

BAS integration guide

BACnet[®] protocol

Doc. Name:

D-EIGOC00104-26_00EN-EWYK-CZ

Product Name:

EWAK-CZ/EWYK-CZ

Control software name:

ICARO



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1. Introduction

This document contains information to incorporate EWA(Y)K-CZ Unit Controllers into a building automation system (BAS) via BACnet communication protocols.

EWA(Y)K-CZ data points accessible from a BACnet network are made available to a BAS provided that the proper communication module (Microtech 4).

BACnet terms are not defined. Refer to the standard BACnet specifications for definitions and details about the protocol.



2. About this document

2.1 Notice

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- **BACnet** from American Society of Heating, Refrigerating and Air-Conditioning Engineers,
- **MicroTech 4** from Daikin Applied Europe.

2.2 Before starting

Application range	This document refers to the following components:	
	Microtech 4	Controller
	POL904.00/STD	BACnet MS/TP module
	POL908.00/STD	BACnet IP 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 N etwork
	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.



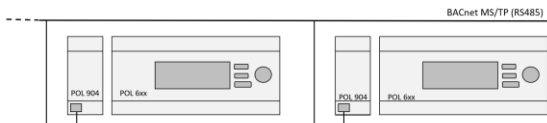
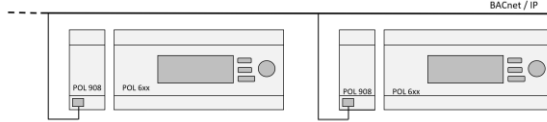
RISK OF BURNS: Electrical currents cause components to get hot either temporarily or permanently. Handle power cable, electrical cables and conduits, terminal box covers and motor frames with great care.

Field of application		Use Modbus communication module 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 Modbus communication modules. Maintenance of Modbus 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

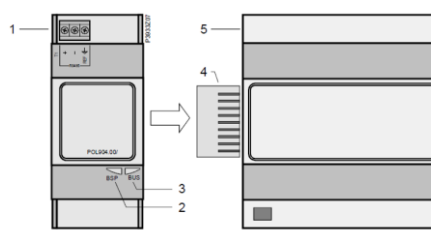
4.1 General information

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 a BACnet network provided it is equipped with the proper communication module (POL904 and POL908).
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 MS/TP (POL904)	
BACnet/IP (POL908)	



4.2 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

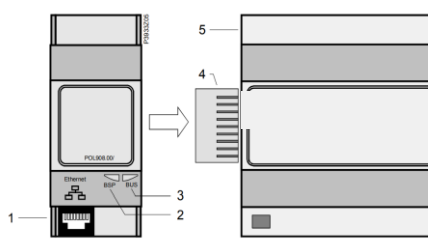
Configuration parameters

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		



4.3 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.



5. BACnet integration list

Note All the BACnet objects “_red”: Reduced does not have priority array and can be access only through “Present Value”.
All the BACnet object such as AV, BV, and MV used as setpoints, must the written with priority 8 (Manual operator).



Always verify “Clear Alarms – Network” writing configuration before starting normal operations: a continuous clear command can lead to potential hazard and unit damaging

Description	Object_Type	Object_ID	Object_Name	R/W	Range
Local/Network Source	BI	3	ChillerLocalRemote	R	0 Local 1 Network
Enabled State	BI	7	ChillerEnableOutput	R	0 Disabled 1 Enabled
Capacity Limited	BI	6	ChillerLimited	R	0 No 1 Yes
Unit general alarm	BI	10	AlarmDigitalOutput	R	0 No 1 Yes
Thermoregulation State	BI	4	ThermostatStatus	R	0 off 1 On
Unit Enable Setpoint - Network	BV	2	ChillerEnableStp	W (Prio 8)	0 Disable 1 Enable
Clear Alarms – Network	BV	8	ClearAlarm	W (Prio 8)	0 Normal 1 Clear
Operation Mode	MV_red	2	ActiveMode	R	1 Not Used 2 Cool 3 Heat 4 Not Used 5 Defrost
Active Setpoint	AV_red	5	ActiveLvlgwaterTarget	R	-15...70°C



Description	Object_Type	Object_ID	Object_Name	R/W	Range
Actual Capacity	AV_red	2	ChillerCapacity	R	0...100%
Active Capacity Limit Output	AV_red	1	ActiveCapacityLimit	R	0...100%
Status	MV_red	1	UnitStatus	R	1 Off 2 Start 3 Run 4 Preshutdown 5 Service
Evaporator Entering Water Temp	AI	1	EntEvapwaterTemp	R	°C
Evaporator Leaving Water Temp Unit	AI	2	LvgEvapwaterTempUnit	R	°C
Outdoor Air Temperature	AI	5	OutdoorAirTemp	R	°C
Warning CODE	AV_red	903	AVWarningAlarmCode	R	0 No Alarm 1 External event
Problem CODE	AV_red	904	AVProblemAlarmCode	R	0 No Alarm 1 Circuit Alarm
Fault CODE	AV_red	905	AVFaultAlarmCode	R	0 No Alarm 1 Unit or both Circuit Alarm
Operation Mode Setpoint – Network	MV	3	ChillerOperationMode	W (Prio 8)	0 NULL 1 Not Used 2 Cool 3 Heat 4 Not Used
Cool Setpoint – Network	AV	4	NetworkCoolTempSetpoint	W (Prio 8)	-15/4°C...28°C
Heat Setpoint – Network	AV	6	NetworkHeatTempSetpoint	W (Prio 8)	20...67°C
Capacity Limit Setpoint - Network	AV	3	CapacityLimitSetpt	W (Prio 8)	0...100%
Current Limit Setpoint - Network	AV	39	CurrentLimitSetpt	W (Prio 8)	0...2000A



Description	Object_Type	Object_ID	Object_Name	R/W	Range
Unit of Measure	MV_red	47	Units	W	1 Metric 2 Imperial
Noise Reduction Enable Setpoint	MV_red	48	SilentModeSetpt	W	1 off 2 On
Defrost - Operating State	MV_red	62	DefrostOpState	R	0 off 1 On
Bivalent Operation - Enable Setpoint	MV_red	70	BivOpsEnableStp	W	0 off 1 On
Bivalent Operation - Temperature Cut-Off	AV_red	71	BivOps'TCutOff	W	-7...7 °C
Bivalent Operation - Temperature Bivalent Mode	AV_red	72	BivOps'Tbivalent	W	0...20 °C
Bivalent Operation - Boiler Start Delay	AV_red	73	BivOps'BoilerStDelay	W	0...60 min
Collective Housing - Enable Setpoint	MV_red	80	CollHsng'EnableStp	W	0 off 1 On
Collective Housing - Tank Temperature	AI	81	CollHsng'TankTemp	R	°C
Collective Housing - Changeover Upper Limit	AV_red	82	CollHsng'CngovrUpperLim	W	CngovrLowerLim...60°C
Collective Housing - Changeover Lower Limit	AV_red	83	CollHsng'CngovrLowerLim	W	-15°C/4°C...60°C
Collective Housing - Tank Temperature Stp	AV_red	84	CollHsng'TankTempStp	W	CngovrLowerLim...CngovrUpperrLim
DHW Enable Setpoint	BV	90	DHWRemoteEn	W (Prio 8)	0 off 1 On
DHW Temperature Setpoint	AV_red	91	DHWTempSp	W	0...60 °C
DHW Temperature	AI	92	DHWWaterTemp	R	°C



Description	Object_Type	Object_ID	Object_Name	R/W	Range
DHW Switching Valve State	MV_red	93	DHW3WVState	R	1 DHW Off 2 Switching 3 DHW Run 4 Error
DHW Anti Legionella Cycle	MV_red	94	DHWAntiLegCycle	R	0 off 1 On
DHW Standby Mode	MV_red	95	DHWStandbyMode	W	0 off 1 On
Evaporator Pump #1 Status	BI	101	EvapPumpSta1	R	0 Pump Off Request 1 Pump On Request
Evaporator Pump #1 Run Hours	AV_red	102	EvapPumpRunHrs1	W	hours
Evaporator VFD Pump - Fixed Speed 1	AV_red	150	VPF'FixSpeedSetpt1	W	%
Evaporator VFD Pump - Fixed Speed 2	AV_red	151	VPF'FixSpeedSetpt2	W	%
Evaporator VFD Pump - Standby Speed	AV_red	152	VPF'StbySpeedSetpt	W	%
Evaporator VFD Pump - Actual Speed	AV_red	153	VPF'ActSpeed	R	%
Evaporator VFD Pump - Building Differential Pressure Setpoint	AV_red	154	VPF'LoadDifPresSetpt	W	kPa
Evaporator VFD Pump - Unit Differential Pressure Setpoint	AV_red	155	VPF'EvapDifPresSetpt	W	kPa
Evaporator VFD Pump - Building Differential Pressure	AI	156	VPF'LoadDifPres	R	kPa
Evaporator VFD Pump - Unit Differential Pressure	AI	157	VPF'EvapDifPres	R	kPa
Evaporator VFD Pump - Bypass Valve State	MV_red	158	VPF'BypVlvSta	R	1 Closed 2 Opened
Evaporator VFD Pump - DeltaTemperature Setpoint	AV_red	159	VPF'DeltaTempSp	W	°C
Evaporator VFD Pump - DeltaTemperature	AV_red	160	VPF'DeltaTemp	R	°C



Description	Object_Type	Object_ID	Object_Name	R/W	Range
Siemens Controller type	MV_red	201	SiemensController	R	1 N/A 2 POL687 3 POL638 4 POL687.00 5 POL687.70 6 POL688.80 7 POL688.80UPS 8 POL468
Application Save	MV_red	202	AppI SaveSp	W	1 Off 2 On
Reserved	Reserved	279	Reserved	W	Reserved
External Alarm	BV	288	ExternalAlarm	R	0 No Alarm 1 InAlarm
External Event	BV	289	UnitExternalEvent	R	0 No Event 1 Event
Reserved	Reserved	290	Reserved	R	Reserved
Reserved	Reserved	291	Reserved	W	Reserved
Unit Alarm Word #5	AV_red	295	UnitAlarmsword4	R	0...4294967295 – See Annex A
Unit Alarm Word #4	AV_red	296	UnitAlarmsword4	R	0...4294967295 – See Annex A
Unit Alarm Word #3	AV_red	297	UnitAlarmsword3	R	0...4294967295 – See Annex A
Unit Alarm Word #2	AV_red	298	UnitAlarmsword2	R	0...4294967295 – See Annex A
Unit Alarm Word #1	AV_red	299	UnitAlarmsword1	R	0...4294967295 – See Annex A
Circuit #1 State	MV_red	300	C1State	R	1 Off 2 Preopen 3 Run 4 Pumpdown



Description	Object_Type	Object_ID	Object_Name	R/W	Range
Circuit #1 Comp #1 – Status	BV	321	C1Comp1Status	R	0 Off 1 On
Circuit #1 Comp #1 – Starts	AV_red	322	C1Comp1Starts	W	0...9999999
Circuit #1 Comp #1 - Run Hours	AV_red	323	C1Comp1Hours	W	0...9999999
Circuit #1 Comp #1 - Actual Capacity	AV_red	325	C1Comp1ActCap	R	0...100%
Circuit #1 Comp #1 - Percent RLA	AV_red	326	C1Comp1RLA	R	0...110%
Circuit #1 or Cir1Comp1 Alarm Word #4	AV_red	396	C1AlarmWord4	W	0...4294967295 – See Annex A
Circuit #1 or Cir1Comp1 Alarm Word #3	AV_red	397	C1AlarmWord3	R	0...4294967295 – See Annex A
Circuit #1 or Cir1Comp1 Alarm Word #2	AV_red	398	C1AlarmWord2	R	0...4294967295 – See Annex A
Circuit #1 or Cir1Comp1 Alarm Word #1	AV_red	399	C1AlarmWord1	R	0...4294967295 – See Annex A
Circuit #2 State	MV_red	400	C2State	R	1 Off 2 Preopen 3 Run 4 Pumpdown
Circuit #2 Comp #1 – Status	BV	421	C2Comp1Status	R	0 Off 1 On
Circuit #2 Comp #1 – Starts	AV_red	422	C2Comp1Starts	W	0...9999999
Circuit #2 Comp #1 - Run Hours	AV_red	423	C2Comp1Hours	W	0...9999999
Circuit #2 Comp #1 - Actual Capacity	AV_red	425	C2Comp1ActCap	R	0...100%
Circuit #2 Comp #1 - Percent RLA	AV_red	426	C2Comp1RLA	R	0...110%
Circuit #2 or Cir2Comp1 Alarm Word #4	AV_red	496	C2AlarmWord4	R	0...4294967295 – See Annex A
Circuit #2 or Cir2Comp1 Alarm Word #3	AV_red	497	C2AlarmWord3	R	0...4294967295 – See Annex A
Circuit #2 or Cir2Comp1 Alarm Word #2	AV_red	498	C2AlarmWord2	R	0...4294967295 – See Annex A
Circuit #2 or Cir2Comp1 Alarm Word #1	AV_red	499	C2AlarmWord1	R	0...4294967295 – See Annex A
M/S Leaving Water Temperature	AI	151	SysCtrlTmp	R	°C
M/S LWT Sensor Fault	BV	502	CommonLWTSenf	R	0 No Alarm 1 In Alarm



Description	Object_Type	Object_ID	Object_Name	R/W	Range
M/S Disconnect Setpoint	MV_red	5	Standa1oneModeSp	W	1 No 2 Yes
Master Comm Error	BV	20	MasterCommErr	R	0 No Alarm 1 In Alarm
Slave 1 Comm Error	BV	21	Slave1CommErr	R	0 No Alarm 1 In Alarm
Slave 2 Comm Error	BV	22	Slave2CommErr	R	0 No Alarm 1 In Alarm
Slave 3 Comm Error	BV	23	Slave3CommErr	R	0 No Alarm 1 In Alarm
Slave Load #1	AV_red	1150	Slave1Load	R	0...100%
Slave State #1	MV_red	1154	Slave1State	R	1 Stop 2 Run 3 Alarm 4 ComErr
Slave Load #2	AV_red	1168	Slave2Load	R	0...100%
Slave State #2	MV_red	1172	Slave2State	R	as Slave State #1
Slave Load #3	AV_red	1186	Slave3Load	R	0...100%
Slave State #3	MV_red	1190	Slave3State	R	as Slave State #1



6. Annex A – Alarming

Unit and circuits alarms are coded inside “Alarm Words”. Each bit represents an alarm that is active when the correspondent bit has 1 value. It follows examples:

Unit Alarm Word #1		Encoding		
Value (dec)	Value (bin)	bit	value	Meaning
17.408	0100 0100 0000 0000	0	0	Not Used
		1	0	Not Used
		2	0	Not Used
		3	0	Not Used
		4	0	Not Used
		5	0	Not Used
		6	0	Not Used
		7	0	Demand Limit Fault
		8	0	Not Used
		9	0	Not Used
		10	1	ACTIVE: Evaporator Entering water temperature sensor fault
		11	0	Evaporator flow loss
		12	0	Evaporator freeze unit
		13	0	Not Used
		14	1	ACTIVE: Evaporator leaving water temperature sensor fault
		15	0	Evaporator pump 1 fault

Circuit #2 Alarm Word #2		Encoding		
Value (dec)	Value (bin)	bit	value	Meaning
1.089	0000 0100 0100 0001	0	1	ACTIVE: High motor temperature
		1	0	Not Used
		2	0	High Vfd Amperes
		3	0	Not Used
		4	0	Not Used
		5	0	Not Used
		6	1	ACTIVE: Low discharge superheat
		7	0	Low evaporating pressure
		8	0	Low pressure ratio
		9	0	Not Used
		10	1	ACTIVE: Mechanical high pressure switch
		11	0	No pressure at start
		12	0	No pressure change at start
		13	0	Not Used
		14	0	Not Used
		15	0	Pumpdown fail

**6.1 Annex A – Unit Alarm Words**

Unit	bit #	Alarm	SIC	SPLIT	R454C	R290
Alarm Word #1	0	<i>Not Used</i>				
	1	<i>Not Used</i>				
	2	<i>Not Used</i>				
	3	<i>Not Used</i>				
	4	<i>Not Used</i>				
	5	<i>Not Used</i>				
	6	<i>Not Used</i>				
	7	Demand Limit Fault	X	X	X	X
	8	<i>Not Used</i>				
	9	<i>Not Used</i>				
	10	Evaporator Entering water temperature sensor fault	X	X	X	X
	11	Evaporator flow loss	X	X	X	X
	12	Evaporator freeze unit	X	X	X	X
	13	<i>Not Used</i>				
	14	Evaporator leaving water temperature sensor fault	X	X	X	X
	15	Evaporator pump 1 fault	X	X	X	X
Alarm Word #2	0	<i>Not Used</i>				
	1	External alarm	X	X	X	X
	2	<i>External Event</i>	-	X	-	X
	3	<i>Not Used</i>				
	4	<i>Not Used</i>				
	5	<i>Not Used</i>				
	6	<i>Not Used</i>				
	7	<i>Not Used</i>				
	8	<i>Not Used</i>				
	9	<i>Not Used</i>				
	10	<i>Not Used</i>				
	11	<i>Not Used</i>				
	12	<i>Not Used</i>				
	13	<i>Not Used</i>				
	14	Low outside ambient temperature lock out	X	X	-	X
	15	Leaving water temperature reset fault	X	X	X	X



Unit	bit #	Alarm	SIC	SPLIT	R454C	R290
Alarm Word #3	0	Outside ambient temperature sensor fault	X	X	X	X
	1	Option extension fault	X	-	X	X
	2	<i>Not Used</i>				
	3	<i>Not Used</i>				
	4	<i>Not Used</i>				
	5	<i>Not Used</i>				
	6	<i>Not Used</i>				
	7	<i>Not Used</i>				
	8	<i>Not Used</i>				
	9	<i>Not Used</i>				
	10	<i>Not Used</i>				
	11	<i>Not Used</i>				
	12	<i>Not Used</i>				
	13	<i>Not Used</i>				
	14	<i>Not Used</i>				
	15	Unit power restore	-	-	-	-
Alarm Word #4	0	ACS communication fail	X	X	X	-
	1	Pump communication fail	X	X	X	X
	2	Domestic Hot Water Alarm	X	X	X	X
	3	Controller Time Not Valid	X	X	X	X
	4	<i>Outdoor Commutication Error</i>	-	X	-	-
	5	<i>Out Mismatch Alarm</i>	-	X	-	-
	6	<i>Software Mismatch Alarm</i>	-	X	-	-
	7	<i>Gas Leakage Alarm</i>	-	X	-	-
	8	<i>Gas Sensor Fault</i>	-	X	-	-
	9	<i>TankWtSenf</i>	X	-	X	X
	10	<i>WaterOverHeatAlm</i>	X	-	X	X
	11	<i>DHW_AntiLeg_AlmEv</i>	-	-	X	X
	12	<i>pCOe Modbus Communication Error</i>	-	-	X	-
	13	<i>Extraction Fan Fault</i>	-	-	-	X
	14	<i>Ground Fault Relay Alarm</i>	-	-	-	X
	15	<i>Inverter DAE communication fail</i>	-	-	-	X
Alarm Word #5	0	<i>Compressor Box Leak Detector comm fail</i>	-	-	-	X
	1	<i>Master electrical panel Leak Detector comm fail</i>	-	-	-	X
	2	<i>Slave electrical panel Leak Detector comm fail</i>	-	-	-	X
	3	<i>POL925 Communication Fail</i>	-	-	-	X
	4	<i>Not Used</i>				
	5	<i>Not Used</i>				
	6	<i>Not Used</i>				
	7	<i>Not Used</i>				
	8	<i>Not Used</i>				
	9	<i>Not Used</i>				
	10	<i>Not Used</i>				



	11	<i>Not Used</i>				
	12	<i>Not Used</i>				
	13	<i>Not Used</i>				
	14	<i>Not Used</i>				
	15	<i>Not Used</i>				

**6.2 Annex A – Circuit Alarm Words**

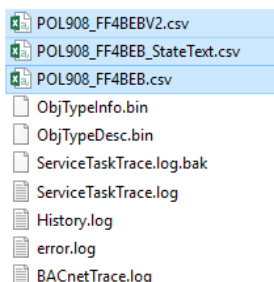
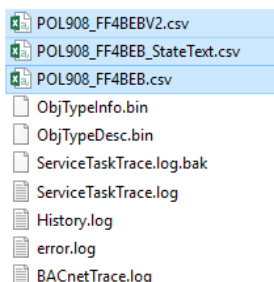
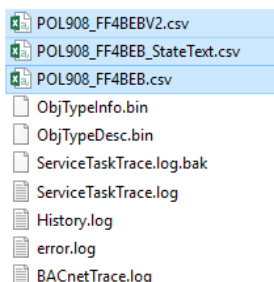
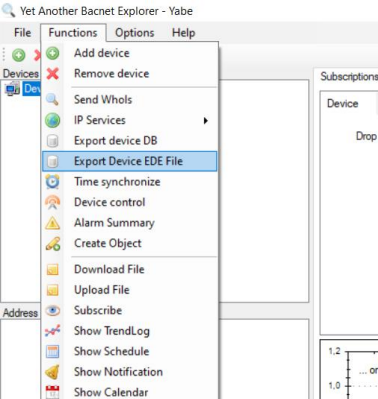
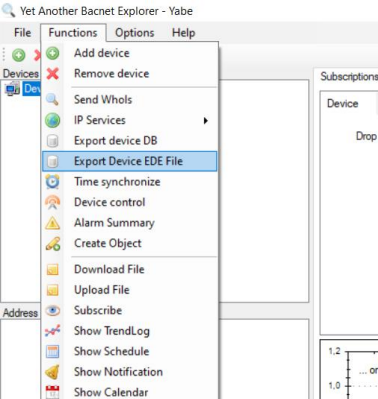
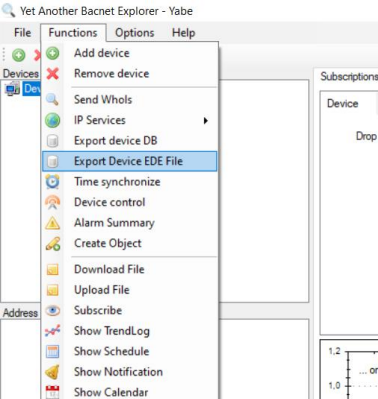
Circuit 1	bit#	Alarm	bit#	Circuit 2	SIC	SPLIT	R454C	R290
Alarm Word#1	0	Condensing pressure sensor fault	0	Alarm Word#1	X	X	X	X
	1	Discharge temperature sensor fault	1		X	X	X	X
	2	<i>Not Used</i>	2					
	3	<i>Not Used</i>	3					
	4	<i>Economizer pressure sensor fault</i>	4		-	-	X	X
	5	<i>Economizer temperature sensor fault</i>	5		-	-	X	X
	6	Evaporating pressure sensor fault	6		X	X	X	X
	7	<i>Not Used</i>	7					
	8	<i>Not Used</i>	8					
	9	<i>Not Used</i>	9					
	10	Fan fault	10		X	X	X	X
	11	Gas leakage	11		X	-	-	
	12	<i>Not Used</i>	12					
	13	High condensing pressure	13		X	X	X	X
	14	High discharge temperature	14		X	X	X	X
	15	<i>Not Used</i>	15					
Alarm Word #2	0	High motor temperature	0	Alarm Word #2	X	X	X	X
	1	<i>Not Used</i>	1					
	2	High Vfd Amperes	2		X	X	X	X
	3	<i>Not Used</i>	3					
	4	<i>Not Used</i>	4					
	5	<i>Not Used</i>	5					
	6	Low discharge superheat	6		X	X	X	X
	7	Low evaporating pressure	7		X	X	X	X
	8	Low pressure ratio	8		X	X	X	X
	9	<i>Not Used</i>	9					
	10	Mechanical high pressure switch	10		X	X	X	X
	11	No pressure at start	11		X	X	X	X
	12	No pressure change at start	12		X	-	X	X
	13	<i>Not Used</i>	13					
	14	<i>Not Used</i>	14					
	15	Pumpdown fail	15		X	X	X	X



Circuit 1	bit #	Alarm	bit #	Circuit 2	SIC	SPLIT	R454C	R290
Alarm Word #3	0	Not Used	0	Alarm Word #3				
	1	Not Used	1					
	2	Not Used	2					
	3	Not Used	3					
	4	Not Used	4					
	5	Suction temperature sensor fault	5		X	X	X	X
	6	Not Used	6					
	7	Vfd communication fail	7		X	X	X	X
	8	Vfd fault	8		X	X	X	X
	9	Not Used	9					
	10	Not Used	10					
	11	Not Used	11					
	12	Not Used	12					
	13	Not Used	13					
	14	Not Used	14					
	15	Not Used	15					
Alarm Word #4	0	Not Used	0	Alarm Word #4				
	1	Not Used	1					
	2	Fan communication alarm	2		X	X	X	X
	3	General Inverter DAE Alarm	3		-	-	-	X
	4	Not Used	4					
	5	Not Used	5					
	6	Not Used	6					
	7	Not Used	7					
	8	Not Used	8					
	9	Not Used	9					
	10	Not Used	10					
	11	Not Used	11					
	12	Not Used	12					
	13	Not Used	13					
	14	Not Used	14					
	15	Not Used	15					



7. 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: <table><tr><th>Step</th><th>Action</th></tr><tr><td>1</td><td>Connect POL908 module to the controller via plug connection.</td></tr><tr><td>2</td><td>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 </td></tr><tr><td>3</td><td>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</td></tr><tr><td>4</td><td>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: </td></tr></table>		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: 
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)	<table><tr><th>Step</th><th>Action</th></tr><tr><td>1</td><td>Connect POL904/908 module to the controller via plug connection.</td></tr><tr><td>2</td><td>Connect PC to POL904 by mean of a RS485-USB converter or to POL908 by mean of ethernet cable.</td></tr><tr><td>3</td><td>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</td></tr><tr><td>4</td><td>From YABE the EDE export option is available in functions menu. </td></tr></table>		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. 
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. 											



8. Annex C – Microtech PICS for BACnet

8.1 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)

8.2 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-OCDB
Network management	Device Management – Backup and Restore-B	DM-BR-B
	Network Management-Connection Establishment-A	NM-CE-A



8.3 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	☐	☐	☐

8.4 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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