# CALEC® ST– BACnet MS/TP

Protocol Implementation Conformance Statement

CALEC® ST with BACnet MS/TP for cooling and heating applications

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| **Date:** | September 21, 2011 |
| **Vendor Name:** | Aquametro AG (Vendor ID 431) |
| **Product Name:** | CALEC ST with BACnet MS/TP |
| **Product Model Number:** | CALEC ST |
| **Application Software Version:** | V1.06.03 |
| **Firmware Revision:** | V1.00.01 |
| **BACnet Protocol Revision:** | 9 |

## Product Description:

The BTU meter CALEC® ST can be use in various commercial buildings and apartments, mainly for cooling and heating applications.
The system based on signal inputs of two matched temperature sensors and any of e.g. Aquametro flow meters.
CALEC® ST provides high accuracy e.g. energy, flow, volume, power, mass and temperature data via the local display and various communication protocols, like BACnet MS/TP, Modbus RTU, LON FTT-10A, M-Bus and N2Open.
Via two auxiliary inputs additional impulses meter (water or oil) can be connected directly to BACnet MS/TP network.

## BACnet Standardized Device Profile (Annex L):

☐ BACnet Operator Workstation (B-OWS)
☐ BACnet Advanced Operator Workstation (B-AWS)
☐ BACnet Operator Display (B-OD)
☐ 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)

## BACnet Interoperability Building Blocks (BIBB) Supported (Annex K):

**Data sharing services:**

| Name | BIBB |
|---|---|
| Data Sharing-Read Property-B | DS-RP-B |
| Data Sharing-Read PropertyMultiple-B | DS-RPM-B |
| Data Sharing-Write Property-B | DS-WP-B |
| Data Sharing-COV-B | DS-COV-B |
| Data Sharing-COV-Unsoliced-B | DS-COVU-B |

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## Protocol Implementation Conformance Statement

**Device management services:**

| Name | BIBB |
|---|---|
| Device Management-Dynamic Device Binding-B | DM-DDB-B |
| Device Management-Dynamic Object Binding-B | DM-DOB-B |
| Device Management-Device CommunicationControl-B | DM-DCC-B |
| Device Management-Reinitialize Device-B | DM-RD-B |
| Device Management-Time Synchronisation-B | DM-TS-B |
| Device Management-UTCTime Synchronisation | DM-UTC-B |

### Segmentation Capability:

Segmentation is not supported

☐ Segmented requests supported Window Size
☐ Segmented responses supported Window Size

### Standard Object Types Supported:

☑ **Device related parameters are supported in the Device Object**
☑ **All measurement values are mapped to Analog input objects**

### Data Link Layer Options:

☐ BACnet IP, (Annex J)
☐ BACnet IP, (Annex J), Foreign Device
☐ ISO 8802-3, Ethernet (Clause 7)
☐ ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
☐ ANSI/ATA 878.1, RS-485 ARCNET (Clause 8), baud rate(s)
☑ **MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800**
☑ **MS/TP slave (Clause 9), baud rate(s): 9600, 19200, 38400, 76800**
☐ Point-To-Point, EIA 232 (Clause 10), baud rate(s):
☐ Point-To-Point, modem, (Clause 10), baud rate(s):
☐ LonTalk, (Clause 11), medium:
☐ BACnet/ZigBee (ANNEX O)
☐ Other:

### Device Address Binding:

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.) ☐Yes ☑ **No**

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## Protocol Implementation Conformance Statement

### Networking Options:

☐ Router, Clause 6 - List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
☐ Annex H, BACnet Tunneling Router over IP
☐ BACnet/IP Broadcast Management Device (BBMD)

Does the BBMD support registrations by Foreign Devices? ☐ Yes ☑ **No**
Does the BBMD support network address translation? ☐ Yes ☑ **No**

### Character Sets Supported:

The Character Set “ANSI X3.4” is supported.

### Complete object list for CALEC ST with BACnet MS/TP:

| Object Name | ObjectType |
|---|---|
| Calec BACnet | Device |
| AI-0-Energy | Analog Input |
| AI-1-Energy-BDE | Analog Input |
| AI-2-Volume | Analog Input |
| AI-3-Volume-BDE | Analog Input |
| AI-4-Mass | Analog Input |
| AI-5-Auxiliary Counter 1 | Analog Input |
| AI-6-Auxiliary Counter 2 | Analog Input |
| AI-7-Auxiliary Counter 3 | Analog Input |
| AI-8-Power | Analog Input |
| AI-9-Volume Flow | Analog Input |
| AI-10-Mass Flow | Analog Input |
| AI-11-Temperature warm | Analog Input |
| AI-12-Temperature cold | Analog Input |
| AI-13-Temperature difference | Analog Input |
| AI-14-Density | Analog Input |

**Detailed Object information**

## Device Object:

| Property Identifier | Property Datatype | Confor-mance Code | Value Calec MSTP |
|---|---|---|---|
| Object_Identifier | BACnetObjectIdentifier | R | (device, 37129) |
| Object_Name | CharacterString | W | "Calec BACnet" |
| Object_Type | BACnetObjectType | R | device |
| System_Status | BACnetDeviceStatus | R | OPERATIONAL |
| Vendor_Name | CharacterStirng | R | „Aquametro AG“ |
| Vendor_Identifier | Unsigned16 | R | 431 |
| Model_Name | CharacterString | R | "CALEC ST MS/TP" |
| Firmware_Revision | CharacterSring | R | "V1.00.01" |
| Application_Software_Revision | CharacterString | R | "V1.06.03" |
| Location | CharacterString | W | "No Location set" |
| Description | CharacterString | R | "CALEC BTU METER" |
| Protocol_Version | Unsigned | R | 1 |
| Protocol_Revision | Unsigned | R | 9 |
| Protocol_Services_Supported | BACnetServicesSupported | R | **{F,F,F,F,F,T,F,F,F,F,F,F,T,F,T,T,F ,T,F,F,T,F,F,F,F,F,F,F,F,F,F,F,T,T, T,F,T,F,F,F}**<br><br>**0,1,2,3,4,5,6,7,8,9,0,1,2,3,4,5,6,7,8,9, 0,1,2,3,4,5,6,7,8,9,0,1,2,3,4,5,6,7,8,9**<br><br>confirmedCOVNotification (1)<br>subscribeCOV (5)<br>readProperty (12)<br>readPropertyMultiple (14)<br>writeProperty (15)<br>deviceCommunicationControl (17)<br>reinitializeDevice (20)<br>I am (26)<br>I have (27)<br>unconfirmedCOVNotification (28)<br>timeSynchronisation (32)<br>who has (33)<br>who is (34)<br>utc time synchronisation (36) |
| ProtocolObjectTypesSupported | BACnetObjectTypesSupported | R | **{T,F,F,F,F,F,F,F,T,F,F,F,F,F,F,F ,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F,F, F,F,F,F}**<br><br>**0,1,2,3,4,5,6,7,8,9,0,1,2,3,4,5,6,7,8,9, 0,1,2,3,4,5,6,7,8,9,0,1,2,3,4,5,6,7**<br><br>Analog_Input<br>Device |

| | | | |
|---|---|---|---|
| Object_List | BACnetArray[N] of Object Identifier | R | {<br>(device, 37129),<br>(analog-input, 0),<br>(analog-input, 1),<br>(analog-input, 2),<br>(analog-input, 3),<br>(analog-input, 4),<br>(analog-input, 5),<br>(analog-input, 6),<br>(analog-input, 7),<br>(analog-input, 8),<br>(analog-input, 9),<br>(analog-input, 10),<br>(analog-input, 11),<br>(analog-input, 12),<br>(analog-input, 13),<br>(analog-input, 14)<br>} |
| Max_APDU_Length_Accepted | Unsigned | R | 128 |
| Segmentation_Supported | BACnetSegmentaion | R | no-segmentation |
| LocalTime | Time | O | (*:*:*.*) |
| LocalData | Date | O | ? |
| Daylight-savings-status | Unsigned | W | ? |
| APDU_Timeout | Unsigned | W | 3000 |
| Number_Of_APDU_Retries | Unsigned | W | 3 |
| Max_Master | Unsigned | W | 127 |
| Max_Info_Frames | Unsigned | W | 1 |
| Device_Address_Binding | List of BACnet-AddressBinding | R | ( ) |
| DatabaseRevision | Unsigned | R | ? |
| Active_COV_Subscriptions | List of BACnetCOV-Subscrition | R | ( ) |

  

### Analog Input Object

| Property Identifier | Property Datatype | Conformance Code | Value Calec MSTP |
|---|---|---|---|
| Object_Identifier | BACnetObjectIdentifier | R | 0-14 |
| Object_Name | CharacterSting | R | "AI-x-abcdefgh"<br>-> see Description |
| Object_Type | BACnetObjectType | R | Analog-input |
| Present_Value | REAL | R | ? |
| Description | CharacterString | O | One of:<br>"Energy"<br>„Energy-BDE“<br>„Volume“<br>„Volume-BDE“<br>„Mass“<br>„Auxiliary Counter 1“<br>„Auxiliary Counter 2“<br>„Auxiliary Counter 3“<br>„Power“<br>„Volume Flow“<br>„Mass Flow“<br>„Temperature warm“<br>„Temperature cold“<br>„Temperature difference“<br>"Density" |
| Status_Flags | BACnetStatusFlags | R | {<br>IN_ALARM,<br>FAULT,<br>OVERRIDDEN,<br>OUT_OF_SERVICE<br>} |
| Event_State | BACnetEventState | R | := ENUMERATED{<br>normal (0),<br>fault (1),<br>offnormal (2),<br>high-limit (3),<br>low-limit (4),<br>} |
| Reliability | BACnetReliability | O | {<br>NO_FAULT_DETECTED,<br>NO_SENSOR,<br>OVER_RANGE,<br>UNDER_RANGE,<br>OPEN_LOOP,<br>SHORTED_LOOP,<br>COMMUNICATION_FAILURE,<br>UNRELIABLE_OTHER<br>} |
| Out_Of_Service | BOOLEAN | W | TRUE, FALSE |
| Update_Interval | Unsigned | O | 200 |

  

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|---|---|---|---|
| Units | BACnetEngineering-Units | R (W) | kilowatt-hours<br>cubic-meters<br>tons<br>kilowatts<br>cubic-meters-per-hour<br>tons-per-hour<br>degrees-celsius<br>degrees-Kelvin<br>kilograms-per-cubic-meter<br><br>-> Unit lists see “Extended AI-Block description (units)” |
| COV_Increment | REAL | W | 1.0 |

**Extended AI-Block description (units):**

| Object Name | Unit | allowed values |
|---|---|---|
| AI-0-Energy | kilowatt-hours | joules,kilojoules,kilojoules-per-kilogramm,megajoules,watt-hours, kilowatt-hours,megawatt-hours,btus,kilo-btus,mega-btus,therms,ton-hours |
| AI-1-Energy-BDE | kilowatt-hours | joules,kilojoules,kilojoules-per-kilogramm,megajoules,watt-hours, kilowatt-hours,megawatt-hours,btus,kilo-btus,mega-btus,therms,ton-hours |
| AI-2-Volume | cubic-meters | cubic-feet, cubic-meters, imperial-gallons, liters, us-gallons |
| AI-3-Volume-BDE | cubic-meters | cubic-feet, cubic-meters, imperial-gallons, liters, us-gallons |
| AI-4-Mass | tons | kilograms, pounds-mass, tons |
| AI-5-Auxiliary Counter 1 | cubic-meters | joules,kilojoules,kilojoules-per-kilogramm,megajoules,watt-hours, kilowatt-hours,megawatt-hours,btus,kilo-btus,mega-btus,therms,ton-hours, cubic-feet, cubic-meters, imperial-gallons, liters, us-gallons, kilograms, pounds-mass, tons |
| AI-6-Auxiliary Counter 2 | cubic-meters | joules,kilojoules,kilojoules-per-kilogramm,megajoules,watt-hours, kilowatt-hours,megawatt-hours,btus,kilo-btus,mega-btus,therms,ton-hours, cubic-feet, cubic-meters, imperial-gallons, liters, us-gallons, kilograms, pounds-mass, tons |
| AI-7-Auxiliary Counter 3 | cubic-meters | joules,kilojoules,kilojoules-per-kilogramm,megajoules,watt-hours, kilowatt-hours,megawatt-hours,btus,kilo-btus,mega-btus,therms,ton-hours, cubic-feet, cubic-meters, imperial-gallons, liters, us-gallons, kilograms, pounds-mass, tons |
| AI-8-Power | kilowatts | milliwatts, watts, kilowatts, megawatts, btus-per-hour, kilo-btus-per-hour, horsepower, tons-refrigeration |
| AI-9-Volume Flow | cubic-meters-per-hour | cubic-feet-per-second, cubic-feet-per-minute, cubic-meters-per-second, cubic-meter-per-minute, cubic-meters-per-hour, imperial-gallons-per-minute, liters-per-second, liters-per-minute, liters-per-hour, us-gallons-per-minute |

  

| Object Name | Unit | allowed values |
|---|---|---|
| AI-10-Mass Flow | tons-per-hour | grams-per-second, grams-per-minute, kilograms-per-second, kilograms-per-minute, kilograms-per-hour, pounds-mass-per-second, pounds-mass-per-minute, pound-mass-perhour, tons-per-hour |
| AI-11-Temperature warm | degrees-celsius | degrees-Celsius, degrees-Kelvin, degrees-Fahrenheit |
| AI-12-Temperature cold | degrees-celsius | degrees-Celsius, degrees-Kelvin, degrees-Fahrenheit |
| AI-13-Temperature difference | degrees-Kelvin | - |
| AI-14-Density | kilograms-per-cubic-meter | - |

  