

i-Vu® Building Automation System

## VVT® Zoning System

Total Control and Comfort for Your Building





# i-Vu® Building Automation System / **VVT® Zoning System**

## Comfort and Control for Small to Medium Sized Commercial Buildings



In the 1990's, Carrier invented the first variable volume/variable temperature (VVT®) zoning system for heating, ventilation, and air conditioning. The VVT system provides small to medium-sized commercial buildings with efficient zoned comfort that requires only a single constant volume air source, such as a rooftop unit or heat pump. VVT buildings typically have many spaces with comfort needs that change with the time of day, occupancy patterns and the season.

Since its origin, Carrier has fully integrated digital controls into the VVT system, creating a smart network that functions as a seamless unit, responsive to occupants and optimized for efficiency. The system uses an intelligent demand strategy to look at the comfort needs of all the spaces simultaneously and operate in the mode (heating, cooling or ventilation) that best meets those diverse needs.

What could be better than this level of comfort and control?

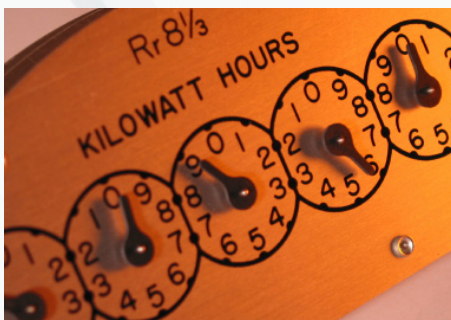
Even more control...from anywhere in the world.

Today's Carrier i-Vu® VVT Zoning System delivers precisely controlled comfort by integrating the intelligent VVT network with the Carrier i-Vu Building Automation System. This system gives facility managers access to the entire VVT system locally — through a wall-mounted touchscreen interface in the building — or from anywhere in the world using a standard web-enabled device. With full setpoint control, scheduling, trending, alarming and reporting capabilities, the i-Vu Building Automation System provides facility managers with everything they need to accurately manage the VVT system in their building — either locally or from any remote location.



# i-Vu® Building Automation System / VVT® Zoning System

## Features and Benefits



### Energy Savings

- Demand limiting strategy adjusts space setpoints and equipment operation before energy rates increase
- Demand Controlled Ventilation (DCV), eliminates over-ventilation
- Setpoint control limits user-adjustments
- Integrated economizer control and night-time free cooling minimize mechanical cooling by using outside air
- Heating and cooling lockouts prevent mechanical cooling and heating based on outside air conditions
- Linkage algorithms integrate diverse building demands with mechanical heating and cooling sources

### Occupant Comfort

- Adjust individual comfort levels easily with attractive space sensors
- Convenient i-Vu scheduling tool provides temperature control at any time— weekdays, weekends, holidays, or after-hours
- Demand Controlled Ventilation (DCV), ensures ample fresh air at all times
- Built-in humidity control
- Integrated optimal start algorithm for conditioning space before occupants arrive

### Simple and Flexible

- Fully scalable network architecture - build small or large systems easily and quickly
- Application-specific controllers - can be factory installed or field-mounted, and include built-in equipment graphics, trends, and alarms for i-Vu
- Pre-engineered control algorithms - simplify system set-up and minimize the need for field programming
- Streamlined system - eliminates the need for expensive system coordination modules

### Complete Control

Powerful i-Vu operator interface

- Plug-and-play with all Carrier systems
- Monitor your facility locally through a powerful touchscreen interface, or from anywhere in the world using a standard web browser or mobile device
- Create schedules, view trends, alarms, custom reports, and much more
- Easily monitor and control ancillary equipment such as variable speed drives, lighting, and electric meters by adding our programmable controllers

### Investment Protection

Carrier's complete system promises:

- Reliability - designed by experts and backed by decades of engineering expertise
- Open standards - built on the widely accepted, ASHRAE® standard BACnet® protocol
- Open service - serviceable by a wide variety of trained, tested, and certified Carrier Controls Experts
- Carrier provides it all — equipment and controls — coupled with local service and support



# i-Vu® Building Automation System / VVT® Zoning System

## How It Works

### Typical Building System Components

#### 1. Carrier Rooftop Unit

Provides efficient, environmentally-sustainable heating, cooling and humidity control using a multi-stage compressor and non-ozone depleting Puron® (R410a) refrigerant.

#### 2. RTU Open Controller

Continuously monitors and precisely regulates constant volume rooftop operation. It controls up to 2 stages of heating (or up to 4 stages in heat pump mode), and 2 stages of cooling (3 stages for 48/50 LC WeatherExpert®).

#### 3. VVT Bypass Damper with Integrated Bypass Controller

Because the rooftop unit is supplying a constant volume of air to spaces with varying air requirements, the VVT Bypass Controller tells the VVT Bypass Damper when to open and close in order to maintain the desired static pressure in the supply duct. The VVT Bypass Controller thus enables constant airflow through the air source, while allowing variable airflow to be delivered to the spaces.

#### 4. VVT Zone Damper with Integrated Zone Controller

The VVT Zone Controller provides temperature and air quality control by modulating the VVT Zone Damper in order to maintain the space temperature and humidity setpoints in each space.

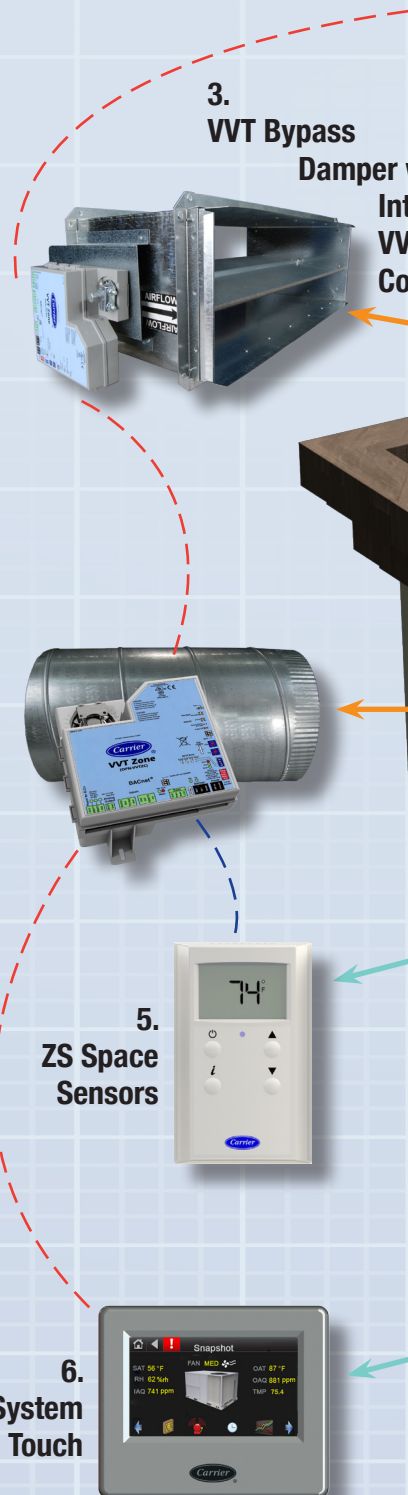
#### 5. ZS Space Sensors

The ZS communicating space sensors tell the VVT Zone Controller when heating or cooling is needed in the space, thus allowing a variable amount of air to be delivered to the space as load dictates. The ZS sensors are available in a variety of space sensing combinations to address your application needs, including temperature, relative humidity, and indoor air quality (CO<sub>2</sub>). They also offer LCD displays, setpoint adjustment, and local override capabilities to provide highly individualized comfort for occupants.

#### 6. i-Vu System Touch

This integrated component of the i-Vu Building Automation System features an illuminated, 4.3" color pixel touchscreen display and connects directly to the BACnet network. Designed for wall mounting, it provides building occupants, facility managers, and installers a powerful user interface for managing the VVT system in their building.

*The i-Vu® Building Automation System provides everything you need to access, manage, and control your building, including the powerful i-Vu user interface, plug-and-play BACnet® controllers, and state-of-the-art Carrier equipment.*

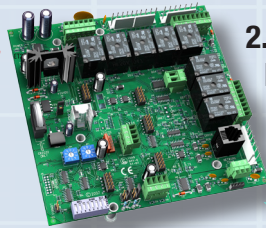


# i-Vu® Building Automation System / VVT® Zoning System

## Typical System Components

### BACnet MS/TP Network

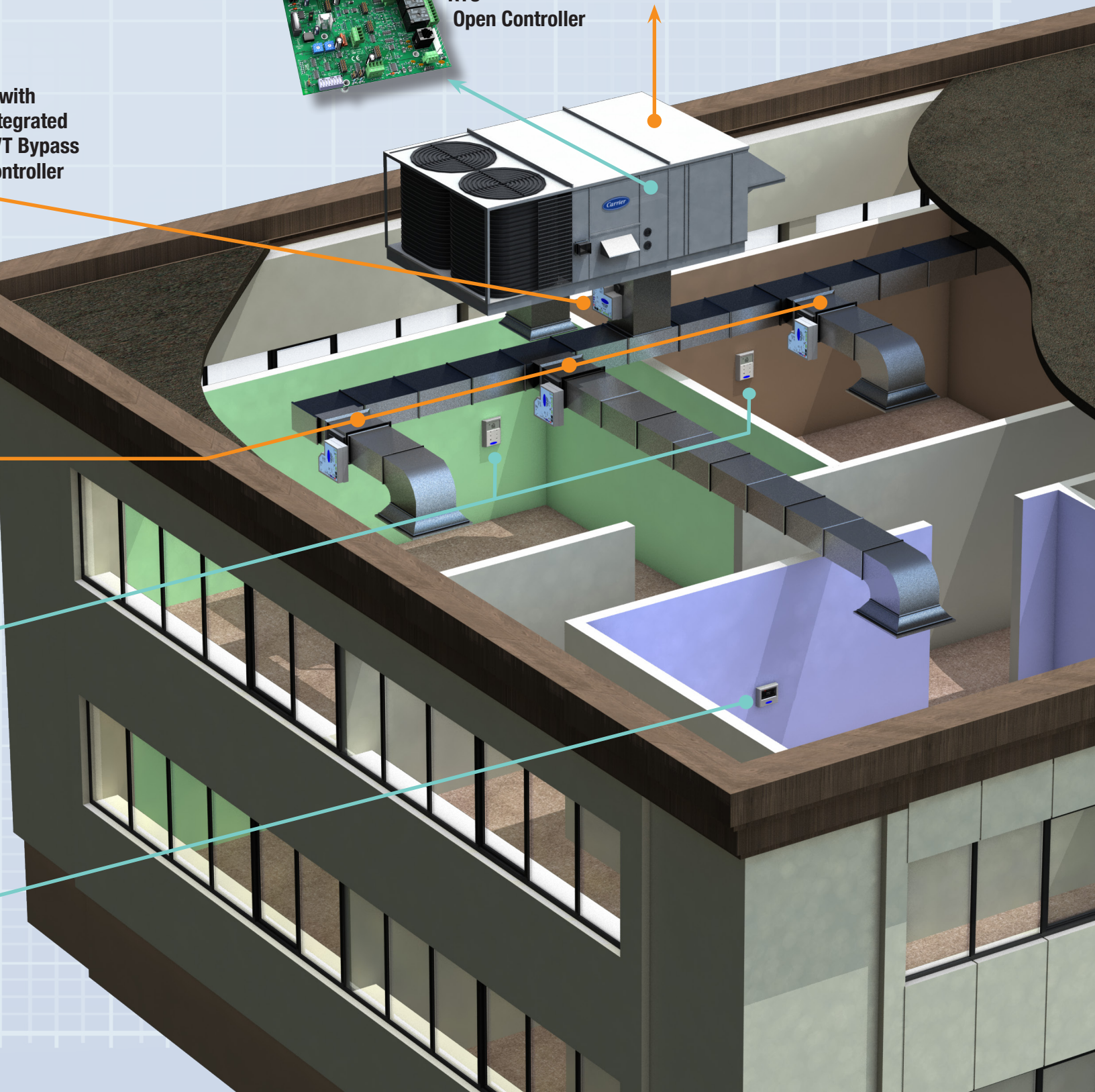
The VVT system is comprised of native BACnet, plug-and-play components that talk to each other intelligently using the ASHRAE standard BACnet protocol.



2. RTU  
Open Controller

1. Carrier  
Rooftop Unit

with  
Integrated  
VVT Bypass  
Controller





# i-Vu® Building Automation System / VVT® Zoning System

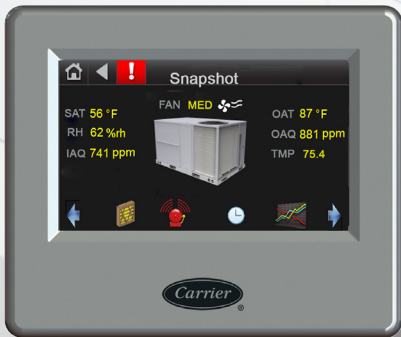
## Optional System Components

### System User Interface Options

*The powerful i-Vu user interface is available in a variety of options and keeps facilities staff connected to their VVT System at all times.*

*Whether you need local access through a wall-mounted touchscreen or remote access via the web, i-Vu connects*

*you immediately, effortlessly and in real time. With i-Vu, it's easy to accomplish all of the essential building management functions, including monitoring, control, scheduling, trending, and alarming.*



#### i-Vu System Touch:

Manage your facility locally using a powerful touchscreen interface. Ideal for the facility manager's office.



#### i-Vu Standard/Plus:

Through any web-enabled device, remotely achieve building systems management via a dedicated compact web server that comes with i-Vu software pre-installed. Your choice of i-Vu Standard or i-Vu Plus packages.



#### i-Vu Pro:

Through any web-enabled device, remotely achieve building systems management via i-Vu software that has been installed on your PC of choice. Great for applications that require unlimited trending and alarming capabilities, or applications where IT compliance specifications determine what type of i-Vu server should be used in the building.

### Equipment User Interface and Space Sensor Options

**i-Vu Equipment Touch** This touchscreen provides building occupants and facility managers with a powerful user interface for managing a single piece of heating, ventilation and air conditioning (HVAC) equipment in the building (such as a rooftop unit). Designed for wall mounting, it features built-in temperature and humidity sensing, and allows occupants to change setpoints and initiate timed local overrides.

**ZS Space Sensors** Carrier's line of intelligent ZS space sensors provides the function and flexibility you need to manage the conditions important to the comfort, productivity, and sustainability of your building.

The ZS sensors are available in a variety of space sensing combinations to address your application needs, including temperature, relative humidity, and indoor air quality (CO<sub>2</sub>).



ZS Standard



ZS Plus



ZS Pro

# i-Vu® Building Automation System / VVT® Zoning System

## General Purpose Controller Options

*i-Vu's line of general purpose controllers provides auxiliary building control to interface with lighting, fans, pumps, and other heating, ventilation and air conditioning (HVAC) equipment.*

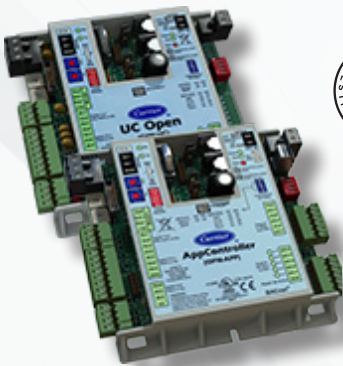
*A library of control programs is available for common applications, and custom programs can be created using Snap graphical programming. All i-Vu controllers feature native BACnet communications.*

### UC Open Controller

- 11 I/O points -> 6 inputs, 5 outputs

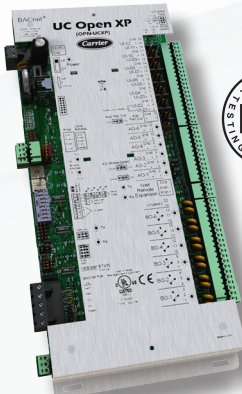
### AppController

- 14 I/O points -> 6 inputs, 8 outputs



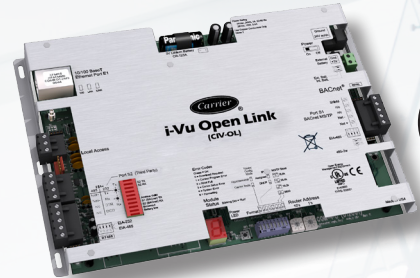
### UC Open XP Controller

- 24 I/O points -> 12 inputs, 12 outputs. Supports point expanders to support up to 48 I/O points



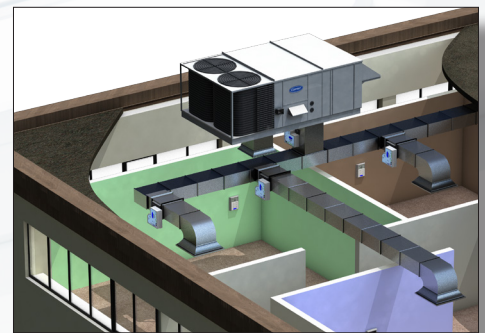
### i-Vu Open Link

- Supports integration using BACnet, Modbus, and LonWorks protocols.



## Why Choose the Carrier i-Vu / VVT Zoning System?

- Carrier rooftop units or heat pumps provide reliable, efficient, environmentally responsible heating and cooling.
- Carrier i-Vu user interfaces provide easy access to system data and system management capabilities.
- Carrier i-Vu VVT Zoning System provides maximal occupant comfort with optimized efficiency and convenient system access from any web-enabled device.



### Open Service / The "Carrier Controls Expert" Advantage

Wondering which contractor is the best choice to service your building automation system or individual controls? Protect your investment by choosing a factory-authorized Carrier Controls Expert Certified Contractor. The Carrier Controls Expert program trains and certifies an elite class of heating, ventilation and air conditioning (HVAC) contractors who have chosen to install and service the i-Vu Building Automation System in commercial buildings.

Through thorough training of their specialized service technicians — and rigorous, ongoing testing at various Carrier Controls Expert Training Centers — certified contractors maintain extensive knowledge of the i-Vu Building Automation System and its components.

The Carrier Controls Expert Certified Contractor is more than just a vendor. They are a partner dedicated to ensuring that individual controls and the i-Vu BAS are correctly maintained.

This serves to maximize the value of your systems, to optimize the performance of the facility and to protect your investment in equipment and controls.

Select your choice of the Carrier Controls Expert certified contractors in your area, and you'll be sure your installer has the expertise and backing of Carrier whenever they serve your facility.

[www.carrier.com/controls-experts](http://www.carrier.com/controls-experts)



# i-Vu® Building Automation System / VVT® Zoning System

## System Components

### Carrier Equipment (includes factory-mounted controller)

Part#	Description
WeatherExpert®, WeatherMaster®, or WeatherMaker®	Carrier constant-volume, packaged rooftop unit with integrated RTU Open controller.
OPNDRddZC	VVT Round Zone Damper with factory-integrated VVT Zone controller, where dd=damper diameter: 08, 10, 12, 14, or 16 inches.
OPND8XwwZC	VVT Rectangular Zone Damper w/factory-integrated VVT Zone controller, where ww=damper width: 10, 14, 18, or 24 inches.

### Controls (for field mounting on Carrier or non-Carrier HVAC equipment)

OPN-RTUM2	RTU Open controller; supports up to 2 stages of heating (or up to 4 stages in heat pump mode), and 2 stages of cooling (3 stages for 48/50 LC WeatherExpert®). Wiring harnesses (part numbers 48TMHSRADR-A00 and OPN-RTUHRN), provide quick field installation.
OPN-VTZC	VVT Zone Controller with integrated actuator (35 in-lb), for single-duct and parallel fan-powered air terminals and supports 2-position hot water, modulating hot water, 2-stage electric heat, or combination baseboard and electric ducted heat.
OPN-VTBP	VVT Bypass Controller with integrated actuator (35 in-lb)

### Space Sensors

ZS-CAR	ZS Standard – Temperature Only
ZS-C-CAR	ZS Standard – Temperature/CO <sub>2</sub>
ZS-H-CAR	ZS Standard – Temperature/RH
ZS-HC-CAR	ZS Standard – Temperature/RH/CO <sub>2</sub>
ZSPL-CAR	ZS Plus – Temperature only. Includes setpoint adjust and local override
ZSPL-C-CAR	ZS Plus – Temperature/CO <sub>2</sub> . Includes setpoint adjust and local override
ZSPL-H-CAR	ZS Plus – Temperature/RH. Includes setpoint adjust and local override
ZSPL-HC-CAR	ZS Plus – Temperature/RH/CO <sub>2</sub> . Includes setpoint adjust and local override
ZSP-CAR	ZS Pro – Temperature only. Includes LCD display, setpoint adjust, and local override
ZSP-C-CAR	ZS Pro – Temperature/CO <sub>2</sub> . Includes LCD display, setpoint adjust, and local override
ZSP-H-CAR	ZS Pro – Temperature/RH. Includes LCD display, setpoint adjust, and local override
ZSP-HC-CAR	ZS Pro – Temperature/RH/CO <sub>2</sub> . Includes LCD display, setpoint adjust, and local override

### General Purpose Controllers (optional)

OPN-UC	UC Open controller, supports 11 I/O points total (6 universal inputs, 5 binary outputs).
OPN-APP	AppController, supports 14 I/O points total (6 universal inputs, 5 binary outputs, 3 analog outputs).
OPN-UCXP	UC Open Expandable Controller, supports 24 I/O points total (12 universal inputs, 6 binary outputs, 6 analog outputs).
OPN-UCXP10	UC Open XP Expander, supports 24 I/O points total (8 binary inputs, 8 analog inputs, 8 binary outputs).
CIV-OL	i-Vu Open Link, supports integration using BACnet, Modbus, or LonWorks protocols.

### System User Interfaces (optional)

SYST1-4-CAR	i-Vu System Touch touchscreen user interface; manages up to 60 BACnet MS/TP controllers.
CIV-OPN	i-Vu Standard web server with pre-installed i-Vu web-based software.
CIV-OPNPL	i-Vu Plus web server with pre-installed i-Vu web-based software.
CIV-OPNPR	i-Vu Pro web-based software for installation on any PC.

### Equipment User Interfaces (optional)

EQT1-4-CAR	i-Vu Equipment Touch touchscreen user interface – manages a single piece of HVAC equipment. Includes built-in temperature and humidity sensor for space mounting.
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