SIEMENS

BACnet PRC-OAVS

Pressurization Control by Differential Flow Reset, with Heating by BTU Compensation — Slow Actuation, Floating or Analog Output, Application 6761

Start-up Procedures

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Restricted

Building Technologies

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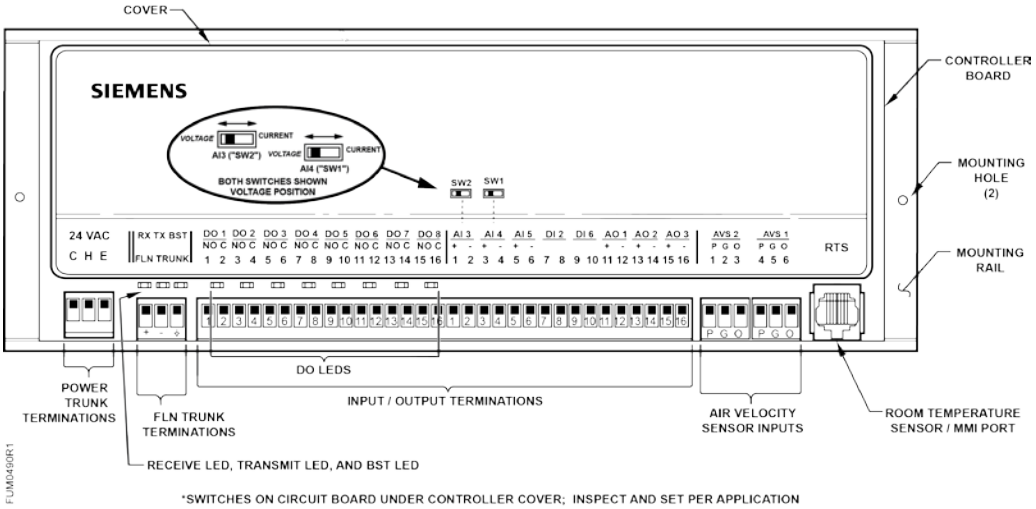
Before You Begin



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

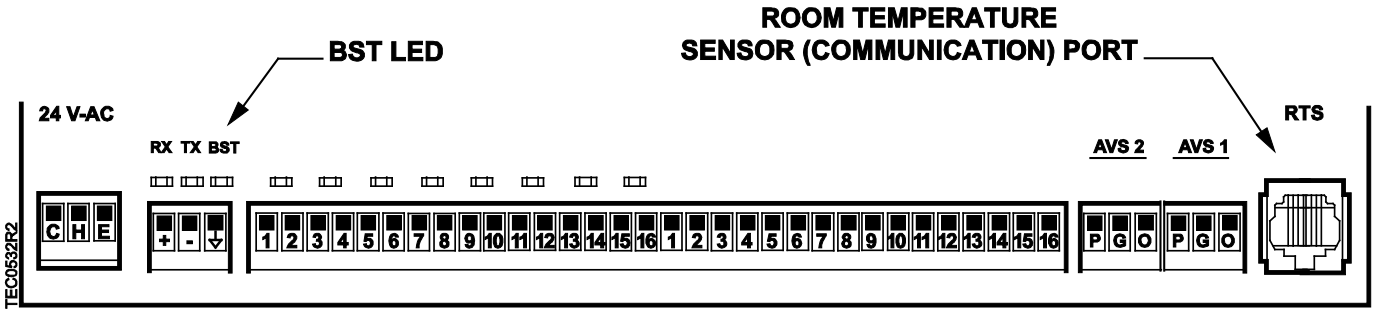
At the job site, locate the major control system and the mechanical and electrical drawings. These components include valves, motors, and any other components working in conjunction with the BACnet Pressurization Room Controller (PRC).

Verify that the PRC input/output (I/O) points are wired per the installation instructions.

NOTE:
Update each controller at the field panel immediately after you have completed the controller start-up procedures and have made all other changes to the controller's point database, including balancing, tuning, and so on.

Verifying Power

1. Verify that the controller has 24 Vac power and that the fuse has been inserted into the trunk or that power to the transformer is ON.
2. Verify that the Basic Sanity Test (BST) LED on the controller flashes once per second.



Verifying Slave Mode Application Number

1. Plug the HMI into the Room Temperature Sensor port.
2. Verify that Application 6792 (Slave Mode) is running at the controller.

Setting the Application

1. Set APPLICATION to the desired number.

- Application 6761: BACnet PRC-OAVS with Pressurization Control by Differential Flow Reset, Slow Actuation, Floating or Analog Output and Heating by BTU Compensation

2. Set CTLR ADDRESS to the correct value obtained from the controller schedule.
   - Each controller must have a unique address.
   - Typical values are from **00** to **127** for master and **128** to **254** for slave, 255 is reserved.

Setting Damper and Reheat Actuator Configuration (floating or analog)

NOTE:
The Supply Damper, Exhaust Damper and Reheat control actuators can be configured as floating control (via pairs of DOs) or voltage analog output control. This is determined by enabling (or disabling) the motor configuration in the MTR SETUP entries. When the MTR SETUP indicates an actuator is not enabled, then the control program will utilize an analog output for that function. When an actuator is enabled, it will be controlled by the pair of digital outputs assigned. The un-used outputs (either AO's or DO's) then will be available as spare points.

MTR SETUP		
Actuator	**MTR SETUP enable**	**MTR SETUP not enabled**
Supply Damper	DO 1&2	AO-2
Exhaust Damper	DO 3&4	AO-3
Reheat Control	DO 5&6	AO-1

Follow the steps to set the damper and reheat actuator running time:
These times should be set for analog actuators as well as floating control actuators.

Supply Damper

1. Set MTR1 TIMING to the correct running time of the supply damper actuator.
   - Application 6761 - GBE-161 is the default actuator to control the dampers. Therefore, set MTR1 TIMING to 130 seconds for 60 Hz Operation, or 150 seconds for 50 Hz operation.
2. For a damper-actuator rotation-angle value other than 90°, set MTR1 ROT ANG to the appropriate value.
   NOTE: NOTICE! On a return from power failure, the damper-command DOs (DOs1 through 6) remain OFF for 5 seconds prior to resuming control. Because of this it is recommended that the supply damper motor setup MTR SETUP be set to Enabled (normally closed) for rooms where negative or neutral pressurization is required and Enabled and Reversed (normally open) for positively pressurized rooms. Likewise, it is recommended that the general exhaust damper motor setup be set to Enabled and Reversed (via MTR SETUP) for rooms where negative or neutral pressurization is required and Enabled for positively pressurized rooms. The default for the motor direction is direct (not reversed).
3. Enable the supply damper actuator for floating control by setting MTR SETUP to 1. See Table *MTR SETUP*. Verify that the actuator completely closes the damper and that it remains closed. If it does not close, reverse the action of the actuator, see Table *MTR SETUP*.
   If the damper still does not close completely, then the actuator has been installed or set up incorrectly.

General Exhaust

1. Set MTR2 TIMING to the correct run time of the actuator.
   - Application 6761 - GBE 161 is the default actuator to control the dampers. Therefore, set MTR2 TIMING to **130 seconds** for 60 Hz Operation, or **150 seconds** for 50 Hz operation.
2. If the second actuator is a floating control damper actuator with a rotation angle other than 90°, set MTR2 ROT ANG to the proper value.
3. Enable the second floating control actuator by referring to Table 1 and changing MTR SETUP as follows:
   - If the first actuator is present and enabled (MTR SETUP = 1), enable the second actuator by changing MTR SETUP to **5**. Verify that the second actuator completely closes the damper and that it remains closed. If it does not close, reverse the action of the second actuator by setting MTR SETUP to **13**.
   - ☐If an actuator is present, enabled, and reverse acting (MTR SETUP = 3), enable the second actuator by changing MTR SETUP to **7**. Verify that the second actuator completely closes the damper and that it remains closed. If it does not close, reverse the action of the second actuator by setting MTR SETUP to **15**.
   - If the second floating control actuator still does not close completely, then the actuator has been installed or set up incorrectly.
4. Enable the reheat actuator for floating control by adding current value MTR SETUP by 16. Verify that the actuator completely closes the valve and that it remains

closed. If it does not close, reverse the action of the actuator by setting MTR SETUP to **48**.

The “enabling and reversing” as described above is also shown in the Table *Additive Values for MTR SETUP*. Use the table to determine the value for MTR SETUP. The values are additive. For example, if you want to have Motor 1 (DOs 1 and 2) enabled, Motor 2 (DOs 3 and 4) enabled and reversed, you would set MTR SETUP equal to 13. (This is because the Motor 1 enable value is 1, the Motor 2 enabled and reversed value is 12. 1+12=13.)

Additive Values[a] for MTR SETUP			
	Not Used	Enabled	Enabled and Reversed
Motor 1 (supply damper) (DO 1 and DO 2)	0	1	3
Motor 2 (exhaust damper) (DO 3 and DO 4)	0	4	12
Motor 3 (reheat control)	0	16	48

a) For consistency with other applications, other values from 0-255 will be accepted, but only the values 0, 1, 3, 4, 5, 7, 12, 13, 15, 16, 48, 17, 49, 20, 52, etc.

For more information, contact your local Siemens Industry representative.

Setting DO DIR.REV

NOTE:
Applies only to DO points that are not used for motor points.

If the normal (de-energized) state of all of the devices controlled by DOs is direct-acting, then leave the point DO DIR.REV at its default value of 0.

Otherwise, reverse the action of the devices as follows:

1. Add the values in Table *DO DIR.REV* for each DO you want to make reverse-acting.
2. Set DO DIR.REV to this value.

DO DIR.REV Values.	
Reverse-Acting DO	Value
DO 1	32
DO 2	16
DO 3	8
DO 4	4
DO 5	2
DO 6	1
DO 7	64

DO DIR.REV Values.	
Reverse-Acting DO	Value
DO 8	128

Analog Actuator Configurations

When the corresponding motor enable value in MTR SETUP is not set, the control is directed to the analog outputs:

- Reheat Control - AO1
- Supply Damper control – AO2
- General Exhaust Damper control – AO3

Reheat actuator – Analog Configuration:

1. Find the value of REHEAT AO1 that closes the valve, per the actuator specification, by commanding REHEAT AO1 and observing the motion of the valve actuator. Set REHEAT CLOSD to this voltage value.
2. Find the value of REHEAT AO1 that opens the valve all the way. Set REHEAT OPEN to this voltage value.
3. Release REHEAT AO1.
4. Verify operation of the reheat valve. Override REHEAT CMD to 0 and verify that the valve closes. Set REHEAT CMD to 100% and verify that the valve opens. Release REHEAT CMD.

Supply Damper - Analog Configuration:

1. Find the value of SUP DMP AO2 that closes the damper, per the actuator specification, by commanding SUP DMP AO2 and observing the action of the damper and actuator. Set SUP DMP CLOS to this voltage value.
2. Find the value of SUP DMP AO2 that opens the damper all the way. Set SUP DMP OPEN to this voltage value.
3. Release SUP DMP AO2.
4. Verify operation of the supply damper. Override SUP DMP CMD to 0 and verify that the valve closes. Set SUP DMP CMD to 100% and verify that the damper opens. Release SUP DMP CMD.

General Exhaust Damper – Analog Configuration:

1. Find the value of GEX DMP AO3 that closes the damper, per the actuator specification, by commanding GEX DMP AO2 and observing the action of the damper and actuator. Set GEX DMP CLOS to this voltage value.
2. Find the value of GEX DMP AO3 that opens the damper all the way. Set GEX DMP OPEN to this voltage value.
3. Release GEX DMP AO3.
4. Verify operation of the supply damper. Override GEX DMP CMD to 0 and verify that the valve closes. Set GEX DMP CMD to 100% and verify that the damper opens. Release GEX DMP CMD.

Setting Supply and General Exhaust Variables

In this section the Duct Area, Automatic Calibration Option, and Flow Coefficient Variables are configured.

Automatic Calibration Option

This only functions when using the OAVS. To set CAL SETUP, select the automatic calibration option that best meets the job's requirements from the following table. It is highly recommended that Option 4, the factory default mode, be used.

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

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.
2	Calibration occurs immediately after the override switch is depressed.
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. This is the recommended option when using a controller with an Autozero Module.

Setting Duct Area

NOTE:
If the PRC will be operating as Supply only, with no General Exhaust box present, or if it will be operating as General Exhaust only with no Supply box present, then follow the instructions in the *Configuring Supply and General Exhaust* section before proceeding to the next section.

If provided, enter the duct area into SUPDUCT AREA and GEXDUCT AREA. Otherwise, use the following table to determine duct area.

Area =	Round Duct	Rectangular Duct
Area in Sq. Ft. (Dimensions in inches)	$(\pi \times R^2)/144$	Length × Height/144
Area in Sq. M (Dimensions in centimeters)	$(\pi \times R^2)/10{,}000$	Length × Height/10,000

NOTE:
When entering the TEC definition for a controller at the field panel, do not enter a duct area. (Choose **N** for none when prompted for the duct shape.) This controller does not send the value of air volume to the field panel in velocity (fpm). Instead, it uses volume (cfm) so a conversion is not necessary.

Flow Coefficients

⚠ CAUTION

It is extremely important that the flow readings are accurate.
Inaccurate flow readings will cause control problems.

NOTE:
Make sure the airflow sensors are calibrated before determining flow coefficients. This is done by setting CAL AIR to **YES** and waiting for it to switch back to NO on its own.

1. Set SUP FLO COEF and GEX FLO COEF to initial values that match your hardware configuration. See Table *Flow Coefficient Initial Values*.
2. Work with a balancer to obtain the exact value(s) for SUP FLO COEF and GEX FLO COEF using the following formula to fine-tune the flow coefficient:

New Flow Coefficient = (Actual Volume ÷ Controller Volume) × Old Flow Coefficient

The actual volume is the value obtained from the balancer's measurements. The controller volume is the value obtained from GEX AIR VOL and SUP AIR VOL. If the controller volume is not within 5% of the actual volume, repeat the procedure until it is. Loose or kinked flow sensor tubes, tubing connected backwards, and improper actuator and/or Actuator operation can cause inaccurate readings.

Flow Coefficient Initial Values.	
SUP FLO COEF	**GEX FLO COEF**
Damper Actuator = 0.73	Damper Actuator = 0.73

Setting up External Airflow Variables

In this section, the external airflow variables are configured.

This version of the PRC uses conventional supply and exhaust actuation (rather than high speed actuation). Therefore, it should be used only where rapid room response to pressure changes is not required.

Other Supply and Other Exhaust

Airflows not connected to the controller must be taken into consideration when pressurizing the room, including snorkels, canopies, as well as other supplies, such as offices within the lab space controlled by constant volume controllers. Since these inputs are not connected to the controller, the combination of their values must be entered into OTHER SUP and OTHER EXH so the controller can properly control the lab space.

NOTE:
If these airflow values change slowly or predictably (for example, VAV temperature control and/or occ/unoc differences), steps can be taken using PPCL to have the changes sent over the network to update OTHER EXH and OTHER SUP with the new values

- Set OTHER EXH and OTHER SUP using actual airflow values for any supply or exhaust equipment not connected to the controller that will remain constant.

Setting MIN and MAX Airflow Setpoints

NOTE:
Airflow readings are most accurate when duct velocity is at least 350 fpm.
Minimum values in the Table *Min and Max Flow Limit Points* should be set up with this in mind.
See the Application Notes section for more information when using Supply or Exhaust only.

1. Using values from the job specifications, enter the minimum and maximum flow limits for occupied and unoccupied conditions in each air terminal. Enter values for the points in Table *Min and Max Flow Limit Points*.
2. If an unoccupied mode is not specified, set the UOC values equal to the OCC values.
3. If using supply or exhaust only, see the Start-up Notes [→ 32] sections for setup details.

Min and Max Flow Limit Points.	
OCC SUP MAX	OCC SUP MIN
OCC GEX MAX	OCC GEX MIN
UOC GEX MAX	UOC GEX MIN
UOC SUP MAX	UOC SUP MIN

The equation relating airflow to air velocity is:

Airflow (cfm) = Velocity (fpm) × Duct Area (sq. ft.) × Flow Coefficient

Therefore, for best results: Airflow ÷ (Duct Area × Flow Coefficient) should be > 350.

Example

UOC SUP MIN ÷ (SUPDUCT AREA × SUP FLO COEF) > 350.

Setting TRACK MODE

Track mode (TRACK MODE) can be either Supply Tracks Exhaust (STE) or Exhaust Tracks Supply (ETS).

- Supply Tracks Exhaust mode is useful when trying to maintain negative pressurization.
- Exhaust Tracks Supply mode is useful when trying to maintain positive pressurization.

During Supply Tracks Exhaust, the supply air volume “tracks” or follows the exhaust air volume. If the exhaust air is “broke” (for instance, the general exhaust box damper is stuck open or stuck closed) the supply air will be adjusted so VOL DIF STPT is maintained as much as possible.

The supply air volume cannot go lower than zero and the application will not allow it to go higher than HTG FLO MAX during heating mode or CLG FLO MAX during cooling mode.

During Exhaust Tracks Supply, the general exhaust air volume “tracks” or follows the supply air volume. If the supply air is “broke” (for instance, the supply box damper is stuck open or stuck closed) the general exhaust air volume will be adjusted such that VOL DIF STPT is maintained as much as possible.

The general exhaust air volume cannot go lower than zero and the application will not allow it to go higher than GEN MAX.

- Set TRACK MODE to the desired value. See the following table.

TRACK MODE Values.	
TRACK MODE (value)	**Description**
0 default	Always STE (Supply Tracks Exhaust), exhaust only.
1	STE during occupancy, ETS during the unoccupied period.
2	ETS during occupancy, STE during the unoccupied period.
3	Always ETS (Exhaust Tracks Supply), supply only.

NOTE:
If TRACK MODE is set greater than 3, it will default to 0.

Setting TRACK METHOD

The TRACK METHOD can be either FLOW or STPT. In most cases, TRACK METHOD should be set to FLOW.

When TRACK MODE is set up for **Exhaust Tracks Supply** flow tracking (ETS):

- TRACK METHOD = FLOW tracking; the general exhaust flow setpoint is calculated using the actual supply airflow being read at the controller.
- TRACK METHOD = STPT tracking; the general exhaust flow setpoint is calculated based on the setpoint for the supply terminal.

However, this module changes over to FLOW tracking mode if the supply cannot reach setpoint.

When TRACK MODE is set up for **Supply Tracks Exhaust** flow tracking (STE):

- TRACK METHOD = FLOW tracking; the supply flow setpoint is calculated using the actual general exhaust airflow being read at the controller.
- TRACK METHOD = STPT tracking; the supply flow setpoint is calculated based on the setpoint for the general exhaust terminal.

However, this module changes over to FLOW tracking mode if the general exhaust cannot reach setpoint.

- Set TRACK METHOD to **FLOW** or **STPT** as desired.

Setting Control Modes (VAV and/or CV)

Applications can operate as either a variable air volume (VAV) controller or a constant volume (CV) controller. These operational modes can vary between the occupied and unoccupied periods, if desired.

VAV means that the supply airflow can be varied to provide cooling. CV means the supply airflow is not a source of modulating cooling. However, the supply and general exhaust can still change in CV mode to keep the volume differential setpoint constant.

The Table *VOLUME STATE Values* shows what the application does when VOLUME STATE is at a particular value.

- Set VOLUME STATE to the desired value.

VOLUME STATE Values.	
VOLUME STATE (value)	**Description**
0	Always Constant Volume.
1 (default)	VAV during occupancy, Constant Volume during unoccupied period.
2	Constant Volume during occupancy, VAV during unoccupied period.
3	Always VAV.

NOTE:
If VOLUME STATE is set greater than 3, it will default to 0.

Setting Airflow Control

These steps require that the Air Velocity Sensors have been calibrated and are operating normally (neither SUP AIR VOL nor GEX AIR VOL (Point 30) are FAILED).

NOTE:
It is very important that the minimum and maximum airflows specified can be reached.

Verifying Flow Range

1. Set SUP FLO STPT to either OCC SUP MIN or UOC SUP MIN (whichever is less) and verify that SUP AIR VOL can reach that value. Then set SUP FLO STPT to either OCC SUP MAX or UOC SUP MAX (whichever is greater) and verify that SUP AIR VOL can reach that value.
   (If it is not possible to achieve minimum and maximum airflow, then the fan system must be adjusted.) When done, release SUP FLO STPT.
2. Repeat this process for the general exhaust by setting GEX FLO STPT to either OCC GEX MIN or UOC GEX MIN (whichever is less) and verify that GEX AIR VOL can reach that value. Then set GEX FLO STPT to either OCC GEX MAX or UOC GEX MAX (whichever is greater) and verify that GEX AIR VOL can reach that value.
   (If it is not possible to achieve minimum and maximum airflow, then the fan system must be adjusted.) When done, release GEX FLO STPT.

Tuning the Flow Loops

1. Set VOL DIF STPT to **0**.
2. Change the flow by commanding SUP FLO STPT and examine the response. If the airflow oscillates or overshoots significantly, or if the supply damper oscillates, reduce the gain (SUP P GAIN). If it takes too long to reach the setpoint, increase SUP P GAIN. Try different values—it should move accurately and with stability. When the desired performance is achieved, release SUP FLO STPT.
3. Repeat the process for GEX FLO STPT, adjusting GEX P GAIN if necessary. When the desired performance is achieved, release GEX FLO STPT.
4. Release VOL DIF STPT.

Setting Pressure Sensor Range and Pressure Setpoint

Follow these steps to set the pressure sensor range and the pressure control set points:

1. Set HI PRES RNG to highest value that the sensor connected to RM PRES AI3 will read.
   HI PRES RNG is not an absolute value; the sign must be considered. For a –0.25 to 0.25 Inches WC sensor, set HI PRES RNG to 0.25.
2. Set LO PRES RNG to the lowest value that the sensor connected to RM PRES AI3 will read.
   LO PRES RNG is not an absolute value; the sign must be included. For example, for a -0.25 to 0.25 Inches WC sensor, set LO PRES RNG to –0.25).
3. Verify the room differential pressure is displayed correctly on RMPRESSURE.
4. Set VOL DIF MIN and VOL DIF MAX to the appropriate CFMs.
   VOL DIF MIN and VOL DIF MAX are not absolute values; the sign must be included in both of these points. (A positive value means the exhaust airflow will actually be greater than the supply airflow, giving the room a negative pressure. A negative value means the supply airflow will be greater than the exhaust, giving the room a positive pressure.)
   VOL DIF STPT will be modulated between these values to maintain the pressure

set point. For example, if the min and max are set to –500 CFM and 1500 CFM respectively, VOL DIF STPT will be modulated between –500 CFM and 1500 CFM in order to maintain the pressure set point.

NOTE:
The following rules should be adhered to when setting the values for VOL DIF MIN and VOL DIF MAX. Also, if VOL DIF MIN is negative and VOL DIF MAX is positive, AVS FAILMODE **must not** be set to a value of 7 or 8.

For negative pressure rooms:

OCC GEX MAX – VOL DIF MAX (58) > OCC SUP MIN

UOC GEX MAX – VOL DIF MAX (58) > UOC SUP MIN

This ensures that airflow in the supply duct is high enough to be read accurately, provided OCC SUP MIN and UOC SUP MIN are set according to guidelines in the *Setting Up MIN and MAX Airflow Set Points* section of this document.

For positive pressure rooms:

OCC SUP MAX > OCC GEX MIN – VOL DIF MIN (57)

UOC SUP MAX > UOC GEX MIN – VOL DIF MIN (57)

If this is not done, there will be situations where PRESS STPT cannot be met.

1. Set PRESS STPT to the appropriate positive or negative value. This setting must be with in the pressure sensor's range (for a –0.25 to 0.25 Inches WC sensor, the set point can be set anywhere between –0.25 and 0.25 Inches WC).
2. Make sure that VOL DIF STPT is released.

Alarms

ALARM ENA is an analog point whose value determines whether or not a particular alarm activates ALARM DO7.

ALARM ENA Values				
ALARM ENA (value)	**Vent Alarm**	**Alarm Switch**	**Differential Flow Alarm**	**Room Pressure Alarm**
0 (default)	Not enabled	Not enabled	Not enabled	Not enabled
1	Enabled	Not enabled	Not enabled	Not enabled
2	Not enabled	Enabled	Not enabled	Not enabled
3	Enabled	Enabled	Not enabled	Not enabled
4	Not enabled	Not enabled	Enabled	Not enabled
5	Enabled	Not enabled	Enabled	Not enabled
6	Not enabled	Enabled	Enabled	Not enabled
7	Enabled	Enabled	Enabled	Not enabled
8	Not enabled	Not enabled	Not enabled	Enabled
9	Enabled	Not enabled	Not enabled	Enabled
10	Not enabled	Enabled	Not enabled	Enabled

ALARM ENA Values				
ALARM ENA (value)	Vent Alarm	Alarm Switch	Differential Flow Alarm	Room Pressure Alarm
11	Enabled	Enabled	Not enabled	Enabled
12	Not enabled	Not enabled	Enabled	Enabled
13	Enabled	Not enabled	Enabled	Enabled
14	Not enabled	Enabled	Enabled	Enabled
15	Enabled	Enabled	Enabled	Enabled

NOTE:
If ALM ENA is set greater than 15, it will display a 0 and act as though it was set to 0.

Differential Pressure Alarm

Set HI PRESS ALM, to the highest differential pressure level allowed before the differential pressure alarm is triggered. Set LO PRESS ALM, to the lowest differential pressure level allowed before the differential pressure alarm is triggered. HI PRESS ALM and LO PRESS AML are not absolute values; the sign must be included in order to enter these point values properly.

Set PRES ALM DEL to the value specified. This is the delay time. If no value is specified, start with the default value of 30 seconds. Adjust as required to eliminate nuisance alarms.

Set ALARM ENA to a value that enables the pressure alarm if the specification requires annunciation of the pressurization alarm through a local alarm device connected to ALARM DO7.

NOTE:
PRESS ALM is the output point that indicates a differential pressure alarm condition and functions even when ALARM ENA is not set for pressure alarm annunciation.

Differential Flow Alarm

1. To set the differential flow alarm, set DIF ALM DBD to the alarm level specified. If no value is specified, use the default value, provided that the warning that follows is satisfied.

⚠ WARNING

To ensure that VOL DIF ALM turns on before the pressure in the room changes sign, DIF ALM DBD must be less than the absolute value of VOL DIF STPT.

For example, if negative pressure is desired and VOL DIF STPT equals 70 cfm and DIF ALM DBD is 200 cfm, then the room could go positive by almost 130 cfm without the pressure alarm turning on. In this case, if you want the alarm to turn on before the room changes sign, then you must set DIF ALM DBD to be less than 70 cfm.

2. For delay time, set DIF ALM DEL to the value specified. If no value is specified, start with the default value of 30 seconds. Adjust as required to eliminate nuisance alarms.
3. Set ALARM ENA to a value that enables the pressure alarm (4, 5, 6, or 7) if the specification requires annunciation of the pressurization alarm through a local alarm device connected to ALARM DO7.

NOTE:
VOL DIF ALM is the output point that indicates an alarm condition.

Ventilation Alarm

1. Set OC V ALM LVL to the specified alarm level for the occupied mode. It may be specified in air changes per hour. If so, convert it to cfm (lps).
   If no ventilation alarm is required, set OC V ALM LVL to **0** (zero).
2. Set UC V ALM LVL to the specified value for the unoccupied mode. If no unoccupied mode is specified, use the same value as OC V ALM LVL.
   (If ventilation alarms are not required during unoccupied mode, set UC V ALM LVL to **0** (zero).

NOTE:
Setting the alarm level to zero means the ventilation alarm will not turn on just because of a low value for TOTL SUPPLY. However, even if the alarm level is set to zero, the ventilation alarm will still turn on if:

- SUP AIR VOL stays below the currently active supply minimum for a time at least equal to VENT ALM DEL.

and/or

- GEX AIR VOL stays below the currently active general exhaust box minimum for a time at least equal to VENT ALM DEL.

   – In the previous note, the currently active supply flow minimum is OCC SUP MIN during occupancy and UOC SUP MIN during the unoccupied period. Likewise, the currently active general exhaust box minimum is OCC GEX MIN during occupancy and UOC GEX MIN during the unoccupied period.

3. For the alarm delay, set VENT ALM DEL to the value specified. If no value is specified, use the default value.
4. Set ALARM ENA to a value that enables the ventilation alarm (**1**, **3**, **5**, or **7**) if the job specification requires annunciation of the ventilation alarm through a local alarm device connected to ALARM DO7.

NOTE:
VENT ALM is the output point that indicates an alarm condition.

Network Alarms

If must indicate other alarms in the local ALARM DO7, they may be programmed in the field panel to work through NET ALM CMD. No setup is required at the controller to enable this function.

Local Annunciation

ALARM ENA does not enable alarms. It only determines whether a particular alarm activates ALARM DO7. The *ALARM ENA Values Table* shows what is enabled when ALARM ENA is at a particular value.

If ALN ENA is set to any value other than 0, 1, 4, or 5, it will display a 0 and like it was set to 0.

NOTE:
If the job specification requires annunciation of the ventilation alarm through a local alarm device connected to ALARM DO7, then ALARM ENA must be set to a value that enables the ventilation alarm (1 or 5).

- Set ALARM ENA to desired value.

Pressurization Alarm

1. To set the differential flow alarm, set DIF ALM DBD to the alarm level specified. If no value is specified, use the default value, provided that the warning that follows is satisfied.

⚠ WARNING

To ensure that VOL DIF ALM turns on before the pressure in the room changes sign, DIF ALM DBD must be less than the absolute value of VOL DIF STPT.

For example, if negative pressure is desired and VOL DIF STPT equals 70 cfm and DIF ALM DBD is 200 cfm, then the room could go positive by almost 130 cfm without the pressure alarm turning on. In this case, if you want the alarm to turn on before the room changes sign, then you must set DIF ALM DBD to be less than 70 cfm.

2. For delay time, set DIF ALM DEL to the value specified. If no value is specified, start with the default value of 30 seconds. Adjust as required to eliminate nuisance alarms.
3. Set ALARM ENA to a value that enables the pressure alarm (4, 5, 6, or 7) if the specification requires annunciation of the pressurization alarm through a local alarm device connected to ALARM DO7.

NOTE:
VOL DIF ALM is the output point that indicates an alarm condition.

Setting Occupancy Control

OCC ENA is an analog point whose value determines whether or not OCC BUTTON, or OCC SWIT DI2, is enabled.

Table *OCC ENA Values* shows what is enabled when OCC ENA is at a particular value.

OCC ENA Values	
OCC ENA (value)	**Description**
0 (default)	Both OCC BUTTON and OCC SWIT DI2 are disabled.
1	Only OCC BUTTON is enabled.
2	Only OCC SWIT DI2 is enabled.

NOTE:
OCC ENA does not allow both OCC BUTTON and OCC SWIT DI2 to be enabled at the same time. This is because the switch point is a maintained input, while the button point is a momentary input. By setting OCC ENA to 1 or 2, the controller can be configured to be on the lookout for one or the other input type. It cannot be on the lookout for both types of input at the same time.

If OCC ENA is set greater than 2, it will display a 0 and act like it was set to 0.

NOTE:
There is no timeout for the push button input on lab controllers.

1. To set up occupancy control, determine the occupancy triggers required by the job specification.
   - If the controller must set occupancy according to the state of a switch connected to OCC SWIT DI2 set OCC ENA to **2**.
   - If the controller must set occupancy according to the push button on the room thermostat, set OCC ENA to **1**.
   - ⇨ If there are other occupancy criteria, they may be programmed at the field panel to work through NET OCC CMD. The controller does not require any setup for this.
   - ⇨ If network commands are not required and occupancy will be set by sources in the room, set NET OCC CMD to **UNOCC**. (If NET OCC CMD = OCC, the controller stays in occupied mode.)
2. If there is no unoccupied mode specified, do the following:
   - Set OCC ENA to **0** (default).
   - Set NET OCC CMD to **OCC** (default).

Setting Room Temperature Control

To set room temperature control, enter the room temperature setpoint (ROOM STPT) or set the thermostat dial. The room temperature should settle at the setpoint with very little oscillation within an hour. If it does not settle out or reach the setpoint, adjust the room temperature loop gains.

NOTE:
Advanced PID algorithms have been implemented at and near the setpoint to minimize actuator repositioning.

NOTE:
When using a Series 2000 Room Thermostat:
During **unoccupied mode**, you cannot change the Room Setpoint using a Siemens Industry Series 2000 thermostat. Any attempt to change Room Setpoints during unoccupied mode using a Series 2000 stat will be ignored.

During **occupied mode**, the Room Setpoint can be changed using a Series 2000 stat. However, if it is, then the controller initial values should be uploaded to the field panel; otherwise, the controller will not keep the adjusted Room Setpoint value upon return from a power failure.

For more information, contact your local Siemens Industry representative.

Room Temperature Offset (Optional)

TEMP OFFSET is a user-adjustable offset that will compensate for deviations between the value of ROOM TEMP and the actual room temperature. This correct value is displays in CTL TEMP.

CTL TEMP = ROOM TEMP + TEMP 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 TEMP 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.

NOTE:
Update each controller at the field panel immediately after you have completed the controller start-up procedures and made all other changes to the controller's point database, including balancing, tuning, and so on.

Room Temperature Setpoint Limits

If the room temperature sensor has a setpoint dial that will be used, set RM STPT MIN and RM STPT MAX for the minimum and maximum allowable room temperature set point values, respectively. Common values for these points are 65°F (18°C) for RM STPT MIN and 80°F (27°C) for RM STPT MAX.

NOTE:
If CTL STPT is going to be controlled from a field panel, this section can be skipped. When CTL STPT is overridden or controlled by a field panel, RM STPT MIN/MAX are ignored.

Setting Discharge Temperature Control

If the discharge temperature limits are called out in the specification, set DISCH MIN and DISCH MAX according to the specification. If they are not called out, then set the limits according to the desired HVAC system operation. For example, from 55°F to 80°F.

1. Set DISCH MIN to match the temperature supplied by the air handler. It should be set a few degrees lower than the air handler temperature. This will prevent undesired heating if there is some discrepancy between the sensor in the air handler and the one in the supply terminal.
2. Set DISCH MAX according to the heating function required.
   - ⇨ Many lab rooms do not need “heat,” meaning they never need supply air to come in above the room temperature setpoint. The reheat equipment only serves to reduce the cooling effect of the supply airflow. In this case, set DISCH MAX a few degrees higher than the room temperature setpoint.
   - ⇨ Rooms with significant exposure to cold outside conditions may call for discharge temperatures significantly above the room temperature. In these rooms, DISCH MAX should be set to the warmest discharge temperature desired for the heating function—for example, 90 degrees.
3. Check the operation of the discharge temperature loop by overriding DISCH STPT and observing the response of DISCH TEMP. Tune the discharge temperature loop if necessary.
   - ⇨ The discharge temperature loop is more sensitive at low airflow than at high airflow. Check tuning at a low flow (such as minimum) by overriding the setpoint and observing the response of the discharge temperature.
   - ⇨ Overshoot is acceptable as a suggested response (even 5 to 10 degrees), but it should dampen out within 1 or 2 cycles. Small sustained oscillations may be acceptable if they do not overwork the valve. If acceptable performance is achieved at low flow, then the system should be stable, but not too slow at high flow.
4. Release DISCH STPT.

To set room temperature control, enter the room temperature setpoint (ROOM STPT) or set the thermostat dial. The room temperature should settle at the setpoint with very little oscillation within an hour. If it does not settle out or reach the setpoint, adjust the room temperature loop gains.

NOTE:
Advanced PID algorithms have been implemented at and near the setpoint to minimize actuator repositioning.

Setting RH Calculation

Inputs

NOTE:
The AI 3/AI 4 current voltage switch is used to properly set an input of 0-10V or 4-20 mA. (This is the switch on the controller, not an actual point.)

AI 3 / AI 4 - Ranges from 0-10V or 4-20 mA depending on the value of the voltage / current switch for AI 3 (or AI 4).

RH CONFIG - This is an enumerated value used for selecting the physical RH input as well as enabling and disabling the RH control.

Outputs

RM RH - The value, in percentage, of RH (humidification control) at the RM sensor.

The point RM RH is assigned using the percentage value from AI 3 (or AI 4) or it may be overridden by a digital room stat.

RH CONFIG is an enumerated analog point that has the following four mode values:

- **0** - RH control is totally disabled.
- **1** - RH control is enabled. AI 3 and AI 4 are both spare. The value of RM RH is used for RH control and in this mode the value of RM RH is set using PPCL from a field panel or by a digital room stat.
- **3** - RH control is enabled. AI 3 is the input used for calculating RM RH. AI 4 is spare.
- **4** - RH control is enabled. AI 4 is the input used for calculating RM RH. AI 3 is spare.

If RM RH is overridden while in modes 1, 3, or 4, the overridden value is used for RH control purposes.

If RM RH is overridden while in mode 0, there is to be no RH control even if RM RH is overridden to some high value that normally would result in RH control.

Entering a value other than one of these four valid values will return 0; no RH control.

NOTE:
Mode 2 is intentionally skipped so that modes 3 and 4 can be used for inputs 3 and 4 respectively.

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

MODHTG FLO

As a safety feature for jobs where reheat is an electric element, these applications include MODHTG FLO to ensure that adequate airflow is present before reheat is energized. The value is in feet-per-minute (fpm) and is defaulted to 300 fpm, which means that the airflow must be at least 300 fpm before heating output is enabled. (Using fpm (feet per minute) rather than cfm (cubic feet per minute) makes the feature not dependent on duct size.)

A value of 300 fpm equates to the following cfm:

In a 12 inch diameter duct and a typical flow coefficient of 0.7, 300 fpm equates to 158 cfm.

12 inch diameter = 0.75 sq ft

0.75 sq ft * 300 fpm * 0.7 = 158 cfm

In an 8 inch diameter duct and a typical flow coefficient of 0.7, 300 fpm equates to 74 cfm.

8 inch diameter = 0.35 sq ft

0.35 sq ft * 300 fpm * 0.7 = 74 cfm

The default value of 300 fpm can be raised or lowered as required based on the manufacturer's minimum flow recommendation for a given electric reheat element. As the fpm changes by a certain percentage, the associated minimum cfm for a given duct size will also change by that same percentage.

If the application uses hot water heat rather than electric heat, then MODHTG FLO may be set lower than the default value of 300. This would allow reheating to occur even if for some reason the box is operating well below its designated minimum flow setting.

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:
   - **Instance Number** – unique to BACnet network (valid values are 0 through 4,194,303).
   - **Object Name** – unique to BACnet network (30 alphanumeric character limit in RAD50).
   - **Device Description** – description of controller (60 alphanumeric character limit).

- **Device 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 do one of the following:
   - Check the **MS/TP Slave** check box if the controller is to function as a slave device (when address range is 0 through 127).
   - Set the **Max 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. Use **38400** for optimal use with WCIS.
   - If using a communicating digital Room Unit, the baud rate uses whatever rate the network is using or sets it 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 continuously flashes On/Off rapidly. This indicates a 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 66*xx* 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*.

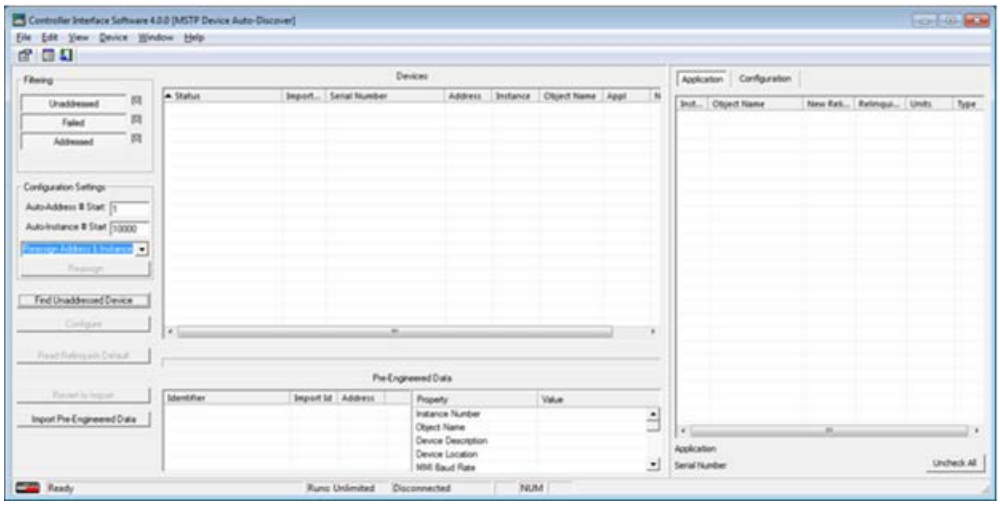
NOTE:
The current workflow will continue to support setting the baud rate and address for each controller using the HMI port or at the room unit.

▷ All BACnet PTEC controllers (standard 66*xx* 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 the 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).

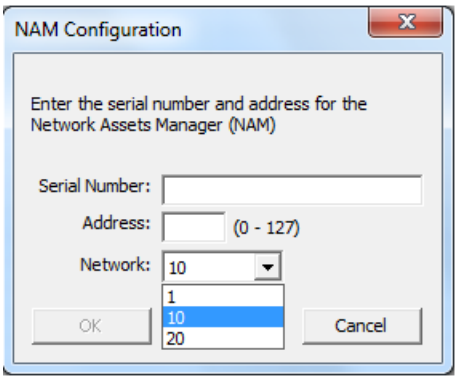
Auto-Discovery

- **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 [→ 28].

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.

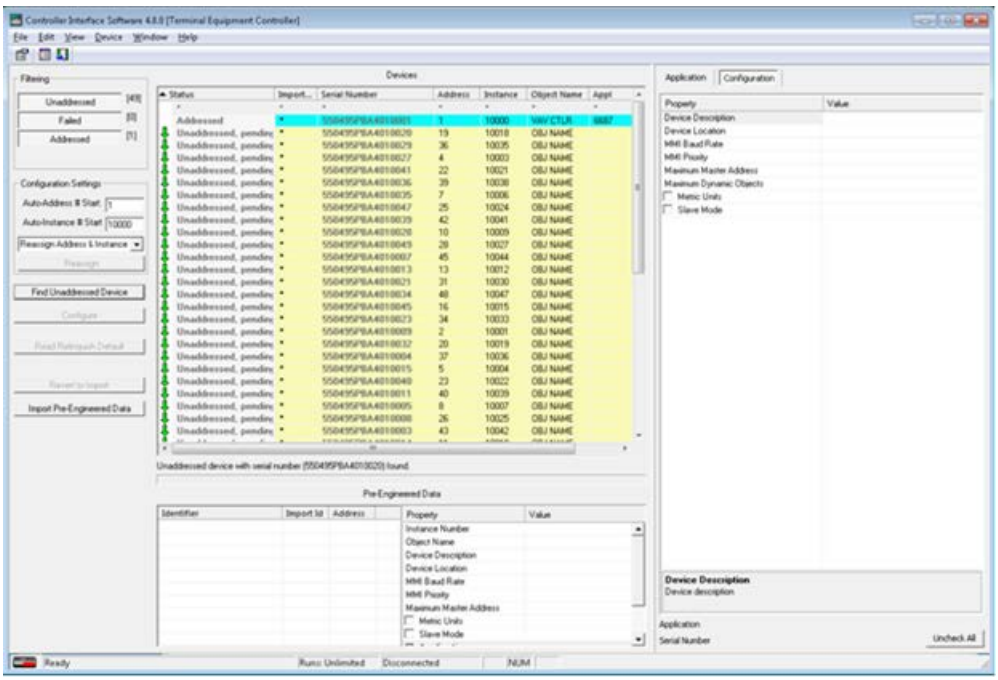


  – Enter the serial number (found on print from electrician).
  – Enter a unique (unused) address (0 through 127).
  – Click **OK**.

  ⇨ 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.

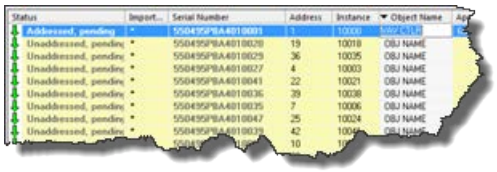


Configuring Discovered Devices

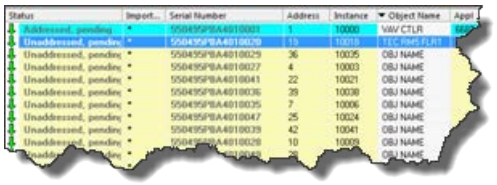
Each device on the network must have unique identifiers in the following fields:

- 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.

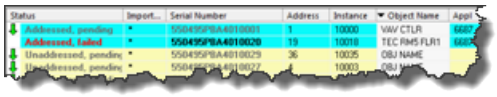


2. When all fields are defined, click **Configure**.



   ⇨ 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.
  - 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 [➞ 29].

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 are updated 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**.
4. Click **Configure**.

⇨ The Application will load into each controller selected. The **Application** and **Configuration** tabs are updated 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 set up 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 set up 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

NOTE:
When re-loading/flashing firmware, existing PPCL may no longer function correctly.

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**.

The Start-up is complete.

Start-up Notes

This section includes notes on operating with only a supply or general exhaust box.

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