

BACnet Heat Pump Controller - Multi-Stage

Start-up Procedures

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Before You Begin



WinCIS version 2.1.4 or later must be used to configure Siemens Building Technologies BACnet TECs.

If WinCIS does not communicate (through the HMI port / RTS sensor), try a different baud rate. The default baud rate is 1200.

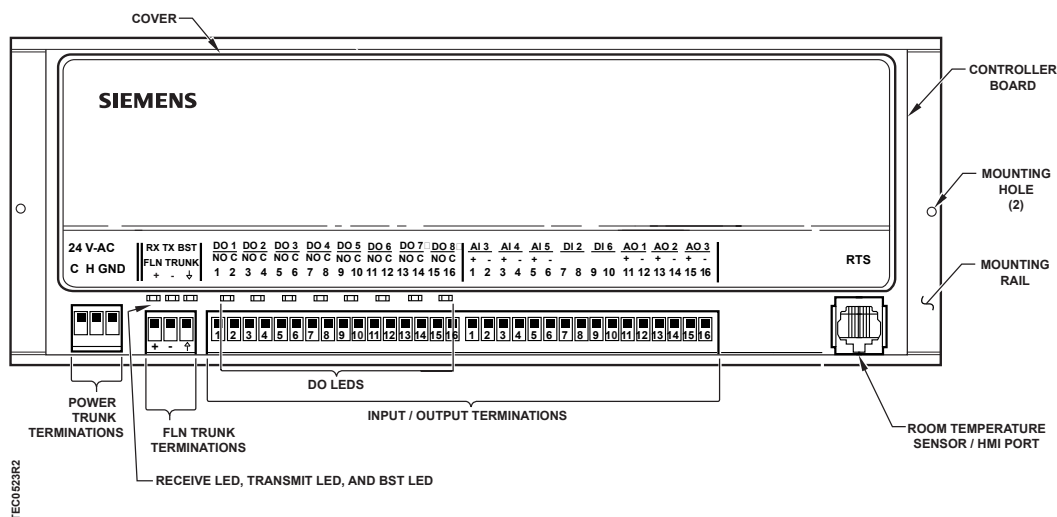


Figure 1. BACnet Heat Pump Controller - Multi-Stage.

Enabling Actuators

For Floating-type Damper



CAUTION:

The controller's DOs control only 24 Vac loads. The maximum rating is 12 VA for each DO.

MTR TIMING

1. Use Table 1 to set run time(s) for the actuator(s) used by your application.
2. For damper rotation angles other than 90°, set DMPR ROT ANG to the appropriate value. (PTS4 rotation angle is 90°.)

Table 1. Damper Actuator Run Time.

Damper Actuator	Setting (seconds)	
	50 Hz	60 Hz
GDE131.1	125	90
GLB131.1	150	125
PTS4 electronic-to-pneumatic transducer from ACT	—	90

3. Enable the damper actuator by setting MTR SETUP according to Table 2.



When MTR SETUP is changed, all enabled actuators will calibrate. Wait until each actuator has completed its calibration before continuing.

Table 2. Motor Enable/Reverse Values for MTR SETUP (Point 58) (For Floating-Type Dampers Only).

Motor 1 Not Used	Motor 1 Enabled	Motor 1 Enabled and Reversed
0	1	3

For Spring-Return Damper (0 to 10V)

- Set DAMPER TYPE to **SPRING**.
- Do one of the following:
 - If the damper should open as the voltage increases (normally closed), leave AO DIR.REV at its default value of 0.
 - If the spring-return damper should close as the voltage increases (normally open), set AO DIR.REV to 1.

Setting DO DIR.REV

Application 2893:

If the normal (de-energized) state of the reversing valve is cooling, leave DO DIR.REV at its default value of 0.

If the normal (de-energized) state of the reversing valve is heating, set DO DIR.REV to 4.



When REV VALVE is changed from normally cooling to normally heating by setting DO DIR.REV to 4, its value will change to reflect the appropriate state of the reversing valve, HEAT/COOL.



CAUTION:

If any changes are made to DO DIR.REV, cycle power/reset the controller.

Setting Controller Address and Application

Set CTLR ADDRESS to the BACnet MS/TP MAC address. (0–127 = Master; 128–254 = Slave)

Set APPLICATION to the desired number in Table 3.

Table 3. BACnet Heat Pump Controller - Multi-Stage— Applications.

Application Description	Application Number
Multiple Compressor Heat Pump with Reversing Valve and Mixed Air Control	2893
Multiple Heating and Cooling Heat Pump with Mixed Air Control and Internal Reversing Valve	2894
BACnet Heat Pump Slave Mode	2849

After you set the application, the controller goes through a shut-down/load sequence as it switches from slave mode to the application selected. On some controllers a calibration cycle follows the shut-down/load sequence.

Setting Number of Compressors

Application 2893:

If using one compressor, leave CMP TOTL at its default value of 1. Otherwise, set CMP TOTL to the number of compressors used. Valid entries are 0, 1, 2, or 3.

Application 2894:

If using one heating compressor, leave HTG CMP TOTL at its default value of 1. Otherwise, set HTG CMP TOTL to the number of compressors used for heating. Valid entries are 0, 1, or 2.

Setting Compressor Minimum OFF and ON Times

If the default values are not appropriate, display the main application report and set the points for compressor minimum OFF and ON times according to the specifications for the equipment being used:

Application 2893:

Compressor 1	CMP1 MIN OFF	default = 3 min
	CMP1 MIN ON	default = 3 min
Compressor 2	CMP2 MIN OFF	default = 3 min
	CMP2 MIN ON	default = 3 min
Compressor 3	CMP3 MIN OFF	default = 3 min
	CMP3 MIN ON	default = 3 min

Application 2894:

Cooling Compressor 1	CLG1 MIN OFF	default = 3 min
	CLG1 MIN ON	default = 3 min
Cooling Compressor 2	CLG2 MIN OFF	default = 3 min
	CLG2 MIN ON	default = 3 min
Heating Compressor 1	HTG1 MIN OFF	default = 3 min
	HTG1 MIN ON	default = 3 min
Heating Compressor 2	HTG2 MIN OFF	default = 3 min
	HTG2 MIN ON	default = 3 min

Setting Stages of Electric Heat and Cooling

Electric Heat:

Check the hardware to verify the number of electric heat stages wired to the controller and set EHTG STG CNT to this value. (If not using electric heat, set EHTG STG CNT to 0.)

**CAUTION:**

For installations using electric heat coils, never set min airflow settings to 0. Equipment damage can occur if electric heat is on without airflow.

Cooling (Application 2894):

If using one cooling compressor, leave CLG CMP TOTL at its default value of 1. Otherwise, set CLG CMP TOTL to the number of compressors used for cooling. Valid entries are 0, 1, or 2.

Free Cooling:

If free cooling is not used, leave FREE CLG at its default value of DISABL.

If free cooling is desired, add the appropriate PPCL statements at the field panel to command FREE CLG on when free cooling is available and off when it is not available, and set FREE CLG to ENABLE.

Enabling Night Mixed Air Control

If mixed air control is desired during night mode, enable it by setting NGT MA CTL to YES.

Room Temperature Setpoints and STAT TYPE

Room Temperature Setpoints:

- DAY CLG STPT
- DAY HTG STPT
- NGT CLG STPT
- NGT HTG STPT

1. Set each room temperature setpoint to its desired value.
2. If the room temperature sensor has a setpoint dial that will be used, set STPT DIAL to YES. Otherwise, set STPT DIAL to NO.
3. If STPT DIAL = YES, set STAT TYPE to indicate the type of room sensor and setpoint control you will be using. Do one of the following: (If STPT DIAL = NO, skip to Step 4.)
 - For the “Relative Setpoint Adjustment” option used with room sensor part number SB1-0916 or SB1-1072 (with red and blue “warmer/cooler” slider and no preprinted 55 – 95 degree temperature scale), **set STAT TYPE to OFFSET and then skip to Step 5.**
 - For regular Siemens Series x000 stats, set STAT TYPE to NORMAL (default) and proceed with Step 4.
4. Set RM STPT MIN and RM STPT MAX for the minimum and maximum allowable room temperature setpoint values, respectively. Valid values range from 55° to 95°F (13° to 35°C). Default values are 55°F (13°C) for RM STPT MIN and 90°F (32°C) for RM STPT MAX.
5. If STAT TYPE = OFFSET, set STPT SPAN to the maximum number of degrees to be added to (or subtracted from) the Day Heating or Cooling setpoint.

➤ Example, day cooling (when STAT TYPE = OFFSET):

DAY CLG STPT = 72

STPT SPAN = 4

Result: Setpoint dial adjustable range is 68 to 76 degrees.

STAT SUPV (Point 126)

Point 126, STAT SUPV was developed for use with Series 3000 room stats. It is an enumerated point that can be configured to tell the controller how to respond to a loss of communication of at least one minute between a Series 3000 room stat and the controller.

Review the following table and then set STAT SUPV to the desired value.

Value of STAT SUPV	Description
0	No response (good also for Series 1000/2000 stats)
1	If communication is lost for at least one minute between the controller and a Series 3000 room stat, CTL TEMP will have a status of Fail.
2	If communication is lost for at least one minute between the controller and a Series 3000 room stat, RM RH (Point 127) will have a status of Fail.
3	If communication is lost for at least one minute between the controller and a Series 3000 room stat, both CTL TEMP and RM RH will be Fail.

Setting Override Time

If using night/unoccupied override, set OVRD TIME to the number of whole hours that an override should last. If OVRD TIME equals 0 (default), this feature is disabled.

Setting Fan to Cycle with Compressor

If the fan is to cycle during day mode with the compressor(s), set CYCLE FAN to YES. Otherwise, the fan will be on all the time in day mode.

Enabling Wall Switch

If a wall switch is used for day/night (occ/unocc) control, enable it by setting WALL SWITCH to YES.

Setting Room Temperature Offset (optional)



The Room Temperature Offset feature is optional.

When the room has stabilized (within 5°F) take a precision temperature reading at the room temperature sensor. Record the difference between this reading and the value of ROOM TEMP in RMTMP OFFSET.

EXAMPLE: If the actual room temperature is 72.0°F, and the value of ROOM TEMP is 73.0°F, then the value entered into RMTMP OFFSET is –1.0. In this case, the value of ROOM TEMP would read 73.0°F, but the value of CTL TEMP would read 72.0°F.

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

AI5 / AI4 OFFSET (optional)

AI 5 OFFSET (Point 125) works like RMTMP OFFSET. It can be used to calibrate AI5 aux temp sensor input if necessary. The *actual* temperature plus AI 5 OFFSET will equal AI5 display temperature.

AI 4 OFFSET (Point 124) works exactly like AI 5 OFFSET.

Setting Suggested Point Values

The following are suggested point values for various heat pump configurations. Set these values as appropriate for your configuration.

Table 4. Application 2893: Suggested Point Values for Heat Pump Configurations with 1 Compressor.

Point Number	Descriptor	1 Compressor 0 Elec Heat Stages	1 Compressor 1 Elec Heat Stages	1 Compressor 2 Elec Heat Stages	1 Compressor 3 Elec Heat Stages
61	FREE CLG ON	40%	40%	40%	35%
62	FREE CLG OFF	20%	20%	20%	15%
76	EHTG STG CNT	0	1	2	3
81	EHEAT 1 ON	–	80%	80%	70%
82	CMP1 ON	60%	60%	60%	55%
83	CMP1 OFF	40%	40%	40%	35%
84	RVAL SWITCH	30%	30%	30%	30%
85	SWITCH LIMIT	5%	5%	5%	5%
94	EHEAT 2 ON	–	–	98%	85%
95	EHEAT 3 ON	–	–	–	98%

Table 5. Table 5. Application 2893: Suggested Point Values for Heat Pump Configurations with 2 or 3 Compressors.

Point Number	Descriptor	2 Compressors 0 Elec Heat Stages	2 Compressors 2 Elec Heat Stages	3 Compressors 0 Elec Heat Stages	3 Compressors 1 Elec Heat Stage
16	CMP2 ON	70%	70%	70%	55%
17	CMP2 OFF	50%	50%	50%	40%
34	CMP3 ON	–	–	90%	70%
35	CMP3 OFF	–	–	70%	55%
61	FREE CLG ON	30%	30%	30%	25%
62	FREE CLG OFF	10%	10%	10%	10%
75	CMP TOTL	2	2	3	3
76	EHTG STG CNT	0	2	0	1
81	EHEAT 1 ON	–	85%	–	85%
82	CMP1 ON	50%	50%	50%	40%
83	CMP1 OFF	30%	30%	30%	25%
84	RVAL SWITCH	30%	30%	30%	30%
85	SWITCH LIMIT	5%	5%	5%	5%
94	EHEAT 2 ON	70%	98%	–	–

Table 6. Application 2894: Suggested Point Values for Heat Pump Configurations with 0 or 1 Compressor.

Point Number	Descriptor	0 Heating Compressors 1 Cooling Compressor 1 Electric Heat Stage	0 Heating Compressors 2 Cooling Compressor 1 Electric Heat Stage	1 Heating Compressor 1 Cooling Compressor 0 Electric Heat Stages
30	CLG CMP1 ON	60%	50%	60%
31	CLG CMP1 OFF	40%	30%	40%
34	CLG CMP2 ON	–	70%	–
35	CLG CMP2 OFF	–	50%	–
61	FREE CLG ON	40%	30%	40%
62	FREE CLG OFF	20%	10%	20%
75	HTG CMP TOTL	0	0	1

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Table 6. Application 2894: Suggested Point Values for Heat Pump Configurations with 0 or 1 Compressor. (continued)

Point Number	Descriptor	0 Heating Compressors 1 Cooling Compressor 1 Electric Heat Stage	0 Heating Compressors 2 Cooling Compressor 1 Electric Heat Stage	1 Heating Compressor 1 Cooling Compressor 0 Electric Heat Stages
76	EHTG STG CNT	1	1	0
77	CLG CMP TOTL	1	2	1
81	ELEC HEAT ON	60%	60%	—
82	HTG CMP1 ON	40%	40%	60%
83	HTG CMP1 OFF	20%	20%	40%
85	SWITCH LIMIT	5%	5%	5%

Table 7. Application 2894: Suggested Point Values for Heat Pump Configurations with 1 Heating and 1 or 2 Cooling Compressors.

Point Number	Descriptor	1 Heating Compressor 1 Cooling Compressor 1 Electric Heat Stage	1 Heating Compressor 2 Cooling Compressors 1 Electric Heat Stage	1 Heating Compressor 2 Cooling Compressors 0 Electric Heat Stages
30	CLG CMP1 ON	60%	50%	50%
31	CLG CMP1 OFF	40%	30%	30%
34	CLG CMP2 ON	—	70%	70%
35	CLG CMP2 OFF	—	50%	50%
61	FREE CLG ON	40%	30%	30%
62	FREE CLG OFF	20%	10%	10%
81	ELEC HEAT ON	80%	80%	—
82	HTG CMP1 ON	60%	60%	60%
83	HTG CMP1 OFF	40%	40%	40%
85	SWITCH LIMIT	5%	5%	5%

Table 8. Application 2894: Suggested Point Values for Heat Pump Configurations with 2 Heating and 1 or 2 Cooling Compressors.

Point Number	Descriptor	2 Heating Compressors 1 Cooling Compressor 0 Electric Heat Stages	2 Heating Compressors 1 Cooling Compressor 1 Electric Heat Stage	2 Heating Compressors 2 Cooling Compressors 0 Electric Heat Stages
16	HTG CMP2 ON	70%	70%	70%
17	HTG CMP2 OFF	50%	50%	50%
30	CLG CMP1 ON	60%	60%	50%
31	CLG CMP1 OFF	40%	40%	30%
34	CLG CMP2 ON	–	–	70%
35	CLG CMP2 OFF	–	–	50%
61	FREE CLG ON	40%	40%	30%
62	FREE CLG OFF	20%	20%	10%
81	ELEC HEAT ON	–	90%	–
82	HTG CMP1 ON	50%	50%	50%
83	HTG CMP1 OFF	30%	30%	30%
85	SWITCH LIMIT	5%	5%	5%

HP DO OVRD

This application includes a setup point that enables or disables ON and OFF commands to critical DOs. Specifically, the fan and compressor(s) (and reversing valve in application 2893) cannot be directly commanded ON or OFF unless the point HP DO OVRD is set to ENABLE. When HP DO OVRD is set to DISABL, commands to these critical DO points are ignored regardless of BACnet command priority. Commands to electric heat DOs and any spare DOs are always allowed. Physical points DO1 and DO2 can never be overridden when configured for motor control. However, the position of the attached motor is always commandable via the DMPR COMD point.



CAUTION:

HP DO OVRD should be set to ENABLE only when there is a complete understanding of the consequences. Since the direct control will override the application's minimum on/off time safeties, improper use of the DO commands can cause permanent equipment damage. Also, during normal daily operation, the override of critical DOs should only be done via a BACnet command. If a digital output is overridden via the MMI port, the point may be left in an incorrect internal state upon release. If during commissioning an override command must be issued via the MMI port, **IT IS CRITICAL** that the point be manually commanded off before the point is released.

- Set HP DO OVRD = DISABL to prevent all external commands from overriding the fan, compressor(s), or reversing valve DOs regardless of BACnet priority level. (This is the default mode)
- Set HP DO OVRD = ENABLE (**READ THE CAUTION ABOVE! EQUIPMENT DAMAGE CAN OR WILL RESULT IF HP DO OVRD IS SET TO ENABLE INAPPROPRIATELY**) to allow external commands at any BACnet priority level to override the fan, compressor(s), or reversing valve DOs.

Configuring BACnet Parameters



WinCIS version 2.1.4 or later must be used to configure Siemens Building Technologies BACnet MS/TP TECs.

Using WinCIS, do the following:

1. From the **Device** menu, select **Device Properties** to configure BACnet parameters.
 - **Object Name** – unique to BACnet network (12 character RAD50 limit)
 - **Object ID** – unique to BACnet network (valid values are 0 to 4,194,303)
 - **Description** – description of controller (60 character limit)
 - **Location** – physical location of controller (60 character limit)
 - **Baud Rate** – 9600, 19200, 38400 or 76800
2. Press the **Write** button — the controller accepts the configuration values and then resets.



When successfully installed the controller's RX and TX LEDs flash rapidly and continuously.

The start-up is complete.