



# Controls System

Selecting Parts for VAV and Zoning Systems



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# AAON Controls System: Selecting Parts for VAV and Zoning Systems

## VAV Systems

VAV systems typically consist of a cooling only HVAC unit and VAV terminal units located in the downstream ductwork that are used to control the volume and temperature air delivered to the various building zones. The HVAC unit may have gas or electric heat, but it is typically sized and applied for morning warm-up purposes.

## Zoning Systems

Zoning systems consist of one or more heat/cool changeover HVAC units with voting zones located in the downstream ductwork. These zones will each vote for the unit to operate either in cooling or heating mode depending on their individual needs. Once the zones calling for a particular mode are satisfied, the system can switch to the opposite mode if other zones are calling for that mode.

## System Configuration

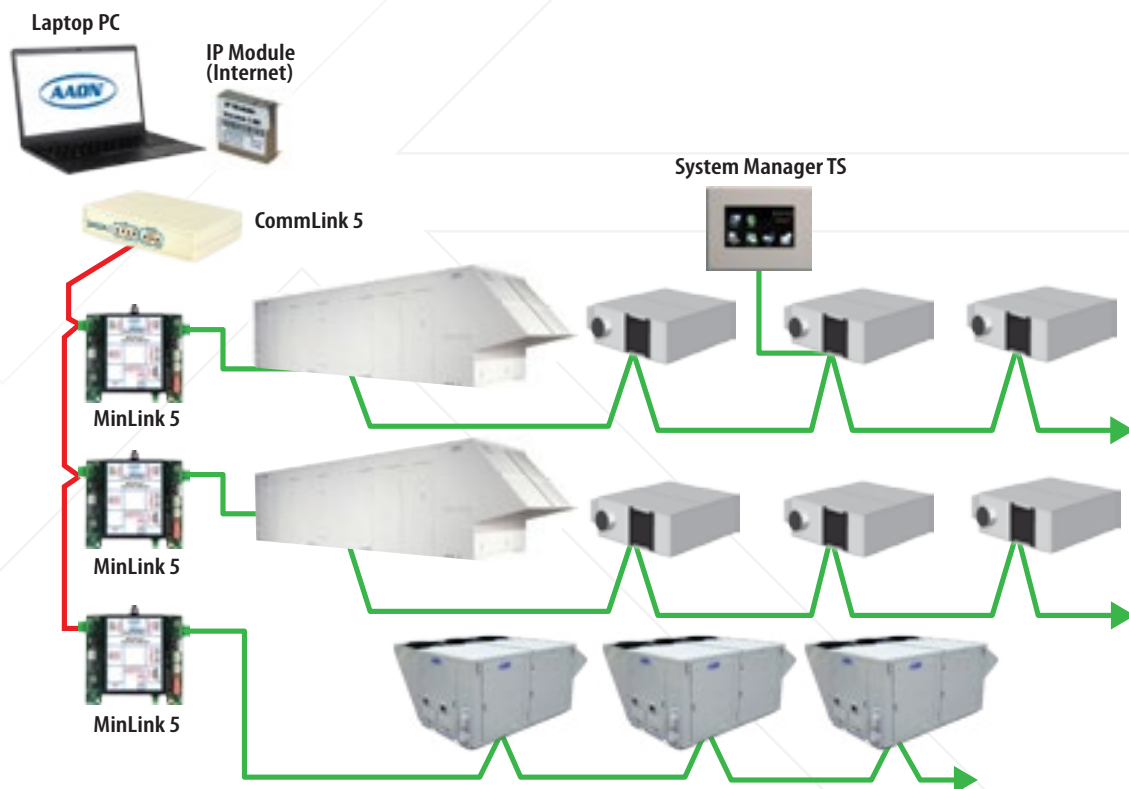
### Networked

The Networked configuration is used any time the HVAC system has VAV/Zone Controllers. The Networked configuration provides dynamic communications between all controllers on the Network. This allows programming and status monitoring of all the controllers from a central location.

This configuration requires a CommLink 5 Interface. The CommLink 5 is a high speed communication device that allows all the controllers on a system to communicate with each other. Additionally, this configuration requires one MiniLink Polling Device per RTU with VAV/Zone Controllers. The MiniLink creates the local loops within the network.

The CommLink 5 allows for up to 60 local loops, while the MiniLink allows up to 59 controllers per loop. This provides the capability of connecting over 3500 controllers on a Networked system. The controllers on each loop are daisy-chained together using two conductor shielded communication wire.

Optionally, the System Manager TS-L is an end user interface that can be used for limited configuration and monitoring of the control system. It has a color touch screen display and intuitive graphical user interface. It can be located on any local loop on the system. Multiple System Manager TS-L end user interfaces can also be used if desired.

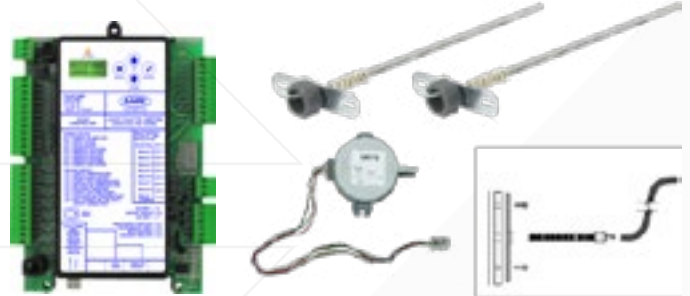


## Selection Process

The 7 steps below can be followed to easily create a bill of materials for your VAV or Zoning system.

### Step 1 Determine the quantity of HVAC Units that will serve VAV boxes or Zone Dampers on the job. Each of these units will require the following parts:

- Qty. 1 • ASM01698 • VCCX2 Controller
- Qty. 2 • G051250 • Duct Temp Sensors
- Qty. 1 • ASM01640 • Duct Static Pressure Sensor
- Qty. 1 • ASM02242 • Duct Static Pressure Pick-up Tube



**Note 1:** The RTU may already have some or all of the above-mentioned parts, depending on the features selected.

**Note 2:** At the jobsite there must be at least one Outside Air Temperature Sensor. This value can then be broadcast to all the units.

### Step 2 Select the number of MiniLinks needed

The MiniLink 5 creates a local network loop that the controller(s) and System Manager(s) reside on. Select one MiniLink per unit that is serving VAV boxes or Zone Dampers.

- Qty. 1 • ASM01626 • MiniLink Polling Device 5

**Note:** If there are additional units on the job that do not have VAV boxes or Zone Dampers, these RTUs may reside on a MiniLink with a system that has VAV boxes or Zone Dampers. Please keep in mind that each MiniLink local loop will support up to 59 devices.



### Step 3 Select Communications Interfaces

At the bare minimum, the jobsite will need to have a CommLink 5 on site.

The CommLink 5 is used to transfer communication between controllers or local loops on the control system. It can also be used as an interface for connection of a Microsoft computer (with Prism 2 installed) to the system.

If remote access is required, an IP Module must be added to the CommLink 5. The IP Module installs inside the CommLink 5 Communications Interface and provides a TCP/IP Port connection from the AAON control system to a building's Ethernet LAN, providing communications with the control system through any PC (with Prism 2 installed) connected to the LAN or the Internet.

- Qty. 1 • ASM01874 • CommLink 5
- Qty. 1 • ASM01902 • IP Module Kit



**Note:** The CommLink 5 is capable of supporting up to 60 MiniLinks.

## Step 4 Select Additional Communication Devices

The following are Communication Devices that, although not required, can enhance the customer's experience:

Qty. 1 • ASM01900 • System Manager TS-L

The System Manager TS-L provides a direct, graphic-enhanced, menu-driven link to allow the end user limited access to the system. With this device the user can change space temperature setpoints, change schedules, view status points, and view certain alarms of all controllers on the AAON Controls System.



Qty. 1 • ASM02244 • USB Link 2

The USB Link 2 is a portable device that is used as an interface to connect a PC with Prism2 to AAON controllers at the unit. This device is normally supplied to service personnel for initial configuration, service and troubleshooting needs.

## Step 5 Select VAV/Zone Controllers

AAON does not offer VAV Boxes, however, the Control and Actuator Packages below can be selected to be mounted on any standard VAV box. Similarly, when dampers are being supplied by a third party, the AAON Controls product line offers two types of Zone Controller Packages; Pressure Dependent and Pressure Independent.

Select quantity based on the total number of zones on the system.

Qty. 1 • ASM02661 • Pressure Dependent VAV/Zone BACnet Controller Package

- Includes: Pressure Dependent VAV/Zone BACnet Controller and Actuator.

Qty. 1 • ASM02662 • Pressure Independent VAV/Zone BACnet Controller Package

- Includes: Pressure Independent VAV/Zone BACnet Controller and Actuator.

Qty. 1 • ASM02653 • Pressure Dependent Rectangular Damper Kit

- Includes: Pressure Dependent VAV/Zone BACnet Controller and Actuator with enclosure.



**Note 1:** If dampers or VAV Boxes are being supplied by a third party source, the controls can be drop shipped directly to the manufacturer of choice.

**Note 2:** For Zoned Systems see directions on following page.

## Step 6 Select VAV/Zone Controller Expansion Module

ASM01629 • VAV/Zone Controller Expansion Module

The VAV/Zone Expansion Module allows Fan & Heat control of terminal units, including series and parallel fan terminal units with up to 3 stages of reheat, SCR electric heat, or modulating hot water heat as well as 1 stage of auxiliary heat.

**Note:** If dampers or VAV Boxes are being supplied by a third party source, the controls can be drop shipped directly to the manufacturer of choice.



## Step 7 Select Room Sensor

Regardless if the system is VAV or Zoned, each zone will require its own room temperature sensor. Select one sensor for each of the zones from the following list:

- ASM02227 • Standard Room Sensor – Plain
- ASM01638 • Standard Room Sensor – w. Override
- ASM01642 • Standard Room Sensor – w. Slide Adjust
- ASM01643 • Standard Room Sensor – w. Override and Slide Adjust
- ASM01819 • Digital Room Temperature Sensor

Typically, the Digital Room Sensor is hard wired to the VAV/Zone Controller or can use the optional EBC E-BUS Cables.



## For Zoned Systems replace step 5 with the following:

The AAON Controls product line provides Round and Rectangular Dampers. Round Dampers come with VAV/Zone Controller and Actuator mounted from the factory. However, if Rectangular Dampers are needed the Control and Actuator Packages are purchased separately.

## Select Zoned Dampers.

The AAON Controls product line offers round and rectangular dampers for Zoned application.

### Pressure Dependent Round Dampers:

Pressure Dependent system does not have an air flow sensor and its minimum and maximum airflow is set based on a percentage.

- ASM02605 • PD BACnet Round Zone Damper Assembly - (6 inches)
- ASM02606 • PD BACnet Round Zone Damper Assembly - (8 inches)
- ASM02607 • PD BACnet Round Zone Damper Assembly - (10 inches)
- ASM02608 • PD BACnet Round Zone Damper Assembly - (12 inches)
- ASM02609 • PD BACnet Round Zone Damper Assembly - (14 inches)
- ASM02610 • PD BACnet Round Zone Damper Assembly - (16 inches)

### Pressure Independent Round Dampers:

Pressure Independent system has an air flow sensor and its minimum and maximum airflow is based on actual CFM.

- ASM02611 • PI BACnet Round Zone Damper Assembly - (6 inches)
- ASM02612 • PI BACnet Round Zone Damper Assembly - (8 inches)
- ASM02613 • PI BACnet Round Zone Damper Assembly - (10 inches)
- ASM02614 • PI BACnet Round Zone Damper Assembly - (12 inches)
- ASM02615 • PI BACnet Round Zone Damper Assembly - (14 inches)
- ASM02616 • PI BACnet Round Zone Damper Assembly - (16 inches)

Size all Zone Dampers based on the required zone CFM per design calculations. The recommended velocity for selecting Pressure Dependent Zone Dampers is 1000 to 1500 FPM. Pressure Independent Zone Dampers must be selected below 1200 FPM for proper airflow sensor operation. For quiet operation, it is recommended all Zone Dampers be selected for 1000 FPM or lower velocity.

Size all Bypass Dampers to handle 60% to 70% of the HVAC units rated CFM. The recommended velocity for selecting Bypass Dampers is 1750 to 2000 FPM.

Round Air Damper Selection						
Air Damper Round Duct Size (Area Ft <sup>2</sup> )	6" (0.196)	8" (0.349)	10" (0.545)	12" (0.785)	14" (1.069)	16" (1.396)
Velocity through Round Air Damper (FPM)	Volume through Round Air Damper (CFM)					
750 - P.I. or P.D. Zone	147	262	409	589	802	1047
1000 - P.I. or P.D. Zone	196	349	545	785	1069	1396
1250 - P.I. or P.D. Zone	245	436	681	981	1336	1745
1500 - P.I. or P.D. Zone	294	523	818	1178	1604	2094
1750 - Bypass Only	<i>Bypass dampers are not available in these sizes</i>		954	1374	1871	2443
2000 - Bypass Only			1090	1570	2138	2792
2250 - Bypass Only			1226	1766	2405	3141

## Rectangle Dampers:

The Rectangular Dampers are used in an application where a rectangular duct is specified or required because of space limitations or job requirements. The Rectangular Damper utilizes opposed blades for improved airflow control.

Rectangular Damper Selection Data															
Damper Height (B)	8"	10"	12"	14"	16"	18"	20"	22"	24"	26"	28"	30"	32"	34"	36"
Damper Width (A)	Airflow Through Rectangular Damper CFM at 1000 FPM Velocity														
8"	260	380	490	560	670	790	860	970	1080	1160	1270	1380	1460	1570	1590
10"	330	470	610	700	840	980	1080	1220	1350	1450	1590	1730	1820	1960	1990
12"	400	560	730	840	1010	1180	1290	1460	1630	1740	1910	2070	2190	2350	2390
14"	460	660	850	980	1180	1370	1510	1700	1900	2030	2220	2420	2550	2750	2780
16"	530	750	970	1130	1350	1570	1720	1940	2170	2320	2540	2760	2920	3140	3180
18"	590	840	1090	1270	1520	1770	1940	2190	2440	2610	2860	3110	3280	3530	3580
20"	660	940	1220	1410	1680	1960	2150	2430	2710	2900	3180	3460	3650	3920	3980
22"	730	1030	1340	1550	1850	2160	2370	2670	2980	3190	3500	3800	4010	4320	4370
24"	790	1130	1460	1690	2020	2350	2580	2920	3250	3480	3810	4150	4380	4710	4770
26"	860	1220	1580	1830	2190	2550	2800	3160	3520	3770	4130	4490	4740	N/A	N/A
28"	920	1310	1700	1970	2360	2750	3010	3400	3790	4060	4450	4840	N/A	N/A	N/A
30"	990	1410	1820	2110	2530	2940	3230	3650	4060	4350	4770	N/A	N/A	N/A	N/A
32"	1060	1500	1940	2250	2690	3140	3440	3890	4330	4640	N/A	N/A	N/A	N/A	N/A
34"	1120	1590	2070	2390	2860	3340	3660	4130	4600	N/A	N/A	N/A	N/A	N/A	N/A
36"	1190	1690	2190	2530	3030	3530	3880	4380	4880	N/A	N/A	N/A	N/A	N/A	N/A

Zone Dampers should be sized based on the required zone CFM. The table below is calculated based on 1000 FPM velocity through the Rectangular Damper. Zone Damper recommended velocity is 1000-1500 FPM. Select 1000 FPM or less for quiet operation. For other velocities, use the following multiplier to obtain the correct CFM: 500 FPM = 0.5, 750 FPM = .75, 1250 FPM = 1.25, 1500 FPM = 1.5, 2000 FPM = 2.0, 2250 FPM = 2.25

Bypass Dampers should be selected for 60% to 70% of the HVAC units rated CFM capacity. Recommended Bypass Damper velocity is 1750 - 2250 FPM.

## Additional Components.

### Bypass:

If the system has bypass dampers select from any of the following round bypass dampers:

- ASM01928 • Round Bypass Damper Assembly (10 inches)
- ASM01929 • Round Bypass Damper Assembly (12 inches)
- ASM01930 • Round Bypass Damper Assembly (14 inches)
- ASM01931 • Round Bypass Damper Assembly (16 inches)

If using rectangular dampers or if dampers are being supplied by other, select the following bypass actuator:

- G045890 • Bypass Damper Actuator
- ASM02338 • Bypass Rectangular Damper Kit

## Slave Zones.

If the system was designed to have slaved zones choose from any of the following Round Slaved Zone Dampers:

- ASM01932 • PD Round Slaved Zone Damper Assembly (6 inches)
- ASM01933 • PD Round Slaved Zone Damper Assembly (8 inches)
- ASM01934 • PD Round Slaved Zone Damper Assembly (10 inches)
- ASM01935 • PD Round Slaved Zone Damper Assembly (12 inches)
- ASM01936 • PD Round Slaved Zone Damper Assembly (14 inches)
- ASM01937 • PD Round Slaved Zone Damper Assembly (16 inches)

If using rectangular dampers or if dampers are being supplied by others, select the following Slaved Kit:

- ASM01851 • Slaved VAV/Zone Damper Kit
- ASM02252 • Slaved VAV/Zone Rectangular Damper Kit

**Note:** Up to two slaved zones per each VAV/Zone zone controller.

# Select VAV Components

Unit Controllers and Sensors – Communication Components – VAV/Zone Components  
Space Sensors – VAV/Zone Expansion Modules

Unit Controllers and Sensors			Communication Components			Space Sensors		
Qty.	Description	AAON Parts Number	Qty.	Description	AAON Parts Number	Qty.	Description	AAON Parts Number
	VCCX2 Controller	ASM01698		MiniLink 5	ASM01626		Standard Room Sensor – Plain	ASM02227
	Duct Temperature Sensor	G051250		CommLink 5	ASM01874		Standard Room Sensor – w. Override	ASM01638
	Duct Static Pressure Sensor	ASM01640		IP Module Kit	ASM01902		Standard Room Sensor – w. Slide Adjust	ASM01642
	Duct Static Pressure Pick-up Tube	ASM02242		System Manager TS	ASM01900		Standard Room Sensor – w. Override and Slide Adjust	ASM01643
	Outside Air Temperature Sensor	G042230		USB Link 2	ASM02244		Digital Room Temperature Sensor	ASM01819

VAV/Zone Components			VAV/Zone Expansion Module		
Qty.	Description	AAON Parts Number	Qty.	Description	AAON Parts Number
	PD VAV/Zone Controller Package	ASM02661		VAV/Zone Controller Expansion Module	ASM01629
	PI VAV/Zone Controller Package	ASM02662			
	PD Rectangular Damper Kit	ASM02653			

# Select Zoning Components

Pressure Dependent Round Dampers – Pressure Independent Round Dampers – Round Bypass Dampers  
Round Slave Dampers – Bypass Actuators – Slaved Actuators - Rectangular Dampers

Pressure Dependent Round Dampers		
Qty.	Description	AAON Parts Number
	PD Round Zone Damper Assembly (6 inches)	ASM02605
	PD Round Zone Damper Assembly (8 inches)	ASM02606
	PD Round Zone Damper Assembly (10 inches)	ASM02607
	PD Round Zone Damper Assembly (12 inches)	ASM02608
	PD Round Zone Damper Assembly (14 inches)	ASM02609
	PD Round Zone Damper Assembly (16 inches)	ASM02610

Pressure Independent Round Dampers		
Qty.	Description	AAON Parts Number
	PI Round Zone Damper Assembly (6 inches)	ASM02611
	PI Round Zone Damper Assembly (8 inches)	ASM02612
	PI Round Zone Damper Assembly (10 inches)	ASM02613
	PI Round Zone Damper Assembly (12 inches)	ASM02614
	PI Round Zone Damper Assembly (14 inches)	ASM02615
	PI Round Zone Damper Assembly (16 inches)	ASM02616

Round Slave Dampers		
Qty.	Description	AAON Parts Number
	PD Round Slaved Zone Damper Assembly (6 inches)	ASM01932
	PD Round Slaved Zone Damper Assembly (8 inches)	ASM01933
	PD Round Slaved Zone Damper Assembly (10 inches)	ASM01934
	PD Round Slaved Zone Damper Assembly (12 inches)	ASM01935
	PD Round Slaved Zone Damper Assembly (14 inches)	ASM01936
	PD Round Slaved Zone Damper Assembly (16 inches)	ASM01937

Round Bypass Dampers		
Qty.	Description	AAON Parts Number
	Round Bypass Dampers Assembly (10 inches)	ASM01928
	Round Bypass Dampers Assembly (12 inches)	ASM01929
	Round Bypass Dampers Assembly (14 inches)	ASM01930
	Round Bypass Dampers Assembly (16 inches)	ASM01931

Rectangular Damper		
Qty.	Description	AAON Parts Number
	Rectangular Damper	Varies

Slaved Actuator		
Qty.	Description	AAON Parts Number
	Slaved VAV/Zone Damper Kit	ASM01851
	Slaved VAV/Zone Rectangular Damper Kit	ASM02252

Bypass Actuator		
Qty.	Description	AAON Parts Number
	Bypass Rectangular Damper Kit	ASM02338



Contact your local AAON representative to find out  
more information about VAV and Zoning Systems from AAON.

[www.AAON.com/RepSearch](http://www.AAON.com/RepSearch)

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