

OJ-Air2Master BACnet integration.

Vers. 01

Introduction

Using BACnet when integrating an Air Handling Unit into a Building Management System (BMS) requires a few things to be considered:

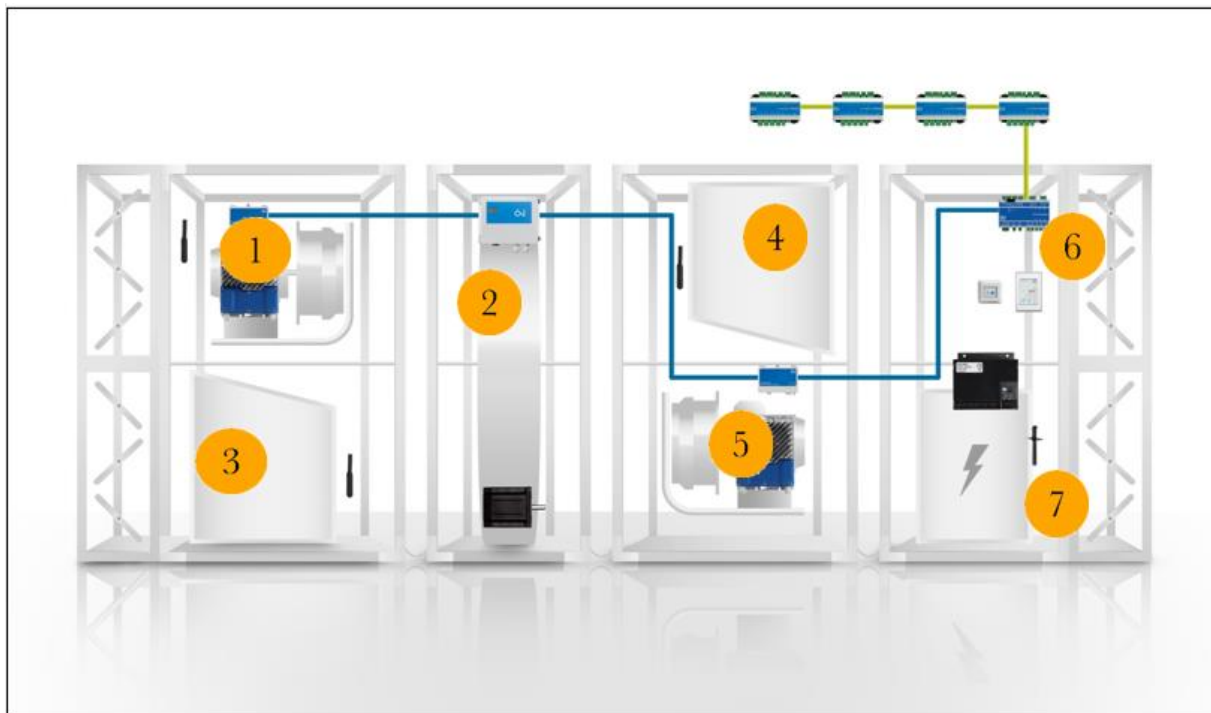
- How many datapoints shall be used.
- How often shall the data be polled.
- Use of the Change of Value (COV) BACnet service.

The total network traffic depends on the combination of the above listed. A poor integration strategy can overload the IT network and the AHU controller.

Data polling

A small BMS integration include parameters related to AHU operation, Alarms, Fans, Filters, and Coils. The general Operation mode can be monitored by these parameters available at the OJ-Air2Masters BACnet interface:

	BACNet
Actual operating mode	AI 0
Operation ON/OFF	BI 0
Extended low speed -> Active	BI 3
Extended high speed -> Active	BI 4
Alarm relay 1 (A-alarm)	BI 30
Alarm relay 2 (B-alarm)	BI 31
Alarm reset signal (AutoReturn to zero)	BV 0



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Other parameters provide the information often used in a system overview.

	BACNet
1	Actual exhaust temp. [1/100°C] AI 22 Actual extract flow [l/s] AI 7 Extract motor output percentage [1/100%] AI 60 Setpoint for extract flow, low speed [l/s] AV 12 Setpoint for extract flow, medium speed [l/s] AV 254 Setpoint for extract flow, high speed [l/s] AV 13
2	Rot. heat exchanger – output percent. [%] AI 73
3	Actual outdoor temp. [1/100°C] AI 20 Inlet filter pressure [Pa] AI 27 Inlet filter monitor max. alarm limit [Pa] AI 31
4	Extract filter pressure [Pa] AI 28 Max. alarm limit, extract filter pressure drop [Pa] AI 32
5	Actual inlet flow [l/s] AI 5 Inlet motor output percentage [1/100%] AI 51 Setpoint for inlet flow, low speed [l/s] AV 10 Setpoint for inlet flow, medium speed [l/s] AV 251 Setpoint for inlet flow, high speed [l/s] AV 11
6	Actual room temperature [1/100 °C] AI 21 Actual extract duct pressure [Pa] AI 3 Setpoint for duct pressure, extract, low speed [Pa] AV 6 Setpoint for duct pressure, extract, medium speed [Pa] AV 255 Setpoint for duct pressure, extract, high speed [Pa] AV 7
7	Actual inlet temperature [1/100°C] AI 16 Control type setting AV 133 Temperature setpoint for actual control type AV 134 Min. limit, inlet temp. [1/100°C] AV 135 Max. limit, inlet temp. [1/100°C] AV 136 Actual heating power [1/100%] AI 36 Heating relay 1 BI 26 Act. heating bat. temp.[1/100°C] AI 26 Actual cooling power [1/100%] AI 38 Actual inlet duct pressure [Pa] AI 1 Setpoint for duct pressure, inlet, low speed [Pa] AV 2 Setpoint for duct pressure, inlet, medium speed [Pa] AV 252 Setpoint for duct pressure, inlet, high speed [Pa] AV 3

Monitoring these 42 suggested parameters will neither overload a normal IT network or the OJ-Air2Master if they are polled once every second. The OJ-Air2Master BACnet protocol offers more than 1000 parameters. The request interval must be 10 seconds or higher if the BMS system needs to poll them all. A 10 second polling interval will always be OK. A slower polling interval might be preferred to reduce the IT network load or required data storage capacity.

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Change of Value Subscription

To reduce the IT network load, it is possible for the BMS system to subscribe to a list of parameters (Active_COV_Subscriptions), and only receive the data when the value has changed more than a defined level (COV_Increment)

This is described in **ANSI/ASHRAE Standard 135-2016**

12.11.39 Active_COV_Subscriptions

The Active_COV_Subscriptions property is a BACnetLIST of BACnetCOVSubscription, each of which consists of a Recipient, a Monitored Property Reference, an Issue Confirmed Notifications flag, a Time Remaining value and an optional COV Increment. This property provides a network-visible indication of those COV subscriptions that are active at any given time. Whenever a COV Subscription is created with the SubscribeCOV or SubscribeCOVProperty service, a new entry is added to the Active_COV_Subscriptions list. Similarly, whenever a COV Subscription is terminated, the corresponding entry shall be removed from the Active_COV_Subscriptions list.

12.2.16 COV_Increment

This property, of type REAL, shall specify the minimum change in Present_Value that will cause a COVNotification to be issued to subscriber COV-clients. This property is required if COV reporting is supported by this object.

COV subscriptions must be handled with great care and there are a few things to consider:

- How many datapoints shall be subscribed.
- How long time shall the subscription live.
- What is a reasonable COV_increment.
- How are the subscriptions removed from the Active_COV_Subscription list.

The main idea by using COV subscriptions is to reduce the IT network traffic and only transmit parameters when needed. Some BMS screens might show some live values with a faster update frequency. When the user moves to another screen, these parameters are no longer necessary and can be removed from the subscription list. The parameters are transmitted each time its value change more than the COV_increment value. If for example, the parameter Supply Air Temperature COV_increment is set to 0,2°C, a temperature change of 1°C will result in 5 transmissions of the datapoint value.

The OJ-Air2Master supports maximum 300 parameters as COV subscriptions. The BMS system must check the **Active_COV_Subscription** list regularly and remove unnecessary parameters.

The BMS system must set the **COV_increment** to reasonable values for each **Analogue Input** and **Analogue Value** COV_subscription parameter. Small values of for example 1 Pa, 1 m3/h or 1W will trigger a heavy transmission of parameters due to small fluctuations. Reasonable COV_increments are normally 1% of the nominal value. For example, 100ppm, 1%, 100m3/h, 0,2°C, 10Pa, 100W, 30sec. 0,1Bar, 0,2A, 100J/m3, 1Hz, 0,2V, 100rpm.

The OJ-Air2Master can be overloaded if the Change of Value subscription is not correctly used.

Overload symptoms can be:

- HMI communication loss
- Removal of SD card from the OJ-Air2Master improves the operation.

Stopping the BACnet server from the OJ-Air2Master webpage or removing the LAN cable from the OJ-Air2Master TCP/IP port will not reduce the load. The **Active_COV_Subscription** set by the BMS system will still be activated inside the OJ-Air2Master. Even a power cycle will not solve the issue. The BMS system must clean up the **Active_COV_Subscription** to reestablish a normal system load.