

BACnet gateway



1. Overview

BACnet support for up to 4 Air Handling Units GLOBAL/ESENSA equipped with TAC control boards and SAT ETHENET. The BACnet Standardized Device Profile (Annex L) of the BACnet device is: BACnet Application Specific Controller (B-ASC). The supported Data Link Layer Options is BACnet / IP.

2. Installation

LED 1 - GREEN: ON

LED 2 - GREEN: BACnet comm.

LED 3 - Device state

LED 4 - GREEN: Modbus comm.

LED 5 - GREEN: Not used

LED 6 - GREEN: Not used

Connector 3: Ethernet 1 Port (RJ45 Plug)

Connector 4: Ethernet 2 Port (RJ45 Plug)

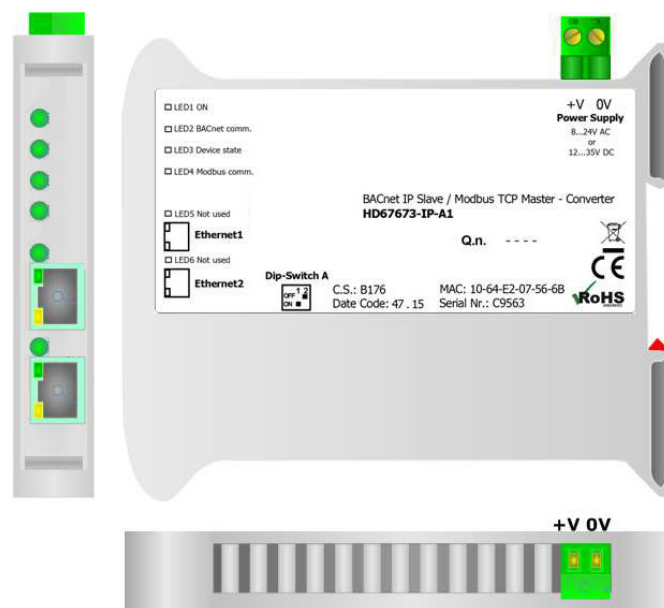
Power supply:

0V = Ground

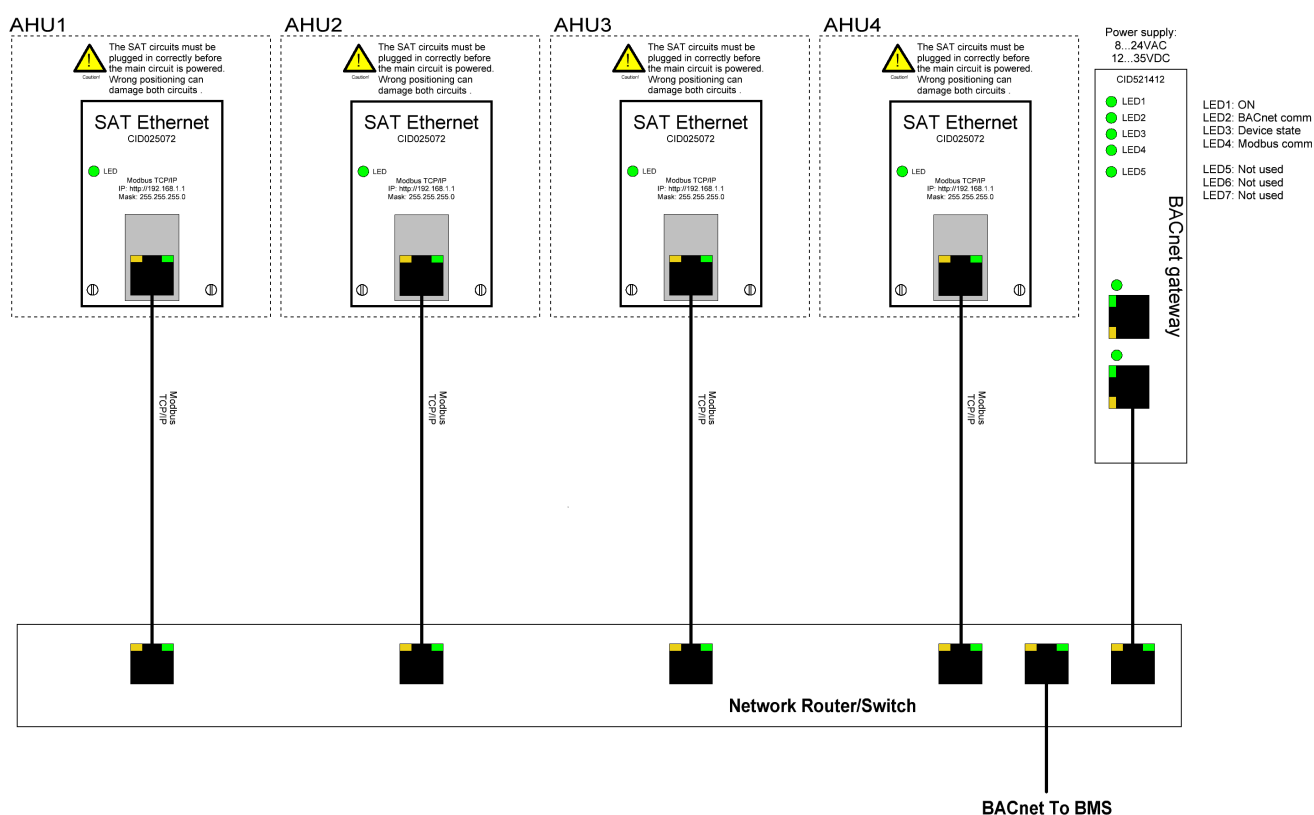
+V = Positive wire

VAC : min 8V ; max 24V

VDC : min 12V ; max 25V



2.1 Topology



3. Configuration

3.1 Default configuration

The default configuration is indicated in the following table:

- BACnet gateway:	- Unit n°1: IP ADDRESS: 192.168.1.1
IP ADDRESS gateway: 192.168.1.9	- Unit n°2: IP ADDRESS: 192.168.1.2
Modbus TCP Master (inside the gateway) : 192.168.1.8	- Unit n°3: IP ADDRESS: 192.168.1.3
SUBNET MASK: 255.255.255.0	- Unit n°4: IP ADDRESS: 192.168.1.4
GATEWAY: 0.0.0.0	
PORT: 47808	
BACnet device name: Swegon	
Device Identifier: 1	

3.2 Custom configuration

To allow the integration in an existing BMS, it is possible to adapt the network settings, as well as the units types and quantity.

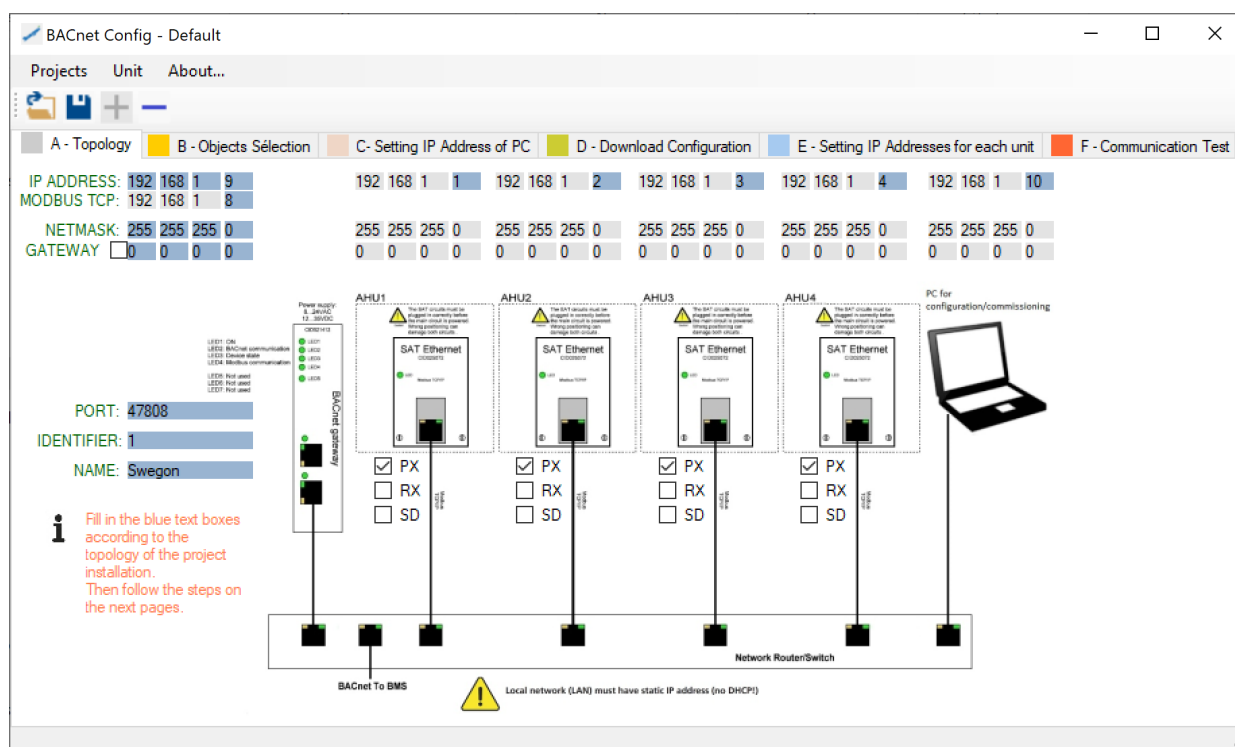
In order to facilitate the configuration, we recommend to download and install the "BACnet Config" software from www.swegon.com.



In the tab "A – Topology" of the main screen of BACnet Config (see picture here below), it is possible to :

- Remove or add an unit
- Change the gateway IP configuration
- Change the gateway communication port
- Change the last number of the IP address of the units on the corresponding row inside the table.
- Choose for each unit its type: PX (default), RX or SD.
- Select/unselect objects (tab 'B')
- Save the configuration
- Open a previously saved configuration

To install and run the application, make sure you have all the rights and access as a network administrator.



3.3 Download custom configuration

The module has a default configuration loaded, so there should be no need to make any changes if the default configuration can be used.

3.3.1 Procedure to change the configuration

Set up first the computer used for downloading in order to be able to communicate with the gateway:

Follow steps of the tab "C – Setting IP Address of PC" of BACnet Config application or

Set directly IP address of the computer to 192.168.1.10.
The net mask will be 255.255.255.0.

The gateway: 0.0.0.0.



In order to change configuration, make sure you have all the rights and access as a network administrator.

A - Topology B - Objects Sélection C - Setting IP Address of PC D - Download Configuration E - Setting IP Addresses for each unit F - Communication Test

Connect your PC with an ethernet cable to the same network as the BACnet gateway.
Then setup the IP address of your PC so that to be in the same range of the current BACnet IP address.

☒ Configuration with this topology not yet sent to BACnet gateway (192.168.1.10)
☐ Configuration with this topology already sent to BACnet gateway (192.168.1.10)
☐ BACnet gateway has never been configured, or last configuration sent is not known anymore (192.168.2.204).
Then put DIP SWITCH 2 (or the unique one for some models) on gateway as in the picture (ON position).
After configuration of the BACnet Gateway, put the DIP SWITCH back to OFF position

Configure PC Automatically

Find Ethernet Adapter

Ethernet Ada...	IP Address	Subnet Mask	Gateway	D...
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Use Selected Ethernet Adapter

Configure PC Manually

- 1 - Open Network Connections
- 2 - Double click on Ethernet adapter connected
- 3 - Click on Property button
- 4 - Double click on "Internet Protocol Version 4 (TCP/IPv4)
- 5 - Write Address as follow:

☐ Obtain an IP address automatically
☒ Use the following IP address:

IP address:
Subnet mask:
Default gateway:

Follow next Step on the tab "D – Download configuration" :

A - Topology B - Objects Sélection C - Setting IP Address of PC D - Download Configuration E - Setting IP Addresses for each unit F - Communication Test

- 1 - Launch Compositor
- 2 - Press the button "Open Configuration"
- 3 - Select this project : Default
- 4 - Press the button "Update Device"
- 5 - Enter the current IP Address of the BACnet Gateway
- 6 - Press the button "Ping": if the device is not found, then go back to step 2 to set the IP settings of the PC in the same range of the one of the current address of the BACnet device

Update Firmware from Ethernet (UDP)

SW67673
Update Firmware from Ethernet (UDP)

Insert the IP Address of HD67673

. . .

Check the Connection the device

SW67673

BACnet / Modbus TCP Master - Converter

Begin: Opened Configuration of the Converter : Default

Step 1:

Step 2:

Step 3:

Step 4: *Tip: Create EDE file thanks to button "Objects Map"*

Step 5:

www.ADFweb.com

3.4 Resetting the IP address:

The gateway comes with default IP address 192.168.1.9. If this address has been changed later on and the address is not known anymore, follows this procedure to set back the factory address.

1. Turn off the Device;
2. Put Dip2 of 'Dip-Switch A' at ON position
3. Turn on the device
4. Connect the Ethernet cable;
5. Insert the IP "192.168.2.205";
6. Press the "Ping" button, must appear "Device Found!"
7. Press the "Next" button;
8. Check all operations;
9. Press the "Execute update firmware" button to start the upload;
10. When all the operations are "OK" turn off the Device;
11. Put Dip2 of 'Dip-Switch A' at OFF position
12. Turn on the device.
13. Upload a configuration (see 5.2).



N.B. On some models, only one dip switch is present, then turn this unique one



Data Link Layer Options:
BACnet IP, (Annex J)

Character Sets Supported:
ISO 10646 (UTF-8)

3.5 Configuration of the Air Handling Unit IP Address

By default, the IP address of SAT WIFI-ETHERNET is 192.168.1.1 with netmask 255.255.255.0 and gateway 0.0.0.0.

Each Air Handling Unit in the BACnet network has to be configured with static IP settings according to the topology.

The setup can be done through a point-to-point connection with a PC (see manual MI Regulation_SW_TAC7 + MODBUS TCP/IP) or with the user interface:

- TACtouch for TAC7 , function Communication/SAT LAN
- RC viewer for TAC5 GLOBAL SD, advanced setup/



N.B. : it is necessary to reset the control board after the change of configuration to validate it.

Parameter	Value
IP CNFG	Select DHCP if the IP address of the unit is assigned dynamically, select MANUAL to enter a static IP address. Default is MANUAL.
IP address	If IP CNFG= MANUAL, enter the static IP address: 4 numbers from 0 to 255 in IP address 1, IP address 2, IP address 3 and IP address 4.
netmask	If IP CNFG= MANUAL, enter the netmask: 4 numbers from 0 to 255 in netmask 1, netmask 2, netmask 3 and netmask 4.
gateway	If IP CNFG= MANUAL, enter the gateway: 4 numbers from 0 to 255 in gateway 1, gateway 2, gateway 3 and gateway 4.
DNS (TAC7 only)	The DNS (Domain Name Server) setting is not relevant in BACnet application, no need to setup associated parameters

Appendix - Objects descriptions and table

A. Standard objects supported

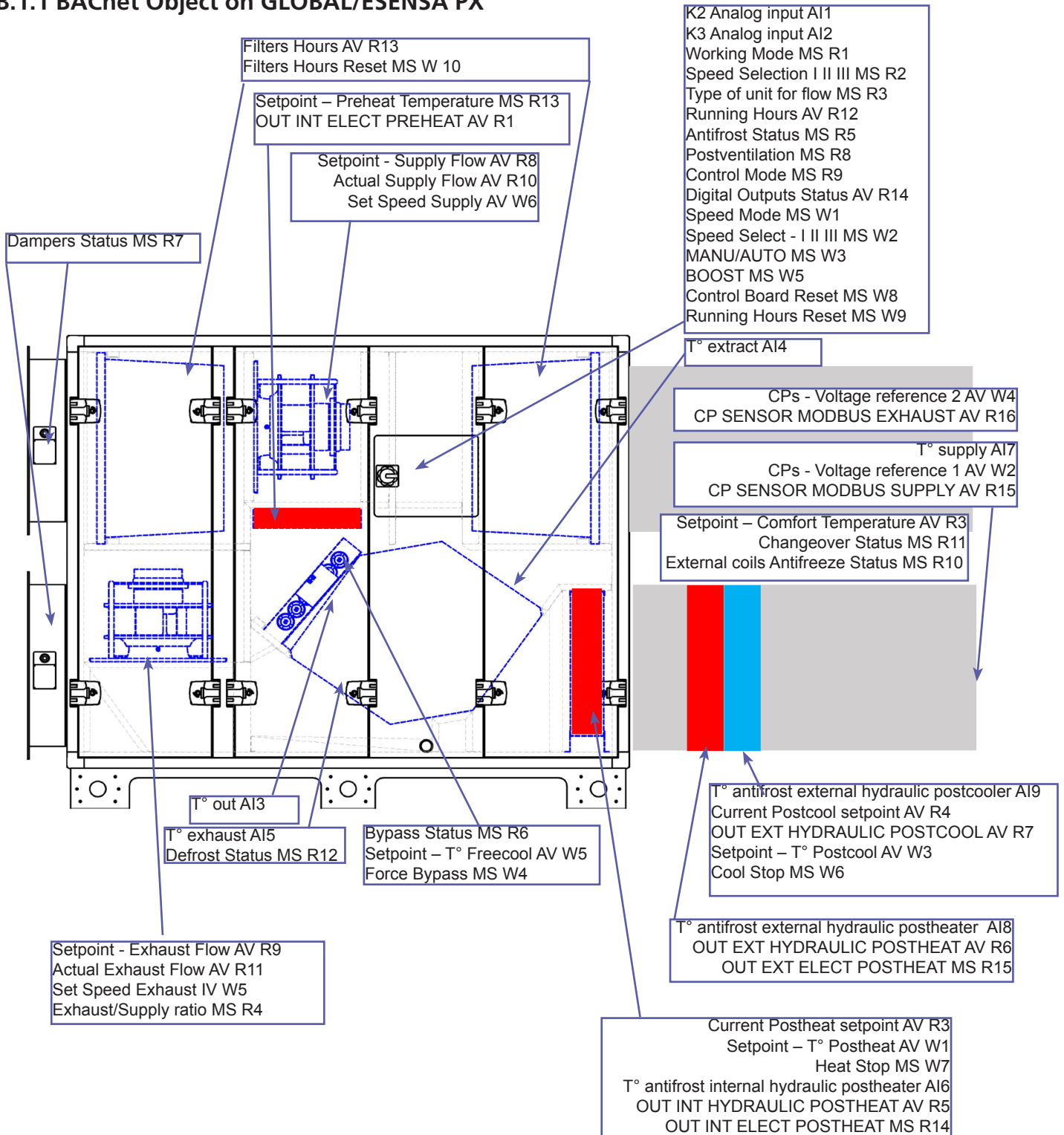
Object Type	
Analog Input	Object_Identifier, Object_Name, Object_Type, Present_Value, Status_Flags, Event_State, Out_Of_Service, Units, Description.
Analog Value	Object_Identifier, Object_Name, Object_Type, Present_Value, Status_Flags, Event_State, Out_Of_Service, Units, Description.
Integer Value	Object_Identifier, Object_Name, Object_Type, Present_Value, Status_Flags, Event_State, Out_Of_Service, Units, Description.
Device	Object_Identifier, Object_Name, Object_Type, System_Status, Vendor_Name, Vendor_Identifier, Model_Name, Firmware_Revision, Application_Software_Version, Protocol_Version, Protocol_Revision, Protocol_Services_Supported, Protocol_Object_Types_Supported, Object_List, Max_APDU_Length_Accepted, Segmentation_Supported.

B. Objects Description

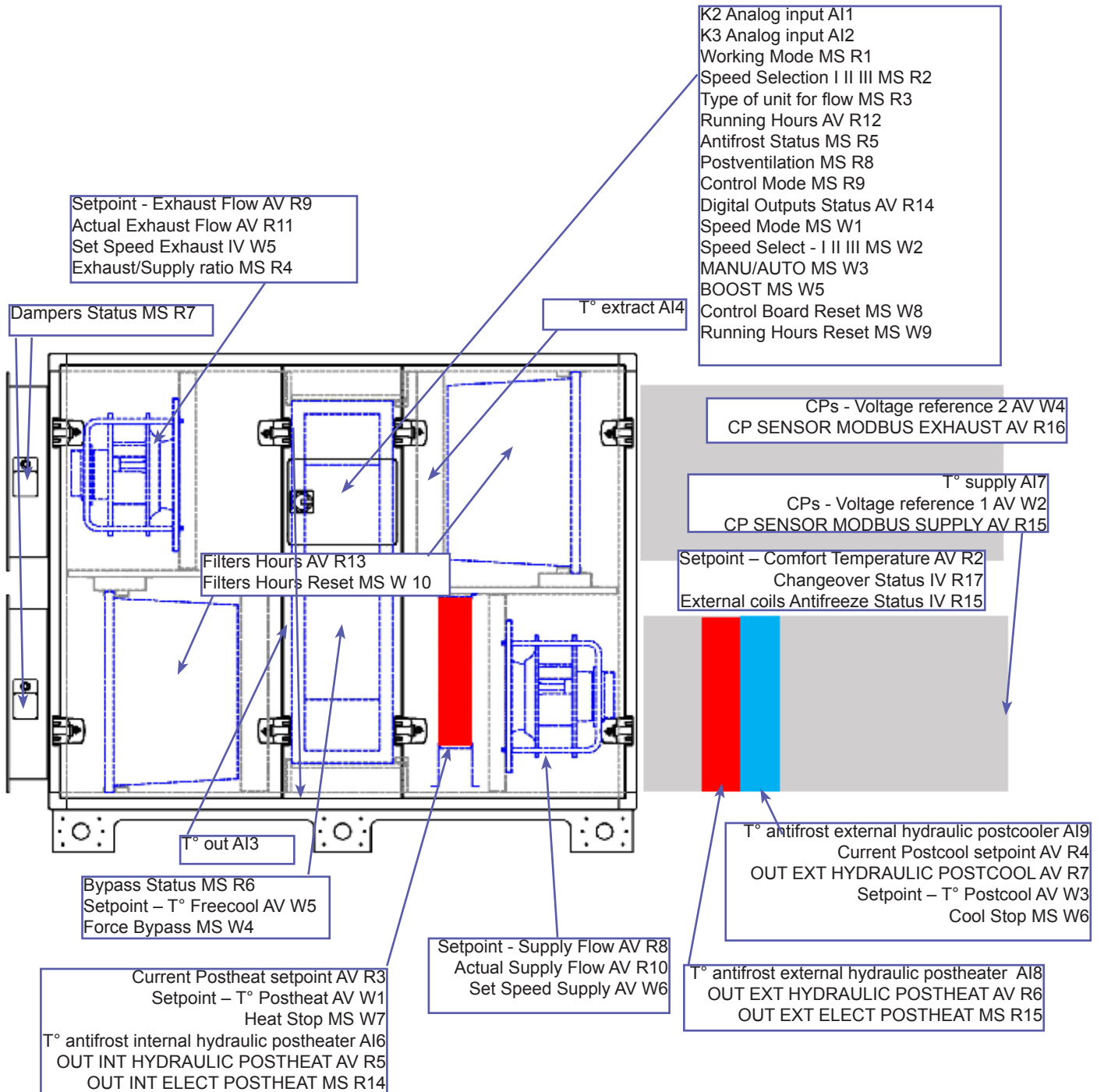
B.1 Overview

The function of each objects is shown here bellow for each unit type, GLOBAL/ESENSA PX (double flow unit with plate heat exchanger), GLOBAL/ESENSA RX (double flow unit with rotor heat exchanger) or GLOBAL SD (single flow unit).

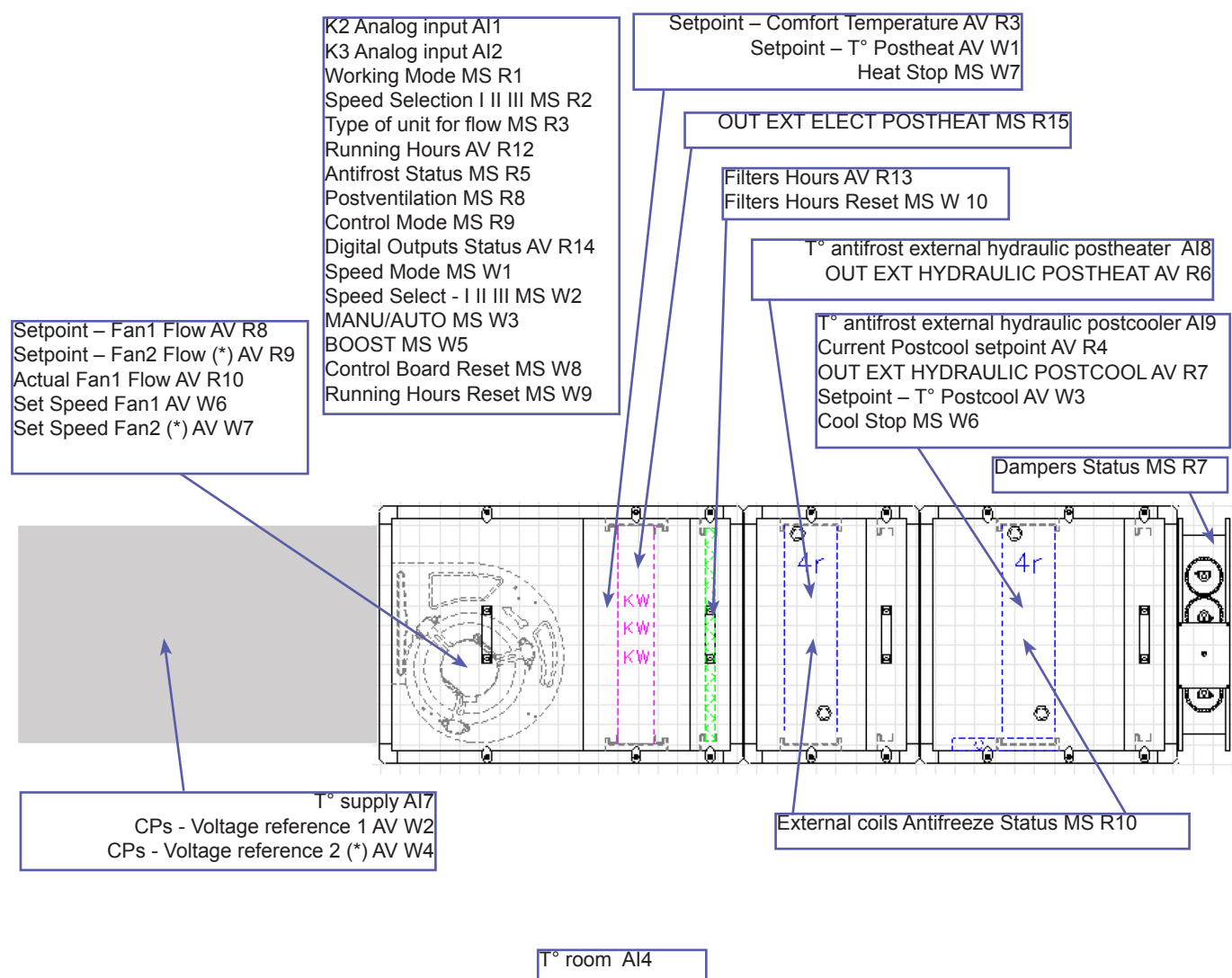
B.1.1 BACnet Object on GLOBAL/ESENSA PX



B.1.2 BACnet Object on GLOBAL/ESENSA RX



B.1.3 BACnet Object on GLOBAL SD



*Only when 2 fans are used

B.2 BACnet objects tables

Here follows the description of the BACnet objects divided into tables with same data type.



At each object row description, a cross marked on PX, RX or SD indicates that the corresponding unit type does not use this specific object.

B.2.1 Analogue Input (RO): AI

Object Instance	Object Name	Min/Max
1	K2 Analog input	0-10,0 [V]
PX RX SD	Analog input on K2 contact	
2	K3 Analog input	0-10,0 [V]
PX RX SD	Analog input on K3 contact	
3	T° out	-99,9-99,9 [°C]
PX RX SD	Outside temperature measured on T1 sensor (-999=open, +999=short circuit)	
4	T° extract/room	-99,9-99,9 [°C]
PX RX SD	Extract/room temperature measured on T2 sensor (-999=open, +999=short circuit)	
5	T° exhaust	-99,9-99,9 [°C]
PX RX SD	Exhaust temperature measured on T3 sensor (-999=open, +999=short circuit)	
6	T° antifrost internal hydraulic postheater (only used on TAC5)	-99,9-99,9 [°C]
PX RX SD	Temperature for the antifrost protection of the hydraulic postheater inside the unit measured on T4 (TAC5) sensor (-999=open, +999=short)	
7	T° supply	-99,9-99,9 [°C]
PX RX SD	Supply temperature measured on T5 sensor (-999=open, +999=short)	
8	T° antifrost internal (TAC6)/external hydraulic postheater	-99,9-99,9 [°C]
PX RX SD	Temperature for the antifrost protection of the hydraulic postheater internal (TAC6)/external to the unit measured on T7 sensor (-999=open, +999=short)	
9	T° antifrost external hydraulic postcooler or reversible coil (TAC6)	-99,9-99,9 [°C]
PX RX SD	Temperature for the antifrost protection of the hydraulic postcooler or reversible coil (TAC6) external to the unit measured on T8 sensor (-999=open, +999=short)	

B.2.2 Analogue Value (RO): AV R

Object Instance	Object Name	Min/Max
1	Setpoint – Preheat Temperature	-9,9-9,9 [°C]
PX  SD	Preheat T° setpoint	
2	Setpoint – Comfort Temperature	0,1-99,9 [°C]
PX RX SD	Current Comfort T° setpoint (KWout/NV/BA+/BA-) (0=OFF)	
3	Current Postheat setpoint	0,1-99,9 [°C]
PX RX SD	Current Postheat setpoint (KWout/NV/BA+/KWext) (0=OFF)	
4	Current Postcool setpoint	0,1-99,9 [°C]
PX RX SD	Current PostCooling setpoint (BA-) (0=OFF)	
5	OUT INT HYDRAULIC POSTHEAT	0-10,0 [V]
PX RX 	Output for the power control of the hydraulic postheater inside the unit	
6	OUT EXT HYDRAULIC POSTHEAT	0-10,0 [V]
PX RX SD	Output for the power control of the hydraulic postheater external to the unit	
7	OUT EXT HYDRAULIC POSTCOOL/REVERSIBLE (TAC6)	0-10,0 [V]
PX RX SD	Output for the power control of the hydraulic postcooler external to the unit	
8	Setpoint - Supply Flow. <i>Note for SD units: the supply fan corresponds to fan1.</i>	0-99999
PX RX SD	Current setpoint for the supply fan (unit defined in object "Type of unit for flow"). <i>Note for SD units: the supply fan corresponds to fan1.</i>	
9	Setpoint - Exhaust Flow <i>Note for SD units: the exhaust fan corresponds to fan2, if present.</i>	0-99999
PX RX SD	Current setpoint for the exhaust fan (unit defined in object "Type of unit for flow"). <i>Note for SD units: the exhaust fan corresponds to fan2, if present.</i>	
10	Actual Supply Flow. <i>Note for SD units: the supply fan corresponds to fan1.</i>	0-99999
PX RX SD	Actual Supply Flow (unit defined in object "Type of unit for flow"). <i>Note for SD units: the supply fan corresponds to fan1.</i>	
11	Actual Exhaust Flow. <i>Note for SD units: the exhaust fan corresponds to fan2, if present.</i>	0-99999
PX RX SD	Actual Exhaust Flow (unit defined in object "Type of unit for flow"). <i>Note for SD units: the exhaust fan corresponds to fan2, if present.</i>	
12	Running Hours	0-999999 [H]
PX RX SD	Run time, working hours	
13	Filters Hours	0-999999 [H]
PX RX SD	Filters alarm: hours count	

Object Instance	Object Name	Min/Max
14	Digital Outputs Status	0-65536
PX RX SD	Contains a bit for each status associated to a digital output: "Default alarm" : bit 0 "HEAT OR COOL indication": bit 1 on TAC7, excepted GLOBAL LP models, in case on heat pump/chiller. "COOL indication": bit 2 On TAC7, excepted GLOBAL LP models, in case on heat pump/chiller. For the others status, consider a shift of 1 bit position on TAC7 respect to TAC5 (GLOBAL SD) "pressure alarm": bit 7 ON TAC7 ; bit 6 on TAC5 (GLOBAL SD) "fan on": bit 8 ON TAC7 ; bit 7 on TAC5 (GLOBAL SD) "circulator for heating hydraulic battery": bit 9 ON TAC7 ; bit 8 on TAC5 (GLOBAL SD) "bypass on": bit 10 ON TAC7 ; bit 9 on TAC5 (GLOBAL SD) "circulator for cooling hydraulic battery": bit 10 ON TAC7 ; bit 6 on TAC5 (GLOBAL SD)	
15	CP SENSOR MODBUS SUPPLY	0-9999 [Pa]
PX RX SD	Pressure measured by the Modbus sensor located on the supply duct	
16	CP SENSOR MODBUS EXHAUST	0-9999 [Pa]
PX RX SD	Pressure measured by the Modbus sensor located on the exhaust duct	
17	Clock: seconds	0-59 [sec.]
PX RX SD	Current seconds of the control board clock	
18	Clock: minutes	0-59 [min.]
PX RX SD	Current minutes of the control board clock	
19	Clock: hours	0-23 [H]
PX RX SD	Current hours of the control board clock	
20	Clock: day	1-31 [day]
PX RX SD	Current day of week of the control board clock	
21	Clock: month	1-12 [month]
PX RX SD	Current month of the control board clock	
22	Clock: year	2000-9999
PX RX SD	Current year of the control board clock	

B.2.3 Analogue Value (RO): MS R

Object Instance	Object Name	Min/Max
1	Working Mode	0-9
PX RX SD	Current Working mode (0=OFF 1=CA 2=LS 3=CPf 4=CPs (5=CAs) 6=TQ 9=InitPa)	
2	Speed Selection I II III	0-3
PX RX SD	Current speed (0=STOP 1=LOW/I 2=MEDIUM/II 3=HIGH/III)	
3	Type of unit for flow	0-4
PX RX SD	Current main Setpoint unit (0= m3/h 1=Pa 2=0,1V 3=torque% 4=l/s)	
4	Exhaust/Supply ratio. <i>Note for SD units: the exhaust fan corresponds to fan1 and the exhaust fan corresponds to fan2, if present.</i>	5-127
PX RX SD	% (F3F4/F1F2) for PX, RX; %F2/F1 for SD.	
5	Antifrost Status	0-2
PX RX SD	0=OFF 1=REC ON 2=NV ON	
6	Bypass Status	0-2
PX RX SD	0=CLOSED/OFF 1=OPEN/ON 2=PARTIALLY OPEN	
7	Dampers Status	0-15
PX RX SD	0=CLOSED, 1=OPENING, 2=OPEN. The other status values are to be considered only for TAC7 models (damper 1 is dedicated to supply and 2 for exhaust): 3=CLOSING;4=OPENING1 CLOSE2;5=OPEN1 CLOSE2; 6=CLOSING1 CLOSE2;7=CLOSE1 OPENING2;8=OPEN1 OPENING2;9=CLOSING1 OPENING2;10=CLOSE1 OPEN2;11=OPENING1 OPEN2;12=CLOSING1 OPEN2;13=CLOSE1 CLOSING2;14=OPENING1 CLOSING2;15=OPEN1 CLOSING2	
8	Postventilation	0-1
PX RX SD	Post ventilation status (0=NO 1=YES)	
9	Control Mode	0-10
PX RX SD	Control by (1=ERROR 2=FIREALARM 3=VIEWER 4=CBR 5=VIEWSCHEG 6=MBSCHED 7=MB40201 8=BYPASS 9=BOOST 10=MB40204). <u>Can be used to check whether the unit is in alarm (then value will be 1, or 2 if fire alarm).</u>	
10	External Batteries Antifreeze Status	0-3
PX RX SD	BA+ BA- Antifreeze status (0=OFF, 1=BA+ ON or BA+/- ON, 2=BA- ON, 3=BA+ and BA- ON)	
11	Changeover Status	0-1
PX RX SD	Automatic changeover between heating and cooling (0=inactive, 1=heating, 2=cooling)	
12	Defrost Status	0-2
PX RX SD	0=IDLE, 1=ACTIVE, 2=STOP to drain water	

Object Instance	Object Name	Min/Max
13	OUT INT ELECT PREHEAT	0-100
PX 	Output percentage for the power control of the electrical preheater	
14	OUT INT ELECT POSTHEAT	0-100
PX RX 	Output percentage for the power control of the electrical postheater inside the unit	
15	OUT EXT ELECT POSTHEAT	0-100
PX RX SD	Output percentage for the power control of the electrical postheater external to the unit	

B.2.4 Analogue Value (R/W): AV W

Object Instance	Object Name	Min/Max
1	Setpoint – T° Postheat	0-99,9 [°C]
PX RX SD	Postheating T° setpoint (0=OFF)	
2	CPs - Pressure reference 1 N.B.: for TAC5, the value is in 0,1 V instead of Pa	0-999 [Pa]
PX RX SD	CPs mode: setpoint voltage for [CPs on SUP] or [CPs on EXH] <u>Apply the corresponding pressure reference value obtained during initialization for normal working</u>	
3	Setpoint – T° Postcool	0-99,9 [°C]
PX RX SD	Postcooling T° setpoint (0=OFF)	
4	CPs - Pressure reference 2 N.B.: for TAC5, the value is in 0,1 V instead of Pa	0-999 [Pa]
PX RX SD	CPs mode: setpoint pressure for [CPs on SUP + EXH] <u>Apply the corresponding pressure reference value obtained during initialization for normal working</u> N.B.: for TAC5, the value is in 0,1 V instead of Pa	
5	Setpoint – T° Freecool	0-99,9 [°C]
PX RX 	Freecooling T° setpoint (0=OFF)	
6	Set Speed Supply. Note for SD units: the supply fan corresponds to fan1.	0-99999
PX RX SD	Set supply Flow (m3/h or l/s) or Torque (%). Note for SD units: the supply fan corresponds to fan1. <u>To use this object, Speed mode must be set to 3 (see object 1 in table Integer Value (R/W): MS W)</u>	
7	Set Speed Exhaust. Note for SD units: the exhaust fan corresponds to fan2, if present.	0-99999
PX RX SD	Set exhaust Flow (m3/h or l/s) or Torque (%). Note for SD units: the exhaust fan corresponds to fan2, if present. <u>To use this object, Speed mode must be set to 3 (see object 1 in table Integer Value (R/W): MS W)</u>	

B.2.5 Analogue Value (R/W): MS W

Object Instance	Object Name	Min/Max
1	Speed Mode	0-3
PX RX SD	Communication determines speed (0=NO 1=Predefined Speed I-II-III 2=TIMETABLE 3=set values in objects). Select 1 to use in combination with Speed Select (See object 2 here below) Select 3 to use in combination with Set supply/ Exhaust Flow (See object 6&7 respectively in table Analogue Value (R/W): AV W)	
2	Speed Select - I II III. To use this object, Speed mode must be set to 1 (see object 1 here above)	0-3
PX RX SD	Selection of predefined speed (0=OFF 1=LOW 2=MEDIUM 3=HIGH)	
3	MANU/AUTO	0-1
PX RX SD	MANUAL/AUTO mode (0=MANUAL 1=AUTO/Time scheduler)	
4	Force Bypass	0-2
PX RX SD	Override: force bypass ON or OFF, 0=normal, 1=force_on, 2=force_off	
5	BOOST	0-1
PX RX SD	Force boost mode, 0/1	
6	Cool Stop	0-1
PX RX SD	Override: force cooling to stop if set to 1. Note that cooling will start if this object is set to 0 and if Heat Stop object is set to 1.	
7	Heat Stop	0-1
PX RX SD	Override: force heating to stop if set to 1.	
8	Control Board Reset	0-1
PX RX SD	Do RESET of controller, clear alarms (0=NO, 1=RESET). Autoreset on the control board, so it is necessary to put back value 0 after a few seconds to avoid continuous reset.	
9	Running Hours Reset	0-1
PX RX SD	Do reset of run time, working hours (0=NO, 1=RESET). Autoreset on the control board, so it is necessary to put back value 0 after a few seconds to avoid continuous reset.	
10	Filters Hours Reset	0-1
PX RX SD	Do reset of filters hours (0=NO, 1=RESET). Autoreset on the control board, so it is necessary to put back value 0 after a few seconds to avoid continuous reset.	