thermistor	Point	4 inches (rigid)			QAM2032.010
		8 inches (rigid)			QAM2032.020
		18 inches (rigid)			QAM2032.045
	Averaging	8 feet (flexible)			QAM2032.250
		16 feet (flexible)			QAM2032.500
		24 feet (flexible)			QAM2032.750
1K Ω @ 32F Ni RTD	Point	4 inches (rigid)		±0.72°F (±0.4°C) @ 32°F (0°C)	QAM2020.010
		8 inches (rigid)			QAM2020.020
		18 inches (rigid)			QAM2020.045
	Averaging	16 feet (flexible)		±0.75°F (±0.4°C) @ 75°F (24°C)	QAM2020.500
		24 feet (flexible)			QAM2020.750
1K Ω @ 70°F Ni RTD	Point	8 inches (rigid)		±0.72°F (±0.4°C) @ 32°F (0°C)	QAM2021.020
		18 inches (rigid)			QAM2021.045
	Averaging	24 feet (flexible)			QAM2021.750
1K Ω Pt RTD (375a)	Point	18 inches (rigid)		±0.54°F (±0.3°C) @ 32°F (0°C)	544-339-18
		4 inches (rigid)			544-339-4
		8 inches (rigid)			544-339-8
	Averaging	16 feet (flexible)			544-342-16
		24 feet (flexible)			544-342-24
		8 feet (flexible)			544-342-8
		18 inches (rigid)			544-343-18
		24 inches (rigid)			544-343-24
		36 inches (rigid)			544-343-36
		48 inches (rigid)			544-343-48
1K Ω Pt RTD (385a)	Point	4 inches (rigid)			QAM2012.010
		8 inches (rigid)			QAM2012.020
		18 inches (rigid)			QAM2012.045
	Averaging	8 feet (flexible)		±0.75°F (±0.4°C) @ 75°F (24°C)	QAM2012.250
		16 feet (flexible)			QAM2012.500
		24 feet (flexible)			QAM2012.750
4 to 20 mA	Point	18 inches (rigid)	-4°F to 122°F (-20°C to 50°C)	±0.54°F (±0.3°C) @ 32°F (0°C)	544-560-18
		4 inches (rigid)			544-560-4
		8 inches (rigid)			544-560-8
		18 inches (rigid)	20°F to 120°F (-7°C to 49°C)		533-376-18
		4 inches (rigid)			533-376-4
		8 inches (rigid)			533-376-8
	Averaging	16 feet (flexible)			533-380-16
		24 feet (flexible)			533-380-24
		8 feet (flexible)			533-380-8
		18 inches (rigid)			535-490-18
		24 inches (rigid)			535-490-24
		36 inches (rigid)			535-490-36
		48 inches (rigid)			535-490-48
	Point	18 inches (rigid)	30°F to 250°F (-1°C to 121°C)		533-377-18
		4 inches (rigid)			533-377-4
		8 inches (rigid)			533-377-8
For Use with Siemens TEC Only	Point	4 inches (rigid)	-40°F to 180°F (-40°C to 82°C)	± 0.50°F (± 0.28°C) @ 77°F (25°C)	538-871
		4 inches (rigid), Bracket			540-128
		18 inches (rigid)			540-739

Accessories

Flange and Gasket Kit for Variable Insertion Depth of Rigid Point Sensors	AQM2000

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SIEMENS

Technical Specification Sheet
Document No. 149-1014
August 27, 2015

TEC Terminal Box (VAV) Controller

The TEC Terminal Box Controller provides high performance Direct Digital Control (DDC) of pressure-independent, variable-air-volume zone-level routines. The TEC Terminal Box Controller 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 Siemens Industry control system.

Features

- Advanced PID algorithm for the temperature control loops is employed to provide stability and to reduce unnecessary changes in the Flow setpoint when the room temperature is at or near the room temperature setpoint.
- Unique control algorithms for specific applications.
- Plenum rated controller.
- Setpoints and control parameters assigned and changed locally or remotely.
- Setpoints and control parameters stored in Electrically Erasable Programmable Read Only Memory (EEPROM)—no battery backup required.
- Returns from power failure without operator intervention.
- No calibration required, thereby reducing maintenance costs.
- Reports airflow in cfm (lps).
- Meets low duct static pressure requirements.
- Separate minimum and maximum air volume setting for heating and cooling modes.

Applications

- Slave Mode (Application 2091)
- VAV Cooling Only (Application 2020)
- VAV Cooling or Heating (Application 2021)
- VAV with Electric Reheat or Baseboard Radiation (Application 2022)
- VAV with Hot Water Reheat (Application 2023)
- VAV Series Fan Powered with Electric Reheat (Application 2024)
- VAV Series Fan Powered with Hot Water Reheat (Application 2025)
- VAV Parallel Fan Powered with Electric Reheat (Application 2026)
- VAV Parallel Fan Powered with Hot Water Reheat (Application 2027)

Control algorithms are pre-programmed. The controller is ready to operate after selecting the application. If desired, the operator may adjust the room temperature setpoints and other parameters. The controller is designed for operation and modification without vendor assistance.

Hardware

Controller Board

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 540-155) protects the controller assembly.

Autozero Modules (optional devices, P/NB 540-200N) are available for mounting with the controller for those applications where uninterrupted airflow is necessary. An optional 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
- Analog input devices (room temperature sensor, room setpoint dial, auxiliary temperature sensor)
- 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.

Terminal Box Controller Specifications

Power Requirements	
Operating Range	24 Vac +/-20%, 50 or 60 Hz
Power Consumption	3 VA (plus 12 VA per DO)

Dimensions	4-1/8" W × 7-3/4" L × 1-1/2" H
Weight	approx. 3 lbs (1.35 kg)
Controlled Temperature Accuracy, Heating or Cooling	±1.8°F (0.9°C)

Autozero Module 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 29 mm)
Weight	1.3 oz. (36.9 g)

Inputs	
Analog	1 room temperature sensor 1 velocity sensor 1 setpoint (optional) 1 auxiliary temperature sensor
Digital	1 aux temp dry contact 1 dry contact only input

Outputs	
Analog	N/A
Digital	6 DO 24 Vac optically isolated solid state switches @ 0.5 amp

Communications	
Remote	4800 bps FLN Trunk
Local	WCIS

Ambient Conditions	
Shipping & 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)

Agency Listings	
UL Listing	UL 916, PAZX
cUL Listed	Canadian Standards C22.2 No. 205-M1983, PAZX7
FCC Compliance	FCC Part 15, Class A

Optional Accessories

Autozero Module

The optional Autozero Module (product number 540-380) should be used when continuous operation at occupied flow is required for an area. The Autozero Module is connected to the air velocity inlet ports of the 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.

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)

Pneumatic Transducer

The PTS Pneumatic Transducer contains the transducers that provide 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 Number
TEC Terminal Box Controller	540-100N
TEC Terminal Box Controller with Autozero Module	540-200N
Small enclosure for electronic controller without damper actuator (short board).	540-155

Document Information

Technical Specification Sheets/Technical Instructions	Document Part Number
Room Temperature Sensors – Series 2200	149-820
Room Temperature Sensors – Series 2000	149-321
Duct Temperature Sensor	149-134P25
Analog Sensors – 100 K Ohm Thermistor	149-262
Siemens Valves	**Document Part Number**
599 Series Zone Valves 2-Way, 3-Way Zone Valve Electric	154-034
599 Series Zone Valves and Actuators – Modulating, On/Off Spring Return, 2-Position Control	154-063
Siemens Electronic Actuators	**Document Part Number**
OpenAir Electronic Damper Actuators, GDE/GLB Series Non-spring Return Rotary 24 Vac – Modulating Control 0 to 10 Vdc	155-187P25
OpenAir Electronic Damper Actuators, GDE/GLB Series Non-spring Return, 24 Vac Floating Control, Rotary	155-188P25
OpenAir GEB Series Non-spring Return, 24 Vac, 132 lb-in Rotary Electronic Damper Actuators	155-318P25

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Document No.149-1014
Printed in the USA

SIEMENS

Submittal Sheet
Document No. 154-011P25
January 25, 2011

OpenAir™ GDE Series, Non-spring Return, 24 Vac, 44 lb-in, Direct Coupled, Electronic Damper Actuator

Product Number	Operating Voltage	Control		Pre-Cabled			No Cables		Built-in Control Options				Bulk Pack	
	24 Vac +20%, -15%	0 to 10 Vdc	Floating Control	Standard	Plenum, 18 AWG, 3 ft (0.9m)	Plenum, 18 AWG, 6 ft (1.8 m)	Terminal Strip	Post Header	Feedback	Potentiometer	Dual Auxiliary Switches	Slope and Offset	24 pieces	12 pieces
GDE131.1U	●		●	●										
GDE131.1U/B	●		●	●									●	
GDE131.1N	●		●					●						
GDE131.1N/B	●		●					●					●	
GDE131.1P	●		●		●									
GDE131.1P/B	●		●		●								●	
GDE131.1Q	●		●			●								
GDE131.1Q/B	●		●			●								●
GDE131.1T	●		●				●							
GDE131.1T/B	●		●				●						●	
GDE132.1P	●		●		●					●				
GDE136.1P	●		●		●						●			
GDE161.1N	●	●						●						
GDE161.1N/B	●	●						●					●	
GDE161.1P	●	●			●				●					
GDE161.1P/B	●	●			●				●				●	
GDE161.1Q	●	●				●			●					
GDE161.1T	●	●					●							
GDE161.1T/B	●	●					●						●	
GDE163.1P	●	●			●				●			●		
GDE164.1P	●	●			●				●		●	●		
GDE166.1P	●	●			●				●		●			

Description

The OpenAir, non-spring return, direct-coupled, electronic damper actuators provide modulating and floating control of building HVAC dampers.

c UL us LISTED CE

Features

- Compact, lightweight design
- Models available with dual independently adjustable auxiliary switches
- Modulating models available with built-in feedback (Exception: GDE161.1N and GDE161.1T do not provide feedback)
- Floating control models available with feedback potentiometer
- Manual override
- Mechanical range adjustment capability
- Easily visible position indicator
- Precabled 18 AWG, 3 ft (0.9 m), or 6 ft (1.8 m) long
- Synchronous motor technology
- UL873 and cUL (C22.2 No. 24-93) listed
- CE certified plenum only
- Connection cables for GDExx.1N models sold separately.

Technical Data

Torque:	44 lb-in (5 Nm)
Runtime for 90°:	90 seconds at 60 Hz opening and closing 108 seconds at 50 Hz opening and closing
Frequency:	50/60 Hz
Power consumption:	3.3 VA (modulating), 2.3 VA (three-position)
Equipment rating (24 Vac):	Class 2 per UL/CSA
Noise level:	<35 dBA (running)
Angle of rotation:	90° nominal, 95° maximum
Shaft dimensions:	3/8 to 5/8 in. (8 to 16 mm) dia., 3/4 in. (20 mm) min. length
Operating temperature:	-22°F to 130°F (-30°C to 55°C)
Storage temperature:	-40°F to 158°F (-40°C to 70°C)
Ambient humidity:	95% RH (non-condensing)
Enclosure:	NEMA 2, IP54 per EN60529
GDExxx.1N and GDExxx.1T:	NEMA 1
Material:	Durable plastic
Agency listings:	UL873, cUL C22.2 No. 24-93
CE Conformity:	Plenum only
Electromagnetic compatibility (EMC)	2004/108/EC
Emissions Standards	EN61000-6-3
Immunity standards	EN61000-6-2
Gear Lubrication:	Silicone-free
Weight	1.06 lb (0.48 kg)
Country of Origin	USA

Typical Specifications

Non-spring return damper actuators shall be the direct-coupled type that requires no connecting linkages. The non-spring return actuators under 100 lb-in shall be capable of direct-mounting to a shaft up to a 5/8-inch diameter. Actuators shall provide stall protection throughout the full range of rotation. All non-spring return actuators shall be capable of both clockwise and counterclockwise operation. All non-spring return actuators shall hold position in the event of a power failure. All modulating actuators shall return to the 0 position in the event only the control signal is lost. All actuators shall provide a means of manually positioning the output coupling in the absence of power. Dual independently adjustable auxiliary switches must be integral to the actuator. All actuators must provide an easily readable high contrast yellow on black position indicator. All actuators shall be UL873 and CSA22.2 listed, CE certified, and manufactured under ISO 9002 and ISO 14000 procedures. Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuators rated torque and temperatures. Actuators shall be as manufactured by Siemens Industry, Inc.

Dimensions

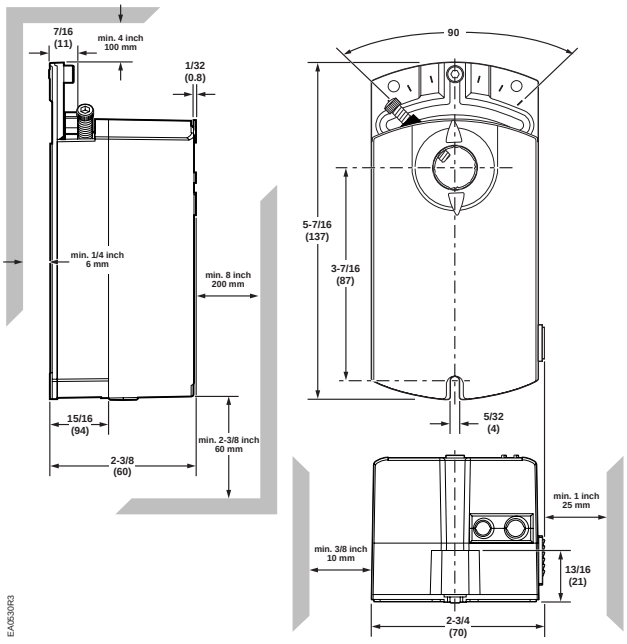
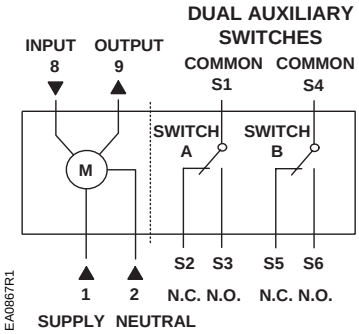


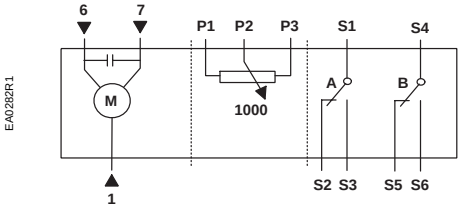
Figure 1. GDE/GLB Dimensions in Inches (mm).

Wiring Diagrams

0 to 10 Vdc Modulating, 24 Vac:



Floating, 24 Vac:



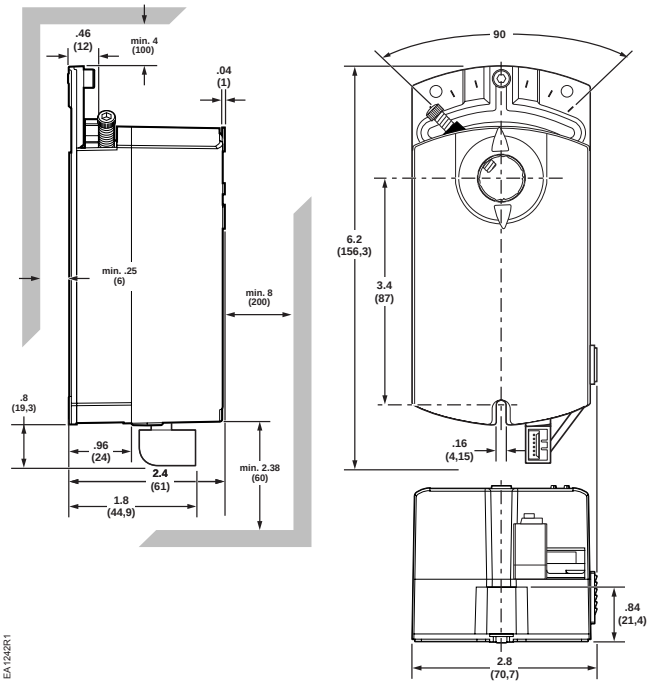


Figure 2. GDE Terminal Strip Model/Post Header AMP Model in Inches (mm).

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SIEMENS

Technical Specification Sheet
Document No. 149-715
February 19, 2018

Series 2200/3200 Communicating Room Sensors for Use with Siemens Terminal Equipment Controllers

QxAx2xx.EWSC
Sensing Only

QxAx2xx.DWSC
with Display

QxAx2xx.FWSC
Full HMI

Description

These Series 2200/3200 Room Sensors are designed for use with Siemens Terminal Equipment Controllers (TECs)*. The sensor and controller communicate using an RJ-11 cable with plug connections at both ends for easy and error-free wiring. Installation is quick and straightforward with all hardware included for mounting on a standard 2” × 4” electrical box. Screws and anchors are provided for mounting the sensor directly to a wall. Matching gaskets and trim rings are also available.

All units include an RJ-11 tool port at the bottoms of the sensor housings for connection to Siemens configuration, commissioning and start-up tools.

QAA Series Sensors measure room temperature, while QFA Series sensors measure both temperature and relative humidity. The QPA Series Sensors measure temperature and CO_2 or temperature, CO_2* and relative humidity.

QPA Series sensors are designed to help maintain occupant comfort and are not intended for use in life safety applications.

The “E” versions have a blank front to prevent unauthorized adjustments and are ideal for high traffic areas or remote spaces that are not supervised.

The “D” versions display room temperature and/or room humidity.

The “F” versions feature a full HMI that can display room conditions and temperature setpoint. The display is easily configured to limit the information that is available to the occupant. Temperature setpoint can be adjusted using soft touch plus (+) and minus (-) keys, and an override key enables the user to manually signal to the controller that the space is occupied.

Specifications

Temperature	
Measuring range	32°F to 122°F (0°C to 50°C)
Accuracy	
QAA2280.EWxC	± 0.50°F (± 0.28°C)
QAA2280.DWxC	± 0.9°F (± 0.5°C)
QAA2280.FWxC	± 0.9°F (± 0.5°C)
QPA2282.EWxC	± 0.9°F (± 0.5°C)
All others	± 0.54°F (± 0.3°C) @ 77°F (25°C)
Humidity (QFA and QPA2284)	
Measuring Range	0 to 100% rh
Accuracy	± 2% between 10 to 90%
Long-Term Stability	<0.5% rh/year
Resolution	0.03% rh
Repeatability	± 0.1% rh
CO2 (QPA Models)	
Technology	Dual Beam NDIR
Measuring Range	0 to 2000 PPM
Accuracy*	± (50 ppm + 2% of MV)
Field Calibration	Not required
CO2 Drift	± 5% of range over 5 years
Setpoint/Override (“F” versions only)	
Setpoint Range	55°F to 95°F (13°C to 35°C)
Input Power	
QAA and QFA	Powered using TEC RJ-11 port
QPA	Requires AQM2200
Agency Listing	UL cUL CE FCC RCM
Color	White
Dimensions	4.5” × 2.75” × 1.18” (115 mm × 70 mm × 30 mm)
Shipping Weight	6 oz. (170 g)

* Allow up to 96 hours for unit to reach published accuracy.

Product Ordering Information

Part Number[1)]	Temp	Humidity[2)]	CO_2 [3)]	Display	Setpoint Adjustment	Tool Port	Communication Type
QAA2280.DWSC	•	—	—	•	—	•	Digital (P1)
QAA2280.EWSC	•	—	—	—	—	•	Analog - Resistive
QAA2280.FWSC	•	—	—	•	•	•	Digital (P1)
QFA3280.DWSC	•	•	—	•	—	•	
QFA3280.EWSC	•	•	—	—	—	•	
QFA3280.FWSC	•	•	—	•	•	•	
QPA2282.EWSC[2)]	•	—	•	—	—	•	
QPA2284.EWSC[2)]	•	•	•	—	—	•	
QPA2284.FWSC[2)]	•	•	•	•	•	•	

[1)] For no-logo version, change "S" to "N" in part number position 10.
[2)] QPA models require an AQM2200 24V Power Module.
[3)] P1 TECs cannot read relative humidty and CO_2 data. Use BACnet TECs for applications requiring these measurements.

Accessories Ordering Information

Description	Part Number
Power Module[1)] (Required only with QPA2282 and QPA2284 sensors)	AQM2200
Room Unit Back Plate (10-pack)[1)]	AQA2200-INTL
Room Unit Back Plate (Single)[1)]	AQA2200-2X4
Room Sensor Insulating Gasket (10-pack) (Recommended for hollow wall installations.)	563-102 GSKT KIT
25-foot (7.6 m) cable with connections	588-100A
50-foot (15.2 m) cable with connections	588-100B
100-foot (30.5 m) cable with connections	588-100C
Passkey Tool (Used to set room unit parameters)	544-643A
Replacement RH Sensing Element – TEC Room Unit[2)]	AQF3060

[1)] For use when installing Series 2200/3200 Sensors on conduit boxes other than US style 2” × 4”. Back plate measures 3-1/4” × 5” (82.55 mm × 127 mm).

[2)] For use with all QFA models and QPA2284.xxxx only.

Disposal

The devices are considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the devices through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

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INSIGHT ENGINEERING, PLLC

MECHANICAL CONTRACTOR:
COMFORT SYSTEMS USA

POWERS
BUILDING HVAC, CONTROLS, & SERVICE

DWG	DESCRIPTION
	GENERAL
	Cover Sheet
LEG	Legend & Abbreviations
	VALVE SUBMITTAL
	Valve Submittal
	CONTROL DRAWINGS
001	VAV HW RH
002	VAV HW RH BOM

REVISION HISTORY

1	10/23/2023	DWJ	AS-BUILTS

SIEMENS

Powers of Arkansas
Controls Division

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JLM VA Medical Media Relocate
LITTLE ROCK, AR

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DWJ	DWJ	JD	04/27/22	10/23/23

Cvrsheet

22CNEB3069

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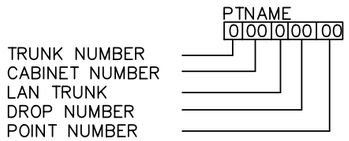
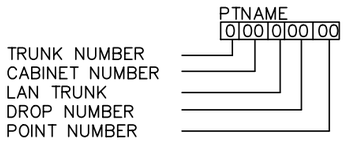
N: \DT RESOURCES\JOBS\22CNEB3069\MDT\CVRSHEET.DWG

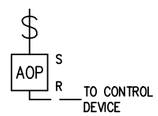
CONTROL SYMBOL	CONTROL SYMBOL DESCRIPTION
AC	AIR COMPRESSOR
AD	AIR DRYER
ADXR	ACTUATOR DXR
AE	ACTUATOR ELECTRIC
AEM	APOGEE ETHERNET MICROSERVER
AF	AIR FILTER
AFS	AIR FLOW STATION
AOP	ANALOG OUTPUT, PNEUMATIC
AP	ACTUATOR PNEUMATIC
APS	AUX. POWER SUPPLY
AT	AUTOMATIC TRAP
ATD	AUTO TANK DRAIN
ATEC	ACTUATOR TEC
AZM	AUTOZERO MODULE
BCU	BUS COUPLING UNIT
BELL	BELL
BIM	BUS INTERFACE MODULE
BOIL	BOILER
BRT	BRIGHTNESS
BRTT	BRIGHTNESS AND TEMPERATURE
BTN	BUTTON
CBL	CABLES
CKV	CHECK VALVE
CM	CONSTRUCTION MATERIALS
CP	COMPONENT PANEL
CPU	CENTRAL PROCESSING UNIT
CRT	CATHODE RAY TUBE
CS	CURRENT SWITCH
CT	CURRENT TRANSDUCER
CTTE	CO2 TEMP TRANSMITTER ELEC
CVC	CONSTANT VOLUME CONTROLLER
D	DAMPER
DDC	DUAL DUCT CONTROLLER
DEM	DEMAND ENERGY MONITOR
DP	DEW POINT TRANSMITTER
DPR	DIFFERENTIAL PRESS. REGULATOR
DPS	DIFFERENTIAL PRESSURE SWITCH
DPTE	DIFF. PRESS. TRANSMITTER ELEC.
DPTP	DIFFERENTIAL PRESSURE PNEUMATIC
DPU	DIGITAL POINT UNIT
DXR	TERMINAL EQUIPMENT CONTROLLER
EC	ENTHALPY COMPARITOR
EP	ELECTRO-PNEUMATIC VALVE
ES	END SWITCH
ET	ENTHALPY TRANSMITTER
EXP	EXPANSION PANEL
FAN	FAN
FHC	FUME HOOD CONTROLLER
FM	FLOW MTR. (FLOW METER STATION)
FMS	FIRE MGMT. SYSTEM
FS	FLOW SWITCH
FTP	FLOW TRANSMITTER PNEU.
G	GAUGE
GD	GAS DETECTOR
H	HYGROSTATS
HE	HUMIDIFIER ELECTRIC
HHC	HAND-HELD OPERATOR'S TERMINAL
HL	HIGH LIMIT
HMI	GAMMA TOUCH PANEL
HOA	HAND-OFF-AUTO SWITCH
HORN	HORN
HPC	HEAT PUMP CONTROLLER
HTD	HIGH TEMPERATURE DETECTOR
HTE	HUMIDITY TRANSMITTER ELECTRIC
HTP	HUMIDITY TRANSMITTER PNEUMATIC
INT	INTERCOM
KWM	ELECTRIC KILOWATT METER
LA	LIGHT ACTUATOR
LC	LIMIT CONTROLLER (LIMITEM)
LLS	LIQUID LEVEL SWITCH
LLT	LIQUID LEVEL TRANS.
LPR	POWER SUPPLY 24VAC/24VDC
LTDE	LOW TEMP. DETECTOR ELECTRIC
LTDP	LOW TEMP. DETECTOR PNEUMATIC
LUI	LOCAL USER INTERFACE
MBC	MODULAR BUILDING CONTROLLER
MDM	MODEM
ME	ELECTRONIC ACTUATOR
MEC	MODULAR EQUIPMENT CONTROLLER
MG	MAGNEHELIC GAUGE
MPU	MULTI-POINT UNIT
MS	MOTOR STARTER
OCC	OCCUPANCY
OCCB	OCCUPANCY AND BRIGHTNESS
OBS	OBSOLETE
ODP	OPERATOR DATA PANEL
P	PUMP
PA	PULSE ACCUMULATOR
PCT	PROGRAMMABLE CLOCK TIMER
PE	PRESSURE ELECTRIC SWITCH
PL	PILOT LIGHT
PM	POWER MONITOR
PNL	PANEL
PPM	POINT PICKUP MODULE
PRC	PRESSURE REG. CONTROLLER
PRV	PRESSURE REDUCING VALVE
PS	POSITIONING SWITCH
PSE	POSITION SENSOR ELECTRIC
PST	PULL STATION
PT	PITOT TUBE
PTE	PRESSURE TRANSMITTER ELECTRIC
PTP	PRESSURE TRANSMITTER PNEUMATIC
PTR	PRINTER
PV	PILOT VALVE
PXCC	PX COMPACT CONTROLLER
PXCM	PXC-MODULAR CONTROLLER
PXG3	BACNET ROUTER ETHERNETIP-MS/TP
RBC	REMOTE BUILDING CONTROLLER
RC	RECEIVER CONTROLLER
RCU	REMOTE CONTROL UNIT
RE	RELAY ELECTRIC
RP	RELAY PNEUMATIC
RS	RESTRICTOR
RV	RELIEF VALVE
S/W	SOFTWARE
SA	SHADE ACTUATOR
SC	STEP CONTROLLER
SCU	STAND ALONE CONTROL UNIT
SD	SMOKE DETECTOR
SE	SWITCH ELECTRIC
SIO	SLX IO MODULES
SLX	APOGEE SLX CONTROLLER
SPKR	SPEAKER
SPP	STATIC PRESSURE PROBE
SPR	STATIC PRESSURE REGULATOR
SV	SOLENOID VALVE
SW	SWITCH PNEUMATIC
T	ROOM THERMOSTAT, PNEUMATIC
TBC	TERMINAL BOX CONTROLLER
TC	TEMPERATURE CONTROLLER(S200)
TCU	TERMINAL CONTROL UNIT
TDR	TIME DELAY RELAY
TE	THERMOSTAT, ELECTRIC
TEC	TERMINAL EQUIPMENT CONTROLLER
TH	THERMOMETER
TI	TRUNK INTERFACE
TIE	TRUNK ISOLATOR EXTENDER
TIU	TELCOM INTERFACE UNIT
TMR	TIMER, TIME CLOCK
TTE	TEMPERATURE TRANSMITTER ELECTRIC
TTP	TEMPERATURE TRANSMITTER PNEUMATIC
TXIO	TX-I/O FAMILY CONTROLLER MODULES
UC	UNITARY CONTROLLER
UCC	UNIT CONDITIONER CONTROLLER
UVC	UNIT VENT CONTROLLER
V	VALVE
V*	VALVE SERVICE PARTS
VA	TEC VALVE ACTUATOR
VAC	VARIABLE AIR VOLUME CONTROLLER
VB	VIBRATION ISOLATOR
VTE	VELOCITY TRANSMITTER ELECTRICAL
W	WELL
WST	WEATHER STATION
XDR	TRANSDUCER
XFMR	TRANSFORMER

DDC ELECTRICAL POINT

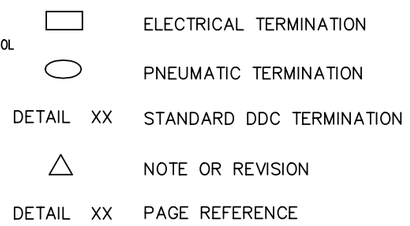


DDC PNEUMATIC POINT

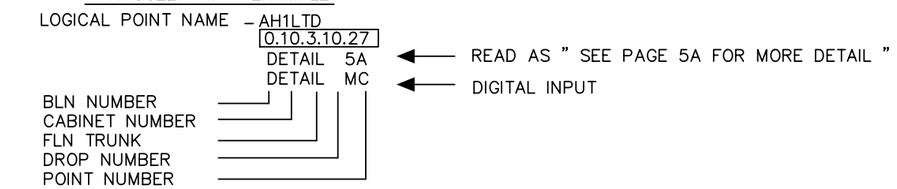




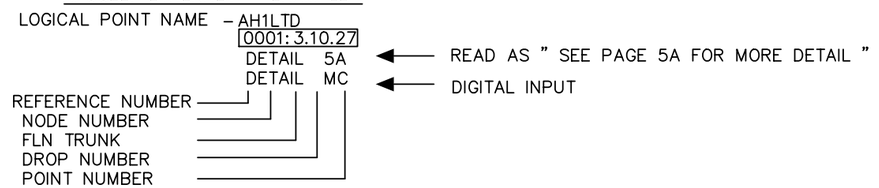
DETAILS



APOGEE: PII – EXAMPLE



APOGEE: ETHERNET – EXAMPLE



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JLM VA Medical Media Relocate
LITTLE ROCK, AR

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DWJ	DWJ	JD		10/23/23

Legend & Abbreviations

22CNEB3069

LEG

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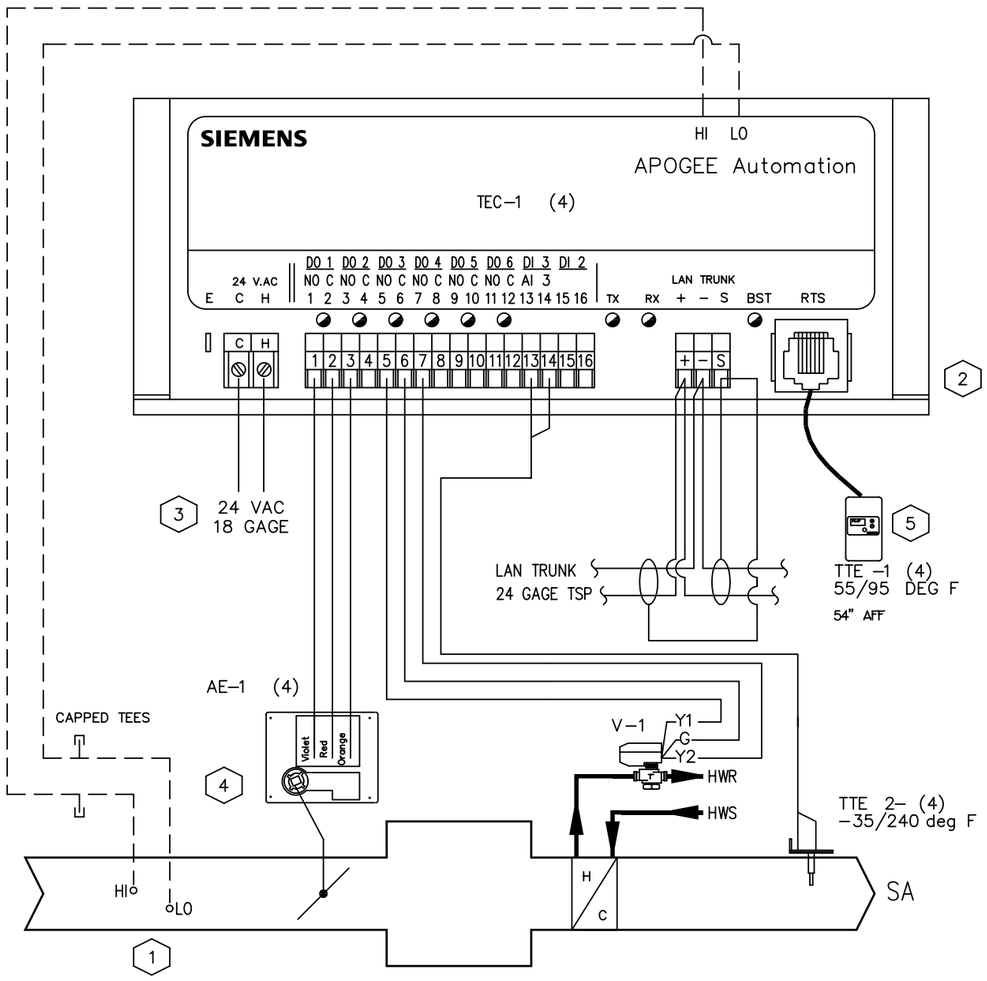

1 / 001 VAV WITH REHEAT COIL (#2023)
TYPICAL OF 4

INSTALLATION NOTES:

1. VAV BOX INSTALLED BY MECHANICAL CONTRACTOR WITH 3 TO 5 STRAIGHT DUCT DIAMETERS UPSTREAM OF BOX TO PROVIDE PROPER FLOW SENSING
2. TEC-1 TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE
3. 24 VAC POWER FROM EXISTING TRANSFORMER IN ELECTRIC ROOM 7E-108.
4. MOUNT ACTUATOR WITH DAMPER IN FULL OPEN POSITION. VERIFY TEC-1 AND ACTUATOR REQUIREMENT WITH THE BOX MANUFACTURER
5. LOCATE AS SHOWN ON FLOOR PLANS/CONTRACT DOCUMENTS

GENERAL NOTE:
EXTEND EXISTING FLN COMMUNICATION CALBLING FROM EXISITNG VAV TERMINAL SERVING STORAGE 7E-117 TO NEW SUPPLY AIR CONTROLLERS.

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LITTLE ROCK, AR

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DWJ	DWJ	JD	04/27/22	10/23/23

VAV HW RH

22CNEB3069
0
001

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N: \DT RESOURCES\JOBS\22CNEB3069\MDT\VAV HW RH.DWG

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1	4	GDE131.1P	SIEMENS	154 011	ACT NSR PLENUM 24/108L 5Nm
TEC 1	4	540-100N	SIEMENS	149 171	TERM BOX CTLR ELEC OUT
TTE 1	4	QAA2280.FWSC	SIEMENS	149715	RTS, TEC/RJ-11, FULL HMI
TTE 2	4	536-811	SIEMENS	149 134	DCT PT TMP, 100K OHM, 4", BRACKET MNT
V					SEE VALVE SUBMITTAL

AIR TERMINAL NO. 1 SEQUENCE OF OPERATION:

AIR TERMINAL MODE OF OPERATION IS EITHER "OCCUPIED" OR "UNOCCUPIED" BASED UPON WEEKLY SCHEDULE OR OPERATOR COMMAND. MODE OF OPERATION MAY BE CHANGED BY THE USER FROM "UNOCCUPIED" TO "OCCUPIED" FOR A PERIOD OF FOUR (4) HOURS BY PRESSING A PUSHBUTTON LOCATED AT THE THERMOSTAT.

DURING THE "OCCUPIED" MODE OF OPERATION THE AIR TERMINAL CONTROLLER SHALL MODULATE THE TERMINAL DAMPER BETWEEN THE MINIMUM AND MAXIMUM "OCCUPIED" AIR FLOWS SCHEDULED IN SEQUENCE WITH THE HEATING WATER CONTROL VALVE AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE AT SETPOINT. THE SPACE TEMPERATURE SETPOINT SHALL BE ADJUSTABLE BY THE USER FROM A MINIMUM OF 68 DEG. F TO A MAXIMUM OF 76 DEG. F. ON A DECREASE IN SPACE TEMPERATURE THE TERMINAL DAMPER SHALL CLOSE TO THE MINIMUM AIR FLOW AND THE HEATING WATER CONTROL VALVE SHALL MODULATE OPEN. ON AN INCREASE IN SPACE TEMPERATURE THE HEATING WATER CONTROL VALVE SHALL CLOSE AND THE TERMINAL DAMPER SHALL MODULATE OPEN.

DURING THE "UNOCCUPIED" MODE OF OPERATION THE AIR TERMINAL CONTROLLER SHALL MODULATE THE TERMINAL DAMPER BETWEEN THE MINIMUM AND MAXIMUM "UNOCCUPIED" AIR FLOWS SCHEDULED IN SEQUENCE WITH THE HEATING WATER CONTROL VALVE AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE AT SETPOINT. THE SPACE TEMPERATURE SETPOINT SHALL BE ADJUSTABLE BY THE USER FROM A MINIMUM OF 68 DEG. F TO A MAXIMUM OF 76 DEG. F. ON A DECREASE IN SPACE TEMPERATURE THE TERMINAL DAMPER SHALL CLOSE TO THE MINIMUM AIR FLOW AND THE HEATING WATER CONTROL VALVE SHALL MODULATE OPEN. ON AN INCREASE IN SPACE TEMPERATURE THE HEATING WATER CONTROL VALVE SHALL CLOSE AND THE TERMINAL DAMPER SHALL MODULATE OPEN.

REVISION HISTORY

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VAV HW RH BOM

22CNEB3069

002

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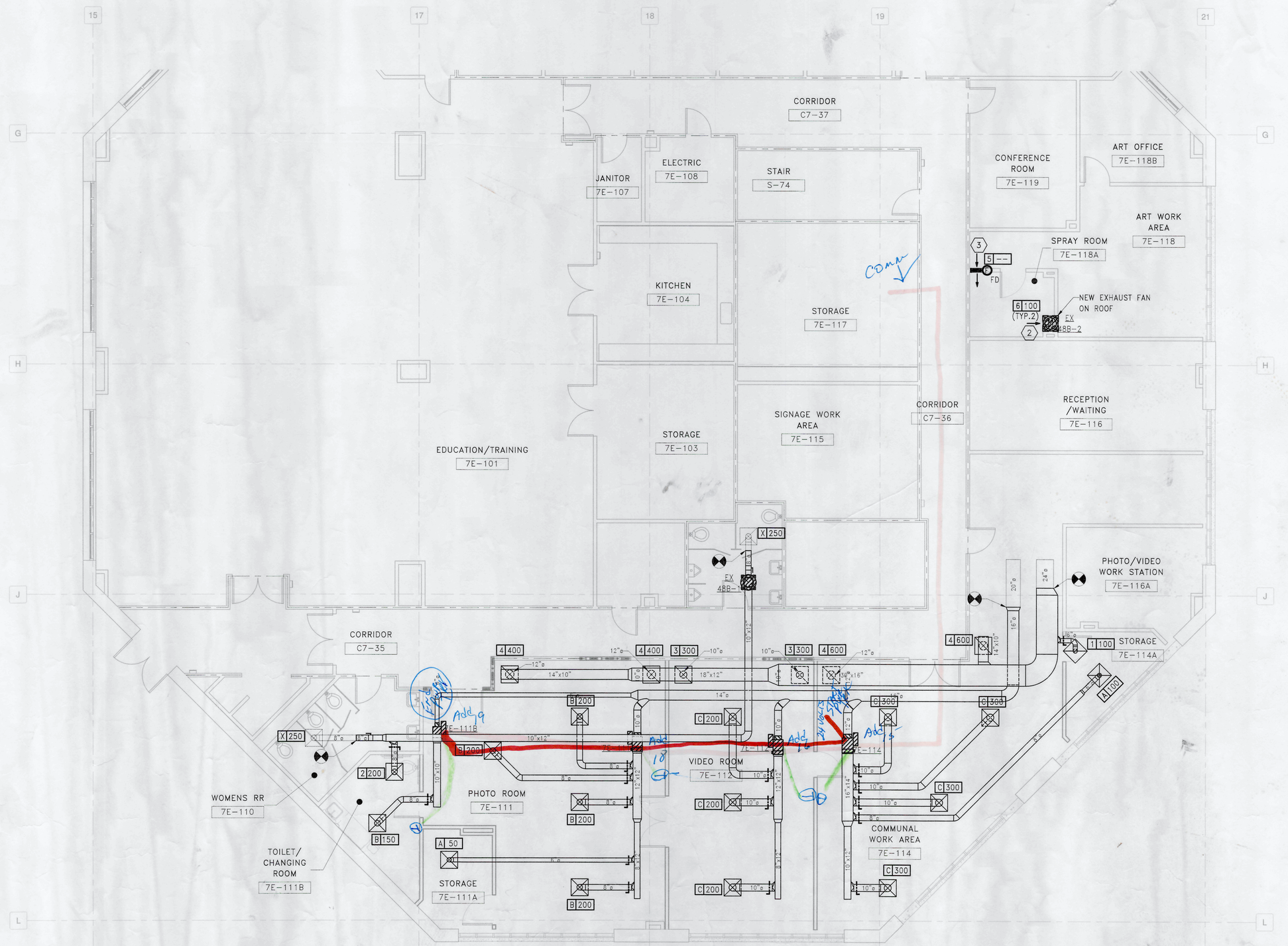
N:\DT RESOURCES\JOBS\22CNEB3069\MDT\VAV HW RH-K00.dwg

HVAC KEYED NO

1. CONNECT EXISTING EXHAUT DUCT TO NEW POINT INDICATED.
2. 10"X6" EXHAUST DOWN IN CHASE. MOUN INTAKE AT 8"A.F.F. AND HIGH EXHAUST I BELOW CEILING.
3. TRANSFER GRILLE LOCATED HIGH IN WALL CEILING.



F2 FLOOR PLAN - HVAC

3/16" = 1'-0"
7TH FLOOR SLAB ELEVATION = 492.67'

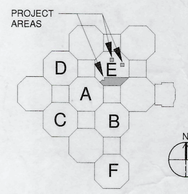
N

0 2'-8" 5'-4" 10'-8"
SCALE: 3/16" = 1'-0"

HVAC LEGEND

SYMBOL	DESCRIPTION
	NEW EQUIPMENT
	EXISTING EQUIPME
	EXISTING EQUIPME DEMOLISHED
	EXISTING DUCT/PI DEMOLISHED
	EXISTING DUCT/PI
	NEW DUCT/PIPING
	CAPPED PIPE
	THERMOSTAT WIRE
H-1	HVAC EQUIPMENT
	CONNECT TO EXIS
	POINT OF DEMOLIT
	MANUAL VOLUME D
	STREAMLINE TAP V VOLUME DAMPER
	SUPPLY DIFFUSER
	RETURN GRILLE
	EXHAUST GRILLE

KEY PLAN



CON

INSIGHT ENGINEERING, PLLC CERTIFICATE OF AUTHORIZATION No. 3523 ARKANSAS

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1/10/20

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: **FLOOR PLAN - HVAC**
Approved: Project Director

Phase: **CONSTRUCTION DOCUMENTS**
FULLY SPRINKLERED

Project Title: **RELOCATE MEDICAL MEDIA**
Location: **VAMC LITTLE ROCK**
Issue Date: 2020.01.10
Checked: KCK
Drawn: CJC

VA FORM 08 - 6231

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SIEMENS

TEC Controller

Terminal Box Controller (VAV) - Electronic Output

Owner's Manual

125-5075
2015-08-26

Building Technologies

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How To Use This Manual

This manual is written for the owner and user of the TEC Terminal Box Controller. It is designed to help you become familiar with the Siemens TEC and its applications.

This section covers manual organization, manual conventions, symbols used in the manual, and other information that will help you use this manual.

Manual Organization

This manual contains the following chapters:

- *Chapter 1 - Hardware,* describes the hardware components and the accessories that are used with the TEC.
- *Chapter 2 - Applications,* describes the control applications available in the model of the TEC that includes a terminal block for wireable input/output connections.
- *Chapter 3 - Point Database,* defines the point database descriptors and includes address and applications.
- *Chapter 4 – Basic Service and Maintenance,* describes basic corrective measures you can take should you encounter a problem when using the TEC. For issues not covered in this chapter, consult your local Siemens Industry representative.
- The *Glossary* describes the terms and acronyms used in this manual.
- The *Index* helps you locate information presented in this manual.

Manual Conventions

The following table lists conventions to help you use this manual in a quick and efficient manner.

Convention	Examples
Numbered Lists (1, 2, 3…) indicate a procedure with sequential steps.	1. Turn OFF power to the field panel. 2. Turn ON power to the field panel. 3. Contact the local Siemens Industry representative.
Conditions that must be completed or met before beginning a task are designated with a ▹. Intermediate results (what will happen following the execution of a step), are designated with a ⇨. Results, which inform the user that a task was completed successfully, are designated with a ⇨.	▹Composer software is properly installed. ▹A Valid license is available. 1. Select **Start** > **Programs** > **Siemens** > **GMS** > **Composer**. ⇨The Project Management window displays. 2. Open an existing project or create a new one. ⇨The project window displays.
Actions that should be performed are specified in boldface font.	Type **F** for Field panels. Click **OK** to save changes and close the dialog box.
Error and system messages are displayed in Courier New font.	The message `Report Definition successfully renamed` displays in the status bar.
New terms appearing for the first time are italicized.	The field panel continuously executes a user-defined set of instructions called the *control program*.
	This symbol signifies Notes. Notes provide additional information or helpful hints.

Convention	Examples
Cross references to other information are indicated with an arrow and the page number, enclosed in brackets: [→92]	For more information on creating flowcharts, see Flowcharts [→92].
Placeholders indicate text that can vary based on your selection. Placeholders are specified by italicized letters, and enclosed with brackets [ ].	Type **A C D H** [*username*] [*field panel #]*.

Manual Symbols

The following table lists the safety symbols used in this manual to draw attention to important information.

Symbol	Meaning	Description
NOTICE	CAUTION	Equipment damage may occur if a procedure or instruction is not followed as specified. (For online documentation, the NOTICE displays in white with a blue background.)
	CAUTION	Minor or moderate injury may occur if a procedure or instruction is not followed as specified.
	WARNING	Personal injury or property damage may occur if a procedure or instruction is not followed as specified.
	DANGER	Electric shock, death, or severe property damage may occur if a procedure or instruction is not followed as specified.

Getting Help

For more information about the TEC Terminal Box Controller, contact your local Siemens Industry representative.

Where to Send Comments

Your feedback is important to us. If you have comments about this manual, please submit them to SBT_technical.editor.us.sbt@siemens.com

Chapter 1 – Product Overview

The TEC Terminal Box Controller is the Siemens Industry FLN controller used in pressure independent Variable Air Volume applications. It provides Direct Digital Control (DDC) for eight applications and is available in both short and long board hardware assemblies.

- The controller can operate as an independent, stand-alone, DDC room controller or it can be networked with a field panel.
- The controller provides all termination, input/output, system and local communication connections.
- The controller hardware consists of the controller with cover and mounting bracket (See Figure TEC Terminal Box Controller).

The following applications are covered:

- Slave Mode (Application 2091)
- VAV Cooling Only (Application 2020)
- VAV Cooling or Heating (Application 2021)
- VAV with Electric Reheat or Baseboard Radiation (Application 2022)
- VAV with Hot Water Reheat (Application 2023)
- VAV Series Fan Powered with Electric Reheat (Application 2024)
- VAV Series Fan Powered with Hot Water Reheat (Application 2025)
- VAV Parallel Fan Powered with Electric Reheat (Application 2026)
- VAV Parallel Fan Powered with Hot Water Reheat (Application 2027)

Hardware Inputs

Analog

Air velocity sensor	Application 2020 Application 2021 Application 2022 Application 2023 Application 2024 Application 2025 Application 2026 Application 2027
Room temperature sensor	Application 2020 Application 2021 Application 2022 Application 2023 Application 2024 Application 2025 Application 2026 Application 2027
(Optional) Room temperature setpoint dial	Application 2020 Application 2021 Application 2022 Application 2023 Application 2024 Application 2025 Application 2026 Application 2027

(Optional) Auxiliary or duct temperature sensor	Application 2020 Application 2021 Application 2022 Application 2023 Application 2024 Application 2025 Application 2026 Application 2027

Digital

(Optional) Night mode override	Application 2020 Application 2021 Application 2022 Application 2023 Application 2024 Application 2025 Application 2026 Application 2027
(Optional) Wall switch	Application 2020 Application 2021 Application 2022 Application 2023 Application 2024 Application 2025 Application 2026 Application 2027
(Optional) Night mode override	Application 2020 Application 2021 Application 2022 Application 2023 Application 2024 Application 2025 Application 2026 Application 2027
(Optional) Wall switch	Application 2020 Application 2021 Application 2022 Application 2023 Application 2024 Application 2025 Application 2026 Application 2027

Hardware Outputs

Analog

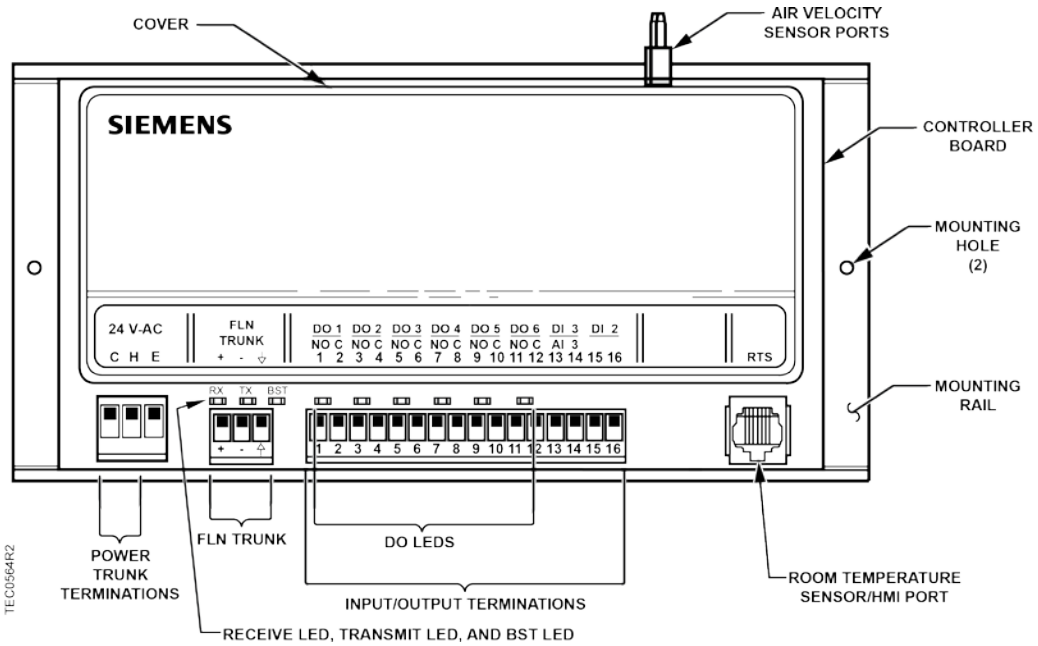
None

Digital

Damper actuator (DO 1/DO 2)	Application 2020 Application 2021 Application 2022 Application 2023 Application 2024 Application 2025 Application 2026 Application 2027
Autozero Module	Application 2020 Application 2021 Application 2022 Application 2023
Stage 1 electric heat or 2-position heating valve	Application 2022
Stage 1 electric heat	Application 2024 Application 2026
Stage 2 electric heat	Application 2022 Application 2024 Application 2026
Stage 3 electric heat	Application 2022 Application 2024 Application 2026
1st heating valve actuator	Application 2023 Application 2025 Application 2027
2nd heating valve actuator	Application 2023
Series Fan	Application 2024 Application 2025
Parallel Fan	Application 2026 Application 2027

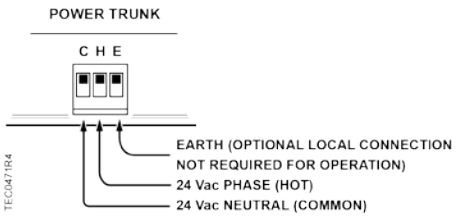
Ordering Notes

TEC Terminal Box Controller	540-100N
TEC Terminal Box Controller with Autozero Module	540-200N



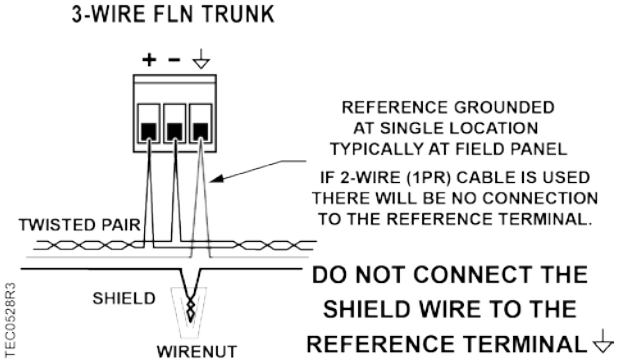
Generic Controller I/O Layout. See *Wiring Diagram* for application specific details.

Power Wiring



Communication Wiring

The controller connects to the field panel by means of a Floor Level Network (FLN) trunk. Communication wiring connects to the three screw terminals on the controller labeled “+” (positive), “-“ (negative), and “⏚” (reference).



Controller LED Indicators

NOTE:
The TX and RX LEDs indicate communication over the FLN.

To determine if the controller is powered up and working, verify that the Basic Sanity Test (BST) Light Emitting Diode (LED) is flashing ON/OFF once per second. The controller has nine Light Emitting Diode (LED) indicators (see Figure Siemens BACnet VAV Controller).

Controller LEDs.			
LED Type	**Label (if present)***	**LED Number**	**Indication**
DO	LED 1 - LED 6	1 – 6	Indicates the ON/OFF status of the DO associated with it. A glowing LED indicates that the DO is energized.
Transmit	TX	7	Indicates, when flashing, that the controller is transmitting information to the field panel.
Receive	RX	8	Indicates, when flashing, that the controller is receiving information from the field panel.
BST ”Basic Sanity Test”	BST	9	Indicates, when flashing ON and OFF once per second, that the controller is functioning properly.

* Some LED labels and numerals may be hidden by the controller cover.

Temperature Sensors

Temperature sensors used with the TEC Terminal Box Controller include an electronic room temperature sensor and an optional duct temperature sensor.

Room Temperature Sensor

The room temperature sensor connects to the controller by means of a cable terminated at both ends with a six-conductor RJ-11 plug-in connector.

See the Ordering Notes section for the location of the room temperature sensor/Human Machine Interface (HMI) port.

Duct Temperature Sensor

An optional duct temperature sensor provides duct air temperature sensing inputs to the controller.

For more information about temperature sensors, contact your local Siemens Industry representative.

Actuators

Actuators used with the TEC Terminal Box Controller include electronic damper motors, electronic valve motors, and electronic valve assemblies. These actuators are powered through the controller to position cooling and/or reheat valves or supply air dampers.

Related Equipment

- *(Optional)* Autozero Module
- *(Optional)* Relay Module
- Damper Actuator(s)
- *(Optional)* Duct Temperature Sensor
- Room Temperature Sensor
- *(Optional)* Valve Actuator

Contact your local Siemens Industry representative for product numbers and more information.

Chapter 2 – Applications

Basic Operation

The TEC Terminal Box Controller provides Direct Digital Control (DDC) for Variable Air Volume (VAV) terminal box applications. Temperature control varies with the application. If present, heating can be provided by hot water, up to three stages of electric reheat, or optional baseboard radiation.

Control Temperature Setpoints

The controller maintains a specified temperature setpoint based on Day/Night mode, the heating/cooling mode, or the setpoint dial (if used).

This application has a number of different room temperature setpoints (DAY HTG STPT, NGT CLG STPT, RM STPT DIAL, and so on.). The application actually controls using the CTL STPT. CTL STPT is set to different values depending on its override status, the time of day, whether or not a temperature deadband (zero energy band) has been configured, and the type of RTS used.

Day/Night Mode

The controller maintains the specified day setpoint temperature during daytime hours and the specified night setpoint at night.

Night Mode Override Switch

If the ROOM TEMPERATURE SENSOR has an override switch, it can be used to command the controller into day mode for an adjustable period of time. This only affects a controller in night mode.

Control Loops

Temperature Loop – Heating Loop – Cooling Loop

Maintain temperature setpoint by changing the flow setpoint or modulating the heat source (valve/electric heat).

Flow Loop

Maintains flow setpoint by modulating the damper actuator.

Calibration

Air Velocity Sensor

Calibration of the controller's internal air velocity sensor is periodically required to maintain accurate air velocity readings. Calibration may be set to take place automatically or manually.

Additional calibration is provided by driving the valve or damper fully closed or open, whenever they are commanded to 0 or 100 percent.

Fail-Mode Operation

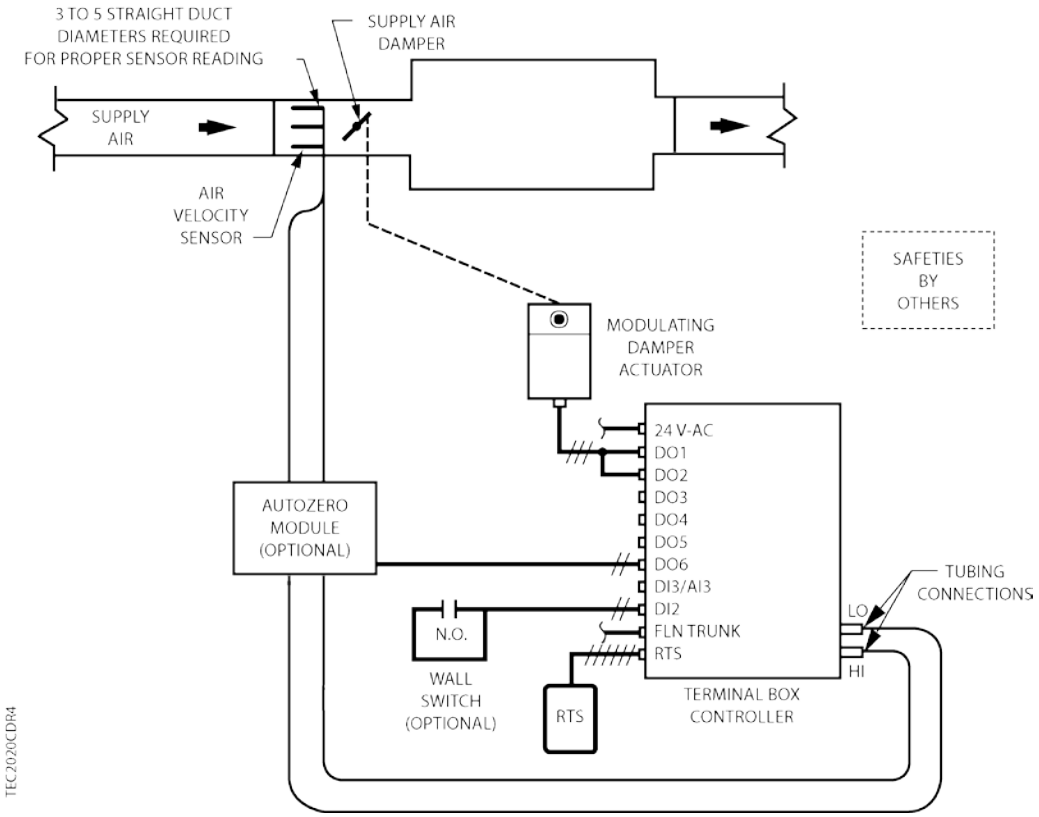
If the RTS or the setpoint dial fails, then the controller operates using the last known temperature value.

Notes

1. If the temperature swings in the room are excessive, or if there is trouble in maintaining the setpoint, contact your local Siemens Industry representative for more information.
2. The TEC Terminal Box Controller, as shipped from the factory, keeps all associated equipment OFF. The controller and its equipment are released to application control at start up.

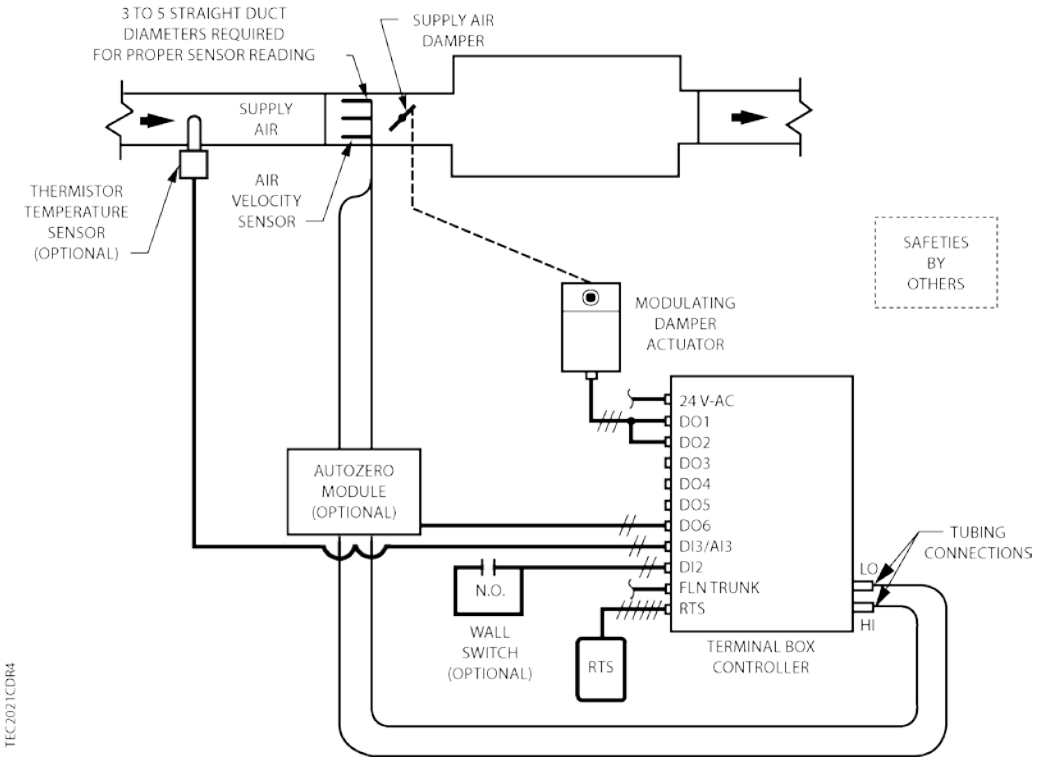
Application 2020 VAV Cooling Only

In Application 2020, the controller modulates the supply air damper of the terminal box for cooling. In order for it to work properly, the central air-handling unit must provide cool supply air.



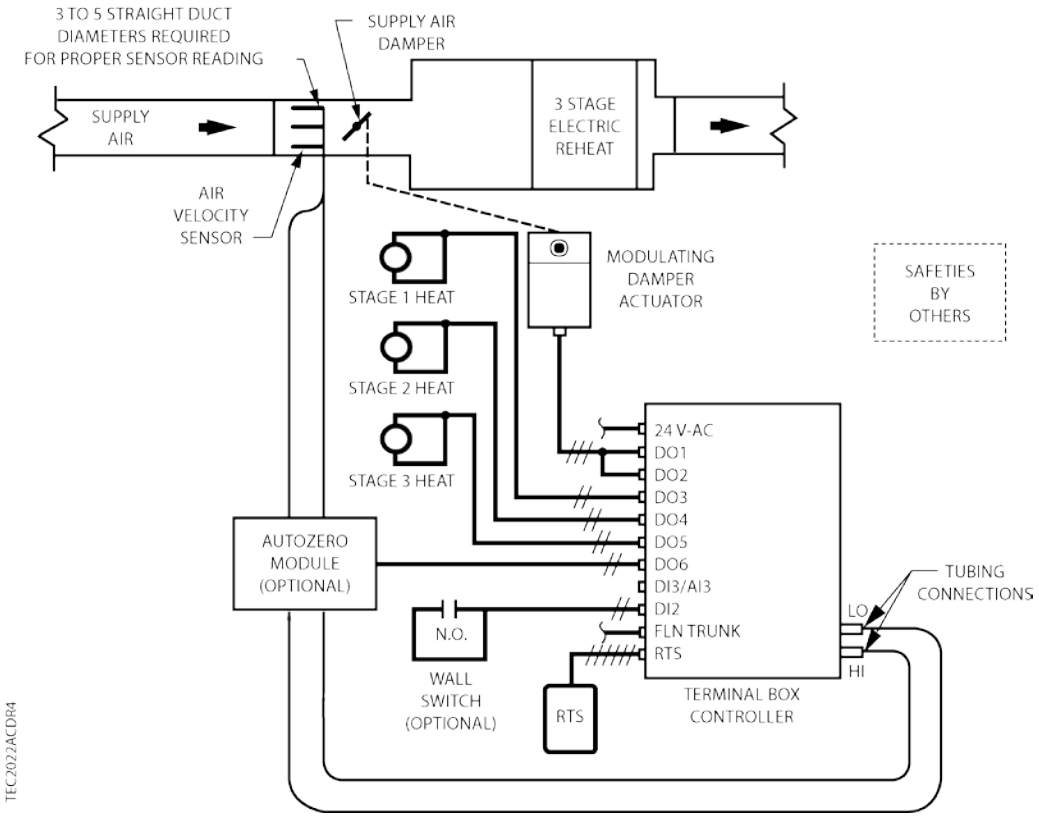
Application 2021 VAV Cooling or Heating

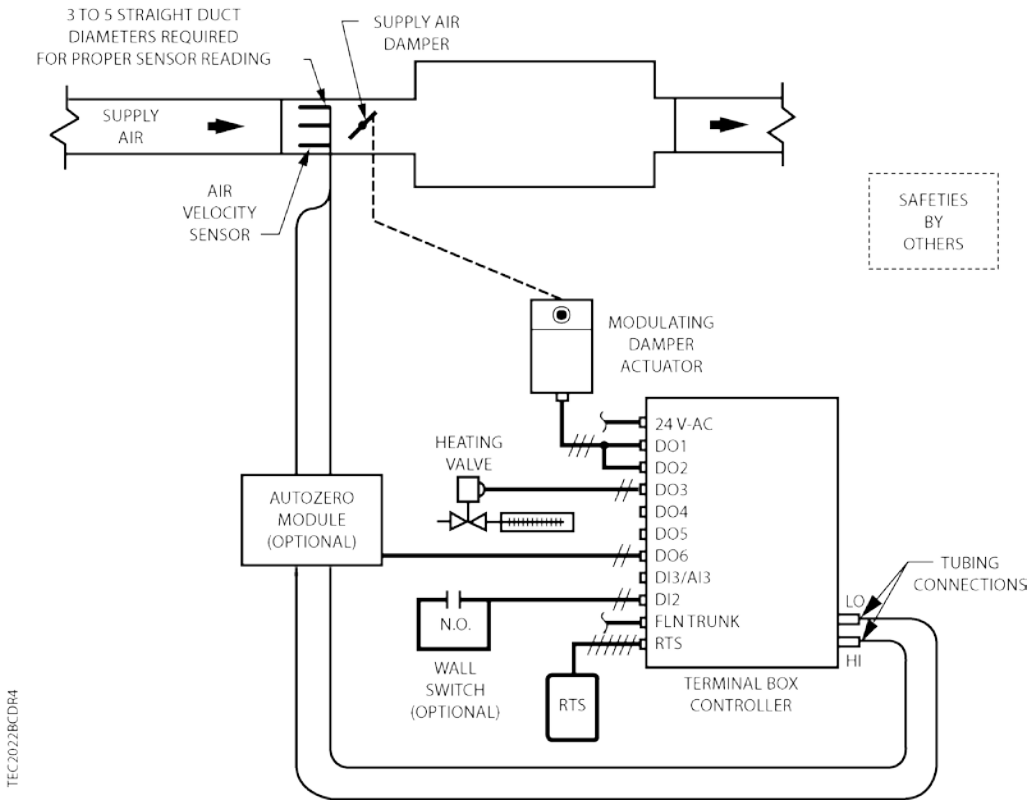
In Application 2021, the controller modulates the supply air damper of the terminal box for cooling or heating. In order for it to work properly, the central air-handling unit must provide cool supply air in cooling mode and warm air during heating mode.



Application 2022 VAV with Electric Reheat or Baseboard Radiation

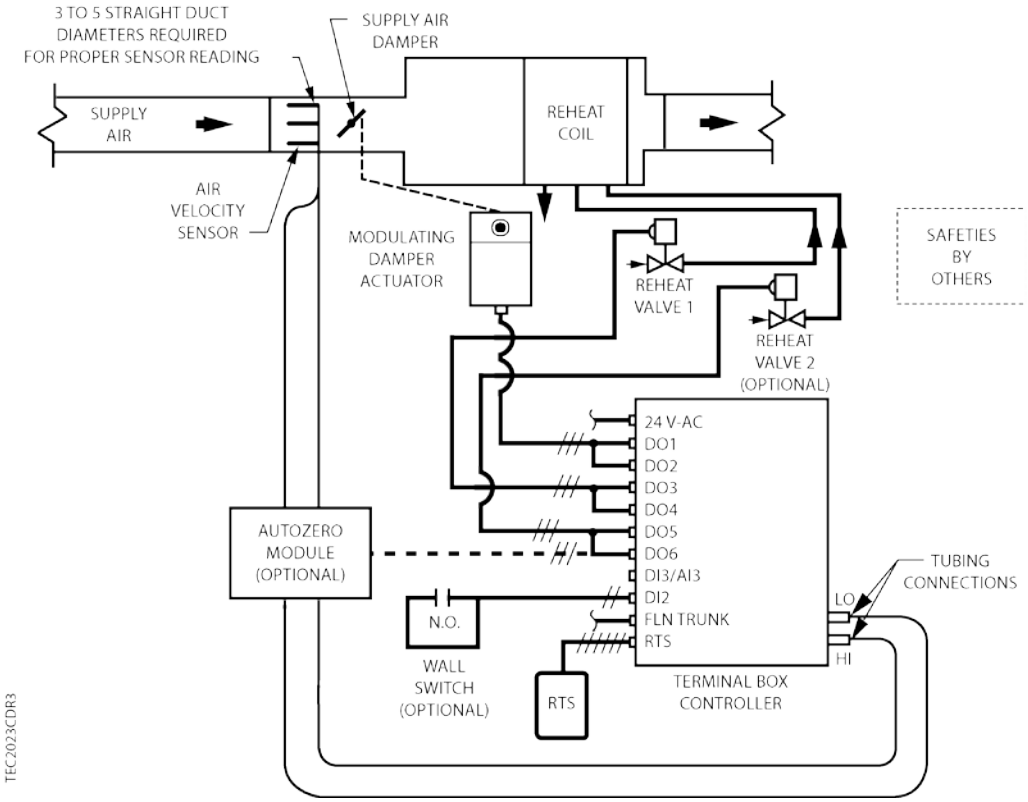
In Application 2022, the controller modulates the supply air damper of the terminal box for cooling and controls stages of electric reheat or baseboard radiation for heating. When in heating, the terminal box either maintains minimum airflow or modulates the supply air damper. In order for the terminal box to work properly, the central air-handling unit must provide supply air.




3 TO 5 STRAIGHT DUCT DIAMETERS REQUIRED FOR PROPER SENSOR READING
SUPPLY AIR DAMPER
SUPPLY AIR
AIR VELOCITY SENSOR
SAFETIES BY OTHERS
MODULATING DAMPER ACTUATOR
24 V-AC
DO1
DO2
DO3
DO4
DO5
DO6
DI3/AI3
DI2
FLN TRUNK
RTS
HEATING VALVE
AUTOZERO MODULE (OPTIONAL)
TUBING CONNECTIONS
LO
HI
N.O.
WALL SWITCH (OPTIONAL)
RTS
TERMINAL BOX CONTROLLER
TEC2022BCDR4

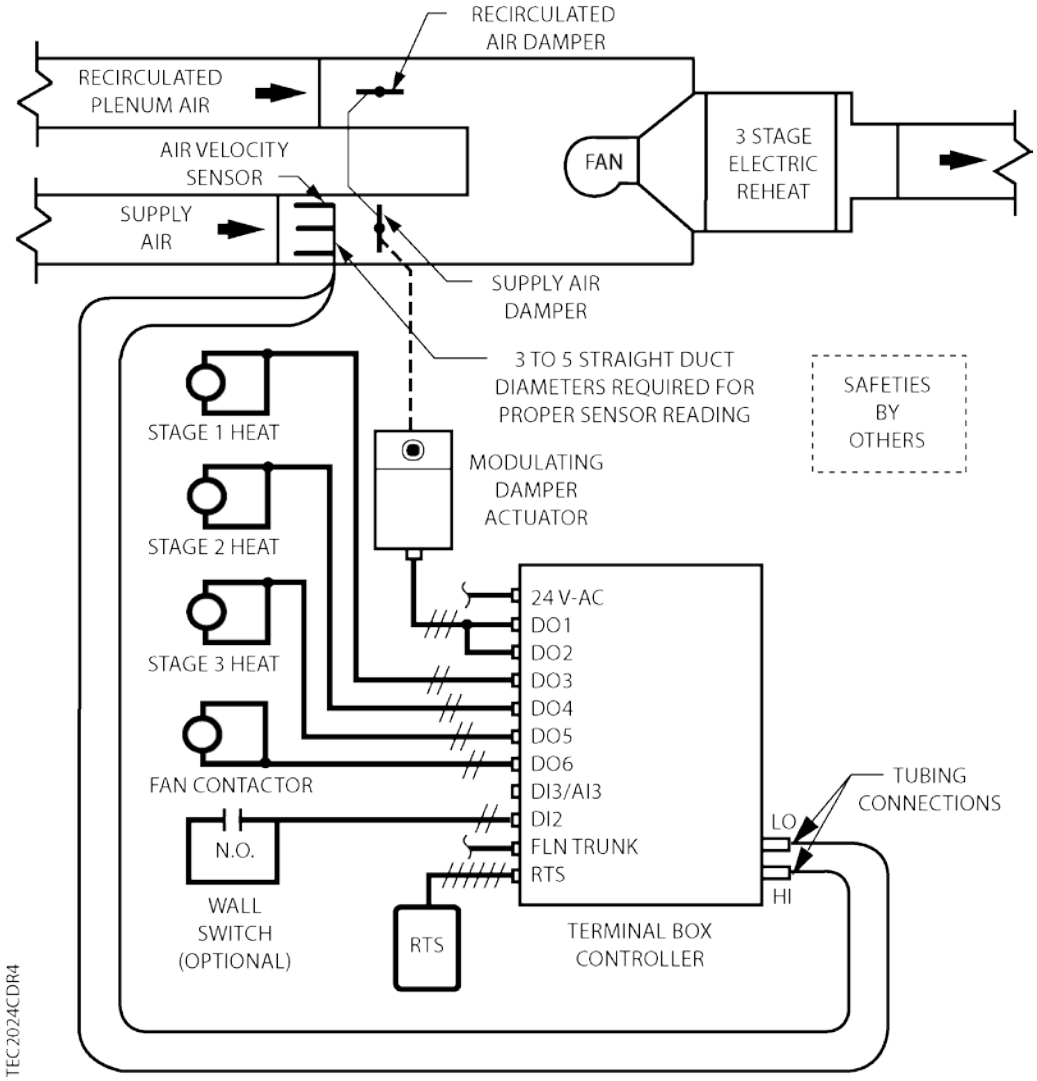
Application 2023 VAV with Hot Water Reheat

In Application 2023, the controller modulates the supply air damper of the terminal box for cooling and controls a hot water valve (or valves) for heating. When in heating, the terminal box either maintains minimum airflow or modulates the supply air damper. In order for the terminal box to work properly, the central air-handling unit must provide supply air for cooling.



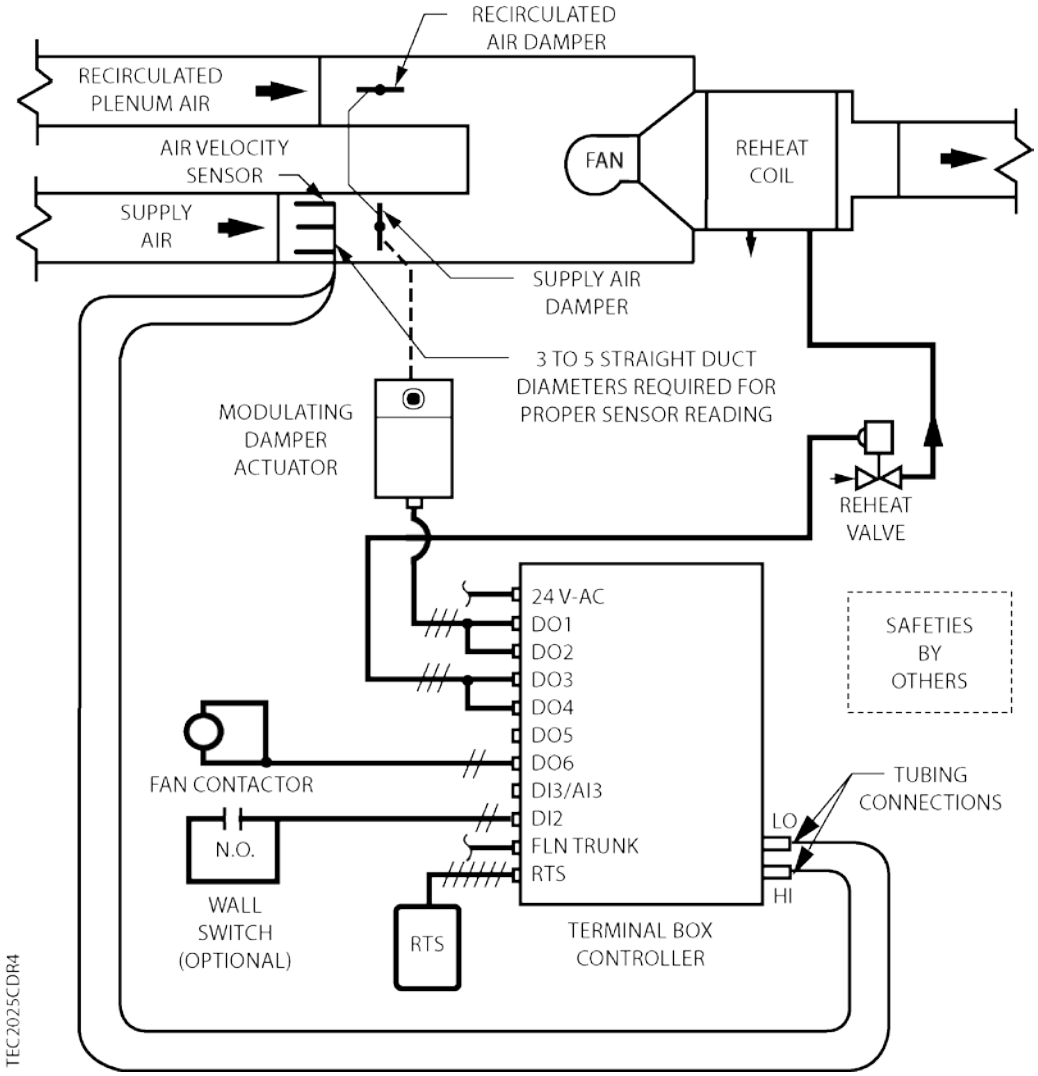
Application 2024 VAV Series Fan Powered with Electric Reheat

In Application 2024, the controller modulates the supply air damper of the terminal box for cooling and controls stages of electric reheat for heating. When in heating, the terminal box either maintains minimum airflow or modulates the supply air damper. Application 2024 has a series fan for air circulation. In order for the terminal box to work properly, the central air-handling unit must provide supply air.



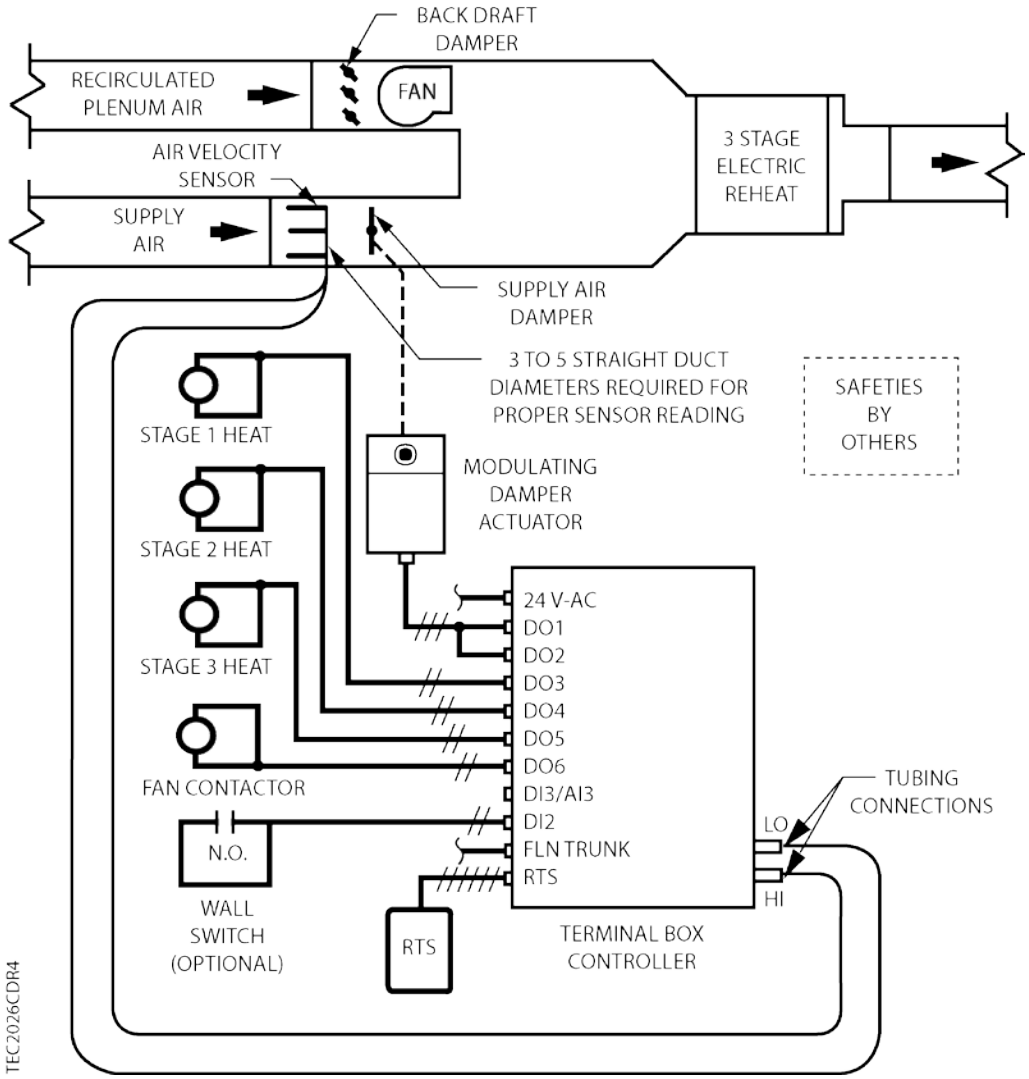
Application 2025 VAV Series Fan Powered with Hot Water Reheat

In Application 2025, the controller modulates the supply air damper of the terminal box for cooling and modulates a hot water valve for heating. When in heating, the terminal box either maintains minimum airflow or modulates the supply air damper. Application 2025 has a series fan for air circulation. In order for the terminal box to work properly, the central air-handling unit must provide supply air.



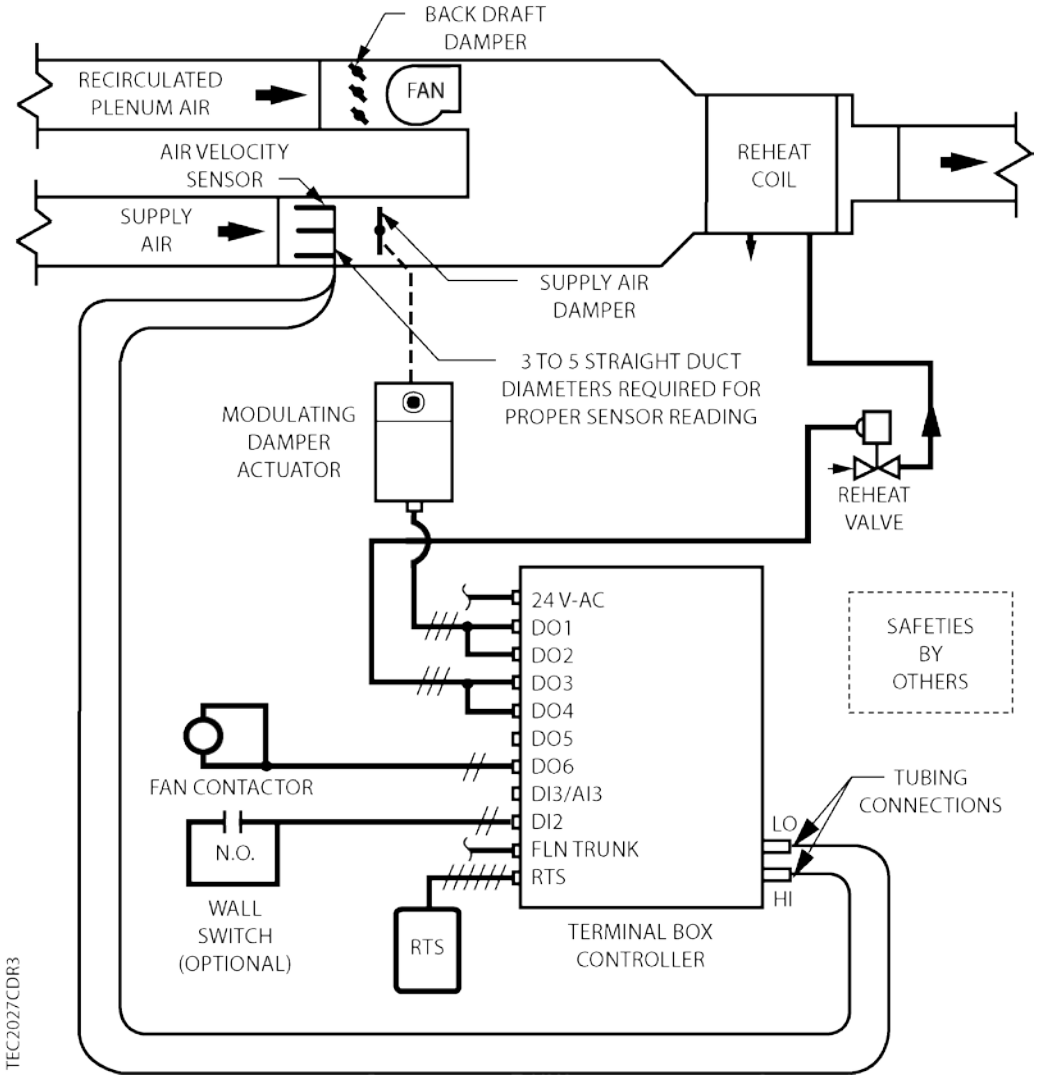
Application 2026 VAV Parallel Fan Powered with Electric Reheat

In Application 2026, the controller modulates the supply air damper of the terminal box for cooling and controls stages of electric reheat for heating. When in heating, the terminal box either maintains minimum airflow or modulates the supply air damper. Application 2026 has a parallel fan that re-circulates the room air in heating mode. In order for the terminal box to work properly, the central air-handling unit must provide supply air.



Application 2027 VAV Parallel Fan Powered with Hot Water Reheat

In Application 2027, the controller modulates the supply air damper of the terminal box for cooling and modulates a hot water valve for heating. When in heating, the terminal box either maintains minimum airflow or modulates the supply air damper. Application 2027 has a parallel fan that re-circulates the room air. In order for the terminal box to work properly, the central air-handling unit must provide supply air.



Application 2091 Slave Mode

Application 2091 is the slave mode application for the TEC (see Ordering Notes for product numbers). Slave mode is the default application that comes up when power is first applied to the controller. Slave mode provides no control. Its purpose is to allow the operator to perform equipment checkout before a control application is put into effect and to set some basic controller parameters (CTLR ADDRESS, APPLICATION, etc.).

Chapter 3 – Point Database

Chapter 3 presents a description of the TEC Terminal Box Controller point database, including point descriptors, point addresses, and a listing of applications in which each point is found.

Descriptor	Address[1]	Application	Description
CTLR ADDRESS	01	All	Identifies the controller on the FLN trunk.
APPLICATION	02	All	Identification number of the program running in the controller.
ROOM TEMP	{04}[2]	All	Actual reading from the room temperature sensor.
HEAT.COOL	{05}	All *except* 2020, 2091	Current mode of operation for applications that can be in either a heating mode or a cooling mode.
DAY CLG STPT	06	All *except* 2091	The temperature setpoint in degrees that the controller maintains during day periods in cooling mode if a room temperature sensor setpoint dial is not present or is not used. See *STPT DIAL*.
NGT CLG STPT	08	All *except* 2091	The temperature setpoint in degrees that the controller maintains during the night periods in cooling mode.
DAY HTG STPT	07	All *except* 2020, 2091	The temperature setpoint in degrees that the controller maintains during day periods in heating mode if a room temperature sensor setpoint dial is not present or is not used. See *STPT DIAL*.
NGT HTG STPT	09	All *except* 2020, 2091	The temperature setpoint in degrees that the controller maintains during the night periods in heating mode.
RM STPT MIN	11	All *except* 2091	The minimum temperature setpoint in degrees that the controller can use from the setpoint dial. This overrides any temperature setpoint from the setpoint dial that falls below this minimum.
RM STPT MAX	12	All *except* 2091	The maximum temperature setpoint in degrees that the controller can use from the setpoint dial. This overrides any temperature setpoint from the setpoint dial that falls above this maximum.
RM STPT DIAL	{13}	All	The temperature setpoint in degrees from the room temperature sensor (not available on all temperature sensor models). This setpoint will be used for control in day mode (heating or cooling) when enabled by STPT DIAL.
STPT DIAL	14	All *except* 2091	YES indicates that there is a room setpoint dial on the room temperature sensor and it should be used as the temperature setpoint for control in day/occupied mode. NO indicates that the appropriate preset setpoint will be used as the temperature setpoint for control in day/occupied heating or cooling mode. Valid input: YES or NO.
AUX TEMP	{15}	All *except* 2021	Actual reading from a 100K Ω thermistor.
SUPPLY TEMP	{15}	2021	Actual reading from a 100K Ω thermistor. The controller uses this value to determine whether it is in heating or cooling mode.
FLOW START	16	All *except* 2020, 2021, 2091	Determines how the damper modulation will be sequenced while in heating mode. When HTG LOOPOUT is above this value, then FLOW STPT starts to increase.

Descriptor	Address[1]	Application	Description
FLOW END	17	All *except* 2020, 2021, 2091	Determines how the damper modulation will be sequenced while in heating mode. When HTG LOOPOUT is below this value, then FLOW STPT starts to decrease.
WALL SWITCH	18	All	YES indicates that the controller is to monitor the status of a wall switch that is connected to UI 2. NO indicates that the controller will not monitor the status of a wall switch, even if one is connected. Valid input: YES or NO.
DI OVRD SW	{19}	All	Actual indication of the status of the override switch (not physically available on all temperature sensor models) at the room temperature sensor. ON indicates that the switch is being pressed. OFF indicates that the switch is released. Valid input: ON or OFF.
OVRD TIME	20	All *except* 2091	The amount of time in hours that the controller will operate in day/occupied mode when the override switch is pressed while the controller is in night/unoccupied mode.
NGT OVRD	{21}	All *except* 2091	Indicates the mode that the controller is operating in with respect to the override switch. NIGHT indicates that the switch has not been pressed and the override timer is not active. DAY indicates that the switch has been pressed and the override timer is active. The controller then uses a day mode temperature setpoint. This point is only in effect when DAY.NGT indicates night mode.
REHEAT START	22	All *except* 2020, 2021, 2091	Determines how the reheat modulation will be sequenced while in heating mode. When HTG LOOPOUT is above this value, then the reheat modulates upward.
REHEAT END	23	All *except* 2020, 2021, 2091	Determines how the reheat modulation will be sequenced while in heating mode. When HTG LOOPOUT is below this value, then the reheat modulates downward.
DI 2	{24}	All	Actual status of a contact connected to the controller at DI 2. ON indicates that the contact is closed; OFF indicates that the contact is open. If a wall switch is used, it is connected to DI 2. See *WALL SWITCH*.
DI 3	{25}	All *except* 2021	Actual status of a contact connected to the controller at AI 3/DI 3. ON indicates that the contact is closed; OFF indicates that the contact is open. When a contact is connected at DI 3, AI 3 is not available. See *AUX TEMP*.
SERIES ON	26	2024, 2025	When flow rises above this value, the series fan will turn ON.
SERIES ON	26	2026	This point is present, but not used in this application.
SERIES OFF	27	2024, 2025	When flow drops below this value and other conditions have been met, the series fan will turn OFF.
SERIES OFF	27	2026	This point is present, but not used in this application.
PARALLEL ON	28	2024	This point is present, but not used in this application.
PARALLEL ON	28	2026, 2027	When flow drops below this value and other conditions have been met, the parallel fan will turn ON.
DAY.NGT	{29}	All	Indicates the mode in which the controller is operating. Day temperature setpoints will be used in day mode. Night temperature setpoints will be used in night mode. This point is normally set by the field panel.
PARALLEL OFF	30	2024	This point is present, but not used in this application.
PARALLEL OFF	30	2026, 2027	When flow rises above this value, the parallel fan will turn

Descriptor	Address[1]	Application	Description
			OFF.
CLG FLOW MIN	31	All *except* 2091	The minimum amount of air in CFM (LPS) to be supplied to the space in cooling mode.
CLG FLOW MAX	32	All *except* 2091	The maximum amount of air in CFM (LPS) to be supplied to the space in cooling mode.
HTG FLOW MIN	33	All *except* 2020, 2091	The minimum amount of air in CFM (LPS) to be supplied to the space in heating mode.
HTG FLOW MAX	34	All *except* 2020, 2091	The maximum amount of air in CFM (LPS) to be supplied to the space in heating mode.
AIR VOLUME	{35}	All	Actual amount of air in CFM (LPS) currently passing through the air velocity sensor.
FLOW COEFF	36	All	Calibration factor for the airflow sensor.
MTR3 COMD	{37}	2020, 2021, 2022, 2091	The value to which the Motor 3 actuator is commanded in percent of full value.
VLV2 COMD	{37}	2023	The value to which the valve 2 actuator is commanded in percent of full travel for applications using a second water valve.
MTR3 POS	{38}	2020, 2021, 2022, 2091	The current position of the Motor 3 actuator in percent of full travel. This value is calculated based on motor run time.
VLV2 POS	{38}	2023	The current position of Valve 2 in percent of full travel. This value is calculated based on valve run time.
MTR3 TIMING	39	All except 2024, 2025, 2026, 2027	The time, in seconds, required for the Motor 3 actuator to travel from the full closed position to the full open position.
DO 1	{41}	All	Digital output 1 controls a 24 Vac load with an ON or OFF status. If Motor 1 is enabled, DO 1 is coupled with DO 2 to control an actuator.
DO 2	{42}	All	Digital output 2 controls a 24 Vac load with an ON or OFF status. If Motor 1 is enabled, DO 2 is coupled with DO 1 to control an actuator.
DO 3	{43}	All *except* 2022, 2024, 2026	Digital output 3 controls a 24 Vac load with an ON or OFF status. If Motor 2 is enabled, DO 3 is coupled with DO 4 to control an actuator.
HEAT STAGE 1	{43}	2022, 2024, 2026	This point is DO 3 in applications with electric reheat. This digital output controls the contact for the first stage of heating and has a status of ON or OFF.
DO 4	{44}	All *except* 2022, 2024, 2026	Digital output 4 controls a 24 Vac load with an ON or OFF status. If Motor 2 is enabled, DO 4 is coupled with DO 3 to control an actuator.
HEAT STAGE 2	{44}	2022, 2024, 2026	This point is DO 4 in applications with electric reheat. This digital output controls the contact for the second stage of heating and has a status of ON or OFF.
DO 5	{45}	2020, 2021, 2023, 2091	Digital output 5 controls a 24 Vac load with an ON or OFF status. If Motor 3 is enabled, DO 5 is coupled with DO 6 to control an actuator.
DO 5	{45}	2025, 2027	Digital output 5 controls a 24 Vac load with an ON or OFF status.
HEAT STAGE 3	{45}	2022, 2024, 2026	This point is a digital output used to control the contact for the third stage of heating and has a status of ON or OFF.

Descriptor	Address[1]	Application	Description
DO 6	{46}	All *except* 2024, 2025, 2026, 2027	Digital output 6 controls a 24 Vac load with an ON or OFF status. If Motor 3 is enabled, DO 6 is coupled with DO 5 to control an actuator. In applications with CAL MODULE set to YES, this digital output controls the Autozero Module to calibrate the controller's internal air velocity transducer.
FAN	{46}	2024, 2025, 2026, 2027	This point is a digital output used to control the fan. ON indicates that the DO is energized; OFF indicates that the DO is de-energized.
DMPR COMD	{48}	All *except* 2091	The value to which the damper motor is commanded in percent of full travel.
MTR1 COMD	{48}	2091	The value to which the Motor 1 actuator is commanded in percent of full travel.
DMPR POS	{49}	All *except* 2091	The current position of the damper motor in percent of full travel. This value is calculated based on motor run time.
MTR1 POS	{49}	2901	The current position of Motor 1 in percent of full travel. This value is calculated based on motor run time. See *MTR1 TIMING*.
MTR1 TIMING	51	All	The time, in seconds, required for the Motor 1 actuator to travel from full closed to the full open position.
MTR2 COMD	{52}	2020, 2021, 2091	The value to which the Motor 2 actuator is commanded in percent of full travel (for use as an auxiliary slave point).
VLV COMD	{52}	2025, 2027	The value to which the valve actuator is commanded in percent of full travel for applications using a water valve.
VLV1 COMD	{52}	2023	The value to which the valve 1 actuator is commanded in percent of full travel for applications using a water valve.
MTR2 POS	{53}	2020, 2021, 2091	The current position of the Motor 2 actuator in percent of full travel (for use as an auxiliary slave point). This value is calculated based on motor run time. See *MTR2 TIMING*.
VLV POS	{53}	2025	The current position of the valve in percent of full travel for applications using a water valve. This value is calculated based on motor run time.
VLV1 POS	{53}	2023	The current position of valve 1 in percent of full travel for applications using a water valve. This value is calculated based on motor run time.
MTR2 TIMING	55	All *except* 2022, 2024, 2026	The time, in seconds, required for the Motor 2 actuator to travel from full closed to the full open position.
DMPR ROT ANG	56	All *except* 2091	The number of degrees the damper is free to travel.
DPR1 ROT ANG	56	2091	The number of degrees that damper 1 is free to travel.
DPR2 ROT ANG	57	2091	The number of degrees that damper 2, the hot duct damper, is free to travel.
MTR SETUP	58	All	The configuration setup code for Motors 1 and 2. This enables the motors individually and sets each motor to be either direct or reverse acting. **Note:** When a motor is enabled, its associated DOs are enabled.
DO DIR.REV	59	All	The configuration setup code for DOs. Allows the DOs to be direct or reverse acting (enabled equals energized or disabled equals de-energized).

Descriptor	Address[1]	Application	Description
EHEAT FLOW	60	2022	The flow required before the electric heat will be enabled.
COOL TEMP	61	2021	The discharge air temperature where the controller will switch from heating to cooling mode. Used only in applications with SUPPLY TEMP.
HEAT TEMP	62	2021	The discharge air temperature where the controller will switch from cooling to heating mode. Used only in applications with SUPPLY TEMP.
CLG P GAIN	63	All *except* 2091	The proportional gain value for the cooling temperature control loop.
CLG I GAIN	64	All *except* 2091	The integral gain value for the cooling temperature control loop.
CLG D GAIN	65	All *except* 2091	The derivative gain value for the cooling temperature control loop.
CLG BIAS	66	All *except* 2091	The biasing of the cooling temperature control loop. See *CLG LOOPOUT*.
HTG P GAIN	67	All *except* 2020, 2091	The proportional gain value for the heating temperature control loop.
HTG I GAIN	68	All *except* 2020, 2091	The integral gain value for the heating temperature control loop.
HTG D GAIN	69	All *except* 2020, 2091	The derivative gain value for the heating temperature control loop.
HTG BIAS	70	All *except* 2020, 2091	The biasing of the heating temperature control loop. See *LOOPOUT*.
FLOW P GAIN	71	All *except* 2091	The proportional gain value for the flow control loop.
FLOW I GAIN	72	All *except* 2091	The integral gain value for the flow control loop.
FLOW D GAIN	73	All *except* 2091	The derivative gain value for the flow control loop.
FLOW BIAS	74	All *except* 2091	The biasing of the flow control loop.
FLOW	{75}	All *except* 2091	Indicates the amount of air currently passing the air velocity sensor. The value is calculated as a percentage based on where the value of AIR VOLUME is in the range between 0 and CTL FLOW MAX.
CTL FLOW MIN	{76}	All *except* 2091	The active minimum flow used as a limit for the flow control loop. This value is the same as CLG FLOW MIN if the controller is in cooling mode, or is the same as HTG FLOW MIN if the controller is in heating mode, unless it is overridden.
CTL FLOW MAX	{77}	All *except* 2091	The active maximum flow used as a limit for the flow control loop. This value is the same as CLG FLOW MAX if the controller is in cooling mode, or is the same as HTG FLOW MAX if the controller is in heating mode unless, it is overridden.
CTL TEMP	{78}	All *except* 2091	The temperature used as input for the temperature control loops. This value is the same as the value in ROOM TEMP unless it is overridden.
CLG LOOPOUT	{79}	All *except* 2091	The cooling temperature control loop output value in percent.

Descriptor	Address[1]	Application	Description
HTG LOOPOUT	{80}	All *except* 2020, 2091	The heating temperature control loop output value in percent.
AVG HEAT OUT	{81}	2022, 2024, 2026	This point is used to determine what stages of electric heat are used for a given loop output value. The ranges for the value are determined by the number of stages used: 0 to 100 for 1 stage of electric heat, 0 to 200 for 2 stages of electric heat, and 0 to 300 for 3 stages of electric heat. With electric heat, this value is equal to: HTG LOOPOUT × STAGE COUNT.
STAGE MAX	82	2022, 2024, 2026	The value, in percent, which the heating loop must exceed for the electric heat to be ON for the full duty cycle (STAGE TIME).
STAGE FAN	83	2025, 2027	The valve must be opened greater than this value before the fan will turn ON.
STAGE MIN	83	2022, 2024, 2026	The value, in percent, which the heating loop must go below for the electric heat to be OFF for the full duty cycle (STAGE TIME).
DMPR STATUS	{84}	2020, 2021, 2022, 2023	This point is used only when CAL MODULE set to YES. It readjusts the damper position if the command value is not equal to the actual position of the damper. CAL indicates that the damper is operating normally. RECAL indicates that the damper position was adjusted (recalibrated) by 25% because the desired airflow was not obtainable under its current status.
SWITCH LIMIT	85	All *except* 2020, 2021, 2091	The active temperature control loop output must be less than this value to switch between cooling mode and heating mode. Actual switchover depends on SWITCH DBAND being exceeded and is subject to SWITCH TIME being expired.
SWITCH TIME	86	All *except* 2020, 2021, 2091	The time, in minutes, before the heat/cool mode can change over when the other parameters are appropriate.
CAL MODULE	87	All *except* 2024, 2025, 2026, 2027	YES indicates that the Autozero Modules are enabled to calibrate the air velocity transducers. The dampers will not be used for calibration. NO indicates that Autozero Modules are disabled and that the air velocity transducers will be calibrated by closing the dampers. Valid input: YES or NO.
STAGE COUNT	88	2022, 2024, 2026	The number of electric heating stages used by the application. DOs associated with unused stages may be used as spare DOs.
VALVE COUNT	88	2023	The number of heating valves available.
STAGE TIME	89	2022, 2024, 2026	The cycle time in minutes for the electric reheat stages. For example, if there are three stages of electric heat and STAGE TIME = 10 minutes, STAGE COUNT = 3, and AVG HEAT OUT = 150% then, Stage 1 is ON for 10 minutes (100% of the time), Stage 2 is ON for 5 minutes (50% of 10 minutes) and OFF for 5 minutes, and Stage 3 is OFF.
SWITCH DBAND	90	All *except* 2020, 2021, 2091	The temperature range in degrees which is compared to the difference between CTL TEMP and CTL STPT. The difference must exceed this value for temperature control mode to change over. Changeover is also subject to the active temperature control loop output being below SWITCH LIMIT (Point 85) and SWITCH TIME being expired.
TOTAL VOLUME	{91}	All *except* 2091	The total amount of air delivered to a space in CF (L) since the last time the point was reset or rolled over.

Descriptor	Address[1]	Application	Description
CTL STPT	{92}	All *except* 2091	The actual setpoint value being used as input for the active temperature control loop.
FLOW STPT	{93}	All *except* 2091	The setpoint of the flow control loop.
CAL AIR	{94}	All	YES commands the controller to go through calibration sequence for the air velocity transducers. YES is also displayed when the calibration sequence is started automatically. CAL AIR automatically returns to NO after the calibration sequence is completed. Valid input: YES or NO.
CAL SETUP	95	All	The configuration setup code for the calibration sequence options.
CAL TIMER	96	All	Time interval, in hours, between the calibration sequence initiations if a timed calibration option is selected in CAL SETUP.
DUCT AREA	97	All	Area, in square feet (square meters), of the duct where the air velocity sensor is located. This is a calculated value (calculated by the field panel or computer being used) that depends on duct shape and size. It is used in calculating all points in units of CFM, CF, LPS and L. Valid input: .025 ft2 (.002 m2) through 6.375 ft2 (.5923 m2).
LOOP TIME	98	All *except* 2091	The time, in seconds, between control loop calculations.
ERROR STATUS	{99}	All	The status code indicating any errors detected during controller power up. A status of 0 indicates there are no problems.

1) Points not listed are not used in this application.

2) Point numbers that appear in brackets { } may be unbundled at the field panel.

Chapter 4 – Basic Service and Maintenance

This chapter describes basic service and maintenance measures you can take when using a TEC.

You may want to contact your local Siemens Industry representative if a problem occurs or you have any questions about the controller.

NOTE:
When troubleshooting, record the problem and what actions were performed immediately before the problem occurred. Being able to describe the problem in detail is important should you need assistance from your local Siemens Industry representative.

Basic Service Information

Always remove power to the TEC when installing or replacing it. Since the controller does not have a power switch, the recommended method of removing power to a locally powered controller is to turn OFF the power to the 24 Vac transformer. The recommended method of removing power to a controller on a power cable (even to service a single controller) is to turn OFF the power at the transformer.

NOTE:
When removing power to a controller to perform maintenance or service, make sure that the person in charge of the facility is aware of this and that appropriate steps are taken to keep the building in control.

Never remove the cover from the TEC. There are no serviceable parts inside. If a problem is found with this device, contact your local Siemens Industry representative for replacement. An anti-static wrist strap is recommended when installing or replacing controllers.

Preventive Maintenance

Most controller components are designed so that, under normal circumstances, they do not require preventive maintenance. Periodic inspections, voltage checks, and point checks are normally not required. The rugged design makes most preventive maintenance unnecessary. However, devices that are exposed to dusty or dirty environments may require periodic cleaning to function properly.

Safety Features

The controller board stores the controller's address, applications, and point values. In the event of a power failure or a reset, these values are retrieved from the controller's permanent memory and are used by the controller unless overridden by a field panel. If one of the following conditions occurs, the controller will activate safety features present in its fail-safe mode.

- Sensor failure.
- Loss of power. Upon controller power loss, communication with the controller is also lost. The controller will appear as failed (*F*) at the field panel.

Glossary

This glossary contains the collected terms and acronyms that are used in Siemens BACnet PTEC and TEC Controllers. For definitions of point database descriptors, see Chapter 3 - Point Database, in this manual.

airflow

Rate at which a volume of air moves through a duct. Usually expressed in cubic feet per minute (cfm) or liters per second (lps).

algorithm

Mathematical formula and control logic that uses varying inputs to calculate an output value.

AVS

Air Velocity Sensor. An electronic device that converts differential pressure from a pilot tube or multi-point pickup to an analog rate of fluid flow (air velocity in fpm, m/s) to provide calculations of air volume rate (cfm, lps) in a duct. The air velocity sensor may be an external device or an internal component of a controller.

centralized control

Type of control offered by a controller that is connected by means of Field Level Network (FLN).

cfm

Cubic Feet per Minute.

Chilled Beam

A cooling device that provides a cooling system by taking care of both the sensible and latent heat gains of a room in a single package by a series of chilled water coils mounted near or in the ceiling. Coupled with a CV or VAV terminal ventilation system, a chilled beam induces air movement over the coil in the way that it discharges fresh air into the room. This allows for both fresh air and cooling to be taken care of at the same time.

control loop

An algorithm, such as PI or PID, that is used to control an output based on a setpoint and an input reading from a sensor.

CO_2

Carbon dioxide, a naturally occurring chemical compound composed of two oxygen atoms and a single carbon atom. Among other production sources, carbon dioxide is produced as the result of breathing of humans and animals and can therefore be an indirect indication of the concentration of humans in a zone.

CV

Constant air volume. Ventilation system that provides a fixed air volume supplied to and exhausted from the rooms served. The fixed volume may be different during occupied and unoccupied times

Demand Control Ventilation

A control algorithm that provides for the control or reduction of outdoor air intake below design rates when the actual occupancy of spaces served by the system is at less than design occupancy.

DCV

Demand Control Ventilation.

DDC

Direct Digital Control.

Direct digital control

The automated control of a condition or process by a digital device (computer).

DO

Digital Output. Physical output point that sends a two-state signal (ON/OFF, OPEN/CLOSED, YES/NO).

English units

The foot-pound-second system of units for weights and measurements.

equipment controller

FLN device, such as a BACnet PTEC or ATEC, that provides individual room or mechanical equipment control or additional point capacity to a field panel.

field panel

A DDC control device containing a microprocessor for centralized control and monitoring of system components and equipment controllers.

Floating Control

The combination of a modulating controlled device with the use of a pair of two position outputs. The control signal will either activate one or the other outputs to drive the controlled device towards its open or closed position. When both outputs are off, the controlled device maintains its last position. Also referred to as tri-state control.

FLN

Field Level Network. Network consisting of equipment controllers, FLN end devices, fume hoods, etc.

lps

Liters per Second.

loopout

Output of the control loop expressed as a percentage.

Heat pump

An HVAC device used for both space heating and space cooling. When a heat pump is used for heating, it employs the same basic refrigeration-type cycle used by an air conditioner but in the opposite direction, releasing heat into the conditioned-space rather than the surrounding environment. In this use, heat pumps generally draw heat from the cooler external air or from the ground.

HMI

Human Machine Interface. Terminal and its interface program that allows you to communicate with a field panel or equipment controller.

Occupancy sensor

A control device that detects presence of people in a space by using infrared or ultrasonic technology. Occupancy sensors are used to save energy by controlling lighting and temperature and, along with CO2 sensors, to provide control input of demand control ventilation (DCV) algorithms.

override switch

Button on a room temperature sensor that an occupant can press to change the status of a room from unoccupied to occupied (or from night to day) for a predetermined time.

pressure dependent

Variable Air Volume (VAV) room temperature control system in which the temperature drives a damper such that the air volume delivered to the space at any damper position is dependent on the duct static pressure.

pressure independent

Variable Air Volume (VAV) room temperature control system in which the temperature drives an airflow setpoint such that the air volume delivered to the space is independent of variations in the duct static pressure.

PID

Proportional, Integral, Derivative.

RTS

Room Temperature Sensor.

setpoint

Data point that stores a value such as a temperature setting. In contrast, points that monitor inputs, such as temperature, report actual values.

SI units

Systeme International d'Unites. The international metric system.

slave mode

Default application that displays when power is first applied to an equipment controller. No control action is initiated in the slave mode. Input and output points in the slave application can be monitored or controlled by a field panel (or by PPCL in a BACnet PTEC controller).

stand-alone control

Type of control offered by a controller that is providing independent DDC control to a space.

Terminal Equipment Controller

Siemens Industry, Inc. product family of equipment controllers that house the applications software used to control terminal units, such as heat pumps, VAV terminal boxes, fan coil units, unit ventilators, etc.

UI

Universal Input. Can be used as an AI or DI. An AI input is a point receiving a signal that represents a condition that has more than two states. A DI input is a physical input point that receives a two-state signal.

unbundle

Term used to describe the entering of a point that resides in a controller's database into the field panel's database so that it can be monitored and controlled from the field panel.

VAV

Variable air volume. Ventilation system that changes the amount of air supplied to and exhausted from the rooms served.

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SIEMENS

Operator Interface Guide
Document No. 125-703
February 3, 2014

Room Unit for TEC, and ATEC

Overview

This document explains the set up and operation of the Series 2200, 3200, 2300, and 3300 room units. It explains the various operating modes available and describes the procedure for programming the display, according to user preferences.

These devices are used with BACnet Terminal Equipment Controllers (TEC), BACnet Actuator TEC (ATEC) Controllers, and BACnet Programmable Controllers (PTEC).

Product Numbers

QAA2280.xWNC	QFA3280.xWNC
QAA2280.xWSC	QFA3280.xWSC
QAA2380.xWNC	QFA3380.xWNC
QAA2380.xWTC	QFA3380.xWTC
QPA228x.xWNC	QPA238x.xWNC
QPA228x.xWSC	QPA238x.xWTC

Accessories

Description	Product Number
Passkey	544-643A
25-foot (7.6 m) cable with connections	588-100A
50-foot (15.2 m) cable with connections	588-100B
100-foot (30.5 m) cable with connections	588-100C
Replacement rh 2%+ Thermostat Element – TEC Room Unit	AQF3060
Replacement Housing Base (QAA, QFA types)	563-102-01
Replacement Housing Base (QPA types)	563-120
Room Unit Backplate, 10-pack	AQM2200-INTL
Power Supply (QPA types)	AQM2200

Operation

Operation modes

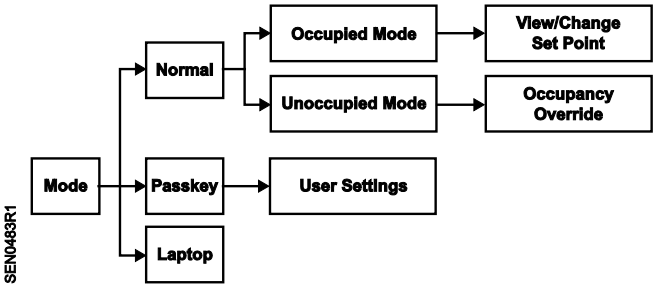


Figure 1. Operation Modes.

Normal Mode

In Normal Mode, the display is updated with temperature, humidity, carbon dioxide, and/or occupied status (all where applicable) on a set time cycle.

The display shows temperature in the desired units (as set by the clipable jumper on the PCA). Depending on the model, the humidity and/or carbon dioxide value(s) will be displayed as well. When multiple variables need to be displayed (temperature, relative humidity, and/or carbon dioxide) the display will cycle through the required values at a rate of one change every three to five seconds.

Operation modes, Continued

Occupied Mode

If the TEC is currently in Unoccupied Mode (display shows man outside of the house), pressing the override button (button designated by an image of a man inside a house) results in the display showing the word OCCUPIED and the request is sent to the TEC to override the unoccupied mode. If the TEC does not get overridden, and stays in unoccupied mode, the display on the sensor reverts back to the unoccupied symbol as soon as possible.

If the TEC is currently in occupied mode, pressing the override button flashes the word OCCUPIED, and does nothing else. This functionality is intended solely to let the user know that the button press was recognized.

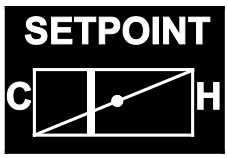
Occupied Mode Display

Unoccupied Mode Display

Setpoint Adjustment Mode

The temperature setpoint is adjusted by using the plus and minus buttons. The resulting changes in setpoint are displayed on the display in 1.0°F or 0.5°C increments.

The setpoint adjustment will display for three seconds. If, during those three seconds, a setpoint button is pressed again, the setpoint will be adjusted accordingly and be displayed, and the three-second countdown will restart. If there is no user input for more than three seconds, the room unit will return to Normal Mode.



Passkey Mode

Insert the passkey in the sensor HMI (Human-Machine Interface) port to setup all of the user functionality listed below. For each parameter, use the following sequence:

- Press the occupancy override button to edit the parameter.
- Press the plus/minus buttons to scroll through the various options available for each parameter to display the desired option.
- Press the occupancy override button again to move to the next user adjustable parameter.
- When finished, remove the passkey from the HMI port. User setting changes will be saved when the passkey is removed.

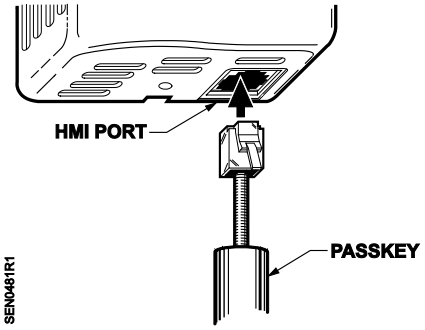


Figure 2. Inserting the Passkey.

NOTE: When the passkey is plugged in, communication between the room unit and the TEC is disabled. See note in *Laptop Pass-thru Mode* section for more information.

Settings

- **Set Pt Disp** - determines how the user views the temperature setpoint adjustment. The default setting is NUMERIC, and displays in degrees. The user can select between a NUMERIC and a GRAPHIC setpoint display.

- **Set Pt Min** - determines the minimum temperature setpoint value. The default setting is 55°F (12.5°C). The user selects the minimum setpoint the room unit should request. The setpoint limit is ultimately defined in the controller. If the setpoint is displayed graphically as a sliding bar, this sets the left end of the slider bar. The limits are 55°F to the Set Pt Max value. The adjustment step size is 1°F (0.5°C).

- **Set Pt Max** - determines the maximum temperature setpoint value. The default setting is 95°F (35°C). The user selects the maximum setpoint the sensor should request. The setpoint limit is ultimately defined in the controller. If the setpoint is displayed graphically as a sliding bar, this sets the right end of the slider bar. The limits are Set Pt Min to 95°F (35°C). The adjustment step size is 1°F (0.5°C).

- **Disp Temp?** – determines whether the temperature value should be displayed. The default value is YES.

- **Disp RH?** – determines whether the humidity value should be displayed. The default value is YES, if the device is a combination temperature/humidity or temperature/humidity, CO_2 room unit. (This option is conditional based on the presence of humidity measurement capability, and only offered with QFA3x80.F or QPA2x84.F types.)

- **Disp CO2?** – determines whether the carbon dioxide value should be displayed. The default value is YES, if the device is a CO_2 Room Unit. (This option is conditional based on the presence of CO_2 measurement capability, and only offered with QPA2x84.F types.)

- **Disp Occ?** – determines whether the occupancy status should be displayed. The default value is YES if the device offers occupancy override capability. **NOTE:** This does not enable/disable the Occupancy override button functionality, just the display of the occupancy status.

- **T Cal** – allows the user to field calibrate the temperature display and output through a bias adjustment. The default value is + 0°F. Adjustments can be made between -5°F and + 5°F, in 0.5°F increments.

- **RH Cal** – allows the user to field calibrate the humidity display and output through a bias adjustment. The default value is + 0%. Adjustments can be made between -5% and + 5%, in 0.5% increments. (This option is conditional based on the presence of humidity measurement capability, and only offered with QFA3x80.F or QPA2x84.F types.)

- **CO2 Cal** – allows the user to field calibrate the carbon dioxide display and output through a bias adjustment. The default value is +0 parts per million (PPM). Adjustments can be made between -175 and + 50 PPM, in 5 PPM increments. (This option is conditional based on the presence of CO2 measurement capability, and only offered with QPA2x84.F types.)

- **Brightness** – allows the user to adjust the display brightness. Valid values are 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10, with 1 being dimmest and 10 being brightest. The default setting is 5.

- **Scr Saver** – allows the user to activate or deactivate the display screen saver. Available options are: NONE, OFF, and FADING. The default value is NONE.

  - **NONE** – The display operates at the programmed brightness level without any interruption.
  - **Off** – The display will turn off after 30 seconds. Any button press will wake it up (without doing anything else), and then the device will operate in Normal Mode for 30 seconds until the display turns off again.
  - **Fading** – Within 30 seconds of no operator interaction, the entire display will fade to a display brightness of 1. The display will operate at this brightness until the user presses a button. At that time, the programmed display brightness will be restored.

- **Factory Defaults** - allows the user to reset all parameters to factory defaults. The default is NO. Available options for this parameter are YES and NO.

Parameter	Default Value
Set Pt Disp	NUMERIC
Set Pt Min	55°F (13°C)
Set Pt Max	95°F (35°C)
DISP Temp?	YES
Disp RH?	YES
Disp CO2?	YES
Disp Occ?	YES
T Cal	+ 0°F (0°C)
RH Cal	+ 0%
CO2 Cal	+0 PPM
Brightness	5
Scr Saver	NONE
Factory Defaults	NO

Laptop Pass-thru Mode

To communicate with the TEC using Datamate Base, Datamate Advanced, or Microsoft Windows™ Controller Interface Software (WCIS), connect a PC-compatible cable (see *Accessories*) from a laptop to the sensor HMI port at the bottom of the room unit. This puts the room unit in laptop mode, which deactivates all buttons and displays LAPTOP on the display. In this mode, the controller communicates only with the laptop and still allows the temperature, humidity, or CO2 values (where applicable) to be updated in the controller. The room unit controls communication, and updates values every 10 seconds. The room unit returns to Normal Mode once the cable is disconnected.

NOTE: The Room Unit (Firmware Revision 016 or lower) will stop updating ROOM TEMP, RM STPT, and OVRD if a passkey or laptop cable is connected to the Room Unit. This issue will affect the normal commissioning process, because the Specialist cannot leave the HMI cable connected to the Room Unit to monitor the TEC's control. This affects all Series 2200, 3200, 2300, and 3300 models, with the exception of QAA2280.EWSC, QAA2380.EWTC, QAA2280.EWNC, and QAA2380.EWNC.

Furthermore, if the TEC is initialized, power is cycled (which has the same effect as initializing the TEC) or the Application (subpoint 2) is commanded to another value, the following will occur:

- The RM TEMP will read and control to 57°F (12°C).
- The RM STPT with read and control to 98°F (37°C).

Once the passkey or HMI cable or passkey is disconnected, the ROOM TEMP will update within 10 seconds. The RM STPT will not update until the setpoint setting is changed on the Room Unit or until the Room Unit cycles power.

The Room Unit (Firmware Revision 029 or higher) in combination with new release TEC products ROOM TEMP, RM STPT, and OVRD will be updated if a passkey or laptop cable is connected to the Room Unit, but the buttons will not work. New release TEC Products Use a SENSOR SEL point that allows the TEC to see all inputs from the Digital Room Sensor, the default setting does not allow the TEC to see the points.

Set-up of Displayed Temperature Units

The factory default for displayed temperature units is °F. To change the display to °C mode, snip the wire jumper on the back of the PCB (the visible side when the unit is taken off the wall).

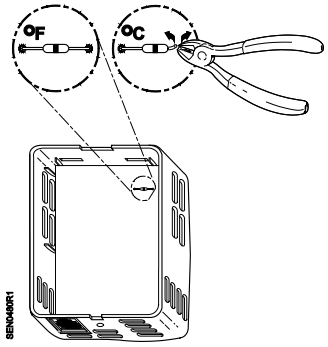


Figure 3. Jumper Location.

Error Messages

Message	Meaning
NO TEC	No communication with TEC. This error will display on the lower right (icon) section of the display, and the upper portion of the display should continue to display temperature values (and/or humidity and CO_2 values where applicable). Or a bad crimp on the RJ11 cable connection. **NOTE:** This error will display whenever TEC subpoints are not available or when the TEC (or its subpoints) are not responding to commands. The default HMI baud rate on the TEC is 1200, but the room unit baud rate is self-adjusting.
NO SENSOR	No temperature (or humidity or CO_2 where applicable) sensor detected on the PCA. This error will display until the error is corrected. This message might also display if the wrong controller-to-room unit-cable is used or if the replacement sensor element is incorrectly installed on the PCA.
0xx	Room unit firmware revision, where X is a number between 0 and 9. For Room Units (Revision 016 and lower) this is visible upon power-up for a few seconds until communication is established with the TEC or ATEC. For Revision 029 and higher, this is visible for a few seconds upon power-up and when the laptop cable is disconnected.

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POWERS

BUILDING HVAC, CONTROLS, & SERVICE

Independent field office for
Siemens Building Technologies

PROJECT #22CNEB3069

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Submittal
For Control Systems For:

SPEC. SECTION: 23 09 23
DIRECT DIGITAL CONTROL SYSTEM FOR HVAC

JLM VA MEDICAL MEDIA RELOCATE

LITTLE ROCK, AR

Mechanical Contractor:
COMFORT SYSTEMS USA

APRIL 21, 2022

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I. TECHNICAL SPECIFICATION SHEETS

II. CONTROL DRAWINGS

Controls Division | **Order Variance** | **Date:** 04/21/22

Job Name: JLM VA Medical Media Relocate | **Job Number:** 22CNEB3069 | **Page:** 1

Product Number	Product Description	System Quantity	Order Quantity
171A-10300S	0.5" 2W 0.4CV SS BALL VLV+GDE131.1P	2	0
171A-10301S	0.5" 2W 0.63CV SS BALL VLV+GDE131.1P	1	0
171A-10302S	0.5" 2W 1CV SS BALL VLV+GDE131.1P	1	0
536-811	DCT PT TMP, 100K OHM, 4", BRACKET MNT	4	0
540-100N	TERM BOX CTLR ELEC OUT	4	0
GDE131.1P	ACT NSR PLENUM 24/108L 5Nm	4	0
QAA2280.FWSC	RTS, TEC/RJ-11, FULL HMI	4	0

SIEMENS

Submittal Sheet
Document No. 154-038
February 4, 2016

599 Series 2-Way Ball Valves

Description

The 599 Series 2-Way Ball Valves are coupled with OpenAir™ actuators to provide equal percentage flow control. The Ball Valves are 1/4-turn rotary control valves.

Product Numbers

Use the product numbers in Table 1 through Table 11 to order a valve and actuator assembly. The product number consists of a 4-character actuator prefix code, a hyphen, and a 5-digit valve body suffix code. Stainless steel product numbers have an "S" suffix in Table 6 through Table 11.

Features

- 200 psi close-off with ANSI Class IV leakage for all line sizes and actuators.
- Available with chrome-plated brass ball and brass stem or stainless steel ball and stem.
- Blow-out proof stem withstands high pressure.
- Universal mounting plate.
- Actuator and plate can be rotated (90 degree increments).
- Standoffs provide a thermal barrier between the actuator and the mounting plate.
- Operating handle for manual operation.

Table 1. Fail-In-Place Assemblies: Chrome-Plated Ball with Brass Stem (1/2-Inch and 3/4-Inch)

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-Off ΔP in psi (kPa)	Fail-in-Place			
				Floating		0 to 10 Vdc	
				GDE 131.1P	GDE 131.1Q	GDE 161.1P	GDE 161.1Q
				3 foot (.9m) Wires	Conduit Adapter & 6-foot (1.8m) Wires	3 foot (.9m) Wires	Conduit Adapter & 6-foot (1.8m) Wires
				Actuator Prefix Code			
				171A	173A	171C	173C
599-10300	1/2 (15)	0.4 (0.34)	200 (1379)	171A-10300	173A-10300	171C-10300	173C-10300
599-10301		0.63 (0.54)		171A-10301	173A-10301	171C-10301	173C-10301
599-10302		1.0 (0.9)		171A-10302	173A-10302	171C-10302	173C-10302
599-10303		1.6 (1.4)		171A-10303	173A-10303	171C-10303	173C-10303
599-10304		2.5 (2.2)		171A-10304	173A-10304	171C-10304	173C-10304
599-10305		4.0 (3.4)		171A-10305	173A-10305	171C-10305	173C-10305
599-10306		6.3 (5.4)		171A-10306	173A-10306	171C-10306	173C-10306
599-10307*		10 (8.6)		171A-10307*	173A-10307*	171C-10307*	173C-10307*
599-10308	3/4 (20)	6.3 (5.4)		171A-10308	173A-10308	171C-10308	173C-10308
599-10309		10 (8.6)		171A-10309	173A-10309	171C-10309	173C-10309
599-10310		16 (14)		171A-10310	173A-10310	171C-10310	173C-10310
599-10311*		25 (22)		171A-10311*	173A-10311*	171C-10311*	173C-10311*

*Denotes a full-port valve without flow characterizers insert.

Table 2. Fail-In-Place Assemblies: Chrome-Plated Ball with Brass Stem (1-Inch to 2-Inch)

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-Off ΔP in psi (kPa)	Fail-in-Place							
				Floating				0 to 10 Vdc			
				GDE 131.1P	GLB 131.1P	GDE 131.1Q	GLB 131.1Q	GDE 161.1P	GLB 161.1P	GDE 161.1Q	GLB 161.1Q
				3 foot (.9m) Wires		Conduit Adapter & 6-foot (1.8m) Wires		3 foot (.9m) Wires		Conduit Adapter & 6-foot (1.8m) Wires	
				Actuator Prefix Code							
				171A	171B	173A	173B	171C	171D	173C	173D
599-10312	1 (25)	10 (9.0)	200 (1379)	171A-10312		173A-10312		171C-10312		173C-10312	
599-10313		16 (14)		171A-10313		173A-10313		171C-10313		173C-10313	
599-10314		25 (22)		171A-10314		173A-10314		171C-10314		173C-10314	
599-10315		40 (34)		171A-10315		173A-10315		171C-10315		173C-10315	
599-10316*		63 (54)		171A-10316*		173A-10316*		171C-10316*		173C-10316*	
599-10317	1 1/4 (32)	16 (14)		171A-10317		173A-10317		171C-10317		173C-10317	
599-10318		25 (22)		171A-10318		173A-10318		171C-10318		173C-10318	
599-10319		40 (34)		171A-10319		173A-10319		171C-10319		173C-10319	
599-10320		63 (54)		171A-10320		173A-10320		171C-10320		173C-10320	
599-10321*		100 (90)		171A-10321*		173A-10321*		171C-10321*		173C-10321*	
599-10322	1 1/2 (40)	25 (22)		171B-10322		173B-10322		171D-10322		173D-10322	
599-10323		40 (34)		171B-10323		173B-10323		171D-10323		173D-10323	
599-10324*		63 (54)		171B-10324*		173B-10324*		171D-10324*		173D-10324*	
599-10325		100 (90)		171B-10325		173B-10325		171D-10325		173D-10325	
599-10326*		160 (140)		171B-10326*		173B-10326*		171D-10326*		173D-10326*	
599-10327	2 (50)	40 (34)		171B-10327		173B-10327		171D-10327		173D-10327	
599-10328		63 (54)		171B-10328		173B-10328		171D-10328		173D-10328	
599-10329*		100 (90)		171B-10329*		173B-10329*		171D-10329*		173D-10329*	
599-10330*		160 (140)		171B-10330*		173B-10330*		171D-10330*		173D-10330*	

***Denotes a full-port valve without flow characterizers insert.**

Table 3. Fail-Safe Assemblies: Chrome-Plated Ball with Brass Stem (1/2-Inch and 3/4-Inch).

Valve Body Product Number*	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔP in psi (kPa)	Fail-Safe					
				2-Position		Floating		2 to 10 Vdc	
				GQD121.1P		GQD131.1P		GQD151.1P	
				N.O.	N.C.	N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code					
				171H	172H	171J	172J	171K	172K
599-10300	1/2 (15)	0.4 (0.34)	200 (1379)	171H-10300	172H-10300	171J-10300	172J-10300	171K-10300	172K-10300
599-10301		0.63 (0.54)		171H-10301	172H-10301	171J-10301	172J-10301	171K-10301	172K-10301
599-10302		1.0 (0.9)		171H-10302	172H-10302	171J-10302	172J-10302	171K-10302	172K-10302
599-10303		1.6 (1.4)		171H-10303	172H-10303	171J-10303	172J-10303	171K-10303	172K-10303
599-10304		2.5 (2.2)		171H-10304	172H-10304	171J-10304	172J-10304	171K-10304	172K-10304
599-10305		4.0 (3.4)		171H-10305	172H-10305	171J-10305	172J-10305	171K-10305	172K-10305
599-10306		6.3 (5.4)		171H-10306	172H-10306	171J-10306	172J-10306	171K-10306	172K-10306
599-10307*		10 (8.6)		171H-10307*	172H-10307*	171J-10307*	172J-10307*	171K-10307*	172K-10307*
599-10308	3/4 (20)	6.3 (5.4)		171H-10308	172H-10308	171J-10308	172J-10308	171K-10308	172K-10308
599-10309		10 (8.6)		171H-10309	172H-10309	171J-10309	172J-10309	171K-10309	172K-10309
599-10310		16 (14)		171H-10310	172H-10310	171J-10310	172J-10310	171K-10310	172K-10310
599-10311*		25 (22)		171H-10311*	172H-10311*	171J-10311*	172J-10311*	171K-10311*	172K-10311*

*Denotes a full-port valve without flow characterizer insert.

Table 4. Fail-Safe Assemblies: Chrome-Plated Ball and Brass Stem (1-Inch to 2-Inch).

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-ff ΔP in psi (kPa)	Fail-Safe					
				2-Position		Floating		0 to 10 Vdc	
				GMA121.1P		GMA131.1P		GMA161.1P	
				N.O.	N.C.	N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code					
				171E	172E	171F	172F	171G	172G
599-10312	1 (25)	10 (9.0)	200 (1379)	171E-10312	172E-10312	171F-10312	172F-10312	171G-10312	172G-10312
599-10313		16 (14)		171E-10313	172E-10313	171F-10313	172F-10313	171G-10313	172G-10313
599-10314		25 (22)		171E-10314	172E-10314	171F-10314	172F-10314	171G-10314	172G-10314
599-10315		40 (34)		171E-10315	172E-10315	171F-10315	172F-10315	171G-10315	172G-10315
599-10316*		63 (54)		171E-10316*	172E-10316*	171F-10316*	172F-10316*	171G-10316*	172G-10316*
599-10317	1 1/4 (32)	16 (14)		171E-10317	172E-10317	171F-10317	172F-10317	171G-10317	172G-10317
599-10318		25 (22)		171E-10318	172E-10318	171F-10318	172F-10318	171G-10318	172G-10318
599-10319		40 (34)		171E-10319	172E-10319	171F-10319	172F-10319	171G-10319	172G-10319
599-10320		63 (54)		171E-10320	172E-10320	171F-10320	172F-10320	171G-10320	172G-10320
599-10321*		100 (90)		171E-10321*	172E-10321*	171F-10321*	172F-10321*	171G-10321*	172G-10321*
599-10322	1 1/2 (40)	25 (22)		171E-10322	172E-10322	171F-10322	172F-10322	171G-10322	172G-10322
599-10323		40 (34)		171E-10323	172E-10323	171F-10323	172F-10323	171G-10323	172G-10323
599-10324*		63 (54)		171E-10324*	172E-10324*	171F-10324*	172F-10324*	171G-10324*	172G-10324*
599-10325		100 (90)		171E-10325	172E-10325	171F-10325	172F-10325	171G-10325	172G-10325
599-10326*		160 (140)		171E-10326*	172E-10326*	171F-10326*	172F-10326*	171G-10326*	172G-10326*
599-10327	2 (50)	40 (34)		171E-10327	172E-10327	171F-10327	172F-10327	171G-10327	172G-10327
599-10328		63 (54)		171E-10328	172E-10328	171F-10328	172F-10328	171G-10328	172G-10328
599-10329*		100 (90)		171E-10329*	172E-10329*	171F-10329*	172F-10329*	171G-10329*	172G-10329*
599-10330*		160 (140)		171E-10330*	172E-10330*	171F-10330*	172F-10330*	171G-10330*	172G-10330*

* Denotes a full-port valve without flow characterizer insert.

Table 5. Fail-Safe Assemblies: Full-Port, Chrome-Plated Ball and Brass Stem, 120V.

Valve Body Product Number*	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔP in psi (kPa)	Fail-Safe, 120V			
				2-Position			
				GQD221.1U		GMA221.1U	
				N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code			
				171L	172L	171M	172M
599-10307*	1/2 (15)	10 (9)	200 (1379)	171L-10307*	172L-10307*	—	—
599-10311*	3/4 (20)	25 (22)		171L-10311*	172L-10311*	—	—
599-10316*	1 (25)	63 (54)		—	—	171M-10316*	172M-10316*
599-10321*	1-/14 (32)	100 (90)		—	—	171M-10321*	172M-10321*
599-10326*	1-1/2 (40)	160 (140)		—	—	171M-10326*	172M-10326*
599-10330*	2 (50)			—	—	171M-10330*	172M-10330*

* Denotes a full-port valve without flow characterizers insert.

Table 6. Fail-In-Place Assemblies: Stainless Steel Ball and Stem (1/2-Inch and 3/4-Inch).

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-Off ΔP in psi (kPa)	Fail-in-Place			
				Floating		0 to 10 Vdc	
				GDE 131.1P	GDE 131.1Q	GDE 161.1P	GDE 161.1Q
				3 foot (.9m) Wires	Conduit Adapter & 6-foot (1.8m) Wires	3 foot (.9m) Wires	Conduit Adapter & 6-foot (1.8m) Wires
				Actuator Prefix Code			
				171A	173A	171C	173C
599-10300S	1/2 (15)	0.4 (0.34)	200 (1379)	171A-10300S	173A-10300S	171C-10300S	173C-10300S
599-10301S		0.63 (0.54)		171A-10301S	173A-10301S	171C-10301S	173C-10301S
599-10302S		1.0 (0.9)		171A-10302S	173A-10302S	171C-10302S	173C-10302S
599-10303S		1.6 (1.4)		171A-10303S	173A-10303S	171C-10303S	173C-10303S
599-10304S		2.5 (2.2)		171A-10304S	173A-10304S	171C-10304S	173C-10304S
599-10305S		4.0 (3.4)		171A-10305S	173A-10305S	171C-10305S	173C-10305S
599-10306S		6.3 (5.4)		171A-10306S	173A-10306S	171C-10306S	173C-10306S
599-10307S*		10 (8.6)		171A-10307S*	173A-10307S*	171C-10307S*	173C-10307S*
599-10308S	3/4 (20)	6.3 (5.4)		171A-10308S	173A-10308S	171C-10308S	173C-10308S
599-10309S		10 (8.6)		171A-10309S	173A-10309S	171C-10309S	173C-10309S
599-10310S		16 (14)		171A-10310S	173A-10310S	171C-10310S	173C-10310S
599-10311S*		25 (22)		171A-10311S*	173A-10311S*	171C-10311S*	173C-10311S*

*Denotes a full-port valve without flow characterizer insert.

Table 7. Fail-In-Place Assemblies: Stainless Steel Ball and Stem (1-Inch to 2-Inch).

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-Off ΔP in psi (kPa)	Fail-in-Place							
				Floating				0 to 10 Vdc			
				GDE 131.1P	GLB 131.1P	GDE 131.1Q	GLB 131.1Q	GDE 161.1P	GLB 161.1P	GDE 161.1Q	GLB 161.1Q
				3 foot (.9m) Wires		Conduit Adapter & 6-foot (1.8m) Wires		3 foot (.9m) Wires		Conduit Adapter & 6-foot (1.8m) Wires	
				Actuator Prefix Code							
				171A	171B	173A	173B	171C	171D	173C	173D
599-10312S	1 (25)	10 (9.0)	200 (1379)	171A-10312S		173A-10312S		171C-10312S		173C-10312S	
599-10313S		16 (14)		171A-10313S		173A-10313S		171C-10313S		173C-10313S	
599-10314S		25 (22)		171A-10314S		173A-10314S		171C-10314S		173C-10314S	
599-10315S		40 (34)		171A-10315S		173A-10315S		171C-10315S		173C-10315S	
599-10316S*		63 (54)		171A-10316S*		173A-10316S*		171C-10316S*		173C-10316S*	
599-10317S	1-1/4 (32)	16 (14)		171A-10317S		173A-10317S		171C-10317S		173C-10317S	
599-10318S		25 (22)		171A-10318S		173A-10318S		171C-10318S		173C-10318S	
599-10319S		40 (34)		171A-10319S		173A-10319S		171C-10319S		173C-10319S	
599-10320S		63 (54)		171A-10320S		173A-10320S		171C-10320S		173C-10320S	
599-10321S*		100 (90)		171A-10321S*		173A-10321S*		171C-10321S*		173C-10321S*	
599-10322S	1-1/2 (40)	25 (22)			171B-10322S		173B-10322S		171D-10322S		173D-10322S
599-10323S		40 (34)			171B-10323S		173B-10323S		171D-10323S		173D-10323S
599-10324S*		63 (54)			171B-10324S*		173B-10324S*		171D-10324S*		173D-10324S*
599-10325S		100 (90)			171B-10325S		173B-10325S		171D-10325S		173D-10325S
599-10326S*		160 (140)			171B-10326S*		173B-10326S*		171D-10326S*		173D-10326S*
599-10327S	2 (50)	40 (34)			171B-10327S		173B-10327S		171D-10327S		173D-10327S
599-10328S		63 (54)			171B-10328S		173B-10328S		171D-10328S		173D-10328S
599-10329S*		100 (90)			171B-10329S*		173B-10329S*		171D-10329S*		173D-10329S*
599-10330S*		160 (140)			171B-10330S*		173B-10330S*		171D-10330S*		173D-10330S*

*Denotes a full-port valve without flow characterizer insert.

Table 8. Fail-Safe Assemblies: Stainless Steel Ball and Stem (1/2-Inch and 3/4-Inch).

Valve Body Product Number*	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔP in psi (kPa)	Fail-Safe					
				2-Position		Floating		2 to 10 Vdc	
				GQD121.1P		GQD131.1P		GQD151.1P	
				N.O.	N.C.	N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code					
				171H	172H	171J	172J	171K	172K
599-10300S	1/2 (15)	0.4 (0.34)	200 (1379)	171H-10300S	172H-10300S	171J-10300S	172J-10300S	171K-10300S	172K-10300S
599-10301S		0.63 (0.54)		171H-10301S	172H-10301S	171J-10301S	172J-10301S	171K-10301S	172K-10301S
599-10302S		1.0 (0.9)		171H-10302S	172H-10302S	171J-10302S	172J-10302S	171K-10302S	172K-10302S
599-10303S		1.6 (1.4)		171H-10303S	172H-10303S	171J-10303S	172J-10303S	171K-10303S	172K-10303S
599-10304S		2.5 (2.2)		171H-10304S	172H-10304S	171J-10304S	172J-10304S	171K-10304S	172K-10304S
599-10305S		4.0 (3.4)		171H-10305S	172H-10305S	171J-10305S	172J-10305S	171K-10305S	172K-10305S
599-10306S		6.3 (5.4)		171H-10306S	172H-10306S	171J-10306S	172J-10306S	171K-10306S	172K-10306S
599-10307S*		10 (8.6)		171H-10307S*	172H-10307S*	171J-10307S*	172J-10307S*	171K-10307S*	172K-10307S*
599-10308S	3/4 (20)	6.3 (5.4)		171H-10308S	172H-10308S	171J-10308S	172J-10308S	171K-10308S	172K-10308S
599-10309S		10 (8.6)		171H-10309S	172H-10309S	171J-10309S	172J-10309S	171K-10309S	172K-10309S
599-10310S		16 (14)		171H-10310S	172H-10310S	171J-10310S	172J-10310S	171K-10310S	172K-10310S
599-10311S*		25 (22)		171H-10311S*	172H-10311S*	171J-10311S*	172J-10311S*	171K-10311S*	172K-10311S*

*Denotes a full-port valve without flow characterizer insert.

Table 9. Fail-Safe Assemblies: Stainless Steel Ball and Stem (1-Inch to 2-Inch).

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔPin psi (kPa)	Fail-Safe					
				2-Position		Floating		0 to 10 Vdc	
				GMA121.1P		GMA131.1P		GMA161.1P	
				N.O.	N.C.	N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code					
				171E	172E	171F	172F	171G	172G
599-10312S	1 (25)	10 (9.0)	200 (1379)	171E-10312S	172E-10312S	171F-10312S	172F-10312S	171G-10312S	172G-10312S
599-10313S		16 (14)		171E-10313S	172E-10313S	171F-10313S	172F-10313S	171G-10313S	172G-10313S
599-10314S		25 (22)		171E-10314S	172E-10314S	171F-10314S	172F-10314S	171G--0314S	172G-10314S
599-10315S		40 (34)		171E-10315S	172E-10315S	171F-10315S	172F-10315S	171G-10315S	172G-10315S
599-10316S*		63 (54)		171E-10316S*	172E-10316S*	171F-10316S*	172F-10316S*	171G-10316S*	172G-10316S*
599-10317S	1-1/4 (32)	16 (14)		171E-10317S	172E-10317S	171F-10317S	172F-10317S	171G-10317S	172G-10317S
599-10318S		25 (22)		171E-10318S	172E-10318S	171F-10318S	172F-10318S	171G-10318S	172G-10318S
599-10319S		40 (34)		171E-10319S	172E-10319S	171F-10319S	172F-10319S	171G-10319S	172G-10319S
599-10320S		63 (54)		171E-10320S	172E-10320S	171F-10320S	172F-10320S	171G-10320S	172G-10320S
599-10321S*		100 (90)		171E-10321S*	172E-10321S*	171F-10321S*	172F-10321S*	171G-10321S*	172G-10321S*
599-10322S	1-1/2 (40)	25 (22)		171E-10322S	172E-10322S	171F-10322S	172F-10322S	171G-10322S	172G-10322S
599-10323S		40 (34)		171E-10323S	172E-10323S	171F-10323S	172F-10323S	171G-10323S	172G-10323S
599-10324S*		63 (54)		171E-10324S*	172E-10324S*	171F-10324S*	172F-10324S*	171G-10324S*	172G-10324S*
599-10325S		100 (90)		171E-10325S	172E-10325S	171F-10325S	172F-10325S	171G-10325S	172G-10325S
599-10326S*		160 (140)		171E-10326S*	172E-10326S*	171F-10326S*	172F-10326S*	171G-10326S*	172G-10326S*
599-10327S	2 (50)	40 (34)		171E-10327S	172E-10327S	171F-10327S	172F-10327S	171G-10327S	172G-10327S
599-10328S		63 (54)		171E-10328S	172E-10328S	171F-10328S	172F-10328S	171G-10328S	172G-10328S
599-10329S*		100 (90)		171E-10329S*	172E-10329S*	171F-10329S*	172F-10329S*	171G-10329S*	172G-10329S*
599-10330S*		160 (140)		171E-10330S*	172E-10330S*	171F-10330S*	172F-10330S*	171G-10330S*	172G-10330S*

* Denotes a full-port valve without flow characterizer insert.

Table 10. Fail-Safe Assemblies: Full-Port, Stainless Steel Ball and Stem, 120V.

Valve Body Product Number*	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔP in psi (kPa)	Fail-Safe, 120V			
				2-Position			
				GQD221.1U		GMA221.1U	
				N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code			
				171L	172L	171M	172M
599-10307S*	1/2 (15)	10 (9)	200 (1379)	171L-10307S*	172L-10307S*	—	—
599-10311S*	3/4 (20)	25 (22)		171L-10311S*	172L-10311S*	—	—
599-10316S*	1 (25)	63 (54)		—	—	171M-10316S*	172M-10316S*
599-10321S*	1-/14 (32)	100 (90)		—	—	171M-10321S*	172M-10321S*
599-10326S*	1-1/2 (40)	160 (140)		—	—	171M-10326S*	172M-10326S*
599-10330S*	2 (50)			—	—	171M-10330S*	172M-10330S*

* Denotes a full-port valve without flow characterizer insert.

Table 11. Fail-Safe Assemblies: Full-Port, Stainless Steel Ball and Stem, 24V with Dual Auxiliary Switches.

Valve Body Product Number*	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔP in psi (kPa)	Fail-Safe, 24V			
				2-Position			
				GQD126.1P		GMA126.1P	
				N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code			
				171N	172N	171P	172P
599-10307S*	1/2 (15)	10 (9)	200 (1379)	171N-10307S*	172N-10307S*	—	—
599-10311S*	3/4 (20)	25 (22)		171N-10311S*	172N-10311S*	—	—
599-10316S*	1 (25)	63 (54)		—	—	171P-10316S*	172P-10316S*
599-10321S*	1-/14 (32)	100 (90)		—	—	171P-10321S*	172P-10321S*
599-10326S*	1-1/2 (40)	160 (140)		—	—	171P-10326S*	172P-10326S*
599-10330S*	2 (50)			—	—	171P-10330S*	172P-10330S*

* Denotes a full-port valve without flow characterizer insert.

Typical Specifications

Ball valves shall have female NPT type fittings and shall be 1/2-inch to 2-inch (15 mm to 50 mm) line and ball sizes. The valves shall have a forged brass body; chrome-plated brass ball with brass stem or stainless steel ball and stem; and EPDM O-ring seals. Valves shall contain glass-filled PTFE ball valve seals or integral seals and flow characterizers to provide an equal percentage control characteristic where required. Ball valves shall utilize a 90-degree rotation for control. They shall provide automated flow control of hot or chilled water and up to 50% water-glycol solution for HVAC control applications.

Technical Data

Pressure Rating	600 WOG/ANSI 250	**Ball Seals**	Glass-filled PTFE with EPDM O-rings
Media Temperature	35°F to 250°F (2°C to 120°C)	**End Connections**	Female NPT
Controlled Medium	Water, 50% water-glycol solution	**Stem**	Brass or stainless steel
Body	Brass: ASTM B283, C37700	**Stem Seals**	EPDM O-rings
Ball	Chrome-plated brass or Stainless steel	**Angle of Rotation**	0° to 90°
Flow Characterizer	Glass-filled PTFE		

Table 12. Full-Port (No Flow Characterizer) Ball Valve Product Numbers and Flow Coefficients.

Valve Product Number	Valve Line Size in Inches (mm)	Effective (Installed) Cv (Kvs)										
		Supply Line Size in Inches (mm)										
		1/2 (13)	3/4 (20)	1 (25)	1-1/4 (32)	1-1/2 (38)	2 (51)	2-1/2 (63)	3 (76)	4 (102)	5 (127)	6 (152)
599-10307 or 599-10307S	1/2 (15)	**10.00 (8.62)**	**6.94 (5.93)**	**6.19 (5.29)**	—	—	—	—	—	—	—	—
599-10311 or 599-10311S	3/4 (20)	—	**25.00 (21.55)**	**18.66 (15.95)**	**15.35 (13.12)**	—	—	—	—	—	—	—
599-10316 or 599-10316S	1 (25)	—	—	**63.00 (54.31)**	**39.78 (34.00)**	**33.56 (28.69)**	—	—	—	—	—	—
599-10321 or 599-10321S	1-1/4 (32)	—	—	—	**100.00 (86.21)**	**69.19 (59.13)**	**51.45 (43.98)**	—	—	—	—	—
599-10324 or 599-10324S	1-1/2 (40)	—	—	—	—	**63.00 (54.31)**	**55.34 (47.30)**	**51.00 (43.59)**	—	—	—	—
599-10326 or 599-10326S		—	—	—	—	**160.00 (137.93)**	**93.80 (80.17)**	**76.34 (65.25)**	—	—	—	—
599-10329 or 599-10329S	2 (50)	—	—	—	—	—	**100.00 (86.21)**	**94.30 (80.60)**	**86.12 (73.61)**	—	—	—

= Valve may be oversized. = Optimal valve size. = Valve may be undersized

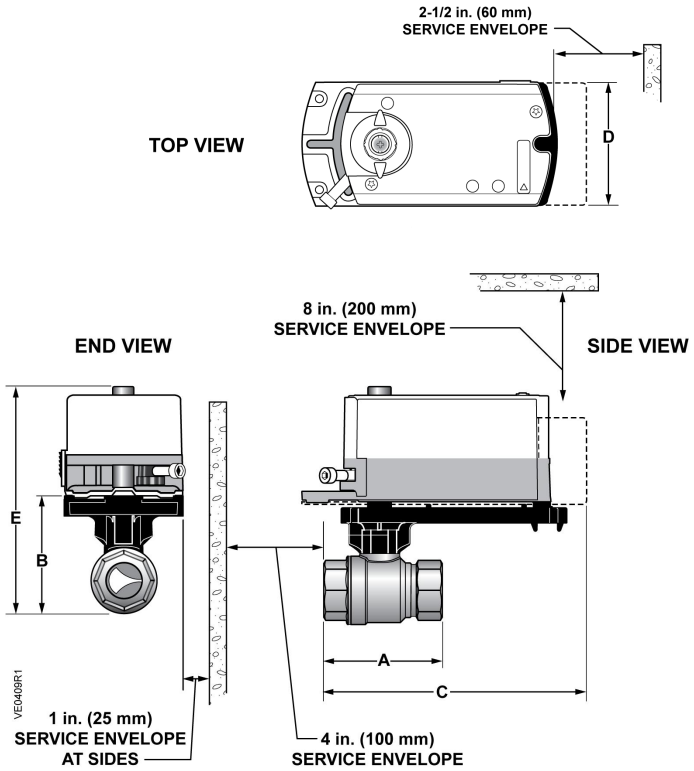

Figure 1. Two-Way Ball Valve and Low Profile Bracket with Actuator Dimensions in Inches (Millimeters).

Line Size Inches (mm)	Cv Range	A Length	B Height	C Length Actuator Codes			D Width	E Height	Valve and Bracket Weight lbs (kg)
				GDE		GQD			
				171A-D	173A-D	171H, J, K, L, N			
1/2 (15)	0.4 to 10	2-7/16 (61)	2-1/4 (57)	5-1/4 (133)	5-3/4 (146)	5-1/4 (133)	2-3/4 (70)	4-13/16 (123)	1 (0.45)
3/4 (20)	6.3 to 25	2-3/4 (70)	2-5/8 67)	5-3/8 (136)	6 (153)	5-3/8 (136)		5-1/4 (133)	1.3 (0.60)

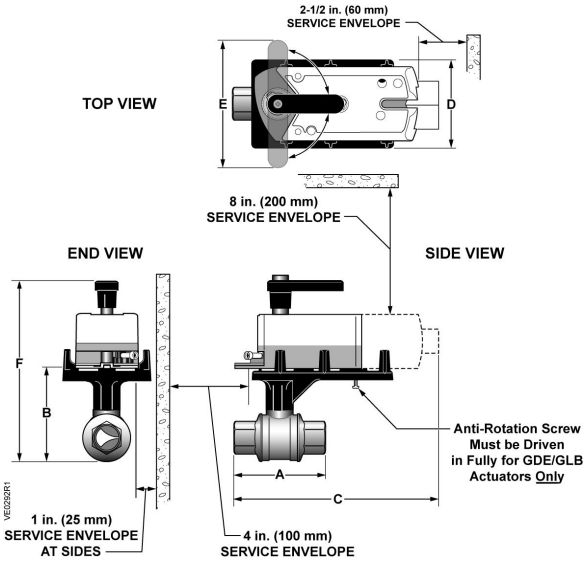

Figure 2. 2-Way Ball Valves.

- All dimensions are in inches (mm).
- Dimension “D”, Depth, is 3.7 inches (94.5) “E”, Handle, is 5.3 inches (135.9).
- Dimension weights are in pounds (kg).

Table 13. Two-Way Ball Valve and Bracket with Actuator Dimensions in Inches (Millimeters).

Line Size Inch (mm)	Cv Range	A Length	C Length * Actuator Codes 171A-D, 173A-D GDE/GLB	C Length * Actuator Codes 171H,J,K GQD	C Length* Actuator Codes 171E,F 172E,F Fail Safe GMA	F Height	Valve and Bracket Weight lbs (kg)
1 (25)	10	3 (77)	6-11/16 (170)	—	8 (203)	8 (203)	1.6 (0.73)
	16, 40, 63	3-1/4 (82)		—	8-3/8 (213)	8-5/16 (212)	1.8 (0.82)
	25	3-7/8 (98)	7 (178)	—	8-11/16 (221)	8-13/16 (223)	
1-1/4 (32)	16	3-3/8(86)	6-11/16 (170)	—	8-7/16 (214)	8-3/8 (213)	2.0 (0.91)
	25 to 100	3-11/16 (94)	6-15/16 (176)	—	8-11/16 (221)	8-13/16 (223)	2.5 (1.1)
1-1/2 (40)	25, 63	3-5/8 (92)		—	8-7/16 (214)	8-13/16 (223)	1.8 (0.82)
	40, 100, 160	3-15/16 (100)	7-1/16 (180)	—	8-3/4 (223)	9-1/4 (235)	3.3 (1.50)
2 (50)	40, 100	4 (102)		—		9-3/8 (238)	3.1 (1.41)
	63	4-5/8 (118)	7-1/2 (190)	—	9-1/8 (223)	10-1/16 (255)	5.25 (2.38)
	160			—			5.3 (2.40)

*Dimension C is the maximum length, measured from actuator, end fitting, or mounting plate, whichever extends the furthest.

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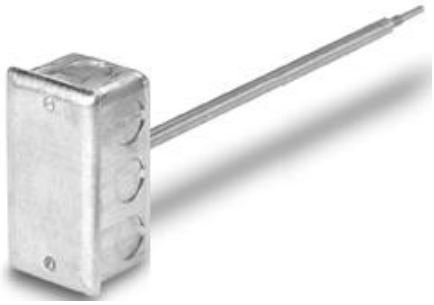
SIEMENS

Technical Specification Sheet
Document No. 149-915
February 19, 2018

Duct Temperature Sensors



Rigid Probe

Rigid Probe – Bracket Mount

Flexible Probe

Description

Siemens Duct Temperature Sensors monitor and transmit changes in duct air temperature to the HVAC control system. They provide an accurate, reliable indication of duct air temperature. The sensor resistance varies proportionally to the actual temperature being measured.

Sensors are offered with a variety of probe lengths to fit almost any size duct. Longer probes are typically flexible for easier handling and installation (see *Product Ordering Information* on the following page for details).

Multiple output signals are available to ensure compatibility with most common HVAC control systems.

Features

- Variety of sensing elements.
- Suitable for multiple duct applications.
- Responsive to temperature change.
- Accurate and reliable indication of duct temperature.
- Familiar installation process does not require special tools.

Specifications

Output Signals	100K Ω Thermistor 10K Ω Type 2 Thermistor 10K Ω Type 3 Thermistor 1K Ω @ 32°F Ni RTD 1K Ω @ 70°F Ni RTD 1K Ω Pt RTD (375a) 1K Ω Pt RTD (385a) 4 to 20mA · -4°F to 122°F · 20°F to 120°F · 30°F to 250°F 10K Ω Matched Pair Thermistor · (For use with Siemens TEC only)
Probe Material	0.028 Wall SAE J526 ZTEW or Galfan steel tubing
Housing*	Standard NEC approved 2 × 4 inch (5 × 10 cm) utility box with 1/2-inch (13 mm) knockouts
Screw Head Type	Standard slotted

* Bracket-mounted units do not include housing.

Disposal

The devices are considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the devices through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Product Ordering Information

Output Signal	Type	Probe Length	Measuring Range	Accuracy	PN
100K Ω Thermistor	Point	18 inches (rigid)	-40°F to 180°F (-40°C to 82°C)	±0.50°F (±0.28°C) @ 77°F (25°C)	535-741-18
		4 inches (rigid)			535-741-4
		8 inches (rigid)			535-741-8
		4 inches (rigid), Bracket			536-811
	Averaging	18 inches (rigid)		±0.36°F (±0.2°C) @ 77°F (25°C)	540-244-18
		36 inches (flexible)			540-245-36
		72 inches (flexible)			540-246-72
10K Ω Type II Thermistor	Point	4 inches (rigid)		±0.4°F (±0.2°C) @ 77°F (25°C)	QAM2030.010
		8 inches (rigid)			QAM2030.020
		18 inches (rigid)			QAM2030.045
	Averaging	8 feet (flexible)			QAM2030.250
		16 feet (flexible)			QAM2030.500
		24 feet (flexible)			QAM2030.750
10K Ω Type III Thermistor	Point	4 inches (rigid)			QAM2032.010
		8 inches (rigid)			QAM2032.020
		18 inches (rigid)			QAM2032.045
	Averaging	8 feet (flexible)			QAM2032.250
		16 feet (flexible)			QAM2032.500
		24 feet (flexible)			QAM2032.750
1K Ω @ 32F Ni RTD	Point	4 inches (rigid)		±0.72°F (±0.4°C) @ 32°F (0°C)	QAM2020.010
		8 inches (rigid)			QAM2020.020
		18 inches (rigid)			QAM2020.045
	Averaging	16 feet (flexible)		±0.75°F (±0.4°C) @ 75°F (24°C)	QAM2020.500
		24 feet (flexible)			QAM2020.750
1K Ω @ 70°F Ni RTD	Point	8 inches (rigid)		±0.72°F (±0.4°C) @ 32°F (0°C)	QAM2021.020
		18 inches (rigid)			QAM2021.045
	Averaging	24 feet (flexible)			QAM2021.750
1K Ω Pt RTD (375a)	Point	18 inches (rigid)		±0.54°F (±0.3°C) @ 32°F (0°C)	544-339-18
		4 inches (rigid)			544-339-4
		8 inches (rigid)			544-339-8
	Averaging	16 feet (flexible)			544-342-16
		24 feet (flexible)			544-342-24
		8 feet (flexible)			544-342-8
		18 inches (rigid)			544-343-18
		24 inches (rigid)			544-343-24
		36 inches (rigid)			544-343-36
		48 inches (rigid)			544-343-48
1K Ω Pt RTD (385a)	Point	4 inches (rigid)			QAM2012.010
		8 inches (rigid)			QAM2012.020
		18 inches (rigid)			QAM2012.045
	Averaging	8 feet (flexible)		±0.75°F (±0.4°C) @ 75°F (24°C)	QAM2012.250
		16 feet (flexible)			QAM2012.500
		24 feet (flexible)			QAM2012.750
4 to 20 mA	Point	18 inches (rigid)	-4°F to 122°F (-20°C to 50°C)	±0.54°F (±0.3°C) @ 32°F (0°C)	544-560-18
		4 inches (rigid)			544-560-4
		8 inches (rigid)			544-560-8
		18 inches (rigid)	20°F to 120°F (-7°C to 49°C)		533-376-18
		4 inches (rigid)			533-376-4
		8 inches (rigid)			533-376-8
	Averaging	16 feet (flexible)			533-380-16
		24 feet (flexible)			533-380-24
		8 feet (flexible)			533-380-8
		18 inches (rigid)			535-490-18
		24 inches (rigid)			535-490-24
		36 inches (rigid)			535-490-36
		48 inches (rigid)			535-490-48
	Point	18 inches (rigid)	30°F to 250°F (-1°C to 121°C)		533-377-18
		4 inches (rigid)			533-377-4
		8 inches (rigid)			533-377-8
For Use with Siemens TEC Only	Point	4 inches (rigid)	-40°F to 180°F (-40°C to 82°C)	± 0.50°F (± 0.28°C) @ 77°F (25°C)	538-871
		4 inches (rigid), Bracket			540-128
		18 inches (rigid)			540-739

Accessories

Flange and Gasket Kit for Variable Insertion Depth of Rigid Point Sensors	AQM2000

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SIEMENS

Technical Specification Sheet
Document No. 149-1014
August 27, 2015

TEC Terminal Box (VAV) Controller

The TEC Terminal Box Controller provides high performance Direct Digital Control (DDC) of pressure-independent, variable-air-volume zone-level routines. The TEC Terminal Box Controller 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 Siemens Industry control system.

Features

- Advanced PID algorithm for the temperature control loops is employed to provide stability and to reduce unnecessary changes in the Flow setpoint when the room temperature is at or near the room temperature setpoint.
- Unique control algorithms for specific applications.
- Plenum rated controller.
- Setpoints and control parameters assigned and changed locally or remotely.
- Setpoints and control parameters stored in Electrically Erasable Programmable Read Only Memory (EEPROM)—no battery backup required.
- Returns from power failure without operator intervention.
- No calibration required, thereby reducing maintenance costs.
- Reports airflow in cfm (lps).
- Meets low duct static pressure requirements.
- Separate minimum and maximum air volume setting for heating and cooling modes.

Applications

- Slave Mode (Application 2091)
- VAV Cooling Only (Application 2020)
- VAV Cooling or Heating (Application 2021)
- VAV with Electric Reheat or Baseboard Radiation (Application 2022)
- VAV with Hot Water Reheat (Application 2023)
- VAV Series Fan Powered with Electric Reheat (Application 2024)
- VAV Series Fan Powered with Hot Water Reheat (Application 2025)
- VAV Parallel Fan Powered with Electric Reheat (Application 2026)
- VAV Parallel Fan Powered with Hot Water Reheat (Application 2027)

Control algorithms are pre-programmed. The controller is ready to operate after selecting the application. If desired, the operator may adjust the room temperature setpoints and other parameters. The controller is designed for operation and modification without vendor assistance.

Hardware

Controller Board

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 540-155) protects the controller assembly.

Autozero Modules (optional devices, P/NB 540-200N) are available for mounting with the controller for those applications where uninterrupted airflow is necessary. An optional 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
- Analog input devices (room temperature sensor, room setpoint dial, auxiliary temperature sensor)
- 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.

Terminal Box Controller Specifications

Power Requirements	
Operating Range	24 Vac +/-20%, 50 or 60 Hz
Power Consumption	3 VA (plus 12 VA per DO)

Dimensions	4-1/8" W × 7-3/4" L × 1-1/2" H
Weight	approx. 3 lbs (1.35 kg)
Controlled Temperature Accuracy, Heating or Cooling	±1.8°F (0.9°C)

Autozero Module 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 29 mm)
Weight	1.3 oz. (36.9 g)

Inputs	
Analog	1 room temperature sensor 1 velocity sensor 1 setpoint (optional) 1 auxiliary temperature sensor
Digital	1 aux temp dry contact 1 dry contact only input

Outputs	
Analog	N/A
Digital	6 DO 24 Vac optically isolated solid state switches @ 0.5 amp

Communications	
Remote	4800 bps FLN Trunk
Local	WCIS

Ambient Conditions	
Shipping & 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)

Agency Listings	
UL Listing	UL 916, PAZX
cUL Listed	Canadian Standards C22.2 No. 205-M1983, PAZX7
FCC Compliance	FCC Part 15, Class A

Optional Accessories

Autozero Module

The optional Autozero Module (product number 540-380) should be used when continuous operation at occupied flow is required for an area. The Autozero Module is connected to the air velocity inlet ports of the 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.

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)

Pneumatic Transducer

The PTS Pneumatic Transducer contains the transducers that provide 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 Number
TEC Terminal Box Controller	540-100N
TEC Terminal Box Controller with Autozero Module	540-200N
Small enclosure for electronic controller without damper actuator (short board).	540-155

Document Information

Technical Specification Sheets/Technical Instructions	Document Part Number
Room Temperature Sensors – Series 2200	149-820
Room Temperature Sensors – Series 2000	149-321
Duct Temperature Sensor	149-134P25
Analog Sensors – 100 K Ohm Thermistor	149-262
Siemens Valves	**Document Part Number**
599 Series Zone Valves 2-Way, 3-Way Zone Valve Electric	154-034
599 Series Zone Valves and Actuators – Modulating, On/Off Spring Return, 2-Position Control	154-063
Siemens Electronic Actuators	**Document Part Number**
OpenAir Electronic Damper Actuators, GDE/GLB Series Non-spring Return Rotary 24 Vac – Modulating Control 0 to 10 Vdc	155-187P25
OpenAir Electronic Damper Actuators, GDE/GLB Series Non-spring Return, 24 Vac Floating Control, Rotary	155-188P25
OpenAir GEB Series Non-spring Return, 24 Vac, 132 lb-in Rotary Electronic Damper Actuators	155-318P25

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Document No.149-1014
Printed in the USA

SIEMENS

Submittal Sheet
Document No. 154-011P25
January 25, 2011

OpenAir™ GDE Series, Non-spring Return, 24 Vac, 44 lb-in, Direct Coupled, Electronic Damper Actuator

Product Number	Operating Voltage	Control		Pre-Cabled			No Cables		Built-in Control Options				Bulk Pack	
	24 Vac +20%, -15%	0 to 10 Vdc	Floating Control	Standard	Plenum, 18 AWG, 3 ft (0.9m)	Plenum, 18 AWG, 6 ft (1.8 m)	Terminal Strip	Post Header	Feedback	Potentiometer	Dual Auxiliary Switches	Slope and Offset	24 pieces	12 pieces
GDE131.1U	●		●	●										
GDE131.1U/B	●		●	●									●	
GDE131.1N	●		●					●						
GDE131.1N/B	●		●					●					●	
GDE131.1P	●		●		●									
GDE131.1P/B	●		●		●								●	
GDE131.1Q	●		●			●								
GDE131.1Q/B	●		●			●								●
GDE131.1T	●		●				●							
GDE131.1T/B	●		●				●						●	
GDE132.1P	●		●		●					●				
GDE136.1P	●		●		●						●			
GDE161.1N	●	●						●						
GDE161.1N/B	●	●						●					●	
GDE161.1P	●	●			●				●					
GDE161.1P/B	●	●			●				●				●	
GDE161.1Q	●	●				●			●					
GDE161.1T	●	●					●							
GDE161.1T/B	●	●					●						●	
GDE163.1P	●	●			●				●			●		
GDE164.1P	●	●			●				●		●	●		
GDE166.1P	●	●			●				●		●			

Description

The OpenAir, non-spring return, direct-coupled, electronic damper actuators provide modulating and floating control of building HVAC dampers.

c UL us LISTED CE

Features

- Compact, lightweight design
- Models available with dual independently adjustable auxiliary switches
- Modulating models available with built-in feedback (Exception: GDE161.1N and GDE161.1T do not provide feedback)
- Floating control models available with feedback potentiometer
- Manual override
- Mechanical range adjustment capability
- Easily visible position indicator
- Precabled 18 AWG, 3 ft (0.9 m), or 6 ft (1.8 m) long
- Synchronous motor technology
- UL873 and cUL (C22.2 No. 24-93) listed
- CE certified plenum only
- Connection cables for GDExx.1N models sold separately.

Technical Data

Torque:	44 lb-in (5 Nm)
Runtime for 90°:	90 seconds at 60 Hz opening and closing 108 seconds at 50 Hz opening and closing
Frequency:	50/60 Hz
Power consumption:	3.3 VA (modulating), 2.3 VA (three-position)
Equipment rating (24 Vac):	Class 2 per UL/CSA
Noise level:	<35 dBA (running)
Angle of rotation:	90° nominal, 95° maximum
Shaft dimensions:	3/8 to 5/8 in. (8 to 16 mm) dia., 3/4 in. (20 mm) min. length
Operating temperature:	-22°F to 130°F (-30°C to 55°C)
Storage temperature:	-40°F to 158°F (-40°C to 70°C)
Ambient humidity:	95% RH (non-condensing)
Enclosure:	NEMA 2, IP54 per EN60529
GDExxx.1N and GDExxx.1T:	NEMA 1
Material:	Durable plastic
Agency listings:	UL873, cUL C22.2 No. 24-93
CE Conformity:	Plenum only
Electromagnetic compatibility (EMC)	2004/108/EC
Emissions Standards	EN61000-6-3
Immunity standards	EN61000-6-2
Gear Lubrication:	Silicone-free
Weight	1.06 lb (0.48 kg)
Country of Origin	USA

Typical Specifications

Non-spring return damper actuators shall be the direct-coupled type that requires no connecting linkages. The non-spring return actuators under 100 lb-in shall be capable of direct-mounting to a shaft up to a 5/8-inch diameter. Actuators shall provide stall protection throughout the full range of rotation. All non-spring return actuators shall be capable of both clockwise and counterclockwise operation. All non-spring return actuators shall hold position in the event of a power failure. All modulating actuators shall return to the 0 position in the event only the control signal is lost. All actuators shall provide a means of manually positioning the output coupling in the absence of power. Dual independently adjustable auxiliary switches must be integral to the actuator. All actuators must provide an easily readable high contrast yellow on black position indicator. All actuators shall be UL873 and CSA22.2 listed, CE certified, and manufactured under ISO 9002 and ISO 14000 procedures. Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuators rated torque and temperatures. Actuators shall be as manufactured by Siemens Industry, Inc.

Dimensions

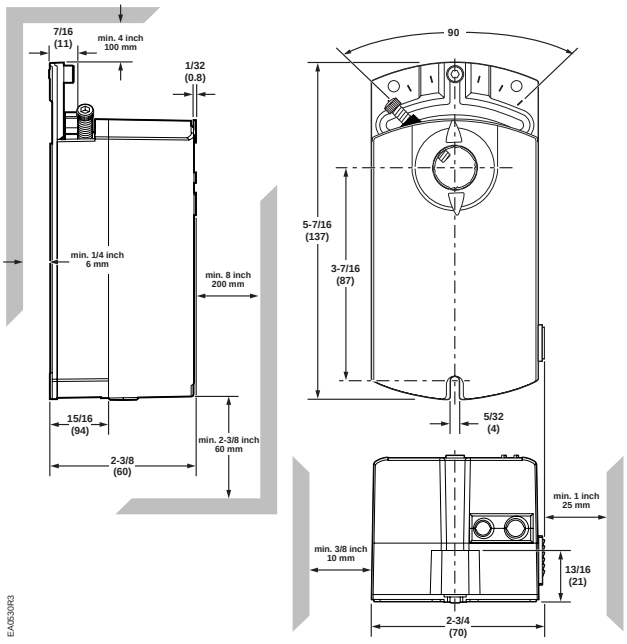
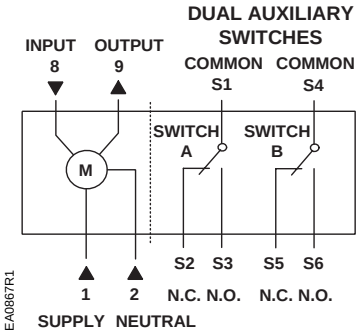


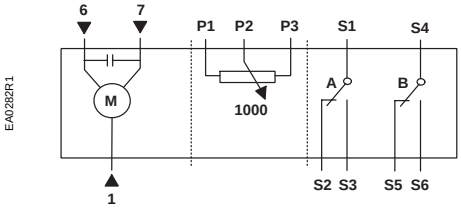
Figure 1. GDE/GLB Dimensions in Inches (mm).

Wiring Diagrams

0 to 10 Vdc Modulating, 24 Vac:



Floating, 24 Vac:



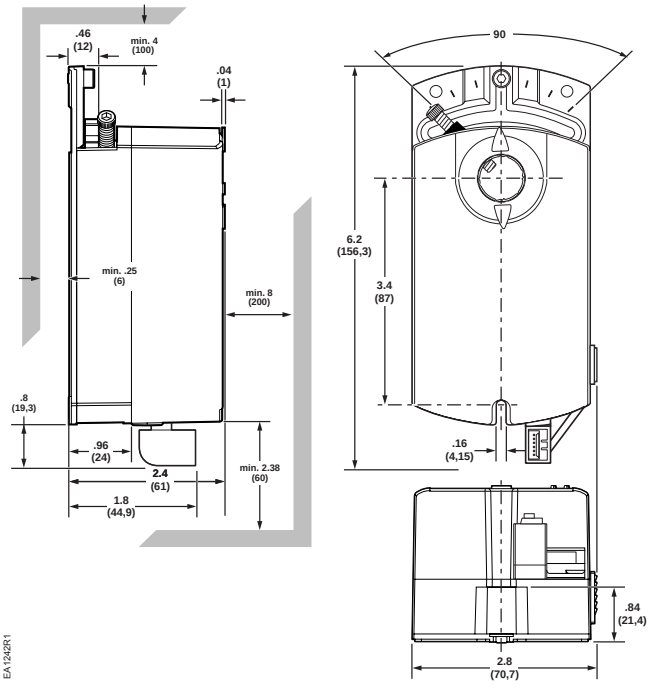


Figure 2. GDE Terminal Strip Model/Post Header AMP Model in Inches (mm).

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SIEMENS

Technical Specification Sheet
Document No. 149-715
February 19, 2018

Series 2200/3200 Communicating Room Sensors for Use with Siemens Terminal Equipment Controllers

QxAx2xx.EWSC
Sensing Only

QxAx2xx.DWSC
with Display

QxAx2xx.FWSC
Full HMI

Description

These Series 2200/3200 Room Sensors are designed for use with Siemens Terminal Equipment Controllers (TECs)*. The sensor and controller communicate using an RJ-11 cable with plug connections at both ends for easy and error-free wiring. Installation is quick and straightforward with all hardware included for mounting on a standard 2” × 4” electrical box. Screws and anchors are provided for mounting the sensor directly to a wall. Matching gaskets and trim rings are also available.

All units include an RJ-11 tool port at the bottoms of the sensor housings for connection to Siemens configuration, commissioning and start-up tools.

QAA Series Sensors measure room temperature, while QFA Series sensors measure both temperature and relative humidity. The QPA Series Sensors measure temperature and CO_2 or temperature, CO_2* and relative humidity.

QPA Series sensors are designed to help maintain occupant comfort and are not intended for use in life safety applications.

The “E” versions have a blank front to prevent unauthorized adjustments and are ideal for high traffic areas or remote spaces that are not supervised.

The “D” versions display room temperature and/or room humidity.

The “F” versions feature a full HMI that can display room conditions and temperature setpoint. The display is easily configured to limit the information that is available to the occupant. Temperature setpoint can be adjusted using soft touch plus (+) and minus (-) keys, and an override key enables the user to manually signal to the controller that the space is occupied.

Specifications

Temperature	
Measuring range	32°F to 122°F (0°C to 50°C)
Accuracy	
QAA2280.EWxC	± 0.50°F (± 0.28°C)
QAA2280.DWxC	± 0.9°F (± 0.5°C)
QAA2280.FWxC	± 0.9°F (± 0.5°C)
QPA2282.EWxC	± 0.9°F (± 0.5°C)
All others	± 0.54°F (± 0.3°C) @ 77°F (25°C)
Humidity (QFA and QPA2284)	
Measuring Range	0 to 100% rh
Accuracy	± 2% between 10 to 90%
Long-Term Stability	<0.5% rh/year
Resolution	0.03% rh
Repeatability	± 0.1% rh
CO2 (QPA Models)	
Technology	Dual Beam NDIR
Measuring Range	0 to 2000 PPM
Accuracy*	± (50 ppm + 2% of MV)
Field Calibration	Not required
CO2 Drift	± 5% of range over 5 years
Setpoint/Override (“F” versions only)	
Setpoint Range	55°F to 95°F (13°C to 35°C)
Input Power	
QAA and QFA	Powered using TEC RJ-11 port
QPA	Requires AQM2200
Agency Listing	UL cUL CE FCC RCM
Color	White
Dimensions	4.5” × 2.75” × 1.18” (115 mm × 70 mm × 30 mm)
Shipping Weight	6 oz. (170 g)

* Allow up to 96 hours for unit to reach published accuracy.

Product Ordering Information

Part Number[1)]	Temp	Humidity[2)]	CO_2 [3)]	Display	Setpoint Adjustment	Tool Port	Communication Type
QAA2280.DWSC	•	—	—	•	—	•	Digital (P1)
QAA2280.EWSC	•	—	—	—	—	•	Analog - Resistive
QAA2280.FWSC	•	—	—	•	•	•	Digital (P1)
QFA3280.DWSC	•	•	—	•	—	•	
QFA3280.EWSC	•	•	—	—	—	•	
QFA3280.FWSC	•	•	—	•	•	•	
QPA2282.EWSC[2)]	•	—	•	—	—	•	
QPA2284.EWSC[2)]	•	•	•	—	—	•	
QPA2284.FWSC[2)]	•	•	•	•	•	•	

[1)] For no-logo version, change "S" to "N" in part number position 10.
[2)] QPA models require an AQM2200 24V Power Module.
[3)] P1 TECs cannot read relative humidty and CO_2 data. Use BACnet TECs for applications requiring these measurements.

Accessories Ordering Information

Description	Part Number
Power Module[1)] (Required only with QPA2282 and QPA2284 sensors)	AQM2200
Room Unit Back Plate (10-pack)[1)]	AQA2200-INTL
Room Unit Back Plate (Single)[1)]	AQA2200-2X4
Room Sensor Insulating Gasket (10-pack) (Recommended for hollow wall installations.)	563-102 GSKT KIT
25-foot (7.6 m) cable with connections	588-100A
50-foot (15.2 m) cable with connections	588-100B
100-foot (30.5 m) cable with connections	588-100C
Passkey Tool (Used to set room unit parameters)	544-643A
Replacement RH Sensing Element – TEC Room Unit[2)]	AQF3060

[1)] For use when installing Series 2200/3200 Sensors on conduit boxes other than US style 2” × 4”. Back plate measures 3-1/4” × 5” (82.55 mm × 127 mm).

[2)] For use with all QFA models and QPA2284.xxxx only.

Disposal

The devices are considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the devices through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

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MEDICAL MEDIA RELOCATE

LITTLE ROCK, AR

ENGINEERING FIRM:
INSIGHT ENGINEERING, PLLC

MECHANICAL CONTRACTOR:
COMFORT SYSTEMS USA

POWERS
BUILDING HVAC, CONTROLS, & SERVICE

DWG	DESCRIPTION
	GENERAL
	Cover Sheet
LEG	Legend & Abbreviations
	VALVE SUBMITTAL
	Valve Submittal
	CONTROL DRAWINGS
001	VAV HW RH
002	VAV HW RH BOM

REVISION HISTORY

1	4/21/2022	DWJ	SUBMITTALS

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Cvrsheet

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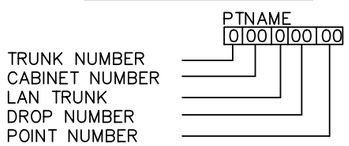
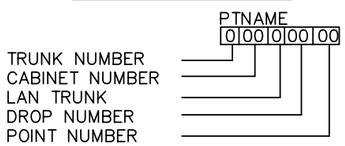
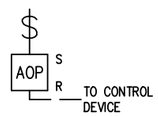
CONTROL SYMBOL	CONTROL SYMBOL DESCRIPTION
AC	AIR COMPRESSOR
AD	AIR DRYER
ADXR	ACTUATOR DXR
AE	ACTUATOR ELECTRIC
AEM	APOGEE ETHERNET MICROSERVER
AF	AIR FILTER
AFS	AIR FLOW STATION
AOP	ANALOG OUTPUT, PNEUMATIC
AP	ACTUATOR PNEUMATIC
APS	AUX. POWER SUPPLY
AT	AUTOMATIC TRAP
ATD	AUTO TANK DRAIN
ATEC	ACTUATOR TEC
AZM	AUTOZERO MODULE
BCU	BUS COUPLING UNIT
BELL	BELL
BIM	BUS INTERFACE MODULE
BOIL	BOILER
BRT	BRIGHTNESS
BRTT	BRIGHTNESS AND TEMPERATURE
BTN	BUTTON
CBL	CABLES
CKV	CHECK VALVE
CM	CONSTRUCTION MATERIALS
CP	COMPONENT PANEL
CPU	CENTRAL PROCESSING UNIT
CRT	CATHODE RAY TUBE
CS	CURRENT SWITCH
CT	CURRENT TRANSDUCER
CTTE	CO2 TEMP TRANSMITTER ELEC
CVC	CONSTANT VOLUME CONTROLLER
D	DAMPER
DDC	DUAL DUCT CONTROLLER
DEM	DEMAND ENERGY MONITOR
DP	DEW POINT TRANSMITTER
DPR	DIFFERENTIAL PRESS. REGULATOR
DPS	DIFFERENTIAL PRESSURE SWITCH
DPTE	DIFF. PRESS. TRANSMITTER ELEC.
DPTP	DIFFERENTIAL PRESSURE PNEUMATIC
DPU	DIGITAL POINT UNIT
DXR	TERMINAL EQUIPMENT CONTROLLER
EC	ENTHALPY COMPARITOR
EP	ELECTRO-PNEUMATIC VALVE
ES	END SWITCH
ET	ENTHALPY TRANSMITTER
EXP	EXPANSION PANEL
FAN	FAN
FHC	FUME HOOD CONTROLLER
FM	FLOW MTR. (FLOW METER STATION)
FMS	FIRE MGMT. SYSTEM
FS	FLOW SWITCH
FTP	FLOW TRANSMITTER PNEU.
G	GAUGE
GD	GAS DETECTOR
H	HYGROSTATS
HE	HUMIDIFIER ELECTRIC
HHC	HAND-HELD OPERATOR'S TERMINAL
HL	HIGH LIMIT
HMI	GAMMA TOUCH PANEL
HOA	HAND-OFF-AUTO SWITCH
HORN	HORN
HPC	HEAT PUMP CONTROLLER
HTD	HIGH TEMPERATURE DETECTOR
HTE	HUMIDITY TRANSMITTER ELECTRIC
HTP	HUMIDITY TRANSMITTER PNEUMATIC
INT	INTERCOM
KWM	ELECTRIC KILOWATT METER
LA	LIGHT ACTUATOR
LC	LIMIT CONTROLLER (LIMITEM)
LLS	LIQUID LEVEL SWITCH
LLT	LIQUID LEVEL TRANS.
LPR	POWER SUPPLY 24VAC/24VDC
LTDE	LOW TEMP. DETECTOR ELECTRIC
LTDP	LOW TEMP. DETECTOR PNEUMATIC
LUI	LOCAL USER INTERFACE
MBC	MODULAR BUILDING CONTROLLER
MDM	MODEM
ME	ELECTRONIC ACTUATOR
MEC	MODULAR EQUIPMENT CONTROLLER
MG	MAGNEHELIC GAUGE
MPU	MULTI-POINT UNIT
MS	MOTOR STARTER
OCC	OCCUPANCY
OCCB	OCCUPANCY AND BRIGHTNESS
OBS	OBSOLETE
ODP	OPERATOR DATA PANEL
P	PUMP
PA	PULSE ACCUMULATOR
PCT	PROGRAMMABLE CLOCK TIMER
PE	PRESSURE ELECTRIC SWITCH
PL	PILOT LIGHT
PM	POWER MONITOR
PNL	PANEL
PPM	POINT PICKUP MODULE
PRC	PRESSURE REG. CONTROLLER
PRV	PRESSURE REDUCING VALVE
PS	POSITIONING SWITCH
PSE	POSITION SENSOR ELECTRIC
PST	PULL STATION
PT	PITOT TUBE
PTE	PRESSURE TRANSMITTER ELECTRIC
PTP	PRESSURE TRANSMITTER PNEUMATIC
PTR	PRINTER
PV	PILOT VALVE
PXCC	PX COMPACT CONTROLLER
PXCM	PXC-MODULAR CONTROLLER
PXG3	BACNET ROUTER ETHERNETIP-MS/TP
RBC	REMOTE BUILDING CONTROLLER
RC	RECEIVER CONTROLLER
RCU	REMOTE CONTROL UNIT
RE	RELAY ELECTRIC
RP	RELAY PNEUMATIC
RS	RESTRICTOR
RV	RELIEF VALVE
S/W	SOFTWARE
SA	SHADE ACTUATOR
SC	STEP CONTROLLER
SCU	STAND ALONE CONTROL UNIT
SD	SMOKE DETECTOR
SE	SWITCH ELECTRIC
SIO	SLX IO MODULES
SLX	APOGEE SLX CONTROLLER
SPKR	SPEAKER
SPP	STATIC PRESSURE PROBE
SPR	STATIC PRESSURE REGULATOR
SV	SOLENOID VALVE
SW	SWITCH PNEUMATIC
T	ROOM THERMOSTAT, PNEUMATIC
TBC	TERMINAL BOX CONTROLLER
TC	TEMPERATURE CONTROLLER(S200)
TCU	TERMINAL CONTROL UNIT
TDR	TIME DELAY RELAY
TE	THERMOSTAT, ELECTRIC
TEC	TERMINAL EQUIPMENT CONTROLLER
TH	THERMOMETER
TI	TRUNK INTERFACE
TIE	TRUNK ISOLATOR EXTENDER
TIU	TELCOM INTERFACE UNIT
TMR	TIMER, TIME CLOCK
TTE	TEMPERATURE TRANSMITTER ELECTRIC
TTP	TEMPERATURE TRANSMITTER PNEUMATIC
TXIO	TX-I/O FAMILY CONTROLLER MODULES
UC	UNITARY CONTROLLER
UCC	UNIT CONDITIONER CONTROLLER
UVC	UNIT VENT CONTROLLER
V	VALVE
V*	VALVE SERVICE PARTS
VA	TEC VALVE ACTUATOR
VAC	VARIABLE AIR VOLUME CONTROLLER
VB	VIBRATION ISOLATOR
VTE	VELOCITY TRANSMITTER ELECTRICAL
W	WELL
WST	WEATHER STATION
XDR	TRANSDUCER
XFMR	TRANSFORMER

DDC ELECTRICAL POINT



DDC PNEUMATIC POINT





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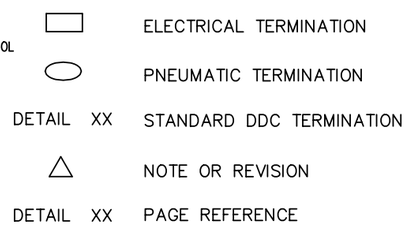
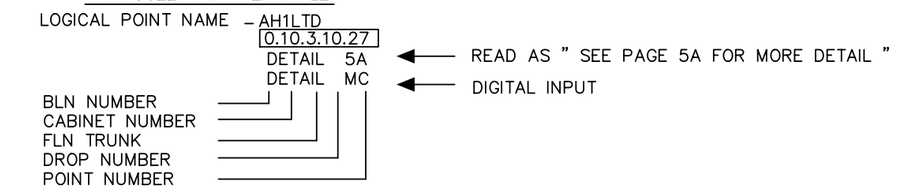


APOGEE: PII – EXAMPLE



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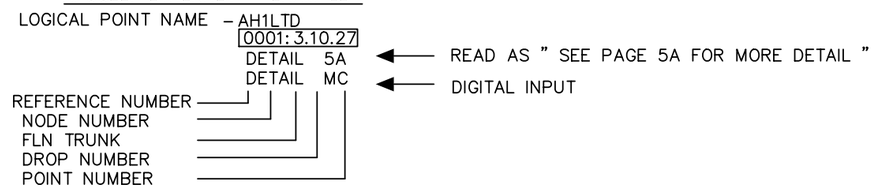

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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
DWJ	DWJ	JD		04/21/22

Legend & Abbreviations

22CNEB3069

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Powers of Arkansas

Controls Division

Valve Submittal - Water

LOCATION:	LITTLE ROCK, AR	**PROJECT NAME:**	JLM VA Medical Media Relocate	**DATE:**	04/21/22
JOB NO:	22CNEB3069			**PAGE:**	1
ENGR:	DWJ			**REV:**	

GENERAL NOTES:

1. All valves 2-1/2" and larger have flanged ends, 2" and smaller have screwed ends.
2. All control valves and wells shall be installed by the mechanical contractor.
3. Standard abbreviations used on control valves are:

BODY TYPES: 3W - Three way; 2W - Two way; A - Angle; N.C. - Normally Closed; N.O. - Normally Open; NOC - Ball Valve can be N.O. or N.C.; BF - Butterfly Valve; DS - Double Seated;

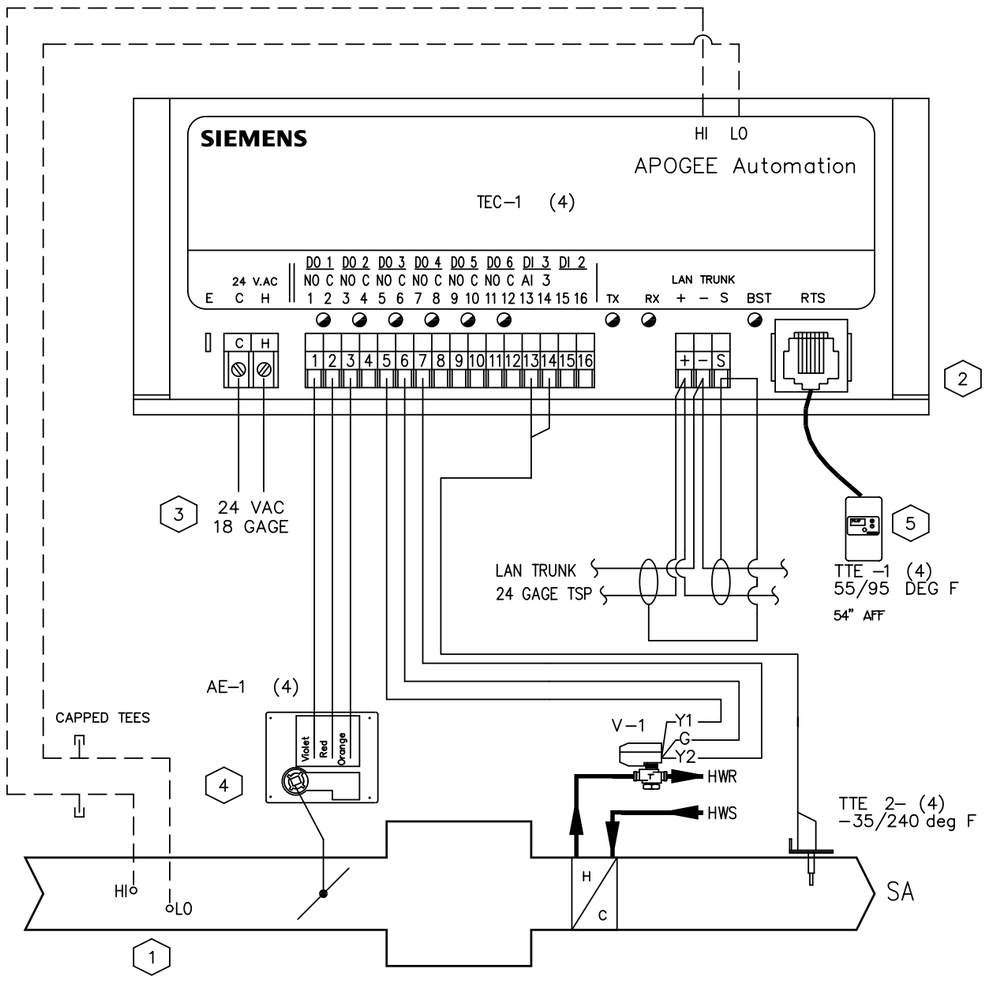
UNITS:

Steam inlet pressure, actual pressure drop, and shut off pressure indicated in PSIG.

ACTUATOR TYPES: SR - Spring Return; NSR - No Spring Return CR - Capacitor Driven Return; DA - Double Acting

Valve ID/ Location	Qty	Product Number	Valve Size	Body Type	Body Style	Actual Cv	Actuator Type	Design P. Drop (psi)	Required Flow (gpm)	Min (gpm)	Max (gpm)	Preset (gpm)	Steam Inlet	Press Drop (psi)	Valve Spec Sheet	Shut Off	ANSI Class	Comment
Mechanical System:		**VAV HW RH**													**VAV HW RH**			
V-1	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	3.00	1.28	N/A	N/A	N/A	--	1.64	154038	200	600	7E-114 RHV
V-2	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	3.00	0.78	N/A	N/A	N/A	--	3.80	154038	200	600	7E-112 RHV
V-3	1	171A-10301S	0.50	2W	Ball	0.63	NO-NSR	3.00	1.15	N/A	N/A	N/A	--	3.33	154038	200	600	7E-111 RHV
V-4	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	3.00	0.50	N/A	N/A	N/A	--	1.56	154038	200	600	7E-111B RHV

NOTES: All control valves and wells shall be installed by the heating contractor.



1 / 001 VAV WITH REHEAT COIL (#2023)
TYPICAL OF 4

INSTALLATION NOTES:

1. VAV BOX INSTALLED BY MECHANICAL CONTRACTOR WITH 3 TO 5 STRAIGHT DUCT DIAMETERS UPSTREAM OF BOX TO PROVIDE PROPER FLOW SENSING
2. TEC–1 TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE
3. 24 VAC POWER FROM EXISTING TRANSFORMER IN ELECTRIC ROOM 7E–108.
4. MOUNT ACTUATOR WITH DAMPER IN FULL OPEN POSITION. VERIFY TEC–1 AND ACTUATOR REQUIREMENT WITH THE BOX MANUFACTURER
5. LOCATE AS SHOWN ON FLOOR PLANS/CONTRACT DOCUMENTS

GENERAL NOTE:
EXTEND EXISTING FLN COMMUNICATION CALBLING FROM EXISITNG VAV TERMINAL SERVING STORAGE 7E–117 TO NEW SUPPLY AIR CONTROLLERS.

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VAV HW RH

22CNEB3069
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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1	4	GDE131.1P	SIEMENS	154 011	ACT NSR PLENUM 24/108L 5Nm
TEC 1	4	540-100N	SIEMENS	149 171	TERM BOX CTLR ELEC OUT
TTE 1	4	QAA2280.FWSC	SIEMENS	149715	RTS, TEC/RJ-11, FULL HMI
TTE 2	4	536-811	SIEMENS	149 134	DCT PT TMP, 100K OHM, 4", BRACKET MNT
V					SEE VALVE SUBMITTAL

AIR TERMINAL NO. 1 SEQUENCE OF OPERATION:

AIR TERMINAL MODE OF OPERATION IS EITHER "OCCUPIED" OR "UNOCCUPIED" BASED UPON WEEKLY SCHEDULE OR OPERATOR COMMAND. MODE OF OPERATION MAY BE CHANGED BY THE USER FROM "UNOCCUPIED" TO "OCCUPIED" FOR A PERIOD OF FOUR (4) HOURS BY PRESSING A PUSHBUTTON LOCATED AT THE THERMOSTAT.

DURING THE "OCCUPIED" MODE OF OPERATION THE AIR TERMINAL CONTROLLER SHALL MODULATE THE TERMINAL DAMPER BETWEEN THE MINIMUM AND MAXIMUM "OCCUPIED" AIR FLOWS SCHEDULED IN SEQUENCE WITH THE HEATING WATER CONTROL VALVE AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE AT SETPOINT. THE SPACE TEMPERATURE SETPOINT SHALL BE ADJUSTABLE BY THE USER FROM A MINIMUM OF 68 DEG. F TO A MAXIMUM OF 76 DEG. F. ON A DECREASE IN SPACE TEMPERATURE THE TERMINAL DAMPER SHALL CLOSE TO THE MINIMUM AIR FLOW AND THE HEATING WATER CONTROL VALVE SHALL MODULATE OPEN. ON AN INCREASE IN SPACE TEMPERATURE THE HEATING WATER CONTROL VALVE SHALL CLOSE AND THE TERMINAL DAMPER SHALL MODULATE OPEN.

DURING THE "UNOCCUPIED" MODE OF OPERATION THE AIR TERMINAL CONTROLLER SHALL MODULATE THE TERMINAL DAMPER BETWEEN THE MINIMUM AND MAXIMUM "UNOCCUPIED" AIR FLOWS SCHEDULED IN SEQUENCE WITH THE HEATING WATER CONTROL VALVE AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE AT SETPOINT. THE SPACE TEMPERATURE SETPOINT SHALL BE ADJUSTABLE BY THE USER FROM A MINIMUM OF 68 DEG. F TO A MAXIMUM OF 76 DEG. F. ON A DECREASE IN SPACE TEMPERATURE THE TERMINAL DAMPER SHALL CLOSE TO THE MINIMUM AIR FLOW AND THE HEATING WATER CONTROL VALVE SHALL MODULATE OPEN. ON AN INCREASE IN SPACE TEMPERATURE THE HEATING WATER CONTROL VALVE SHALL CLOSE AND THE TERMINAL DAMPER SHALL MODULATE OPEN.

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VAV HW RH BOM

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