

# GEN XV - VRF-VAV

A NEW CONCEPT IN AIR DELIVERY

PROVIDING THE BENEFITS OF VAV WITH THE EFFICIENCY OF VRF TECHNOLOGY

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COMMERCIAL ZONING - **SIMPLIFIED**



## Engineering & Application Guide

# GEN XV - VRF-VAV Engineering Guide

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### Providing VAV system control to VRF Equipment with VRF-VAV

**VRF-VAV** is an innovative concept in air delivery providing the benefits of **VAV** with the efficiency of **VRF** technology using pressure independent self-balancing **Smart Air Valves (SAVs)** to enhance VRF operation. VRF-VAV eliminates multiple indoor units, refrigerant lines, condensate lines, electrical runs and more to simplify and streamline VRF installations and operation.

Zonex Smart Air Valves (**SAV**) control an indoor fan coil's air flow while respective VRF manufacturer's outdoor and indoor units control and manage the refrigerant flows.

The Zonex system is controlled by the **GEN XV** controller, with a free mobile app that provides remote internet access and control of all fan coils, SAVs, thermostats, generic loads, accessed onsite or remotely over the internet from ANYWHERE.

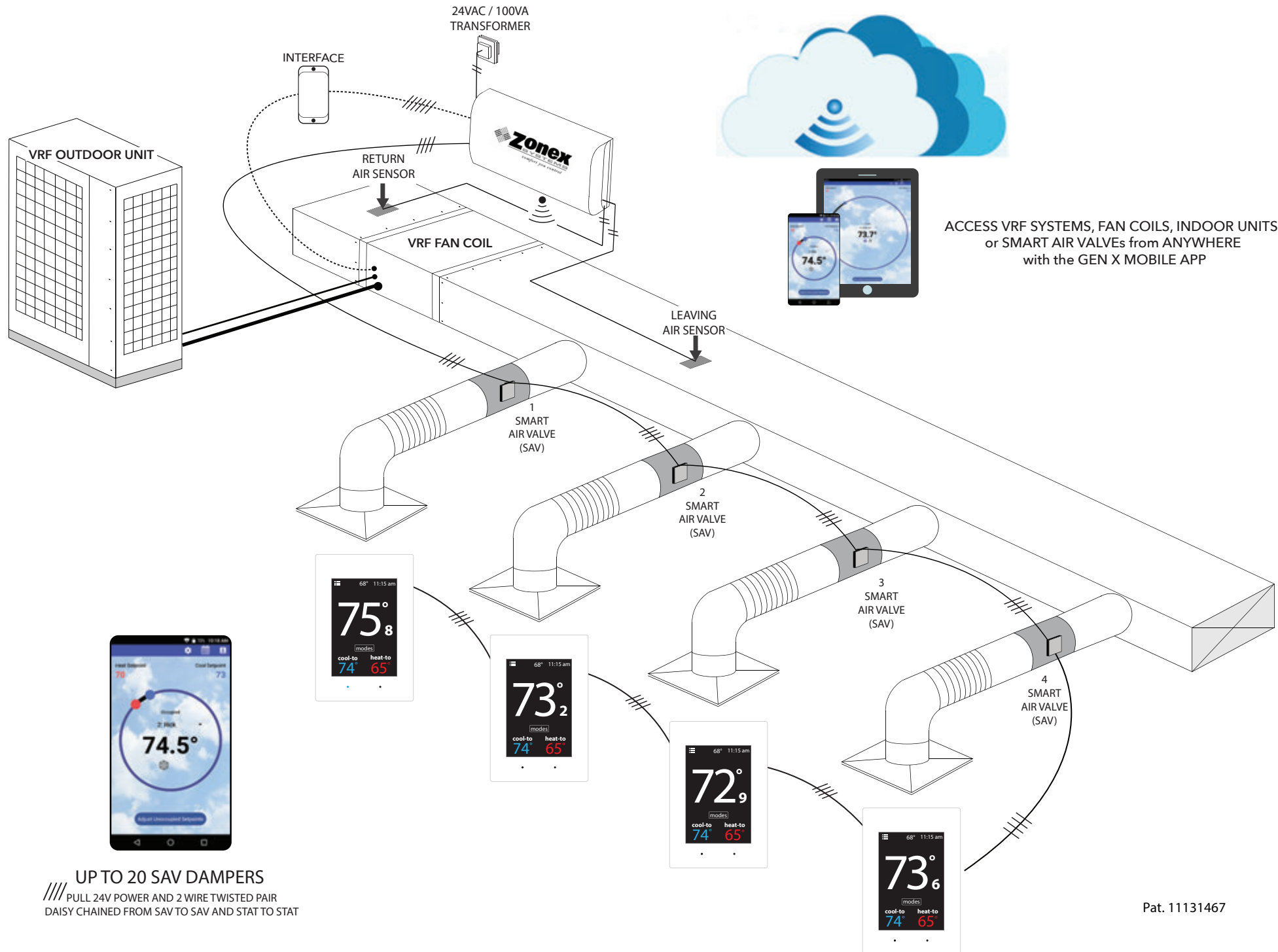
The **GEN XV** controller communicates with the indoor unit or fan coil through the VRF manufacturer's 24V thermostat interface. This interface accepts standard thermostat inputs and connects to the output of **GEN XV** controller. The thermostat interface converts standard 24VAC legacy thermostat to a communication protocol that the VRF unit can understand. This is the means by which the **GEN XV** can initiate heat calls, cool calls, and other functions of the VRF unit.

This operation does not alter in any way how the VRF System operates, this is important to understand as the VRF System maintains internal operations and communications as designed from the manufacturer. Smart Air Valves maintain a constant air volume regardless of the static pressure in the supply air duct.

**GEN XV** controls 2-20 independent **Smart Air Valves (SAV)** per fan coil. SAVs intelligently operate like an indoor unit without affecting VRF operation. **GEN X RMV** controllers are used to expand the system to control multiple zoned or stand alone fan coils remotely. **GEN XV** can support up to 20 **RMV** expansion controllers providing control of up to 400 units, **SAV** or other control points. The **GEN XV** controller is designed for Auto Changeover, VAV operation.

This is an exciting system, truly innovative and game changing for the VRF market. Enabling the engineer or contractor to reduce costs, adhere to Code Requirements, and provide greater comfort and efficiency using the Zonex VRF - VAV System to simplify and streamline VRF installation while reducing ongoing maintenance and enhancing operation.

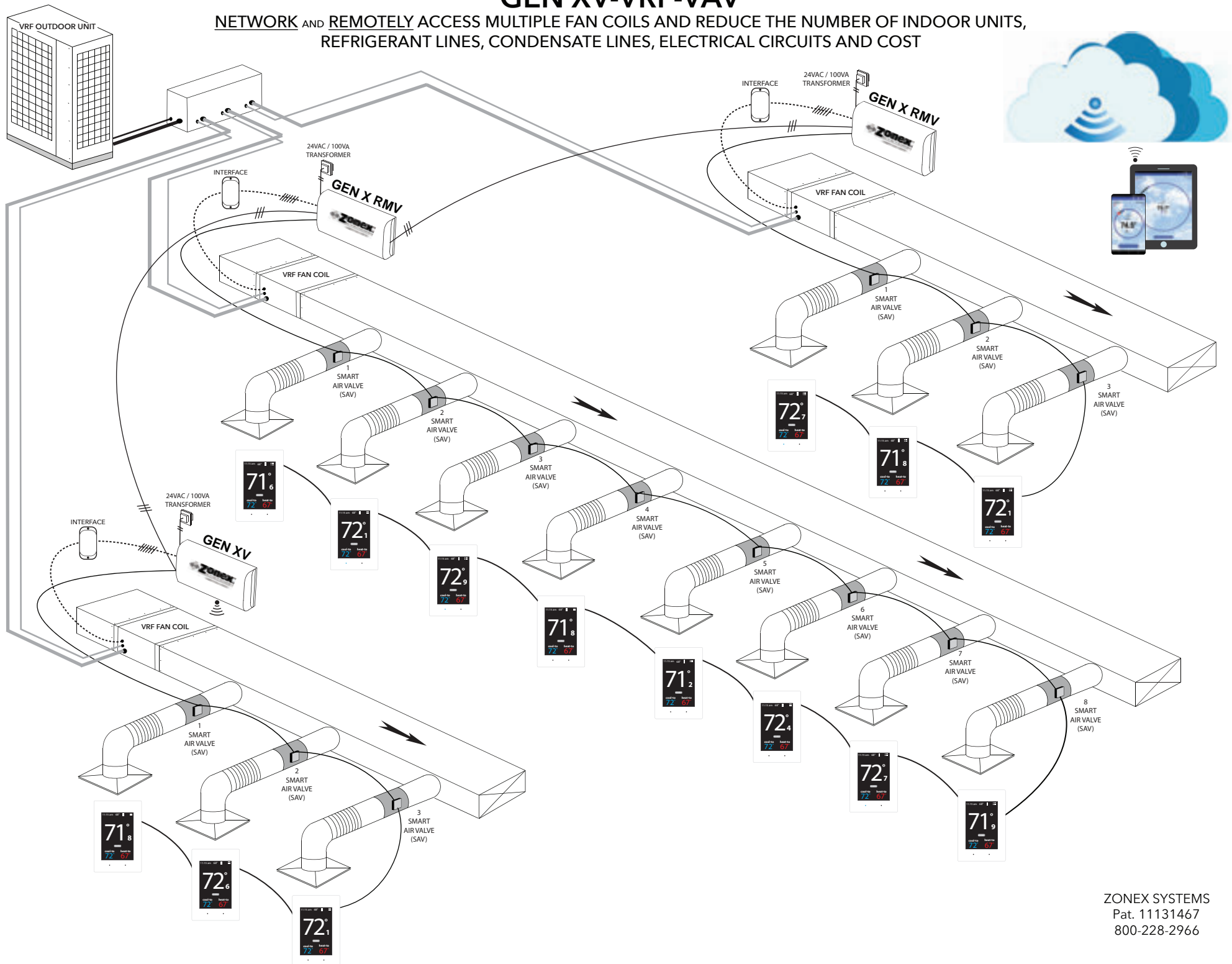
*An innovative product bringing VAV to VRF systems using SMART AIR VALVES. This System's energy savings enhances VRF operation and eliminates multiple indoor units, refrigerant lines, condensate lines, electrical circuits and cost*



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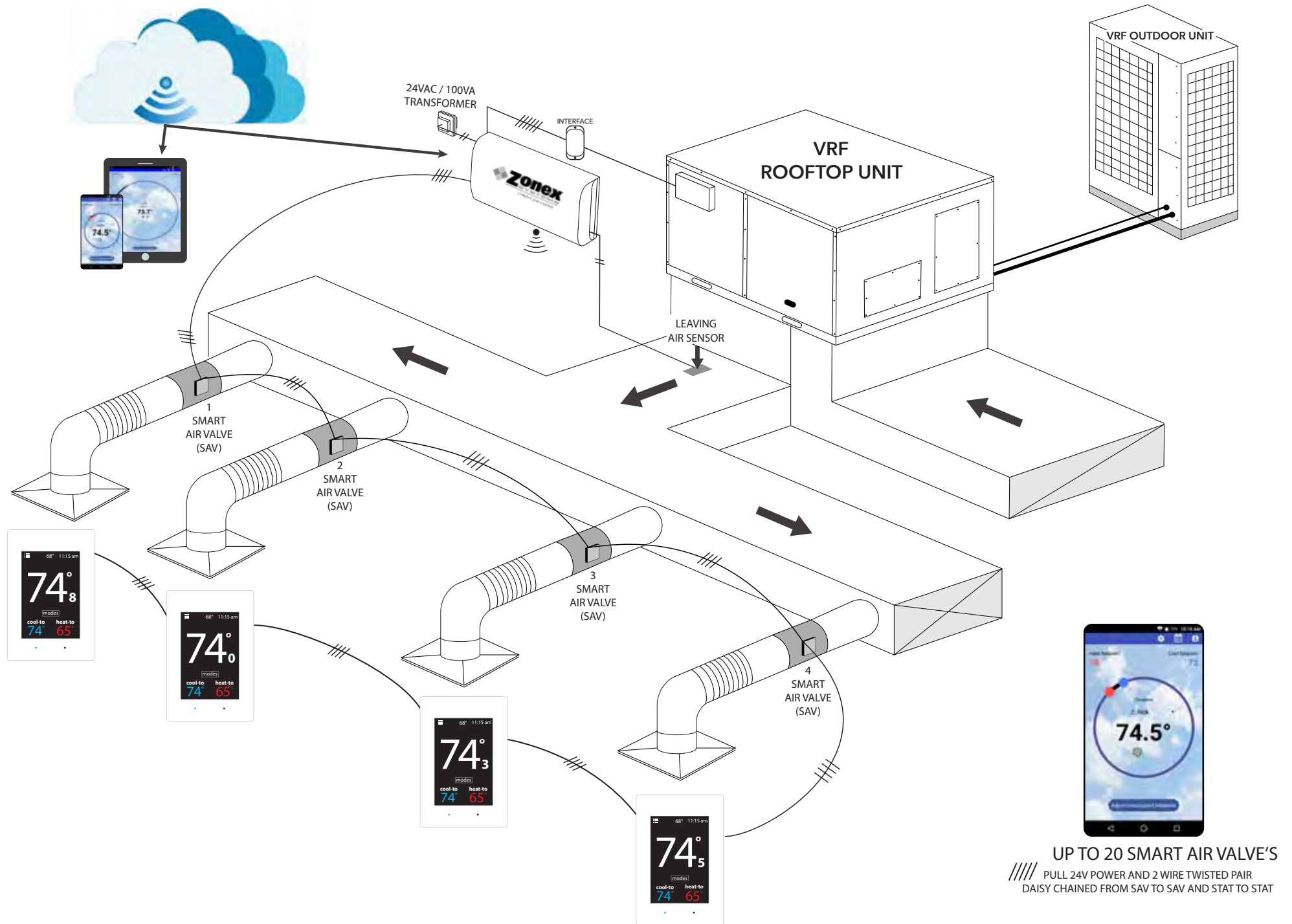
# GEN XV-VRF-VAV

NETWORK AND REMOTELY ACCESS MULTIPLE FAN COILS AND REDUCE THE NUMBER OF INDOOR UNITS, REFRIGERANT LINES, CONDENSATE LINES, ELECTRICAL CIRCUITS AND COST



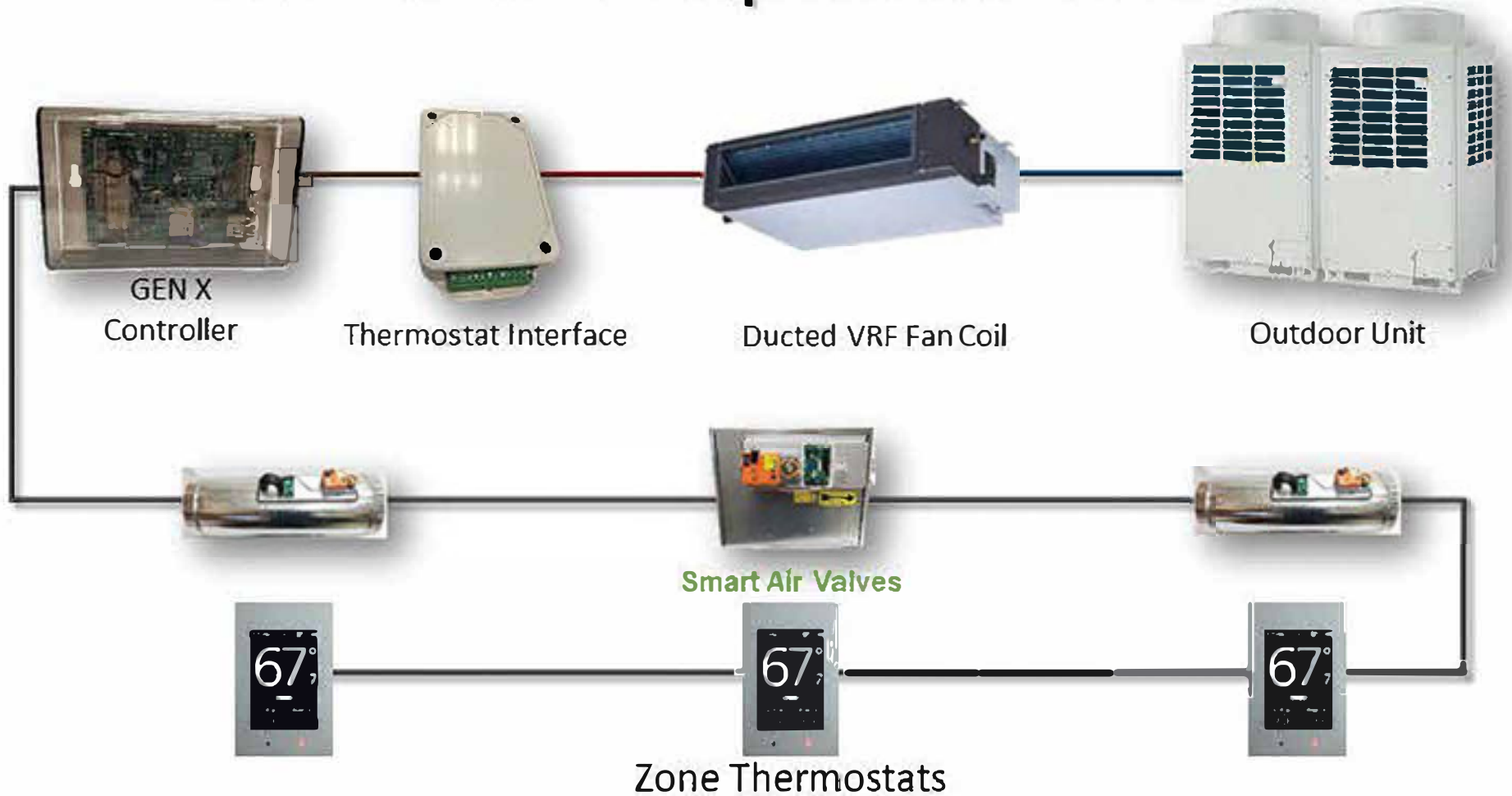
# GEN X-VRF-VAV

An innovative product bringing VAV to VRF systems using SMART AIR VALVE's. This System's energy savings enhances VRF operation and eliminates multiple indoor units, refrigerant lines, condensate lines, electrical circuits and cost





# VRF-VAV Component Overview





## ***Vote Based Auto Changeover with Programmable Thermostats Accessed Remotely or On-site from a Phone, Mobile Device or Web Browser***

### **GENERAL OPERATION**

Zonex Systems VRF-VAV System enhances VRF operations by providing engineers, contractors and building owners a means to maximize system efficiency, reduce installation costs, and provide greater comfort to individual zones within a building. This system allows for up to 20 Smart Air Valves (SAV) to be connected to a VRF Fan Coil, & uses the VRF Manufacturer's Legacy Interface to place calls for heating, cooling, or ventilation without compromising VRF operations or logic.

The GEN XV system is an auto changeover, vote based VAV system. As zone thermostats call for heating or cooling, votes are tallied by the GEN XV controller. Each minute the GEN XV controller will poll all thermostats to determine majority vote and initiate call for Heat, Cool, or if no votes for heating or cooling are present - VENT modes of operation. If voting majority switches from Heat to Cool or vice versa, GEN XV controller will initiate a changeover sequence shutting down current mode of operation, and energize the majority call to meet the current demand.

System configuration, remote & onsite monitoring, and system adjustments can be performed via the Zonex GEN XV mobile App or any web browser. The Mobile App allows for system configuration, scheduling, set point changes, and monitoring from mobile devices. This includes alarming and alerts via app notifications and/or email and provides accessibility to VRF-VAV system operation at any time day or night.

The GEN XV also relies on the VRF unit's built time delay after a heat/cool call is satisfied or in the event of an opposing call changeover to the opposite mode of operation. High/Low Limit protection is controlled by the VRF unit.

### **Cool Call**

Each SAV is controlled via a EzTouchX zone thermostat that monitors zone temperature. When zone temperature rises 1° above the zone thermostat's cooling set point, stat will call for cooling. On the next poll of the GEN XV controller, this vote will be counted and if there is a single vote or majority vote for cooling the GEN XV controller will initiate cooling call.

Once a cooling call is initiated, GEN XV controller will energize 24 volt legacy outputs to the VRF manufacturer's thermostat interface (the interface is VRF Manufacturer Specific). The "Y" control circuit will be energized for cooling operations, and VRF interface will convert 24 volt input and send this call for cooling to VRF Air Handler. VRF Air Handler then uses proprietary logic to initiate a cooling call to the VRF outdoor unit. VRF Air Handler will automatically set fan speed, enable compressor operations, and allow superheat to be communicated to outdoor unit to maximize efficiency.

The GEN XV controller sends current mode of operation (heat or cool) to all zone thermostats so that their corresponding SAVs can be in the appropriate mode of operation. The CFM of an SAV corresponds to its size, see sizing and engineering charts (pg 27) for airflow information. SAV controller continuously monitors air velocity to automatically reposition SAV to provide the targeted CFM to its zone. Once set point has been reached the EzTouchX ends its call for cooling and its vote will be removed from tally on the next poll by the GEN XV. If other zone stats continue calling for cooling the cool call will remain active by the GEN XV, the SAVs will continue to maintain targeted air flows, and satisfied stats will switch their SAVs to VENT mode. VENT CFM is set within the SAV controller at the factory. During this mode, a minimal amount of cool air will enter the zone to assist in maintaining system operation and minimize compressor cycling. If room temperature falls 2° below cooling set point the SAV will go to the closed position.



### Heating

Each SAV is controlled via a EzTouchX that monitors zone temperature. When zone temperature falls 1° below EzTouchX heating set point, a EzTouchX will call for heating. On the next poll of the GEN XV controller, this vote will be counted and if there is a single vote or majority vote for heating, GEN XV controller will initiate heating call.

Once a heating call is initiated, GEN XV controller will energize 24 volt legacy outputs to the VRF manufacturer's thermostat interface (the interface is VRF Manufacturer Specific). The "W" control circuit will be energized for heating operations, and VRF interface will convert 24 volt input and send this call for heating to VRF Air Handler. VRF Air Handler then uses proprietary logic to initiate a heating call to the VRF outdoor unit. VRF Air Handler will automatically set fan speed, enable compressor operations, and allow superheat to be communicated to outdoor unit to maximize efficiency.

The GEN XV controller sends current mode of operation (heat or cool) to all zone thermostats so that their corresponding SAVs can be in the appropriate mode of operation. The CFM of an SAV corresponds to its size, see sizing and engineering charts (pg 27) for airflow information. SAV controller continuously monitors air velocity to automatically reposition SAV to provide the targeted CFM to its zone. Once set point has been reached the EzTouchX ends its call for heating and its vote will be removed from tally on the next poll by the GEN XV. If other zone stats continue calling for heating the heat call will remain active by the GEN XV, the SAVs will continue to maintain targeted air flows, and satisfied stats will switch their SAVs to VENT mode. VENT CFM is set within the SAV controller at the factory. During this mode, a minimal amount of hot air will enter the zone to assist in maintaining system operation and minimize compressor cycling. If room temperature rises 2° above heating set point the SAV will go to the closed position.

Each EzTouchX has the ability to control auxiliary heating devices such as reheat or baseboard heat. Auxiliary heat is configured at the zone thermostat. If there is a cool call, heat call, or the VRF system is a cooling only unit, the EzTouchX will energize AUX heat outputs if the zone temperature drops 2° below heat set point. If the EzTouchX is configured for reheat, SAV will position damper to provide airflow over electric strip heat, hot water coil or other heating element.

### Changeover

VRF-VAV operating strategy is based on auto changeover majority vote first call first served system. GEN XV controller polls all associated EzTouchXs each minute to tally calls for cooling and heating. If the majority of calls are for cooling, the system will operate in cooling mode. If the majority of calls are for heating, the system will operate in heating mode.

If the system is operating in cooling and after system poll a majority of EzTouchXs are calling for heating, GEN XV will initiate a changeover strategy allowing cooling to run for an additional 3-20 minutes (Configured via the Zonex Mobile App), and shut down cooling operations and initiate Heat operations.

If the system is operating in heating and after system poll a majority of EzTouchXs are calling for cooling, GEN XV will initiate a changeover strategy allowing heating to run for an additional 3-20 minutes (Configured via the Zonex Mobile App), shut down heating operations and initiate cool operations.

### All Calls Satisfied

When all calls for cooling or heating are satisfied EzTouchX will operate in Vent Mode. Outputs for cooling and heating are de-energized and if GEN XV controller is configured for Fan On - Continuous, VRF Air Handler blower will be operational during Occupied times and ventilation air will be provided to all zones. If GEN XV controller is configured for FAN Intermittent, Air Handler blower will shut down.

Variable Refrigerant Flow (VRF) systems optimize energy savings by monitoring airflow and super-heat. Based on the airflow, the Air Handlers Electronic Expansion Valve (EEV), reduces or increases the refrigerant flow. This airflow generated information is sent to the inverter in the outdoor unit. The inverter generates a reduced or increased Hertz (cycles per second) to the compressor causing the outdoor unit to reduce or increase its speed and volume of refrigerant being delivered to the indoor Air Handler. Single or Multiple Air Handlers may be connected to one outdoor unit allowing multiple zone control from one Air Handler.

VRF-VAV systems can have up to 20 Smart Air Valves (SAV) or zones per controller per VRF air handler.

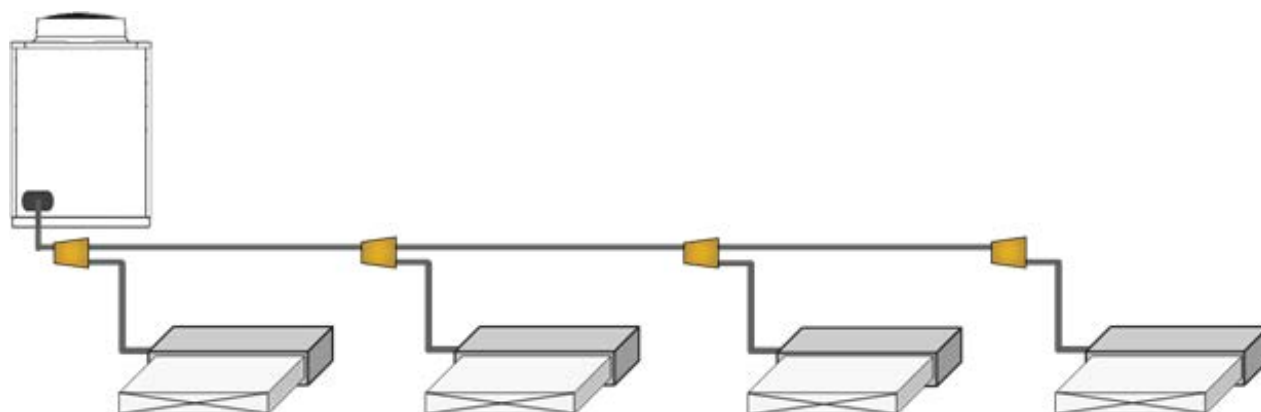
Using VRF Manufacturers 24 volt thermostat interface, Zonex VRF-VAV will place calls for COOL, HEAT, or VENT based on thermostat inputs from each zone. SAV's are self balancing pressure independent dampers that will automatically adjust to provide target CFM based on duct size and system operation..

VRF-VAV is designed to use SAVs to control the volume of airflow through an Air Handling Unit. This allows the VRF Outdoor Unit to control refrigerant flow exactly the way VRF systems are designed to do. Zonex SAVs control each Air Handlers air flow. VRF systems control refrigerant flow to each Air Handler.

A group of SAV's on an Air Handlers duct system automatically form a discharge damper which regulates the air volume or CFM that can flow through the Air Handler. The airflow determines the EEV refrigerant flow to the Air Handler.

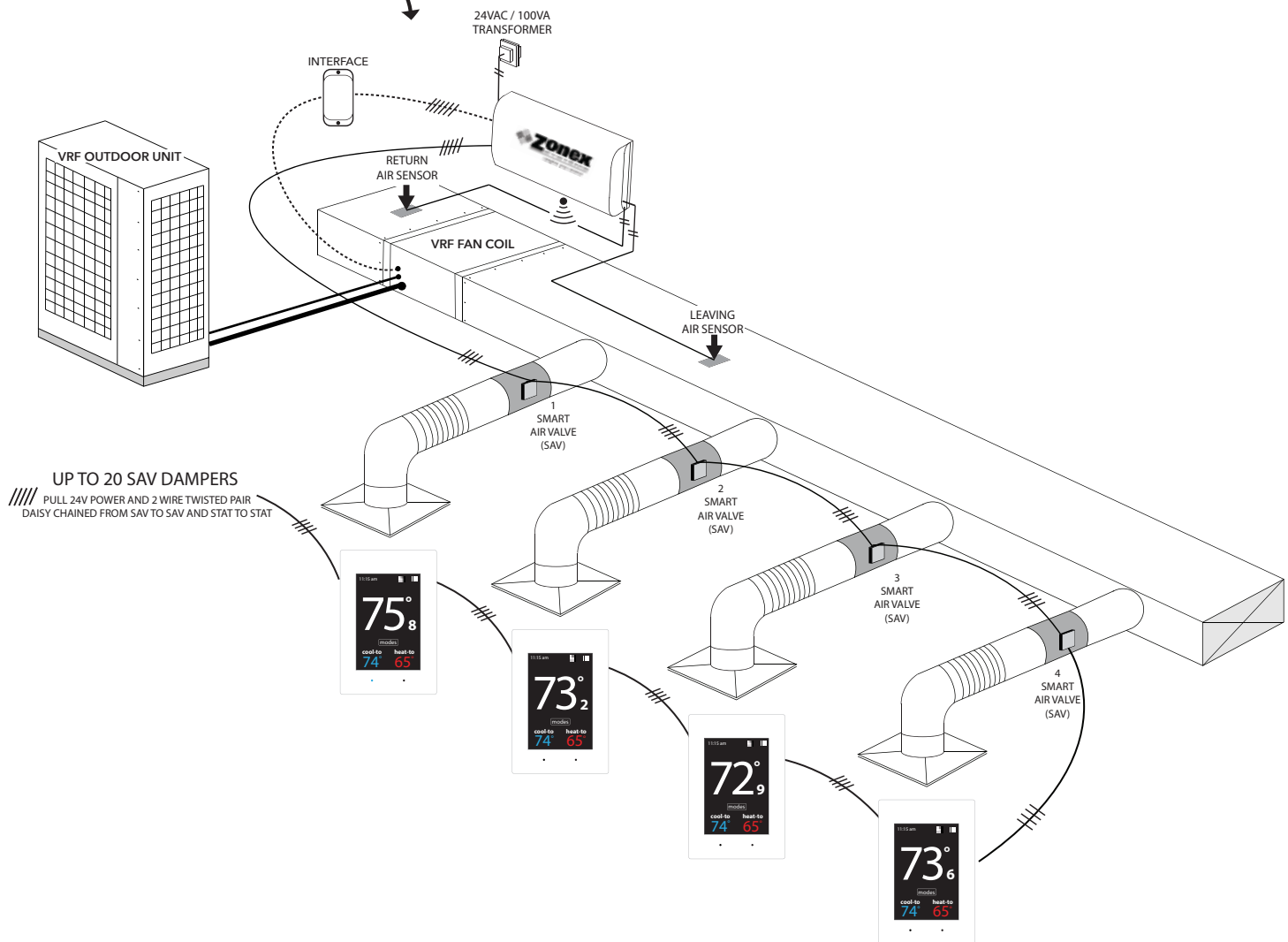
## Why Zonex System VRF - VAV

### Standard Ducted VRF Application



A standard installation of VRF systems has an Outdoor Unit providing refrigerant to multiple Air Handlers or Cassettes, with each device controlling a single zone. This approach will work, but requires an excessive number of air handlers. Each additional air handler requires, copper lines, electrical wiring, condensate lines, and labor, not to mention the ongoing maintenance required to keep the system working properly.

## THERE IS A BETTER WAY



The Zonex Systems VRF-VAV System provides a solution that will reduce installation and maintenance cost and works with VRF units to maximize efficiency and comfort. Zonex with Smart Air Valves control air flow while the VRF outdoor units maintain and manage refrigerant flow.

### Benefits:

- |                                    |   |
|------------------------------------|---|
| Lower equipment cost               | Lower installation cost                       |
| Mitigate ASHRAE 15 and 34 concerns | Energy Efficiency                             |
| Meets ventilation codes            | Reduced refrigerant lines                     |
| Reduced condensate drain lines     | Reduce electrical installation cost           |
| Reduced maintenance cost           | Individual control of even the smallest zones |
| Maximize VRF Operations            | Control it all from the HUB thermostat        |

Due to VRF fan coil design, many small areas with reduced heat/cool loads cannot be controlled effectively. VRF-VAV provides a solution, allowing for the smallest of areas to be served, SAVs provide air needed to every zone.

**Manufacturers Interface** – Most VRF manufacturers have a 24 volt thermostat interface. This interface allows the use of standard 24 volt legacy style thermostats, R Y W G C, to be used with fan coil units. VRF-VAV by Zonex provides 24 volt legacy style outputs to manufacturer interface allowing for calls of COOL, HEAT or Ventilation.

**GEN XV Controller** – Each VRF system will have a communicating GEN XV controller to place calls via unit thermostat interface for cool, heat or ventilation. This controller also acts as the master control for all SAVs attached to this fan coil, polls thermostats for majority vote to set demand for cooling, and heating or vent operations. GEN XV controller has supply air, return air, and outdoor air temperature sensors.

**EzTouchX** – Programmable communicating zone thermostat used with each SAV device.

**SATouchX** – Programmable stand alone thermostat used for non-zoned VRF fan coil. Also requires Manufacturer's 24 volt thermostat interface.

**SAV** – Round Smart Air Valve – Self balancing pressure independent damper designed to deliver targeted CFM based on velocity and duct size.

**SAV WxH** – Rectangular Smart Air Valve - Self balancing pressure independent damper designed to deliver targeted CFM based on velocity and duct size.

**STPR** – Communications wire specialized for RS485 control systems. **No wire substitutions can be made**

## COMMERCIAL APPLICATIONS

1. Complete load calculation for each zone area.
2. Total all loads and size outdoor unit using manufacturers guide.
3. If a single ducted air handler can be used, determine the number of independent zones required for the application.
4. Using load calculations for each zone and compare with SAV CFM sizing chart to determine size of SAV and duct. You may have up to 20 SAVs on a single VRF Ducted Air Handler.
5. If application is using multiple VRF Fan Coils, use manufacturers guide to size air handlers to outdoor unit and then use load calculation for each zone and Zonex SAV sizing chart to determine size of SAV and duct for each zone.
6. All outlets require an SAV damper.

Once you have determined needed cooling/heating capacity and determined proper sizes for VRF Air Handlers, you need to size ductwork for each independent zone. Use the SAV sizing chart to determine the proper size of each duct to deliver desired amount of air to meet zone requirement.

## CHOOSING SAV DAMPERS FOR EACH ZONE

Carefully calculate the CFM required for each zone that will be connected to each VRF Air Handler.

Use ASHRAE or other load calculations for the space you intend to cool or heat.

Choose the correct SAV from the attached sizing tables for round or rectangular SAV's. Using required CFM or BTU.

Total the CFM for each SAV to be connected to each Air Handler. Choose a Manufacturers CFM at 400 CFM per ton to select a fan coil.

For ESP External Static Pressure be sure the following duct losses are covered.

Layout the duct system for .1" WC per 100 feet of metal duct run. When flex duct is used be sure to follow Manufacturers static pressure losses per 100 feet of run is used.

Add .2"WC loss for the SAV in the longest run including fitting and elbow losses to determine total ESP required by the Air Handler Fan. Do not forget to add Return Air, and register losses.

The SAV's are pressure independent and self balancing if adequate pressure is available.

Check to be sure that the Air Handler has adequate External Static Pressure for the total static pressure loss of the duct system.

Check Local Codes to be sure adequate Ventilation air is available.

## Typical Capacities for Round SAVs

	Diameter	*CFM HI	Velocity FPM	BTU HI
SAV05	5"	120	800	3,677
SAV06	6"	172	800	5,155
SAV07	7"	234	800	7,016
SAV08	8"	305	800	9,164
SAV09	9"	387	800	11,598
SAV10	10"	477	800	14,319
SAV12	12"	687	800	20,619
SAV14	14"	936	800	28,065

\*Air delivery may vary +/- 10% based on altitude, air density or installation. These air quantities were derived from duct sizing chart .1" friction loss per 100' duct. All CFM's listed are approximate. The pressure drop for these dampers is .2"

## Typical Capacities for Rectangular SAVs

Designing a Rectangular Smart Air Valve (SAV)

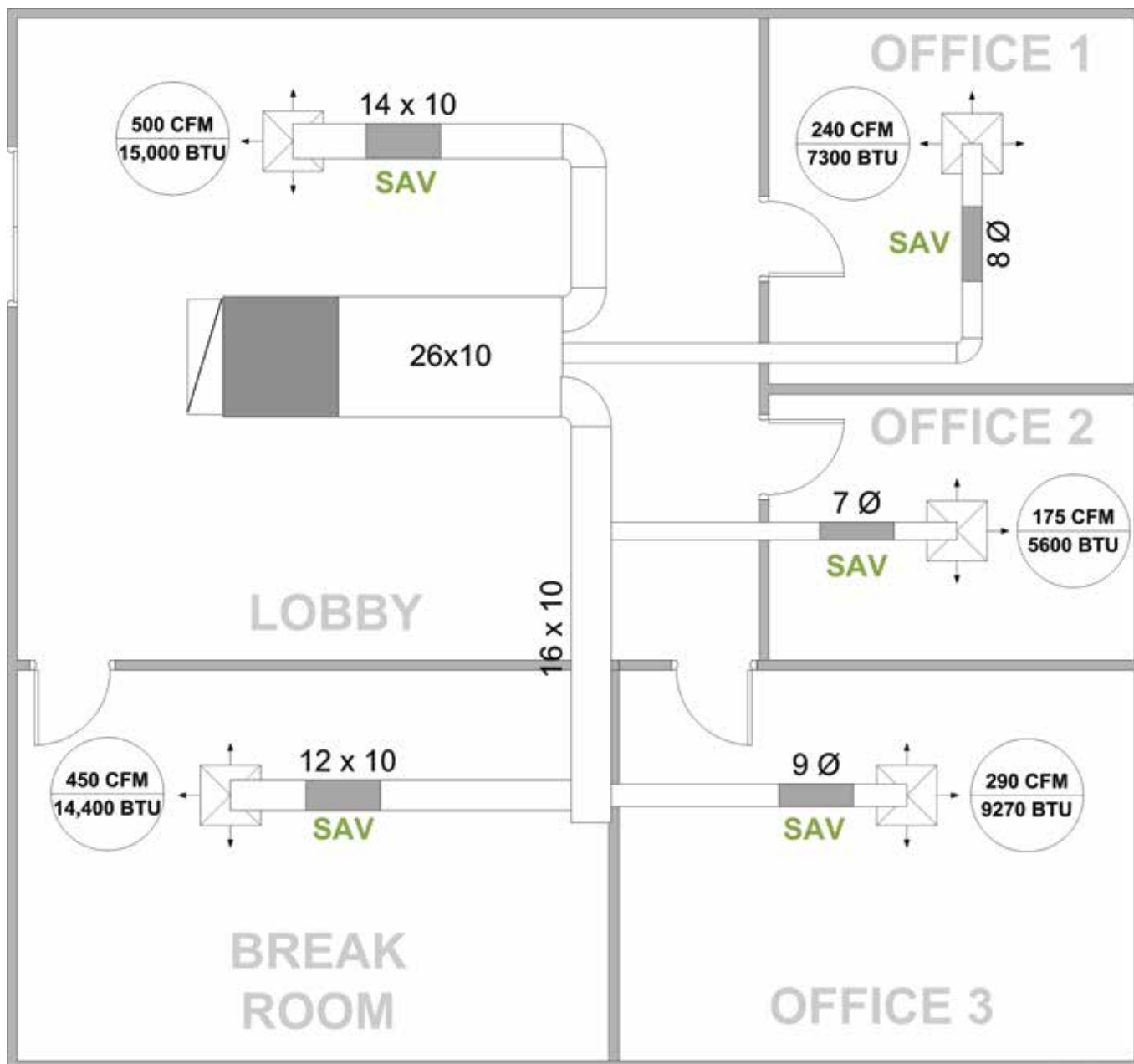
CFM x .205 = Area in Square Inches Divide Square Inches by desired duct Height to find the duct Width

BTU	*CFM	SQ inches	SAV WxH		SAV WxH		SAV WxH		SAV WxH
16,745	558	102	13x8	or	10x10	or	9x12	or	7x14
17,894	596	109	13x8	or	11x10	or	9x12	or	8x14
18,551	618	113	14x8	or	11x10	or	9x12	or	8x14
19,536	651	119	15x8	or	12x10	or	10x12	or	8x14
20,439	681	125	15x8	or	12x10	or	10x12	or	9x14
21,342	711	130	16x8	or	13x10	or	11x12	or	9x14
22,245	741	136	17x8	or	13x10	or	11x12	or	10x14
23,148	772	141	17x8	or	14x10	or	12x12	or	10x14
24,050	802	147	18x8	or	14x10	or	12x12	or	10x14
24,953	832	152	19x8	or	15x10	or	12x12	or	11x14
25,856	862	158	19x8	or	15x10	or	13x12	or	11x14
26,759	892	163	20x8	or	16x10	or	13x12	or	11x14
27,662	922	169	20x8	or	16x10	or	14x12	or	12x14
28,656	952	174	21x8	or	17x10	or	14x12	or	12x14
29,468	982	180	22x8	or	17x10	or	15x12	or	12x14
30,371	1012	185	22x8	or	18x10	or	15x12	or	13x14
31,274	1042	191	23x8	or	18x10	or	15x12	or	13x14
32,177	1073	196	24x8	or	19x10	or	16x12	or	14x14
33,080	1103	202	24x8	or	19x10	or	16x12	or	14x14
33,983	1133	207	25x8	or	20x10	or	17x12	or	14x14
34,885	1163	213	26x8	or	20x10	or	17x12	or	15x14
35,788	1193	218	26x8	or	21x10	or	17x12	or	15x14
36,691	1223	224	27x8	or	22x10	or	18x12	or	15x14
37,594	1253	229	28x8	or	22x10	or	18x12	or	16x14
38,497	1283	235	28x8	or	23x10	or	19x12	or	16x14
39,400	1313	240	29x8	or	23x10	or	19x12	or	16x14
40,303	1343	246	29x8	or	24x10	or	20x12	or	17x14
41,206	1374	251	30x8	or	24x10	or	20x12	or	17x14
42,109	1404	257	31x8	or	25x10	or	20x12	or	18x14

\*Air delivery may vary +/- 10% based on altitude, air density or installation. These air quantities were derived from duct sizing chart .1" friction loss per 100' of duct. All CFMs listed are approximate. The pressure drop for these dampers is .2"

# STEPS TO SIZE AIR DISTRIBUTION SYSTEM

1. Perform load calculation for each zone
2. Calculate required airflow per zone
3. Determine which zones will be associated with each fan coil (Proximity, BTU requirement, Type of Load, etc. should be used to determine fan coil association)
4. Determine how many fan coils will be used in building
5. Total zone air flow requirements and verify air flow requirement to select VRF fan coil
6. Use peak load calculation to select fan coil - VRF Fan Coil
7. Use air flow per zone to size SAV and duct to match required air flow per zone



**WARNING:**  
Every duct connected to the air handler MUST have an SAV

**WARNING:**  
Do not connect external and internal zones to the same air handler



## Explanation:

In this application a single air handler connected to an outdoor unit is being used to condition a lobby, break room, and three offices. A load calculation has been completed and determined the loads for each space as follows:

Lobby - 15,000 BTUs or 500 CFM

Break Room - 14,400 BTUs or 450 CFM

Office 1 - 7,300 BTUs or 240 CFM

Office 2 - 5,600 BTUs or 175 CFM

Office 3 - 9,270 BTUs or 290 CFM

## Using the SAV charts, the proper SAV can be found to service each zone:

Lobby - Rectangular SAV sized for 500 CFM - SAV14x10

Break Room - Rectangular SAV sized for 450 CFM - SAV12x10

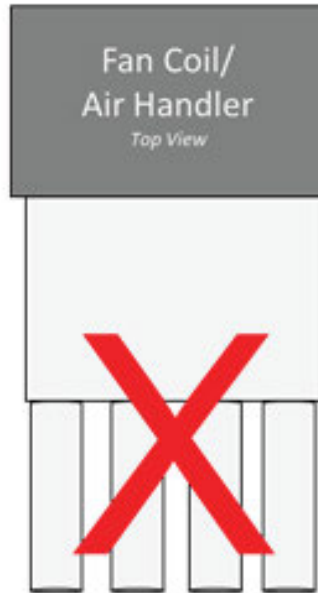
Office 1 - Round SAV sized for 240 CFM - SAV8

Office 2 - Round SAV sized for 175 CFM - SAV7

Office 3 - Round SAV sized for 290 CFM - SAV9

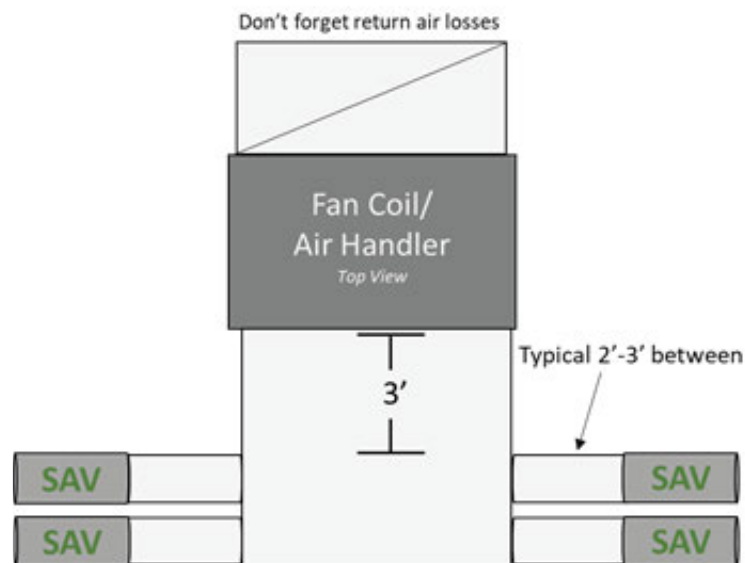
When designing ductwork, a supply air plenum and trunk line are needed, **SAV's are never installed in line with an Air Handlers discharge air outlet**, they are to be connected to a trunk duct. SAV's must be installed 24" to 36" from the trunk duct line, install a short duct from trunk line 24" to 36" long. Then install the SAV. From the SAV continue duct to the supply register.

## WRONG WAY



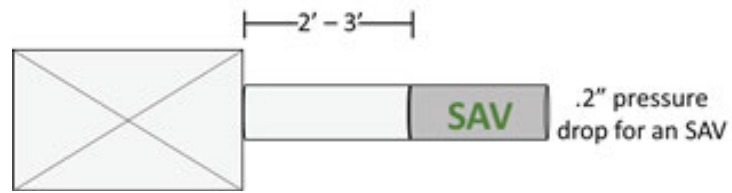
Wrong way to connect dampers  
Never connect dampers in line with the air handler. The SAV pressure switch measures excessive velocity pressures when installed in line with the fan coil

## CORRECT WAY

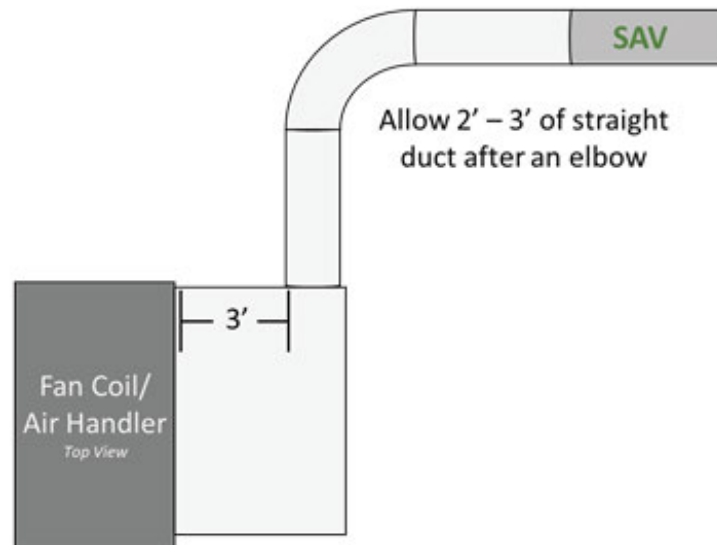


Correct way to connect SAV's  
to a duct trunk line

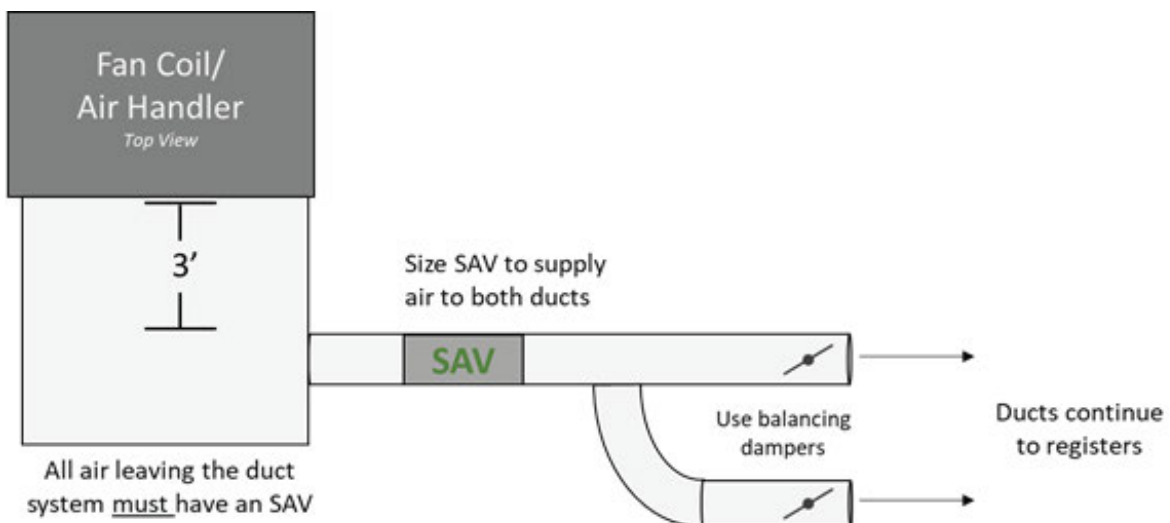
## SAV and Duct Installation



Allow 2'-3' of straight duct between the trunk and SAV



Allow 3' before the first take-off



For multiple registers use balancing dampers

# GEN XV Communicating SYSTEM CONTROLLER

## SUBMITTAL



## **GEN XV Wi-Fi** Mobile APP based System Controller

## DESCRIPTION

The GEN XV is a microcontroller based, auto changeover Universal system controller (Part # GEN XV). The GEN XV controls a fan coil or indoor unit in VRF applications and supports up to 20 energy saving pressure independent self-balancing Smart Air Valves (SAV). Communications hub is APP based and accessed via mobile phone, tablets, or web browser. GEN XV is native BACnet compliant allowing for seamless integration with BAS systems.

The GEN XV gathers information every 60 seconds from each thermostat (EzTouchX) that communicates with Smart Air Valves over a 2-wire data link directing control-based decisions to the fan coil or indoor unit.

The GEN XV is powered with one 24 V 100VA transformer, which also powers all Smart Air Valves (SAV) and thermostats in the system. Power from the controller, along with a 2-wire twisted pair communications loop, is daisy chained from SAV to SAV and thermostat to thermostat to streamline installation and system communications.

The GEN XV is equipped with leaving air, return air, and outside air sensors. Capacity control is governed by the VRF unit's internal high & low limits. Auto changeover operation is vote based, predicated on a first call, first served, majority wins on changeover algorithm.

The Gen XV is expandable up to 20 additional VRF fan coils using the add-on GEN X RMV controller that is daisy chained via the (RS485) communications loop. Each GEN X RMV supports up to 20 Smart Air Valves (SAV) per fan coil.

## TECHNICAL DATA

### **Electrical**

**Supply Voltage:** 24vac

**Power consumption:** 0.7 VA

#### **Inputs:**

24vac

3 Temperature Sensing Thermistors

#### **Outputs:**

24vac

5 SPST dry contacts, 1A @ 24vac

**Fuse protection:** Use Fused Transformer

### **BACnet Interface**

**Communication Protocol:** BACnetIP Connection

**Type:** Ethernet

**Wiring:** 10Base-T/100Base-TX

### **Environmental**

**Operating temperature:** 32 to 160° F (0 to 71° C)

**Operating humidity:** 10-95%, non-condensing

**Storage temperature:** 0 to 160° F (-18 to 71° C)

### **General**

**Communications:** 2 wire Plenum rated twisted pair Zonex Wire

**Enclosure Dimensions:** 6 ¼" x 4 ¼" x 1"

07/21/2022



## SUBMITTAL



## **GEN X RMV** System Controller To Expand System Capability

### DESCRIPTION

The *GEN X RMV* is a microcontroller based, auto changeover Universal system controller (Part # GEN X RMV). The *GEN X RMV* controls a fan coil or indoor unit in VRF applications and supports up to 20 energy saving pressure independent self-balancing Smart Air Valves (SAV). Communications hub is APP based and accessed via mobile phone, tablets, or the web browser.

The *GEN XV* gathers information every 60 seconds from each thermostat (EzTouchX) that communicates with Smart Air Valves over a 2-wire data link directing control-based decisions to the fan coil or indoor unit.

The *GEN X RMV* is powered with one 24 V 100VA transformer, which also powers all Smart Air Valves and thermostats in the system. Power from the controller, along with a 2-wire twisted pair communications loop, is daisy chained from SAV to SAV and thermostat to thermostat to streamline installation and system communications.

The *GEN X RMV* is equipped with leaving air, return air, and, outside air sensors. Capacity control is governed by the VRF unit's internal high & low limits. Auto changeover operation is vote based, predicated on a first call, first served, majority wins on changeover algorithm.

Additional control strategies are established on the APP based communications hub which shall interact and initiate control decisions with the *GEN XV* system controller and each thermostat or remote sensor in the system.

### TECHNICAL DATA

#### **Electrical**

**Supply Voltage:** 24vac

**Power consumption:** 0.7 VA

#### **Inputs:**

24vac

2 Temperature Sensing Thermistors

#### **Outputs:**

24vac

5 SPST dry contacts, 1A @ 24vac

**Fuse protection:** Use Fused Transformer

#### **Environmental**

**Operating temperature:** 32 to 160° F (0 to 71° C)

**Operating humidity:** 10-95%, non-condensing

**Storage temperature:** 0 to 160° F (-18 to 71° C)

#### **General**

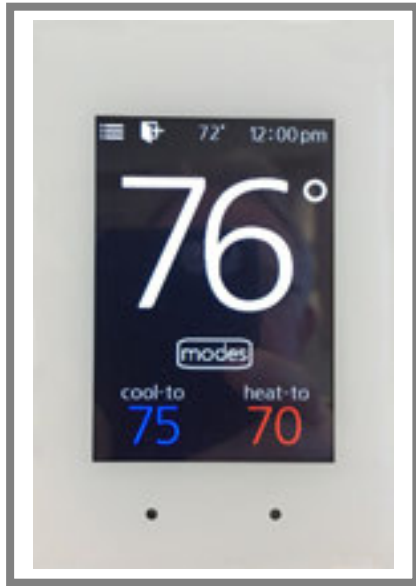
**Communications:** 2 wire Plenum rated twisted pair Zonex Wire

**Enclosure Dimensions:** 6 ¼" x 4 ¼" x 1"

7/21/2022

# EzTouchX – Color Touch Screen Zone Thermostat

## SUBMITTAL



## **EzTouchX** *Communicating / Modulating Color Touch Screen Zone Thermostat for use with the GEN X, GEN V and GEN XV Building Automation Systems*

### DESCRIPTION

The **EzTouchX** is a microprocessor based, auto changeover, communicating color touch screen zone thermostat used with the **GEN X, GEN V and GEN XV** (for VRF-VAV) control systems. The EzTouchX can operate two position (spring open/power close), modulating medium pressure, heavy-duty dampers, and communicate with SAVs for VRF-VAV systems.

The EzTouchX controls modulating zone dampers based on variance from set point to a position that will match the supply load to the demand requirement. While the HVAC unit is running and a zone thermostat is not calling or is calling for the opposite mode, its corresponding damper fully closes. When the HVAC unit is not running, the thermostats open to the Vent mode to provide ventilation if the indoor blower fan is running continuously. Two position dampers remain open when the system is in the vent mode or when the EzTouchX is calling for the same mode as the HVAC unit is currently operating in. If the EzTouchX is calling for the mode opposite to what the HVAC unit is calling for or is satisfied the two-position damper will remain closed.

The EzTouchX is easy to configure and adjust via the touch screen display. Zone ambient temperature is continuously displayed with a range of 55° to 95° F and reports the RH% of the space it is located in. Set points can be manually adjusted at the thermostat or from the management interface. Thermostats can be locked through the management interface to limit or prevent set point adjustment at the thermostat. Override operation can be configured for a 2-8 hour window to provide for after-hours operation.

The EzTouchX can be field configured for auxiliary heat operations: baseboard, reheat\*, and fan powered boxes with an adjustable dead band of 2-4°.

**\*NOTE:** An air proving switch must be used for this application; field supplied.

### TECHNICAL DATA

#### Electrical

**Input voltage:** 24VAC

**Power consumption:** 5VA maximum

**Output:**

- RO/RC Triacs – 24VAC @ .3 amp max
- AUX Heat Relay – 15VA @ 24 VAC max

#### Temperature/Humidity Sensors

**Display Range:** 55° to 95° F

**Humidity Sensor:** (0-100% RH) +/-2% RH

#### Environmental

**Operating Temperature:** 35° to 130° F (2° to 54° C)

**Operating Humidity:** 5 to 95% non-condensing

**Storage Temperature:** 0° to 150° (-18° to 66° C)

#### General

**Dimensions:** 4 1/2" H x 3" W x 1" D

**Accuracy:** +/- 0.8° F

**Memory:** Non-volatile EEPROM

**Display:** 320x480 3.5 TFT

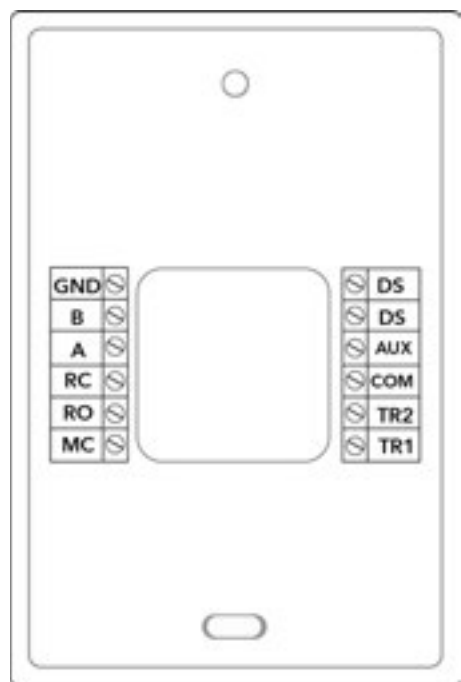
**Viewing Angle:** 140°

**Communication:** RS485 - 2 wire Plenum rated twisted pair Zonex Wire

Rev 4/30/21

# EzTouchX – Color Touch Screen Zone Thermostat

## TERMINAL FUNCTIONS



### 24V Terminal Block

RO – Run Open, damper  
RC – Run Close, damper  
MC – Damper Common

AUX – Reheat/AUX Heat Output

COM – Aux Common

DS – Duct Sensor (optional)

DS – Duct Sensor (optional)

TR1- 24vac power - In and Out

TR2- 24vac common - In and Out

(18 ga. Minimum wire size)

### Communication Terminal Block

A – Data Transmit - In and Out

B – Data Receive - In and Out

GND – Not Used

(Use Zonex Two wire twisted pair communication wire)

## FEATURES

- Full Color Touch Screen Display
- High Tech look and operation
- Auto Changeover
- Adjustable Aux or Reheat operation
- Control Round or Rectangular Dampers
- Diagnostic tool for thermostat communication and operation
- Control fully modulating dampers
- Relative Humidity reporting
- Set point lock
- Display lock out
- Auto / Off / Cool only / Heat only
- Non-volatile memory retains stored set points
- \*Slave capability – up to 3 dampers per stat
- Temperature Calibration
- F or C Temperature operation
- Optional Duct Temperature monitoring (LAT sensor is not included)

## ACCESSORIES

### Part No.

### Description

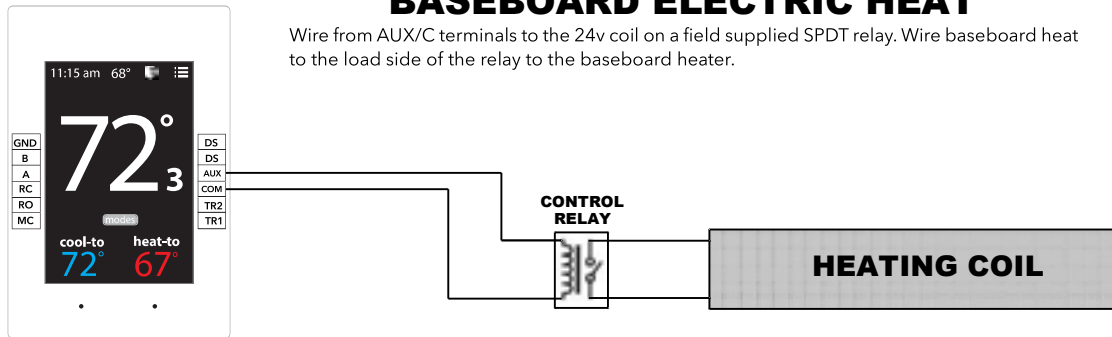
RZKITX	Thermostat and actuator as a package for VVT upgrades
EzTouchX-RS	EzTouchX thermostat with remote sensor
LAT	Leaving Air Temperature sensor

\*Smart Air Values (SAV) dampers cannot be slaved



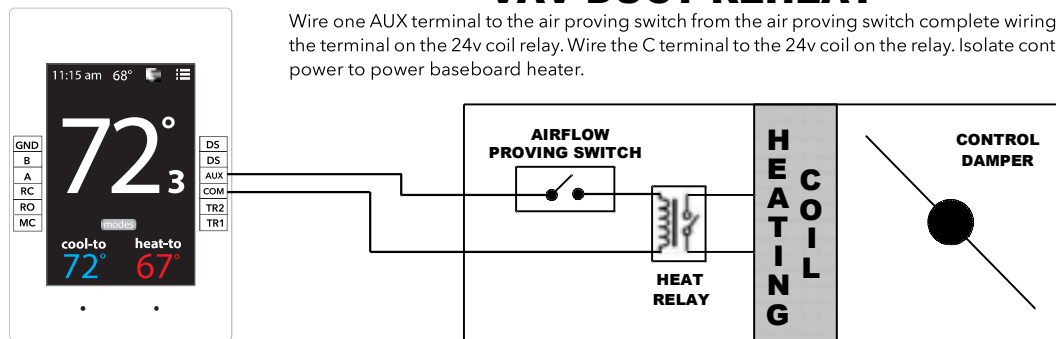
## BASEBOARD ELECTRIC HEAT

Wire from AUX/C terminals to the 24v coil on a field supplied SPDT relay. Wire baseboard heat to the load side of the relay to the baseboard heater.



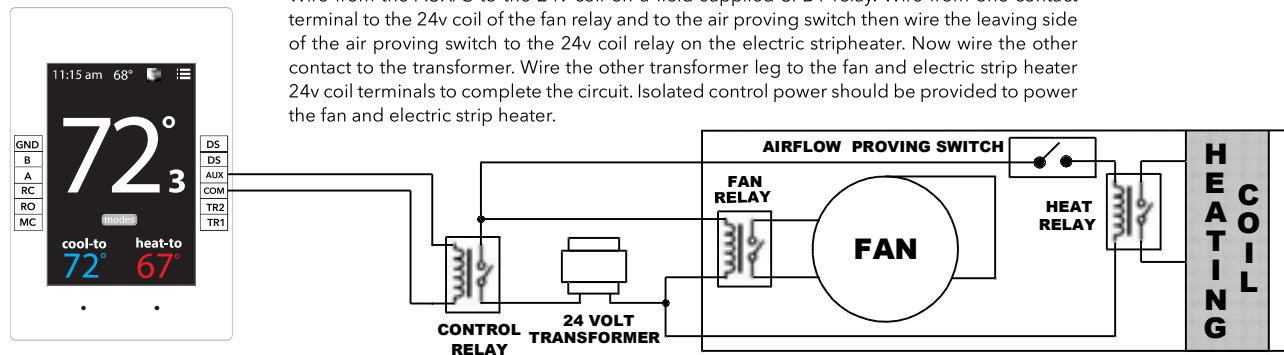
## VAV DUCT REHEAT

Wire one AUX terminal to the air proving switch from the air proving switch complete wiring to the terminal on the 24v coil relay. Wire the C terminal to the 24v coil on the relay. Isolate control power to power baseboard heater.



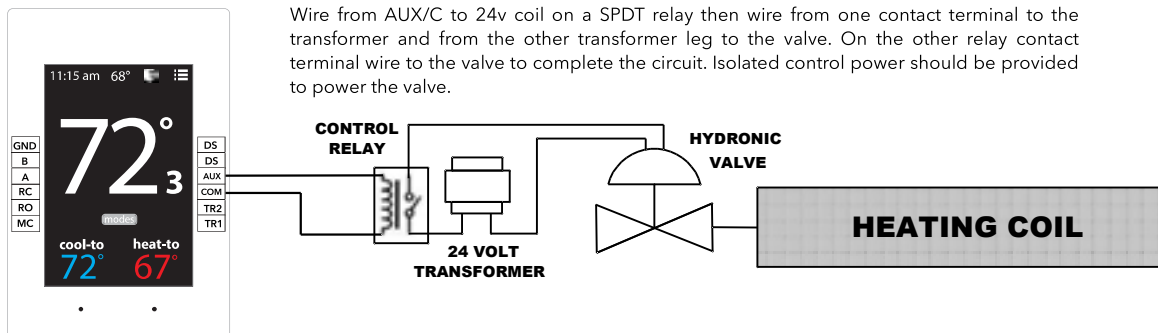
## DUCT FAN REHEAT

Wire from the AUX/C to the 24v coil on a field supplied SPDT relay. Wire from one contact terminal to the 24v coil of the fan relay and to the air proving switch then wire the leaving side of the air proving switch to the 24v coil relay on the electric stripheater. Now wire the other contact to the transformer. Wire the other transformer leg to the fan and electric strip heater 24v coil terminals to complete the circuit. Isolated control power should be provided to power the fan and electric strip heater.



## BASEBOARD HYDRONIC HEAT

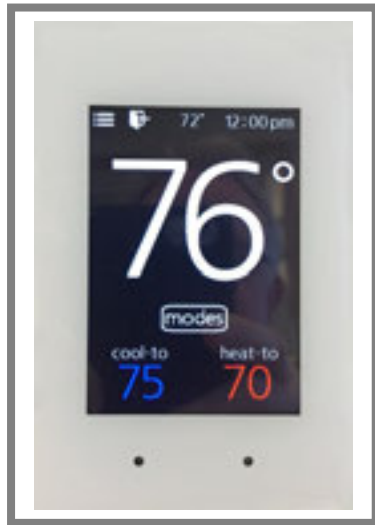
Wire from AUX/C to 24v coil on a SPDT relay then wire from one contact terminal to the transformer and from the other transformer leg to the valve. On the other relay contact terminal wire to the valve to complete the circuit. Isolated control power should be provided to power the valve.



# SATouchX PROGRAMMABLE COMMUNICATING THERMOSTAT



## SUBMITTAL



## **SATouchX** **Controls Stand Alone units** **Programmable Communicating** **Gas/Electric / Heat Pump Thermostat**

### DESCRIPTION

The Zonex Systems **SATouchX** is a microprocessor based, auto changeover, touch screen programmable communicating standalone thermostat. The universal standalone communicating thermostat operates and communicates with GEN X, GEN XV and GEN UC systems with our remote based App from a Wi-Fi mobile device and through the HUB stat for the GEN V system.

The SATouchX is quite easy to configure for Gas/ Elec (2-stage Cool / Heat) or Heat Pump (2-stage Cool / 3-stage Heat) configuration. The SATouchX is hard wired to the unit and communicates back to the control board via the RS- 485 communication link.

The SATouchX is equipped with a 24v occupied output signal to the economizer when the SATouchX is in occupied operation.

The SATouchX thermostat features an onboard thermistor for precise temperature measurement. In the event of power loss, the Heat and Cool set points are stored in a non-volatile memory, without the need for battery backup.

The ambient space temperature is continually displayed with large, easy-to-read numbers. The temperature display range is 45° to 95° F. FAN mode, Heat or Cool set points and operation modes are all indicated on the display. The SATouchX comes with a Supply and Return air sensor to monitor the air temperature.

Programmed set points can be manually adjusted at the thermostat or electronically locked and controlled through a mobile device, to provide limited manual set point adjustment. There is a 2-8 hour override, provided for after hour's operation.

### TECHNICAL DATA

#### **Electrical:**

**Supply Voltage:** 24VAC

**Power consumption:** 5VA

#### **Input:**

- 24VAC
- Humidity/Temperature (0-100% RH) +/-2% RH and +/-0.2 °C

#### **Output:**

- 1 x 24VAC Bistable Relay
- 6 x 24VAC @ 2A Relay's

**Communication:** RS-485 – Zonex 2 wire twisted pair plenum rated wire

#### **Environmental:**

**Operating Temperature:** 35° to 130° F (2° to 54° C)

**Operating Humidity:** 5 to 95% non-condensing

**Storage Temperature:** 0° to 150° (-18° to 66° C)

#### **General:**

**Dimensions:** 4 1/2" H x 3" W x 3/4" D

**Temperature Display Range:** 55° to 95° F

**Accuracy:** +/- 0.8° F

**Memory:** Non-volatile EEPROM

**Display:** 320x480 3.5 TFT

**Viewing Angle:** 140°

**Included Accessories:** Supply and Return Air Sensors

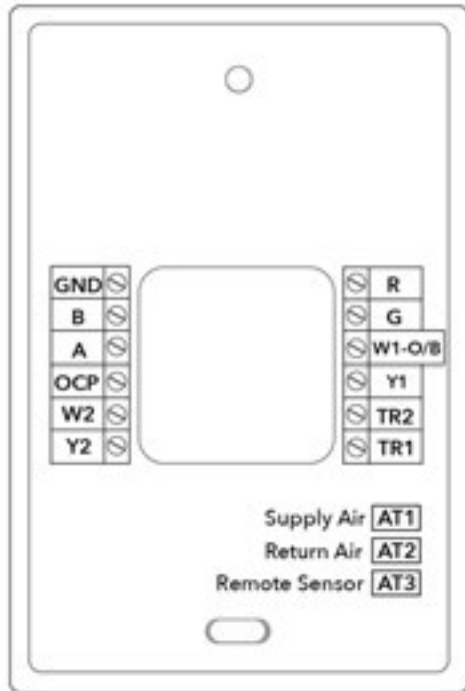
#### **Notes:**

\*Compatible with GEN X, GEN V, GEN XV, and GEN UC

Rev 7/21/21

# SATouchX PROGRAMMABLE COMMUNICATING THERMOSTAT

## TERMINAL FUNCTIONS



### Unit Terminal Block

Y1 - First stage cool  
Y2 - Second stage cool  
W1 / O/B - First stage heat or Reversing Valve  
W2 - Second stage heat  
G - Fan  
R - 24v from the unit  
OCP – 24v output when in occupied mode

### 24v from Independent Transformer

TR1 - 24vac power input - In and Out  
TR2 - 24vac power common - In and Out  
Use 18 ga. Minimum wire size

### Communication Terminal Block

A - Data Transmit - In and Out  
B - Data Receive - In and Out  
GND – Not Used  
Use Zonex 2 Wire Twisted Pair

### Supply, Return Air and Remote sensor plugs

AT1 - Supply Air sensor harness plug  
AT2 - Return Air sensor harness plug  
AT3 - Remote Sensor harness plug

## FEATURES

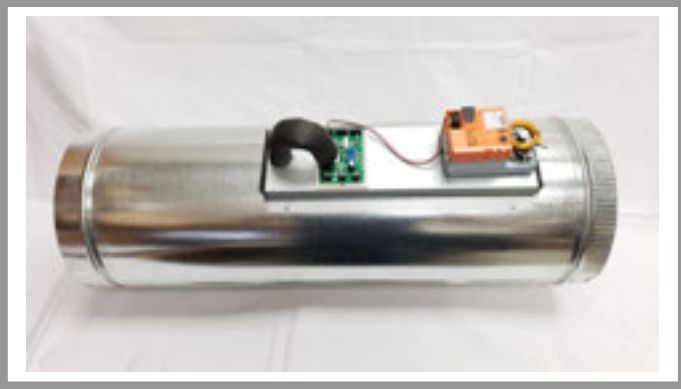
- Full Color Touch Screen Display
- Gas /Elect (2C/2H) or Heat Pump (2C/3H) standalone control
- Emergency Heat operation
- Auto Changeover 7-day Programmable
- Attractive design
- Accurate temperature control
- Electronic Lock feature
- Supply and Return Air monitoring
- Relative Humidity reporting
- Optional Remote Sensor operation
- Configurable fan operation for Occupied mode
- F° or C° Temperature Operation
- Auto / Heat only / Cool only / Off operation
- Non-volatile memory: Retains temperature set points, time, date, and schedules
- RS-485 communication
- Temperature Calibration
- Communicates with GEN X mobile App
- 24v occupied output signal to RTU for economizer operation

## ACCESSORIES

<u>Part No.</u>	<u>Description</u>
SATouchXRS	SATouchX thermostat with Remote Sensor
WPLT	Wall Plate

# ROUND VRF-SAV (SMART AIR VALVE)

## SUBMITTAL



### **SAV**

***Round Supply Damper used in VRF or pressure independent applications***

## DESCRIPTION

The SAV, (Smart Air Valve) is pressure independent, self-balancing damper utilized in VRF applications to deliver specific CFM to each zone in a ducted system. The Smart Air Valve has a built-in pitot tube measuring section that controls adjustable air velocities, that are measured by differential pressure sensors. The SAV velocity setting potentiometers will assign a target air velocity at each SAV. The SAV air delivery will adjust itself to locate the target velocity. Then the SAV will hold this assigned air delivery regardless of static pressure changes in the system.

The EzTouchX used with a Smart Air Valve can request various preset air volume targets and send a specific target request to the SAV. The SAV will maintain constant CFM or cooling to the space. Once the zone is satisfied the SAV will switch to the vent mode to limit on/off compressor operation

The Smart Air Valve is a new concept in air delivery. This operation emulates the way an indoor VRF unit operates allowing the addition of VAV or variable air volume control in a VRF system controlling up to 20 Smart Air Valves per indoor unit or fan coil.

Zonex VRF-VAV supplies a predictable CFM from each damper in the system.

The 6" – 10" damper cylinders are fabricated from 22-gauge steel; the 12" – 14" cylinders from 20-gauge steel. Each cylinder features two rolled beads, which provide maximum structural integrity. The trailing end is crimped for ease of installation. A positive air seal is accomplished through use of a high-density foam gasket around the blade perimeter. The damper blade is bolted to the hexagonal damper shaft.

Dampers feature 24VAC, full stall motors, which do not require use of end switches to terminate travel. Each SAV is paired and controlled from its respective EzTouchX zone thermostat.

Damper motors are easily removed for damper shaft and motor inspection. Each actuator hat section is insulated to prevent condensation.

## TECHNICAL DATA

### ***Electrical:***

**Supply Voltage:** 24VAC

**Power consumption:** 2 VA maximum (1.5 w)

### ***Environmental:***

**Operating temperature:** 20 to 125° F (-7 to 52° C)

**Operating humidity:** 10-95% non-condensing

**Storage temperature:** -20 to 130° F (-29 to 54° C)

### ***General:***

**Shell:** 20-22 gauge cold rolled galvanized steel

**Shaft:** 1/2" dia. aluminum, hexagonal

**Bushings:** Celcon

**Actuator:** Power Open/Power Close

**Stroke:** 60°

**Pressure drop:** .2" W.C. @ rated CFM

Rev 07/21/2022

# ROUND VRF-SAV (SMART AIR VALVE)

## TYPICAL CAPACITIES

	Diameter	*CFM HI	Velocity FPM	BTU HI
SAV05	5"	109	800	3,677
SAV06	6"	172	800	5,155
SAV07	7"	234	800	7,016
SAV08	8"	305	800	9,164
SAV09	9"	387	800	11,598
SAV10	10"	477	800	14,319
SAV12	12"	687	800	20,619
SAV14	14"	936	800	28,065

\*Air delivery may vary +/- 10% based on altitude, air density or installation. These air quantities were derived from duct sizing chart .1" friction loss per 100' of duct. All CFMs listed are approximate. The pressure drop for these dampers is .2"

## Dimensional Data

	Diameter	Length	Width
SAV05	5"	30"	8"
SAV06	6"	30"	9"
SAV07	7"	30"	10"
SAV08	8"	30"	11"
SAV09	9"	30"	12"
SAV10	10"	30"	13"
SAV12	12"	30"	15"
SAV14	14"	32"	17"

## ORDERING INFORMATION

Part No.	Description
SAV05	Smart Air Valve, 5" diameter
SAV06	Smart Air Valve, 6" diameter
SAV07	Smart Air Valve, 7" diameter
SAV08	Smart Air Valve, 8" diameter
SAV09	Smart Air Valve, 9" diameter
SAV10	Smart Air Valve, 10" diameter
SAV12	Smart Air Valve, 12" diameter
SAV14	Smart Air Valve, 14" diameter

# RECTANGULAR VRF-SAV (SMART AIR VALVE)

## SUBMITTAL



### **SAV**

***Rectangular Supply Damper used in VRF or pressure independent applications***

## DESCRIPTION

The SAV, (Smart Air Valve) is a pressure independent, self-balancing rectangular damper utilized in VRF applications to deliver specific CFM to each zone in a ducted system. The Smart Air Valve has a built-in pitot tube measuring section that controls adjustable air velocities, that are measured by differential pressure sensors. The SAV velocity setting potentiometers will assign a target air velocity at each SAV. The SAV air delivery will adjust itself to locate the target velocity. Then the SAV will hold this assigned air delivery regardless of static pressure changes in the system.

The EzTouchX used with a Smart Air Valve can request various preset air volume targets and send a specific target request to the SAV. The SAV will maintain constant CFM or cooling to the space. Once the zone is satisfied the SAV will switch to the vent mode to limit on/off compressor operation.

The Smart Air Valve is a new concept in air delivery. This operation emulates the way an indoor VRF unit operates allowing the addition of VAV or variable air volume control in a VRF system controlling up to 20 Smart Air Valves per indoor unit or fan coil.

Zonex VRF-VAV supplies a predictable CFM from each damper in the system.

Rectangular Smart Air Valves feature parallel blade construction for height dimensions to 14".

The damper assembly is enclosed in a 26" long, 20-gauge galvanized steel sleeve, with standard slip and drive connections. Damper blades are bolted to a hexagonal damper shaft.

Damper blades close against steel blade stops. The damper linkage is non-adjustable and fully enclosed within the damper.

Dampers feature 24VAC, full stall motors, which do not require use of end switches to terminate travel. Each SAV is paired and controlled from its respective EzTouchX zone thermostat.

Damper motors are easily removed for damper shaft and motor inspection. Each actuator hat section is insulated to prevent condensation.

## TECHNICAL DATA

### ***Electrical:***

**Supply Voltage:** 24vac

**Power consumption:** 2 VA maximum (1.5W)

### ***Environmental:***

**Operating temperature:** 20 to 125° F (-7 to 52° C)

**Operating humidity:** 10-95% non-condensing

**Storage temperature:** -20 to 130° F (-29 to 54° C)

### ***General:***

**Shell:** 20-gauge cold rolled galvanized steel

**Shaft:** 1/2" dia. plated steel, hexagonal

**Blades:** 16 gauge galvanized

**Bushings:** Stainless steel oilite

**Actuator:** Power Open / Power Close

**Stroke:** 90°

Rev 07/21/2022

# RECTANGULAR VRF-SAV (SMART AIR VALVE)

## TYPICAL CAPACITIES

Designing a Rectangular Smart Air Valve (SAV)

CFM x .205 = Area in Square Inches

Divide Square Inches by desired duct Height to find the duct Width

BTU	*CFM	SQ inches	SAV WxH		SAV WxH		SAV WxH		SAV WxH
16,745	558	102	13x8	or	10x10	or	9x12	or	7x14
17,894	596	109	13x8	or	11x10	or	9x12	or	8x14
18,551	618	113	14x8	or	11x10	or	9x12	or	8x14
19,536	651	119	15x8	or	12x10	or	10x12	or	8x14
20,439	681	125	15x8	or	12x10	or	10x12	or	9x14
21,342	711	130	16x8	or	13x10	or	11x12	or	9x14
22,245	741	136	17x8	or	13x10	or	11x12	or	10x14
23,148	772	141	17x8	or	14x10	or	12x12	or	10x14
24,050	802	147	18x8	or	14x10	or	12x12	or	10x14
24,953	832	152	19x8	or	15x10	or	12x12	or	11x14
25,856	862	158	19x8	or	15x10	or	13x12	or	11x14
26,759	892	163	20x8	or	16x10	or	13x12	or	11x14
27,662	922	169	20x8	or	16x10	or	14x12	or	12x14
28,656	952	174	21x8	or	17x10	or	14x12	or	12x14
29,468	982	180	22x8	or	17x10	or	15x12	or	12x14
30,371	1012	185	22x8	or	18x10	or	15x12	or	13x14
31,274	1042	191	23x8	or	18x10	or	15x12	or	13x14
32,177	1073	196	24x8	or	19x10	or	16x12	or	14x14
33,080	1103	202	24x8	or	19x10	or	16x12	or	14x14
33,983	1133	207	25x8	or	20x10	or	17x12	or	14x14
34,885	1163	213	26x8	or	20x10	or	17x12	or	15x14
35,788	1193	218	26x8	or	21x10	or	17x12	or	15x14
36,691	1223	224	27x8	or	22x10	or	18x12	or	15x14
37,594	1253	229	28x8	or	22x10	or	18x12	or	16x14
38,497	1283	235	28x8	or	23x10	or	19x12	or	16x14
39,400	1313	240	29x8	or	23x10	or	19x12	or	16x14
40,303	1343	246	29x8	or	24x10	or	20x12	or	17x14
41,206	1374	251	30x8	or	24x10	or	20x12	or	17x14
42,109	1404	257	31x8	or	25x10	or	20x12	or	18x14

\*Air delivery may vary +/- 10% based on altitude, air density or installation. These air quantities were derived from duct sizing chart .1" friction loss per 100' of duct. All CFMs listed are approximate. The pressure drop for these dampers is .2"

## ORDERING INFORMATION

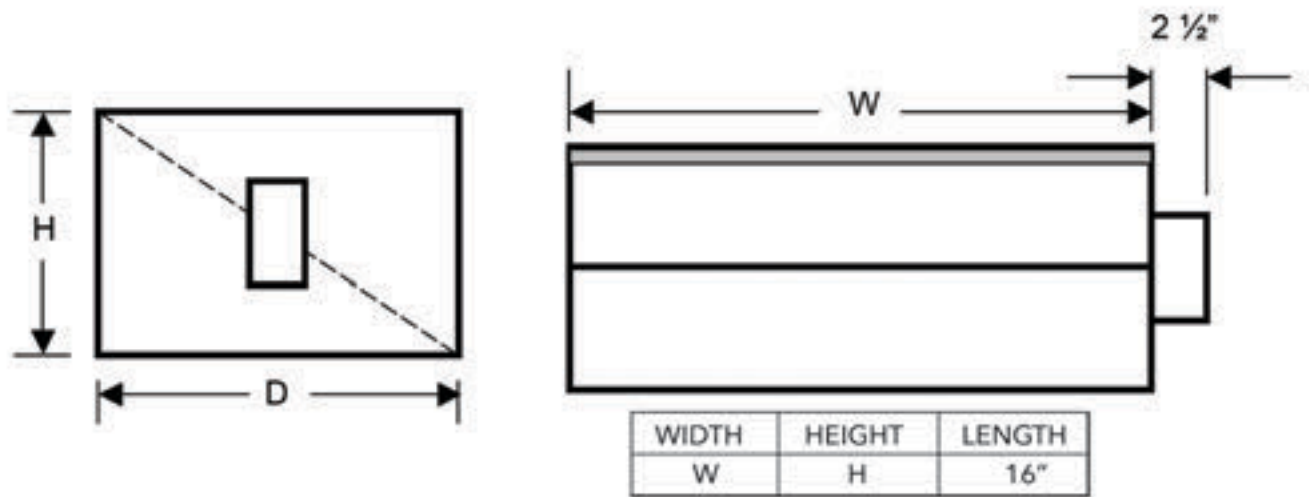
5622 Engineer Drive / Huntington Beach, CA 92649 (800) 228-2966



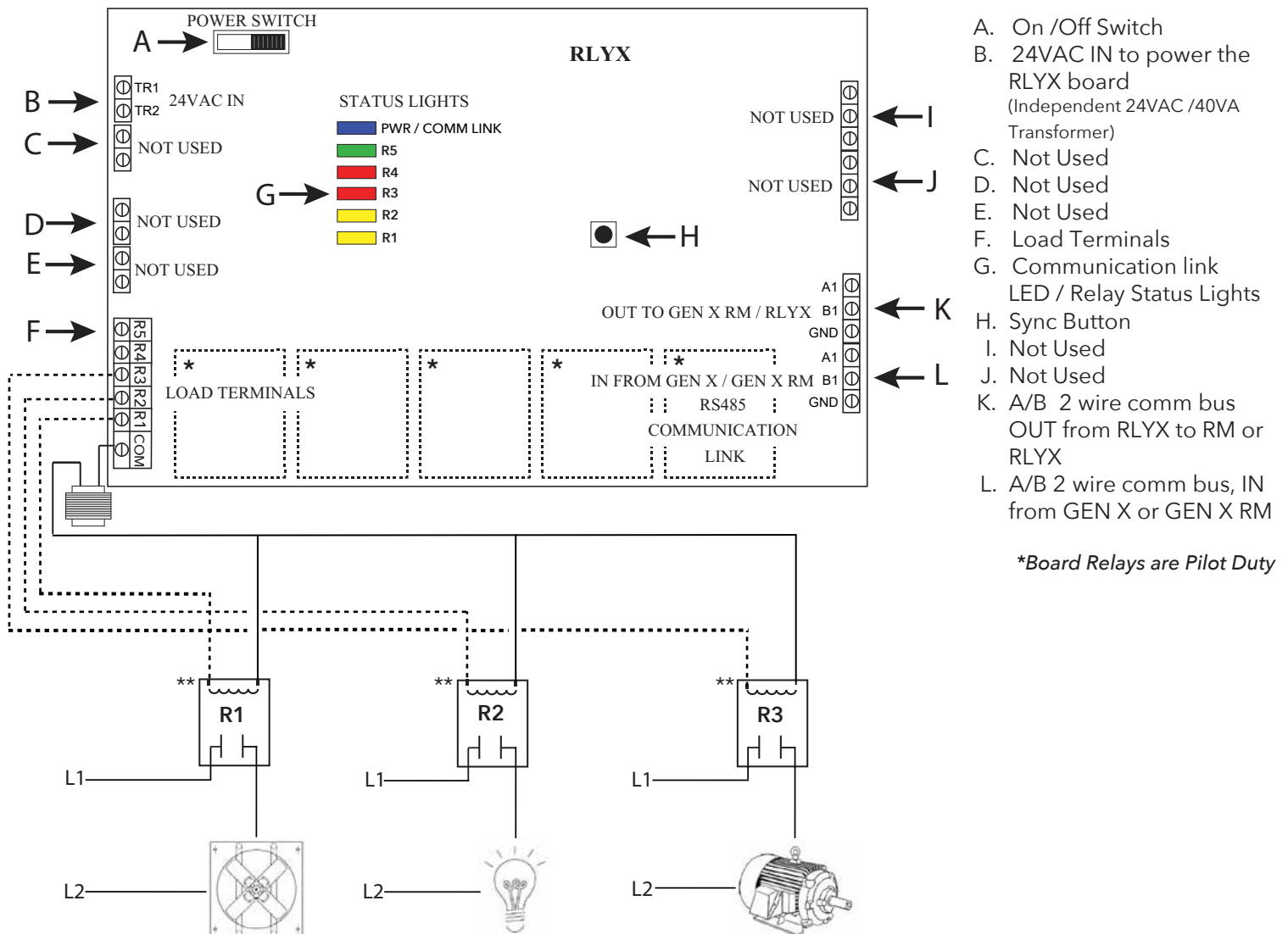
RECTANGULAR VRF-SAV (SMART AIR VALVE)

Part No. SAV WxH Smart Air Valve, Width x Height – Actuator located on the Height dimension

DIMENSIONAL DATA



The RLYX is a communicating device equipped with 5 SPST relay terminals switched between a single Common terminal (NOT as dry contacts independent from each other). The RLYX can be used to control loads such as fans, pumps, blowers, lighting, or any load that can be operated using low voltage signals of 24VAC or less. When a relay is energized a circuit is completed between Common and the corresponding relay terminal (i.e. Common and R1, Common and R2 and so on). Status of the relays are displayed as either ON or OFF under the Zone Overview or System Diagnostics screens of the GEN X App and LED indicators on the RLYX board. Relays will energize in the Occupied mode and de-energize in the Unoccupied mode. One Occupied and one Unoccupied event can be scheduled per day for each relay/load on either a daily basis or on 5-1-1 basis (Mon-Fri, Sat-Sun). Each relay terminal on the RLYX can be configured with its own independent schedule tailored to the needs of each load. The RLYX can also be configured with Vacation Schedules for holidays or other special events when the building will be Unoccupied during the regular schedule. If more than five loads are to be controlled then additional RLYX's will be required. The GEN X can support up to twenty RLYX and/or GEN X RM controllers, if the application requires more than twenty RLYX and/or GEN X RM controllers then additional GEN X's will be required.



# RLYX COMMUNICATING RELAY MODULE



## **SUBMITTAL**



## **RLYX** ***Communicating Relay Module*** ***For Generic Load Control***

### **DESCRIPTION**

The Zonex Systems RLYX is a communicating relay module, which provides programmed ON and OFF schedules for auxiliary devices such as blowers, fans, lighting, etc. The *GEN X* or *GEN UC* Scheduling program provides Occupied – Unoccupied events each day for each RLYX, including vacation days. The control status of the RLYX is displayed on the Zonex Systems Mobile App.

The RLYX consists of 5 SPST relays for controlling 24vac circuits. The RLYX is powered by its own 24volt 40va transformer. Multiple RLYX devices can be utilized to control more than 5 generic loads.

The RLYX requires a unique address from 01 to 20 and communicates via a 2 wire twisted pair communications buss to its *GEN X* or *GEN UC*.

### **OPERATION**

The RLYX requires a unique address for system communication. The ON – OFF times for the RLYX are entered in the Schedule tab via the Zonex Systems Mobile App.

When the RLYX is in the occupied mode, the on-board relays are energized. In the Unoccupied mode, the relays are de-energized. The mode status is displayed on the Mobile App overview screen for the RLYX control board.

NOTE: The SPST relay outputs are pilot duty dry contacts rated for a maximum load of 2 amps on 24vac circuits only. Additional pilot relays may be required for proper circuit control.

### **TECHNICAL DATA**

#### ***Electrical***

**Supply Voltage:** 24vac

**Power Consumption:** 4 VA maximum

**Output:** 5 – SPST dry contacts, 2A @24vac

**Communication:** RS-485

**Comm. link maximum length:** 4,000 ft.

#### ***Environmental***

**Operating temperature:** 32° to 130° F (2 to 54° C)

**Operating humidity:** 5% to 95% non-condensing

**Storage temperature:** 0° to 150° F (-18 to 66° C)

**Enclosure Dimensions:** 6 ¼" x 4 ¼"x1"

Rev 12/9/19

# VRF-VAV

## **GEN XV\***

Wi-Fi App Based Controller

Part # - **GEN XV**

Mobile App Included

1- Per VRF Coil or VRF RTU  
**Supports 2 - 20 Smart Air Valves (SAV)**

*\*Requires manufacturer's thermostat interface*

Add Part # **GEN XRMV** to expand your GEN XV system by adding GEN XRMV controller for each additional fan coil.  
(Each GEN X RMV supports 2-20 Smart Air Valve (SAV))

Daisy Chain: Zonex communications wire and 24VAC from SAV to SAV and Stat to Stat  
1-24VAC / 100VA Transformer Powers the GEN XV, All the SAV's, and Thermostats in the system  
Each GEN XRMV expansion controller requires an additional transformer to support up to 20 Smart Air Valves

Add Part # **RLYX** to energize up to 5 generic loads such as fans, pumps, blowers and lighting

### **Zone Thermostat**

Part # - **EzTouchX**

1 - Thermostat per Smart Air Valve (SAV)

### **Smart Air Valves (SAV)**

Part #

SAV + Damper Size - Round

SAV WxH - Rectangular

### **Thermostat to Control Standalone VRF's**

Part # - **SATouchX\***

Controls and Networks Standalone VRF systems  
with SA / RA reporting from the mobile app

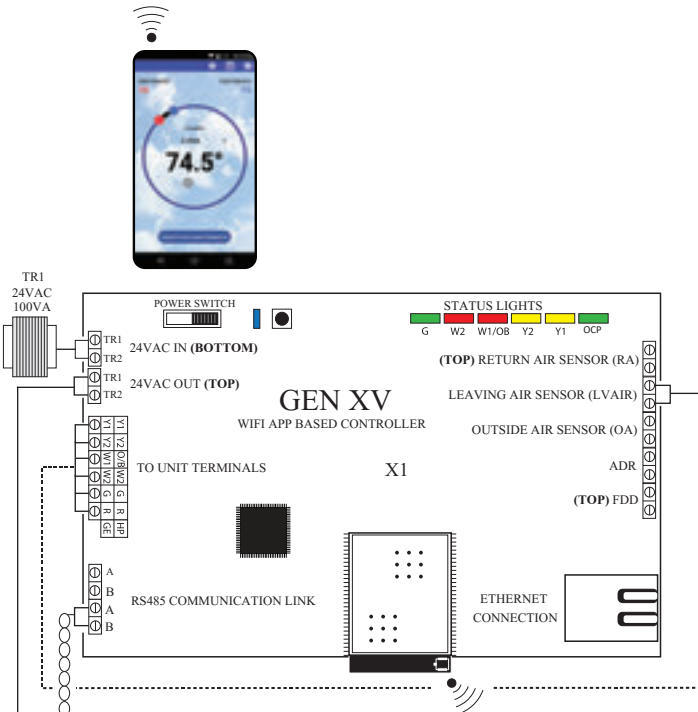
*\*Requires manufacturer's thermostat interface*

## THIS COMPLETES YOUR GEN XV SYSTEM

For assistance, contact Zonex at (800) 228-2966  
or visit [zonexproducts.com](http://zonexproducts.com) for more information

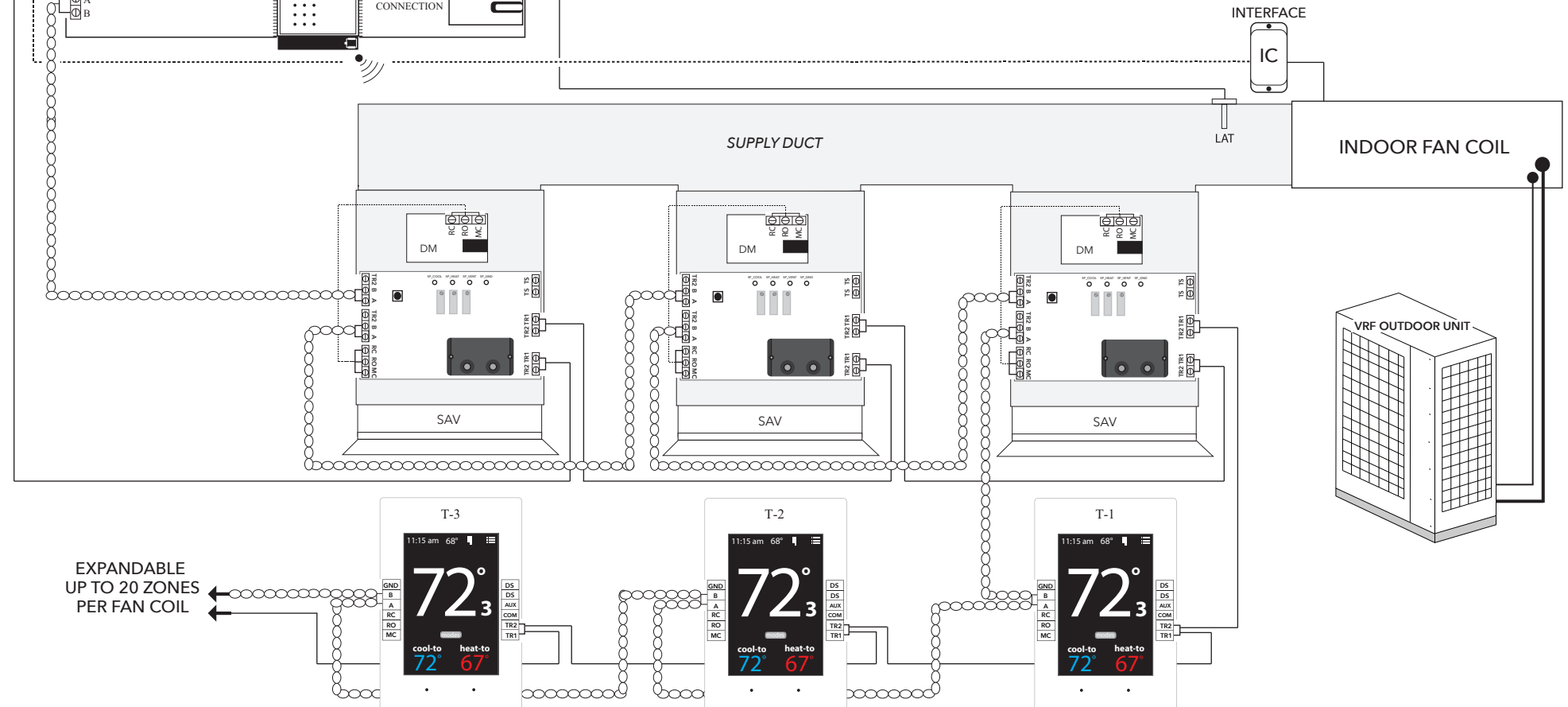
# GEN XV

## VRF-VAV WITH SMART AIR VALVES

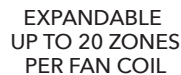


DEVICE	ID	DESCRIPTION	DEVICE	ID	DESCRIPTION
MOBILE APP, WIFI BASED CONTROL BOARD	X1	GEN XV CONTROLLER CONTROLS 2-20 SMART AIR VALVES - ONLY 1-24VAC 100VA TRANSFORMER POWERS ALL SAV's AND THERMOSTATS	SYSTEM TRANSFORMER	TR1	24VAC/100VA TRANSFORMER SIZED @ (5VA PER SMART AIR VALVE) DAISY CHAIN SAV TO SAV
THERMOSTAT	T1-T20	COLOR TOUCH SCREEN ZONE THERMOSTAT	RS485 COMMUNICATION LINK	∞	ZONEX 2 WIRE STPR TWISTED PAIR
SMART AIR VALVE ACTUATOR	DM	SUPPLIED WITH SMART AIR VALVE (FACTORY PRE-WIRED)	UNIT TERMINAL WIRING	-----	18 AWG THERMOSTAT WIRE
SMART AIR VALVE (SAV)	SAV	PRESSURE INDEPENDENT SELF BALANCING SMART AIR VALVE	SUPPLY LAT DISCHARGE SENSOR	LAT	SUPPLY LAT
INTERFACE CONTROLLER	IC	INTEGRATES 24V THERMOSTAT OUTPUTS TO VRF SYSTEM (FIELD SUPPLIED)	WIRELESS COMMUNICATION	📶	COMMUNICATES WIRLESSLY TO A NETWORK OR DEVICE

VISIT OUR ONLINE CATALOG AT [ZONEXPRODUCTS.COM](http://ZONEXPRODUCTS.COM)  
FOR APPLICATIONS ASSISTANCE CALL 800-228-2966

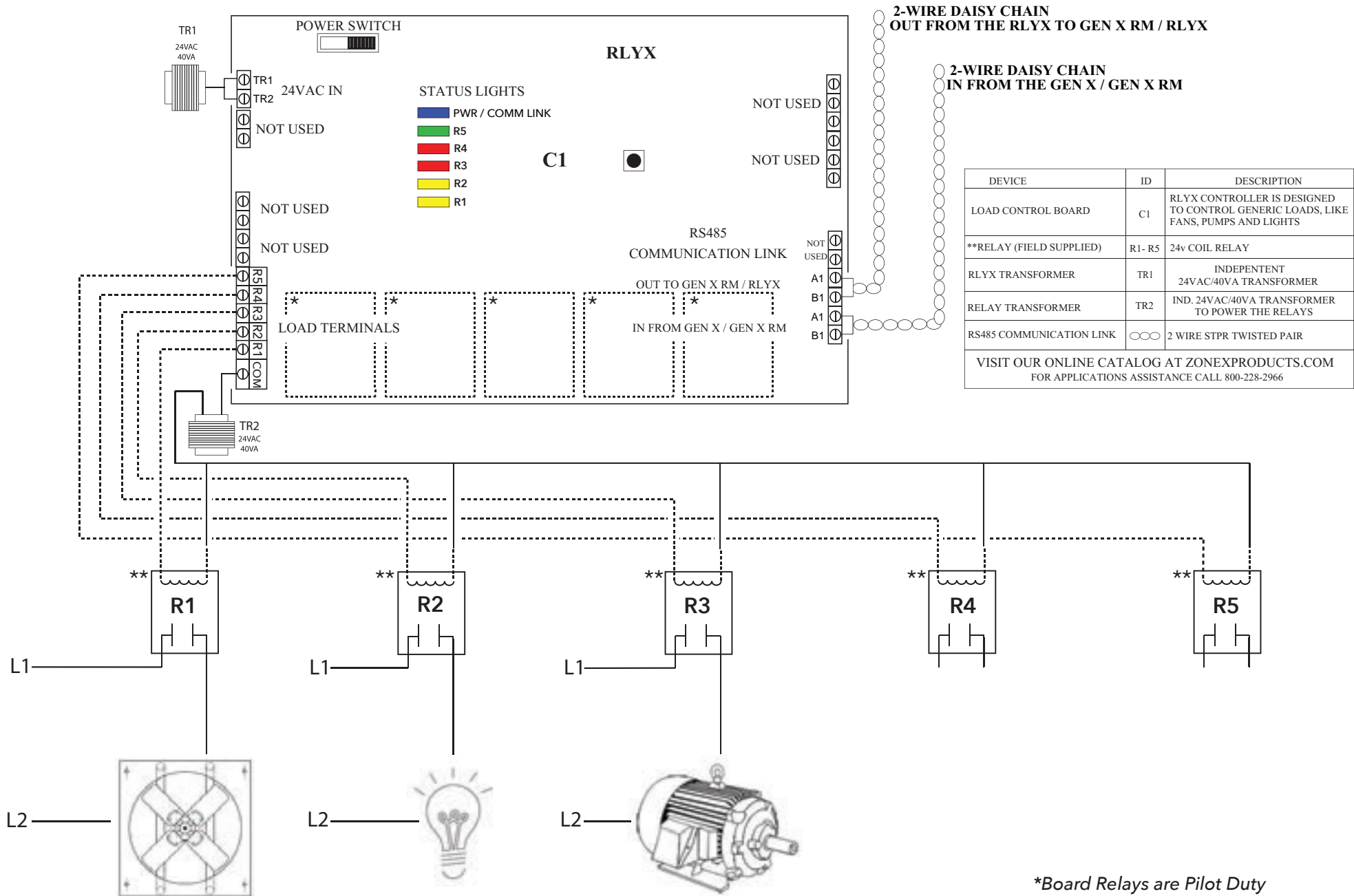


*RELAY MODULE- PROVIDING SYSTEM EXPANSION CAPABILITY FOR ADDITIONAL VRF FAN COILS OR INDOOR UNITS*



# RLY X

## SCHEDULE AND CONTROL GENERIC LOADS



\*Board Relays are Pilot Duty  
 \*\*Isolate with a 24v Coil Relay  
 (FIELD SUPPLIED)



# VRF-VAV

## Mobile App based **GEN XV** System

Using Programmable Thermostats controlling Pressure Independent Self Balancing  
Smart Air Valves

### **Automatic Temperature Control Specification**

#### **Section 15950 - Controls and Automation**

##### **PART 1: General**

- 1.1** The automatic temperature controls (ATC) under this section will be supplied and installed in accordance with the General Conditions, Supplementary Conditions, and all Division I General Requirements and Referenced Documents.
- 1.2** The installation of the ATC shall be in accordance with all National, State and Local codes pertaining to this type of work.
- 1.3** All work must comply with Section 15050 – Basic Materials and Methods – and all other Division 15 Sections, as applicable.
- 1.4** The scope shall include furnishing and installing a temperature control system to include remote control panels, temperature control devices, appurtenances, etc. to accomplish specific control sequences specified herein, sensing and indicating devices, temperature indicating instruments, supporting structures and other required components.
- 1.5** The scope shall include all thermostats, sensors, VAV-SMART AIR VALVES (SAV), actuators, microprocessor central controllers, VAV diffusers, static pressure sensors, fan powered boxes, and reheat products and all other new components of the system requiring connections.

##### **PART 2: General Instructions**

- 2.1** The Building Automation System/Automatic Temperature Control (BAS/ATC) Systems as specified herein shall be provided in their entirety by the BAS/ATC Contractor. The BAS/ATC Contractor shall base his Bid on the system as specified and on the sequence of operations.
- 2.2** As part of his Bid, the BAS/ATC Contractor shall submit for review by the owner's authorized representatives a written description of his BAS/ATC systems, including block diagrams, showing all major components and control panels and required cabling between each.
- 2.3** The BAS/ATC contractor shall include manufacturer's literature for each type of panel, controller, or device that may be shown on the Riser Diagram.
- 2.4** The Riser Diagram shall show schematically the entire building system with all major components identified.

##### **PART 3: Scope of Work**

- 3.1** The BAS/ATC systems shall be supplied and installed completely under the BAS/ATC Contract. Control components shall be mounted and wired by the BAS/ATC Contractor.
- 3.2** The BAS/ATC Contractor shall provide the engineering, installation, calibration, software programming and checkout necessary for complete and fully operational BAS/ATC systems, as specified hereafter.
- 3.3** Wiring in exposed areas and in mechanical rooms shall be in EMT. Wiring in accessible, concealed areas shall be plenum rated cable.

## **PART 4: Submittals**

- 4.1** The following data/information shall be submitted for approval:
- 4.2** Complete sequence of operation.
- 4.3** Control system drawings, including all pertinent data, to provide a functional operating system.
- 4.4** Damper / SAV schedules showing size, configuration, capacity and location of all equipment.
- 4.5** Data sheets for all hardware control components.
- 4.6** A description of the installation materials including conduit, wire, flex, etc.
- 4.7** Thermostat/Sensor locations.
- 4.8** Control panel locations.
- 4.9** Provide as part of the submittal five copies of all data and control drawings.

## **PART 5: Qualifications**

- 5.1** The BAS/ATC Contractor shall participate in an online training with Zonex Systems prior to installation of the GEN XV VRF-VAV control system.
- 5.2** The BAS/ATC Contractor shall complete Zonex Job Completion and Start-Up Check List and review with building owner or representative at the conclusion of the controls system installation.
- 5.3** The BAS/ATC Contractor shall have an office within a 100-mile radius of the job site, staffed with factory trained personnel capable of providing instruction, routine maintenance and 24-hour emergency maintenance service for all system components.
- 5.4** The BAS/ATC Contractor shall have a minimum of three years' experience installing and servicing similar microprocessor based control systems.
- 5.5** The Contractor shall be prepared to provide evidence of this history as a condition of acceptance and approval prior to bidding.

## **PART 6: System Description**

- 6.1** The SYSTEM shall be a pressure independent Auto Changeover VRF-VAV zoning system that controls one or multiple VRF Fan Coils networked together, supporting up to 20 Independent VRF fan coils or VRF rooftop units with each supporting 2 - 20 Pressure Independent Smart Air Valves (SAV) - zones per ducted VRF Fan Coil. Each SAV shall emulate the operation of an indoor VRF fan coil / rooftop unit. VRF-VAV system shall allow for the addition of VAV or Variable Air Volume control with VRF systems controlling up to 20 SAV zones per fan coil. Zones shall be controlled via programmable thermostats, Pressure Independent SAV self-balancing dampers and a mobile web based App to configure and monitor system operation, remotely or on-site. The *GEN XV* control panel shall be Universal and support Cooling Only/Heat Pump/Gas – Electric applications.
- 6.2** The system shall be BACnetIP compatible.
- 6.3** The System shall be expandable to add additional VRF condensers, fan coils and pressure independent SAV controls, all controllable via the Zonex Mobile App.
- 6.4** Each pressure independent SAV shall include built-in Pitot tube measuring section to monitor air velocities, which are measured by differential pressure sensors. The SAV velocity setting potentiometers shall assign a target air velocity at each damper; these settings shall be set at the factory. The damper air delivery shall adjust itself to match the target velocity. SAV will hold assigned air delivery regardless of static pressure changes in the system. Each EzTouchXV zone thermostat can request air volume targets based on demand for cooling, heating or ventilation.

SAV Round Air Valves shall have elliptical blades and SAV Rectangular dampers shall have louvered blades.

- 6.5** The system shall poll each thermostat every 60 seconds to evaluate the number of heating and cooling calls in the System. Control decisions shall be Vote based.
- 6.6** The system shall allow for zone thermostats to be configured with weighted voting, priority, for each thermostat. Via the mobile App, a thermostat shall be configurable to establish priority votes. Priority selections shall be 0 or Null Vote, 1, 2, or 3 votes selectable for each thermostat independently. System shall also provide an Opposed Call feature to address maverick zones in the system.
- 6.7** Mobile App shall digitally display Leaving Air Temperatures from the VRF fan coil.
- 6.8** Occupied and unoccupied set up and set back capability shall also be available with 2–8-hour override capability.
- 6.9** Zone thermostat locking function shall be available from the App with minimum local control at each thermostat in the system.
- 6.10** The System shall provide full control of HVAC heating and cooling equipment in multiple zone applications.
- 6.11** The System shall integrate with the VRF unit via the VRF Manufacturer's 24 VAC legacy thermostat interface to provide calls for cooling and heating.
- 6.12** The System shall use SAV - self balancing process to measure air velocity to adjust damper to meet zone airflow requirements.
- 6.13** The System shall use SAV self-balancing damper that is configured for zone design.
- 6.14** The System shall automatically reset damper position based on zone thermostat call for cooling, heating or ventilation targets based upon SAV design.
- 6.15** The System shall be Wifi enabled to communicate via the Zonex Mobile App.
- 6.16** The Systems shall communicate via a local area network (LAN).
- 6.17** The System shall communicate with Zonex Mobile App by way of AWS – Amazon Web Service.
- 6.18** The System shall provide alarming features for high temperature, low temperature, and communications errors via Email alerts.
- 6.19** The System shall provide system diagnostics via the Zonex Mobile App.
- 6.20** The System shall not alter the operation of the VRF System, Outdoor Unit or Air Handler, in any way.

## **PART 7: Controls Manufacturer**

- 7.1** The control system will be the GEN X VRF-VAV Commercial Zoning System, as manufactured by Zonex Systems, Huntington Beach, CA. Any substitution of the above specified control system will require a 10-day prior approval by the engineer.
- 7.2** For pricing, contact the factory at 800-228-2966 or visit [www.zonexproducts.com](http://www.zonexproducts.com)
- 7.3** For substitution, submit a complete description, engineering data, and names of existing installations of substitute products.
- 7.4** Be prepared to provide a field inspection by the engineer, if he chooses to observe the actual installation of proposed substitution.

## **PART 8: Stand Alone System Controller**

- 8.1** Each zoned VRF Ducted Fan Coil unit shall contain a standalone microprocessor controller capable of supporting up to 20 pressure independent SAV zone valves, to be controlled with thermostats or sensors on site or remotely via a mobile App (GEN XV - **VRF-VAV**).

- 8.2** The system controller shall be universal and equipped to handle Cooling Only, Heat Pump or Gas Electric VRF units which will communicate and power all zones with one plenum rated twisted data link and one transformer – 24 VAC power daisy chained from SAV damper to SAV and thermostat to thermostat with no home run wiring. System controller shall power all SAV zone dampers and thermostats in the system with only 1– 24V 100 VA transformer.
- 8.3** The system controller shall provide and operate with automatic changeover logic. The system algorithm is based on a first call first serve majority wins on changeover strategy. System shall address or have the ability to address opposing calls. When a call is made to the system, the VRF system shall be energized to the proper mode. During the operation of the VRF unit the VRF-VAV system controller shall poll all zones every 60 seconds to determine the majority and minority of votes to set system to proper mode of operation.
- 8.4** The system controller shall communicate to the zone thermostats the mode of system operations and the zone thermostats will notify the SAV damper of which position is required to meet zone needs.
- 8.5** System controller shall rely on the VRF unit’s built high and low limits for capacity control.

## **PART 9: Mobile APP (Communications Hub)**

- 9.1** The mobile app shall be accessible from any IOS or Android device and any web browser to monitor, control, and systems operation.
- 9.2** System schedules, i.e. set up and set back times along with days of operation or vacation scheduling shall be established at the Mobile App.
- 9.3** Set points shall be lockable, either individually or globally, from the Mobile App, allowing for minimum temperature adjustment at each local thermostat.
- 9.4** Zone Temperature Settings, both occupied and unoccupied set points, shall be established either individually or globally from the Mobile App.
- 9.5** The Mobile App shall provide adjustable override hours for system thermostats for 2 – 8 hours.
- 9.6** Mobile App shall have a selectable fan option for continuous or AUTO operation.
- 9.7** System shall be vote based and the Mobile App shall provide the ability to establish system priority with 0, 1, 2 or 3 additional votes on one or all thermostats in the system, establishing priority votes to accelerate changeover operation. A “0” vote, or null option, shall also be available.
- 9.8** The system controller shall be equipped with an onboard diagnostic routine; accessed via the Mobile APP to ensure the installing contractors control wiring and communication wiring are operational.
- 9.9** The system controller shall allow the contractor to provide default occupied and unoccupied set points for every thermostat or sensor in the system directly from the Mobile App.
- 9.10** Maverick or rogue system calls shall be recognized and, if not addressed within a field selectable 15 – 30- minute period, system shall purge and satisfy the maverick call. This feature may be enabled or disabled from the Mobile App.
- 9.11** Temperature format F Fahrenheit or C Celsius shall be selectable at the Mobile App and, when selected, any and all temperature or sensing devices shall be displayed in that temperature format.
- 9.12** The systems Mobile App shall provide e-mail alerts if temperatures or other system functions are out of range.
- 9.13** Mobile APP shall provide all time clock updates for the system.
- 9.14** Morning warm-up shall be enabled from the Mobile App.
- 9.15** Mobile APP shall provide password capability to protect the system and to ensure only authorized operators interact and control the system functions.
- 9.16** VRF-VAV controller shall retain all set points in non-volatile memory.

- 9.17** All Thermostat functions shall be available for review only from each system thermostat to streamline service and system trouble shooting.
- 9.18** Manufacturer's Default settings may be established or reset from the Mobile App.

## **PART 10: Zone Temperature Sensors (Zone Thermostats)**

- 10.1** The typical Zone Temperature Sensor (Model EzTouchXV) shall contain all of the electronics to:
- 10.2** Control SAV pressure independent self-balancing zone dampers and provide for proper temperature requirement.
- 10.3** Thermostats shall direct pre-selected air velocity targets to its respective zone SAV.
- 10.4** Thermostats shall include color LCD touchscreens on the face to set independent heating and cooling set points and to maintain a minimum two-degree dead band.
- 10.5** Thermostats shall have color LCD touchscreens allowing the operator to change or review the thermostat set points.
- 10.6** Thermostat shall be capable of being remotely locked from the Mobile App and shall provide local control of +/- 2 degrees from the locked heating or cooling set point. The adjustable temperature range is from 55 to 95 degrees F. Celsius display, 12 to 35C shall also be available.
- 10.7** Thermostats shall be capable of being remotely locked to a level that does not allow for local set point changes.
- 10.8** Each zone thermostat shall contain one microprocessor that receives the current temperature from the space, which communicates this information to the SAV controller and to the central VRF-VAV control microprocessor via a 2-wire plenum rated, RS 485 data communications link.
- 10.9** The zone thermostat shall have a color LCD touchscreen showing current space temperature, time, current mode of operation, duct/outside air temperature, the heating and cooling set points established for that zone.
- 10.10** Each zone thermostat shall also be equipped with an off mode; when initiated, its zone damper will go fully closed, or established minimum position.
- 10.11** The thermostat shall be available with Remote sensor capability.
- 10.12** Thermostat shall be configurable for Baseboard, AUX, and Reheat operations.
- 10.13** When utilizing perimeter electric or hot water baseboard heating for supplemental heating, the thermostat operates a zone damper only for airflow and energizes the supplemental heat when the temperature drops two degrees below set point. At one degree below set point, it signals the system of a heating call. Heat range shall be adjustable at the Mobile App from 2-4 degrees.
- 10.14** When utilizing reheat feature, the thermostat shall energize reheat and position the damper to provide space temperature heating.

## **PART 11: SAV Damper Controller**

- 11.1** The SAV Damper Controller shall include the ability to configure three target air velocities for each independent zone. Heat/ Cool/ Ventilation.
- 11.2** Each fan coil or indoor unit shall have the ability to support up to 20 SAV dampers.
- 11.3** SAV Controller shall have the ability to set up target CFM-Velocities for Heat, Cool, and Ventilation air flows.
- 11.4** SAV Controller shall receive mode of operation information from VRF-VAV controller as to current mode of operation and self-balance dampers to meet current zone demand and system mode of operation.
- 11.5** SAV shall monitor air velocity and adjust damper position to maintain configured damper air velocities to deliver specific CFM to each zone.
- 11.6** SAV controller shall communicate with assigned zone thermostat.

## **PART 12: Zone Dampers / Smart Air Valves**

- 12.1** SAV – Smart Air Valves shall be available in either round or rectangular sizes and configuration.
- 12.2** Each round SAV zone damper (Model SAV) shall consist of 20-22 gauge galvanized metal duct fitted with an elliptical damper to provide linear airflow. The damper shall contain a seal to prevent leakage when fully closed. Each damper shall contain a full stall 24-volt modulating actuator, which shall not draw more than 5 VA on one drive assembly. The damper shell will be crimped on one end and beaded on both ends for damper rigidity. Each damper will have an SAV self balancing damper control board to accommodate 24 V power and communications link and outputs to adjust damper position.
- 12.3** Each rectangular SAV zone damper (MODEL SAV WxH) shall be constructed of 20-gauge “snap-lock” steel frame with S & Drive connections. The total length of the damper will be 16”. Dampers 10” and smaller in height will utilize a single blade construction: those dampers larger than 10” height will utilize opposed blade construction. The damper shall contain a seal to prevent leakage when fully closed. Each damper shall contain a full stall 24-volt modulating actuator, which shall not draw more than 5 VA on one drive assembly. The damper shell will be equipped with “S” and drive type connections at each end of the SAV. Each damper will have an SAV self balancing damper control board to accommodate 24 V power and communications link and outputs to adjust damper position.
- 12.4** SAV will be installed with a minimum of 3 feet of branch duct between the SAV damper and main trunk ducting.
- 12.5** SAV board shall also be equipped with three potentiometers to set air velocity requirements to meet zone design.
- 12.6** SAV board shall monitor air velocity and self balance damper to meet configured air flow requirements for cooling, heating, and ventilation modes.
- 12.7** SAV shall sense varying air flows, the fan coils expansion valve shall direct information to the VRF systems inverter to slow or reduce compressor RPM to enhance energy savings operation.

## **PART 13: Transformers and Wiring**

- 13.1** An independent 24-volt transformer sized at 5 VA per zone SAV shall power the VRF-VAV System GEN XV Controller and all SAV dampers in the system.
- 13.2** All power wiring shall be 24-volt AC.
- 13.3** A twisted two wire plenum rated communication bus shall be used to daisy chain VRF-VAV GEN XV controller, EzTouchXV thermostats, and SAV boards. The two wire communication bus shall be Zonex Part # STPR.

END OF SECTION 15950

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