

# **SIEMENS**

## **BACnet ATEC Controller**

### **VAV - Cooling Only, Application 6630**

#### **Application Note**

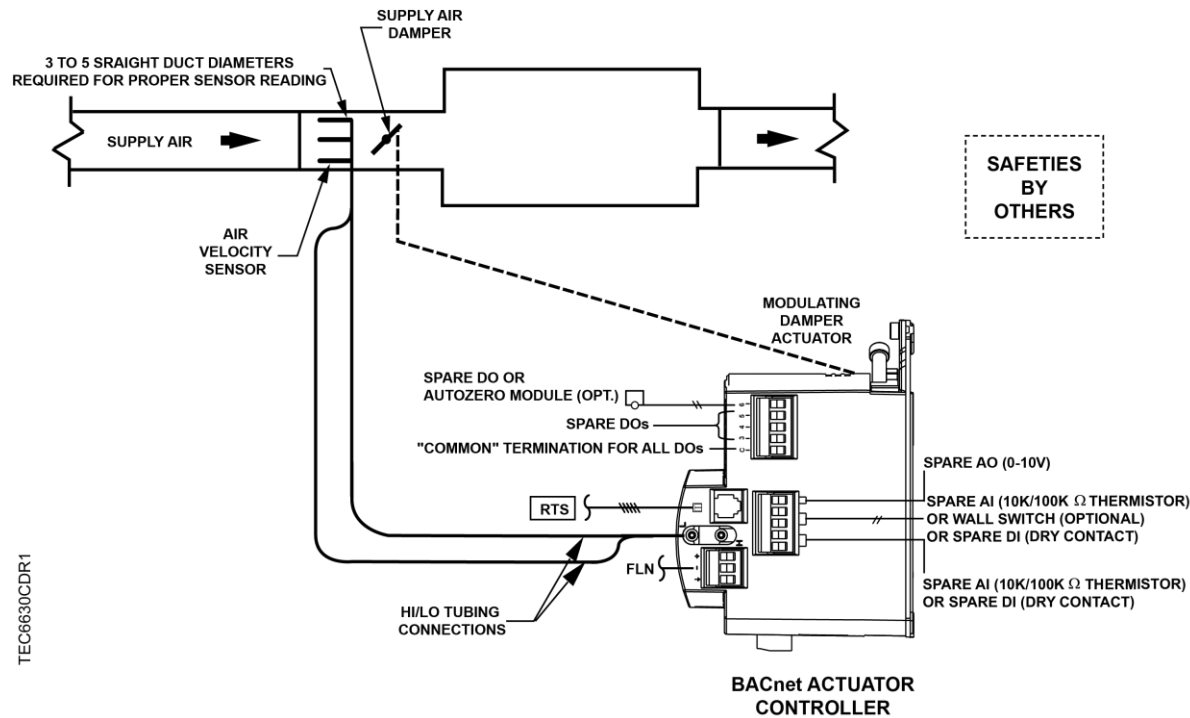


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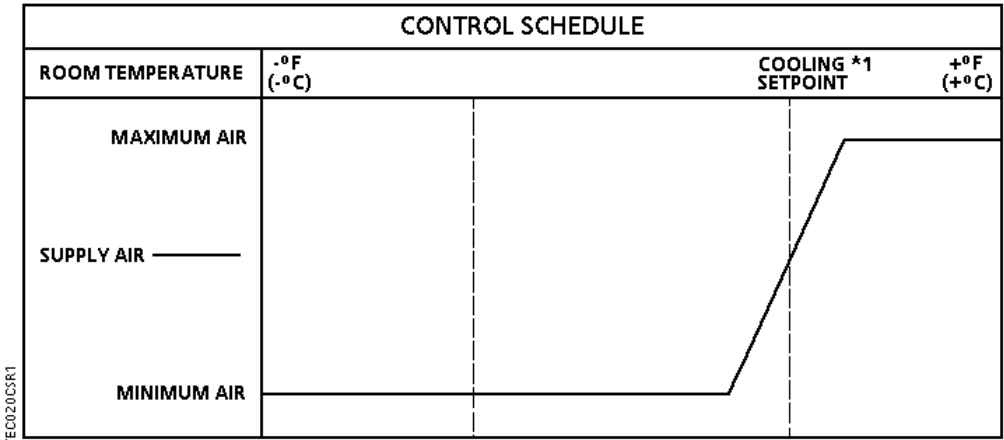
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# Overview

In Application 6630, 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 6630 Cooling Only Control Diagram.



Application 6630 Control Schedule.



**NOTE:**  
1. See *Control Temperature Setpoints*.

## BACnet

The controller communicates using BACnet MS/TP protocol for open communications on BACnet MS/TP networks.

Product	Supported BIBBs	BIBB Name
BTEC/PTEC	DS-RP-B B	Data Sharing-Read Property-B
	DS-RPM-B	Data Sharing-Read Property Multiple-B
	DS-WP-B	Data Sharing-Write Property-B
	DM-DDB-B	Device Management-Dynamic Device Binding-B
	DM-DOB-B	Device Management-Dynamic Object Binding-B
	DM-DCC-B	Device Management-Device Communication Control-B
	DM-RD-B	Device Management-Reinitialize Device-B
	DM-BR-B	Device Management-Backup and Restore-B
	DM-OCD-B	Device Management-Object Creation and Deletion-B
	CPT	Confirmed Private Transfer (Auto Discovery)
	UPT	Unconfirmed Private Transfer

## Hardware Inputs

### Analog

- Air velocity sensor
- Room temperature sensor
- *(Optional)* Room temperature setpoint dial
- Spare sensor (two temperature) (100K or 10K  $\Omega$  selectable thermistor) or Digital Input

### Digital

- *(Optional)* Night mode override
- *(Optional)* Wall switch



#### NOTE:

Digital Room Units (Firmware Revision 26 and later) will update their controlled inputs without putting them Out Of Service. However, a command from an external source through the digital room unit will put the associated BACnet Input point Out Of Service.

## Room Unit Identification

- For Analog Room Units (Series 1000) – The revision number is visually identified by its case.
- For Digital Room Units (Series 200/2300 Firmware Revision 25 or earlier) – The revision number displays for 5 seconds when the room unit is first powered up. These room units will display `laptop` when a laptop is connected and will no longer update room temperature sensor values.
- For Digital Room Units (Series 2200/2300 Firmware Revision 26 and later) – The revision number displays for 5 seconds when the room unit is first powered up or when a laptop is disconnected. These room units will continue to display and update the room temperature sensor values when a laptop is connected.

## Hardware Outputs

### Analog

- Spare Analog Output (0-10V)

### Digital

- Damper actuator (internal)
- *(Optional)* Autozero Module
- Spare DO (external, up to four)

## Ordering Notes

550-430PA	BACnet Actuating Terminal Equipment Controller (ATEC) 44 lb-in. (5 Nm)
550-431PA	BACnet Actuating Terminal Equipment Controller (ATEC) 88 lb-in (10 Nm)

# Sequence of Operation

## Control Temperature Setpoints

This application has a number of different room temperature setpoints (NGT CLG STPT, RM STPT DIAL, and so on.). The application actually controls to CTL STPT. CTL STPT is set to different values depending on its override status, the time of day, and the type of RTS used.

### CTL STPT is Overridden

If CTL STPT is overridden, that value is used regardless of any other settings.

### CTL STPT in Night Mode

The controller is in Night mode if DAY.NGT = NGT and NGT OVRD = NGT.

When the controller is in Night mode, CTL STPT holds the value of NGT CLG STPT. When the controller is in Night mode the value of RM STPT DIAL is ignored.

### CTL STPT in Day Mode

The controller is in Day mode if DAY.NGT = DAY or NGT OVRD = DAY.

#### Without setpoint dial:

When the controller is in Day mode and STPT DIAL = NO, CTL STPT holds the value of DAY CLG STPT.

#### With setpoint dial:

When the controller is in Day mode and STPT DIAL = YES, CTL STPT holds a value based on RM STPT DIAL, depending on your room unit model/revision.

The following sections describe the value of CTL STPT based on room unit type and configuration:

- CTL STPT using Standard/Absolute Mode (Digital Room Unit, Revision 26 and later)
- CTL STPT using Warmer/Cooler Mode (Digital Room Unit, Revision 26 and later)
- CTL STPT using Standard/Absolute Mode (Analog or Digital Room Unit)
- CTL STPT using Warmer/Cooler Mode (Analog Room Unit Only)

## CTL STPT Using Standard/Absolute Mode (Digital Room Unit, Revision 26 and later)

### Digital Room Unit (2200/2300 Series Firmware Revision 26 and later)

For all new digital room units, the value displayed and reported by the room unit is linked to the current cooling mode.

When STPT SPAN is set to 0, the room setpoint adjustment on the digital room unit functions in a standard mode. The range of the adjustment is based on RM STPT MIN and RM STPT MAX.

CTL STPT is set equal to RM STPT DIAL. The values for RM STPT MIN and RM STPT MAX are applied to limit RM STPT DIAL before it is copied into CTL STPT.

## CTL STPT Using Warmer/Cooler Mode (Digital Room Unit, Revision 26 and later)

### Digital Room Unit (2200/2300 Series Firmware Revision 26 and later)



**NOTE:**

The warmer-cooler function is only available with BACnet PTEC controllers (standard 66xx apps).

When STPT SPAN is set to a value  $> 0$ , the room setpoint adjustment on the digital room unit functions in a warmer/cooler mode. The range of the adjustment is calculated based on the current DAY CLG STPT and the STPT SPAN value. This allows the Room Setpoint Dial to be incremented up or down from this setpoint by STPT SPAN.

CTL STPT is set equal to RM STPT DIAL. The values for RM STPT MIN and RM STPT MAX is applied to limit RM STPT DIAL before it is copied into CTL STPT.

When STPT SPAN  $> 0$ , the minimum and maximum values for RM STPT DIAL are calculated as follows:

- Minimum lowest adjusted setpoint value is equal to  $\text{DAY CLG STPT} - \text{STPT SPAN}$
- Maximum highest adjusted setpoint value is equal to  $\text{DAY CLG STPT} + \text{STPT SPAN}$

## CTL STPT Using Standard/Absolute Mode (Analog or Digital Room Unit)

### Analog (Series 1000) or Digital Room Units (Firmware Revision 25 or earlier)

When STPT SPAN is set to 0, CLT STPT is set based on the value of the setpoint dial and the setpoint.



**NOTE:**

2200/2300 digital room units with Firmware Revision 25 or earlier are only compatible with standard room unit functionality (no warmer/cooler).



## CTL STPT Using Warmer/Cooler Mode (Analog Room Unit Only)

### Analog Room Unit (Series 1000)


**NOTE:**

The warmer-cooler function for analog room units (Series 1000) use the warmer/cooler scale of units with a warmer/cooler housing.

When SPTP SPAN > 0, the minimum and maximum values for RM STPT DIAL are calculated as follows:

- Minimum lowest adjusted setpoint value is equal to DAY CLG STPT - STPT SPAN
- Maximum highest adjusted setpoint value is equal to DAY CLG STPT + STPT SPAN

The full range of the analog room unit slider are mapped to a range of minimum setpoint value to maximum setpoint value.

CTL STPT is set equal to RM STPT DIAL. The values for RM STPT MIN and RM STPT MAX are applied to limit RM STPT DIAL before it is copied into CTL STPT.

**Example in Cooling Mode**

If the STPT SPAN is set to 2.0 degrees, and the DAY CLG STPT is 76°F, the room unit slider will adjust the cooling setpoint from 74°F to 78°F.

## Room Temperature, Room Temperature Offset and CTL TEMP

ROOM TEMP is the temperature that is being sensed by the room temperature sensor (RTS).

RMTMP OFFSET (or TEMP OFFSET) is a user-adjustable offset that compensates for deviations between the value of ROOM TEMP and the actual room temperature.

CTL TEMP is the room temperature that is used for control purposes. In other words, the application is trying to maintain CTL TEMP at the control setpoint.

When CTL TEMP is not overridden, CTL TEMP and ROOM TEMP are related by the following equation:

$$\text{CTL TEMP} = \text{ROOM TEMP} + \text{RMTMP OFFSET (or TEMP OFFSET)}$$

If CTL TEMP is not overridden then,

- The current value of ROOM TEMP (normal or overridden) determines the value of CTL TEMP.
- If ROOM TEMP has a status of Failed, then the last known good value of ROOM TEMP determines the value of CTL TEMP.

## Day and Night Modes

The day/night status of the space is determined by the status of DAY.NGT. The control of this point differs depending on whether the controller is monitoring the status of a wall switch or if the controller is connected to a field panel.

When WALL SWITCH = NO, the controller does not monitor the status of the wall switch, even if one is connected to it. In this case, if the controller is operating stand-alone, then the controller stays in day mode all the time. If the controller is operating with centralized control (that is, it is connected to a field panel), then the field panel can send an operator or PPCL command to override the status of DAY.NGT.

When a wall switch is physically connected to the termination strip on the controller at AI/DI 4 (see the *Control Diagram* in the Overview section), and WALL SWITCH = YES, the controller monitors the status of AI/DI 4. When the status of AI/DI 4 is ON (the switch is closed), then DAY.NGT is set to DAY indicating that the controller is in Day mode. When the status of AI/DI 4 is OFF (the switch is open), then DAY.NGT is set to NIGHT indicating that the controller is in Night mode.

## Night Mode Override Switch

If an override switch is present on the room temperature sensor and a value (in hours) other than zero has been entered into OVRD TIME, pressing the override switch resets the controller to DAY operational mode for the time period that is set in OVRD TIME.

The status of NGT OVRD changes to DAY. After the override time elapses, the controller returns to night mode and the status of NGT OVRD changes back to NIGHT.

The override switch on the room sensor only affects the controller when it is in Night mode.

## Ventilation Demand Minimum

This VAV application has the ability to adjust the minimum flow setpoint for varying ventilation needs during occupied times. This may be done internally on controllers with PPCL, or externally using IAQ or DCV programs in a field panel. Since the requirement may also exist to keep the cooling flow minimum setpoint as originally specified, a new setpoint, ventilation demand minimum (VENT DMD MIN), is provided (and can be changed or written to as necessary).

The additional flow setpoint (VENT DMD MIN) is provided to allow setting and adjustment of the ventilation air required during occupied modes. VENT DMD MIN flow setpoint is used in conjunction with the existing cooling flow minimum setpoint but only during the occupied modes. See *Night Flow Minimum* for operation in unoccupied times.

VENT DMD MIN can be set above, equal to, or below CLG FLOW MIN setpoints and the controlling minimum would be the larger of the two. This allows the cooling flow minimum to be set to zero and use the vent demand to control cooling ventilation requirements.

## Night Flow Minimum

Some applications do not provide a distinction between day/occupied and night/unoccupied modes for the minimum airflow setpoints. For day/occupied operation, the cooling minimum flow setpoint is designed to be the airflow for minimum cooling and ventilation. For night/unoccupied times, the associated air handling unit was typically not running and therefore no distinction was necessary.

Using the additional flow setpoint, NGT FLOW MIN, in place of cooling flow minimum, addresses this condition. Since the flow at night/unoccupied times does not require the ventilation needs for personnel, it can be set below other minimums or at zero. The configured maximum cooling flow setpoint is still used when the zone temperature exceeds the night cooling setpoint.

## Control Loops

The terminal box is controlled by two Proportional, Integral, and Derivative (PID) control loops; a temperature loop and a flow loop.

The temperature loop is a cooling loop. The active temperature loop maintains room temperature at the value in CTL STPT. See *Control Temperature Setpoints*.

**Temperature Loop** – A cooling loop that maintains room temperature at the value in CTL STPT. See *Control Temperature Setpoints*.

The temperature loop generates cooling loopout which is then used to generate FLOW STPT. FLOW STPT is the result of scaling the cooling loopout to the appropriate range of values determined by CLG FLOW MIN and CLG FLOW MAX. In order to scale it, the loopout is multiplied by the range (MAX – MIN) and then added to the minimum setpoint.

When CTL FLOW MIN  $\neq$  0 CFM, FLOWSTPT  $\neq$  CLG LOOPOUT, the minimum flow setpoint is  $(\text{CTL FLOW MIN} / \text{CLG FLOW MAX}) \times 100\%$  flow. And, FLOW STPT is  $[\text{CLG LOOPOUT} \times (100\% - \text{minimum setpoint})] + \text{minimum setpoint}$ .

## Example

If CTL FLOW MIN = 200 cfm, and CLG FLOW MAX = 1000 cfm, the minimum flow setpoint is  $(200 \text{ cfm} / 1000 \text{ cfm}) \times 100\% \text{ flow} = 20\%$ .

When CLG LOOPOUT is 0%, FLOW STPT = 20% flow.

$[0\% \times (100\% - 20\%)] + 20\% = 20\%$

This ensures that the airflow out of the terminal box is no less than CTL FLOW MIN.

When CLG LOOPOUT is 50%, FLOW STPT = 60% flow.

$[50\% \times (100\% - 20\%)] + 20\% = 60\%$

When CLG LOOPOUT is 100%, FLOW STPT = 100% flow.

$[100\% \times (100\% - 20\%)] + 20\% = 100\%$

**Flow Loop** – The flow loop maintains FLOW STPT by modulating the supply air damper, DMPR COMD. The flow loop maintains the airflow between CTL FLOW MIN and CTL FLOW MAX.

## DAY/OCCUPIED MODE

When the controller is in day cooling mode:

- CTL FLOW MIN = larger of CLG FLOW MIN and VENT DMD MIN, and CTL FLOW MAX = CLG FLOW MAX.

## NIGHT/UNOCCUPIED MODE

When the controller is in night cooling mode:

- CTL FLOW MIN = NGT FLOW MIN, and CTL FLOW MAX = CLG FLOW MAX.

To enhance stable flow control, an advanced algorithm is used to calculate a controllable setpoint as the value approaches zero cfm (lps).

## Calibration

Calibration of the controller's internal air velocity sensor(s) is periodically required to maintain accurate air velocity readings. CAL SETUP is set with the desired calibration option during controller startup.

Depending on the value of CAL SETUP, calibration may be set to take place automatically or manually. If CAL AIR = YES, calibration is in progress.

- For a controller used without an Autozero Module (CAL MODULE = NO), the damper is commanded closed to get a zero airflow reading during calibration.
- For a controller used with an Autozero Module (CAL MODULE = YES), calibration occurs without closing the damper.

At the end of a calibration sequence, CAL AIR automatically returns to NO. A status of NO indicates that the controller is not in a calibration sequence.

## Floating Control Actuation Auto-correct

In addition to the existing options for floating control actuator full stroke actions, all floating control actuators are provided with additional logic to fully drive open or closed when commanded to 100% or 0%.

## Room Unit Operation

### Sensor Select

SENSOR SEL is a configurable, enumerated point (values are additive). This point tells the controller what type of room unit is being used and how to handle loss of communication, for more information see Fail Mode Operation. It also provides the ability to enable the optional RH and CO2 sensors and indicates which thermistor type is connected.

### Room Temperature, Setpoint, RH and CO2

- When the digital room unit (Series 2200/2300) is used, SENSOR SEL selects the source for temperature and setpoint and enables a loss of communications indication:
  - 1 = enables supervision (from the room unit) for fail communications for temperature and setpoint.
  - 2 = enables supervision (from the room unit) for fail communications for relative humidity.
  - 4 = enables supervision (from the room unit) for fail communications for CO2.
- When the analog room unit (Series 1000/2000) is used, SENSOR SEL values for temperature/setpoint, relative humidity and CO2 should be left at their default values (0).

## Thermistor Inputs

- Default for either input is 10K.
- To enable 100K  $\Omega$  thermistor on input, see the following table for additive values.

SENSOR SEL Value * (additive)	Description (include values to enable feature)
1	Select Digital Room Unit (for temperature sensing and setpoint dial)
2	Relative Humidity (RH) sensing
4	CO <sub>2</sub> sensing
8	100K $\Omega$ thermistor on AI 3 (or input is 10K $\Omega$ )
16	100K $\Omega$ thermistor on AI 4 (or input is 10K $\Omega$ )

**Example 1:** Digital Room Unit with temperature, RH, CO<sub>2</sub> and 10K thermistor.  
 $1+2+4+0 = 7$

**Example 2:** Analog Room unit with 100K thermistor.  $0+0+0+8 = 8$

## Room CO<sub>2</sub>

RM CO<sub>2</sub> displays the CO<sub>2</sub> value in units of parts-per-million (PPM). RM CO<sub>2</sub> (from the digital 2200/2300 room units) can be used with PPCL in the PTEC/ATEC controller or unbundled for control or monitoring purposes.

## Room RH

RM RH displays the relative humidity value in percent. RM RH can be used for PPCL in the PTEC or unbundled for control or monitoring purposes.

RM RH displays the relative humidity value in percent.

## Room DEW POINT

The controller provides a calculation for DEW POINT temperature in Fahrenheit degrees (or Celsius degrees) using room temperature (using CLT TEMP) and room humidity (using RM RH). This calculation is valid for ranges of 55°F (12.8°C) to 95°F (35°C) and 20 to 100% relative humidity.

## Auto Discovery

Auto Discovery allows you to automatically discover and identify PTEC/ATEC controllers on the BACnet MS/TP Network. There are two basic configurations:

- Devices not configured with an address. (Devices are discovered by their unique serial number.)
- Devices configured with an address and available for modification.

## Auto Addressing

Auto Addressing allows you to automatically assign device addresses to a PTEC/ATEC controller on the BACnet MS/TP Network. If a controller is not configured with a MAC address, you have the option to auto-address or manually address the controller. During this time the baud rate is automatically detected by the controller. Controller(s) must be connected on the BACnet/IP network in order for automatic addressing to occur.

## PPCL STATUS

PPCL STATUS displays LOADED or EMPTY.

- LOADED = PPCL - programming is present in the controller. A new application number must be assigned (12000 through 12999).
- EMPTY = NO PPCL - programming is present.

The maximum number of PPCL dynamic points is 15.

## Fail Mode Operation

If the air velocity sensor fails, the controller uses pressure dependent control. The temperature loop controls the operation of the damper.

If the room temperature sensor fails, the controller operates using the last known temperature value.

## Performing the Automated Fault Detection and Diagnostics

VAV ATEC controllers have a built-in checkout procedure that performs a basic fault detection and diagnostic routine. It can be manually initiated at any time after the controller has been installed. This procedure tests all of the necessary I/O and ensures the controller can operate within the set airflow range, between CLG FLOW MIN and CLG FLOW MAX.

To perform the checkout procedure, set CHK OUT to **YES**. When the procedure has completed, CHK OUT returns to NO and the results display in CHK STATUS, Table *Possible Failure Value and Description*.

Possible Failure Value and Description	
CHK STATUS Values	Description
-1	Checkout procedure has not been run since last controller initialization.
0	No errors found.
1	RTS failed.
2	Room Setpoint dial failed (If STPT DIAL = YES).
4	AVS failed.
8	Controller could not reach CLG FLOW MIN or below.
16	Controller could not reach CLG FLOW MAX or above.
32	Controller did not read low (zero) flow when damper closed.



**NOTE:**

Multiple failures are added together and displayed as one value. For example, if the RTS failed (1) and the controller could not reach CLG FLOW MAX (16), CHK STATUS displays 17.

Failure codes indicate the following possible problems.

**Room temperature sensor failed—CHK STATUS = 1**

1. The cable for the room temperature sensor may be unplugged or loose. Check both ends to ensure that the cable is securely seated.
2. Connect directly to the controller through the room temperature sensor connection on the VAV Actuator and check whether communication is possible. If so, the problem lies in the room temperature sensor or its cable. If not, the problem is with the controller.
3. Contact your local Siemens Industry representative.

**Room setpoint dial failed—CHK STATUS = 2**

1. The cable for the room temperature sensor may be unplugged or loose. Check both ends to ensure that the cable is securely seated.
2. The controller may be incorrectly set to use a setpoint dial with a sensor that does not have the dial. If the sensor has no dial, change STPT DIAL from **YES** to **NO**.
3. Connect directly to the controller through the room temperature sensor connection on the VAV Actuator and check whether communication is possible. If so, the problem lies in the room temperature sensor or its cable. If not, the problem is with the controller.
4. Contact your local Siemens Industry representative.

**Air velocity sensor failed—CHK STATUS = 4**

1. The sensor tubing may be blocked, leaking, or disconnected. Check for pinched, disconnected, or cracked sensor tubing. Correct as needed.
2. The tubing connections for the air velocity sensor may be reversed. Re-pipe if HI and LO connections are incorrect.
3. The sensor or the VAV Actuator may be faulty.

**Controller could not reach CLG FLOW MIN or below—CHK STATUS = 8**

1. The actuator may be loose on the shaft. Check that the set screw is fully tightened against the damper shaft. Follow these torque guidelines:
  - 70 ± 5 inch pounds—solid metal
  - 37 ± 2 inch pounds—plastic, graphite, composite, or hollow metal (Hollow metal shafts require an insert to prevent shaft damage.)
2. The tubing for the air velocity sensor may be pinched, disconnected, or cracked. Check the tubing and correct as needed.
3. The tubing connections for the air velocity sensor may be reversed. Re-pipe if HI and LO connections are incorrect.
4. Box sizing information may be incorrect. Check the values of the following points and correct as needed:
  - DUCT AREA
  - FLOW COEFF
  - CLG FLOW MIN
  - CLG FLOW MAX
5. Motor setup information may be incorrect. Check the values of the following points and correct as needed:
  - MTR SETUP
  - MTR1 TIMING
  - DMPR ROT ANG
6. The box may not have been balanced correctly. Contact your local Siemens Industry representative.
7. The air velocity sensor may need calibration. Set CAL AIR to **YES** to run the calibration sequence. When CAL AIR returns to NO, indicating that the sequence is finished, run the checkout procedure again to see whether the problem has been corrected.

**Controller could not reach CLG FLOW MAX or above—CHK STATUS = 16**

1. Check for the problems described immediately above for CLG FLOW MIN.
2. The box may be starved for air, because either the central air-handling unit is off or there is low duct static.



## Controller did not read low (zero) flow when damper closed—CHK STATUS = 32

1. Check for the problems described above for CLG FLOW MIN.
2. The damper shaft may not be secured correctly to the actuator so that when the actuator is fully closed, the damper does not completely shut off airflow.
3. Airflow calibration (at zero) may need to be performed ensuring the damper is fully closed and/or the air handling unit is off.

## Application Notes

- If temperature swings in the room are excessive or there is trouble maintaining the setpoint, the cooling loop must be tuned. If FLOW is oscillating while FLOW STPT is constant, the flow loop requires tuning.
- The controller, as shipped from the factory, keeps all associated equipment OFF.
- Spare DOs can be used as auxiliary points that are controlled by the field panel after being defined in the field panel's database. DO 3 and DO 4 or DO 5 and DO 6 may be used as auxiliary motor points. If using a pair of spare DOs to control a motor, you must unbundle the corresponding motor command point.

For more information, contact your local Siemens Industry representative.

## Wiring Diagram

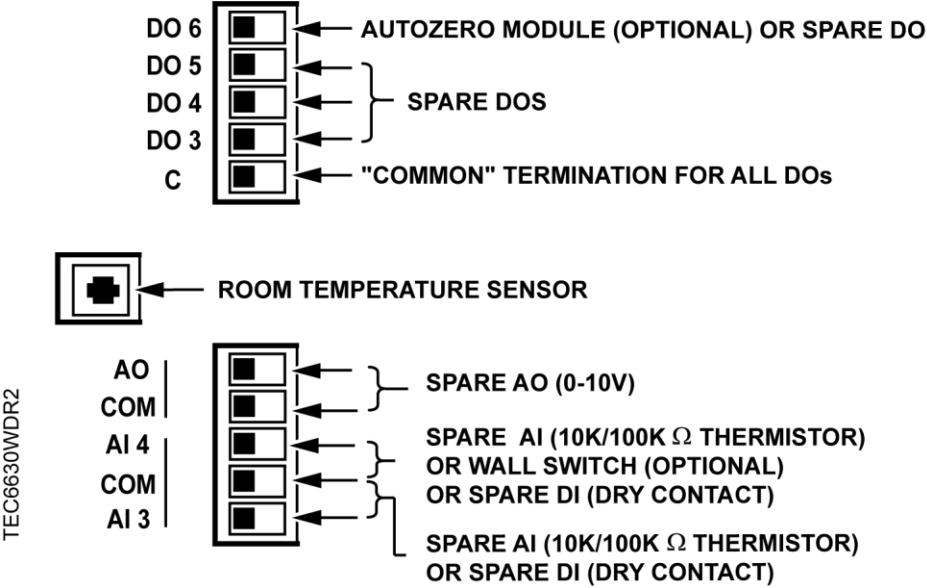
{Commented by Geszvain Mimi, 10/15/2014 3:31:06 PM: Writer: When running a UL production, delete the duplicate NOTE (the 12 VA rating) in the Word output. }



### NOTE:

The controller's DOs control 24 Vac loads only. The maximum rating is 12 VA for each DO. An external interposing relay is required for any of the following:

- VA requirements higher than the maximum
- 110 or 220 Vac requirements
- DC power requirements
- Separate transformers used to power the load  
(for example, part number 540-147, Terminal Equipment Controller Relay Module)



Application 6630 VAV Cooling Only Wiring Diagram.

## Application 6630 Point Database

Object Type <sup>1)</sup>	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units) <sup>2)</sup>	Eng Units (SI Units)	Range	Active Text	Inactive Text
AO	1	CTLR ADDRESS	255	--	0-255	--	--
AO	2	APPLICATION	6684	--	0-32767	--	--
AO	3	RMTMP OFFSET	0.0 (0.0)	DEG F (DEG C)	-31.75-32	--	--
AI	{04}	ROOM TEMP	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
AO	6	DAY CLG STPT	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
AO	8	NGT CLG STPT	82.0 (27.92888)	DEG F (DEG C)	48-111.75	--	--
AO	{10}	DEW POINT	-40.0 (-40.0)	DEG F (DEG C)	-40-1598.35	--	--
AO	11	RM STPT MIN	55.0 (12.80888)	DEG F (DEG C)	48-111.75	--	--
AO	12	RM STPT MAX	90.0 (32.40888)	DEG F (DEG C)	48-111.75	--	--
AI	{13}	RM STPT DIAL	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
BO	14	STPT DIAL	NO	--	Binary	YES	NO
AI	{15}	AUX TEMP AI3	74.0 (23.495556)	DEG F (DEG C)	37.5-165	--	--
BO	18	WALL SWITCH	NO	--	Binary	YES	NO
BI	{19}	DI OVRD SW	OFF	--	Binary	ON	OFF
AO	20	OVRD TIME	0	HRS	0-255	--	--
BO	{21}	NGT OVRD	NIGHT	--	Binary	NIGHT	DAY
BI	{24}	DI 4	OFF	--	Binary	ON	OFF
BI	{25}	DI 3	OFF	--	Binary	ON	OFF
BO	{29}	DAY.NGT	DAY	--	Binary	NIGHT	DAY
AO	31	CLG FLOW MIN	220 (103.818)	CFM (LPS)	0-131068	--	--
AO	32	CLG FLOW MAX	2200 (1038.18)	CFM (LPS)	0-131068	--	--
AI	{35}	AIR VOLUME	0 (0.0)	CFM (LPS)	0-131068	--	--
AO	36	FLOW COEFF	1	--	0-2.55	--	--
AO	{37}	MTR3 COMD	0	PCT	0-102	--	--
AO	{38}	MTR3 POS	0	PCT	0-102	--	--
AO	39	MTR3 TIMING	130	SEC	0-511	--	--

Object Type <sup>1)</sup>	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units) <sup>2)</sup>	Eng Units (SI Units)	Range	Active Text	Inactive Text
AO	40	NGT FLOW MIN	0 (0.0)	CFM (LPS)	0-131068	--	--
BO	{41}	DO 1	OFF	--	Binary	ON	OFF
BO	{42}	DO 2	OFF	--	Binary	ON	OFF
BO	{43}	DO 3	OFF	--	Binary	ON	OFF
BO	{44}	DO 4	OFF	--	Binary	ON	OFF
BO	{45}	DO 5	OFF	--	Binary	ON	OFF
BO	{46}	DO 6	OFF	--	Binary	ON	OFF
AO	{47}	VENT DMD MIN	0 (0.0)	CFM (LPS)	0-131068	--	--
AO	{48}	DMPR COMD	0	PCT	0-102	--	--
AO	{49}	DMPR POS	0	PCT	0-102	--	--
AI	{50}	AI 4	74.0 (23.495556)	DEG F (DEG C)	37.5-165	--	--
AO	51	MTR1 TIMING	95	SEC	0-511	--	--
AO	{52}	MTR2 COMD	0	PCT	0-102	--	--
AO	{53}	MTR2 POS	0	PCT	0-102	--	--
AO	54	STPT SPAN	0.0 (0.0)	DEG F (DEG C)	0-63.75	--	--
AO	55	MTR2 TIMING	130	SEC	0-511	--	--
AO	56	DMPR ROT ANG	90	--	0-255	--	--
AO	58	MTR SETUP	0	--	0-255	--	--
AO	59	DO DIR. REV	0	--	0-255	--	--
AO	63	CLG P GAIN	20.0 (36.0)	--	0-63.75	--	--
AO	64	CLG I GAIN	0.01 (0.018)	--	0-1.023	--	--
AO	65	CLG D GAIN	0 (0.0)	--	0-510	--	--
BO	{66}	CHK OUT	NO	--	Binary	YES	NO
AO	{70}	CHK STATUS	-1	--	-1-32766	--	--
AO	71	FLOW P GAIN	0	--	0-51.15	--	--
AO	72	FLOW I GAIN	0.01	--	0-1.023	--	--
AO	73	FLOW D GAIN	0	--	0-510	--	--
AO	74	FLOW BIAS	50	PCT	0-102	--	--
AO	{75}	FLOW	0	PCT	0-1023.75	--	--
AO	{76}	CTL FLOW MIN	220 (103.818)	CFM (LPS)	0-131068	--	--
AO	{77}	CTL FLOW MAX	2200 (1038.18)	CFM (LPS)	0-131068	--	--
AO	{78}	CTL TEMP	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
AO	{79}	CLG LOOPOUT	0	PCT	0-102	--	--

Object Type <sup>1)</sup>	Object Instance (Point Number)	Object Name (Descriptor)	Factory Default (SI Units) <sup>2)</sup>	Eng Units (SI Units)	Range	Active Text	Inactive Text
AO	{84}	AOV 1	0	VOLTS	0-10.23	--	--
BO	87	CAL MODULE	NO	--	Binary	YES	NO
AO	{92}	CTL STPT	74.0 (23.44888)	DEG F (DEG C)	48-111.75	--	--
AO	{93}	FLOW STPT	0	PCT	0-255.75	--	--
BO	{94}	CAL AIR	NO	--	Binary	YES	NO
AO	95	CAL SETUP	4	--	0-255	--	--
AO	96	CAL TIMER	12	HRS	0-255	--	--
AO	97	DUCT AREA	1.0 (0.09292)	SQ. FT (SQ M)	0-6.375	--	--
AO	98	LOOP TIME	5	SEC	0-255	--	--
AO	{99}	ERROR STATUS	0	--	0-255	--	--
AO	124	SENSOR SEL	0	--	0-255	--	--
AI	{125}	RM CO2	1000	PPM	0-8191	--	--
AI	{126}	RM RH	50	PCT	0-102	--	--
BO	{127}	PPCL STATE	EMPTY	--	Binary	LOADED	EMPTY

<sup>1)</sup> Object Types are; Analog Input (AI), Analog Output (AO), Binary Input (BI) and Binary Output (BO).

<sup>2)</sup> A single value in a column means that the value is the same in English units and in SI units.

<sup>3)</sup> Point numbers that appear in brackets { } may be unbundled at the field panel.

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