SAUTER

Creating Sustainable Environments.

# MANUAL SAUTER ASV3


SAUTER
ASV305BF7000W
SAUTER Smart VAV Actuator
AC/DC 24V±10%
50/60Hz, 3VA, 1.5W
BACNET MS/TP RS-485
70-100S, 5Nm
IP20
SAUTER
Smart VAV Actuator
MS/TP
System
Hbus
CW CCW
Terminating R
Baud rate
Hbus
RJ11
24 VDC
Power supply
GND
Analog Input
AI1 COM AI2
BACnet MS/TP
B+ B- GND

# 1 Contents

# 2 ABOUT CONTROLLERS

## 2.1 About Controllers

ASV305BF7XXXW smart VAV actuators provide high-performance DDC (direct digital control) of pressure-independent, VAV (variable-air-volume) functions are designed and produced for extended functionalities in HVAC systems, VAV and laboratory applications.

The controllers' features are simple to set up yet comprehensive what the function to use. We are menu-driven and 3 setup choices when using the ASV305BF7XXXW VAV actuator. You can set up our actuator by using:

- BMS parameter setting
- BACnet DDC editor software (provided)
- Thermostats (EY-RU305F700XW Series)

All our models are BACnet Applications Specific Controllers (BASC) and are ready to connect to a BACnet MS/TP network. Device instance, MAC address, and Baud rate can be easily be set from the EY-RU305F700XW Series Thermostats and ASV305BF7XXXW itself without any special tools or software.

## 2.2 Specifications

All our inputs and outputs are factory programmed and application specific. No field configuration is needed unless its needed for offset.

For details listing our input and output of object list, please see BACnet object list, page 30 onwards.

### 2.2.1 Analog Inputs

Analog input mean BACnet analog input. Not all Analog input are applicable/required for our models. Connectors: 22 – 24 AWG

Input range: Ai0 -Passive, 10 kΩ, Ai1 0 to 10vDc

### 2.2.2 Analog Outputs

Analog outputs mean BACnet analog outputs. Not all Analog output are applicable/required for our models. Connectors: 22 – 24 AWG

Output range: Ao1/2 – 0 to 10VDC

### 2.2.3 Digital Outputs

Digital outputs mean BACnet binary outputs. Not all Digital input are applicable/required for our models Connectors: 22 – 24 AWG

Output range: Do0/1 – 24VAC

## 2.2.4Communications to BACnet MS/TP

- BACNET MS/TP RS-485, 9600-76800 BPS, 1200M
- Removable terminal block
- Wire size recommended 22 – 24 AWG
- Dip Switches on end of line termination return

## 2.2.5Air Flow Sensor Features

- CMOSens® Technology
- Configured as BACnet analog input object. Measuring Range up to ±500 Pa (±2 inH2O) Span accuracy of 5%
- Zero-point accuracy 0.1pa
- Tube connections for 1/4-inch FR tubing

## 2.2.6Memory

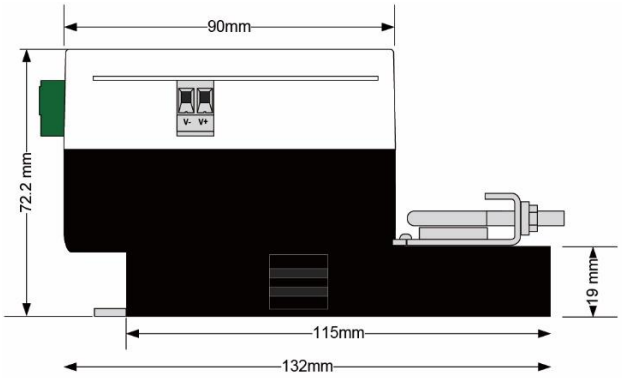
- Programs and program parameters are stored in non-volatile memory.
- Auto restart on power failure.

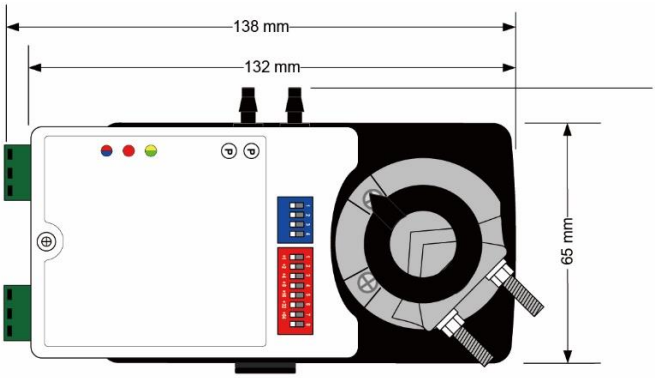
## 2.2.7Certification

- Federal Communications Commission (FCC)
- CE Certified
- BACnet Testing Laboratory (BTL) listed as an application specific controller (B-ASC)

## 2.2.8Actuator Specifications

Dimension (mm)



## 2.3 Available Models

The following is a list of ASV305BF7XXXW series available models.

| Type | Measuring range | Running time for 90 | Torque | Inputs/Outputs |
|---|---|---|---|---|
| **ASV305BF7000W** | 0...500 Pa | 75s to 85s | 5 Nm | 0 |
| **ASV305BF7200W** | 0...500 Pa | 75s to 85s | 5 Nm | 2 AI, 0 DO, 0 AO |
| **ASV305BF7220W** | 0...500 Pa | 75s to 85s | 5 Nm | 2 AI, 2 DO, 0 AO |
| **ASV305BF7202W** | 0...500 Pa | 75s to 85s | 5 Nm | 2 AI, 0 DO, 2 AO |
| **ASV305BF7222W** | 0...500 Pa | 75s to 85s | 5 Nm | 2 AI, 2 DO, 2 AO |

## 2.4 Accessories and Replacement Parts

Following accessories and replacement parts are available from SAUTER

| Type | Description |
|---|---|
| **EY-RU305F7001W** | Room unit with LCD display and temperature sensor |
| **EY-RU305F7002W** | Room unit with LCD display, humidity, and temperature sensor |
| **EY-RU305F7003W** | Room unit with LCD display, humidity, CO2, and temperature sensor |

# 2.5 Technical Specification

| | | |
|---|---|---|
| Power supply | | |
| Power supply | Power supply | 24 V~, +/-10%, 50...60 Hz |
| Power consumption at nominal voltage 50/60 Hz (~/=) | Power consumption during operation5 | 1.5 W |
| | Power consumption when idle | 0.5 W |
| Parameters | | |
| Integrated damper actuator | Angle of rotation | 90° (95° mechanical) |
| | Admissible dimensions of damper shaft | Ø 6...16 mm, □ 5. 12 mm |
| | Admissible damper shaft (hardness) | Max. 300 HV |
| | Surge-voltage resistance | Not supported on 24V model |
| | Operating noise | < 42 dB (A) |
| ∆p sensor | Measuring range ∆p (gain = 1) | 0...500 Pa |
| | Linearity error | 3% of reading |
| | Time constant | 0.23 s |
| | Influence of position | < 1 Pa |
| | Reproducibility | 0.5% FS |
| | Zero-point stability | < 0.05 Pa / Year |
| | Admissible positive pressure | ±1 kPa |
| | Admissible operating pressure pstat | ±5 kPa |
| | Low-pressure connections | Ø i = 3.5...6 mm |
| Ambient conditions | | |
| | Operating temperature | 0...50 °C |
| | Storage and transport temperature | -20...70 °C |
| | Admissible humidity | 5% to 95% rh, non-condensing |
| Inputs/outputs | | |
| | Analogue inputs | Dry contact for any kind input & Thermistor 10k |
| | Analogue outputs | 0-10V, 4-20mA ,12 bits resolution |
| Interfaces and communication | | |
| | RS-485 not electrically isolated | 9600-76800 BPS, 1200 Meters |
| | Communication protocols | BACNET MS/TP RS485 |
| | | 9600-76800 BPS, 1200 Meters |
| | BACnet BTL certification | BACnet Application Specific Controller (B-ASC) |
| | Access method | Client/server |
| | Topology | Line, daisy chain |
| | Number of participants | Up to 127 recommended 32 |
| | Bus termination | 120 Ω (both ends) SW4 (S3) |
| Construction | | |
| | Weight | 0.68 kg |
| | Fitting | Self-centering spindle adapter |
| Standards and directives | | |
| | Type of protection | IP20 (EN 60529) |
| | Protection class | III (EN 60730) |
| | Conformity | Machine directive 2006/42/EC, appendix II 1. B |
| | EMC Directive 2014/30/EU | EN 61326 1 :2013 Electrical equipment for measurement, control and laboratory use EMC requirements Part 1: General requirements EN 61326-1:2013, EN 61000-4-2:2009, EN 61000-4-3:2006+A1:2008+A2:2010, EN 61000-4-8:2010, FCC Part 15,subpart B,Class A |

# 3 Installing the controllers

## 3.1 Setting of Angle of Rotations and Limits

ASV305BF7XXXW controllers are manufactured for a damper or VAV Terminal box that rotates from 0 to 90 degrees, open to close position. If the VAV box is not a 90-degree, then set the rotation limits to its suitable degree before mounting the controllers.

### 3.1.1 Mechanical Limiting Angle of Rotation

Adjustment of mechanical limiter

1. Loosen screw of mechanical limiter
2. Move limiter to appropriate position *
3. Tighten screw

* Working range of 90° can be reduced up to 30° from each end position

## 3.2 Mounting on A VAV Terminal Box

Mounting the controller inside the metal enclosure. To maintain the specifications of the wiring, its recommended to use either shield cables or enclose all cables in the conduit.

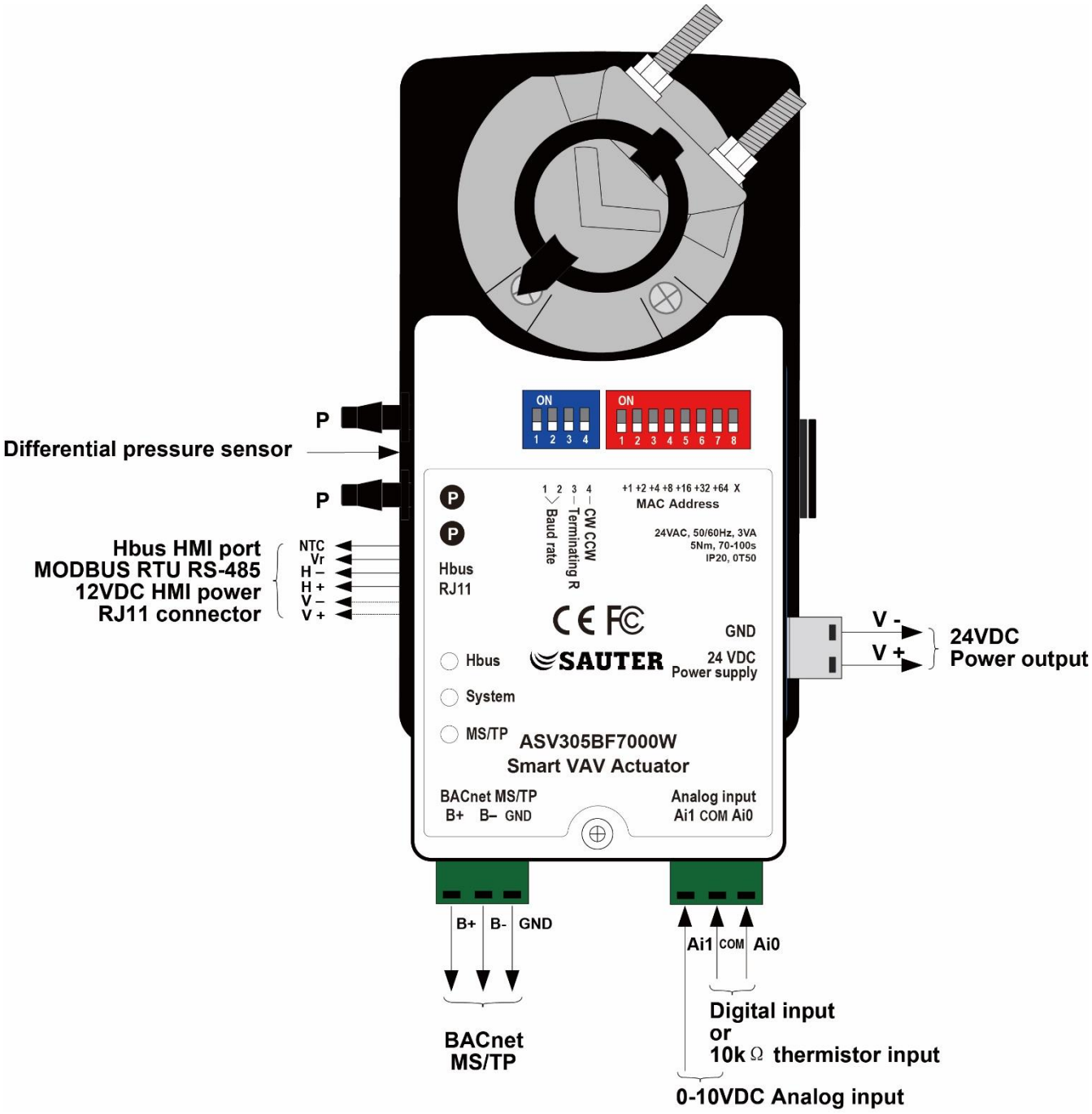
Mount the controller directly over the shaft with a min. length of 45mm. The shaft dimensions must be 06 to 15 mm if round and 5 to 10.5mm if square in shape.

Mount the controller as follows:

1. Manually rotate the damper on the VAV box to fully open position.
2. On the ASV305BF7XXXW controller, press the manual override button and rotate the bolt in the same direction that opened the VAV box. Turn the angle of rotation to its limit.
3. Loosen the nuts and the U-bolt until the shaft can fit through the collar.
4. Place the ASV305BF7XXXW controller over the shaft.
5. Tighten the nuts on the U-bolt.
6. Center the mounting point with our damper holder provided in the box and screw the holder with the screw provided.
7. Evenly tighten the U-bolt.

# 3.3 Connecting an Airflow Sensor

An airflow sensor is one of the inputs on the controller. Connect the tubing from the pitot assembly of the airflow sensors input to the VAV terminal box differential pressure plug. Our airflow sensor is uni-direction.



## 3.4 Connecting Inputs and Outputs

ASV305BF7XXXW VAV actuators series have preconfigured its inputs and outputs to support the supplied program and applications.

- For more detail of the input and output information, please see specifications page 5.
- For connecting to Room thermostats, please see below chapter 3.5.
- For details listing our input and output of object list, please see BACnet object list, page 30 onwards.

## 3.5 Connecting to Room Thermostats

The ASV305BF7XXXW VAV controller is pre-program for all our supported EY-RU305F700XW room thermostats. Connect any of the following thermostats using RJ-11 cable and no additional programming or configuration is required to function.

- EY-RU305F7001W
- EY-RU305F7002W
- EY-RU305F7003W

Connect the ASV305BF7XXXW VAV controller to the EY-RU305F700XW room thermostats using a standard RJ-11 cable up to 35M long. See the installation guide for more info.

## 3.6 Connecting Power

The ASV305BF7XXXW VAV controller requires a 24VAC or 100 – 277VAC power supply. Use the following guidelines when choosing the wiring transformers to its controller.

1. Using a Class-2 Transformer of its appropriate size to supply power ASV305BF7XXXW VAV controller.
2. SAUTER recommends using one transformer for each ASV305BF7XXXW VAV controllers.

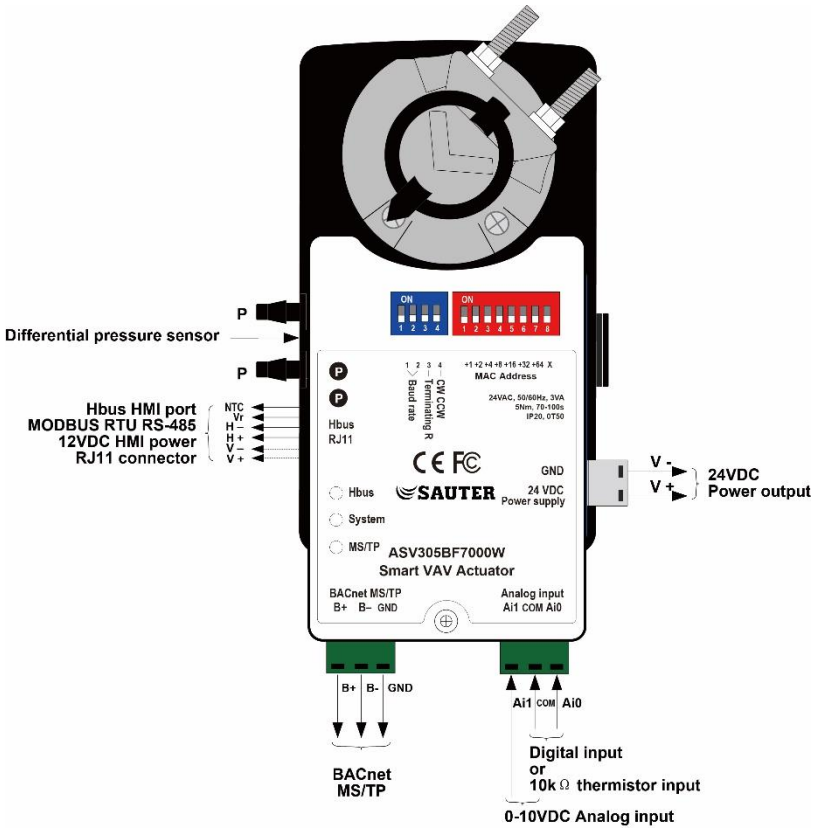
Connect the 24VAC/ 100 – 277VAC power supply to the terminal block on the right side of the controller. Connect the ground side of the transformer to its negative terminal [-] and the AC phase to the positive [+] terminal. Power is supplied to the controller once the transformer is connected to power.

## 3.7 Analog Input

ASV305BF7XXXW VAV controller specific models comes with 2 Analog Input (AI).

AI0 - Thermistor 10k (type II) AI1 - 0-10VDC

The AI0 can be used as a Dry Contact for any kind of input including occupancy sensor for energy saving or temperature input of Thermistor 10K(TypeII). While AI1 can be used for 0-10 VDC (or) 0-20 mA analog input including temperature/humidity/CO2/pressure sensor for additional application.




## 3.8 Digital Outputs

ASV305BF7XXXW VAV controller specific models with 2 Digital Output (DO).

DO0 & 1 - 24 VAC ± 10%

The DO can be used for on/off control heating valve, fan control, 2-stage electric duct heater, as well as to power other field devices such as temperature sensor or differential pressure sensor which needs 24VAC supply.

## 3.9 Analog Outputs

ASV305BF7XXXW VAV controller specific models come with 2 analog Outputs (AO).

AO 0 & 1 - 0-10 VDC/ 0-20 mA

The AO can be used to control modulating heating valve or electric duct heater with proportional control.

# 4 Configuration the VAV Box and Actuators

## 4.1 Maintenance

Our actuators are maintenance-free. If necessary, please clean it with a dry cloth on the surface cover.

## 4.2 Changing the Temperature Set-points And Limits

Changing the ASV305BF7XXXW VAV actuators user functions with EY-RU305F700XW series thermostats are limited to active setpoint of the room and occupancy mode.

Quick start to change set points:

1. Press Up or down to change the temperature setpoint.
2. Press the [power] button to change the occupancy mode.

To Enter the admin mode, press the "UP" and "DOWN" button together and hold for 3 seconds. You may need a password to enter.

## 4.3 Configuring the VAV Box Options

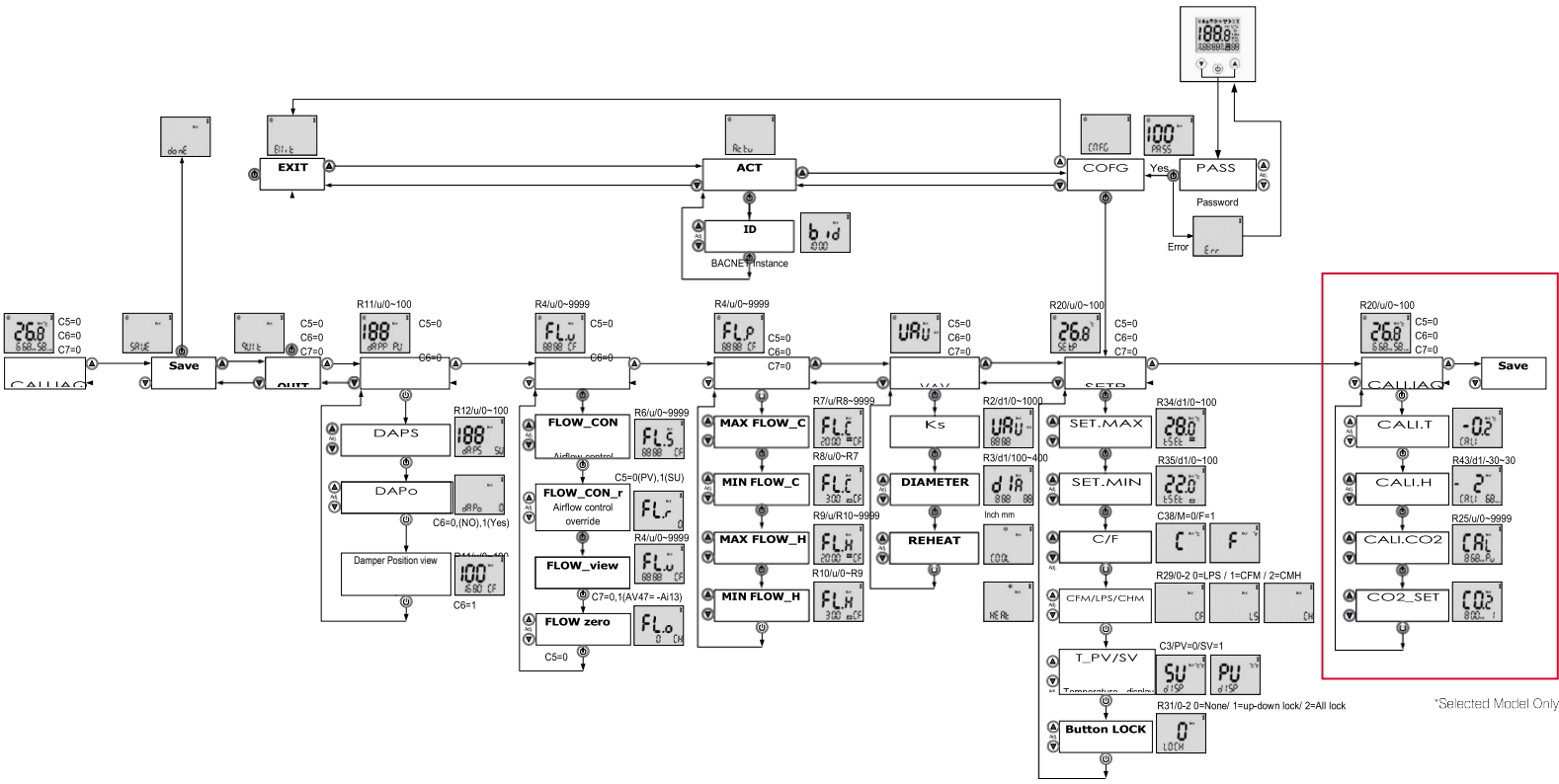
The configurations of the functions that are accessible through an EY-RU305F700XW series room thermostat. The values and setting that are entered during the installation and commissioning of a VAV terminal unit can be set via 3 ways. Typically, most of the functions do not need to change after the installation and commissioning process.

To set up the configuration function, you will need the following items and information.

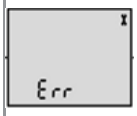
- Details about the VAV terminal unit. Example size, inlet diameter and max/min airflow.
- An EY-RU305F700XW series thermostats, BMS system or a PC to be use as a configuration tool.
- The Building automation system configurations and setting for the network.

Please take note that not all functions are available on every model of the ASV305BF7XXXW VAV controller.

## 4.4 EY-RU305F700XW HMI Parameter Setting Flow Chart




## 4.5 Getting Started with Configuration

| NO. | PROCEDURE | DETAIL STEPS | SENSOR DISPLAY |
|---|---|---|---|
| **1** | Entering Admin Mode | 1. Connect the EY-RU305F700XW thermostats to ASV305BF7XXXW controller<br>2. Press the "UP" and "DOWN" buttons together and hold for 3 secs.<br>3. If password is not changed, the password is "100"<br>4. If display "ERR", the password is wrong<br>5. If display "COFG", you have successfully entered the admin mode |  <br>Screen on password<br>  <br>Incorrect Password<br>Successfully entered admin mode |
| **2** | Select a configuration function | 1. Choose COFG for more configuration setting<br>2. Choose "ACTu" for BACnet instance ID configuration<br>3. Choose "Exit" to return to normal mode |  <br>For BACnet instance ID |

| | | | |
|---|---|---|---|
| | | |  To exit |

## 4.6 Entering System Temperature Set-points And Limits

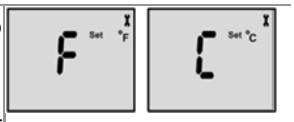
The system temperature set-points are the operation parameters and limits for the ASV305BF7XXXW VAV controllers/VAV terminal box.

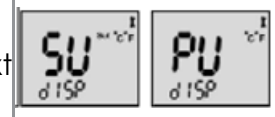
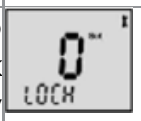
The temperature set-points include the following functions:

1. Max temperature set point
2. Min Temperature set point
3. Celsius or Fahrenheit selection
4. CFM or LPS or CMH airflow unit
5. Temperature display _ Present Value or Set Value
6. Button Lock Level

Once the following procedure is set, please select "Save" or else the controller will not capture the configuration.

| NO. | PROCEDURE | DETAIL STEPS | SENSOR DISPLAY |
|---|---|---|---|
| **1** | Set Temperature setpoint | 1. Use the arrow to "SETP". Press the power button to select it |  SEtp on screen |
| **2** | Set Max temp setpoint | 1. Adjustable using "up" and "down" button from 0 to 100 value<br>2. Press power button to move on to the next function |  Max Temp set-point |
| **3** | Set Min Temp Setpoint | 1. Adjustable using "up" and "down" button from 0 to 100 value<br>2. Press power button to move on to the next function<br>3. Please take note that Min Temp cannot be higher than Max temp set- point |  Min Temp Setpoint |

| | | | |
|---|---|---|---|
| **4** | Celsius or Fahrenheit selection | 1. Adjustable using "up" and "down" button to either F (Fahrenheit) or C (Celsius)<br>2. Press power button to move on to the next function |  <br>To choose Fahrenheit or Celsius |

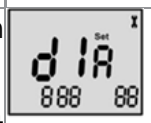
| NO. | PROCEDURE | DETAIL STEPS | SENSOR DISPLAY |
|---|---|---|---|
| **5** | CFM or LPS or CMH airflow unit | 1. Adjustable using "up" and "down" button to either CFM (cubic feet per minute) or LPS (liters per second) or CMH (cubic meters per hour)<br>2. Press power button to move on to the next function |  <br>Options for CFM, LPS or CMH |
| **6** | Temperature Dis- play Present Value or Set Value | 1. Adjustable using "up" and "down" button to either SV (set value) or PV (present value)<br>2. Press power button to move on to the next function |  <br>Set Value or Present Value |
| **7** | Lock Level | 1. Adjustable using "up" and "down" button to choose lock level: 0 (Unlock) or 1 (Lock temperature setting) or 2(Lock Occupancy mode & temperature setting)<br>2. Press power button to move on to the next function |  <br>Lock Level |

# 4.7 Configuring the VAV Terminal Box Options

The Configuring VAV terminal box options set the ASV305BF7XXXW VAV controller for specific mechanical installation and configuration for the VAV box. The box options include the following functions:

1. Set Primary K factor
2. Set VAV inlet diameter
3. Cool or heating mode

Once the following procedure is set, please select "Save" or else the controller will not capture the configuration.

| NO. | PROCEDURE | DETAIL STEPS | SENSOR DISPLAY |
|---|---|---|---|
| **1** | Enter VAV box configuration | 1. Use the arrow to "VAV". Press the power button to select it |  VAV on screen |
| **2** | Set Primary K factor | 1. Once you press the power button on the "VAV", you should enter "K factor"<br>2. Adjustable using "up" and "down" button from -0 to 1000 value<br>3. Press power button to move on to the next function |  K factor |
| **3** | Set VAV inlet diameter | 1. Adjustable using "up" and "down" button from 0 to 400 value<br>2. Press power button to move on to the next function MM/inch of the VAV terminal box to be select |  VAV inlet diameter |
| **4** | Cool or heating mode | 1. Adjustable using "up" and "down" button from "cool" or "Heat"<br>2. Press power button to move on to the next function |  Cooling or Heating Mode |

# 4.8 Configuring the Airflow Set-points

The airflow set-points are to set the airflow limits for VAV terminal box. The airflow set-points include the following functions:

1. Set Max Air flow for cooling mode
2. Set Min Air flow for cooling mode
3. Set Max Air flow for Heating mode
4. Set Min Air flow for Heating mode

Once the following procedure is set, please select "Save" or else the controller will not capture the configuration.

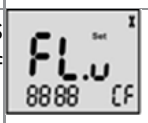
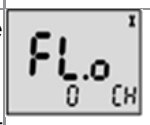
| NO. | PROCEDURE | DETAIL STEPS | SENSOR DISPLAY |
|---|---|---|---|
| **1** | Enter Flow parameter configuration | 1. Use the arrow to "FL.p". Press the power button to select it |  FL. p on screen |
| **2** | Set Max Air flow for cooling mode | 1. Once you press the power button on the "FL. p", you should enter "FL.C"<br>2. Adjustable using "up" and "down" button from 0 to 9999 value<br>3. Press power button to move on to the next function |  Max Airflow for cooling |
| **3** | Set Mom Air flow for cooling mode | 1. Adjustable using "up" and "down" button from 0 to 9999 value<br>2. Press power button to move on to the next function |  Min Airflow for cooling |
| **4** | Set Max Air flow for Heating mode | 1. Adjustable using "up" and "down" button from 0 to 9999 value<br>2. Press power button to move on to the next function |  Max Airflow for Heating |
| **5** | Set Min Air flow for Heating mode | 1. Adjustable using "up" and "down" button from 0 to 9999 value<br>2. Press power button to move on to the next function |  Min Airflow for Heating |

## 4.9 Configuring the Airflow Testing and Calibration

The airflow testing and calibration is testing of airflow and airflow zero calibration. The airflow testing and calibration include the following functions:

1. Set Airflow control setpoint
2. View airflow present value
3. Set Airflow zeroing calibration

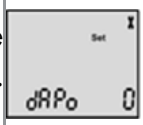
Once the following procedure is set, please select "Save" or else the controller will not capture the configuration.

| NO. | PROCEDURE | DETAIL STEPS | SENSOR DISPLAY |
|---|---|---|---|
| **1** | Enter flow present Value configuration | 1. Use the arrow to "FL. u". Press the power button to select it the number shown here is the actual airflow value |  FL.u on screen |
| **2** | Set Air flow control setpoint | 1. Once you press the power button on the "FL.u", you should enter "FL.s"<br>2. Adjustable using "up" and "down" button from 0 to 9999 value<br>3. Press power button to move on to double confirm on the airflow override. Press button after choosing your option<br>1 = Yes<br>0 = No |  Airflow set-point<br>  Confirmation of set-point |
| **3** | View Present airflow value | 1. After confirming the airflow override, this function will let you see the current value of the present airflow<br>2. Press power button to cancel the airflow override and move to next functions |  View Present Airflow Value |
| **4** | Flow Zeroing Calibration | 1. *Please ensure there no airflow before doing this function<br>2. Once you press this button, the current value of the airflow will be taken as 0<br>3. Press power button to move on to double confirm on the zeroing process. Press button after choosing your option<br>1 = Yes<br>0 = No |  Flow Zeroing |

# 4.10 Configuring the Damper Position

The Damper position is used to measure airflow and commissioning. The damper position includes the following functions:

1. View current damper position
2. Override current damper position

| NO. | PROCEDURE | DETAIL STEPS | SENSOR DISPLAY |
|---|---|---|---|
| **1** | View current Damper Position | 1. Use the arrow to "dAPP". The value shown is the current % of the damper position<br>2. Press the power button to select it<br>3. The number shown here is the damper position in % value |  <br>DAPP on screen |
| **2** | Set Damper position | 1. Once you press the power button on the "dAPP", you should enter "dAPS"<br>2. Adjustable using "up" and "down" button from 0 to 100 value. Value in %<br>3. Press power button to move on to double confirm on the damper position override. Press button after choosing your option<br>1 = Yes<br>0 = No |  <br>Damper position<br>  <br>Confirmation of set-point |
| **3** | View Present Damper position value | 1. After confirming the damper position override, this function will let you see the current value of the current damper position<br>2. Press power button to cancel the airflow override and move to next functions<br>3. Please take note that after this function, ASV305BF7XXXW VAV actuators will move back to its rightful position |  <br>View current Damper Position |

# 4.11 Calibrating the Sensors

EY-RU305F700XW has built in sensors depends on various models. Temperature sensors for EY-RU305F7001W; Temperature & Humidity sensor for EY-RU305F7002W; Temperature, Humidity & CO2 sensor for EY-RU305F7003W.

1. Temperature Calibration
2. Humidity Calibration
3. CO2 Calibration

| NO. | PROCEDURE | DETAIL STEPS | SENSOR DISPLAY |
|---|---|---|---|
| **1** | Set Temperature calibration | 1. Use the arrow to "CALI.IAQ". Once you press the power button on the "CALI.IAQ", you should enter "CALI"<br>2. Adjustable using "up" and "down" button from -10 to 10 value<br>3. Press power button to move on to the next function |  <br>Temp Calibration |
| **2** | Set Humidity calibration | 1. Adjustable using "up" and "down" button from -10 to 10 value<br>2. Press power button to move on to the next function |  <br>Humidity Calibration |
| **3** | Set CO2 calibration | 1. Use the arrow to "CAL". The value shown is the current ppm value of the CO2 level<br>2. Adjustable using "up" and "down" button to set the desired ppm value<br>3. Press power button to double confirm on the CO2 value override<br>1 = Yes<br>0 = No |  <br>Current CO2 level<br>  <br>Confirmation |

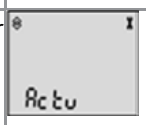
## 4.12 Exiting Configuration Mode

After configuration ASV305BF7XXXW VAV controller, you will need to save the setting before exiting the "ADMIN" mode. You can choose to discard your setting by choosing "QUIT" option.

| NO. | PROCEDURE | DETAIL STEPS | SENSOR DISPLAY |
|---|---|---|---|
| **1** | | 1. Quit discarding all the changes made |  |
| **2** | | 1. Quit saving all the changes made |  |

## 4.13 Configuring the Instance ID

The Instance ID can be changed via Room Thermostats setting.

| NO. | PROCEDURE | DETAIL STEPS | SENSOR DISPLAY |
|---|---|---|---|
| **1** | Choose Actuator Information | 1. Use the arrow to "ACTU". Press the power button to select it |  Actuator info on screen |
| **2** | Set Instance ID | 1. Once you press the power button on the "ACTU", you should enter "B ID"<br>2. Adjustable using "up" and "down" button from 0 to 9999 value.<br>3. Please take note that the instance ID shown at the screen is your current value of Instance ID. |  Instance ID on screen |

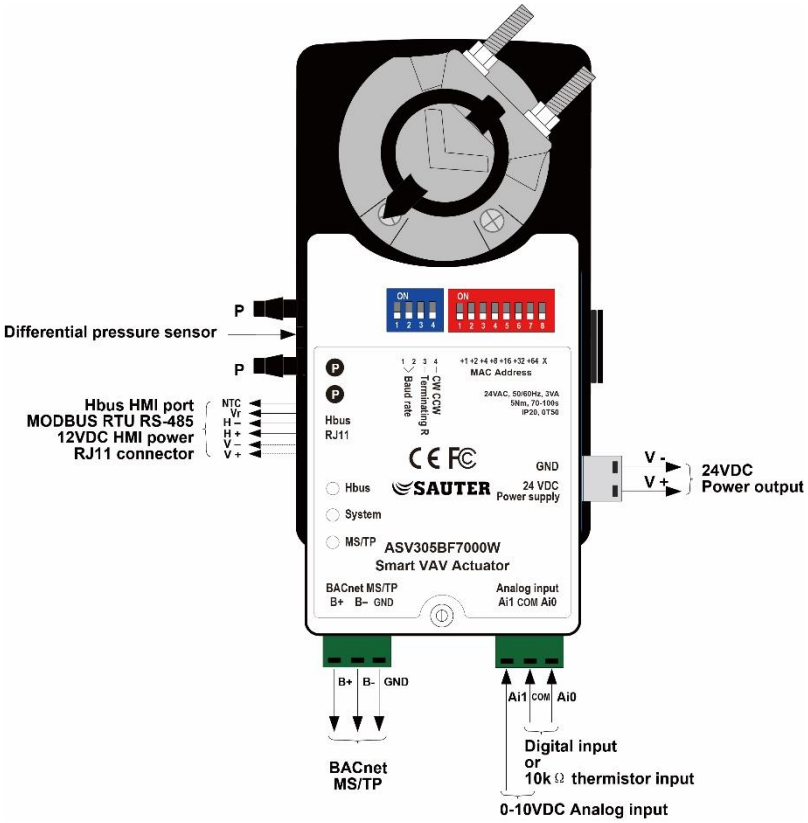
# 5 Cooling or Heating Without Reheat

## 5.1 Cooling or Heating Without Reheat

THE ASV305BF7XXXW Series controller is configured for single-duct Cooling or Heating VAV control without reheat. Connect the controller as shown below in the illustration.

For Cooling and heating, a duct temperature sensor is recommended for discharge air temperature limiting and automatic changeover.

For more information, please contact us or visit SAUTER-controls.com




## 5.2 Sequences of Operation

This topic will cover the sequences of operation for our ASV305BF7XXXW series controllers. These sequences of operation are descriptions of each major component of ASV305BF7XXXW programming. They are provided as an aid to understand how our ASV305BF7XXXW controllers work and operate.

## 5.3 Input Sources

The ASV305BF7XXXW Controllers require specific sensors to measure the room temperature, airflow, and discharge of air temperature. All sensors are pre-program and are automatically detect according to its model specification.

1. EY-RU305F700XW series room thermostats

## 5.4 EY-RU305F700XW Series Room Thermostats

The EY-RU305F700XW series thermostats are digital wall mount sensors that include room temperature, a digital LCD display and 3 push- button interfaces for entering set-points and configuring the controllers. If an EY-RU305F700XW series room thermostat is detected by our ASV305BF7XXXW VAV controller, the controller will automatically map the room thermostats to its object list. For more information about detailed listing for input and output of object list, please see BACnet object list, page 30 onwards.

The EY-RU305F700XW series room thermostats come with 3 models:

1. EY-RU305F7001W – LCD Room Unit for ASV305BF7XXXW with Temperature Sensors
2. EY-RU305F7002W - LCD Room Unit for ASV305BF7XXXW with Temperature and Humidity sensors
3. EY-RU305F7003W - LCD Room Unit for ASV305BF7XXXW with Temperature, Humidity and Carbon Dioxide senor

# 6 Room Set points

## 6.1 Room Set points

There are four temperature set-points each for heating and cooling for a total of 5 set-points.

1. Active Set-point
2. Occupied cooling
3. Unoccupied cooling
4. Occupied heating
5. Unoccupied heating

## 6.2 Active Set Point

The active set-point is the current set-point set by the user. The active set-point is determined by the following:

1. If space is occupied, the controller will use the occupied mode set-point as the active set-point
2. If an EY-RU305F700XW or NEVR series is connected, the Active set-point will be set via the temperature set-point of the thermostats. The range of adjustment is set b
3. If space is unoccupied, the controller will use the unoccupied set-point.

## 6.3 Occupied

A temperature setpoint entered by the technician during the setup and commissioning of the controller. This set-point is used when the controller is occupied which is determined by the Building Management System, motion sensors or the off/on occupancy button of the Thermostats.

## 6.4 Unoccupied

A temperature setpoint entered by the technician during the setup and commissioning of the controller. This set-point is used when the system is unoccupied.

## 6.5 Damper Operation

Damper Movement is determined by comparing the actual airflow reading through the differential pressure and airflow set- points. If the current room temperature is 2 degrees within the temperature set-point, no damper action will be initiated. Once is over the 2-degree Deadband, the damper position will be move and changes.

# 7 System Integration and Networking

## 7.1 System Integration and Networking

These topics in this section will cover the integrating the ASV305BF7XXXW VAV controllers into a Building automation network. These are advanced reference topics and are recommended to control for technicians and engineers.

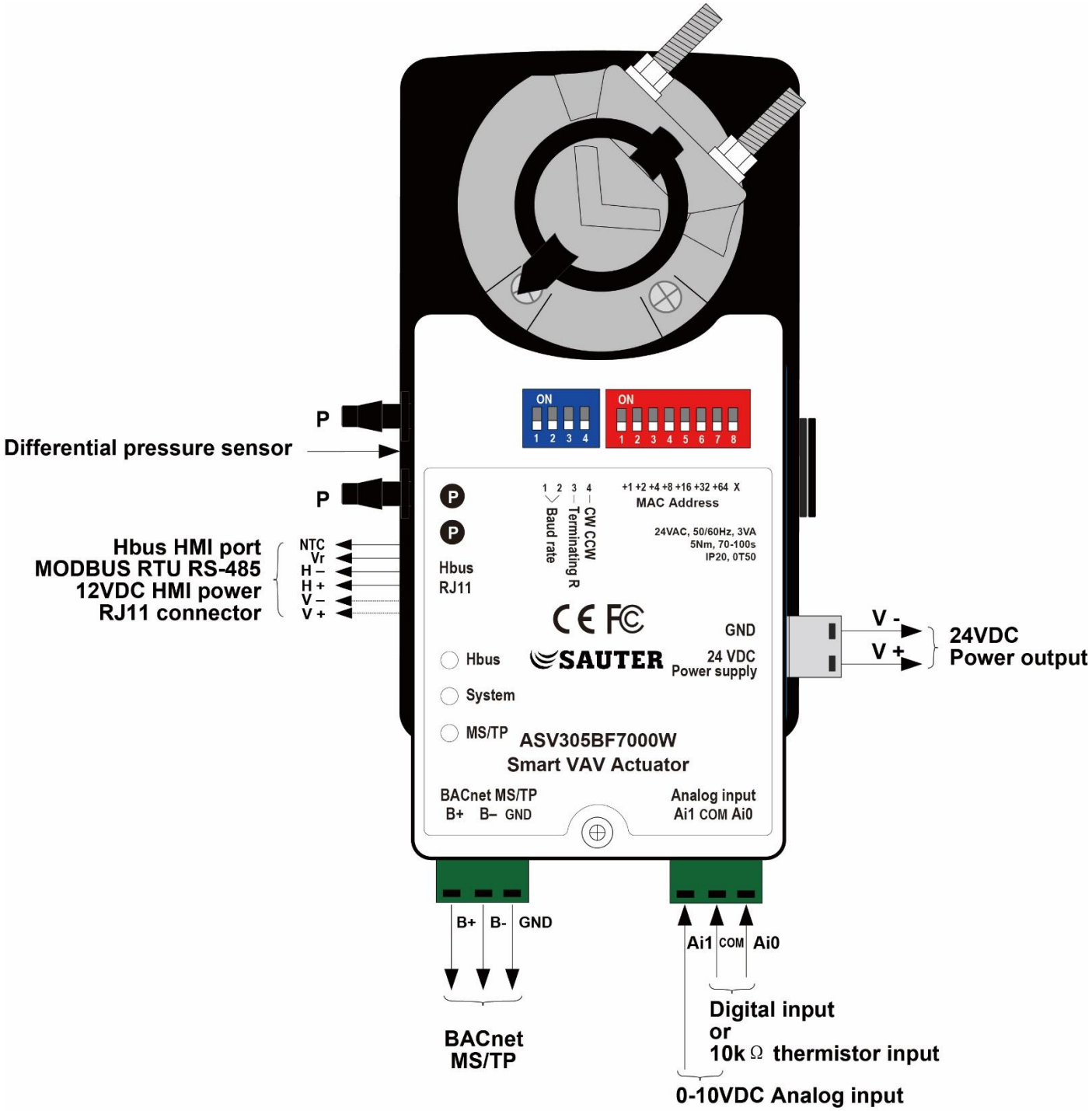
ASV305BF7XXXW VAV controller can be installed as a standalone controller or they can be connected to a BACnet MS/TP network environment. The topics in this section are reference material for technicians or engineers who are planning, installing, commissioning, and setting up a controller that is connected to a network.

In addition to the information in this section, you will also need the following information:

1. Detailed plans and drawings for the building automation system.
2. Information about the Lan including routers, switches, and network firewalls configuration.
3. Sequences of operation for other BACnet Devices that will be monitoring or interacting with our ASV305BF7XXXW VAV actuators.

# 7.2 Connecting to an MS/TP Network

ASV305BF7XXXW VAV controllers are BACnet MS/TP listed controllers. Connect them only to a BACnet MS/TP network. To enter the BACnet device instance, Mac address and network baud, please see chapter 7.6 and 7.7 page 29.



## 7.3 Connections and Wiring

Use the following guideline when connecting the controller to an MS/TP network:

1. Connect not more than 128 addressable BACnet devices to one MS/TP network. The devices can be any mixes of controllers, router and Building control.
2. For best network performance, we suggest limiting the MS/TP network device to be less than 22 controllers.
3. Use Twisted pair, shielded cable (22 - 24 AWG) with capacitance no more than 51 picofarads per foot for all networking wiring in a branch.
4. Connect the (-) terminal in parallel with all other (-) terminals.
5. Connect the (+) terminal in parallel with all other (+) terminals.
6. Connect the shields of the cable together at each midline controllers.

End of line Termination Return Switches

The controllers on the physical ends of each wiring segment must have the end of line termination return switch on for proper network operation.

1. For controllers at the end of the networking, set the Terminal Return to "ON"
2. For the start or mid of controllers, set the Terminal Return to "OFF"

## 7.4 Network Bulbs

ASV305BF7XXXW VAV controllers include 3 status bulbs on the left-hand side of the controller. The MS/TP status bulb serves three functions:

1. Flashing – transmitting of data
2. Blue light – TX
3. Red light – RX

If either blue or red light is not flashing, it indicates that the network is not phased correctly. Remove power and check on the networking wiring or power connections.

## 7.5 Setting Up Networking Communications

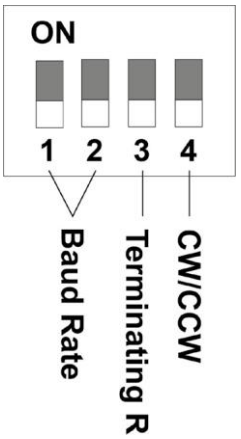
Set the network communication settings before connecting the controllers on the network. The setting of the network requires the password to enter which described in the topic above. Please see page 33 object List to change the default password, please take a look at AV41.

There are 3 settings to set before connecting to the MS/TP network:

1. BACnet Instance ID
2. MAC address
3. Baud Rate

# 7.6 BACnet Instance ID

ASV305BF7XXXW VAV controllers include 3 status bulbs on the left-hand side of the controller. As mention earlier, the BACnet ID can be set via BMS, PC or EY-RU305F700XW series room thermostats. Please see chapter 4.13 page 23 on how to set instance ID on our room thermostats.



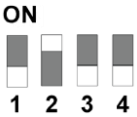

*SW4 (S3): Terminating Resistor*

Factory - set OFF, it is mean to terminating resistor on MS/TP, If S3 ON, it is mean terminating resistor for last device on MS/TP.

*SW4 (S4): Changing Direction of Rotation*

Factory - set OFF, the direction of rotation is CW.

The direction of rotation can be changed by the CW/CCW switch (Slide 4 of SW4)

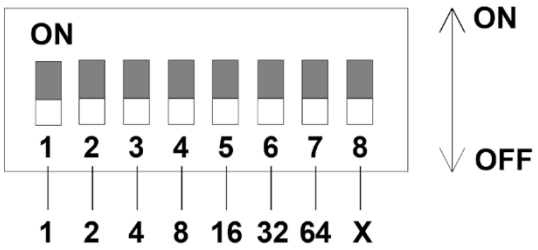
| | | | | | |
|---|---|---|---|---|---|
|   | 9600 Baud | S1 (OFF)<br>S2 (OFF) |   | 19,200 Baud | S1 (ON)<br>S2 (OFF) |
|   | 38,400 Baud | S1 (OFF)<br>S2 (ON) |   | 76,800 Baud | S1 (ON)<br>S2 (ON) |

# 7.7 Mac Address

Our mac address can be set directly on top of the ASV305BF7XXXW VAV controller. The address is set via Binary System. Please see the picture below on more information about the MAC Address switch.

Dip Switch 8 (SW8): MAC Address switch Switches 1 - 7: MAC Address

Switches 9: Not in use



# 8 BACnet Objects List

## 8.1 TABLE 1: BACNET OBJECT LIST FOR CONTROLLER INPUTS/OUTPUTS

| BACNET OBJECT ID | BACNET OBJECT NAME | DESCRIPTION | UNIT | OBJECT TYPE | READ/ WRITE | NOTE |
|---|---|---|---|---|---|---|
| **AI0** | Temp | Ai0 for NTC sensor, Digital Input (Dry Contact) | °C | Analog Input (NTC), Digital Input | R | Selected Model only |
| **AI1** | ADC | Ai1 for 0-10VDC | VDC | Analog Input | R | Selected Model only |
| **AI2** | NTC | For Knob thermostat NTC temperature sensor (Internal Use) | °C | Analog Input | R | |
| **AI3** | VR | For Knob thermostat VR temperature setpoint (Internal Use) | °C | Analog Input | R | |
| **AI12** | Air Pressure | For DP sensor (Internal Use) | Pa | Analog Input | R | |

| BACNET OBJECT ID | BACNET OBJECT NAME | DESCRIPTION | UNIT | OBJECT TYPE | READ/ WRITE | NOTE |
|---|---|---|---|---|---|---|
| **AI13** | Air Flow | For VAV box airflow (Internal Use) | LPS | Analog Input | R | |
| **AO14** | AO0 | Ao0 For 0-10VDC (Heating Valve Output) | % | Analog Output | RW | Selected Model only |
| **AO15** | AO1 | Ao1 for 0-10VDC | Vtg | Analog Output | RW | Selected Model only |
| **BI4** | Over Current | Actuator DC motor over current (Internal Use) | - | Digital Input | RW | For Calculation of running time |
| **BI5** | Over Current | Actuator DC motor over current (Internal Use) | - | Digital Input | RW | For Calculation of running time |
| **BO6** | Open Damper | Damper actuator open control (Internal Use) | - | Digital Output | RW | For Calculation of running time |
| **BO7** | Close Damper | Damper actuator close | - | Digital Output | RW | For Calculation of running time |

| BACNET OBJECT ID | BACNET OBJECT NAME | DESCRIPTION | UNIT | OBJECT TYPE | READ/ WRITE | NOTE |
|---|---|---|---|---|---|---|
| | | control (Internal Use) | | | | |
| **BO8** | DO0 | DO0 for 24VAC | - | Digital Output | RW | Selected Model only |
| **BO9** | DO1 | DO1 for 24VAC | - | Digital Output | RW | Selected Model only |

## 8.2 TABLE 2: BACNET OBJECT LIST FOR ANALOG VALUES

| BACNET OBJECT ID | BACNET OBJECT NAME | DESCRIPTION / RANGE | UNIT | DEFAULT VALUE | READ/ WRITE | MODBUS ID | NOTE |
|---|---|---|---|---|---|---|---|
| **AV0** | BACnet device instance number | 0-9999 | - | 1000 | R | R0 (HMI) | The value in PC configuration software must be divided by 10. |
| **AV1** | DDC Program Version | 0-999999999 | - | - | R | R1 | - |
| **AV2** | VAV box K factor | 0-1000 | - | 100 | RW | R2 (HMI) | - |
| **AV3** | VAV box inlet diameter mm | 100=4"<br>125=5"<br>150=6"<br>200=8"<br>250=10"<br>300=12"<br>350=14"<br>400=16" | mm | 150 | RW | R3 (HMI) | - |
| **AV4** | Current VAV airflow | 0-9999 | LPS, CFM, CMH | - | R | R4 (HMI) | - |
| **AV5** | VAV demand airflow | 0-9999 | LPS, CFM, CMH | - | RW | R5 | - |
| **AV6** | Forced airflow control | 0-9999 | LPS, CFM, CMH | - | RW | R6 (HMI) | - |
| **AV7** | Cooling maximum airflow | AV8-9999 | LPS, CFM, CMH | 30 | RW | R7 (HMI) | - |
| **AV8** | Cooling minimum airflow | 0-AV7 | LPS, CFM, CMH | 10 | RW | R8 (HMI) | - |
| **AV9** | Heating maximum airflow | AV10-9999 | LPS, CFM, CMH | 30 | RW | R9 (HMI) | - |

| BACNET OBJECT ID | BACNET OBJECT NAME | DESCRIPTION / RANGE | UNIT | DEFAULT VALUE | READ/ WRITE | MODBUS ID | NOTE |
|---|---|---|---|---|---|---|---|
| **AV10** | Heating minimum airflow | 0-AV9 | LPS, CFM, CMH | 10 | RW | R10 (HMI) | - |
| **AV11** | VAV damper position (0-10) | 0-10 | - | - | R | R11 (HMI) | Modbus HMI value is 10 times of this value |
| **AV12** | VAV damper override position (0-10) | 0-10 | - | - | RW | R12 (HMI) | - |
| **AV13** | Damper actuator travel time | 0-999 | Sec | - | R | R13 | - |
| **AV14** | Heating f loating valve travel time | 0-999 | Sec | 50 | R | R14 | - |
| **AV15** | Cooling PID parameter- Kp | 0-3276 | °C/ °F | (50) | RW | R15 | - |
| **AV16** | Cooling PID parameter- Ki | 0-3276 | %/°C | 0 | RW | R16 | - |
| **AV17** | Heating PID parameter- Kp | 0-3276 | °C/ °F | (50) | RW | R17 | - |
| **AV18** | Heating PID parameter- Ki | 0-3276 | %/°C | 0 | RW | R18 | - |
| **AV19** | Dead band for temperature control | 0-3276 | °C/ °F | 1 | RW | R19 | - |
| **AV20** | HMI Temperature sensor display /Pressure display PA | 0-100 | °C,Pa | - | R | R20 (HMI) | - |
| **AV21** | HMI Humidity sensor display /ID address | 0-100 | %RH | - | R | R21 (HMI) | For EY-RU305F7002WH and EY-RU305F7003W |
| **AV22** | PPM/RPM/Time display select | 0-100 | - | - | R | R22 | For EY-RU305F7003W |
| **AV23** | HMI Temperature sensor | 0-100 | °C/ °F | - | R | R23 (HMI) | - |
| **AV24** | HMI Humidity sensor | 0-100 | %RH | - | R | R24 (HMI) | For EY-RU305F7002W and EY-RU305F7003W |
| **AV25** | HMI CO2 sensor | 0-9999 | PPM | - | R | R25 (HMI) | For EY-RU305F7003W |

| BACNET OBJECT ID | BACNET OBJECT NAME | DESCRIPTION / RANGE | UNIT | DEFAULT VALUE | READ/ WRITE | MODBUS ID | NOTE |
|---|---|---|---|---|---|---|---|
| **AV26** | AV26 | Not use | - | - | R | R26 | |
| **AV27** | AV27 | Not use | PPM | - | R | R27 | |
| **AV28** | AV28 | Not use | Pa | - | R | R28 | |
| **AV29** | Airflow display unit select | 0=LPS 0.1=CFM 0.2=CMH | - | 0.2 | RW | R29 (HMI) | - |
| **AV30** | Alarm code | No define | - | - | RW | R30 | - |
| **AV31** | HMI pushbutton lock level | 0=No Lock 1=Temp Lock 2=All Lock | - | 0 | RW | R31 (HMI) | - |
| **AV32** | HMI backlight | 0-100 | - | 0 | RW | R32 | - |
| **AV33** | Cooling setpoint | av34-av35 | °C/ °F | - | RW | R33 (HMI) | - |
| **AV34** | Cooling set point high limit | av35-9999 | °C/ °F | 30 | RW | R34 (HMI) | - |
| **AV35** | Cooling set point low limit | 0-av34 | °C/ °F | - | RW | R35 (HMI) | - |
| **AV36** | set up/dow n step | 0.1/0.2/0.5/1 | °C/ °F | 0.5 | R | R36 | - |
| **AV37** | Heating set point | AV39-38 | °C/ °F | 20 | RW | R37 | - |
| **AV38** | Heating set point high limit | AV39-9999 | °C/ °F | 30 | RW | R38 | - |
| **AV39** | Heating set point low limit | 0-AV39 | °C/ °F | 0 | RW | R39 | - |
| **AV40** | HMI Version | - | - | - | R | R40 | - |
| **AV41** | HMI Passw ord | 0-199 | - | 10(HMI 100) | 0 | R41 (HMI) | Value is mulitply by 10 |
| **AV42** | HMI Temperature sensor offset | -10~10(0.1) | °C/ °F | 0 | RW | R42 (HMI) | - |
| **AV43** | HMI Humidity sensor offset | -30~30(1) | %RH | 0 | RW | R43 (HMI) | For EY-RU305F7002W H and EY-RU305F7003W |
| **AV44** | AV44 | Not use | | | RW | R44 | |
| **AV45** | AV45 | Not use | - | - | - | R45 | - |

| BACNET OBJECT ID | BACNET OBJECT NAME | DESCRIPTION / RANGE | UNIT | DEFAULT VALUE | READ/ WRITE | MODBUS ID | NOTE |
|---|---|---|---|---|---|---|---|
| **AV46** | CO2 or Termperature set point (for ai1 set point) | 0-3276 | - | 1000 | - | R46 | - |
| **AV47** | CO2 PID parameter- Kp (for ai1) | 0-3276 | 0 | 20 | R | R47 (HMI) | - |
| **AV48** | CO2 PID parameter- Ki (for ai1) | 0-3276 | - | - | R | R48 (HMI) | - |
| **AV49** | CO2 value(for ai1 or HMI CO2) | 0-9999 | - | - | R | R49 | - |
| **AV50** | ai1 for 0-10 v (CO2 or Temperature sensor) input | 0-10 | Vtg | AV51-AV52 | R | R50 | - |
| **AV51** | ai1 for (Co2 sensor or Temperature) input scale min. | 0-AV52 | PPM | 40 | RW | R51 | - |
| **AV52** | ai1 for (Co2 sensor or Temperature) input scale max. | AV52-9999 | PPM | 200 | RW | R52 | - |
| **AV57** | Air f low PID output | Internal use | - | - | R | R57 | - |
| **AV58** | Cooling temp setpoint+DB | Internal use | - | - | R | R58 | - |
| **AV59** | heating temp setpoint- DB | Internal use | - | - | R | R59 | - |
| **AV60** | Ai0 mode select | 0=not use, 1=Occupied, Unoccupied2=NTC thermistor | - | 0 | R | R60 | - |
| **AV61** | Current VAV position feedback (0-100) | 0-100 | % | - | R | R61 | - |
| **AV62** | Damper min. position selection | Internal use | Pa | - | R | R62 | - |
| **AV63** | Cooling set point | Internal use | - | - | R | R63 | - |
| **AV64** | HMI Temp. display- Fahrenheit | Internal use | °F | - | | - | - |

| BACNET OBJECT ID | BACNET OBJECT NAME | DESCRIPTION / RANGE | UNIT | DEFAULT VALUE | READ/ WRITE | MODBUS ID | NOTE |
|---|---|---|---|---|---|---|---|
| **AV65** | HMI Temp. setpoint-Fahrenheit | Internal use | °C | - | | - | - |
| **AV66** | Internal Calculation for AI0/AI1 | Internal Calculation for AI0/AI1 10k thermistor or Average Temp | - | - | | - | - |
| **AV67** | Ai1 mode select | 0-7 | - | 0 | | - | - |
| **AV68** | Actual airflow | Internal Use | LPS | - | | - | - |
| **AV69** | Heating mode select | 0-5 | - | 0 | | - | - |
| **AV70** | Cooling PID out | 0-100 | - | - | | - | - |
| **AV71** | Airflow correction value | Internal Use | - | - | - | - | - |
| **AV72** | AV-72 | Internal Use | - | - | - | - | - |
| **AV73** | Cooling maximum airflow | Internal Use | - | - | R | - | - |
| **AV74** | Cooling minimum airflow | Internal Use | - | - | R | - | - |
| **AV75** | AV-75 | Buffer - Setpoint for airflow PID | - | - | R | - | - |
| **AV76** | AV-76 | Buffer-Damper Position Calculation stage (1) | - | - | R | - | - |
| **AV77** | Airflow PID parameter-Kp | Internal Use | - | (2) | RW | - | - |
| **AV78** | Airflow PID parameter-Ki | Internal Use | - | (2) | RW | - | - |
| **AV79** | AV-79 | Internal Use | - | - | - | - | - |
| **AV80** | Damper Override Position | 0-100 | % | - | R | - | - |
| **AV81** | Not Use | Not Use | - | - | RW | - | - |
| **AV82** | Not Use | Not Use | - | - | R | - | - |

| BACNET OBJECT ID | BACNET OBJECT NAME | DESCRIPTION / RANGE | UNIT | DEFAULT VALUE | READ/ WRITE | MODBUS ID | NOTE |
|---|---|---|---|---|---|---|---|
| **AV83** | AV-83 | Buffer-Damper position calculation stage (2) | - | - | R | - | - |
| **AV84** | AV-84 | Buffer-Damper position calculation stage (3) | - | - | R | - | - |
| **AV85** | Override air f low control | Override air f low control | LPS | - | R | - | - |
| **AV86** | Not Use | Not Use | - | - | - | - | - |
| **AV87** | Not Use | Not Use | - | - | - | - | - |
| **AV88** | Heating PID Output | 0-100 | % | - | R | - | - |
| **AV89** | Heating maximum airflow | Heating maximum airflow | LPS | - | R | - | - |
| **AV90** | Heating temp. setpoint | Internal Use | 0 | - | RW | - | - |
| **AV91** | Heating min airflow | Internal Use | LPS | - | R | - | - |
| **AV92** | AV-92 | Buffer- travel time counter A | - | - | RW | - | - |
| **AV93** | AV-93 | Buffer-cooling demand airflow | - | - | R | - | - |
| **AV94** | AV-94 | Buffer-heating demand airflow | - | - | R | - | - |
| **AV95** | AV-95 | Buffer- Damper travel time A | - | - | RW | - | - |
| **AV96** | AV-96 | Buffer- travel time counter B | - | - | RW | - | - |
| **AV97** | AV-97 | Buffer- Damper travel time B | - | - | RW | - | - |
| **AV98** | AV-98 | Buffer- Mode judgment A | - | - | RW | - | - |
| **AV99** | AV-99 | Buffer- Mode judgment B | - | - | RW | - | - |
| **AV100** | AV-100 | Buffer- Damper travel time C | - | - | RW | - | - |
| **AV101** | AV-101 | °C value of cooling setpoint | °C | - | R | - | - |
| **AV102** | AV-102 | °F value of cooling setpoint | °F | - | R | - | - |

| BACNET OBJECT ID | BACNET OBJECT NAME | DESCRIPTION / RANGE | UNIT | DEFAULT VALUE | READ/ WRITE | MODBUS ID | NOTE |
|---|---|---|---|---|---|---|---|
| **AV103** | AV-103 | °C value of cooling temp setpoint high limit | °C | - | RW | - | - |
| **AV104** | AV-104 | °F value of cooling temp setpoint high limit | °F | - | RW | - | - |
| **AV105** | AV-105 | 1 stage heating temp. setpoint | - | - | RW | - | - |
| **AV106** | AV-106 | °F value of temp set point low limit | °F | - | RW | - | - |
| **AV107** | AV-107 | °C value of temp set point low limit | °C | - | RW | - | - |
| **AV108** | AV-108 | 2 stage heating temp. setpoint | - | - | RW | - | - |
| **AV109** | AV-109 | Cooling output for airflow PID calculation | % | - | R | - | - |
| **AV111** | AV-111 | Setpoint Value for Cooling temperature PID | °C | - | R | - | - |
| **AV112** | AV-112 | Present Value for Cooling Temperature PID | °C | - | R | - | - |
| **AV113** | AV-113 | Actual airflow - filtered | LPS | - | R | - | - |
| **AV114** | AV-114 | Not use | - | - | - | - | - |
| **AV115** | AV-115 | Counter (0-AV117) | - | - | R | - | - |
| **AV116** | AV-116 | Not use | - | - | - | - | - |
| **AV117** | AV-117 | Output sampling 2.2sec | - | 2.2 | RW | - | - |
| **AV118** | Demand VAV Position | VAV position control output, 0-100 | % | - | R | - | - |
| **AV119** | AV-119 | Counter for DP changes, 0-25 | - | - | RW | - | - |
| **AV120** | AV-120 | Heating f loating output, 0-100 | % | - | R | - | - |
| **AV121** | VAV Off-min position | 0-100 | % | 20 | R | - | BV59 is the mode select for this |
| **AV122** | AV-122 | Arithmetic Operation (AV75-AV124) | - | - | R | - | - |

| BACNET OBJECT ID | BACNET OBJECT NAME | DESCRIPTION / RANGE | UNIT | DEFAULT VALUE | READ/ WRITE | MODBUS ID | NOTE |
|---|---|---|---|---|---|---|---|
| **AV123** | AV-123 | Arithmetic Operation (AV75+AV124) | - | - | R | - | - |
| **AV124** | AV-124 | Dead band for air f low control | - | (5) | RW | - | - |
| **AV125** | AV-125 | Arithmetic Operation Air f low unit | LPS | - | R | - | - |
| **AV126** | AV-126 | Air f low display for HMI | - | - | RW | - | - |
| **AV127** | AV-127 | Humidity offset for HMI | % | - | RW | - | - |

NOTE:

AV object Present value corresponds to MODBUS Holding Register: av0 ~ av499 corresponds to 40001~4500, the value is 10 times the symbol integer (Present Value -3276.8~3276.7 correspond to -32768~32767). If AV default value is in (), the value is fixed and can only be changed in DDC programming.

## 8.3 TABLE 3: BACNET OBJECT LIST FOR BINARY VALUES

| BACNET OBJECT ID | BACNET OBJECT NAME | | | READ/ WRITE | MODBUS ID | NOTE |
|---|---|---|---|---|---|---|
| **BV0** | Master/Slave Mode, | Slave = 0,Master =1 | - | RW | C0 | - |
| **BV1** | VAV box Occupied/ unoccupied | Unoccupied=0, Occupied=1 | - | RW | C1 (HMI) | |
| **BV2** | Cool/Heat mode | Cooling = 0,Heating = 1 | - | RW | C2 (HMI) | |
| **BV3** | HMI Temperature display type_ Present value/ Set point value | Present value=0, Set point value=1 | - | RW | C3 (HMI) | |
| **BV4** | BV-4 | BV-4 | - | - | C4 | |
| **BV5** | Override airflow control | No =0,Yes=1 | - | RW | C5 (HMI) | |
| **BV6** | Damper override | No =0,Yes=1 | - | RW | C6 (HMI) | |
| **BV7** | Override VAV airflow | No =0,Yes=1 | - | RW | C7 (HMI) | |

| BACNET OBJECT ID | BACNET OBJECT NAME | | | READ/ WRITE | MODBUS ID | NOTE |
|---|---|---|---|---|---|---|
| | zero calibration | | | | | |
| **BV8** | BV-8 | Internal Use | - | - | C8 | |
| **BV9** | BV-9 | Internal Use | - | - | C9 | |
| **BV10** | No Airflow in main duct | Airflow =0, No Airflow =1 | - | R | C10 | |
| **BV11** | Need low er temp. air for AHU | No =0,Yes=1 | - | R | C11 | |
| **BV12** | Alarm for 90% of the airf low achieve for more than 300 Sec – Cooling Mode | No =0,Yes=1 | - | R | C12 | |
| **BV13** | Alarm for 90% of the airf low achieve for more than 300 Sec – Heating Mode | No =0,Yes=1 | - | R | C13 | |
| **BV14** | BV-14 | Internal Use | - | - | C14 | |
| **BV15** | BV-15 | Internal Use | - | - | C15 | |
| **BV16** | BV-16 | Internal Use | - | - | C16 | |
| **BV17** | BV-17 | Internal Use | - | - | C17 | |
| **BV18** | BV-18 | Internal Use | - | - | C18 | - |
| **BV19** | BV-19 | Internal Use | - | - | C19 | - |
| **BV20** | Alarm icon | No =0,Yes=1 | 0 | RW | C20 (HMI) | - |
| **BV21** | Lock icon | No =0,Yes=1 | 0 | R | C21 (HMI) | - |
| **BV22** | Valve icon | No =0,Yes=1 | 0 | RW | C22 (HMI) | - |
| **BV23** | Cooling icon | No =0,Yes=1 | 1 | R | C23 (HMI) | - |

| BACNET OBJECT ID | BACNET OBJECT NAME | | | READ/ WRITE | MODBUS ID | NOTE |
|---|---|---|---|---|---|---|
| **BV24** | Heating icon | No =0,Yes=1 | 0 | R | C24 (HMI) | - |
| **BV25** | Fan Icon | No =0,Yes=1 | 0 | RW | C25 (HMI) | - |
| **BV26** | Sleep Icon | No =0,Yes=1 | 0 | RW | C26 (HMI) | - |
| **BV27** | Unoccupied Icon | No =0,Yes=1 | 0 | R | C27 (HMI) | - |
| **BV28** | Tool Icon | No =0,Yes=1 | 0 | RW | C28 (HMI) | - |
| **BV29** | Sending / Calculating Icon | No =0,Yes=1 | 0 | R | C29 (HMI) | - |
| **BV30** | ON/OFF icon | No =0,Yes=1 | 0 | R | C30 (HMI) | - |
| **BV31** | Button pressed (alarm reset) | No =0,Yes=1 | - | - | C31 (HMI) | - |
| **BV32** | ON/OFF control status | Off =0, On=1 | - | RW | C32 (HMI) | - |
| **BV33** | ON/OFF is allow ed | Allow =0, Prohibit=1 | 0 | R | C33 (HMI) | - |
| **BV34** | HMI Temperature setting is allow ed | Allow =0, Prohibit=1 | 0 | R | C34 (HMI) | - |
| **BV35** | BV-35 | HMI humidity setting is allow ed, Allow =0, Prohibit=1 | 0 | RW | C35 (HMI) | For EY-RU305F7002W |
| **BV36** | BV-36 | HMI CO2 setting is allow ed, Allow=0, Prohibit=1 | 0 | RW | C36 (HMI) | For EY-RU305F7003W |
| **BV37** | BV-37 | HMI pressure setting is allow ed, Allow =0,Prohibit=1 | 0 | RW | C37 (HMI) | - |
| **BV38** | Deg C/F Unit display select | DegC=0,DegF=1 | 0 | RW | C38 (HMI) | - |
| **BV39** | Deg/Pa display select | Deg=0, Pa=1 | 0 | RW | C39 (HMI) | - |
| **BV40** | 24hr/12hr time mode select | 24 hr=0,12 hr=1 | 0 | RW | C40 (HMI) | - |
| **BV41** | Humidity display | No =0,Yes=1 | 0 | R | C41 (HMI) | For EY-RU305F7002W |
| **BV42** | ID address display | No =0,Yes=1 | 0 | RW | C42 (HMI) | - |

| BACNET OBJECT ID | BACNET OBJECT NAME | | | READ/ WRITE | MODBUS ID | NOTE |
|---|---|---|---|---|---|---|
| **BV43** | Clock display | No =0,Yes=1 | 0 | RW | C43 (HMI) | - |
| **BV44** | PPM display | No =0,Yes=1 | 0 | R | C44 (HMI) | For EY-RU305F7003W |
| **BV45** | RPM display | No =0,Yes=1 | 0 | RW | C45 (HMI) | - |
| **BV46** | BV-46 | Internal Use | - | - | C46 | - |
| **BV47** | BV-47 | Internal Use | - | - | C47 | - |
| **BV48** | BV-48 | Internal Use | - | - | C48 | - |
| **BV49** | CO2 control | 0=ai1 co2 sensor, 1=HMI co2 sensor | 0 | - | C49 | - |
| **BV50** | BV-50 | Internal Use | - | - | C50 | - |
| **BV51** | VAV/CAV mode select | 0=VAV,1=CAV | 0 | - | C51 | - |
| **BV52** | BV-52 | Arithmetic Operation-Off delay 160 sec after BV55 | - | - | C52 | - |
| **BV53** | BV-53 | Arithmetic Operation-BV104 & !BV52 | - | - | C53 | - |
| **BV54** | BV-54 | Arithmetic Operation-AV113 is within AV122~AV123 | - | - | C54 | - |
| **BV55** | BV-55 | Arithmetic Operation- On delay 5sec after BO54 | - | - | C55 | - |
| **BV56** | BV-56 | Arithmetic Operation-BV62 & BV38 | - | - | C56 | - |
| **BV57** | BV-57 | Arithmetic Operation-AV33 changes>.1 | - | - | C57 | - |
| **BV58** | BV-58 | Arithmetic Operation-AV34 changes>.1 | - | - | C58 | - |
| **BV59** | Pow er off min open/min f low select | 0 min VAV open position,1 Vmin | 0 | - | C59 | - |
| **BV60** | Ai1control mode disable/ enable 0-10VDC | 0 Disable,1 Enable. | 0 | - | C60 | - |
| **BV61** | BV-61 | Arithmetic Operation-AV35 changes>.1 | - | - | C61 | - |

| BACNET OBJECT ID | BACNET OBJECT NAME | | | READ/ WRITE | MODBUS ID | NOTE |
|---|---|---|---|---|---|---|
| **BV62** | BV-62 | Arithmetic Operation- BV57 or BV58 or BV61 | - | - | C62 | - |
| **BV63** | BV-63 | Damper end position, No =0,Yes=1 | - | - | C63 | - |
| **BV64** | BV-64 | Arithmetic Operation- one shot BV63 | - | - | - | - |
| **BV65** | BV-65 | Not use | - | - | - | - |
| **BV66** | BV-66 | Arithmetic Operation- one shot BV63 | - | - | - | - |
| **BV67** | BV-67 | Arithmetic Operation- CounterCountCompletion of BO6 once per 5000 sec | - | - | - | - |
| **BV68** | BV-68 | Arithmetic Operation- AV98=1 | - | - | - | - |
| **BV69** | BV-69 | Arithmetic Operation- one shot BO6 | - | - | - | - |
| **BV70** | BV-70 | Arithmetic Operation- BV68 or BV80 | - | - | - | - |
| **BV71** | BV-71 | Arithmetic Operation- Ondelay 1sec after BO7 | - | - | - | - |
| **BV72** | BV-72 | Arithmetic Operation- V95>2 | - | - | - | - |
| **BV73** | BV-73 | Arithmetic Operation- AV99=1 | - | - | - | - |
| **BV74** | BV-74 | Arithmetic Operation- BV73 & BV71 | - | - | - | - |
| **BV75** | BV-75 | Arithmetic Operation-Off delay 160 sec after Initial | - | - | - | - |
| **BV76** | BV-76 | Arithmetic Operation- one shot bv63 | - | - | - | - |
| **BV77** | BV-77 | Arithmetic Operation- CounterCountCompletion of BO7 once per 5000 sec | - | - | - | - |
| **BV78** | BV-78 | Arithmetic Operation- AV99 is not equal to 1 | - | - | - | - |
| **BV79** | BV-79 | Arithmetic Operation- one shot BO7 | - | - | - | - |
| **BV80** | BV-80 | Arithmetic Operation- BV71 & BV78 | - | - | - | - |
| **BV81** | BV-81 | Not use | - | - | - | - |
| **BV82** | BV-82 | Not use | - | - | - | - |

| BACNET OBJECT ID | BACNET OBJECT NAME | | | READ/ WRITE | MODBUS ID | NOTE |
|---|---|---|---|---|---|---|
| **BV83** | BV-83 | Not use | - | - | - | - |
| **BV84** | BV-84 | Arithmetic Operation- BV101 or BV32 | - | - | - | - |
| **BV85** | BV-85 | Arithmetic Operation- one shot BV89 | - | - | - | - |
| **BV86** | BV-86 | Arithmetic Operation- one shot BV27 | - | - | - | - |
| **BV87** | BV-87 | Arithmetic Operation- BV2 & BV84 | - | - | - | - |
| **BV88** | BV-88 | Arithmetic Operation-!BV2 & BV84 | - | - | - | - |
| **BV89** | BV-89 | Arithmetic Operation- BV83+BV81 | - | - | - | - |
| **BV90** | BV-90 | Internal Use | - | - | - | - |
| **BV91** | BV-91 | Internal Use | - | - | - | - |
| **BV92** | BV-92 | Internal Use | - | - | - | - |
| **BV93** | BV-93 | Internal Use | - | - | - | - |
| **BV94** | BV-94 | Internal Use | - | - | - | - |
| **BV95** | BV-95 | Internal Use | - | - | - | - |
| **BV96** | BV-96 | Internal Use | - | - | - | - |
| **BV97** | BV-97 | Internal Use | - | - | - | - |
| **BV98** | BV-98 | Internal Use | - | - | - | - |
| **BV99** | BV-99 | Internal Use | - | - | - | - |
| **BV100** | BV-100 | Internal Use | - | - | - | - |
| **BV101** | BV-101 | Internal Use | - | - | - | - |
| **BV102** | BV-102 | Internal Use | - | - | - | - |
| **BV103** | BV-103 | Arithmetic Operation-one shot BV7 | - | - | - | - |
| **BV104** | BV-104 | Arithmetic Operation- CounterCountCompletion | - | - | - | - |

| BACNET OBJECT ID | BACNET OBJECT NAME | | | READ/ WRITE | MODBUS ID | NOTE |
|---|---|---|---|---|---|---|
| | | of BV105 once per AV117 sec | | | | |
| **BV105** | BV-105 | Arithmetic Operation-Counter Start Initial=1 | - | - | - | - |
| **BV106** | BV-106 | Arithmetic Operation-AI12 changes>2 | - | - | - | - |
| **BV107** | BV-107 | Arithmetic Operation-one shot BV106 | - | - | - | - |
| **BV108** | BV-108 | Arithmetic Operation-BV107 changes count>25 | - | - | - | - |
| **BV109** | BV-109 | Arithmetic Operation-AV75 changes>2 | - | - | - | - |
| **BV110** | BV-110 | Arithmetic Operation-AV68 is w tihin 0~10 | - | - | - | - |
| **BV111** | BV-111 | Arithmetic Operation-BV103 & BV110 | - | - | - | - |
| **BV112** | BV-112 | Internal Use | - | - | - | - |
| **BV113** | Stage 1 Heating | Internal use,Not active = 0, Active = 1 | - | - | - | - |
| **BV114** | Stage 2 Heating | Internal useNot active = 0 Active = 1 | - | - | - | - |
| **BV115** | BV-115 | Internal use | - | - | - | - |
| **BV116** | BV-116 | Internal use | - | - | - | - |
| **BV117** | BV-117 | Internal use | - | - | - | - |
| **BV118** | Stage 3 Heating | Internal use,Not active = 0 Active = 1 | - | - | - | - |
| **BV119** | Stage heating Bo8 | Off = 0, On = 1,Active Bo8 after 60 sec when "On" | - | - | - | - |
| **BV120** | Stage heating Bo9 | Off = 0, On = 1,Active Bo9 after 60 sec when "On" | - | - | - | - |
| **BV121** | BV-121 | Need low er temp. air for AHU (no delay) | - | - | - | - |
| **BV122** | BV-122 | Need higher temp. air for AHU (no delay) | - | - | - | - |
| **BV123** | BV-123 | Not use | - | - | - | - |
| **BV124** | BV-124 | Need more air volume for AHU (no delay) | - | - | - | - |

| BACNET OBJECT ID | BACNET OBJECT NAME | | | READ/ WRITE | MODBUS ID | NOTE |
|---|---|---|---|---|---|---|
| **BV125** | BV-125 | Not use | - | - | - | - |
| **BV126** | BV-126 | Not use | - | - | - | - |
| **BV127** | BV-127 | Internal Use | - | - | - | - |