

Variable Air Volume (VAV) Application Sheet (Cooling Only)



Introduction to P864 Built-in Application

Optergy has a built-in application for Variable Air Volume (VAV) and can be published from the web user interface of the P864. This application is intended to be used in a stand-alone application that is to say, it is a program that can be published before a server is onsite.

To use this application, follow these steps:

1. Login into P864 with user credentials.
2. Navigate to the VAV Operations tab.
3. Fill in the appropriate fields.
4. Press 'Activate VAV Operation'.
 - a. This will overwrite any other program that may be running.
 - b. There is no user audit, as it is assumed there is no server in place during this operation.
5. Press 'Update BACnet Points' to refresh data.

The VAV program will then be operational without the need for a server on site, and can be commissioned immediately. The DDC program is a cooling only application, this means if you need additional control, the user will need to create additional programming code to support added functionality.

The user can optionally import the program from a controller using an Optergy server (v 3.0.0 and later), edit the program and send back to one or more controllers as needed.

Sequence of Operation

The VAV program features this Sequence of Operation:



Occupancy Control and Space Sensor Temperature Alarms

The Occupied Setpoint Mode is activated when the Occupied Command (BV-5040) is turned ON (e.g. Time schedule), or when the occupant has initiated an after-hours override. Also, the P864 defaults to Occupied Setpoint Mode if communication is lost with the building controller (if no local schedule is present). Finally, either a Warmup Command (BV-5041) or a Cooldown Command (BV-5043) activates the Occupied Setpoint Mode.

A Bad Space Sensor Alarm is activated if the room temperature sensor indicates a temperature greater than 120°F/50°C or less than 40°F/5°C.

After the unit has been in Occupied Mode for at least 2 hours, "space too warm" or "space too cold" alarms are triggered if the room temperature is more than 3°F/2°C above the current cooling setpoint or more than 3°F/2°C below the current heating setpoint, respectively.



Occupied Heating and Cooling Setpoint Calculation

Occupied heating and cooling setpoint are calculated from the Occupied Setpoint, Heating and Cooling Offsets for potential use by an external optimum start program. Note that the current heating and cooling setpoints are calculated internally by the P864, no programming is required.



Zone Indicator

Space Temperature is compared with the current heating and cooling setpoints to calculate a zone indicator value for use on templates or displays. Space Too Warm value (BV-5026) that the zone is warmer than the Current Cooling Setpoint, Space Too Cold value (BV-5025) indicates that the zone is below the Current Heating Setpoint.



Damper Motor Control Output

When the system calls for more air (AHU is commanded ON, and the Occupied Command is ON, and there is a need for more air, a signal is sent to drive BO-5 ON (damper motor open command), conversely if the Damper is commanded to close a signal to drive BO-6 ON (damper motor close command). This signal is limited by the motor drive time AV-1016.



Airflow Indicator

The system uses a factory calibrated sensor that outputs a 0-500 PA (0-2 "WC) this pressure value is available as AI-98 (Pa or " WC), and the airflow on AI-99 (L/s or CFM).

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The VAV program features the following Points Lists:

Analog Input

Device Name	Object Instance	Object Name	Description
864079	1	Analog Input 1	Zone Temp
864079	98	Analog Input 98	Pressure Sensor Reading
864079	99	Analog Input 99	Actual Airflow

Analog Value

Device Name	Object Instance	Object Name	Description
864079	5010	Analog Value 5010	Max Airflow
864079	5011	Analog Value 5011	Min Airflow
864079	5012	Analog Value 5012	Zero Cutoff Velocity
864079	5013	Analog Value 5013	Max Reheat Airflow
864079	5014	Analog Value 5014	Desired Airflow
864079	5015	Analog Value 5015	Calculated Cutoff Airflow
864079	5016	Analog Value 5016	Motor Drive Time
864079	5017	Analog Value 5017	Motor Position (Est)
864079	5020	Analog Value 5020	Box Size
864079	5021	Analog Value 5021	Calibration Max Airflow
864079	5022	Analog Value 5022	Calibration Min Airflow
864079	5023	Analog Value 5023	Calculated K-Factor from Calibration Max and Min
864079	5024	Analog Value 5024	K-Factor Override
864079	5025	Analog Value 5025	Duct Height
864079	5026	Analog Value 5026	Duct Width
864079	5027	Analog Value 5027	Duct Diameter
864079	5050	Analog Value 5050	Zone Temp Setpoint
864079	5051	Analog Value 5051	Heating Offset

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The VAV program features the following Points Lists:

Analog Value

Device Name	Object Instance	Object Name	Description
864079	5052	Analog Value 5052	Cooling Offset
864079	5053	Analog Value 5053	Heating Setpoint
864079	5054	Analog Value 5054	Cooling Setpoint
864079	5055	Analog Value 5055	Setpoint High Limit
864079	5056	Analog Value 5056	Setpoint Low Limit
864079	5057	Analog Value 5057	Cooling Signal
864079	5058	Analog Value 5058	Heating Signal
864079	5059	Analog Value 5059	Airflow Ratio
864079	5060	Analog Value 5060	Supply Air Temperature
864079	5070	Analog Value 5070	Internal Point
864079	5071	Analog Value 5071	Internal Point
864079	5072	Analog Value 5072	Internal Point
864079	5073	Analog Value 5073	Internal Point
864079	5074	Analog Value 5074	Internal Point
864079	5075	Analog Value 5075	Internal Point
864079	5076	Analog Value 5076	Internal Point
864079	5077	Analog Value 5077	Internal Point
864079	5078	Analog Value 5078	Internal Point
864079	5079	Analog Value 5079	Internal Point
864079	5080	Analog Value 5080	Internal Point
864079	5081	Analog Value 5081	Internal Point
864079	5082	Analog Value 5082	Clg Damper Pos
864079	5083	Analog Value 5083	Internal Point
864079	5084	Analog Value 5084	Internal Point
864079	5085	Analog Value 5085	Internal Point
864079	5086	Analog Value 5086	Internal Point
864079	5087	Analog Value 5087	Analog Value 5087

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The VAV program features the following Points Lists:

Binary Input

Device Name	Object Instance	Object Name	Description
864079	100	Binary Input 100	Pressure Sensor Detected

Binary Output

Device Name	Object Instance	Object Name	Description
864079	5	Binary Output 5	Damper Open
864079	6	Binary Output 6	Damper Closed

Binary Value

Device Name	Object Instance	Object Name	Description
864079	5000	Binary Value 5000	Device Configuration - Units
864079	5001	Binary Value 5001	VAV Box Type
864079	5002	Binary Value 5002	Program Initialization
864079	5010	Binary Value 5010	Bad Sensor
864079	5011	Binary Value 5011	AH Status
864079	5012	Binary Value 5012	Force Min Airflow
864079	5013	Binary Value 5013	Force Max Airflow
864079	5014	Binary Value 5014	Force Damper Open
864079	5015	Binary Value 5015	Force Damper Closed
864079	5016	Binary Value 5016	No Main Airflow
864079	5025	Binary Value 5025	Space Too Cold
864079	5026	Binary Value 5026	Space Too Warm

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The VAV program features the following Points Lists:

Binary Value

Device Name	Object Instance	Object Name	Description
864079	5040	Binary Value 5040	Time Schedule
864079	5041	Binary Value 5041	OS Warmup
864079	5042	Binary Value 5042	OS Cooldown
864079	5043	Binary Value 5043	Afterhours
864079	5064	Binary Value 5064	Occupied Command
864079	5070	Binary Value 5070	Internal Point
864079	5071	Binary Value 5071	Internal Point
864079	5072	Binary Value 5072	Internal Point
864079	5073	Binary Value 5073	Internal Point
864079	5074	Binary Value 5074	Internal Point

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The VAV Program

P864 VAV Operation

Optergy Description: p864 Instance: 864077 Location: Date: 9/6/19, 8:43AM admin

Device Configuration | VAV Operations | Inputs/Outputs Live Data

AV-5014 Desired Air Flow 800cfm
AV-5020 Box Size 8
AV-5017 Motor Position 75%
AV-98 Pressure Sensor 0 psi
AV-99 Airflow 0 cfm
AI-1 Zone Temperature -3.2°F
AV-5053 Heating SetPoint 63°F
AV-5054 Cooling SetPoint 67°F

Force Open BV-5014
Force Close BV-5015
Max Air Flow BV-5013
Min Air Flow BV-5012
Auto

Current Air Flow
 - Damper Override: Auto
 - Min Air Flow: 200.0 AV-5011 cfm
 - Max Air Flow: 800.0 AV-5010 cfm
 - Zero Cutoff Velocity: 100.0 AV-5012 %
 - Reheat Max Airflow: 400.0 AV-5013 cfm

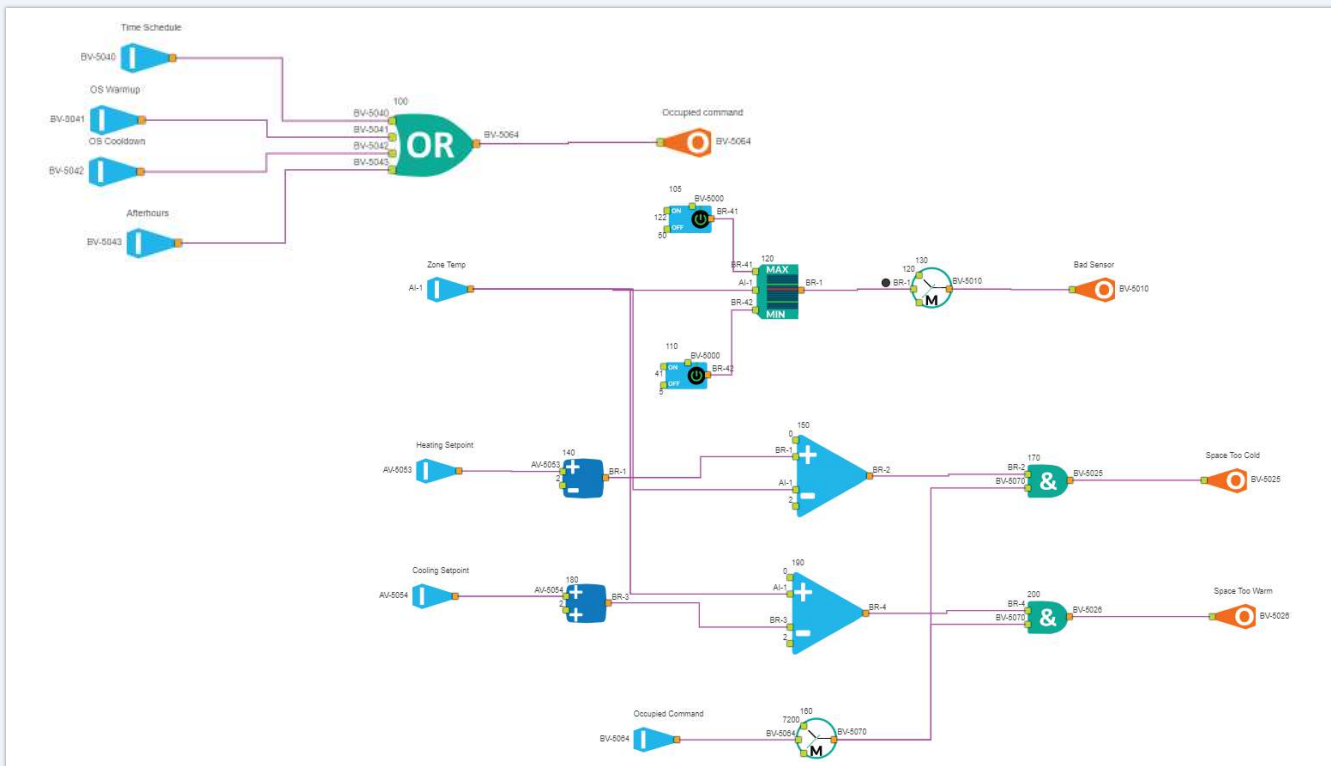
VAV Box Data
 - Vav Box Type: Round BV-5001 Round or Square
 - Duct Diameter: 8.0 AV-5027 in

VAV Balancing
 - Time Schedule: Active BV-5040 Active or Inactive
 - Calibration Max Airflow: 800.0 AV-5021
 - Calibration Min Airflow: 200.0 AV-5022
 - Motor Drive Time: 15.0 AV-5016 S

Temperature Settings
 - Zone Temp SetPoint: 65.0 AV-5050 °F
 - Heating Offset: 2.0 AV-5051 °F
 - Cooling Offset: 2.0 AV-5052 °F
 - SetPoint High Limit: 72.0 AV-5055 °F
 - SetPoint Low Limit: 68.0 AV-5056 °F

Activate VAV Operation | Update BACnet Points

Zone Status

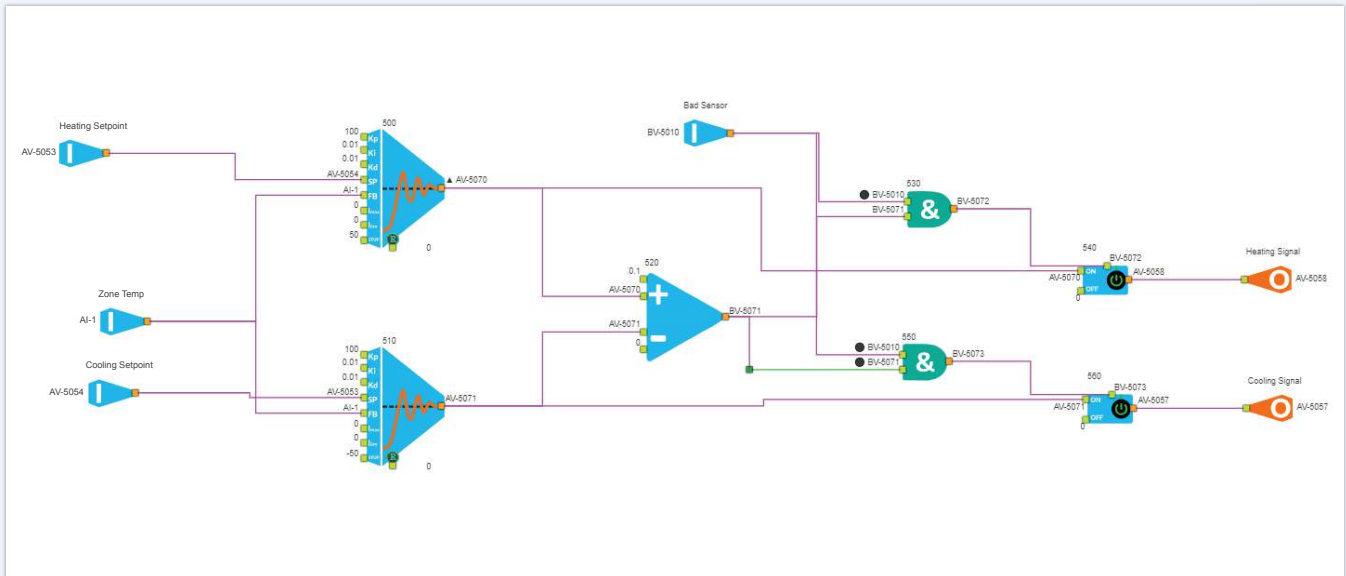


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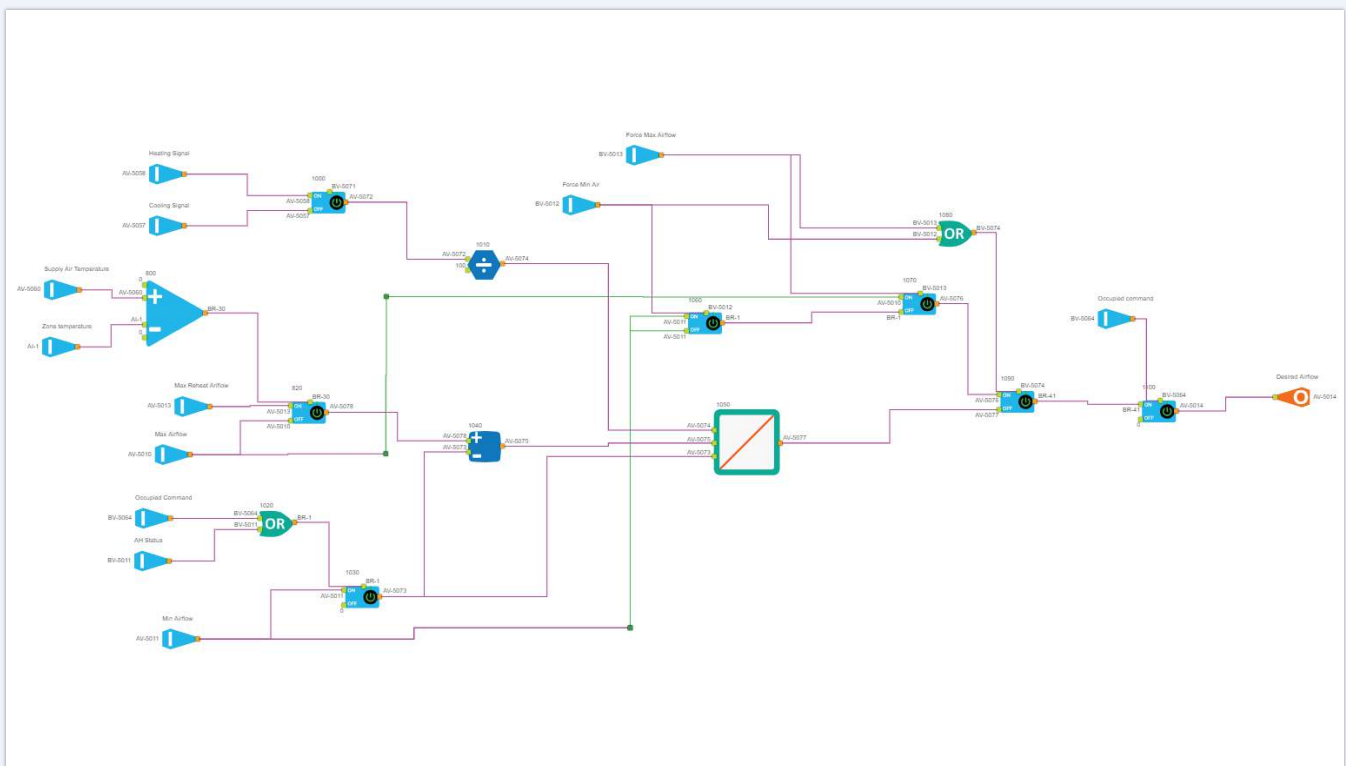


The VAV Program

Heating and Cooling Signals



Desired Airflow

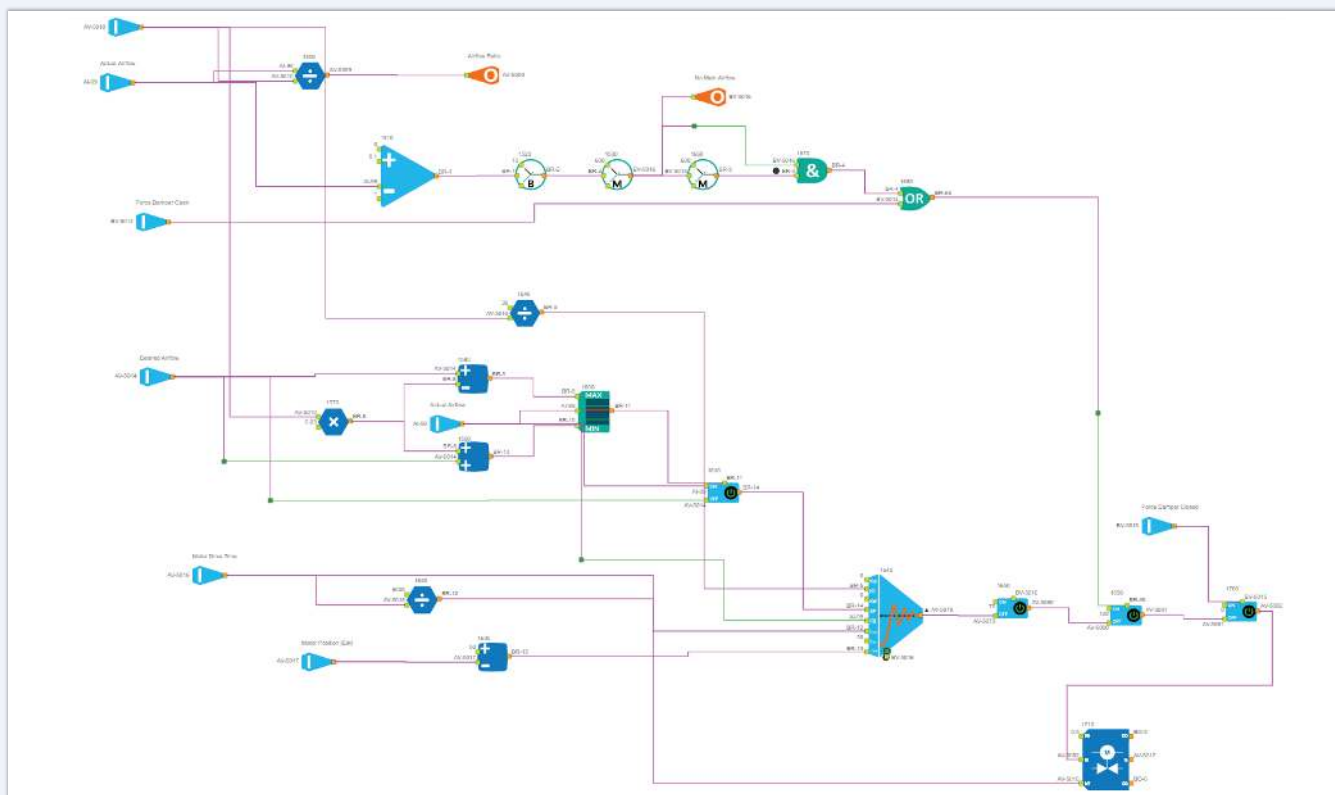


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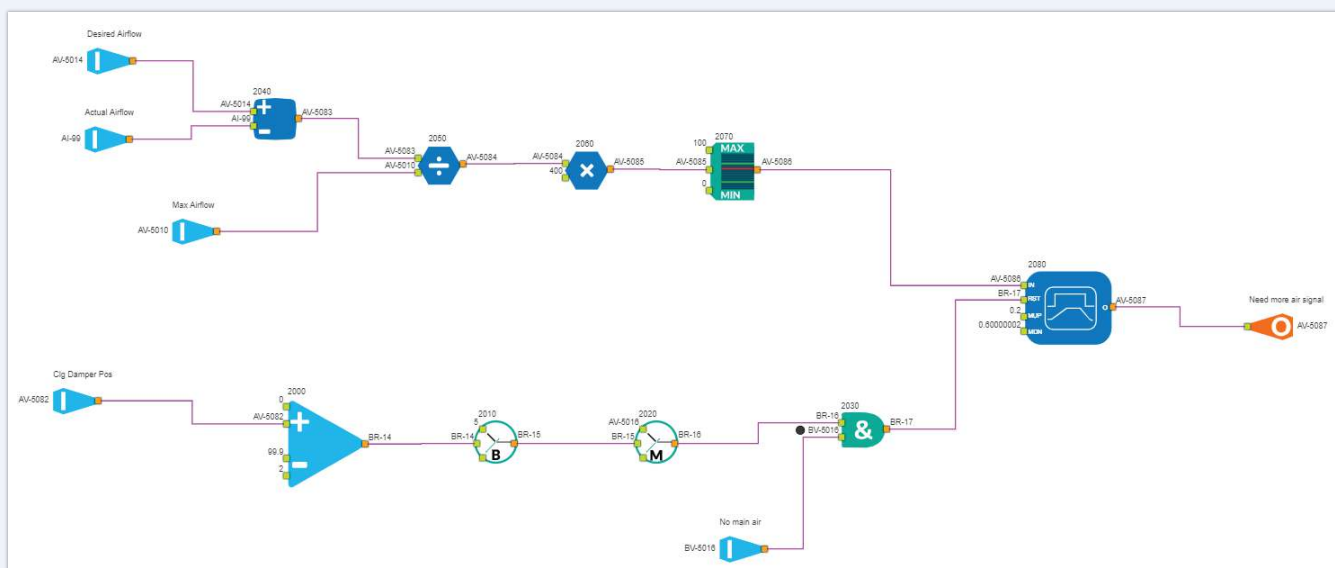


The VAV Program

Damper Control



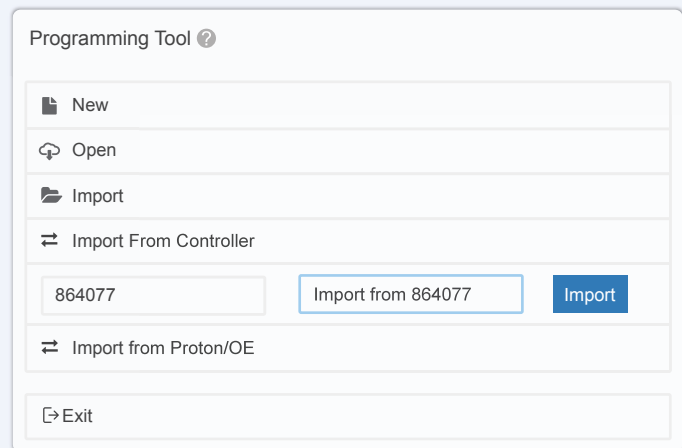
Need More Air



Editing the Program (Using Proton/OE)

To edit the program using Proton or OE (version 3.0.0 and higher), follow these steps:

1. Navigate to a Proton or OE on the same BACnet network.
2. Open the Programming tool.
3. Select File>Import from Controller.
4. Choose Device Instance (must already be scanned in).
5. Select a file name to associate.
6. Press 'Import'.



The VAV program is now ready to edit and modify or add new functionality. For example If the user wanted to add CO2 Monitoring and the default program does not have this, the user can import the program and add new code in addition to the default code.

Descriptors:

Each point used in the code can have a description (BACnet Object>Description Property), the program can write these values. To modify or add new descriptions the user can add/edit the input tags or output tags.



Descriptors can be sent with the Program overwriting any previously entered text strings from data displays. The user (with appropriate permission) can overwrite these from a data display (AV/BV/AI/BI/AO/BO/MSV/MI/MV), from the P864 web user interface the user has access to description to hardware points only, AI/BI/AO/BO

If the user writes a new description from the web user interface after the program has been sent, then the new description will stay until it is re-written by the user from a display or if the Program is sent with descriptors.