BACnet Interface Description

ASHRAE BACnet®

Thermal Energy Meter (TEM)

Edition 2024-04 / V4.1.1

BELIMO®

Contents

BELIMO®

Protocol Implementation Conformance Statement — PICS

General information

Date	15.12.2022
Vendor Name	BELIMO Automation AG
Vendor ID	423
Product Name	Thermal Energy Meter
Product Model Number	22PE…-1U.. e.g. 22PEM-1UC
Application Software Version	04.01.0000
Firmware Revision	14.10.0002
BACnet Protocol Revision	1.14
Product Description	Electronic pressure-independent characterised control valve with energy monitoring
BACnet Standard Device Profile	BACnet Application Specific Controller (B-ASC)
Segmentation Capability	No
Data Link Layer Options	MS/TP Manager BACnet IP, (Annex J) BACnet IP, (Annex J), Foreign Device
Device Address Binding	No static device binding supported
Networking Options	None
Character Sets Supported	ISO 10646 (UTF-8)
Gateway Options	None
Network Security Options	Non-secure device
Conformance	Listed by BTL

BACnet Interoperability Building Blocks supported (BIBBs)

Data sharing — ReadProperty-B (DS-RP-B)
Data sharing — ReadPropertyMultiple-B (DS-RPM-B)
Data sharing — WriteProperty-B (DS-WP-B)
Data sharing — COV-B (DS-COV-B)
Device management — DynamicDeviceBinding-B (DM-DDB-B)
Device management — DynamicObjectBinding-B (DM-DOB-B)
Device management — DeviceCommunicationControl-B (DM-DCC-B)

BACnet MS/TP

Baud Rates	9'600, 19'200, 38'400, 76'800, 115'200 (Default: 38'400)
Address	0…127 (Default: 1)
Number of Nodes	Max. 32 (without repeater), 1 full bus load
Terminating Resistor	120 Ω

BACnet MS/TP

Port	open (Default: 47'808)

Parametrisation

Tool	Belimo Assistant App or integrated webserver

⚠️ All writeable objects with instance number ≥ 90 are persistent and are **not** supposed to be written on a regular basis.

Object processing

Object type	Optional properties	Writeable properties
Device	Description Location Active COV Subscriptions Max Master Max Info Frames Profile Name	Object Identifier Object Name Location Description APDU Timeout (1'000…60'000) Number of APDU Retries (0…10) Max Master (1…127) Max Info Frames (1…30)
Analog Input [AI]	Description COV Increment	COV Increment
Analog Output [AO]	Description COV Increment	Present Value COV Increment Relinquish Default
Analog Value [AV]	Description COV Increment	Present Value COV Increment
Binary Input [BI]	Description Active Text Inactive Text	–
Binary Value [BV]	Description Active Text State Text	Present
Multi-state Input [MI]	Description State Text	–
Multi-state Output [MO]	Description State Text	Present Value Relinquish Default
Multi-state Value [MV]	Description State Text	Present Value
Positive Integer Value [PIV]	Description	–

The device does not support the services CreateObject and DeleteObject.

The specified maximum length of writeable strings is based on single-byte characters.
– Object name 32 char
– Location 64 char
– Description 64 char

Service processing

The device supports the DeviceCommunicationControl services.
No password is required.

A maximum of 6 active COV subscriptions with a lifetime of 1…28'800 s (max. 8 hours) are supported.

BACnet object description

Object name	Object type [Instance]	Description Comment	Values	COV increment	Access
Device_Name	Device [Inst.No]	BACnet internetwork-wide unique number for device identification. This value plus the parameterized MAC address (0...127) define the Device-ID.	0...4'194'302 Default: 1	–	R
Sens1Active_Volt	AI[20]	**Sensor 1 as voltage in V** If Sens1Type MV[220] is not 2: Active then Out_Of_Service is TRUE	0...15	0.01...15 Default: 1	R
Sens1Passive_Ohm	AI[21]	**Sensor 1 as resistor in Ω** If Sens1Type MV[220] is not 4: Passive then Out_Of_Service is TRUE	0.1...1'000'000	0.1...1'000'000 Default: 1	R
T1_UnitSel	AI[22]	**Temperature 1 (remote) in selected unit** Unit can be selected with object	-20...120	0.01...252 Default: 1	R
T2_UnitSel	AI[23]	**Temperature 2 (flow body) in selected unit** Unit can be selected with object	-20...120	0.01...252 Default: 1	R
RelFlow	AV[10]	**Relative volumetric flow in % of qp** (Nominal volumetric flow) Related to VNom_UnitSel [AV100]	0...150	0.01...150 Default: 1	R
AbsFlow_UnitSel	AV[19]	**Absolute volumetric flow in selected unit** Unit can be selected with object MV[123]	0...1,5*qp	0...1,5*qp Default: 1	R
Sens1Temp_UnitSel	AV[20]	**Sensor 1 as temperature in selected unit** Unit can be selected with object If Sens1PassiveType MV[221] is 1:None or Sens1Type MV[220] is not 3:Passive then Out_Of_Service is TRUE	-20...120 Default: 0	0.01...252 Default: 1	R
DeltaT_UnitSel	AV[22]	**Delta temperature in selected unit** Unit can be selected with object MV[128]	0...140	0.01...810 Default: 1	R
CoolingPower_ UnitSel	AV[45]	**Cooling power in selected unit** Unit can be selected with object MV[124]	0...74'150'000	0.1...73'361'050 Default: 1	R
HeatingPower_ UnitSel	AV[46]	**Heating Power in selected unit** Unit can be selected with object MV[124]	0...74'150'000	0...74'150'000 Default: 1	R
CoolingEnergy_ UnitSel	AV[47]	**Cooling energy in selected unit** Unit can be selected with object MV[125]. See also MV[200]	0...2'147'483'641	$1...1.35_E12$ Default: 1	–
HeatingEnergy_ UnitSel	AV[48]	**Heating energy in selected unit** Unit can be selected with object MV[125]. See also MV[200]	0...2'147'483'641	$1...1.35_E12$ Default: 1	–
VolumeDecimal_ UnitSel	AV[50]	**Decimal number of the Volume_m3 object** Resolution of 0.01 m^3 of the Object PIV[50]. See also MV[200]	0.01...0.99	0.01-0.99 Default: 0.1	R
Volume_UnitSel	AV[52]	**Accumulated volume in selected unit** Unit can be selected with object MV[126]. See also MV[200]	0...2'147'483'641	$1...4.2_E10$ Default: 1	R
GlycolConcentra- tion	AV[60]	**Glycol concentration in %** Measured value or override value in settings	0...100	0.01...100 Default: 1	R
Vnom_UnitSel	AV[100]	**Nominal volumetric flow (qp) in selected unit** Unit can be selected with object MV[123]	0...360'000	0...360'000 Default: 1	R

Object name	Object type [Instance]	Description Comment	Values	COV increment	Access
BusWatchdog	AV[130]	**Timeout for bus watchdog in s** Non functional. Reserved for future extension	0…3'600 Default: 0	0.01…120 Default: 1	W
ErrorState	AV[140]	**Error State** Value is bit-coded. More than one bit can be set to 1. Not all bits mentioned in the enumeration are used for this product range. 3: Reverse flow: Reverse flow is detected 6: Flow actual exceeds flow nominal : Actual flow exceeds qp (designed nominal volumetric flow). 7: Flow measurement error: Air in the system, error occurred during flow measurement. 8: Remote temperature not OK: No connection to external temperature sensor. 9: Flowbody temperature not OK: Error with embedded temperature sensor. 10: Communication to sensor interrupted: Internal communication to flow sensor interrupted. 11: Freeze warning: Measured temperature & glycol concentration indicate that grease ice can build up. 12: Glycol detected: Glycol was detected in a MID application.	Bitmask = 0: – 1: – 2: – 3: Reverse flow 4: – 5: – 6: Flow actual exceeds flow nominal 7: Flow measurement error 8: Remote temperature not OK 9: Flowbody temperature not OK 10: Communication to Sensor interrupted 11: Freeze warning 12: Glycol detected 13: – 14: – 15: –	1…16'383 Default: 0	R

Object name	Object type [Instance]	Description Comment Status_Flags	Values	Access
Sens1Switch	BI[20]	**Sensor 1 as switch** If Sens1Type MV[220] is not 5: Switch then Out_Of_Service is TRUE	0: Inactive 1: Active	R
BusTermination	BV[99]	**Bus termination**	0: Disabled 1: Enabled	R
SummaryStatus	MV[99]	**Summary Status** Summarizes all status MV[102] – MV[107]	1: Ok 2: Warning 3: Not Ok	R
StatusSensor	MV[103]	**Status sensor** Indicates informations within the flow sensor and both temperature sensors. 2: Flow measurement error: Air in the system, error occurred during flow measurement. 3: Flowbody temperature not OK: Error with embedded temperature sensor. 4: Remote temperature not OK: No connection to external temperature sensor. 5: Communication to sensor interrupted: Internal communication to flow sensor interrupted.	1: OK 2: Flow measurement error 3: Flowbody temperature not OK 4: Remote temperature not OK 5: Communication to flow sensor interrupted	R

Object name	Object type [Instance]	Description Comment Status_Flags	Values		Access
StatusFlow	MV[104]	**Status flow** 2: Actual flow exceeds nominal flow: Actual flow exceeds the designed nominal flow. 5: Reverse flow detected: Energy Valves detected a reverse flow.	1: OK 2: Actual flow exceeds nominal flow 3: – 4: – 5: Reverse flow		R
StatusMedia	MV[105]	**Status media** 2: Glycol detected: Glycol was detected in a MID application. 3: Freeze warning: Measured temperature & glycol concentration indicate that grease ice can build up.	1: OK 2: Glycol detected 3: Freeze warning		R
UnitSelFlow	MV[123]	**Unit selection flow** The selected unit is valid for AV[17], AV[19], AV[93], AV[97], AV[100], AV[127]	1: m^3/s 2: m^3/h 3: l/s 4: l/min	5: l/h 6: gpm 7: cfm Default: 5	W
UnitSelPower	MV[124]	**Unit selection power** The selected unit is valid for AV[45], AV[46], AV[113], AV[116]	1: W 2: kW 3: MW 4: BTU/h	5: kBTU/h 6: ton Default: 2	W
UnitSelEnergy	MV[125]	**Unit selection energy** The selected unit is valid for AV[47], AV[48], PIV[31], PIV[32]	1: J 2: kJ 3: MJ 4: GJ 5: Wh 6: kWh	7: MWh 8: BTU 9: kBTU 10: tonh Default: 6	W
UnitSelVolume	MV[126]	**Unit selection volume** The selected unit is valid for AV[50], AV[52], PIV[50]	1: m^3 2: Litre 3: Gallon 4: Cubic Foot	Default: 1	W
UnitSelTemperature	MV[127]	**Unit selection temperature sensor** The selected unit is valid for AV[20], AI[22], AV[23]	1: Degree C 2: K 3: Degree F	Default: 1	W
UnitSelDeltaT	MV[128]	**Unit selection Delta T** The selected unit is valid for AV[22]	1: Degree C 2: K 3: Degree F	Default: 1	W
SelectMeterRegisters	MV[200]	**Select between certified meter register and lifetime register.** Value 1 only available for models with MID certification EV..R2+MID For non MID certificied models Values 2 is defined as default. The certified meter register will be reset when the sensor module is replaced. The lifetime register is compensated for glycol (if applicable). Avoid toggling between the two registers as this will affect data logging.	1: Certified meter register 2: Lifetime meter register Default: 1		W
Sens1Type	MV[220]	**Sensor 1 type** Additional sensor input	1: None 2: Active Volt 3: –	4: Passive 5: Switch Default: 1	W

Object name	Object type [Instance]	Description Comment Status_Flags	Values		Access
Sens1TempType	MV[221]	**Sensor 1 passive type**	1: None 2: PT1000 3: Ni1000EU 4: – 5: –	6: – 7: – 8: NTC10k2 9: NTC10k3 Default: 1	W
CoolingEnergyPIV_ UnitSel	PIV[31]	**Cooling energy in selected unit** Unit can be selected with object MV[125]. See also MV[200]	0...2'147'483'647		R
HeatingEnergyPIV_ UnitSel	PIV[32]	**Heating energy in selected unit** Unit can be selected with object MV[125]. See also MV[200]	0...2'147'483'647		R
VolumePIV_ UnitSel	PIV[50]	**Accumulated volume in selected unit** Unit can be selected with object MV[126]. See also MV[200]	0...2'147'483'647		R
MeterSerialNo_ Part1	PIV[201]	**Energy meter serial number first digits** ProductionOrderNumber	–		R
MeterSerialNo_ Part2	PIV[202]	**Energy meter serial number last digits** ProductionSequenceNumber	–		R

Access: R = Read, W = Write

Note: According to the present configuration settings of the Product (e.g. DN size) the HVAC application may perform a size limitation within the indicated BACnet value range.

All inclusive.

Belimo as a global market leader develops innovative solutions for the controlling of heating, ventilation and air-conditioning systems. Damper actuators, control valves, sensors and meters represent our core business.

Always focusing on customer value, we deliver more than only products. We offer you the complete product range for the regulation and control of HVAC systems from a single source. At the same time, we rely on tested Swiss quality with a five-year warranty. Our worldwide representatives in over 80 countries guarantee short delivery times and comprehensive support through the entire product life. Belimo does indeed include everything.

The "small" Belimo devices have a big impact on comfort, energy efficiency, safety, installation and maintenance.

In short: Small devices, big impact.

5 | 5-year warranty

On site around the globe

Complete product range

Tested quality

Short delivery times

Comprehensive support

BELIMO Automation AG
Brunnenbachstrasse 1, 8340 Hinwil, Switzerland
+41 43 843 61 11, info@belimo.ch, www.belimo.com

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