

Variable Air Volume boxes



Quality comfort and cooling controls

The power behind **your mission**







A breath of fresh air

Indoor Air Quality (IAQ) has become an even more important factor for building managers to consider during the COVID-19 pandemic. Thermal comfort is a crucial contributor to the IAQ standards promoted by ASHRAE and ISHRAE.

Our Variable Air Volume (VAV) boxes can assist with maintaining thermal comfort. They are an excellent zone temperature control that are of particular use in India, a tropical region that needs a lot of cooling.

Johnson Controls is a global leader in building solutions. Now we have used this deep expertise to produce a best-in-class VAV controller with a wide range of features and benefits.

This document provides details of our cooling-only, single-duct VAV controllers – but other designs are available.

Please contact your Johnson Controls sales representative to discuss your own requirements.

VAV box – the benefits

Energy efficiency for cost savings and sustainability The VAV controller can be connected to an occupancy sensor. This provides the capability to automatically switch to a higher default set point whenever the zone is not occupied, leading to reduced energy use and increased cost savings.

The NS Series Network Sensors monitor zone temperature, relative humidity (RH), carbon dioxide (CO₂), motion, and local temperature set point adjustments. The sensor transmits this data to the VAV controller on the Sensor/Actuator (SA) bus wherever zone specific controls are required.

Excellent indoor air quality for healthy spaces The roomy box design ensures optimum operational air velocity for great comfort with low sound levels. Wherever zone-specific CO₂ control is required, individual zone CO₂ sensors can be connected to the VAV controller.

Enhanced thermal comfort for enjoyable spaces
Hot air can be made available from the AHU and our standard controller can be programmed for cooling and heating control.

Easy integration with any building management system (BMS)

The versatile VAV controller can be very easily integrated with any BMS – from Johnson Controls or a third party – and all the VAV parameters are easily mapped to the user interface.

Additional optional features

VAV box construction

- Double-skin construction for standard box (circular in – square out)
- Circular VAV
- Oval VAV – with electrical panel protruding or in-built
- Rectangular VAV
- VAV box with connecting “suit to duct” collar pieces
- VAV box with attenuator

Air valve damper

- Circular damper
- Opposed blade damper

Standard design features

- Single-duct, pressure-independent box
- Rectangular inlet and square outlet with suitable flanges for easy connection to ducts
- Multipoint center averaging
- Cross-flow sensors for accurate airflow measurement
- Plenum-rated sensor tubing
- In-built pressure transducer, which increases the pressure signal three times for accurate flow control over wide range
- Single-skin, 22 gauge (0.8mm) galvanized steel casing and valve
- 13mm-thick fiberglass and foil-faced scrim-backed insulation, mechanically fastened for added security
- Primary air valve (damper) embossed with rigidity rings
- Chrome-plated, high-quality steel damper shaft
- Self-lubricating bearings at the damper shaft ends
- Position indicator on end of damper shaft
- Mechanical stops for open and closed position
- IP51 enclosure electric control box
- 24-volt control transformer
- MCB and fuse for rectangular protection
- Three-pin molded plug with 1.8m three-core cable for power supply connection (230 VAC)
- Four-legged legged mounting bracket for easy installation

Insulation

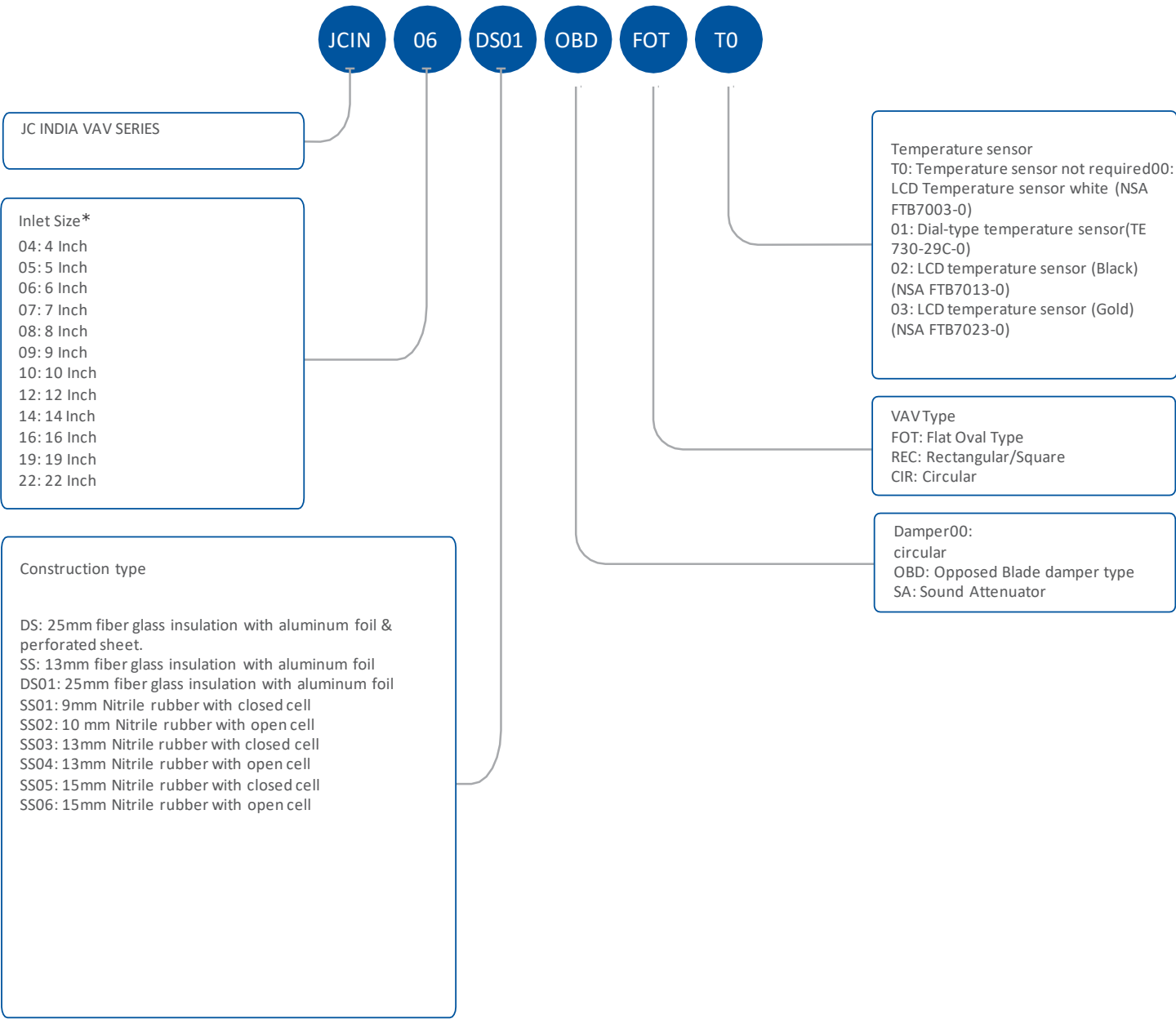
- 25mm fiberglass insulation with aluminum foil and perforated sheet (double skin)
- Closed-cell nitrile rubber foam of specified thickness for thermal insulation
- Open-cell nitrile rubber foam of specified thickness for acoustic insulation

Room temperature sensor

- Adjustable dial type
- LCD screen with temperature display and occupied/unoccupied mode
- Available in three different colors to match the interiors: white, black* or gold*

* Please contact your Johnson Controls sales representative for MOQ requirements.

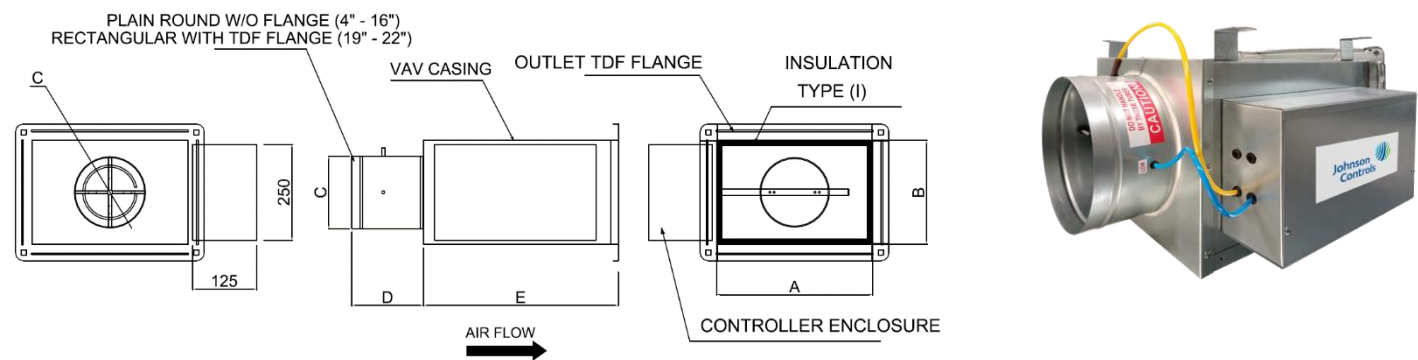
Product nomenclature



* Please contact your regional Johnson Controls sales representative for information on non-standard sizes.

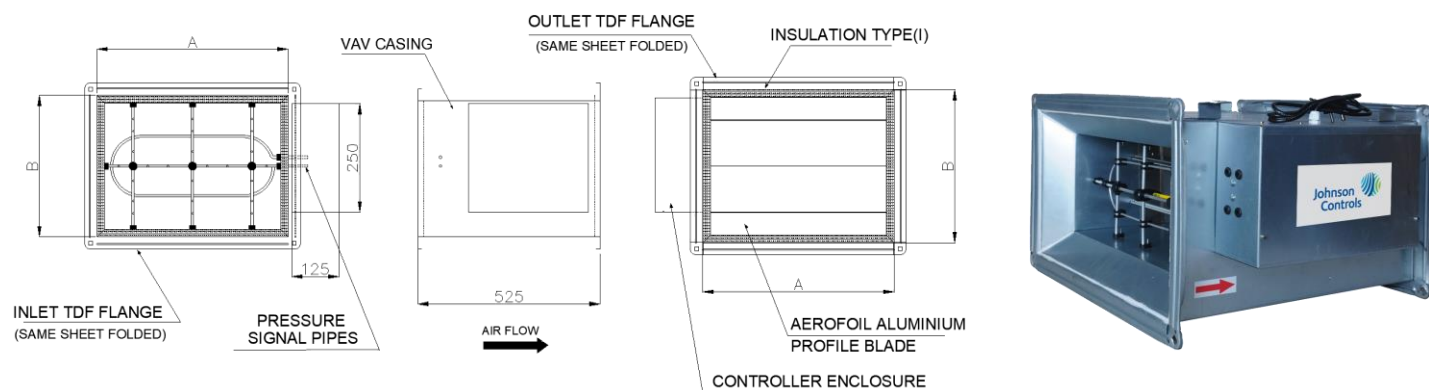
Pressure-independent VAV terminal unit

1. Standard construction (circular inlet/square outlet)



General Model Selection Guide					
VAV Model Size	Air Flow Range (CFM)	Dimensions (mm)			
		A	B	C	E
JCIN 4	45 – 230	250	200	101	400
JCIN 5	75 – 380	250	250	126	400
JCIN 6	100 – 530	305	203	152	400
JCIN 7	150 – 765	305	254	178	400
JCIN 8	200 – 1000	305	254	203	400
JCIN 9	250 – 1270	300	300	229	400
JCIN 10	300 – 1570	356	318	254	400
JCIN 12	450 – 2240	405	381	305	400
JCIN 14	610 – 3100	508	444	356	500
JCIN 16	820 – 4130	610	457	406	500
JCIN 19	1300 – 6630	800	450	705x355	400
JCIN 22	1600 – 8150	900	500	805x405	400

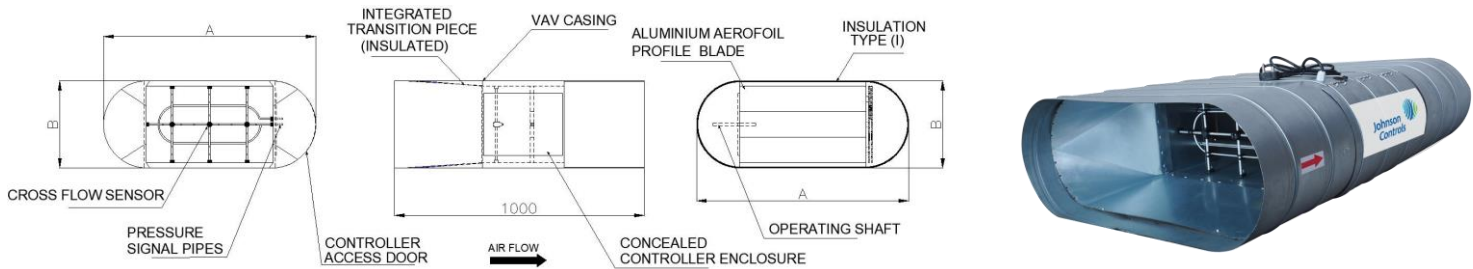
2. Rectangular box (rectangular inlet/outlet)



General Model Selection Guide

Model	Cross Flow Sensor Size (Inch)	Air Flow Range (CFM)	Casing Outlet Dimensions A (mm)	Casing Outlet Dimensions B (mm)
JCIN 4	04 x 04	45 – 230	200	200
JCIN 5	05 x 05	75 – 380	200	200
JCIN 6	06 x 06	100 – 530	250	250
JCIN 7	08 x 05	150 – 765	300	200
JCIN 8	08 x 08	200 – 1000	300	300
JCIN 9	12 x 06	250 – 1270	400	250
JCIN 10	12 x 08	300 – 1570	400	300
JCIN 12	16 x 08	450 – 2240	500	300
JCIN 14	18 x 10	610 – 3100	550	350
JCIN 16	20 x 12	820 – 4130	600	400
JCIN 19	24 x 16	1300 – 6630	700	500
JCIN 22	26 x 18	1600 – 8150	750	550

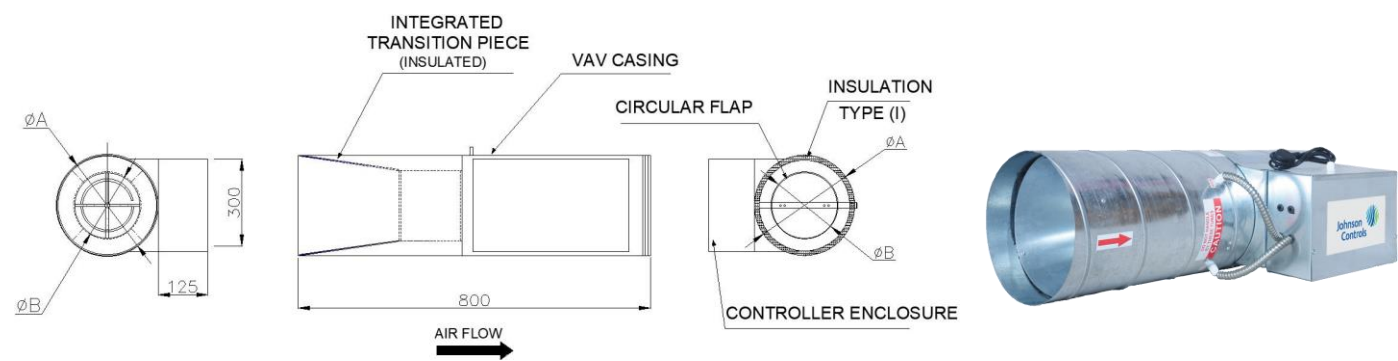
3. Oval VAV box (elliptical/flat oval body)



General Model Selection Guide

Model	Inlet Size (Inch)	Air Flow Range (CFM)	Dimensions A (mm)	Dimensions B (mm)
JCIN 05 x 05	05 x 05	98 - 490	550	150
JCIN 06 x 06	06 x 06	136 - 680	525	200
JCIN 08 x 05	08 x 05	168 - 840	550	150
JCIN 12 x 06	12 x 06	280 - 1400	600	200
JCIN 12 x 08	12 x 08	376 - 1880	575	250
JCIN 16 x 08	16 x 08	522 - 2610	650	250
JCIN 18 x 10	18 x 10	722 - 3610	700	300
JCIN 20 x 12	20 x 12	958 - 4790	750	350

4. Circular VAV

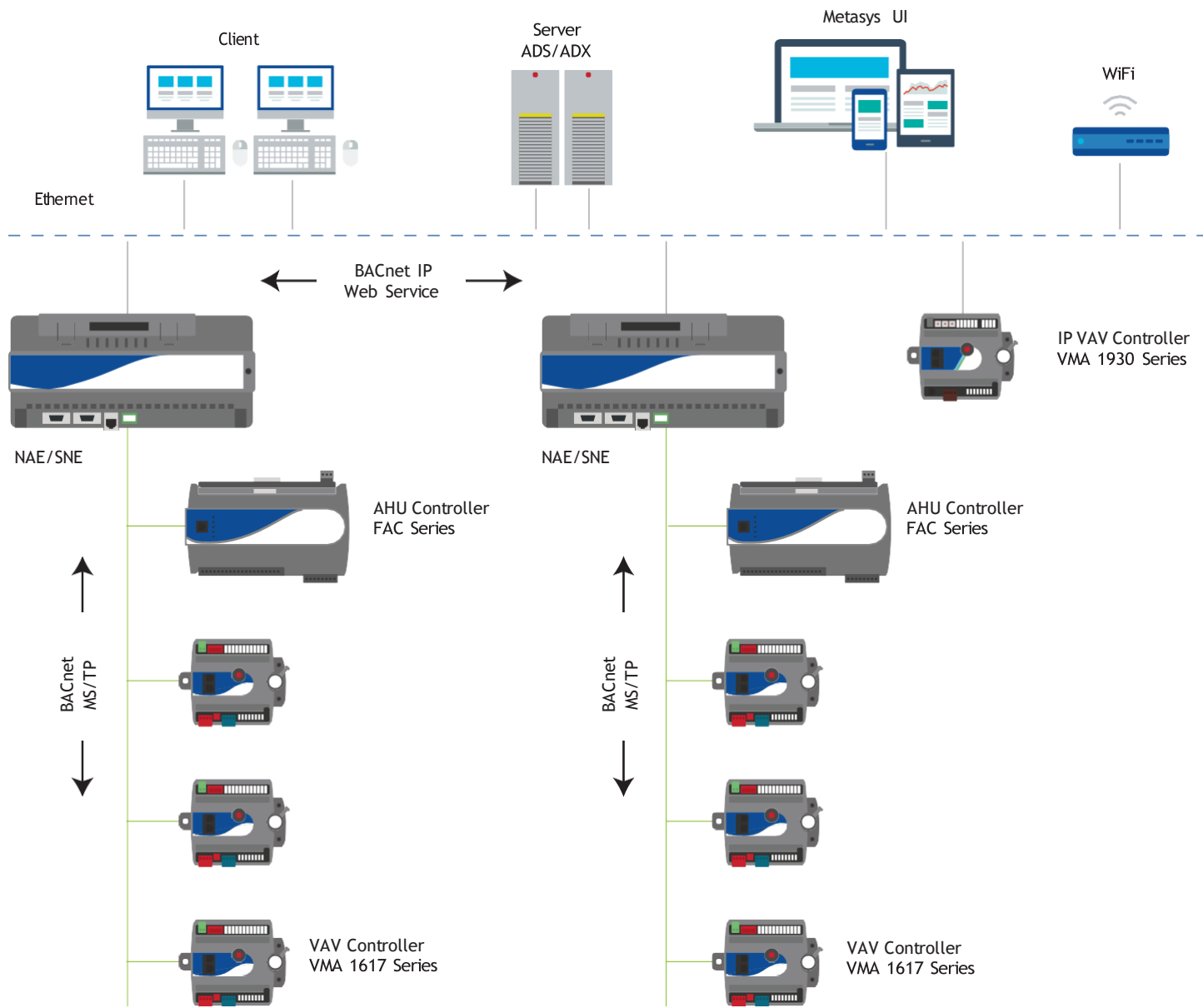


General Model Selection Guide			
VAV Model Size	Inlet Size (in mm)	Dimensions (in mm)	
		ϕA	ϕB
JCIN 6	152	250	152
JCIN 8	203	300	203
JCIN 10	254	350	254
JCIN 12	305	400	305
JCIN 14	357	450	356
JCIN 16	406	500	406

Johnson Controls DDC

The VAV controller is a powerful unit on its own – but your facility can only benefit from installing more VAV controllers to form a larger BMS network. Each VAV controller connects to a BACnet MS/TP network, as the graphic below shows.

You can also program a network automation engine, a network control engine or a supervisory system to provide additional energy management and supervisory control capabilities. These include optimal starts, demand limiting, load rolling, and runtime totalization.



VMA1617 /1717Series Controllers

The VMA1617 is a 32-bit programmable digital controller that is designed specifically for VAV applications that communicate using the BACnet MS/TP protocol. It features an integral digital pressure sensor, an integral damper actuator, and a 32-bit microprocessor.

The compact design facilitates quick installation and smart use of space while never compromising on performance.



VMA1617 (32-Bit) Series Point Type Counts Per Model		
Point Types	Signals Accepted	VMA1617
Modular Jacks		8-pin SA Bus supports analog non-communicating sensor
Universal Input (UI)	Analog Input, Voltage Mode, 33330–10 VDC	3
	Analog Input, Resistive Mode, 0–2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A998 SI), NTC (10k Type L, 2.252k Type 2)	
	Binary Input, Dry Contact Maintained Mode	
Binary Output (BO)	24 VAC Triac	2
Integrated Actuator	Internal	1
Integrated Flow Sensor	Internal	1
Zone Sensor Input	On SA Bus1	Up to 4 NS Series Network Zone Sensors
	Up to 4 NS Series Network Zone Sensors	Up to 9 WRZ sensors when using the ZFR1811 wireless router configuration and up to 5 WRZ sensors when using the one-to-one WRZ- 78xx wireless configuration

VMA1617 (32-Bit) Series Ordering Information	
Product Code Number	Description
MS-VMA1617-1	32-bit, Integrated VAV Controller/Actuator/Pressure Sensor
	3 UI and 2 BO; 24 VAC
	Field Controller (FC) Bus, and Sensor/Actuator (SA) Bus
	8-pin TSTAT Port for use with TE-7xx Series Non-Communicating Sensors

Technical Specifications		
		Description
Product Code Numbers	MS-VMA1617 -1:	32-bit, Integrated VAV Controller/Actuator/Pressure Sensor 3 UI
		and 2 BO; 24 VAC
		FC and SA Bus
		8 - pin TSTAT Port for use with TE-7xx Series Non-Communicating Sensors
Supply Voltage		24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Power Supply Class 2 (North America), Safety Extra-Low Voltage (SELV) (Europe)
Power Consumption		10 VA typical, 14 VA maximum
Ambient Conditions		Operating: 0 to 50°C (32 to 122°F)
		Storage: -40 to 70°C (-40 to 158°F)
Terminations		Inputs/Outputs, SA Bus, and Supply Power: 6.3 mm (1/4 inch) Spade Lugs
		FC Bus Pluggable Screw Terminal Block
Controller Addressing		TSTAT Modular Port: RJ-45 8-Pin Modular Jack
		DIP switch set; valid field controller device addresses 4–127
		(Device addresses 0–3 and 128–255 are reserved and not valid field controller addresses)
Communications Bus2		BACnet MS/TP, RS-485
		3- wire FC Bus between the supervisory controller and field controllers
		4- wire SA Bus from the VMA controller, network sensors, and other sensor/actuator devices, includes a terminal to source 15 VDC supply power from VMA to SA Bus devices.
Processor		RX630 32-bit Renesas® microcontroller
Memory		1 MB Flash Memory and 512 KB Random Access Memory (RAM)
Actuator Rating		4 N/m (35 lb/in.)
Dimensions		Height x Width x Depth: 165 x 125 x 73 mm (6.5 x 4.92 x 2.9 inch) Weight
		0.65kg (1.45lb)
Compliance	United States	UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment. Suitable for use in other environmental air space (plenums) in accordance with Section 300.22(C) of the National Electric Code (1615, 1630, 1617, 1626, 1628, 1632, 1656, 1832, 1826 and 1930). UL1995 Plenum Rated (Models other than 1615, 1630, 1617, 1626, 1628, 1632, 1656, 1832, 1826 and 1930). UL Listed, File S4977, UL 864 UUKL/UUKLC 10th Edition Listed, Smoke Control Units and Accessories for Fire Alarm Systems Equipment (models with U product code suffix only)FCC Compliant to CFR47, Part 15, Subpart B, Class A.
	Canada	Canada: UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada Compliant, ICES-003 UL Listed, File S4977, UL 864 UUKL/ORD-C100-13 10th Edition Listed, Smoke Control Units and Accessories for Fire Alarm Systems (models with U product code suffix only)
	European Union	CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and RoHS Directive.
	Australia and New Zealand	RCM Mark, Australia/NZ Emissions Compliant.
	BACnet International	MS-VMA1617 models: BACnet Testing Laboratories (BTL) Protocol Revision 7 Listed BACnet Application Specific Controller (B-ASC)

TE730 Temperature Sensors



TE730 Temperature Sensors provide wall-mounted temperature sensing. A dial is included to adjust the temperature set point. In addition, a manual occupancy override push button is available on one of the models. This enables the user to request a time-of-dayscheduling override when the space is occupied out of hours.

The wires connecting the temperature sensor to the controller are terminated with a modular jack connection. All models include a Sensor Actuator (SA) Bus access port (six-pin modular jack) for connecting accessories. This allows a technician to commission or service the controller via the temperature sensor.

Selection Chart					
Product Code Number	Temperature Sensor Type	Temperature Set Point Adjustment Dial	Integral Manual Occupancy Override Push Button	Connection	Enclosure Dimensions (Height xWidth x Depth)
TE730-29C-0	Platinum 1kohm Thin Film Resistive	Yes	No	Modular Jack	3-1/4 x 3-1/4 x 1-7/16 inch (80 x 80 x 36 mm)

Technical Specifications	
Description	
Temperature Sensor Type	Platinum 1k ohm Thin Film Resistive
Temperature Sensor Coefficient	Approximately 3.9 ohms per °C (2 ohms per °F)
Temperature Sensor Reference Resistance	1k ohms at 0°C (32°F)
Temperature Sensor Accuracy	±0.56C°/±1.0°F at 21°C (70°F)
Temperature Set Point Range	Adjustable 15 to 29°C (59 to 84°F)
Temperature Sensor Response Time	8-Pin Modular Jack Connector
SA Bus Access	6-Pin Modular Jack Connector with Bottom Access for a Wireless Commissioning Converter or VAV Balancing Tool
Ambient Operating Conditions	0 to 40°C (32 to 104°F); 10 to 90% RH, Noncondensing; 30°C (86°F) Maximum Dew Point
Ambient Storage Conditions	-40 to 60°C (-40 to 140°F); 5 to 95% RH, Noncondensing; 30°C (86°F) Maximum Dew Point
Materials	White Thermoplastic Enclosure
Shipping Weight	0.1 kg (0.3 lb)

NSA Network Sensors

The NSA7000 series network sensor is an electronic zone sensor designed to work directly with Johnson Controls BACnet MS/TP digital HVAC controllers. Mounted flush and featuring an LCD screen, models in this series monitor the temperature set point, zone temperature and humidity, and transmit this data to a field controller on the sensor actuator (SA) bus.

The NSA-FTB7003-0 VAV thermostat monitors the current space temperature and has the option of setting the required space temperature. This VAV thermostat also has features of locking all keys & enabling essential keys as and when required. This thermostat also features an occupancy override button, which allows the user to signal the controller that the zone is occupied to override the scheduled mode. For communication wiring flexibility, all models are equipped with both a modular jack and screw terminals for connecting the NSA7000 network sensor to controllers.

NSA 7000 series network sensors are also available with fan mode push button to set the desired fan speed.



Technical Specifications			
NS Series Network Sensor			
Sensor Type		With Set Point Adjustment	Without Set Point Adjustment
Supply Voltage		9.8 to 16.5 VDC; 15 VDC Nominal	
Current Consumption		25 mA Maximum (Non-Transmitting)	13 mA Maximum (Non-Transmitting)
Terminations		Modular Jack or Screw Terminal Block	
Sensor Addressing on the SA Bus	NS-xTN7003-0 Model	NA	DIP Switch Set (200 to 203)
	All Other Models	Fixed Address of 199	Fixed Address of 199
Wire Size	Modular Jack Models	26 AWG (0.4 mm Diameter) Recommended; Three Twisted Pair (6 conductors)	
	Screw Terminal Block Models	18 to 22 AWG (1.0 to 0.6 mm Diameter); 22 AWG (0.6 mm Diameter) Recommended	
Communication Rate		Auto-Detect: 9600, 19.2k, 38.4k, or 76.8k bps	
Mounting		Surface-Mounted (80 x 80) Surface-Mounted or Vertical Wall box-Mounted (120 x 80)	
Temperature Measurement Range		0.0°C/ 32.0°F to 40.0°C/104.0°F	
Sensor Type		Local Platinum Resistance Temperature Detector (RTD)	
Resolution		±0.5°C/±0.5°F	NA
Sensor Accuracy		±0.6°C/±1.0°F	
Time Constant		10 Minutes Nominal at 10 fpm Airflow	
Default Set Point Adjustment Range		10.0°C/50.0°F to 30.0°C/86.0°F in 0.5° Increments	±3.0°C/±5.0°F
Ambient Conditions	Operating	0 to 40°C (32 to 104°F); 10 to 95% RH, Non-condensing; 29°C (85°F) Maximum Dew Point	
	Storage	-20 to 60°C (-4 to 140°F); 5 to 95% RH, Non-condensing	-40 to 70°C (-40 to 158°F); 5 to 95% RH, Non-condensing
Compliance	United States	UL Listed, File E107041, CCN PAZX, Under UL 916, Energy Management Equipment FCC Compliant to CFR 47, Part 15, Subpart B, Class A	
	Canada	UL Listed, File E107041, CCN PAZX7, Under CSA C22.2 No. 205, Signal Equipment Industry Canada, ICES-003	
	European Union	CE Mark, EMC Directive 89/336/EEC EN61000-6-3 (2001) Generic Emission Standard for Residential and Light Industry EN61000-6-2 (2001) Generic Immunity Standard for Heavy Industrial Environment	
	Australia and New Zealand	C-Tick Mark, Australia/NZ Emissions Compliant	
Shipping Weight		0.09 kg (0.20 lb) - NS-Axx7xxx-0 0.11 kg (0.25 lb) - NS-Bxx7xxx-0	

Notes: 1. There is a minimum order quantity (MOQ) for Black and Gold color thermostats. 2. Thermostats with temperature and humidity sensors are also available. Please contact your Johnson Controls sales representatives in your region for details on further requirements.

Variable Air Volume box - specifications guide

Unless otherwise specified, the material of construction of the VAV boxes shall be not be thinner than 0.8mm galvanized steel. The casing is internally lined with 9mm-thick closed-cell nitrile insulation, rated for a maximum air velocity of 4000 CFM.

The primary air valve consists of a cylindrical body - the outlet is rectangular. The damper blade is connected to a solid shaft with an integral molded sleeve that does not require screw or bolt fasteners with self-lubricating brushes. The shaft is manufactured of chrome-plated steel and coupled with the damper actuator.

The unit includes a molded damper position indicator visible from the exterior of the unit. The pipes used for differential pressure signal transmission should be made of pneumatic-grade plastic for lossless transmission. The control panel housing the DDC controller, actuator, step-down transformer and differential pressure sensor should be rated not less than IP51 to ensure the electronics contained are safe and protected. The air valve leakage shall not exceed one percent of the maximum inlet rated airflow at 3" WG inlet pressure. The VAV terminal is supplied with suitable mounting brackets for withstanding the weight of the terminal.

The VAV boxes are the pressure independent type, complete with a microprocessor DDC controller, damper, damper actuator, cross-flow velocity sensor with differential pressure transmitter, thermostat, and in-built step-down transformer.

The differential pressure airflow sensor traverses the duct along two perpendicular diameters. A single-axis sensor is not acceptable. The airflow should be measured by the perpendicular cross-flow sensor with sensing points designed to cover equally concentric circular areas in the flow measurement grid. The total pressure inputs are averaged using a pressure chamber located at the center of the sensor. A sensor that delivers the differential pressure signal from one end of the sensor is not acceptable.

The VAV boxes comprise 32-bit microprocessor-based BACnet MS/TP DDC controllers and enable interface for communication with the third-party BACnet-based BMS systems. Each VAV unit is bundled with a direct digital controller. The controller

is compatible with a MS/TP BACnet system network. A unique network address and a BACnet site address is assigned to each controller. All controllers are factory mounted and factory wired, with the controller's hardware address already set. The DDC controller has the required input and output points to measure primary air flow, space temperature and to control damper actuator operation. All DDC controllers have a minimum of three Universal Input (UI) points. The DDC controller shall be BTL

(B-ASC) and UL listed (UL916), FCC compliant to CFR 47, and CE mark directed.

Variable Air Volume box DDCs shall be connected in a multi-drop (daisy chain) configuration to the BMS. Through this interface it is possible to perform monitoring, control and programming functions from the BMS. Failure of the communications network does not affect the operation of the VAV DDCs.

A transformer is provided by the terminal unit manufacturer and factory wired to the VAV and other control devices, such as actuators. The transformer shall be 24-volt AC ± 10 percent at 50Hz.

The damper actuator is provided as an integral part of the controller assembly. The actuator running time is 90 degrees in 60 seconds.

The VAV controller operates in conjunction with a space temperature sensor (thermostat) for each terminal unit, which is field mounted, and field wired. The sensor is an RTD, or thermistor housed in an enclosure suitable for wall mounting.

The VAV thermostats are the communicating type and have an LCD display that shows the current space temperature. The VAV thermostat has the option of setting the required temperature. The VAV thermostat will locally have the feature of locking all keys and enabling essential keys as and when required. The option to provide analogue VAV thermostats is available where the VAV thermostats are remotely located.

Ready to learn more?

Please contact our experts at jcindiaproducts@jci.com should you have any questions or want to discuss how our innovative solutions can help boost your HVAC operations.

About Johnson Controls

At Johnson Controls, we transform the environments where people live, work, learn and play. From optimizing building performance to improving safety and enhancing comfort, we drive the outcomes that matter most. We deliver our promise in industries such as healthcare, education, data centers and manufacturing. With a global team of 100,000 experts in more than 150 countries and over 130 years of innovation, we are the power behind our customers' mission. Our leading portfolio of building technology and solutions includes some of the most trusted names in the industry, such as Tyco®, YORK®, Metasys®, Trion®, Frick®, Penn®, Sabroe®, Simplex®, Ansul® and Grinnell®.

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The power behind **your mission**

