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BAS Integration guide

BACnet®protocol

Doc. Name:
D-EIGOC00103-23_01EN_EWAD/H_EWFD/H -T/MZD

Product Name:
EWAD/H-T/MZD & EWFD/H-T/MZD

Control software name:
ETRA / OMEGA

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1. Introduction

This document contains information to incorporate a MicroTech® III and Microtech 4 Unit Controllers into a building automation system (BAS) via BACnet® communication protocol.

Microtech III and Microtech 4 are suitable for network integration. Data points accessible from a BACnet® network are made available to a BAS provided that the proper communication module (Microtech III and Microtech 4) or the corresponding software option (Microtech 4) are installed / activated.

Communication settings and the BACnet® properties with corresponding controller data points are described.
BACnet® terms are not defined. Refer to the respective specifications for definitions and details.

2. About this document

2.1 Revision History

Version	Date	Software Version	Description
D-EIGOC00103-22EN_EWAD-TZD	12/2023	ETRA / OMEGA	First version released

2.2 Notice

2.3 Before starting

Application range

This document refers to the following components:

Microtech 4	Controller
POL908.00/STD	BACnet IP module
POL904.00/STD	BACnet MS/TP module

Users

Users of this document are intended to be:

- BACnet systems integrators
- Service Technicians
- Plant Engineers
- Sales staff

Conventions

Microtech 4 further in this document when proper will be referred to as “Microtech”

Abbreviation

BACnet	**B**uilding **A**utomation and **C**ontrol **Net**work
BSP	**B**oard **S**upport **P**ackage (operating system)

References

- ANSI/ ASHRAE 135-2004. “**BACnet** – A Data Communication Protocol for Building Automation and Control Networks”. American Society of Heating, Refrigerating and Air-Conditioning Engineers – www.ashrae.org.
- Siemens Building Technologies – CB1P3933en – **BACnet** communication modules

3. Safety information

Only personnel qualified in accordance with IEC (International Electrotechnical Commission) recommendations may be permitted access to electrical components. It is particularly recommended that all sources of electricity to the unit be shut off before any work is begun. Shut off main power supply at the main circuit breaker or isolator.

IMPORTANT: This equipment uses and emits electromagnetic signals. Tests have shown that the equipment conforms to all applicable codes with respect to electromagnetic compatibility.

	**RISK OF ELECTROCUTION: Even when the main circuit breaker or isolator is switched off, certain circuits may still be energized, since they may be connected to a separate power source.**
	**RISK OF BURNS: Electrical currents cause components to get hot either temporarily or permanently. Handle power cable, electrical cables and conduits, terminal box covers and motor frames with great care.**

Field of application		Use BACnet communication modules only for control and monitoring functions in ventilation, air conditioning and refrigeration plants.
Intended use		Trouble-free and safe product operation of the above products presupposes transport, storage, mounting, installation, and commissioning as intended as well as careful operation.
Electrical installation		Fuses, switches, wiring and grounding must comply with local safety regulations for electrical installations.
Wiring		When wiring, strictly separate AC 230 V mains voltage from AC 24 V safety extralow voltage (SELV) to protect against electrical shock!
Commissioning and maintenance		Only qualified staff trained accordingly may prepare for use, commission, and maintain BACnet communication modules. Maintenance of BACnet communication modules generally only means regular cleaning. We recommend removing dust and dirt from system components installed in the control panels during standard service.
Faults		Only authorized staff may diagnose and correct faults and recommission the plant. This applies to working within the panel as well (e.g. testing or changing fuses).
Storage and transport		Refer to the environmental conditions specified in the respective data sheets for storage and transport. If in doubt, contact your supplier.
Disposal		Devices contain electrical and electronic components; do not dispose of them in household garbage. Observe all local and applicable laws.

4. Commission this unit in a BACnet network

4.1 General information

Compatibility

The Microtech controllers are tested according to the BACnet Testing Laboratory (BTL) Test Plan. They are designed to meet the requirements of the BACnet Standard as stated in the Protocol Implementation and Conformance Statement (PICS). However, they are not BTL listed. The PICS is located at the end of the present document.

Unit controller

Microtech 4 controller can be integrated in an interoperable BACnet network provided one of the followings:

a) it is equipped with the proper communication module
b) the onboard communication has been made available (software option).

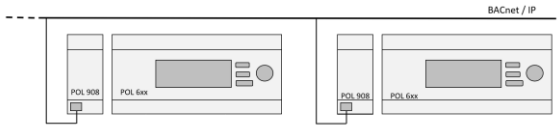
Communication modules

Available communication modules to configure Microtech controllers in BACnet network are:

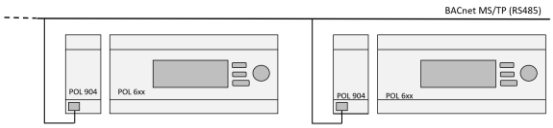
1. **BACnet/IP** (dedicated network or shared Ethernet LAN)
2. **BACnet MS/TP** (Master/Slave Token Passing).

Both communication modules comply with the standardized profile for BACnet equipment **(B-AAC BACnet Advanced Application Controller).**

BACnet/IP (POL908)



BACnet MS/TP (POL904)



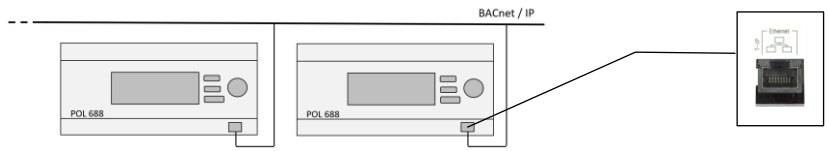
Communication software option

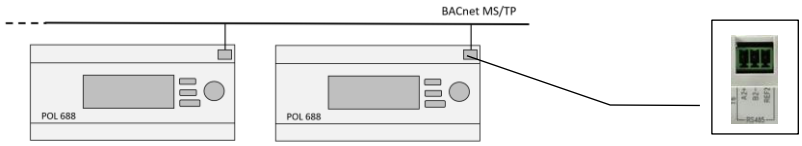
For Microtech 4, BACnet communication is also available 6nboard the controller as a software option.

1. **BACnet/IP** (dedicated network or shared Ethernet LAN)
2. **BACnet MS/TP** (Master/Slave Token Passing).

Both communication options comply with the standardized profile for BACnet equipment **(B-AAC BACnet Advanced Application Controller).**

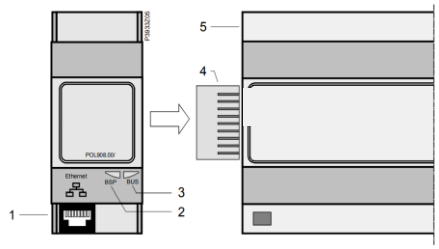
BACnet/IP



BACnet MS/TP	

4.2 BACnet IP module (POL908)

Module description



Part	Description
1	Ethernet interface 10/100 Mbit (IEEE 802.3U), RJ45 plug, 8-pin.
2	Status display “BSP” (Board Support Package).
3	Status display “BUS” (bus connections / bus traffic o.k.).
4	Plug connection “Communication extension bus”.
5	Microtech controller.

BSP Led

Color	Flashing frequency	Meaning
Green	Steady on	BSP operating and communication with controller working.
Yellow	Steady on	BSP operating, but no communication with controller.
Red	Steady on	Hardware fault.
Red/Yellow	Flashing at 1 Hz (1 second on/ 1 second off)	Upgrade mode running.
Red	Flashing at 2 Hz (0,5 second on/ 0,5 second off)	BSP error (software error).

BUS Led

Color	Flashing frequency	Meaning
Green	Steady on	Communication active.
Yellow	Steady on	Initializing
Red	Steady on	Communication interrupted.

Module connection

Step	Action
1	Power off the controller
2	Connect POL908 module to the controller via plug connection (part 4).
3	Connect the TCP/IP bus cable to the POL908.
4	Power on the controller

Configuration

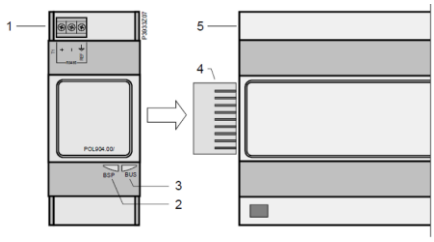
Step	Action
1	Check that BUS led status is steady on green coloured.
2	Navigate the unit’s keypad/display to the main menu page and set the “service” password
3	Navigate the unit’s keypad/display following the path below: **Main menu→Commissioning→BACNetIP Setup**
4	Set parameters in the table below as needed according to the local network

Parameter	Default value
Device Instance	1
UDP Port Number	47808 (BAC0)
DHCP(1)	OFF
Given IP Address[2]	127.0.0.1
Given IP Subnet Mask[2]	255.255.255.000
Given Gateway Address[2]	127.0.0.1

		Unit Support	English
		NC Dev 1	0
		NC Dev 2	0
		(1) Verify whether DHCP should or should not be enabled. If not, obtain the IP Subnet Mask of the shared network from the network administrator. Then, obtain static IP Addresses for all MicroTech Unit Controllers you are integrating into the shared network. Finally, obtain the address of an IP Router to use for sending IP messages to and from the BACnet IP subnets. (2) These addresses are used if DHCP (Dynamic Host Configuration Property) is set to Off. For changes to these parameters to take effect, use the keypad/display and set Apply Changes on the BACnet IP Setup menu to Yes. This will cause the power on the unit controller to reset.	

4.3 BACnet MS/TP module (POL904.00/STD)

Module description



Part	Description
1	Interface RS485, plug-in terminals with screw/terminal connections.
2	Status display “BSP” (Board Support Package).
3	Status display “BUS” (bus connections / bus traffic o.k.).
4	Plug connection “Communication extension bus”.
5	Microtech controller.

BSP Led

Color	Flashing frequency	Meaning
Green	Steady on	BSP operating and communication with controller working.
Yellow	Steady on	BSP operating, but no communication with controller.
Red	Steady on	Hardware fault.
Red/Yellow	Flashing at 1 Hz (1 second on/ 1 second off)	Upgrade mode running.
Red	Flashing at 2 Hz (0,5 second on/ 0,5 second off)	BSP error (software error).

BUS Led

Color	Flashing frequency	Meaning
Green	Steady on	Communication active.
Yellow	Steady on	Initializing
Red	Steady on	Communication interrupted.

Module connection

Step	Action
1	Power off the controller
2	Connect POL904 module to the controller via plug connection (part 4).
3	Connect the TCP/IP bus cable to the POL908.
4	Power on the controller

Configuration procedure

Step	Action
1	Check that BUS led status is steady on green coloured.
2	Navigate the unit’s keypad/display to the main menu page and set the “service” password
3	Navigate the unit’s keypad/display following the path below: **Main menu→Commissioning→BACnetMSTP Setup**
4	Set parameters in the table below as needed according to the local network

Configuration parameters

Parameter	Default value	Notes
Device Instance	variable	The last 8 digits are computed from the production number and date code.
MSTP Address	24 (0x18)	Cycle power after changing it for the changes to take effect.
Baud Rate	38400	**Baud rate** / **Number of devices** 76800 / 64 38400 / 32 19200 and lower / Value not recommended
Max Master	127	Recommended value is the number of MS/TP devices (device address) + 1
Max Info Frames	1	1, unless device generates high-priority events (alarm, COV, client functionality).
Unit Support	English	

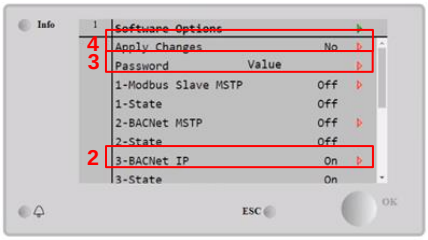
4.4 BACnet / IP software option

Option enabling

1. From the HMI main menu choose:

Commissioning→ Configuration→ Software Options

2. Select “On” for option #3-BACNet IP
3. Insert the unlock password
4. Apply Changes

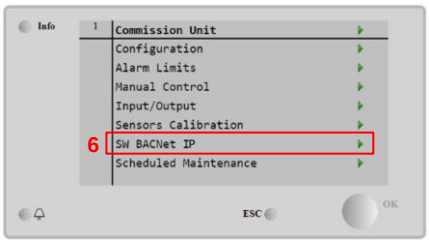


Option configuration

5. From the HMI main menu choose:

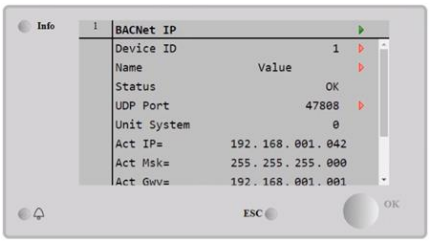
Commissioning

6. Select “SW BACNet IP”

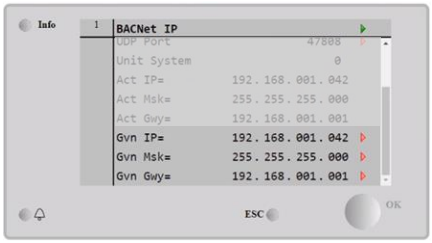


7. Select proper parameters for BACNet IP communication

Parameter	Default value
Device Instance	1
UDP Port Number	47808 (BAC0)
DHCP(1)	OFF
Given IP Address[2]	127.0.0.1
Given IP Subnet Mask[2]	255.255.255.000
Given Gateway Address[2]	127.0.0.1
Unit Support	English
NC Dev 1	0
NC Dev 2	0



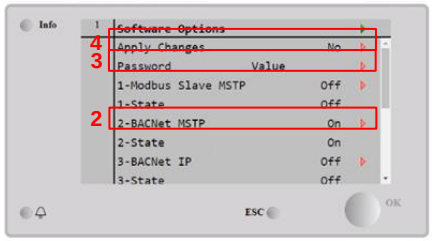
(1) Verify whether DHCP should or should not be enabled. If not, obtain the IP Subnet Mask of the shared network from the network administrator. Then, obtain static IP Addresses for all MicroTech 4 Unit Controllers you are integrating into the shared network. Finally, obtain the address of an IP Router to use for sending IP messages to and from the BACnet IP subnets.

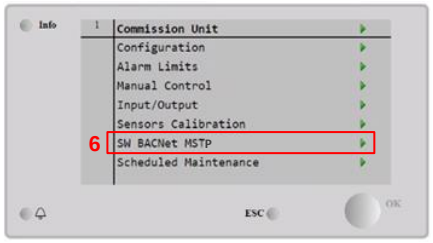


(2) These addresses are used if DHCP (Dynamic Host Configuration Property) is set to Off. For changes to these parameters to take effect, use the keypad/display and set Apply Changes on the BACnet IP Setup menu to Yes. This will cause the power on the unit controller to reset.

4.5 BACnet MS/TP software option

<table>
<tr><td rowspan="2">Option enabling</td><td></td><td>1. From the HMI main menu choose:</td><td></td></tr>
<tr><td></td><td>Commissioning→ Configuration→ Software Options

2. Select “On” for option #2-BACNet MSTP
3. Insert the unlock password
4. Apply Changes</td><td> 
</td></tr>
<tr><td rowspan="2">Option configuration</td><td></td><td>5. From the HMI main menu choose:</td><td></td></tr>
<tr><td></td><td>Commissioning

6. Select “SW BACNet MSTP”</td><td> 
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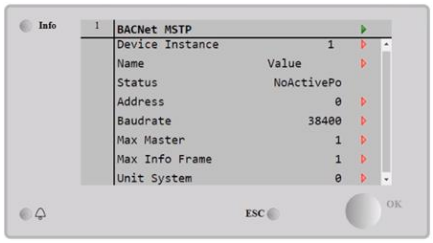
<tr><td></td><td></td><td>7. Select proper parameters for BACNet MSTP communication.</td><td> 
</td></tr>
<tr><td></td><td></td><td colspan="2">
<table>
<tr><th>Parameter</th><th>Default value</th><th colspan="2">Notes</th></tr>
<tr><td>Device Instance</td><td>variable</td><td colspan="2">-</td></tr>
<tr><td>Address</td><td>0</td><td colspan="2">MSTP Address</td></tr>
<tr><td rowspan="4">Baud Rate</td><td rowspan="4">38400</td><td>Baud rate</td><td>Number of devices</td></tr>
<tr><td>76800</td><td>64</td></tr>
<tr><td>38400</td><td>32</td></tr>
<tr><td>19200 and lower</td><td>Value not recommended</td></tr>
<tr><td>Max Master</td><td>1</td><td colspan="2">Recommended value is the number of MS/TP devices (device address) + 1</td></tr>
<tr><td>Max Info Frames</td><td>1</td><td colspan="2">1, unless device generates high-priority events (alarm, COV, client functionality).</td></tr>
</table>
</td></tr>
</table>

5. BACnet integration list

Description	Type	Name	Instance	Range	Read/ Write
Unit - Control Source	BI	3	CtrlSource	0 Network 1 Local	R
Unit - Enabled State	BI	7	EnableOutput	0 Disabled 1 Enabled	R
Unit - Run Allowed	BI	5	RunEnabled	0 Off 1 Allowed	R
Unit - Capacity Limited	BI	6	UnitLimited	0 NotLimited 1 Limited	R
Unit - Alarm Output	BI	10	AlarmOutput	0 NoAlarm 1 Alarm	R
Evaporator - Water Flow State	BI	2	EvapWFlowState	0 NoFlow 1 Flow	R
Unit - Operating State	BI	4	UnitOnOff	0 ThermoOff 1 ThermoOn	R
Unit - Enable Setpoint	BV	2	UnitEnableStp	0 Disable 1 Enable	W
Unit - Alarm Reset Setpoint	BV	8	ClearAlarm	0 None 1 Clear	W
Unit - Active Operation Mode	MV_RED	2	ActMode	1 Ice 2 Cool 3 Heat	R
Unit - Active Temperature Setpoint	AV_RED	5	ActTempStp	°C	R

Description	Type	Name	Instance	Range	Read/ Write
Unit - Actual Capacity	AV_RED	2	ActCapacity	%	R
Unit - Active Capacity Limit	AV_RED	1	ActCapacityLim	%	R
Unit - Status	MV_RED	1	UnitStatus	1 Off 2 Start 3 Run 4 PreShutdown 5 Service	R
Evaporator Entering Water Temperature	AI	1	EvapEntWTemp	°C	R
Evaporator Leaving Water Temperature	AI	2	EvapLvgWTemp	°C	R
Heat Recovery - Enable Setpoint	BV	7	HeatRec'EnableStp	0 Disable 1 Enable	W
Heat Recovery - Entering Water Temperature	AI	177	HeatRec'EntWTemp	°C	R
Heat Recovery - Leaving Water Temperature	AI	150	HeatRec'LvgWTemp	°C	R
Outside Air Temperature	AI	5	OutdoorAirTemp	°C	R
Unit - Average Current	AI	993	AvgCurrent	A	R
Unit - Average Voltage	AV_RED	992	AvgVoltage	V	R
Unit - Active Power	AV_RED	994	ActPower	kW	R
Unit Alarm - Warning Index	AV_RED	902	AVWarningAlarm	0….65534	R
Unit Alarm - Problem Index	AV_RED	900	AVProblemAlarm	0….65534	R
Unit Alarm - Fault Index	AV_RED	901	AVFaultAlarm	0….65534	R
Unit Alarm - Warning Code	AV_RED	903	AVWarningAlarmCode	0….65534	R
Unit Alarm - Problem Code	AV_RED	904	AVProblemAlarmCode	0….65534	R
Unit Alarm - Fault Code	AV_RED	905	AVFaultAlarmCode	0….65534	R

Description	Type	Name	Instance	Range	Read/ Write
Unit - Operation Mode Setpoint	MV	3	UnitModeSetpointNetwork	0 NULL 1 Ice 2 Cool 3 Heat	W
Unit - Cool Temperature Setpoint	AV	4	NetworkCoolTempSetpoint	°C	W
Unit - Ice Temperature Setpoint	AV	7	NetworkIceTempSetpoint	°C	W
Unit - Heat Temperature Setpoint	AV	6	NetworkHeatTempSetpoint	°C	W
Unit - Capacity Limit Setpoint	AV	3	NetworkCapacityLimitSetpoint	%	W
Circuit 1 - Condenser Refrigerant Pressure	AI	99	C1'CondRefPressure	kPa	R
Circuit 1 - Condeser Saturated Temperature	AV_RED	34	C1'CondSatRefTemp	°C	R
Circuit 1 - Evaporator Refrigerant Pressure	AI	141	C1'EvapRefPressure	kPa	R
Circuit 1 - Evaporator Saturated Temperature	AV_RED	68	C1'EvapSatRefTemp	°C	R
Circuit 2 - Condenser Refrigerant Pressure	AI	100	C2'CondRefPressure	kPa	R
Circuit 2 - Condeser Saturated Temperature	AV_RED	35	C2'CondSatRefTemp	°C	R
Circuit 2 - Evaporator Refrigerant Pressure	AI	142	C2'EvapRefPressure	kPa	R
Circuit 2 - Evaporator Saturated Temperature	AV_RED	69	C2'EvapSatRefTemp	°C	R
Circuit 1 - Shutdown Alarm	MV_RED	51	C1'ShutdownAlm	1 NoAlarm 2 Alarm	R
Circuit 2 - Shutdown Alarm	MV_RED	52	C2'ShutdownAlm	1 NoAlarm 2 Alarm	R
Unit - Shutdown Alarm	MV_RED	54	U'ShutAlm	1 NoAlarm 2 Alarm	R
Heat Recovery - Temperature Setpoint	AV	49	NetworkHeatRecSetpoint	°C	W
Heat Recovery - Operating State	MV_RED	42	HeatRec'State	1 Off 2 Recirculation 3 Regulation	R

Description	Type	Name	Instance	Range	Read/ Write
Circ 1 Compressor 1 - Suction Temperature	AI	105	C1'Comp1'SuctTemp	°C	R
Circ 1 Compressor 1 - Discharge Temperature	AI	63	C1'Comp1'DischTemp	°C	R
Circ 1 Compressor 1 - RLA Percentage	AV_RED	8	C1'Comp1'RLAPercent	%	R
Circ 1 Compressor 1 - Current	AI	9	C1'Comp1'Current	A	R
Circ 1 Compressor 1 - Power	AV_RED	45	C1'Comp1'Power	kW	R
Circ 1 Compressor 1 - Number of Starts	AV_RED	92	C1'Comp1'Starts	-	W
Circ 1 Compressor 1 - Number of Running Hours	AV_RED	74	C1'Comp1'RunHours	h	W
Circ 2 Compressor 1 - Suction Temperature	AI	108	C2'Comp1'SuctTemp	°C	R
Circ 2 Compressor 1 - Discharge Temperature	AI	66	C2'Comp1'DischTemp	°C	R
Circ 2 Compressor 1 - RLA Percentage	AV_RED	11	C2'Comp1'RLAPercent	%	R
Circ 2 Compressor 1 - Current	AI	12	C2'Comp1'Current	A	R
Circ 2 Compressor 1 - Power	AV_RED	48	C2'Comp1'Power	kW	R
Circ 2 Compressor 1 - Number of Starts	AV_RED	95	C2'Comp1'Starts	-	W
Circ 2 Compressor 1 - Number of Running Hours	AV_RED	77	C2'Comp1'Hours	h	W
Freecooling - Enable Setpoint	BV	28	Freecool'EnableStp	0 Disable 1 Enable	W
Freecooling - Status	MV_RED	31	Freecool'Status	1 Unit Off 2 FC Full 3 FC Mix 4 Mech	R
Freeccoling - Enabled State	MV_RED	32	Freecool'Enabled	1 No 2 Yes	R
AntiVacuum Protection State	BV	258	AntivacSta	0 No 1 Yes	R
Performance - Unit Thermal Capacity	AV_RED	260	ThermCapacity	kW	R

Description	Type	Name	Instance	Range	Read/ Write
Performance - Unit Power Input	AV_RED	262	ElectPower	kW	R
Performance - Unit Efficiency	AV_RED	264	EER	-	R
Performance - Unit Integrated Efficiency	AV_RED	265	integralEER	-	R
Performance - Unit Thermal Energy	AV_RED	261	ThermEnergy	MWh	R
Performance - Unit Electrical Energy	AV_RED	263	ElectEnergy	MWh	R
Performance - Freecooling Thermal Capacity	AV_RED	273	FreecoolThermCap	kW	R
Performance - Mechanical Thermal Capacity	AV_RED	275	MechThermCap	kW	R
Performance - Percentage of Freecooling Capacity	AV_RED	277	FreecoolCapPerc	%	R
Evaporator Pump - Speed	AV_RED	296	EvapPump'Speed	%	R
Evaporator Pump 1 - Number of Running Hours	AV_RED	112	EvapPump1'RunHours	-	R
Evaporator Pump 1 - Operating State	BI	8	EvapPump1'State	0 Stop 1 Run	R
Evaporator Pump 2 - Number of Running Hours	AV_RED	113	EvapPump2'RunHours	-	R
Evaporator Pump 2 - Operating State	BI	9	EvapPump2'State	0 Stop 1 Run	R
Evaporator Pump - Electrical Power	AV	310	EvapPump'ElectPwr	kW	R
Evaporator Differential Pressure	AV	312	EvapDifPres	kPa	R
Evaporator Estimated Water Flow	AV	314	EvaporatorEstWaterFlow	kg/s	R
Evaporator Pump - Speed RPM	AV	322	EvapPump'ElectSpdRpm	rpm	R
Unit - BACnet Measurement unit setpoint	MV_RED	4	Units	1 Metric 2 English	W

Description	Type	Name	Instance	Range	Read/ Write
Unit - Model	MV_RED	317	UnitModel	1 Centrifugal 2 Water Cooled 3 Air Cooled 4 HeatPump 5 Reserved 6 Reserved 7 Reserved 8 Reserved 9 Other	R
Unit - Safety Mode Setpoint	MV_RED	318	SafetyModeSetpoint	0 Off 1 On	R
Unit - Safety Mode State	MV_RED	319	SafetyModeState	0 Off 1 On	R
Unit Alarm - Evaporator Entering Temperature Sensor Fault	BV	917	Unit'OFFEvapEntWTempFail	0 NoAlarm 1 Alarm	R
Unit Warning - Setpoint Reset Input Out of Range	BV	512	BadSetpointResetInput	0 NoAlarm 1 Alarm	R
Unit Warning - Demand Limit Input Out of Range	BV	513	BadDemandLimitInput	0 NoAlarm 1 Alarm	R
Circuit 1 Warning - Power Loss while Compressor Running	BV	529	C1'InhibitPwrLoss	0 NoAlarm 1 Alarm	R
Circuit 2 Warning - Power Loss while Compressor Running	BV	530	C2'InhibitPwrLoss	0 NoAlarm 1 Alarm	R
Unit Warning - Inhibition for Low Ambient Temperature	BV	533	Unit'InhibitOATLow	0 NoAlarm 1 Alarm	R

Description	Type	Name	Instance	Range	Read/ Write
Evaporator Pump 1 - Fault	BV	575	EvapPump1'Fault	0 NoAlarm 1 Alarm	R
Evaporator Pump 2 - Fault	BV	576	EvapPump2'Fault	0 NoAlarm 1 Alarm	R
Circ 1 Comp 1 Alarm - Low Pressure Ratio	BV	599	C1'Comp1'OFFPresRatioLow	0 NoAlarm 1 Alarm	R
Circ 2 Comp 1 Alarm - Low Pressure Ratio	BV	601	C2'Comp1'OFFPresRatioLow	0 NoAlarm 1 Alarm	R
Unit Alarm - Outside Air Temperature Sensor Fault	BV	605	Unit'OFFOATempSenFail	0 NoAlarm 1 Alarm	R
Circ 1 Comp 1 Alarm - High Motor Current	BV	606	C1'Comp1'OFFCurrentHi	0 NoAlarm 1 Alarm	R
Circ 2 Comp 1 Alarm - High Motor Current	BV	608	C2'Comp1'OFFCurrentHi	0 NoAlarm 1 Alarm	R
Circ 1 Comp 1 Alarm - High Motor Temperature	BV	637	C1'Comp1'OFFMotorTempHi	0 NoAlarm 1 Alarm	R
Circ 2 Comp 1 Alarm - High Motor Temperature	BV	639	C2'Comp1'OFFMotorTempHi	0 NoAlarm 1 Alarm	R
Circuit 1 Alarm - Condenser Pressure Sensor Fault	BV	668	C1'OFFCondPresFail	0 NoAlarm 1 Alarm	R
Circuit 2 Alarm - Condenser Pressure Sensor Fault	BV	670	C2'OFFCondPresFail	0 NoAlarm 1 Alarm	R
Circuit 1 Alarm - Condenser High Pressure	BV	676	C1'OFFCondPresHi	0 NoAlarm 1 Alarm	R

Description	Type	Name	Instance	Range	Read/ Write
Circuit 2 Alarm - Condenser High Pressure	BV	678	C2'OFFCondPresHi	0 NoAlarm 1 Alarm	R
Circuit 1 Alarm - Discharge Temperature Sensor Fault	BV	688	C1'OFFDischTempFail	0 NoAlarm 1 Alarm	R
Circuit 2 Alarm - Discharge Temperature Sensor Fault	BV	690	C2'OFFDischTempFail	0 NoAlarm 1 Alarm	R
Circ 1 Comp 1 Alarm - High Discharge Temperature	BV	694	C1'Comp1'OFFDischTempHi	0 NoAlarm 1 Alarm	R
Circ 2 Comp 1 Alarm - High Discharge Temperature	BV	696	C2'Comp1'OFFDischTempHi	0 NoAlarm 1 Alarm	R
Unit Alarm - Evaporator Water Flow Loss	BV	701	Unit'OFFEvapFlowLoss	0 NoAlarm 1 Alarm	R
Unit Alarm - Evaporator Water Freeze	BV	702	Unit'OFFEvapLvgWTempLow	0 NoAlarm 1 Alarm	R
Circuit 1 Alarm - Evaporator Pressure Low	BV	704	C1'OFFEvapPresLow	0 NoAlarm 1 Alarm	R
Circuit 2 Alarm - Evaporator Pressure Low	BV	706	C2'OFFEvapPresLow	0 NoAlarm 1 Alarm	R
Circuit 1 Alarm - Evaporator Pressure Sensor Failure	BV	711	C1'OFFEvapPresFail	0 NoAlarm 1 Alarm	R
Circuit 2 Alarm - Evaporator Pressure Sensor Failure	BV	713	C2'OFFEvapPresFail	0 NoAlarm 1 Alarm	R
Circuit 1 Alarm - Too many restart	BV	742	C1'OFFRestartsAlm	0 NoAlarm 1 Alarm	R

Description	Type	Name	Instance	Range	Read/ Write
Circuit 2 Alarm - Too many restart	BV	744	C2'OFFRestartsAlm	0 NoAlarm 1 Alarm	R
Unit Alarm - Evaporator Leaving Temperature Sensor Fault	BV	748	Unit'OFFEvapLvgWTempFail	0 NoAlarm 1 Alarm	R
Circuit 1 Alarm - Mechanical High Pressure	BV	760	C1'OFFMechPressHi	0 NoAlarm 1 Alarm	R
Circuit 2 Alarm - Mechanical High Pressure	BV	762	C2'OFFMechPressHi	0 NoAlarm 1 Alarm	R
Circuit 1 Alarm - Oil Filter High Pressure	BV	796	C1'OFFOilFilterPresHi	0 NoAlarm 1 Alarm	R
Circuit 2 Alarm - Oil Filter High Pressure	BV	798	C2'OFFOilFilterPresHi	0 NoAlarm 1 Alarm	R
Circuit 1 Alarm - Oil Pressure Sensor Failure	BV	802	C1'OFFOilPresFail	0 NoAlarm 1 Alarm	R
Circuit 2 Alarm - Oil Pressure Sensor Failure	BV	804	C2'OFFOilPresFail	0 NoAlarm 1 Alarm	R
Unit Alarm - Phase Voltage	BV	820	Unit'OFFPhaseVoltage	0 NoAlarm 1 Alarm	R
Circuit 1 Alarm - OverVoltage	BV	978	C1'OFFOverVoltage	0 NoAlarm 1 Alarm	R
Circuit 2 Alarm - OverVoltage	BV	982	C2'OFFOverVoltage	0 NoAlarm 1 Alarm	R
Circuit 1 Alarm - UnderVoltage	BV	979	C1'OFFUnderVoltage	0 NoAlarm 1 Alarm	R

Description	Type	Name	Instance	Range	Read/ Write
Circuit 2 Alarm - UnderVoltage	BV	981	C2'OFFUnderVoltage	0 NoAlarm 1 Alarm	R
Circ 1 Comp 1 Alarm - Suction Temperature Sensor Fault	BV	857	C1'Comp1'OFFSuctTempFail	0 NoAlarm 1 Alarm	R
Circ 2 Comp 1 Alarm - Suction Temperature Sensor Fault	BV	859	C2'Comp1'OFFSuctTempSen	0 NoAlarm 1 Alarm	R
Circuit 1 Alarm - No Pressure at Start	BV	911	C1'OFFNoPressStart	0 NoAlarm 1 Alarm	R
Circuit 2 Alarm - No Pressure at Start	BV	912	C2'OFFNoPressStart	0 NoAlarm 1 Alarm	R
Controller Alarm - Circuit 1 Board Offline	BV	723	C1'OFFBoardOffline	0 NoAlarm 1 Alarm	R
Controller Alarm - Circuit 2 Board Offline	BV	724	C2'OFFBoardOffline	0 NoAlarm 1 Alarm	R
Unit - Power Restore	BV	515	Unit'PowerRestore	0 NoAlarm 1 Alarm	R
Circuit 1 Alarm - Pumpdown Failure	BV	516	C1'FailPumpdown	0 NoAlarm 1 Alarm	R
Circuit 2 Alarm - Pumpdown Failure	BV	517	C2'FailPumpdown	0 NoAlarm 1 Alarm	R
Unit Alarm - External Event	BV	924	Unit'ExternalEvent	0 NoAlarm 1 Alarm	R
Controller Alarm - Unit Board Offline	BV	925	Unit'OFFBoardOffline	0 NoAlarm 1 Alarm	R

Description	Type	Name	Instance	Range	Read/ Write
Circuit 1 Alarm - No Pressure change at Start	BV	905	C1'OFFNoPresChgAtStart	0 NoAlarm 1 Alarm	R
Circuit 2 Alarm - No Pressure change at Start	BV	906	C2'OFFNoPresChgAtStart	0 NoAlarm 1 Alarm	R
Circ 1 Compr 1 Alarm - VFD Fault	BV	762	C1'Comp1'OFFVfdFault	0 NoAlarm 1 Alarm	R
Circ 2 Compr 1 Alarm - VFD Fault	BV	888	C2'Comp1'OFFVfdFault	0 NoAlarm 1 Alarm	R
Circ 1 Compr 1 Alarm - VFD High Temperature	BV	942	C1'Comp1'OFFVfdTempHi	0 NoAlarm 1 Alarm	R
Circ 2 Compr 1 Alarm - VFD High Temperature	BV	944	C2'Comp1'OFFVfdTempHi	0 NoAlarm 1 Alarm	R
Circ 1 Compr 1 Alarm - VFD Communication Failure	BV	948	C1'Comp1'OFFVfdCommFail	0 NoAlarm 1 Alarm	R
Circ 2 Compr 1 Alarm - VFD Communication Failure	BV	950	C2'Comp1'OFFVfdCommFail	0 NoAlarm 1 Alarm	R
Unit Alarm - Emergency Stop Switch	BV	921	EmergencyStopAlarm	0 NoAlarm 1 Alarm	R
Unit Alarm - Evaporator Temperature Sensors Inverted	BV	922	EvapWTempInverted	0 NoAlarm 1 Alarm	R
Unit Alarm - External Alarm	BV	923	Unit'OFFExternalAlarm	0 NoAlarm 1 Alarm	R
Circ 1 Compr 1 Problem - Low Discharge Superheat	BV	961	C1'Comp1'DischSHeatLow	0 NoAlarm 1 Alarm	R

Description	Type	Name	Instance	Range	Read/ Write
Circ 2 Compr 1 Problem - Low Discharge Superheat	BV	963	C2'Comp1'DischSHeatLow	0 NoAlarm 1 Alarm	R
Unit Warning - Curennt Limit Input Out Of Range	BV	918	BadCurrentLimitInput	0 NoAlarm 1 Alarm	R
Controller Alarm - Option Board Offline	BV	919	Unit'OFFOptBoardOffline	0 NoAlarm 1 Alarm	R
Circuit 1 Alarm - Gas Leakage	BV	844	C1'OFFGasLeakage	0 NoAlarm 1 Alarm	R
Circuit 2 Alarm - Gas Leakage	BV	845	C2'OFFGasLeakage	0 NoAlarm 1 Alarm	R
Unit - Electrical Panel Temperature	AI	187	SwitchBoxTemp	°C	R
Unit Warning - Electrical Panel Temp Sensor Fault	BV	983	Unit'SwitchBoxSensFault	0 NoAlarm 1 Alarm	R
Unit Warning - Electrical Panel High Temperature	BV	984	Unit'SwitchBoxTempHigh	0 NoAlarm 1 Alarm	R
Controller Alarm - Fan Board Offline	BV	837	Unit'OFFFanBoardOffline	0 NoAlarm 1 Alarm	R
Circuit 1 Alarm - Fan Fault	BV	838	C1'FanAlm	0 NoAlarm 1 Alarm	R
Circuit 2 Alarm - Fan Fault	BV	839	C2'FanAlm	0 NoAlarm 1 Alarm	R
Shunt Active Filter – Grid Voltage	AV_RED	951	SAFGridVoltage	V	R
Shunt Active Filter – Grid Active Power	AV_RED	952	SAFGridActivePower	kW	R

Description	Type	Name	Instance	Range	Read/ Write
Shunt Active Filter – Grid Power Factor	AV_RED	953	SAFGridPowerFactor		R
Shunt Active Filter – Grid TDDi	AV_RED	954	SAFGridTDDi	%	R
Circ 2 Compressor 1 - Actual Capacity	AV_RED	1800	C2'Comp1'ActCapacity	%	R
Circ 2 Compressor 1 - OffAuto Setpoint	MV_RED	440	C2'Comp1'OffAutoStp	1 Off 2 Auto	W
Circ 2 Compressor 1 - Full Load State	BV	1802	C2'Comp1'FullLoadSta	0 Normal 1 Full Load	R
Circ 2 Compressor 1 - VFD Output	AV_RED	148	C2'Comp1'VfdOutput	rpm	R
Circ 2 Compressor 1 - Alarm Active	BV	1806	C2'Comp1'Alarm	0 NoAlarm 1 Alarm	R
Circ 2 Compressor 1 - Oil Feed Pressure	AI	166	C2'Comp1'OilFeedPress	kPa	R
Circ 2 Compressor 1 - Operating State	BV	441	C2'Comp1'State	0 Stop 1 Run	R
Circ 1 Compressor 1 - Actual Capacity	AV_RED	1840	C1'Comp1'ActCapacity	%	R
Circ 1 Compressor 1 - OffAuto Setpoint	MV_RED	430	C1'Comp1'OffAutoStp	1 Off 2 Auto	W
Circ 1 Compressor 1 - Full Load State	BV	1842	C1'Comp1'FullLoadSta	0 Normal 1 Full Load	R
Circ 1 Compressor 1 - VFD Output	AV_RED	1845	C1'Comp1'ActSpeed	rpm	R
Circ 1 Compressor 1 - Alarm Active	BV	1846	C1'Comp1'Alarm	0 NoAlarm 1 Alarm	R
Circ 1 Compressor 1 - Oil Feed Pressure	AI	165	C1'Comp1'OilFeedPress	kPa	R

Description	Type	Name	Instance	Range	Read/ Write
Circ 1 Compressor 1 - Operating State	BV	431	C1'Comp1'State	0 Stop 1 Run	R
Unit - Refrigerant type	MV_RED	1854	RefrigType	1 R22 2 R134a 3 R407c 4 R410a 5 R1234ze 5 resv3	R
Unit - Number of Circuits	AV_RED	1855	NrCircuits	1…2	R
Unit - Number of Compressors	AV_RED	1856	NrCompressors	1...4	R
Circuit 2 - Evaporator Superheat Active Setpoint	AV_RED	1896	C2'EvapSuperheatStpVal	dK	R
Circuit 1 - Evaporator Superheat Active Setpoint	AV_RED	1897	C1'EvapSuperheatStpVal	dK	R
Circuit 2 - Evaporator Superheat Temperature	AV_RED	1898	C2'EvapSuperheat	dK	R
Circuit 1 - Evaporator Superheat Temperature	AV_RED	1899	C1'EvapSuperheat	dK	R
Unit - Active Energy	AV_RED	990	ActEnergy	kWh	R
Unit - Power Factor	AV_RED	991	PowerFactor	-	R
Unit - Current Limit Setpoint	AV	995	NetworkCurrentLimitSetpoint	A	W
Variable Flow - Plant Differential Pressure	AI	1905	VarFlow'LoadDPres	kPa	W
Varibale Flow - Water Bypass Valve State	MV_RED	1906	VarFlow'WBypVlvSta	1 Closed 2 Opened	R
Varibale Flow - Plant Differential Pressure setpoint	AV_RED	1909	VarFlow'LoadDPresStpt	kPa	W
Variable Flow - Plant Delta Temperature	AV_RED	1911	VarFlow'DeltaTemp	°Dc	R
Variable Flow - Plant Delta Temperature Setpoint	AV_RED	1913	VarFlow'DeltaTempStp	°Dc	W
Variable Flow - Fixed Speed 1 Setpoint	AV_RED	1915	VarFlow'FixSpeedStp	%	W
Circuit 2 - Expansion Valve Position	AV_RED	208	C2'ExpValvePos	%	R
Circuit 2 - Fan Speed	AV_RED	209	C2'FanSpeed	%	R

Description	Type	Name	Instance	Range	Read/ Write
Circuit 2 - Condenser Approach Temperature	AV_RED	210	C2'CondApproach	dK	R
Circuit 2 - Evaporator Approach Temperature	AV_RED	211	C2'EvapApproach	dK	R
Circuit 2 - Fan Staging	AV_RED	1997	C2'FanStatus	1 Off 2 Run	R
Circuit 1 - Expansion Valve Position	AV_RED	168	C1'ExpValvePos	%	R
Circuit 1 - Fan Speed	AV_RED	169	C1'FanSpeed	%	R
Circuit 1 - Condenser Approach Temperature	AV_RED	170	C1'CondApproach	dK	R
Circuit 1 - Evaporator Approach Temperature	AV_RED	171	C1'EvapApproach	dK	R
Circuit 1 - Fan Staging	AV_RED	1997	C1'FanStatus	1 Off 2 Run	R
Noise Reduction - Enable Setpoint	BV	1998	NoiseReductEnableSetpoint	0 Auto 1 Reducing	W
Noise Reduction - Operating State	BV	2000	NoiseReductState	0 Normal 1 Reduced	R

5.1 Alarm Codes and Indexes

Premise		Unit communicates to BAS the status alarm through Codes and Indexes. Those are grouped in 3 level of alarm
Levels of Alarm		The three levels of alarms are as it follows: **Level** / **Description** Warning: They are notifications from unit or equipment of an incorrect status Problem: They are notifications from unit or equipment of a status that does allow unit to work properly Fault: They are notifications from unit or equipment (circuits, Compressors, Sensors, etc) that can cause stop of the unit or specific equipment
Index		Index describes the general cause of the notification
Code		Code describes which equipment or device of the unit is generating a notification

CODE	INDEX	LEVEL	Device	Description
257	1	Warning	Unit	Condenser Entering Water Temperature Sensor Failure
513	2	Warning	Unit	Evaporator Entering Water Temperature Sensor Failure
769	3	Warning	Unit	Liquid Line Refrigerant Temperature Sensor Failure
1025	4	Warning	Unit	Condenser Leaving Water Temperature Sensor Failure (STOP if Heat)
1281	5	Warning	Unit	Evaporator pump maintenance
1537	6	Warning	Unit	Condenser pump maintenance
1829	7	Warning	C1.Comp1	Compressor maintenance #n
1833		Warning	C1.Comp2	
1837		Warning	C1.Comp3	
1861		Warning	C2.Comp1	
1865		Warning	C2.Comp2	

CODE	INDEX	LEVEL	Device	Description
1869		Warning	C2.Comp3	
2049	8	Warning	Unit	Bad setpoint override input
2305	9	Warning	Unit	Bad demand limit input
2561	10	Warning	Unit	Power Loss While Running
2817	11	Warning	Unit	Unit Power Restore
3105	12	Warning	Circuit 1	Circuit Failed Pumpdown
3137		Warning	Circuit 2	
3329	13	Warning	Unit	External Event
3585	14	Warning	Unit	Bad Current Limit Input
3841	15	Warning	Unit	Option Controller Communication Failed
4128	16	Warning	Circuit 1	Low Refrigerant Charge
4160		Warning	Circuit 2	
4352	17	Warning	Unit	Chiller network Communication Failure
6177	24	Warning	Circuit 1	Economizer Pressure Sensor Fault #n
6209		Warning	Circuit 2	
6433	25	Warning	Circuit 1	Economizer Temperature Sensor Fault #n
6465		Warning	Circuit 2	
6689	26	Warning	Circuit 1	Economizer EXV Motor Fault
6721		Warning	Circuit 2	
7201	28	Warning	Circuit 1	Economizer EXV Module Communications Fault
7233		Warning	Circuit 2	
7461	29	Warning	C1.Comp1	Hot Gas Bypass Fault
7465		Warning	C1.Comp2	
7493		Warning	C1.Comp1	
7497		Warning	C1.Comp2	

CODE	INDEX	LEVEL	Device	Description
7681	30	Warning	Unit	Energy Meter Commununication Failure
9729	38	Warning	Unit	Heat Recovery Entering Water Temperature Sensor Fault
9985	39	Warning	Unit	Heat Recovery Leaving Water Temperature Sensor Fault
10241	40	Warning	Unit	SwitchBox Temperature High
10497	41	Warning	Unit	SwitchBox Temperature Sesnor Fault
10785	42	Warning	Circuit 1	Defrost EXV Motor Fault
10817		Warning	Circuit 2	
11009	43	Warning	Unit	Heat Recovery EWT or LWT freeze
11265	44	Warning	Unit	Heat Recovery Water Temperature Inverted
11553	45	Warning	Circuit 1	Liquid Refrigerant Temperature Sensor Fault
11585		Warning	Circuit 2	
11777	46	Warning	Unit	Smart Grid Communication Failure
16418	64	Problem	Circuit 1	Power Loss While Running
16450		Problem	Circuit 2	
16642	65	Problem	Unit	START INHIBITED - Ambient Temperature Low
16898	66	Problem	Unit	INHIBIT LOAD – Condenser Pressure High
17186	67	Problem	Circuit 1	INHIBIT LOAD – Condenser Pressure High
17218		Problem	Circuit 2	
17410	68	Problem	Unit	UNLOAD – Condenser Pressure High
17698	69	Problem	Circuit 1	UNLOAD – Condenser Pressure High
17730		Problem	Circuit 2	
18178	71	Problem	Pump 1	PUMP START ATTEMPTED - Condenser Pump #1 Failure
18434	72	Problem	Pump 2	PUMP START ATTEMPTED - Condenser Pump #2 Failure
18722	73	Problem	Circuit 1	INHIBIT LOAD - Discharge Temperature High
18754		Problem	Circuit 2	

CODE	INDEX	LEVEL	Device	Description
18946	74	Problem	Unit	NO EWT RESET - Entering Evaporator Temperature Sensor Failure
19202	75	Problem	Unit	INHIBIT LOAD - Evaporator Pressure Low
19490	76	Problem	Circuit 1	INHIBIT LOAD - Evaporator Pressure Low
19522		Problem	Circuit 2	
19714	77	Problem	Unit	UNLOAD - Evaporator Pressure Low
20002	78	Problem	Circuit 1	UNLOAD - Evaporator Pressure Low
20034		Problem	Circuit 2	
20262	79	Problem	C1.Comp1	UNLOAD - Compressor Motor Current High
20266		Problem	C1.Comp2	
20294		Problem	C2.Comp1	
20298		Problem	C2.Comp2	
20513	80	Problem	Circuit 1	UNLOAD - Discharge Temperature High
20545		Problem	Circuit 2	
20738	81	Problem	Pump 1	PUMP START ATTEMPTED - Evaporator Pump #1 Failure
20994	82	Problem	Pump 2	PUMP START ATTEMPTED - Evaporator Pump #2 Failure
21250	83	Problem	Unit	(Check Chiller Display for Cause)
21542	84	Problem	C1.Comp1	INHIBIT LOAD - Compressor Motor Current High
21546		Problem	C1.Comp2	
21574		Problem	C2.Comp1	
21578		Problem	C2.Comp2	
21763	85	Problem	Unit	UNLOAD - Power Holes
22050	86	Problem	Circuit 1	INHIBIT FREECOOLING - Wrong Valve Position
22082		Problem	Circuit 2	
22274	87	Problem	Unit	DATACENTER MODULE - SAF Side - Top Temperature Sensor Fault
22530	88	Problem	Unit	DATACENTER MODULE - SAF Side - Top Left Temperature Sensor Fault

CODE	INDEX	LEVEL	Device	Description
22786	89	Problem	Unit	DATACENTER MODULE - SAF Side - Top Right Temperature Sensor Fault
23042	90	Problem	Unit	DATACENTER MODULE - PLC Side - Temperature Sensor Fault
23298	91	Problem	Unit	DATACENTER MODULE - SAF Side - Bottom Temperature Sensor Fault
23554	92	Problem	Unit	DATACENTER MODULE - SAF Side - Relative Humidity Sensor Fault
23810	93	Problem	Unit	DATACENTER MODULE - Module Communication Fail
1027	4	Fault	Unit	UNIT SHUTDOWN - Condenser Leaving Water Temperature Sensor Failure (If Watercooled Heatpump)
5671	22	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Oil Sump Temperature High
5675		Fault	C1.Comp2	
5703		Fault	C2.Comp1	
5707		Fault	C2.Comp2	
6691	26	Fault	Circuit 1	CIRCUIT SHUTDOWN - Eco EXV Alarm
6723		Fault	Circuit 2	
6947	27	Fault	Circuit 1	CIRCUIT SHUTDOWN - Fans Fault Alarm
6979		Fault	Circuit 2	
9251	36	Fault	Circuit 1	CIRCUIT SHUTDOWN - EXV Alarm
9283		Fault	Circuit 2	
26151	102	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Discharge Pressure Sensor Fault
26155		Fault	C1.Comp2	
26407	103	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Suction Pressure Low
26411		Fault	C1.Comp2	
26663	104	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Discharge Pressure High
26667		Fault	C1.Comp2	
27943	109	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Surge Temperature
27947		Fault	C1.Comp2	
31015	121	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Suction Pressure Sensor Fault

CODE	INDEX	LEVEL	Device	Description
31019		Fault	C1.Comp2	
32551	127	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Low pressure ratio
32555		Fault	C1.Comp2	
32583		Fault	C2.Comp1	
32587		Fault	C2.Comp2	
32771	128	Fault	Unit	UNIT SHUTDOWN - Outside Air Temperature Sensor Fault
33063	129	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Motor Overload Trip
33067		Fault	C1.Comp2	
33095		Fault	C2.Comp1	
33099		Fault	C2.Comp2	
33059	129	Fault	Circuit 1	CIRCUIT SHUTDOWN - Motor Current High
33091		Fault	Circuit 2	
33795	132	Fault	Unit	UNIT SHUTDOWN - Motor Protector Trip
34087	133	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Motor Protector Trip
34091		Fault	C1.Comp2	
34119		Fault	C2.Comp1	
34123		Fault	C2.Comp2	
34083	133	Fault	Circuit 1	CIRCUIT SHUTDOWN - Motor Protector Trip
34115		Fault	Circuit 2	
34343	134	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - VFD Current High
34347		Fault	C1.Comp2	
34375		Fault	C2.Comp1	
34379		Fault	C2.Comp2	
34599	135	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Motor Temperature High #n
34603		Fault	C1.Comp2	

CODE	INDEX	LEVEL	Device	Description
34631		Fault	C2.Comp1	
34635		Fault	C2.Comp2	
34855	136	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - VFD Temperature Sensor Fault
34859		Fault	C1.Comp2	
34887		Fault	C2.Comp1	
34891		Fault	C2.Comp2	
35111	137	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Phase Loss
35115		Fault	C1.Comp2	
35143		Fault	C2.Comp1	
35147		Fault	C2.Comp2	
35367	138	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Phase Reversal
35371		Fault	C1.Comp2	
35399		Fault	C2.Comp1	
35403		Fault	C2.Comp2	
35623	139	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - VFD Overvoltage
35627		Fault	C1.Comp2	
35655		Fault	C2.Comp1	
35659		Fault	C2.Comp2	
35879	140	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - VFD Undervoltage
35883		Fault	C1.Comp2	
35911		Fault	C2.Comp1	
35915		Fault	C2.Comp2	
36099	141	Fault	Unit	UNIT SHUTDOWN - Condenser Pressure Sensor Fault
36391	142	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Condenser Pressure Sensor Fault #n
36395		Fault	C1.Comp2	

CODE	INDEX	LEVEL	Device	Description
36423		Fault	C2.Comp1	
36427		Fault	C2.Comp2	
36387	142	Fault	Circuit 1	CIRCUIT SHUTDOWN - Condenser Pressure Sensor Fault #n
36419		Fault	Circuit 2	
36611	143	Fault	Unit	UNIT SHUTDOWN - Condenser Water Flow Loss
36867	144	Fault	Unit	UNIT SHUTDOWN - Condenser Pressure High
37155	145	Fault	Circuit 1	CIRCUIT SHUTDOWN - Condenser Pressure High #n
37187		Fault	Circuit 2	
37415	146	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Current High with Compressor OFF #n
37419		Fault	C1.Comp2	
37447		Fault	C2.Comp1	
37451		Fault	C2.Comp2	
37671	147	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Discharge Temperature Sensor Fault #n
37675		Fault	C1.Comp2	
37703		Fault	C2.Comp1	
37707		Fault	C2.Comp2	
37927	148	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Discharge Temperature High #n
37931		Fault	C1.Comp2	
37959		Fault	C2.Comp1	
37963		Fault	C2.Comp2	
38147	149	Fault	Unit	UNIT SHUTDOWN - Condenser Entering Water Temperature Sensor Fault
38403	150	Fault	Unit	UNIT SHUTDOWN - Evaporator Water Flow Loss
38659	151	Fault	Unit	UNIT SHUTDOWN - Evaporator LWT or EWT Low (Freeze)
38915	152	Fault	Unit	UNIT SHUTDOWN - Evaporator Pressure Low
39207	153	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Evaporator (or Suction) Pressure Low #n

CODE	INDEX	LEVEL	Device	Description
39211		Fault	C1.Comp2	
39239		Fault	C2.Comp1	
39243		Fault	C2.Comp2	
39203	153	Fault	Circuit 1	CIRCUIT SHUTDOWN - Evaporator Pressure Low
39235		Fault	Circuit 2	
39427	154	Fault	Unit	UNIT SHUTDOWN - Evaporator Pressure Sensor Fault
39719	155	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Evaporator Pressure Sensor Fault #n
39723		Fault	C1.Comp2	
39751		Fault	C2.Comp1	
39755		Fault	C2.Comp2	
39715	155	Fault	Circuit 1	CIRCUIT SHUTDOWN - Evaporator Pressure Sensor Fault #n
39747		Fault	Circuit 2	
39975	156	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Ground Fault Trip #n
39979		Fault	C1.Comp2	
40007		Fault	C2.Comp1	
40011		Fault	C2.Comp2	
40231	157	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Lift Pressure Low #n
40235		Fault	C1.Comp2	
40263		Fault	C2.Comp1	
40267		Fault	C2.Comp2	
40483	158	Fault	Circuit 1	CIRCUIT SHUTDOWN - Liquid Line Pressure Sensor Fault #n
40515		Fault	Circuit 2	
40739	159	Fault	Circuit 1	CIRCUIT SHUTDOWN - Liquid Line Temperature Sensor Fault #n
40771		Fault	Circuit 2	
40963	160	Fault	Unit	UNIT LOCKOUT - Number of Allowed Re-Starts Exceeded

CODE	INDEX	LEVEL	Device	Description
41255	161	Fault	C1.Comp1	COMPRESSOR LOCKOUT - Number of Allowed Restarts Exceeded #n
41259		Fault	C1.Comp2	
41287		Fault	C2.Comp1	
41291		Fault	C2.Comp2	
41251	161	Fault	Circuit 1	CIRCUIT LOCKOUT - Number of Allowed Restarts Exceeded #n
41283		Fault	Circuit 2	
41475	162	Fault	Unit	UNIT SHUTDOWN - Evaporator Leaving Water Temperature Sensor Fault
41731	163	Fault	Unit	UNIT SHUTDOWN - Evaporator Entering Water Temperature Sensor Fault
42023	164	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Evaporator Leaving Water Temperature Sensor Fault #n
42027		Fault	C1.Comp2	
42055		Fault	C2.Comp1	
42059		Fault	C2.Comp2	
42019	164	Fault	Circuit 1	CIRCUIT SHUTDOWN - Evaporator Leaving Water Temperature Sensor Fault #n
42051		Fault	Circuit 2	
42243	165	Fault	Unit	UNIT SHUTDOWN - Mechanical High Pressure Trip
42535	166	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Mechanical High Pressure Trip #n
42539		Fault	C1.Comp2	
42567		Fault	C2.Comp1	
42571		Fault	C2.Comp2	
42531	166	Fault	Circuit 1	CIRCUIT SHUTDOWN - Mechanical High Pressure Trip #n
42563		Fault	Circuit 2	
42791	167	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Oil Net Pressure Low #n
42795		Fault	C1.Comp2	
42823		Fault	C2.Comp1	
42827		Fault	C2.Comp2	

CODE	INDEX	LEVEL	Device	Description
43047	168	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Oil Feed Temperature High #n
43051		Fault	C1.Comp2	
43079		Fault	C2.Comp1	
43083		Fault	C2.Comp2	
43303	169	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Oil Feed Temperature Low #n
43307		Fault	C1.Comp2	
43335		Fault	C2.Comp1	
43339		Fault	C2.Comp2	
43559	170	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Oil Feed Temperature Sensor Fault #n
43563		Fault	C1.Comp2	
43591		Fault	C2.Comp1	
43595		Fault	C2.Comp2	
43815	171	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Oil Level Low #n
43819		Fault	C1.Comp2	
43847		Fault	C2.Comp1	
43851		Fault	C2.Comp2	
44071	172	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Oil Delta Pressure High #n
44075		Fault	C1.Comp2	
44103		Fault	C2.Comp1	
44107		Fault	C2.Comp2	
44327	173	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Oil Feed Pressure Sensor Fault #n
44331		Fault	C1.Comp2	
44359		Fault	C2.Comp1	
44363		Fault	C2.Comp2	
44583	174	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Oil Sump Pressure Sensor Fault #n

CODE	INDEX	LEVEL	Device	Description
44587		Fault	C1.Comp2	
44615		Fault	C2.Comp1	
44619		Fault	C2.Comp2	
44839	175	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Oil Sump Temperature Sensor Fault #n
44843		Fault	C1.Comp2	
44871		Fault	C2.Comp1	
44875		Fault	C2.Comp2	
45059	176	Fault	Unit	UINT SHUTDOWN - Phase Voltage Monitoring Alarm
45091		Fault	Circuit 1	CIRCUIT SHUTDOWN - Phase Voltage Monitoring Alarm
45123		Fault	Circuit 2	
45351	177	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Starter Fault #n
45355		Fault	C1.Comp2	
45383		Fault	C2.Comp1	
45387		Fault	C2.Comp2	
45607	178	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - No Starter Transition #n
45611		Fault	C1.Comp2	
45639		Fault	C2.Comp1	
45643		Fault	C2.Comp2	
45863	179	Fault	C1.Comp1	COMPRESSOR START ABORT - Oil Pressure Low #n
45867		Fault	C1.Comp2	
45895		Fault	C2.Comp1	
45899		Fault	C2.Comp2	
46119	180	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Subcooling Low #n
46123		Fault	C1.Comp2	
46151		Fault	C2.Comp1	

CODE	INDEX	LEVEL	Device	Description
46155		Fault	C2.Comp2	
46375	181	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Surge Suction Superheat High-Running #n
46379		Fault	C1.Comp2	
46407		Fault	C2.Comp1	
46411		Fault	C2.Comp2	
46631	182	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Surge Suction Superheat High-Starting #n
46635		Fault	C1.Comp2	
46663		Fault	C2.Comp1	
46667		Fault	C2.Comp2	
46887	183	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Suction Temperature Sensor Fault #n
46891		Fault	C1.Comp2	
46919		Fault	C2.Comp1	
46923		Fault	C2.Comp2	
46883	183	Fault	Circuit 1	CIRCUIT SHUTDOWN - Suction Temperature Sensor Fault #n
46915		Fault	Circuit 2	
47143	184	Fault	C1.Comp1	COMPRESSOR START ABORT - Vanes Alarm #n
47147		Fault	C1.Comp2	
47175		Fault	C2.Comp1	
47179		Fault	C2.Comp2	
47399	185	Fault	C1.Comp1	COMPRESSOR SHUTDOWN – Motor Fault #n
47403		Fault	C1.Comp2	
47431		Fault	C2.Comp1	
47435		Fault	C2.Comp2	
47619	186	Fault	Unit	UNIT SHUTDOWN - Mechanical Low Pressure Trip
47911	187	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Mechanical Low Pressure Trip #n

CODE	INDEX	LEVEL	Device	Description
47915		Fault	C1.Comp2	
47943		Fault	C2.Comp1	
47947		Fault	C2.Comp2	
47907	187	Fault	Circuit 1	CIRCUIT SHUTDOWN - Mechanical Low Pressure Trip #n
47939		Fault	Circuit 2	
48131	188	Fault	Unit	Controller board offline #n (Circuit number describe Control board number. 0=Unit alarm for Extension modules other than Circuits extension)
48163		Fault	Circuit 1	
48195		Fault	Circuit 2	
48419	189	Fault	Circuit 1	CIRCUIT SHUTDOWN - No Pressure Change After Start
48451		Fault	Circuit 2	
48675	190	Fault	Circuit 1	CIRCUIT SHUTDOWN - No Pressure at Startup
48707		Fault	Circuit 2	
48935	191	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Slide position sensor Fault #n
48939		Fault	C1.Comp2	
48967		Fault	C2.Comp1	
48971		Fault	C2.Comp2	
49155	192	Fault	Unit	UNIT STOP - Emergency Stop Alarm
49411	193	Fault	Unit	UNIT STOP - Evaporator Water Temperatures Inverted
49667	194	Fault	Unit	UNIT STOP - External Alarm
49923	195	Fault	Unit	UNIT SHUTDOWN - Evaporator Leaving Water Temperature 1 Sensor Fault
50179	196	Fault	Unit	UNIT SHUTDOWN - Evaporator Leaving Water Temperature 2 Sensor Fault
50435	197	Fault	Unit	UNIT SHUTDOWN - Evaporator 1 Freeze Protection
50691	198	Fault	Unit	UNIT SHUTDOWN - Evaporator 2 Freeze Protection
50983	199	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - VFD Fault #n
50987		Fault	C1.Comp2	

CODE	INDEX	LEVEL	Device	Description
51015		Fault	C2.Comp1	
51019		Fault	C2.Comp2	
51239	200	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - VFD Temperature High #n
51243		Fault	C1.Comp2	
51271		Fault	C2.Comp1	
51275		Fault	C2.Comp2	
51495	201	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - VFD Communication Error #n
51499		Fault	C1.Comp2	
51527		Fault	C2.Comp1	
51531		Fault	C2.Comp2	
51751	202	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - VFD Temperature Low #n
51755		Fault	C1.Comp2	
51783		Fault	C2.Comp1	
51787		Fault	C2.Comp2	
52007	203	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - VFD Undergrid
52011		Fault	C1.Comp2	
52039		Fault	C2.Comp1	
52043		Fault	C2.Comp2	
52263	204	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - VFD Overgrid
52267		Fault	C1.Comp2	
52295		Fault	C2.Comp1	
52299		Fault	C2.Comp2	
52519	205	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Discharge Superheat Low #n
52523		Fault	C1.Comp2	
52551		Fault	C2.Comp1	

CODE	INDEX	LEVEL	Device	Description
52555		Fault	C2.Comp2	
52739	206	Fault	Unit	UNIT SHUTDOWN - Gas Leakage
52771		Fault	Circuit 1	CIRCUIT SHUTDOWN - Gas Leakage
52803		Fault	Circuit 2	
52995	207	Fault	Unit	UNIT SHUTDOWN - Battery Mode
53251	208	Fault	Unit	UNIT SHUTDOWN - High Pitch (Marine)
53507	209	Fault	Unit	UNIT SHUTDOWN - High Roll (Marine)
53763	210	Fault	Unit	UNIT SHUTDOWN - Pitch Sensor Fault (Marine)
54019	211	Fault	Unit	UNIT SHUTDOWN - Roll Sensor Fault (Marine)
54275	212	Fault	Unit	UNIT SHUTDOWN - Evaporator Differenital Pressure Sensor Fault
54531	213	Fault	Unit	UNIT SHUTDOWN - Evaporator Differenital Pressure High
54787	214	Fault	Unit	UNIT SHUTDOWN - Condenser Differenital Pressure Sensor Fault
55043	215	Fault	Unit	UNIT SHUTDOWN - Condenser Differenital Pressure High
55335	216	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - VFD Card Temperature High
55339		Fault	C1.Comp2	
55367		Fault	C2.Comp1	
55371		Fault	C2.Comp2	
55591	217	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - RLA High
55595		Fault	C1.Comp2	
55623		Fault	C2.Comp1	
55627		Fault	C2.Comp2	
55847	218	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - RLA Low
55851		Fault	C1.Comp2	
55879		Fault	C2.Comp1	
55883		Fault	C2.Comp2	

CODE	INDEX	LEVEL	Device	Description
56103	219	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - Surge Alarm
56107		Fault	C1.Comp2	
56135		Fault	C2.Comp1	
56139		Fault	C2.Comp2	
56323	220	Fault	Unit	UNIT SHUTDOWN - Evaporator Water Differential Pressure Low
56579	221	Fault	Unit	UNIT SHUTDOWN - Condenser Water Differential Pressure Low
56835	222	Fault	Unit	UNIT SHUTDOWN - Unit or Compressor not configured
57091	223	Fault	Unit	UNIT SHUTDOWN - Power Availability Alarm (Marine)
57347	224	Fault	Unit	UNIT SHUTDOWN - Freecooling water valves feedback Alarm
57635	225	Fault	Circuit 1	CIRCUIT SHUTDOWN - Freeccoling Valves Feedback Alarm
57667		Fault	Circuit 2	
57895	226	Fault	C1.Comp1	COMPRESSOR SHUTDOWN - VFD Components to be replaced
57899		Fault	C1.Comp2	
57927		Fault	C2.Comp1	
57931		Fault	C2.Comp2	
58147	227	Fault	Circuit 1	CIRCUIT SHUTDOWN - Fans Communication Fail
58179		Fault	Circuit 2	
58403	228	Fault	Circuit 1	CIRCUIT SHUTDOWN - Anti-Chattering Alarm
58435		Fault	Circuit 2	
58663	229	Fault	C1.Comp1	CIRCUIT SHUTDOWN - Comp X Alarm
58667		Fault	C1.Comp2	
58671		Fault	C1.Comp3	
58675		Fault	C1.Comp4	
58695		Fault	C2.Comp1	
58699		Fault	C2.Comp2	

CODE	INDEX	LEVEL	Device	Description
58703		Fault	C2.Comp3	
58707		Fault	C2.Comp4	
58915	230	Fault	Circuit 1	CIRCUIT SHUTDOWN - Ssh Low Limit Alarm
58947		Fault	Circuit 2	
59139	231	Fault	Unit	UNIT SHUTDOWN - Tank Water Temp Sensor fault
59651	233	Fault	Unit	UNIT SHUTDOWN - Condenser LWT or EWT (freeze)
59907	234	Fault	Unit	UNIT SHUTDOWN - Changeover Valve hardware Alarm
60163	235	Fault	Unit	UNIT SHUTDOWN - Changeover Valve feedback Alarm
60419	236	Fault	Unit	UNIT SHUTDOWN – Beluga Pump Fault Alarm
60675	237	Fault	Unit	UNIT SHUTDOWN – Beluga Pump Modbus Communication Alarm

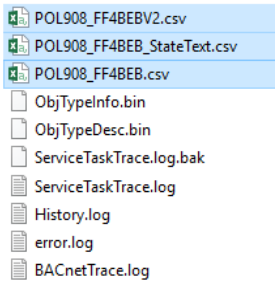
6. Annex 2 – EDE files for BACnet

Premise

The EDE files are created by the BACnet server each time the server is started. Download and import new files if s any change in controller configuration is done. Some BACnet objects could be no more available or new objects could be added. Also change in BACnet settings affect the new EDE file.

EDE file from BACnet IP module (POL908.00)

EDE files from POL908 module can be exported via ftp as it follows:

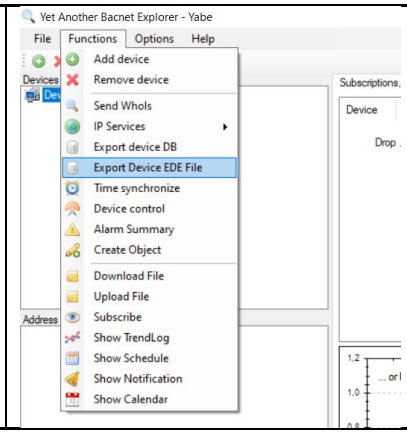
Step	Action
1	Connect POL908 module to the controller via plug connection.
2	Connect to the POL908 TCP/IP port the bus cable from: • a LAN if DHCP of the module is set to ON • a PC with static IP address if DHCP of the module is set to OFF
3	Set proper IP address and Subnet mask of the module and apply changes. i.e. IP 192.168.1.45 Subnet mask 255.255.255.0
4	Open a resource explorer instance and type the module IP address. i.e. ftp://192.168.1.45/Temp. In the folder “Temp” the EDE files in .csv format are available: 

EDE file from both modules:

BACnet MS/TP (POL904.00)

BACnet IP (POL908.00)

Step	Action
1	Connect POL904/908 module to the controller via plug connection.
2	Connect PC to POL904 by mean of a RS485-USB converter or to POL908 by mean of ethernet cable.
3	A BACnet explorer tool is needed in order to access the module and export the EDE files from it. Freeware tools are available on the internet, i.e. YABE
4	From YABE the EDE export option is available in functions menu.

		 Yet Another Bacnet Explorer - Yabe File Functions Options Help Add device Remove device Send Whols IP Services Export device DB Export Device EDE File Time synchronize Device control Alarm Summary Create Object Download File Upload File Subscribe Show TrendLog Show Schedule Show Notification Show Calendar Devices Address Subscriptions Device Drop

7. Annex 3 - Microtech PICS for BACnet

7.1 BACnet standardized device profile

☐	BACnet Operator Workstation	(B-OWS)
☒	BACnet Building Controller	(B-BC)
☐	BACnet Advanced Application Controller	(B-AAC)
☐	BACnet Application Specific Controller	(B-ASC)
☐	BACnet Smart Sensor	(B-SS)
☐	BACnet Smart Actuator	(B-SA)

7.2 BACnet interoperability building blocks supported

Data sharing		Data Sharing – ReadProperty-A	DS-RP-A
		Data Sharing – ReadProperty-B	DS-RP-B
		Data Sharing – ReadPropertyMultiple-A	DS-RPM-A
		Data Sharing – ReadPropertyMultiple-B	DS-RPM-B
		Data Sharing – WriteProperty-A	DS-WP-A
		Data Sharing – WriteProperty-B	DS-WP-B
		Data Sharing – WritePropertyMultiple-B	DS-WPM-B
		Data Sharing – COV-B	DS-COV-B
		Data Sharing – COV-A	DS-COV-A
Alarm and event management		Alarm and Event – Notification Internal-B	AE-N-I-B
		Alarm and Event – AcknowledgeAlarm-B	AE-ACK- B
		Alarm and Event – Information-B	AE-INFO-B
		Alarm and Event – Alarm Summary-B	AE-ASUM-B
		Alarm and Event – Event-Enrollment Summary-B	AE-ESUM-B
Scheduling		Scheduling – Internal-B	SCHED-I-B
		Scheduling – External-B	SCHED-E-B
Trending		Trending-Viewing and Modifying Trends Internal-B	T-VMT-I-B
		Trending-Automated Trend Retrieval-B	T-ATR-B
Device management		Device Management – Dynamic Device Binding-A	DM-DDB-A
		Device Management – Dynamic Device Binding-B	DM-DDB-B
		Device Management – Dynamic Object Binding-B	DM-DOB-B
		Device Management – DeviceCommunicationControl-B	DM-DCC-B
		Device Management – TimeSynchronization-B	DM-TS-B
		Device Management – UTCTimeSynchronization-B	DM-UTC-B
		Device Management – ReinitializeDevice-B	DM-RD-B

		Device Management – List Manipulation-B	DM-LM-B
		Device Management – Object Creation and Deletion-B	DM-OCD-B
		Device Management – Backup and Restore-B	DM-BR-B
Network management		Network Management-Connection Establishment-A	NM-CE-A

7.3 BACnet standard object types supported

Object type	Supported	Can be created dynamically	Can be deleted dynamically
Analog Input	☒	☐	☐
Analog Output	☒	☐	☐
Analog Value	☒	☐	☐
Binary Input	☒	☐	☐
Binary Output	☒	☐	☐
Binary Value	☒	☐	☐
Calendar	☒	☐	☐
Command	☐	☐	☐
Device	☒	☐	☐
Event Enrollment	☒	☒	☒
File	☒	☐	☐
Group	☐	☐	☐
Loop	☐	☐	☐
Multi-State Input	☒	☐	☐
Multi-State Output	☒	☐	☐
Multi-State Value	☒	☐	☐
Notification Class	☒	☐	☐
Program	☐	☐	☐
Schedule	☒	☐	☐
Averaging	☐	☐	☐
Trend Log	☒	☐	☐
Life-Safety-Point	☐	☐	☐
Life-Safety-Zone	☐	☐	☐
Accumulator	☐	☐	☐
Pulse-Converter	☐	☐	☐

7.4 BACnet standard object types description

Analog Input		**Property supported**	**Writable**	**Range restrictions**
		Object_Identifier		
		Object_Name		
		Object_Type		
		Present_Value	X	
		Description		
		Status_Flags		
		Event_State		
		Reliability		
		Out_Of_Service	X	
		Units		
		Max_Pres_Value		
		Min_Pres_Value		
		Priority_Array		
		Relinquish_Default	X	

		COV_Increment	X	0 .. maxReal
		Time_Delay		
		Notification_Class		
		High_Limit	X	Min_Pres_Value <= x <=Max_Pres_Value And High_Limit > Low_Limit
		Low_Limit	X	Min_Pres_Value <= x <=Max_Pres_Value And High_Limit > Low_Limit
		Deadband	X	0 .. maxReal
		Limit_Enable	X	
		Event_Enable	X	
		Acked_Transitions		
		Notify_Type		
		Event_Time_Stamps		
Analog Output		**Property supported**	**Writable**	**Range restrictions**
		Object_Identifier		
		Object_Name		
		Object_Type		
		Present_Value	X	
		Description		
		Status_Flags		
		Event_State		
		Reliability		
		Out_Of_Service	X	
		Units		
		Max_Pres_Value		
		Min_Pres_Value		
		Priority_Array		
		Relinquish_Default	X	
		COV_Increment	X	0 .. maxReal
		Time_Delay		
		Notification_Class		
		High_Limit	X	Min_Pres_Value <= x <=Max_Pres_Value And High_Limit > Low_Limit
		Low_Limit	X	Min_Pres_Value <= x <=Max_Pres_Value And High_Limit > Low_Limit
		Deadband	X	0 .. maxReal
		Limit_Enable	X	
		Event_Enable	X	
		Acked_Transitions		
		Notify_Type		
		Event_Time_Stamps		
Analog Value		**Property supported**	**Writable**	**Range restrictions**
		Object_Identifier		
		Object_Name		
		Object_Type		
		Present_Value	X	Depends on the Unit
		Description		
		Status_Flags		
		Event_State		
		Reliability		
		Out_Of_Service	X	
		Units		
		Max_Pres_Value		
		Min_Pres_Value		

		Priority_Array		
		Relinquish_Default	X	
		COV_Increment	X	0 .. maxReal
		Time_Delay		
		Notification_Class		
		High_Limit	X	Min_Pres_Value <= x <=Max_Pres_Value And High_Limit > Low_Limit
		Low_Limit	X	Min_Pres_Value <= x <=Max_Pres_Value And High_Limit > Low_Limit
		Deadband	X	0 .. maxReal
		Limit_Enable	X	
		Event_Enable	X	
		Acked_Transitions		
		Notify_Type		
		Event_Time_Stamps		
Analog Value (setpoints)		**Property supported**	**Writable**	**Range restrictions**
		Object_Identifier		
		Object_Name		
		Object_Type		
		Present_Value	X(1)	Depends on the Unit
		Units		
		Status_Flags		
		COV_Increment	X	0 .. maxReal
		Out_Of_Service	X(1)	
		Event_State		
		(1) Writeable if Out_Of_Service=True		
Binary Input		**Property supported**	**Writable**	**Range restrictions**
		Object_Identifier		
		Object_Name		
		Object_Type		
		Description		
		Present_Value	X(1)	
		Status_Flags		
		Out_Of_Service	X	
		Event_State		
		Inactive_Text		
		Active_Text		
		Polarity	X	
		Notification_Class		
		Reliability		
		Acked_Transitions		
		Event_Enable	X	
		Alarm_Value	X	
		Notify_Type		
		Time_Delay		
		Event_Time_Stamps		
		Elapsed-active-time	X	Only 0
		Time-of-active-time-reset		
		(1) Writeable if Out_Of_Service=True		
Binary Output		**Property supported**	**Writable**	**Range restrictions**
		Object_Identifier		

		Object_Name		
		Object_Type		
		Description		
		Present_Value	X	
		Status_Flags		
		Out_Of_Service	X	
		Event_State		
		Inactive_Text		
		Active_Text		
		Notification_Class		
		Reliability		
		Acked_Transitions		
		Event_Enable	X	
		Notify_Type		
		Time_Delay		
		Event_Time_Stamps		
		Polarity	X	
		Feedback_Value		
		Priority_Array		
		Relinquish_Default	X	
		Elapsed-active-time	X	Only 0
		Time-of-active-time-reset		

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