SIEMENS

BACnet PTEC Controller

VAV Chilled Beam with Demand Control Ventilation (CO2) and Floating or Analog Output

Start-up Procedures

140-1196
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Building Technologies

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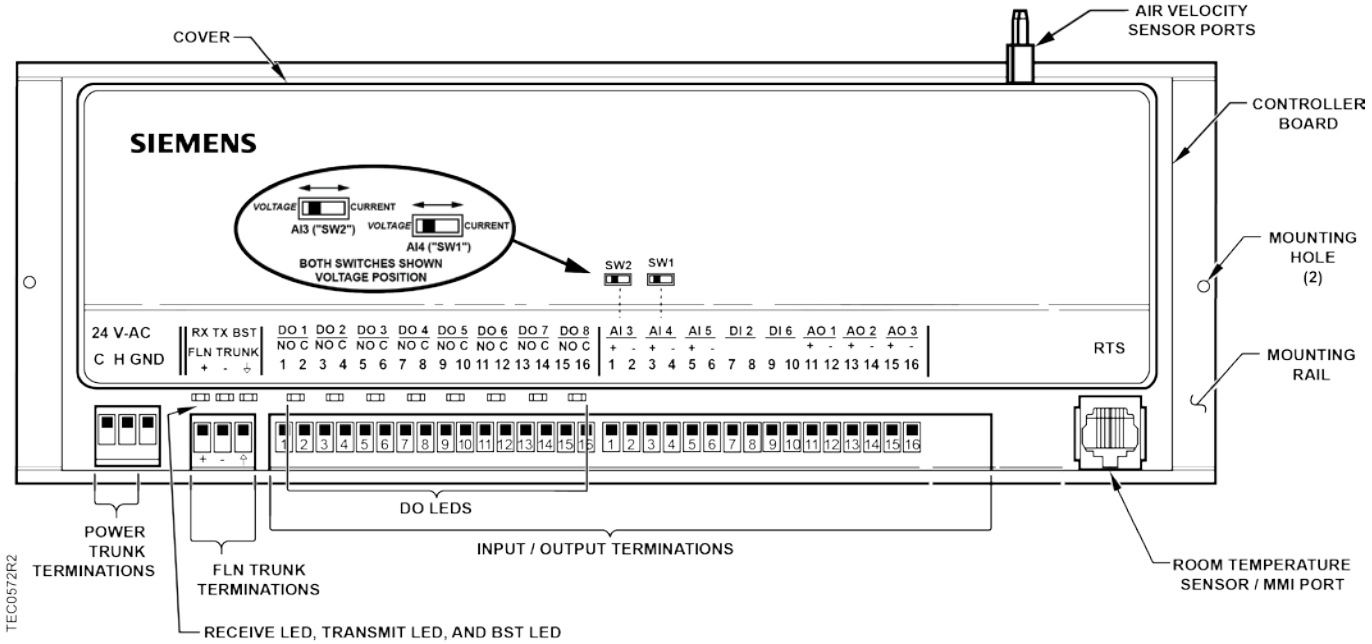
Before You Begin

NOTE:
For information on applications with Firmware Revision B*x*40 or earlier, see InfoLink and/or Asset Portal for documentation.

NOTE:
WCIS version 4.0 or later must be used to auto-discover and auto-address Siemens BACnet MS/TP Equipment Controllers.

If you need metric units and the controller is communicating through the MS/TP Driver in the field panel, uncheck the **Metric** check box. The conversion must be handled in the field panel.



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

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.

If an alternative source is selected (for example, using CO2 CONFIG or RH CONFIG to select an AI or using an external device) you must ensure that the room unit is not provided with the same sensor option.

Communication and DO Indicators

The BACnet VAV Chilled Beam with Demand Control Ventilation (CO2) and Floating or Analog Output Controller has LEDs to indicate communication (yellow), DO (digital output) status and BST (yellow).

The RX LED flashes for data packets received by the controller from the MS/TP network. The TX LED flashes for data packets sent by the controller to the MS/TP network. Each DO has an associated LED located above its termination point. This LED point is ON when the associated DO is commanded ON; otherwise, it is OFF.

The BACnet PTEC will automatically detect the MS/TP baud rate at start up and communicates with other devices when configured as a master MS/TP device (address 1 through 127). The TX LED starts flashing as it attempts to communicate with other devices.

The BST (Basic Sanity Test) will flash on for half a second and off for half a second as an indication that the controller is running.

Room Unit Identification

- For Analog Room Units – The revision number is visually identified by its case.
- For Digital Room Units (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 (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.

Enabling Actuators

⚠ CAUTION

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

The points that determine actuator run times are:

- DMPR TIMING
- H VLV TIMING
- C VLV TIMING

1. Use the following table(s) 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.

Damper Actuator Run Time		
Damper Actuator	Setting (seconds)	
	50 Hz	60 Hz
GDE 131.1 (floating control)	108	90
GLB 131.1 (floating control)	150	125
GDE 161.1 (0 to 10V control)	108	90
GLB 161.1 (0 to 10V control)	150	125
PTS4 electronic-to-pneumatic transducer from ACT	-	90

Valve Actuator Run Time		
Valve Actuator	Setting (seconds)	
	50 Hz	60 Hz
SSB81U, floating control fail-in-place	180	150
SSC81U, floating control fail-in-place	150	125
SSC81.5U, floating control fail-safe	125	125
SQS85.53U, floating control spring return	35	30
SSB61U, 0-10V proportional fail-in-place	75	75
SSC61U, 0-10V proportional fail-in-place	30	30
SSC61.5U, 0-10V proportional fail-safe	25	25
SQS65U, 0-10V proportional fail-in-place	35	30
SQS65.5U, 0-10V proportional fail-safe (SR)	35	30
PTS4 electronic-to-pneumatic	-	90

Specifying Motor Setup

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

In this application, the value of MTR SETUP determines the type, not the number, of output control signals generated by the application. The output signals for H VLV COMD and C VLV COMD can be floating or 0 to 10V analog. Use the additive values in the *Motor Enable/Reverse Values for MTR SETUP* table, along with the output signal logic in the *MTR SETUP Sample Configurations* table, to arrive at the MTR SETUP value needed for your job.

The MTR SETUP values are additive. For example, if you need Motor 1 (DOs 1 and 2) enabled, Motor 2 (DOs 3 and 4) enabled, and Motor 3 (DOs 5 and 6) disabled, you must set MTR SETUP equal to 5. This is because the Motor 1 (for the damper) enable value is 1, the Motor 2 enable value is 4, and the Motor 3 disable value is 0. 1 + 4 + 0 = 5. In this case, you have a floating signal for damper (DOs 1 and 2), heating (DOs 3 and 4), and a 0 to 10V analog signal for cooling (AOV1).

Motor Enable/Reverse Values for MTR SETUP			
	MTR SETUP Value [1]		
	Disabled	Enabled	Enabled and Reversed
Motor 1	0	1	3
Motor 2	0	4	12
Motor 3	0	16	48

[1] The values in this table are additive and must be added per the requirements of the job.

The following example shows motor setup configurations for a floating damper with hot water and chill water valves. In each case, motor 1 for the damper, is controlled by DO1 and DO2.

MTR SETUP Sample Configurations.		
MTR SETUP [a] [b]	HVLV COMD	CVLV COMD
Motors 1 and 2 Enabled, Motor 3 Disabled	Motor 2 (DO 3 and DO 4)	AOV1
Motor 1 Enabled, Motor 2 Disabled, Motor 3 Enabled	AOV2	Motor 3 (DO 5 and DO 6)
Motors 1, 2, and 3 Enabled	Motor 2 (DO 3 and DO 4)	Motor 3 (DO 5 and DO 6)
Motor 1 Enabled, Motors 2 and 3 Disabled	AOV2	AOV1

[a] Motor 1 is reserved for the damper. The default value of MTR SETUP is 0 - it must be changed to enable the damper.

[b] The MTR SETUP values in this table assume none of the actuators are reverse acting. If any actuators must be reverse floating acting, use the additive values in the *Motor Enable/Reverse Values for MTR SETUP* table to arrive at the correct value for MTR SETUP.

NOTE:
If Motor 2 (DO 3 and 4) is used for floating point control of a valve for heating valve, then AOV 2 is spare. In this case, although AOV 2 is spare, AOV 2 OPEN and AOV 2 CLOSE are not used for control of the output for this spare analog. Likewise, if Motor 3 is used for chilled water valve, AOV 1 will be spare but AOV 1 OPEN and AOV 1 CLOSE would not be used for control of AO 1 output.
If AOs are used for modulating heating/cooling devices, the associated DOs are spare but unavailable for motor control.

Verifying Actuator Setup

1. Command all actuators closed. Verify that they close and remain closed. If not, adjust the setting for MTR SETUP according to Table *MTR SETUP Values*.
2. If any of the actuators still do not close completely, then the actuators have been installed or set up incorrectly. See the BACnet VAV Chilled Beam with Demand Control Ventilation (CO2) and Floating or Analog Output Controller Installation Instructions (550-148), the iKnow Troubleshooting Tool, or contact Technical Support.

Setting Voltages to Open and Close 0 to 10V Actuators

If AOV control is used for modulating a valve instead of floating control, the open/close voltages must be set. Otherwise, this section can be skipped.

1. Set AOV 1 OPEN to the voltage that fully opens the modulating heating device connected to AOV 1.
2. Set AOV 1 CLOSE to the voltage that completely closes the modulating heating device connected to AOV 1.
3. Set AOV 2 OPEN to the voltage that fully opens the modulating heating device connected to AOV 2. If the electric coil is controlled by an analog input (i.e. an SCR) and is connected to AOV 2, then AOV 2 OPEN is the voltage that causes the SCR to be fully on.
4. Set AOV 2 CLOSE to the voltage that completely closes the modulating heating device connected to AOV 2. (If an SCR is connected to AOV 2, then AOV 2 CLOSE is the voltage that causes the SCR to be fully off.)

NOTE:
The maximum voltage output for an AO is 10V. The controller does not control the modulating devices beyond 10V.

Setting Controller Address

1. In WCIS select **View > Edit/View Reports**.
2. Select a report from list and click **Apply**.
3. Set CTLR ADDRESS to the BACnet MS/TP MAC address. (0 through 127 for Master; 128 through 254 for Slave).

NOTE:
See the *WCIS Online Help* for instructions on auto-addressing on the network. Otherwise, set the controller address and MS/TP network baud rate prior to connecting the controller to the network. See Configuring BACnet Parameters [→ 22].

Setting the Application

Add the TEC to your job database and select Application 6659.

After you set the application, the controller goes through a shut-down/load sequence as it switches to the application selected. After the application loads, the calibration cycle begins.

At the start of the calibration cycle, the controller automatically sets CAL AIR to YES. When the cycle is complete, CAL AIR returns to NO.

The air velocity sensor calibration cycle begins within three minutes of an application start-up or initialization, depending on the controller's address. After this delay, the calibration cycle takes from 2 to 5 minutes to complete. The air damper closes during calibration.

NOTE:
You can continue the startup procedure while calibration is underway. However, the controller will ignore commands to control end devices (such as the damper) until calibration of the air velocity sensor is finished.

Air Velocity Sensor Calibration

In addition to air flow calibration, when an application number is selected, calibration can also occur.

The air velocity sensor calibration cycle takes from 2 to 5 minutes to complete. The air damper closes during calibration. At the start of the calibration cycle, the controller automatically sets the point CAL AIR to YES. When the cycle is complete, it sets CAL AIR to NO.

NOTE:
For a controller used without an Autozero Module, the damper is commanded closed to get a zero airflow reading during calibration. For a controller used with an Autozero Module, calibration occurs without closing the damper.

Wait until the calibration cycle is complete (CAL AIR is set to NO) before continuing with this startup procedure.

Enabling Autozero Module

If an Autozero Module is used, enable it by setting CAL MODULE to **YES**.

NOTE:
For a controller without an Autozero Module, the damper is commanded closed to get a zero airflow reading during calibration. For a controller with an Autozero Module, the damper is closed only for the first calibration after controller initialization or power up.

Selecting Automatic Calibration Option

1. Using the following table, set CAL SETUP to the value that best meets your job requirements.
2. If appropriate, change CAL TIMER from the default of 12 hours. This setting applies only if your choice for CAL SETUP includes Option 4.

NOTE:
The air velocity sensor should be calibrated at least once every 24 hours. Make sure that the sensor has been calibrated before balancing takes place, as this will affect the balancer's results.

CAL SETUP Options.	
CAL SETUP (value)	**Description**
0	Calibration occurs ONLY when the point CAL AIR is set to **YES**.
1	Calibration occurs when the field panel commands a day/night mode changeover. Actual calibration is subject to a time delay of 0, 1, 2, or 3 minutes. This delay is determined by the point CTLR ADDRESS divided by 4. The remainder is the time delay in minutes. **Example:** If CTLR ADDRESS = 11, then the controller will wait 3 minutes (11 ÷ 4 = 2 R3) after it receives the day/night mode changeover command before beginning the calibration routine.
2	Calibration occurs immediately after the override switch is pressed.
4 (factory default value)	Calibration occurs on the time interval set in the point CAL TIMER. **Example:** If CAL TIMER = 12, then the calibration period is 12 hours. Actual calibration is subject to a time delay based on the value of CTLR ADDRESS. See the example in Option 1.

NOTE:
Options can be combined by summing their numbers. For example, to calibrate in Options 1 and 2, set CAL SETUP to **3**.

Setting Room Temperature Offset (optional)

Enter plus or minus corrections for room temperature sensor in RMTMP OFFSET.

Example

If the actual room temperature is 72.0°F (22.2°C), but the value of ROOM TEMP is showing 73.0°F (23.8°C), then the value you enter into RMTMP OFFSET (or TEMP OFFSET) is –1.0 (negative 1 degree). In this case, ROOM TEMP will read the raw value 73.0°F (23.8°C), but CTL TEMP will equal 72.0°F (22.2°C).

CTL TEMP = ROOM TEMP + RMTMP OFFSET (or TEMP OFFSET)

Setting Room Temperature Setpoints (Digital and Analog Room Units)

Set the following basic control temperature setpoints:

- Day (or OCC) cooling setpoint: DAY CLG STPT (default 74°F)
- Day (or OCC) heating setpoint: DAY HTG STPT
- Night (or UOC) cooling setpoint: NGT CLG STPT
- Night (or UOC) heating setpoint: NGT HTG STPT

If STPT DIAL is set to NO, CTL STPT will use the above setpoint depending on the HEAT.COOL mode and the day/night mode.

Setting STPT SPAN

Set STPT SPAN = 0 for Room Unit setpoint use as standard (absolute values for example, 74 F). For configurations for warmer/cooler (per *Selecting Options for Room Unit Setpoints*), set STPT SPAN = 1 degree or greater (for example, STPT SPAN = 2 will allow -2 to +2 degrees from the current heating or cooling setpoint).

Selecting Options for Room Unit Setpoints

In addition to the base room temperature setpoints that should be entered above, when STPT DIAL = YES, the following options are provided for room units using Standard/Absolute or Warmer/Cooler temperature setpoints, depending on the room unit provided.

The following sections provide the setup configurations based on desired room unit setpoint option:

- Standard/Absolute Setpoints Mode (Digital Room Units [→ 12])
- Warmer/Cooling Setpoints Mode (Digital Room Units [→ 12])
- Standard/Absolute Setpoints Mode (Analog or Digital Room Units [→ 13])
- Warmer/Cooling Setpoints Mode (Analog Room Units) [→ 14]

NOTE:
For all of these configurations, if a zero shift of setpoint is desired or specified when changing from heating to cooling, set DAY CLG STPT = DAY HTG STPT. This may not be in compliance with various energy and control standards.

Standard/Absolute Setpoint Mode (Digital Room Unit)

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

The setpoint value entered on the room unit will be equal to the RM STPT DIAL and will be used for CTL STPT.

1. Set STPT DIAL = **YES**.
2. Set STPT SPAN = **0**.
3. Set SENSOR SEL = **1** (additive value)
   Enables Room Unit Temperature and setpoint options. Other room unit options can then be added as needed. See *Setting SENSOR SEL*.
4. Set RM STPT MIN and RM STPT MAX to a limit range for setpoint adjustment.
5. Set DAY CLG STPT and DAY HTG STPT to the initial values to be used by the room unit and to establish the heating/cooling setpoint and shift.

Configuration values used by the digital room unit are sent from the points configured above in the PTEC and do not need to be individually entered into the room unit. These include, SET PT MIN, SET PT MAX and SEL PT DIS (display option).

Example

DAY CLG STPT = 74, DAY HTG STPT = 70

In cooling mode, the current room setpoint in RM STPT DIAL displays when you press a setpoint UP/DOWN button. You can change the displayed value and the RM STPT DIAL value within the min/max limits.

When you press the UP button to the new cooling setpoint of 78 (an increase from the base cooling setpoint of plus 4 degrees), it will be displayed in RM STPT DIAL. When the controller switches to heating mode, the RM STPT DIAL will display the DAY HTG STPT, also offset by plus 4 degrees (74).

In this Standard/Absolute configuration, the value of RM STPT DIAL will display the actual control setpoint.

Warmer/Cooler Setpoint Mode (Digital Room Unit)

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

NOTE:
The revision number displays for 5 seconds when the room unit is first powered up or when a laptop is disconnected.
Digital Room Units (Firmware Revision 26 and later) will continue to display and update the room temperature sensor values when a laptop is connected.

The room unit setpoint shift (warmer/cooler) will be used to set the RM STPT DIAL temperature and will be used for CTL STPT.

1. Set STPT DIAL = **YES**.
2. Set STPT SPAN = **1** (or greater).
3. Set SENSOR SEL = **1** (additive value)
   Enables Room Unit Temperature and setpoint options. Other room unit options can then be added as needed. See *Setting SENSOR SEL*.
4. Set RM STPT MIN and RM STPT MAX to a limit range for setpoint adjustment.

5. Set DAY CLG STPT and DAY HTG STPT to the initial values to be used by the room unit and to establish the initial heating/cooling setpoint shift.

Configuration values used by the digital room unit are sent from the points configured above in the PTEC and do not need to be individually entered into the room unit. These include, SET PT MIN, SET PT MAX and SEL PT DIS (display option).

Example

DAY CLG STPT = 74, DAY HTG STPT = 70; STPT SPAN = 2

In cooling mode, this warmer/cooler configuration, when you press the UP or DOWN button, the graphic display will indicate the current shift, if any. You can change the graphic display two steps UP or DOWN. You press UP (warmer) by two steps (maximum shift allowed with the setup). The RM STPT DIAL will display the new cooling setpoint of 76; (a shift from the base cooling setpoint of 2 degrees). When the controller switches to heating mode, the RM STPT DIAL will display the DAY HTG STPT, also offset by plus 2 degrees (72), while the room unit graphic display will maintain its + 2 shift.

RM STPT DIAL value will be limited to RM STPT MIN and RM STPT MAX values.

In this warmer/cooler configuration, the value of RM STPT DIAL will display the actual control setpoint.

Standard/Absolute Setpoint Mode (Analog or Digital Room Unit)

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

NOTE:
The revision number displays for 5 seconds when the room unit is first powered up.

For the configuration for these devices, the CTL STPT is an offset calculation from the value set on the room unit. This offset is established by the difference between the DAY CLG STPT and the DAY HTG STPT. The value on the RM STPT DIAL, as set by the room unit, is the midpoint of this offset.

1. Set STPT DIAL = **YES**.
2. Set STPT SPAN = **0**.
3. Do one of the following:
   - Digital Room Unit: Set SENSOR SEL = **1** for Digital Room units (additive value)
     Enables Room Unit Temperature and setpoint options. Other room unit options can then be added as needed. See *Setting SENSOR SEL*.
   - Analog Room Unit: Set SENSOR SEL = **0** for Analog Room units (additive value)
     Disables Digital Room Unit Temperature and setpoint options. Other sensor select options for type of thermistor used can then be added as needed. See *Setting SENSOR SEL*.
4. Set RM STPT MIN and RM STPT MAX to limit range for setpoint adjustment.
5. Set DAY CLG STPT and DAY HTG STPT to establish the heating/cooling deadband only (actual value are not used to establish CTL STPT).

Example

DAY CLG STPT = 74, DAY HTG STPT = 70

This provides a setpoint deadband of 4 degrees.

In either cooling or heating mode, the RM STPT DIAL will display the value set by the room unit (limited by RM STPT MIN and MAX).

- In cooling mode, CTL STPT will be RM STPT DIAL + 0.5 * setpoint deadband
- In the heating mode, CTL STPT will be RM STPT DIAL – 0.5 * setpoint deadband

Example

When the user selects a setpoint on the room unit of 78 degrees it will be displayed in RM STPT DIAL. However, the control setpoint will be offset from this value. In cooling mode, CTL STPT will be 78 + 2 = 80 degrees, and in heating mode CTL STPT will be 78-2 = 76 degrees.

The displayed temperature setpoint on the room unit and the value of RM STPT DIAL will display MID POINT of the actual control setpoints.

Warmer/Cooler Setpoint Mode (Analog Room Unit Only)

Analog Room Unit (1000 Series)

The room unit setpoint shift (warmer/cooler) will be used to set the RM STPT DIAL temperature and will be used for CTL STPT.

1. Set STPT DIAL = **YES**.
2. Set STPT SPAN = **1** (or greater).
3. Set SENSOR SEL = **0** (additive value)
   Disables Digital Room Unit Temperature and setpoint options. Other sensor select options for type of thermistor used can then be added as needed. See *Setting SENSOR SEL*.
4. In this option, RM STPT MIN and RM STPT MAX are not used to limit setpoint range (this is accomplished by the STPT SPAN adjustment).
5. Set DAY CLG STPT and DAY HTG STPT to the initial values to be used by the room unit and to establish the initial heating/cooling setpoint shift.

The analog room unit setpoint slider is mapped to + and – the STPT SPAN configured.

When the slider is at mid point, there is no shift in cooling or heating setpoint used by CTL STPT and displayed in RM STPT DIAL.

Example

DAY CLG STPT = 74, DAY HTG STPT = 70; STPT SPAN = 4

In cooling mode, In this warmer/cooler configuration, when the user moves the slider half way up to the top (a 2 degree shift), the CTL STPT and RM STPT DIAL will display the new cooling setpoint of 76 (a shift from the base cooling setpoint of 2 degrees). When the controller switches to heating mode, CTL STPT and RM STPT DIAL will display the DAY HTG STPT also offset by plus 2 degrees (72) while the slide remains at the previous position.

In this warmer/cooler configuration, the value of RM STPT DIAL will display the actual control setpoint.

Setting SENSOR SEL

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 data. 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:
  - Temperature/Setpoint enable and supervision for fail communications (temperature) with a value of 1.
  - Relative humidity enable and supervision (from the room unit) for fail communications with a value of 2.
  - CO2 enable and supervision (from the room unit) for fail communications with a value of 4.
- When the analog room unit (Series 1000/2000) is used, default temperature sensing (0) from an analog room unit is enabled. Relative humidity and CO_2 sensing are not available and should not be selected.

Thermistor Inputs

- Default for input is 10K.
- To enable 100K thermistor on input, see the following table for additive values of 8.

Other Inputs (only available on Digital Room Unit)

- Use the following table to select and enable communications supervision of room temperature/setpoint dial, relative humidity and CO_2 for additive values of 1, 2 and 4.

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_2 sensing
8	Long board: 100K Ω thermistor on AI 5 (or input is 10K Ω)
16	(Not used)

Room DEW POINT

When the SENSOR SEL or RH CONFIG enables the relative humidity sensor, the controller calculates a DEW POINT for information and is used when the application is adopted (PPCL) for chilled ceiling configurations. Calculations are based on valid (or overridden) values of the room temperature using control temperature (CTL TEMP) and room humidity (RM RH).

Room ENTHALPY

When the SENSOR SEL or RH CONFIG enables the relative humidity sensor, the controller calculates the ENTHALPY value for information or for use by PPCL in the controller or field panel to determine when FREE CLG should be enabled. Calculations are based on valid values of the control temperature (CTL TEMP) and room humidity (RM RH).

Setting HC.ENDIS

HC.ENDIS determines whether the application is heating only, cooling only, or if it uses both heating and cooling modes. Set HC.ENDIS to the desired value.

- 3 = heating and cooling (default)
- 1 = heating only
- 2 = cooling only

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 Duct Area

If provided, enter the duct area (sq ft or sq m) into DUCT AREA and continue to *Setting Flow Coefficient*.

If you do not know the duct area, use the following table:

Area =	Round Duct	Rectangular Duct
Area in Sq. Ft.	$(\pi \times R^2)/144$ (where $\pi = 3.14$ and $R =$ radius of duct in inches)	Width x Height/144 (in inches)
Area in Sq. M	$(\pi \times R^2)/10{,}000$ (where $\pi = 3.14$ and $R =$ radius of duct in centimeters)	Width x Height/10,000 (in centimeters)

Setting Flow Coefficient

1. Set FLOW COEFF to the appropriate value found in the following table. This value is a starting point for the air balancer.
2. To fine tune the flow coefficient use the following formula:

   ⇨ **New Flow Coefficient = (Actual Volume ÷ Controller Volume) × Old Flow Coefficient**
   The actual volume is the actual value obtained from the balancer's measurements. The controller volume is the value obtained from AIR VOLUME.
3. If the controller volume is not within 5% of the actual volume, repeat Steps 1 and 2 until it is within 5%.

Box Manufacturer Flow Coefficients		
Manufacturer	**Sensor Type**	**Value**
Anemostat	2-pipe without orifice 2-pipe with orifice Spider without orifice Spider with orifice	0.79 0.59 0.73 0.39
Carnes	2-pipe Flow cross	0.66 0.59
Carrier		0.59
E.H. Price/Siemens Industry Terminal Boxes		0.78
Environmental Technologies		0.79
Krueger		0.68
Metal Aire		0.72
Nailor Industries		0.69
Titus		0.60
Trane		0.66

Setting Airflow Setpoints

NOTE:
Maximum flow(s) must be set ≥ minimum flow(s).

1. Set CLG FLOW MIN to the desired minimum cooling airflow setpoint.
2. Set CLG FLOW MAX to the desired maximum cooling airflow setpoint.
3. Set HTG FLOW MIN to the desired minimum heating airflow setpoint.
4. Set HTG FLOW MAX to the desired maximum heating airflow setpoint.
5. Set VENT DMD MIN to the desired minimum ventilation airflow setpoint.
6. Set VNT FLOW MAX to the highest controlled ventilation airflow when the demand control ventilation (DCV) for CO2 is enabled.
7. Set NGT FLOW MIN to the airflow for night (unoccupied) mode.
   - During night mode, airflow will modulate to CLG FLOW MAX or HGT FLOW MAX to satisfy the unoccupied temperature setpoints.
   - During night mode, when demand control ventilation (DVC) is configured, it will increase airflow (from NGT FLOW MIN to VNT FLOW MAX) in response to increased CO2 levels.

⚠ CAUTION

If using electric heat, enter a value for HTG FLOW MIN.
Equipment damage may occur at 0 cfm with electric heat ON.

⚠ CAUTION

As a safety feature, the application includes MODHTG FLOW to ensure that adequate airflow is present before an electric heating element is energized. The standard default for MODHTG FLOW is 20, ensuring adequate airflow (20% of Max setpoint) is provided before a heating coil is enabled.
For installations that include radiant heating panels or hot water coils (either ceiling or wall mounted), MODHTG FLOW should be set to zero.

If the application uses electric heat, it is imperative that MODHTG FLOW be set to a value such as 5 which means that airflow must be at least 5% of maximum heating flow before H VLV COMD turns on.

Setting TEMP CONFIG

TEMP CONFIG is used to select the source for the room temperature to be used by the application for control and for the optional calculations. The default value (1) selects the room temperature input from an external source (such as a room unit or network command). A setting of 5, uses a thermistor input on AUX TEMP AI5 as the source. In either case, the resulting value in control temperature (CTL TEMP) has the optional temperature offset (TEMP OFFSET) value applied.

Value	Function	Note
1 (default)	Room temperature input from external source	Room unit or network command
5	Use thermistor input from AUX TEMP AI5	Range limited to 48 to 95°F for control
Other values	Invalid	Firmware will revert to default value (1)

Enabling Wall Switch

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

Otherwise, leave WALL SWITCH at its default value of **NO**.

Heating/Cooling Start and End

The following configuration points establish whether the flow should ramp up before, during, or in parallel with the ramping of the temperature valves. See the *Application Note: Sequencing Logic* section for additional information.

1. Set C FLOW START to the value of CLG LOOPOUT (0 through 100) at which the flow begins to modulate up from CLG FLOW MIN.
2. Set C FLOW END to the value of CLG LOOPOUT (0 through 100) at which the flow reaches CLG FLOW MAX.
3. Set CHW START to the value of CLG LOOPOUT (0 through 100) at which the chilled water valve begins to modulate open from fully closed.

4. Set CHW END to the value of CLG LOOPOUT (0 through 100) at which the chilled water valve is fully open.
5. Set H FLOW START to the value of HTG LOOPOUT (0 through 100) at which the flow begins to modulate up from HTG FLOW MIN.
6. Set H FLOW END to value of HTG LOOPOUT (0 through 100) at which the flow reaches HTG FLOW MAX.
7. Set REHEAT START to the value of HTG LOOPOUT (0 through 100) at which the hot water valve begins to modulate open from fully closed.
8. Set REHEAT END to the value of HTG LOOPOUT (0 through 100) at which the hot water valve is fully open.

The second stage of cooling can be delayed. Set CLG STG DLY to the number of delay minutes.

NOTE:
If C FLOW START > CHW START, flow does not begin modulating until CLG LOOPOUT has been greater than C FLOW START for more than CLG STG DLY minutes.
If CHW START > C FLOW START, the chilled water valve does not begin to open until CLG LOOPOUT has been greater than C FLOW START for more than CLG STG DLY minutes.
If C FLOW START = CHW START, there is no delay.

Setting the CO2 Parameters

For additional information, see the *Ventilation Control* section in the *Application Note* (140-1194).

- Set CO2 SCALE to the value, in parts per million (PPM), represented by a sensor reading of 10V or 20 mA. (The default is 2000.)

For the following configuration points, *CO2 differential* means the difference between room and outdoor CO2 concentrations as measured in parts per million.

1. Set CO2DIFF STPT to the targeted CO2 differential to be controlled to when the application is in the ventilation mode. (The default is 100 ppm.)
2. Set CO2DIFF HLIM to the CO2 differential which when exceeded causes the application to enter the ventilation control mode. (The default is 500 ppm.)
3. Set CO2DIFF LLIM to the CO2 differential which when succeeded (becomes less than) causes the application to exit ventilation mode and return to temperature control mode. (The default is 400 ppm.)
4. Set CO2 ALM DLY to the desired number of minutes that must elapse before an alarm occurs. (The default is 10 minutes.) CO2 ALARM is set to ALARM state when the CO2 differential (CO2DIFF) has been greater than CO2DIFF HLIM for longer than the time in CO2 ALM DLY.
5. Set CO2 RST DLY to the number of minutes that the CO2 differential must be below CO2DIFF LLIM before FLO CTL MODE switches from ventilation control mode (VENT) to temperature control mode (TEMP).

6. Set OUTDOOR CO2.
   For the most accurate representation of CO2 differential, OUTDOOR CO2 should receive its value using PPCL from a CO2 sensor that is measuring the outdoor CO2 concentration level in parts per million (ppm). The signal may need filtering to reduce fluctuation in the sent value. If the value fluctuates needlessly, it will cause unstable control. If there is no outdoor sensor, OUTDOOR CO2 should be set to a typical outdoor CO2 concentration level in ppm. The default is 450 ppm which should be good for most situations.
7. Set CO2 CONFIG to the type of operation required.

Setting CO2 CONFIG

CO2 CONFIG values for Demand Control Ventilation	
CO2 CONFIG value	**Application Operation**
0	Demand Control Ventilation feature is disabled.
1	CO2 based demand control ventilation is enabled. AI3 and AI4 are spare. The value of RM CO2 that is used for CO2 control is set via PPCL from a field panel or in the 3 way digital room unit.
2	Not used (returns to 0).
3	CO2 based demand control ventilation is enabled. AI3 is the input used for calculating RM CO2.
4	CO2 based demand control ventilation is enabled. AI4 is the input used for calculating RM CO2.

NOTES:
If RM CO2 is overridden while in modes 1, 3 or 4, the overridden value is used for CO2 control purposes. If RM CO2 is overridden (commanded externally) while in mode 0, there is no CO2 control, even with large values.
If AI 3 or AI 4 is used for CO2 sensing, set the associated DIP switch (located on circuit board) to indicate the sensor type, either current or voltage, voltage is default.
Since CO2 sensors may have an accuracy of + or – 50 ppm, some CO2 default values may need adjustment. Ventilation mode default values, above OUTDOOR CO2 are: 500 ppm for entering the Demand Control Ventilation mode; 400 ppm for leaving the Demand Control Ventilation mode; 100 ppm is the default CO2DIFF STPT. Refer to the appropriate industry standards and guidelines when configuring the CO2 differential levels and setpoints.

DCV Modes

Demand Control Ventilation can operate in two basics modes: threshold monitoring and PID control (proportional control only).

DCV Mode 1 – Threshold Monitoring

This is the factory default. In this mode, when the CO2 measurement for the indoor air becomes greater than the CO2 measurement for the outdoor air by a configurable amount, the damper will move to the ventilation maximum until the differential CO2 level drops below a second lower configurable limit. When the differential CO2 level has been at or below the lower limit for a specified number of minutes, the application returns to normal temperature control. If the CO2 differential rises again, the process repeats. With factory default settings, as the differential between indoor and outdoor CO2 concentrations rises above 500 ppm, the damper opens to the ventilation maximum until the CO2 differential level drops below 400 ppm for 10 minutes.

To operate in this mode:

- Set CO2 P GAIN equal to or greater than 1.
- Set CO2DIFF STPT to a value at least 100 ppm below CO2DIFF LLIM.

DCV Mode 2 – with PID Loop Proportional Control only

This mode allows you to adjust CO2 P GAIN and CO2DIFF STPT to establish a desired CO2 steady state level. For example, CO2DIFF STPT could be set to 250 and the gain set to 0.33. With these settings, a CO2 steady state level would establish itself somewhere between an indoor/outdoor differential of 250 and 550 ppm. In this example, the upper limit CO2DIFF HLIM should be set to slightly above 550 ppm to avoid alarms when the controller is controlling near the upper limit of its PID range.

NOTE:
Using I gain (CO2 I GAIN) is not recommended in this application.

The following table shows the relationship between gain and proportional band. Due to the tendency of CO2 levels to drift, the lowest gain possible is recommended when using proportional control.

CO2 P GAIN	Proportional Band
1	Control range will be from setpoint to 100 ppm above setpoint
0.33	Control range will be from setpoint to 300 ppm above setpoint
0.2	Control range will be from setpoint to 500 ppm above setpoint

To operate in DCV Mode 2 (PID Loop – Proportional Control only):

- Set CO2 P GAIN and CO2DIFF STPT as desired according to the above guidelines.

DCV Used/Not Used

DCV Used — When DCV is enabled (CO2 CONFIG = 1, 3 or 4), set VENT DMD MIN to values that assure adequate ventilation for the building component. This is typically about 30% of a ventilation flow rate based on full occupancy. If 400 cfm is minimum flow based on occupancy, 120 cfm (30% of 400) might be used for the VENT DMD MIN values. The number of occupants are inferred by measuring the level of CO2. In this case, as occupancy goes from no occupancy to full occupancy the ventilation would ramp from 120 to 400 cfm.

DCV Not Used — Setting CO2 CONFIG to zero disables the DCV feature. If CO2 CONFIG = 0, set CLG FLOW MIN and HTG FLOW MIN to values that assure adequate ventilation based on full occupant capacity and the square footage of the space. Consult ASHRAE or other appropriate guidelines.

NOTE:
Always refer to the appropriate industry standards and design guides for selecting minimum ventilation levels. ASHRAE guidelines base ventilation needs on a building component and an occupant component.

Condensate Control

1. Set DI6 TYPE to **NOPEN** (default) if the type of condensate sensor used is normally open, and closes when condensation is present.
2. Set DI6 TYPE to **NCLOSE** if the type of condensate sensor used is normally closed, and opens when condensation is present.

Configuring BACnet Parameters

Using WCIS, do the following:

1. From the **Device** menu, select **Device Properties** to configure BACnet parameters.
2. In the **Object** section, enter information for the following fields:
   - **Name** – unique to BACnet network, (30 alphanumeric character limit in RAD50).
   - **ID** – unique to BACnet network (valid values are 0 through 4,194,303).
   - **Description** – description of controller (60 alphanumeric character limit).
   - **Location** – physical location of controller (60 alphanumeric character limit).
3. In the **BACNet Communication Settings** section:
   - **Set the CIS/MMI Command Priority to the desired value.**
   - Set **Baud Rate** to the MS/TP network baud rate. Options are; 9600, 19200, 38400 or 76800.
4. In the **MSTP Slave** section:
   - Check the box for a slave device (when address range is 0 through 127).
   - Set the **MAC Master Node** number.

5. In the **Device Settings** section (configuring the Room Unit port), do one of the following:
   - If using a sensing only Room Unit, the baud rate can be 1200 to 38400. For optimal use with WCIS use **38400**.
   - If using a communicating digital Room Unit, the baud rate uses whatever rate the network is using or sets to 19200 after the controller address is configured.
6. Press the **Write** button. The controller accepts the configuration values and then resets.
   ⇨ When the BACnet MS/TP TEC is successfully installed, the RX and TX LEDs flash On/Off rapidly and continuously (indicating proper communication with other devices on the network).

Auto Discover and Auto Addressing

An improved commissioning workflow has been designed for all BACnet PTEC controllers (standard 66xx applications) along with WCIS (Revision 4.0 and later). This provides the option to use the MS/TP network (using the field panel or a router) and the WCIS tool to discover and auto-address each controller. For more information, see the *WCIS Online Help*.

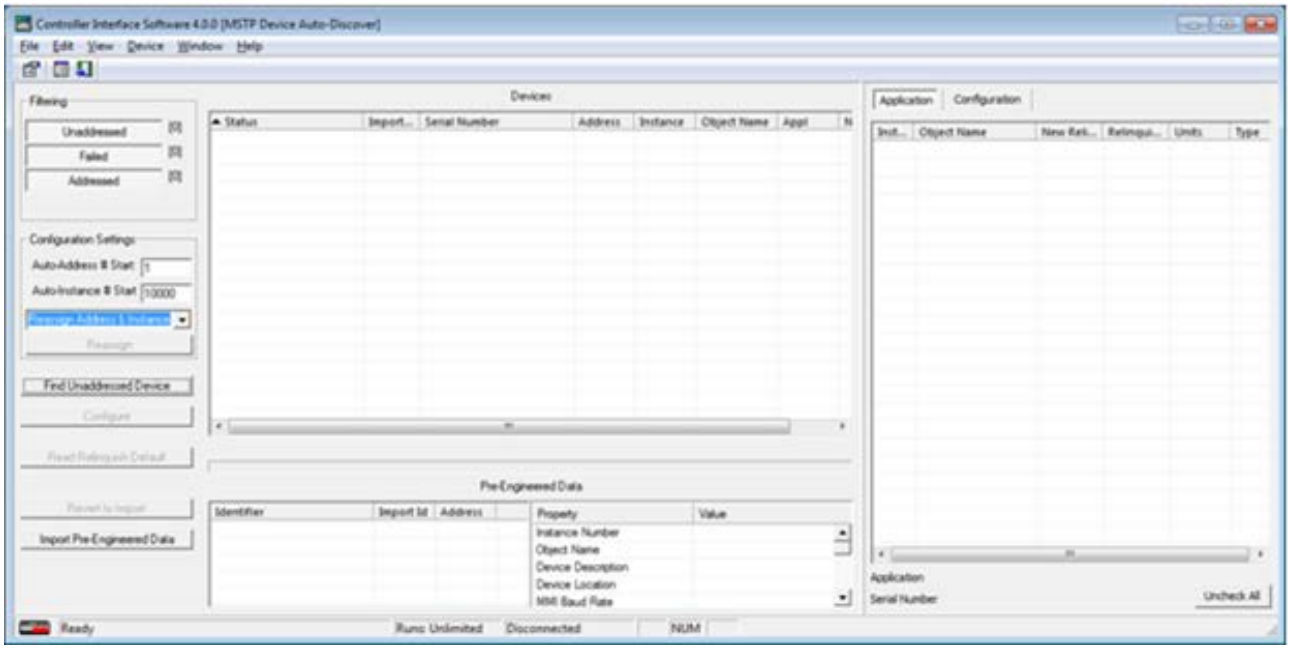
NOTE:
The current workflow will continue to support setting the baud rate and address for each controller using the HMI port or at the room unit.

▷ All BACnet PTEC controllers (standard 66xx applications) have an internal unique serial number and a two part serial number label.

1. Connect WCIS to the field panel or use a router connected to MS/TP network.
2. Assign one PTEC a valid address (using the serial number). This will establish and set the baud rate for the entire network.

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.



Filtering

These buttons allow you to select what you see in the **Auto-discovery** window. All three buttons are selected by default.

- **Unaddressed** - Displays unaddressed devices
- **Failed** - Displays failed devices
- **Addressed** - Displays addressed devices

Configuration Settings

- **Auto Address # Start** - Beginning address number. An address is reserved for each discovered device starting with this number.
- **Auto Instance # Start** - Beginning instance number. An instance number is reserved for each discovered device starting with this number.
- **Reassign Address and Instance** (drop-down menu) - Reassigns the address and instance number of the selected device(s).
- **Reassign Address Only** (drop-down menu) - Reassigns the address of the selected device(s).
- **Reassign Instance Only** (drop-down menu) - Reassigns the instance of the selected device(s).

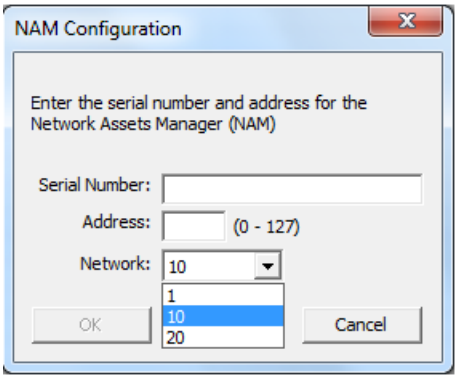
Auto-Discovery

- **Find Unaddressed Device** - Searches the connected network for all devices (addressed and unaddressed).
- **Configure** - Sends modified application data to the controller(s).
- **Read Relinquish Default** - Refreshes relinquish default column of the Application tab with values from the controller.
- **Revert to Import** - Returns to Pre-Engineered Data after changes have been made.
- **Import Pre-Engineered Data** - A .csv file can be used to set initial values in the controller. The file can be taken from Commissioning Tool or exported from Excel. See Commissioning a Controller [→ 26].

Auto-Discovery Procedure

- Click **Find Unaddressed Device**.

  ⇨ If a NAM (Network Asset Manager) device is not defined, the **NAM Configuration** window displays. All new TECs can be assigned as a NAM.

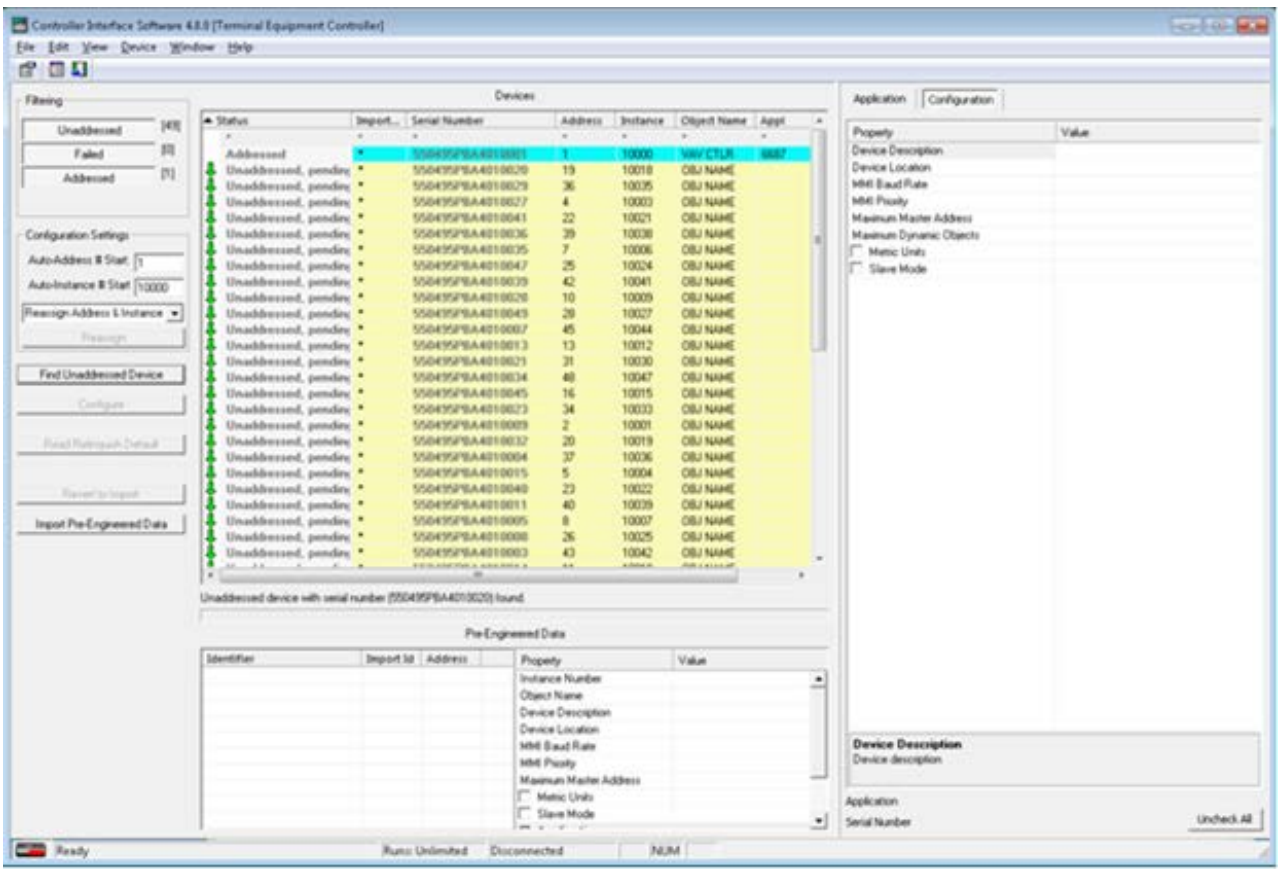


  - Enter the serial number (found on print from electrician).
  - Enter a unique (unused) address (0 through 127).
  - Click **OK**.

  ⇨ The device is assigned as the NAM for the network with the address you specified.

  ⇨ The NAM device auto-discovers all other devices on the network.

  ⇨ WCIS displays all devices.

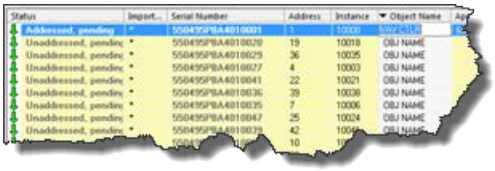


Configuring Discovered Devices

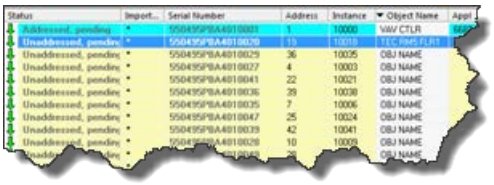
Each device on the network must have unique identifiers in the following fields:

- Address
- Instance
- Object Name - 30 alphanumeric character limit for Siemens field panels.

1. To change any of these fields, click in that field and enter the desired value.

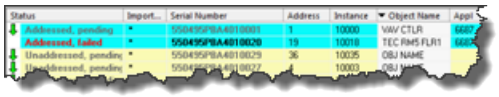


2. When all fields are defined, click **Configure**.



   ⇨ All devices defined properly displays `Addressed`.

   ⇨ If a device has not been defined properly, it displays `Unaddressed` and the problem field displays red text.



3. Correct any issues and click **Configure**.

Commissioning a Controller

Learning the Application Point Team

Once a device has been addressed, select your application.

- Do one of the following:
  - Right-click in the **Application** column and select the desired Application from the menu.
  - Click **Configure** to load the device for your application.
  - Right-click on the controller and select **Learn Point Team Descriptor**.

Import Data

1. Click the **Import Pre-Engineered Data** button.
   ⇨ The **Import Configuration Data** dialog box displays.
2. Browse to the desired .csv file and click **Open**.

⇨ The imported files are listed in the **Pre-Engineered Data** section of the Auto-Discovery window.

Each line in the window is a grouping of data for a controller. For more information see .csv File Format [➟ 28].

Assigning Import Data to Controller

1. Click in the **Import ID** column of the desired controller in the devices section.
2. Select the appropriate **Import ID number** of the Pre-Engineered Data you want to assign.

⇨ The Application and Configuration tabs will update with the new (Pre-Engineered) data. You can manually change/update any data.

Assigning Import Data to Multiple Controllers

1. Click on the desired **Import Data** from the list in the Pre-Engineered Data section.
2. Select all desired controllers in the Devices window.
3. Right-click the selection in the Devices window and then select **Assign Import Data from Import ID x** in the pop-menu.
4. Click **Configure**.

⇨ The Application will load into each controller selected. The Application and Configuration tabs will update with the new (Pre-Engineered) data.

Commissioning Multiple Controllers

If you're commissioning multiple controllers with the same application all values can be loaded to each controller selected.

You can select multiple controllers by holding down either the **SHIFT** or **CTRL** key and clicking on multiple controllers listed.

You can configure values for multiple controllers with different applications by first selecting and making changes to one controller and then selecting all controllers and clicking **Configure**.

NOTE:
Once you select multiple controllers with different applications the Application tab goes blank. However, WCIS retains all changes and send the data for all selected controllers.

.csv File Format

The .csv file is auto generated from CT (is the old manufacture installed output file) and can be imported into WCIS. It has the following format and must be manually created.

First line must be – **IDENTIFIER**, **FIELDID**, **FIELDVAL**, all additional lines will be data in that format.

IDENTIFIER

This field is used to create groupings of data. Each group can be thought of as a collection of information (configuration data and point initial values) that will be loaded into one or more TEC's. The groups cannot be subdivided into smaller collections.

FIELDID

This is the specific data that will be set. All configuration data will have a key word associated with it and all points will be referenced by their point number (object ID). The following is a list of fields:

- ObjectName – Sets the device object name.
- Instance – Sets the device instance number.
- Description – Sets the device description.
- Location – Sets the device location.
- MaxMaster – Sets the device max master.
- MMIBaud – Sets the baud rate of the MMI tool port.
- MMIPriority – Sets priority for P1 commands received through the MMI tool port.
- IsMetric – Sets the units to SI.
- IsSlave – Sets the unit to a MSTP slave device.
- Comment – Creates comments in the file to make it more readable and are not imported into the tool.

FIELDVAL

This value must be set to the FIELDID. The format of this data is specific to the ID.

Description	Acceptable Values
ObjectName	30 RAD50 characters
Instance	0 – 4194302
Description	60 ASCII characters
Location	60 ASCII characters
MaxMaster	1 – 127
Point numbers	Depend on the specific points
MMIBaud	1200, 2400, 4800, 9600, 19200, 38400
MMIPriority	8 – 16
IsMetric	0 – No, 1 – Yes
IsSlave	0 – No, 1 – Yes

The Pre-Engineered Data file can be used in different ways. For example, you can create a group or collection of information for every TEC. You can then assign the correct group to the TEC based on the location as indicated by the job schedule. The schedule will display the serial numbers for all TEC's and the location where the TEC was installed. The groups of data are setup for a specific location and you simply select the correct group for the TEC that has the serial number associated with that location.

You can also setup groups that contain information that must be set in multiple TEC's. Select all TEC's that need the specific data and assign the ID.

Sample .csv file:

IDENTIFIER,FIELDID,FIELDVAL

Building100_TEC_VAV001,ObjectName,VAV in Building 100

Building100_TEC_VAV001,Instance,5400

Flashing Controller Firmware

FLT Procedure

Use the Firmware Loading Tool (FLT) for this procedure.

1. Connect to the RTS port of the PTEC.
2. Set Communications to **1200 baud**.
3. Click the **Identify** button.
4. Browse to the folder where the new firmware is saved.
5. Double-click the firmware file and then click **Load**.

WCIS Procedure

1. Connect to the RTS port of the PTEC.
2. From the **Device** menu, select **Load TEC Firmware**.
   ⇨ The **Load TEC Firmware** dialog box displays.
3. Click the **Browse** button.
4. Browse to the folder where the new firmware is saved.
5. Double-click the firmware file and then click **Load**.

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