

## **Software description PICS BACnet MS/TP**



## Summary

Description of the standard software of BACnet MS/TP modules:

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## **BMT-DO4**

### **BACnet Protocol Implementation Conformance Statement**

**Date:** 21.02.2020  
**Vendor Name:** METZ CONNECT GmbH  
**Product Name:** BMT-DO4  
**Product Model Number:** 110 886 13 21  
**Application Software Version:** 1.0  
**Firmware Revision:** 2.0  
**BACnet Protocol Revision:** 15

#### **Product Description:**

BACnet MS/TP Application Specific Controller providing 4 Relay Outputs.

#### **BACnet Standardized Device Profile (Annex L):**

☒ BACnet Application Specific Controller (B-ASC)

#### **List all BACnet Interoperability Building Blocks Supported (Annex K):**

|                                                |                         |
|------------------------------------------------|-------------------------|
| Data Sharing-ReadProperty-B                    | (DS-RP-B)               |
| Data Sharing-WriteProperty-B                   | (DS-WP-B)               |
| Data Sharing-COV-B                             | (DS-COV-B)              |
| 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, no Password) |
| Device Management-ReinitializeDevice-B         | (DM-RD-B, no Password)  |

#### **Segmentation Capability:**

☐ Able to transmit segmented messages Window Size \_\_\_\_\_  
☐ Able to receive segmented messages Window Size \_\_\_\_\_

#### **Standard Object Types Supported:**

An object type is supported if it may be present in the device.  
 For each standard Object Type supported provide the following data:

- 1) Whether objects of this type are dynamically creatable using the CreateObject service: None
- 2) Whether objects of this type are dynamically deletable using the DeleteObject service: None
- 3) List of the optional properties supported
- 4) List of all properties that are writable where not otherwise required by this standard
- 5) List of all properties that are conditionally writable where not otherwise required by this standard: None
- 6) List of proprietary properties and for each its property identifier, datatype, and meaning: None
- 7) List of any property range restrictions

**Data Link Layer Options:**

- ☒ MS/TP master (Clause 9)  
☒ MS/TP slave (Clause 9)      baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200

**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

**Networking Options:**

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

**Network Security Options:**

- ☒ Non-secure Device - is capable of operating without BACnet Network Security

**Character Sets Supported:**

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ☒ ISO 10646 (UTF-8)      ☒ IBM™/Microsoft™ DBCS      ☒ ISO 8859-1  
☒ ISO 10646 (UCS-2)      ☒ ISO 10646 (UCS-4)      ☒ JIS X 0208

Default strings implemented in the objects use UTF-8.  
Default strings can be restored by writing an empty string.

**If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:**

- ☐ Yes    ☒ No

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**Configuration Switches**

Hexadecimal switches x10, x1 define the network address (00 – F9) and baud rate (FA – FF).

| Switches  | FA   | FB    | FC    | FD    | FE    | FF     |
|-----------|------|-------|-------|-------|-------|--------|
| Baud Rate | 9600 | 19200 | 38400 | 57600 | 76800 | 115200 |

- Turn switch x10 to E (device is temporarily configured as slave)
- Turn switch x1 to A – F to select baud rate
- Turn switch x10 to F, wait 1 second
- Red and green LEDs are blinking when baud rate has been stored in EEPROM
- Turn switch x10 to select network address
- Turn switch x1 to select network address

The device works as MS/TP master, if network address 0x00 ... Max\_Master (see Device Object) is used.

The device works as MS/TP slave, if network address Max\_Master + 1 ... 0xF9 is used.

## Device Object

| Property                                                           | Remark / Value                                                                                                                                                                          | RW   |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | DEVICE (8)                                                                                                                                                                              | R    |
| Object_Identifier                                                  | device, default instance: 421000 + Network-Address, default may be restored by writing 4194303                                                                                          | RW-E |
| Object_Name                                                        | max. 63 Bytes, default "BMT-DO4_" + Network-Address (Hexadecimal)                                                                                                                       | RW-E |
| Property_List                                                      |                                                                                                                                                                                         | R    |
| Description                                                        | max. 127 Bytes, default ""                                                                                                                                                              | RW-E |
| Location                                                           | max. 63 Bytes, default ""                                                                                                                                                               | RW-E |
| Vendor_Name                                                        | "METZ CONNECT GmbH"                                                                                                                                                                     | R    |
| Vendor_Identifier                                                  | 421                                                                                                                                                                                     | R    |
| Model_Name                                                         | "BMT-DO4"                                                                                                                                                                               | R    |
| Firmware_Revision                                                  | "2.0"                                                                                                                                                                                   | R    |
| Application_Software_Version                                       | "1.0"                                                                                                                                                                                   | R    |
| Protocol_Version                                                   | 1                                                                                                                                                                                       | R    |
| Protocol_Revision                                                  | 15                                                                                                                                                                                      | R    |
| Protocol_Services_Supported                                        | read-property, write-property, subscribe-cov, who-has, who-is, read-range, device-communication-control, reinitialize-device                                                            | R    |
| Protocol_Object_Types_Supported                                    | DEVICE, BINARY_OUTPUT, ANALOG_VALUE                                                                                                                                                     | R    |
| Object_List                                                        | device, binary-output 1...4, analog-value 1                                                                                                                                             | R    |
| Max_APDU_Length_Accepted                                           | 480                                                                                                                                                                                     | R    |
| Segmentation_Supported                                             | NO_SEGMENTATION (3)                                                                                                                                                                     | R    |
| System_Status                                                      | OPERATIONAL (0)                                                                                                                                                                         | R    |
| APDU_Timeout                                                       | 1...65535, default 6000                                                                                                                                                                 | RW-E |
| Number_Of_APDU_Retries                                             | 1...10, default 3                                                                                                                                                                       | RW-E |
| Device_Address_Binding                                             | -                                                                                                                                                                                       | R    |
| Database_Revision                                                  | 0...65535, default 0                                                                                                                                                                    | R-E  |
| Max_Master                                                         | 0...127, default 127                                                                                                                                                                    | RW-E |
| Max_Info_Frames                                                    | 1...255, default 1                                                                                                                                                                      | RW-E |
| Active_COV_Subscriptions                                           | property only exists if working as MS/TP master, services Read-Property / Read-Range, max. 6 Subscriptions, for binary-output 1...4, Confirmed / Unconfirmed, Lifetime = 0...65535 sec. | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                         |      |

## Binary Output Object 1...4

| Property                                                           | Remark / Value                                                                                                      | RW   |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | BINARY_OUTPUT (4)                                                                                                   | R    |
| Object_Identifier                                                  | binary-output, instance 1 ... 4                                                                                     | R    |
| Object_Name                                                        | max. 42 Bytes, default "Relay 1" ... "Relay 4"                                                                      | RW-E |
| Property_List                                                      |                                                                                                                     | R    |
| Description                                                        | max. 84 Bytes, default ""                                                                                           | RW-E |
| Inactive_Text                                                      | max. 20 Bytes, default "Off"                                                                                        | RW-E |
| Active_Text                                                        | max. 20 Bytes, default "On"                                                                                         | RW-E |
| Present_Value                                                      | NULL (write only) / INACTIVE (0) / ACTIVE (1)                                                                       | RW   |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0 = Switch A (Auto)<br>1 = Switch 0 (Off) or 1 (On)<br>OUT_OF_SERVICE: 0 / 1 | R    |
| Event_State                                                        | NORMAL (0)                                                                                                          | R    |
| Out_Of_Service                                                     | FALSE (0) / TRUE (1)                                                                                                | RW   |
| Polarity                                                           | NORMAL (0) / REVERSE (1)                                                                                            | RW-E |
| Priority_Array [16]                                                | NULL / INACTIVE (0) / ACTIVE (1)                                                                                    | R    |
| Relinquish_Default                                                 | INACTIVE (0)                                                                                                        | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                     |      |

| Function Table for Binary Output |          |        |                                          |                   |                  |                |                   |
|----------------------------------|----------|--------|------------------------------------------|-------------------|------------------|----------------|-------------------|
| Out_Of<br>Service                | Polarity | Switch | Priority_Array and<br>Relinquish_Default | Present_<br>Value | Binary<br>Output | OVER<br>RIDDEN | OUT_OF<br>SERVICE |
| 0                                | 0        | A      | 0 / 1                                    | 0 / 1             | 0 / 1            | 0              | 0                 |
| 0                                | 0        | 0      | 0 / 1                                    | 0                 | 0                | 1              | 0                 |
| 0                                | 0        | 1      | 0 / 1                                    | 1                 | 1                | 1              | 0                 |
| 0                                | 1        | A      | 0 / 1                                    | 0 / 1             | 1 / 0            | 0              | 0                 |
| 0                                | 1        | 0      | 0 / 1                                    | 1                 | 0                | 1              | 0                 |
| 0                                | 1        | 1      | 0 / 1                                    | 0                 | 1                | 1              | 0                 |
| 1                                | 0        | A      | 0 / 1                                    | 0 / 1             | 0                | 0              | 1                 |
| 1                                | 0        | 0      | 0 / 1                                    | 0 / 1             | 0                | 0              | 1                 |
| 1                                | 0        | 1      | 0 / 1                                    | 0 / 1             | 1                | 0              | 1                 |
| 1                                | 1        | A      | 0 / 1                                    | 0 / 1             | 1                | 0              | 1                 |
| 1                                | 1        | 0      | 0 / 1                                    | 0 / 1             | 0                | 0              | 1                 |
| 1                                | 1        | 1      | 0 / 1                                    | 0 / 1             | 1                | 0              | 1                 |

## Analog Value Object 1

| Property                                                           | Remark / Value                                                                       | RW   |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------|------|
| Object_Type                                                        | ANALOG_VALUE (2)                                                                     | R    |
| Object_Identifier                                                  | analog-value, instance 1                                                             | R    |
| Object_Name                                                        | max. 42 Bytes, default "Watchdog Time"                                               | RW-E |
| Property_List                                                      |                                                                                      | R    |
| Description                                                        | max. 84 Bytes, default ""                                                            | RW-E |
| Present_Value                                                      | Time Constant of Watchdog Timer,<br>0: Watchdog is inactive, Maximum: 655.34 seconds | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                        | R    |
| Event_State                                                        | NORMAL (0)                                                                           | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                            | R    |
| Units                                                              | seconds (73)                                                                         | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                      |      |

The Watchdog Timer resets Present\_Value of all output objects to Relinquish\_Default, if BACnet communication fails permanently.

The timer is restarted, when a BACnet message with an APDU is received.

When the timer times out, the priority arrays of all output objects are completely cleared to NULL.

## **BMT-TO4**

### **BACnet Protocol Implementation Conformance Statement**

**Date:** 21.02.2020  
**Vendor Name:** METZ CONNECT GmbH  
**Product Name:** BMT-TO4  
**Product Model Number:** 110 880 13  
**Application Software Version:** 1.0  
**Firmware Revision:** 2.0  
**BACnet Protocol Revision:** 15

#### **Product Description:**

BACnet MS/TP Application Specific Controller providing 4 Triac Outputs.  
 In operating mode "Pulse Width Control" pulses with programmable period and duty cycle are generated.

#### **BACnet Standardized Device Profile (Annex L):**

☒ BACnet Application Specific Controller (B-ASC)

#### **List all BACnet Interoperability Building Blocks Supported (Annex K):**

|                                                |                         |
|------------------------------------------------|-------------------------|
| Data Sharing-ReadProperty-B                    | (DS-RP-B)               |
| Data Sharing-WriteProperty-B                   | (DS-WP-B)               |
| Data Sharing-COV-B                             | (DS-COV-B)              |
| 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, no Password) |
| Device Management-ReinitializeDevice-B         | (DM-RD-B, no Password)  |

#### **Segmentation Capability:**

☐ Able to transmit segmented messages      Window Size \_\_\_\_\_  
☐ Able to receive segmented messages      Window Size \_\_\_\_\_

#### **Standard Object Types Supported:**

An object type is supported if it may be present in the device.  
 For each standard Object Type supported provide the following data:

- 1) Whether objects of this type are dynamically creatable using the CreateObject service: None
- 2) Whether objects of this type are dynamically deletable using the DeleteObject service: None
- 3) List of the optional properties supported
- 4) List of all properties that are writable where not otherwise required by this standard
- 5) List of all properties that are conditionally writable where not otherwise required by this standard: None
- 6) List of proprietary properties and for each its property identifier, datatype, and meaning: None
- 7) List of any property range restrictions

**Data Link Layer Options:**

- ☒ MS/TP master (Clause 9)  
☒ MS/TP slave (Clause 9)      baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200

**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

**Networking Options:**

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

**Network Security Options:**

- ☒ Non-secure Device - is capable of operating without BACnet Network Security

**Character Sets Supported:**

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ☒ ISO 10646 (UTF-8)      ☒ IBM™/Microsoft™ DBCS      ☒ ISO 8859-1  
☒ ISO 10646 (UCS-2)      ☒ ISO 10646 (UCS-4)      ☒ JIS X 0208

Default strings implemented in the objects use UTF-8.  
 Default strings can be restored by writing an empty string.

**If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:**

- ☐ Yes    ☒ No

**Configuration Switches**

Hexadecimal switches x10, x1 define the network address (00 – F9) and baud rate (FA – FF).

| Switches  | FA   | FB    | FC    | FD    | FE    | FF     |
|-----------|------|-------|-------|-------|-------|--------|
| Baud Rate | 9600 | 19200 | 38400 | 57600 | 76800 | 115200 |

- Turn switch x10 to E (device is temporarily configured as slave)
- Turn switch x1 to A – F to select baud rate
- Turn switch x10 to F, wait 1 second
- Red and green LEDs are blinking when baud rate has been stored in EEPROM
- Turn switch x10 to select network address
- Turn switch x1 to select network address

The device works as MS/TP master, if network address 0x00 ... Max\_Master (see Device Object) is used.

The device works as MS/TP slave, if network address Max\_Master + 1 ... 0xF9 is used.

## Device Object

| Property                                                           | Remark / Value                                                                                                                                                                                                               | RW   |
|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | DEVICE (8)                                                                                                                                                                                                                   | R    |
| Object_Identifier                                                  | device, default instance: 421000 + Network-Address,<br>default may be restored by writing 4194303                                                                                                                            | RW-E |
| Object_Name                                                        | max. 63 Bytes,<br>default "BMT-TO4_" + Network-Address (Hexadecimal)                                                                                                                                                         | RW-E |
| Property_List                                                      |                                                                                                                                                                                                                              | R    |
| Description                                                        | max. 127 Bytes, default ""                                                                                                                                                                                                   | RW-E |
| Location                                                           | max. 63 Bytes, default ""                                                                                                                                                                                                    | RW-E |
| Vendor_Name                                                        | "METZ CONNECT GmbH"                                                                                                                                                                                                          | R    |
| Vendor_Identifier                                                  | 421                                                                                                                                                                                                                          | R    |
| Model_Name                                                         | "BMT-TO4"                                                                                                                                                                                                                    | R    |
| Firmware_Revision                                                  | "2.0"                                                                                                                                                                                                                        | R    |
| Application_Software_Version                                       | "1.0"                                                                                                                                                                                                                        | R    |
| Protocol_Version                                                   | 1                                                                                                                                                                                                                            | R    |
| Protocol_Revision                                                  | 15                                                                                                                                                                                                                           | R    |
| Protocol_Services_Supported                                        | read-property, write-property, subscribe-cov, who-has,<br>who-is, read-range, device-communication-control,<br>reinitialize-device                                                                                           | R    |
| Protocol_Object_Types_Supported                                    | DEVICE, BINARY_OUTPUT, ANALOG_VALUE,<br>ANALOG_OUTPUT, MULTISTATE_VALUE                                                                                                                                                      | R    |
| Object_List                                                        | device, binary-output 1...4, analog-value 1...5,<br>analog-output 1...4, multistate-value 1...4                                                                                                                              | R    |
| Max_APDU_Length_Accepted                                           | 480                                                                                                                                                                                                                          | R    |
| Segmentation_Supported                                             | NO_SEGMENTATION (3)                                                                                                                                                                                                          | R    |
| System_Status                                                      | OPERATIONAL (0)                                                                                                                                                                                                              | R    |
| APDU_Timeout                                                       | 1...65535, default 6000                                                                                                                                                                                                      | RW-E |
| Number_Of_APDU_Retries                                             | 1...10, default 3                                                                                                                                                                                                            | RW-E |
| Device_Address_Binding                                             | -                                                                                                                                                                                                                            | R    |
| Database_Revision                                                  | 0...65535, default 0                                                                                                                                                                                                         | R-E  |
| Max_Master                                                         | 0...127, default 127                                                                                                                                                                                                         | RW-E |
| Max_Info_Frames                                                    | 1...255, default 1                                                                                                                                                                                                           | RW-E |
| Active_COV_Subscriptions                                           | property only exists if working as MS/TP master,<br>services Read-Property / Read-Range,<br>max. 10 Subscriptions,<br>for binary-output 1...4 and analog-output 1...4,<br>Confirmed / Unconfirmed, Lifetime = 0...65535 sec. | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                                                              |      |

## Multistate Value Object 1...4

| Property                                                           | Remark / Value                                                           | RW   |
|--------------------------------------------------------------------|--------------------------------------------------------------------------|------|
| Object_Type                                                        | MULTISTATE_VALUE (19)                                                    | R    |
| Object_Identifier                                                  | multistate-value, instance 1 ... 4                                       | R    |
| Object_Name                                                        | max. 42 bytes,<br>default "Operating Mode 1" ... "Operating Mode 4"      | RW-E |
| Property_List                                                      |                                                                          | R    |
| Description                                                        | max. 84 bytes, default ""                                                | RW-E |
| State_Text                                                         | max. 20 bytes, default<br>1: "Binary Output"<br>2: "Pulse Width Control" | RW-E |
| Present_Value                                                      | Operating Mode of Triac Output 1...4, default 1                          | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0            | R    |
| Event_State                                                        | NORMAL (0)                                                               | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                | R    |
| Number_Of_States                                                   | 2                                                                        | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                          |      |

### Operating Mode 1 "Binary Output"

The triac output is controlled by the Present\_Value of the corresponding Binary Output Object. Output depends on Priority\_Array and Polarity and may be overridden by the Switch.

### Operating Mode 2 "Pulse Width Control"

The triac output generates pulses with a period controlled by the corresponding Analog Value. The pulse width is specified as percentage of the pulse period in the corresponding Analog Output. The Binary Output is overridden by these pulses which themselves may be overridden by the Switch.

## Binary Output Object 1...4

| Property                                                           | Remark / Value                                                                                                      | RW   |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | BINARY_OUTPUT (4)                                                                                                   | R    |
| Object_Identifier                                                  | binary-output, instance 1 ... 4                                                                                     | R    |
| Object_Name                                                        | max. 42 Bytes, default "Triac 1" ... "Triac 4"                                                                      | RW-E |
| Property_List                                                      |                                                                                                                     | R    |
| Description                                                        | max. 84 Bytes, default ""                                                                                           | RW-E |
| Inactive_Text                                                      | max. 20 Bytes, default "Off"                                                                                        | RW-E |
| Active_Text                                                        | max. 20 Bytes, default "On"                                                                                         | RW-E |
| Present_Value                                                      | NULL (write only) / INACTIVE (0) / ACTIVE (1)                                                                       | RW   |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0 = Switch A (Auto)<br>1 = Switch 0 (Off) or 1 (On)<br>OUT_OF_SERVICE: 0 / 1 | R    |
| Event_State                                                        | NORMAL (0)                                                                                                          | R    |
| Out_Of_Service                                                     | FALSE (0) / TRUE (1)                                                                                                | RW   |
| Polarity                                                           | NORMAL (0) / REVERSE (1)                                                                                            | RW-E |
| Priority_Array [16]                                                | NULL / INACTIVE (0) / ACTIVE (1)                                                                                    | R    |
| Relinquish_Default                                                 | INACTIVE (0)                                                                                                        | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                     |      |

| Function Table for Binary Output |          |        |                                          |                   |                  |                |                   |
|----------------------------------|----------|--------|------------------------------------------|-------------------|------------------|----------------|-------------------|
| Out_Of<br>Service                | Polarity | Switch | Priority_Array and<br>Relinquish_Default | Present_<br>Value | Binary<br>Output | OVER<br>RIDDEN | OUT_OF<br>SERVICE |
| 0                                | 0        | A      | 0 / 1                                    | 0 / 1             | 0 / 1            | 0              | 0                 |
| 0                                | 0        | 0      | 0 / 1                                    | 0                 | 0                | 1              | 0                 |
|                                  |          | 1      | 0 / 1                                    | 1                 | 1                |                |                   |
| 0                                | 1        | A      | 0 / 1                                    | 0 / 1             | 1 / 0            | 0              | 0                 |
| 0                                | 1        | 0      | 0 / 1                                    | 1                 | 0                | 1              | 0                 |
|                                  |          | 1      | 0 / 1                                    | 0                 | 1                |                |                   |
| 1                                | 0        | A      | 0 / 1                                    | 0 / 1             | 0                | 0              | 1                 |
| 1                                | 0        | 0      | 0 / 1                                    | 0 / 1             | 0                | 0              | 1                 |
|                                  |          | 1      | 0 / 1                                    | 0 / 1             | 1                |                |                   |
| 1                                | 1        | A      | 0 / 1                                    | 0 / 1             | 1                | 0              | 1                 |
| 1                                | 1        | 0      | 0 / 1                                    | 0 / 1             | 0                | 0              | 1                 |
|                                  |          | 1      | 0 / 1                                    | 0 / 1             | 1                |                |                   |

In Operating Mode "Pulse Width Control" the generated pulses act like the switch toggling between 0 and 1.

Therefore Status\_Flag OVERRIDDEN is set to active and Present\_Value follows the pulses generated. Polarity REVERSE only affects Present\_Value but not the triac output.

## Analog Output Object 1...4

| Property                                                           | Remark / Value                                                                                                           | RW   |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | ANALOG_OUTPUT (1)                                                                                                        | R    |
| Object_Identifier                                                  | analog-output, instance 1 ... 4                                                                                          | R    |
| Object_Name                                                        | max. 42 bytes, default<br>"Pulse Ratio 1" ... "Pulse Ratio 4"                                                            | RW-E |
| Property_List                                                      |                                                                                                                          | R    |
| Description                                                        | max. 84 bytes, default ""                                                                                                | RW-E |
| Present_Value                                                      | 0.0 ... 100.0                                                                                                            | RW   |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0 / 1<br>OUT_OF_SERVICE: 0 / 1                                                    | R    |
| Event_State                                                        | NORMAL (0)                                                                                                               | R    |
| Out_Of_Service                                                     | FALSE (0) / TRUE (1)                                                                                                     | RW   |
| Units                                                              | Percent (98)                                                                                                             | R    |
| Priority_Array [16]                                                | NULL / 0.0 ... 100.0                                                                                                     | R    |
| Relinquish_Default                                                 | 0.0 ... 100.0                                                                                                            | RW-E |
| COV_Increment                                                      | Minimum change of Present_Value for COV notification,<br>default 1.0,<br>property only exists if working as MS/TP master | RW-E |
| Min_Pres_Value                                                     | 0.0 %                                                                                                                    | -    |
| Max_Pres_Value                                                     | 100.0 %                                                                                                                  | -    |
| Resolution                                                         | 10 ms                                                                                                                    | -    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                          |      |

| Function Table for Analog Output |        |                |                    |                    |            |                |
|----------------------------------|--------|----------------|--------------------|--------------------|------------|----------------|
| Out_Of_Service                   | Switch | Priority_Array | Present_Value      | Pulse Ratio        | OVERRIDDEN | OUT_OF_SERVICE |
| 0                                | A      | NULL           | Relinquish_Default | Relinquish_Default | 0          | 0              |
|                                  |        | Value          | Value              | Value              |            |                |
|                                  | 0 / 1  | ...            | 0 / 100 %          | 0 / 100 %          | 1          |                |
| 1                                | A      | NULL           | Relinquish_Default | unchanged          | 0          | 1              |
|                                  |        | Value          | Value              |                    |            |                |
|                                  | 0 / 1  | ...            | 0 / 100 %          |                    | 0          |                |

In Operating Mode "Pulse Width Control" the triac output generates pulses.

The pulse period is controlled by the corresponding Analog Value.

The pulse width is specified as percentage of the pulse period in the corresponding Analog Output.

The Analog Output uses a Priority\_Array so a nonvolatile value may be stored in Relinquish\_Default.

If OVERRIDDEN by the switch the pulse ratio Present\_Value is set to 0 or 100 percent.

## Analog Value Object 2...5

| Property                                                           | Remark / Value                                                      | RW   |
|--------------------------------------------------------------------|---------------------------------------------------------------------|------|
| Object_Type                                                        | ANALOG_VALUE (2)                                                    | R    |
| Object_Identifier                                                  | analog-value, instance 2 ... 5                                      | R    |
| Object_Name                                                        | max. 42 Bytes, default "Pulse Period"                               | RW-E |
| Property_List                                                      |                                                                     | R    |
| Description                                                        | max. 84 Bytes, default ""                                           | RW-E |
| Present_Value                                                      | Time Constant of Pulse Timer,<br>Minimum 0, maximum: 655.34 seconds | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0       | R    |
| Event_State                                                        | NORMAL (0)                                                          | R    |
| Out_Of_Service                                                     | FALSE (0)                                                           | R    |
| Units                                                              | seconds (73)                                                        | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                     |      |

## Analog Value Object 1

| Property                                                           | Remark / Value                                                                       | RW   |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------|------|
| Object_Type                                                        | ANALOG_VALUE (2)                                                                     | R    |
| Object_Identifier                                                  | analog-value, instance 1                                                             | R    |
| Object_Name                                                        | max. 42 Bytes, default "Watchdog Time"                                               | RW-E |
| Property_List                                                      |                                                                                      | R    |
| Description                                                        | max. 84 Bytes, default ""                                                            | RW-E |
| Present_Value                                                      | Time Constant of Watchdog Timer,<br>0: Watchdog is inactive, Maximum: 655.34 seconds | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                        | R    |
| Event_State                                                        | NORMAL (0)                                                                           | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                            | R    |
| Units                                                              | seconds (73)                                                                         | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                      |      |

The Watchdog Timer resets Present\_Value of all output objects to Relinquish\_Default, if BACnet communication fails permanently.

The timer is restarted, when a BACnet message with an APDU is received.

When the timer times out, the priority arrays of all output objects are completely cleared to NULL.

## **BMT-DI4**

### **BACnet Protocol Implementation Conformance Statement**

**Date:** 21.02.2020  
**Vendor Name:** METZ CONNECT GmbH  
**Product Name:** BMT-DI4  
**Product Model Number:** 110 884 13 19  
**Application Software Version:** 1.0  
**Firmware Revision:** 2.0  
**BACnet Protocol Revision:** 15

#### **Product Description:**

BACnet MS/TP Application Specific Controller providing 4 digital inputs.

#### **BACnet Standardized Device Profile (Annex L):**

☒ BACnet Application Specific Controller (B-ASC)

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

|                                                |                         |
|------------------------------------------------|-------------------------|
| Data Sharing-ReadProperty-B                    | (DS-RP-B)               |
| Data Sharing-WriteProperty-B                   | (DS-WP-B)               |
| Data Sharing-COV-B                             | (DS-COV-B)              |
| 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, no Password) |
| Device Management-ReinitializeDevice-B         | (DM-RD-B, no Password)  |

#### **Segmentation Capability:**

☐ Able to transmit segmented messages      Window Size \_\_\_\_\_  
☐ Able to receive segmented messages      Window Size \_\_\_\_\_

#### **Standard Object Types Supported:**

An object type is supported if it may be present in the device.  
 For each standard Object Type supported provide the following data:

- 1) Whether objects of this type are dynamically creatable using the CreateObject service: None
- 2) Whether objects of this type are dynamically deletable using the DeleteObject service: None
- 3) List of the optional properties supported
- 4) List of all properties that are writable where not otherwise required by this standard
- 5) List of all properties that are conditionally writable where not otherwise required by this standard: None
- 6) List of proprietary properties and for each its property identifier, datatype, and meaning: None
- 7) List of any property range restrictions

**Data Link Layer Options:**

- ☒ MS/TP master (Clause 9)  
☒ MS/TP slave (Clause 9)      baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200

**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

**Networking Options:**

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

**Network Security Options:**

- ☒ Non-secure Device - is capable of operating without BACnet Network Security

**Character Sets Supported:**

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ☒ ISO 10646 (UTF-8)      ☒ IBM™/Microsoft™ DBCS      ☒ ISO 8859-1  
☒ ISO 10646 (UCS-2)      ☒ ISO 10646 (UCS-4)      ☒ JIS X 0208

Default strings implemented in the objects use UTF-8.  
 Default strings can be restored by writing an empty string.

**If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:**

- ☐ Yes    ☒ No

**Configuration Switches**

Hexadecimal switches x10, x1 define the network address (00 – F9) and baud rate (FA – FF).

| Switches  | FA   | FB    | FC    | FD    | FE    | FF     |
|-----------|------|-------|-------|-------|-------|--------|
| Baud Rate | 9600 | 19200 | 38400 | 57600 | 76800 | 115200 |

- Turn switch x10 to E (device is temporarily configured as slave)
- Turn switch x1 to A – F to select baud rate
- Turn switch x10 to F, wait 1 second
- Red and green LEDs are blinking when baud rate has been stored in EEPROM
- Turn switch x10 to select network address
- Turn switch x1 to select network address

The device works as MS/TP master, if network address 0x00 ... Max\_Master (see Device Object) is used.

The device works as MS/TP slave, if network address Max\_Master + 1 ... 0xF9 is used.

## Device Object

| Property                                                           | Remark / Value                                                                                                                                                                   | RW   |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | DEVICE (8)                                                                                                                                                                       | R    |
| Object_Identifier                                                  | device, default instance: 421000 + Network-Address, default may be restored by writing 4194303                                                                                   | RW-E |
| Object_Name                                                        | max. 63 bytes, default "BMT-DI4_" + Network-Address (Hexadecimal)                                                                                                                | RW-E |
| Property_List                                                      |                                                                                                                                                                                  | R    |
| Description                                                        | max. 127 bytes, default ""                                                                                                                                                       | RW-E |
| Location                                                           | max. 63 bytes, default ""                                                                                                                                                        | RW-E |
| Vendor_Name                                                        | "METZ CONNECT GmbH"                                                                                                                                                              | R    |
| Vendor_Identifier                                                  | 421                                                                                                                                                                              | R    |
| Model_Name                                                         | "BMT-DI4"                                                                                                                                                                        | R    |
| Firmware_Revision                                                  | "2.0"                                                                                                                                                                            | R    |
| Application_Software_Version                                       | "1.0"                                                                                                                                                                            | R    |
| Protocol_Version                                                   | 1                                                                                                                                                                                | R    |
| Protocol_Revision                                                  | 15                                                                                                                                                                               | R    |
| Protocol_Services_Supported                                        | read-property, write-property, subscribe-cov, who-has, who-is, read-range, device-communication-control, reinitialize-device                                                     | R    |
| Protocol_Object_Types_Supported                                    | DEVICE, BINARY_INPUT, GROUP                                                                                                                                                      | R    |
| Object_List                                                        | device, binary-input 1...4, group 1...3                                                                                                                                          | R    |
| Max_APDU_Length_Accepted                                           | 480                                                                                                                                                                              | R    |
| Segmentation_Supported                                             | NO_SEGMENTATION (3)                                                                                                                                                              | R    |
| System_Status                                                      | OPERATIONAL (0)                                                                                                                                                                  | R    |
| APDU_Timeout                                                       | 1...65535, default 6000                                                                                                                                                          | RW-E |
| Number_Of_APDU_Retries                                             | 1...10, default 3                                                                                                                                                                | RW-E |
| Device_Address_Binding                                             | -                                                                                                                                                                                | R    |
| Database_Revision                                                  | 0...65535, default 0                                                                                                                                                             | R-E  |
| Max_Master                                                         | 0...127, default 127                                                                                                                                                             | RW-E |
| Max_Info_Frames                                                    | 1...255, default 1                                                                                                                                                               | RW-E |
| Active_COV_Subscriptions                                           | property only exists if working as MS/TP master, services Read-Property / Read-Range, max. 6 Subscriptions, for binary-input, Confirmed / Unconfirmed, Lifetime = 0...65534 sec. | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                  |      |

## Binary Input Object 1...4

Terminals 1-...4- = input, L- = ground, connect voltage source.

| Property          | Remark / Value                                                    | RW      |
|-------------------|-------------------------------------------------------------------|---------|
| Object_Type       | BINARY_INPUT (3)                                                  | R       |
| Object_Identifier | binary-input, instance 1 ... 4                                    | R       |
| Object_Name       | max. 42 bytes, default "Input 1" ... "Input 4"                    | RW-E    |
| Property_List     |                                                                   | R       |
| Description       | max. 84 bytes, default ""                                         | RW-E    |
| Inactive_Text     | max. 20 bytes, default "Off"                                      | RW-E    |
| Active_Text       | max. 20 bytes, default "On"                                       | RW-E    |
| Present_Value     | INACTIVE (0) / ACTIVE (1),<br>writable if Out_Of_Service          | R<br>RW |
| Status_Flags      | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0 / 1 | R       |
| Event_State       | NORMAL (0)                                                        | R       |
| Out_Of_Service    | FALSE (0) / TRUE (1)                                              | RW      |
| Polarity          | NORMAL (0) / REVERSE (1)                                          | RW-E    |

R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash

| Function Table for Binary Input |          |              |               |                |
|---------------------------------|----------|--------------|---------------|----------------|
| Out_Of_Service                  | Polarity | Binary Input | Present_Value | OUT_OF_SERVICE |
| 0                               | 0        | 0<br>1       | 0<br>1        | 0              |
| 0                               | 1        | 0<br>1       | 1<br>0        | 0              |
| 1                               | 0        | 0<br>1       | x             | 1              |
| 1                               | 1        | 0<br>1       | x             | 1              |

x: Present\_Value is writable and not affected by inputs

## Group Object 1...3

| Property                                                           | Remark / Value                                    | RW   |
|--------------------------------------------------------------------|---------------------------------------------------|------|
| Object_Type                                                        | GROUP (11)                                        | R    |
| Object_Identifier                                                  | group, instance 1 ... 3                           | R    |
| Object_Name                                                        | max. 42 bytes, default "Group 1" ... "Group 3"    | RW-E |
| Property_List                                                      |                                                   | R    |
| Description                                                        | max. 84 bytes, default ""                         | RW-E |
| Present_Value                                                      | Present_Value of Binary Inputs,<br>see next Table | R    |
| List_Of_Group_Members                                              | see next Table                                    | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                   |      |

| Members of Groups |              |   |   |   |
|-------------------|--------------|---|---|---|
| Group             | Binary Input |   |   |   |
|                   | 1            | 2 | 3 | 4 |
| 1                 | x            | x | x | x |
| 2                 | x            | x |   |   |
| 3                 |              |   | x | x |



## **BMT-DI10**

### **BACnet Protocol Implementation Conformance Statement**

**Date:** 21.02.2020  
**Vendor Name:** METZ CONNECT GmbH  
**Product Name:** BMT-DI10  
**Product Model Number:** 110 881 13 19  
**Application Software Version:** 1.0  
**Firmware Revision:** 2.0  
**BACnet Protocol Revision:** 15

#### **Product Description:**

BACnet MS/TP Application Specific Controller providing 10 digital inputs.

#### **BACnet Standardized Device Profile (Annex L):**

☒ BACnet Application Specific Controller (B-ASC)

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

|                                                |                         |
|------------------------------------------------|-------------------------|
| Data Sharing-ReadProperty-B                    | (DS-RP-B)               |
| Data Sharing-WriteProperty-B                   | (DS-WP-B)               |
| Data Sharing-COV-B                             | (DS-COV-B)              |
| 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, no Password) |
| Device Management-ReinitializeDevice-B         | (DM-RD-B, no Password)  |

#### **Segmentation Capability:**

☐ Able to transmit segmented messages      Window Size \_\_\_\_\_  
☐ Able to receive segmented messages      Window Size \_\_\_\_\_

#### **Standard Object Types Supported:**

An object type is supported if it may be present in the device.  
 For each standard Object Type supported provide the following data:

- 1) Whether objects of this type are dynamically creatable using the CreateObject service: None
- 2) Whether objects of this type are dynamically deletable using the DeleteObject service: None
- 3) List of the optional properties supported
- 4) List of all properties that are writable where not otherwise required by this standard
- 5) List of all properties that are conditionally writable where not otherwise required by this standard: None
- 6) List of proprietary properties and for each its property identifier, datatype, and meaning: None
- 7) List of any property range restrictions

**Data Link Layer Options:**

- ☒ MS/TP master (Clause 9)  
☒ MS/TP slave (Clause 9)      baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200

**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

**Networking Options:**

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

**Network Security Options:**

- ☒ Non-secure Device - is capable of operating without BACnet Network Security

**Character Sets Supported:**

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ☒ ISO 10646 (UTF-8)      ☒ IBM™/Microsoft™ DBCS      ☒ ISO 8859-1  
☒ ISO 10646 (UCS-2)      ☒ ISO 10646 (UCS-4)      ☒ JIS X 0208

Default strings implemented in the objects use UTF-8.  
 Default strings can be restored by writing an empty string.

**If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:**

- ☐ Yes    ☒ No

**Configuration Switches**

Hexadecimal switches x10, x1 define the network address (00 – F9) and baud rate (FA – FF).

| Switches  | FA   | FB    | FC    | FD    | FE    | FF     |
|-----------|------|-------|-------|-------|-------|--------|
| Baud Rate | 9600 | 19200 | 38400 | 57600 | 76800 | 115200 |

- Turn switch x10 to E (device is temporarily configured as slave)
- Turn switch x1 to A – F to select baud rate
- Turn switch x10 to F, wait 1 second
- Red and green LEDs are blinking when baud rate has been stored in EEPROM
- Turn switch x10 to select network address
- Turn switch x1 to select network address

The device works as MS/TP master, if network address 0x00 ... Max\_Master (see Device Object) is used.

The device works as MS/TP slave, if network address Max\_Master + 1 ... 0xF9 is used.

## Device Object

| Property                                                           | Remark / Value                                                                                                                                                                    | RW   |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | DEVICE (8)                                                                                                                                                                        | R    |
| Object_Identifier                                                  | device, default instance: 421000 + Network-Address, default may be restored by writing 4194303                                                                                    | RW-E |
| Object_Name                                                        | max. 63 bytes, default "BMT-DI10_" + Network-Address (Hexadecimal)                                                                                                                | RW-E |
| Property_List                                                      |                                                                                                                                                                                   | R    |
| Description                                                        | max. 127 bytes, default ""                                                                                                                                                        | RW-E |
| Location                                                           | max. 63 bytes, default ""                                                                                                                                                         | RW-E |
| Vendor_Name                                                        | "METZ CONNECT GmbH"                                                                                                                                                               | R    |
| Vendor_Identifier                                                  | 421                                                                                                                                                                               | R    |
| Model_Name                                                         | "BMT-DI10"                                                                                                                                                                        | R    |
| Firmware_Revision                                                  | "2.0"                                                                                                                                                                             | R    |
| Application_Software_Version                                       | "1.0"                                                                                                                                                                             | R    |
| Protocol_Version                                                   | 1                                                                                                                                                                                 | R    |
| Protocol_Revision                                                  | 15                                                                                                                                                                                | R    |
| Protocol_Services_Supported                                        | read-property, write-property, subscribe-cov, who-has, who-is, read-range, device-communication-control, reinitialize-device                                                      | R    |
| Protocol_Object_Types_Supported                                    | DEVICE, BINARY_INPUT, GROUP                                                                                                                                                       | R    |
| Object_List                                                        | device, binary-input 1...10, group 1...11                                                                                                                                         | R    |
| Max_APDU_Length_Accepted                                           | 480                                                                                                                                                                               | R    |
| Segmentation_Supported                                             | NO_SEGMENTATION (3)                                                                                                                                                               | R    |
| System_Status                                                      | OPERATIONAL (0)                                                                                                                                                                   | R    |
| APDU_Timeout                                                       | 1...65535, default 6000                                                                                                                                                           | RW-E |
| Number_Of_APDU_Retries                                             | 1...10, default 3                                                                                                                                                                 | RW-E |
| Device_Address_Binding                                             | -                                                                                                                                                                                 | R    |
| Database_Revision                                                  | 0...65535, default 0                                                                                                                                                              | R-E  |
| Max_Master                                                         | 0...127, default 127                                                                                                                                                              | RW-E |
| Max_Info_Frames                                                    | 1...255, default 1                                                                                                                                                                | RW-E |
| Active_COV_Subscriptions                                           | property only exists if working as MS/TP master, services Read-Property / Read-Range, max. 12 Subscriptions, for binary-input, Confirmed / Unconfirmed, Lifetime = 0...65534 sec. | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                   |      |

## Binary Input Object 1...10

Terminals 1...10 = inputs with common ground (GND), Terminals C1 = +24V.

- Connect switch between input and C1.
- Connect voltage source between input and GND.

Jumper J may select inputs with common +24V instead of GND.

- Connect switch between input and GND.
- Connect voltage source between input and +24V.

| Property                                                           | Remark / Value                                                    | RW      |
|--------------------------------------------------------------------|-------------------------------------------------------------------|---------|
| Object_Type                                                        | BINARY_INPUT (3)                                                  | R       |
| Object_Identifier                                                  | binary-input, instance 1 ... 10                                   | R       |
| Object_Name                                                        | max. 42 bytes, default "Input 1" ... "Input 10"                   | RW-E    |
| Property_List                                                      |                                                                   | R       |
| Description                                                        | max. 84 bytes, default ""                                         | RW-E    |
| Inactive_Text                                                      | max. 20 bytes, default "Off"                                      | RW-E    |
| Active_Text                                                        | max. 20 bytes, default "On"                                       | RW-E    |
| Present_Value                                                      | INACTIVE (0) / ACTIVE (1),<br>writable if Out_Of_Service          | R<br>RW |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0 / 1 | R       |
| Event_State                                                        | NORMAL (0)                                                        | R       |
| Out_Of_Service                                                     | FALSE (0) / TRUE (1)                                              | RW      |
| Polarity                                                           | NORMAL (0) / REVERSE (1)                                          | RW-E    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                   |         |

| Function Table for Binary Input                         |          |              |               |                |
|---------------------------------------------------------|----------|--------------|---------------|----------------|
| Out_Of_Service                                          | Polarity | Binary Input | Present_Value | OUT_OF_SERVICE |
| 0                                                       | 0        | 0<br>1       | 0<br>1        | 0              |
| 0                                                       | 1        | 0<br>1       | 1<br>0        | 0              |
| 1                                                       | 0        | 0<br>1       | x             | 1              |
| 1                                                       | 1        | 0<br>1       | x             | 1              |
| x: Present Value is writable and not affected by inputs |          |              |               |                |

## Group Object 1...11

| Property                                                           | Remark / Value                                    | RW   |
|--------------------------------------------------------------------|---------------------------------------------------|------|
| Object_Type                                                        | GROUP (11)                                        | R    |
| Object_Identifier                                                  | group, instance 1 ... 11                          | R    |
| Object_Name                                                        | max. 42 bytes, default "Group 1" ... "Group 11"   | RW-E |
| Property_List                                                      |                                                   | R    |
| Description                                                        | max. 84 bytes, default ""                         | RW-E |
| Present_Value                                                      | Present_Value of Binary Inputs,<br>see next Table | R    |
| List_Of_Group_Members                                              | see next Table                                    | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                   |      |

| Members of Groups |              |   |   |   |   |   |   |   |   |    |
|-------------------|--------------|---|---|---|---|---|---|---|---|----|
| Group             | Binary Input |   |   |   |   |   |   |   |   |    |
|                   | 1            | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1                 | x            | x | x | x | x | x | x | x | x | x  |
| 2                 | x            | x | x | x | x | x | x |   |   |    |
| 3                 |              |   |   | x | x | x | x | x | x | x  |
| 4                 |              |   | x | x | x | x | x | x |   |    |
| 5                 | x            | x | x | x | x |   |   |   |   |    |
| 6                 |              |   |   |   |   | x | x | x | x | x  |
| 7                 |              |   |   | x | x | x | x |   |   |    |
| 8                 | x            | x | x |   |   |   |   |   |   |    |
| 9                 |              |   |   |   |   |   |   | x | x | x  |
| 10                |              |   |   | x | x |   |   |   |   |    |
| 11                |              |   |   |   |   | x | x |   |   |    |

## **BMT-SI4**

### **BACnet Protocol Implementation Conformance Statement**

**Date:** 21.02.2020  
**Vendor Name:** METZ CONNECT GmbH  
**Product Name:** BMT-SI4  
**Product Model Number:** 110 889 13  
**Application Software Version:** 1.0  
**Firmware Revision:** 2.0  
**BACnet Protocol Revision:** 15

#### **Product Description:**

BACnet MS/TP Application Specific Controller providing 4 digital inputs.  
 Input pulses with minimum High and Low times of 10ms may be counted using Accumulator Objects.

#### **BACnet Standardized Device Profile (Annex L):**

☒ BACnet Application Specific Controller (B-ASC)

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

|                                                |                         |
|------------------------------------------------|-------------------------|
| Data Sharing-ReadProperty-B                    | (DS-RP-B)               |
| Data Sharing-WriteProperty-B                   | (DS-WP-B)               |
| Data Sharing-COV-B                             | (DS-COV-B)              |
| 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, no Password) |
| Device Management-ReinitializeDevice-B         | (DM-RD-B, no Password)  |

#### **Segmentation Capability:**

☐ Able to transmit segmented messages      Window Size \_\_\_\_\_  
☐ Able to receive segmented messages      Window Size \_\_\_\_\_

#### **Standard Object Types Supported:**

An object type is supported if it may be present in the device.  
 For each standard Object Type supported provide the following data:

- 1) Whether objects of this type are dynamically creatable using the CreateObject service: None
- 2) Whether objects of this type are dynamically deletable using the DeleteObject service: None
- 3) List of the optional properties supported
- 4) List of all properties that are writable where not otherwise required by this standard
- 5) List of all properties that are conditionally writable where not otherwise required by this standard: None
- 6) List of proprietary properties and for each its property identifier, datatype, and meaning: None
- 7) List of any property range restrictions

**Data Link Layer Options:**

- ☒ MS/TP master (Clause 9)  
☒ MS/TP slave (Clause 9)      baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200

**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

**Networking Options:**

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

**Network Security Options:**

- ☒ Non-secure Device - is capable of operating without BACnet Network Security

**Character Sets Supported:**

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ☒ ISO 10646 (UTF-8)      ☒ IBM™/Microsoft™ DBCS      ☒ ISO 8859-1  
☒ ISO 10646 (UCS-2)      ☒ ISO 10646 (UCS-4)      ☒ JIS X 0208

Default strings implemented in the objects use UTF-8.  
 Default strings can be restored by writing an empty string.

**If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:**

- ☐ Yes    ☒ No

**Configuration Switches**

Hexadecimal switches x10, x1 define the network address (00 – F9) and baud rate (FA – FF).

| Switches  | FA   | FB    | FC    | FD    | FE    | FF     |
|-----------|------|-------|-------|-------|-------|--------|
| Baud Rate | 9600 | 19200 | 38400 | 57600 | 76800 | 115200 |

- Turn switch x10 to E (device is temporarily configured as slave)
- Turn switch x1 to A – F to select baud rate
- Turn switch x10 to F, wait 1 second
- Red and green LEDs are blinking when baud rate has been stored in EEPROM
- Turn switch x10 to select network address
- Turn switch x1 to select network address

The device works as MS/TP master, if network address 0x00 ... Max\_Master (see Device Object) is used.

The device works as MS/TP slave, if network address Max\_Master + 1 ... 0xF9 is used.

## Device Object

| Property                                                           | Remark / Value                                                                                                                                                                   | RW   |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | DEVICE (8)                                                                                                                                                                       | R    |
| Object_Identifier                                                  | device, default instance: 421000 + Network-Address, default may be restored by writing 4194303                                                                                   | RW-E |
| Object_Name                                                        | max. 63 bytes, default "BMT-SI4_" + Network-Address (Hexadecimal)                                                                                                                | RW-E |
| Property_List                                                      |                                                                                                                                                                                  | R    |
| Description                                                        | max. 127 bytes, default ""                                                                                                                                                       | RW-E |
| Location                                                           | max. 63 bytes, default ""                                                                                                                                                        | RW-E |
| Vendor_Name                                                        | "METZ CONNECT GmbH"                                                                                                                                                              | R    |
| Vendor_Identifier                                                  | 421                                                                                                                                                                              | R    |
| Model_Name                                                         | "BMT-SI4"                                                                                                                                                                        | R    |
| Firmware_Revision                                                  | "2.0"                                                                                                                                                                            | R    |
| Application_Software_Version                                       | "1.0"                                                                                                                                                                            | R    |
| Protocol_Version                                                   | 1                                                                                                                                                                                | R    |
| Protocol_Revision                                                  | 15                                                                                                                                                                               | R    |
| Protocol_Services_Supported                                        | read-property, write-property, subscribe-cov, who-has, who-is, read-range, device-communication-control, reinitialize-device                                                     | R    |
| Protocol_Object_Types_Supported                                    | DEVICE, BINARY_INPUT, GROUP, ACCUMULATOR                                                                                                                                         | R    |
| Object_List                                                        | device, binary-input 1...4, group 1...3, accumulator 1...4                                                                                                                       | R    |
| Max_APDU_Length_Accepted                                           | 480                                                                                                                                                                              | R    |
| Segmentation_Supported                                             | NO_SEGMENTATION (3)                                                                                                                                                              | R    |
| System_Status                                                      | OPERATIONAL (0)                                                                                                                                                                  | R    |
| APDU_Timeout                                                       | 1...65535, default 6000                                                                                                                                                          | RW-E |
| Number_Of_APDU_Retries                                             | 1...10, default 3                                                                                                                                                                | RW-E |
| Device_Address_Binding                                             | -                                                                                                                                                                                | R    |
| Database_Revision                                                  | 0...65535, default 0                                                                                                                                                             | R-E  |
| Max_Master                                                         | 0...127, default 127                                                                                                                                                             | RW-E |
| Max_Info_Frames                                                    | 1...255, default 1                                                                                                                                                               | RW-E |
| Active_COV_Subscriptions                                           | property only exists if working as MS/TP master, services Read-Property / Read-Range, max. 6 Subscriptions, for binary-input, Confirmed / Unconfirmed, Lifetime = 0...65534 sec. | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                  |      |

## Binary Input Object 1...4

Terminals S01+...S04+ = input, Terminals S01-...S04- = ground.  
 Connect switches between input and ground, each input sources 12 V, 13 mA.  
 Input states are shown with yellow LEDs.

| Property          | Remark / Value                                                    | RW      |
|-------------------|-------------------------------------------------------------------|---------|
| Object_Type       | BINARY_INPUT (3)                                                  | R       |
| Object_Identifier | binary-input, instance 1 ... 4                                    | R       |
| Object_Name       | max. 42 bytes, default "Input 1" ...                              | RW-E    |
| Property_List     |                                                                   | R       |
| Description       | max. 84 bytes, default ""                                         | RW-E    |
| Inactive_Text     | max. 20 bytes, default "Off"                                      | RW-E    |
| Active_Text       | max. 20 bytes, default "On"                                       | RW-E    |
| Present_Value     | INACTIVE (0) / ACTIVE (1),<br>writable if Out_Of_Service          | R<br>RW |
| Status_Flags      | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0 / 1 | R       |
| Event_State       | NORMAL (0)                                                        | R       |
| Out_Of_Service    | FALSE (0) / TRUE (1)                                              | RW      |
| Polarity          | NORMAL (0) / REVERSE (1)                                          | RW-E    |

R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash

| Function Table for Binary Input |          |              |               |                |
|---------------------------------|----------|--------------|---------------|----------------|
| Out_Of_Service                  | Polarity | Binary Input | Present_Value | OUT_OF_SERVICE |
| 0                               | 0        | 0<br>1       | 0<br>1        | 0              |
| 0                               | 1        | 0<br>1       | 1<br>0        | 0              |
| 1                               | 0        | 0<br>1       | x             | 1              |
| 1                               | 1        | 0<br>1       | x             | 1              |

x: Present\_Value is writable and not affected by inputs

Input pulses must have minimum High and Low times of 10ms.

## Accumulator Object 1...4

This object counts pulses at the binary input. An external contact is connected to terminals S0x+ and S0x-.

Input pulses must have minimum High and Low times of 10ms, the maximum frequency is 50 Hz. Pulses are counted when the contact is closing.

| Property                                                           | Remark / Value                                                                                                                                                                          | RW   |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | ACCUMULATOR (23)                                                                                                                                                                        | R    |
| Object_Identifier                                                  | accumulator, instance 1...4                                                                                                                                                             | R    |
| Object_Name                                                        | max. 42 bytes, default "Accumulator 1" ...                                                                                                                                              | RW-E |
| Property_List                                                      |                                                                                                                                                                                         | R    |
| Description                                                        | max. 84 bytes, default ""                                                                                                                                                               | RW-E |
| Present_Value                                                      | pulse counter of corresponding input<br>value range is 0 ... Max_Pres_Value<br>value is set modulo (Max_Pres_Value + 1)<br>writable if Out_Of_Service (pulse counter remains unchanged) | R-E  |
|                                                                    |                                                                                                                                                                                         | RW   |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0 / 1                                                                                                                       | R    |
| Event_State                                                        | NORMAL (0)                                                                                                                                                                              | R    |
| Out_Of_Service                                                     | FALSE (0) / TRUE (1)                                                                                                                                                                    | RW   |
| Max_Pres_Value                                                     | 0 ... 4294967295, default 4294967295                                                                                                                                                    | RW-E |
| Units                                                              | default no-units (95)                                                                                                                                                                   | RW-E |
| Prescale                                                           | Multiplier 0 ... 65535, default 1                                                                                                                                                       | RW-E |
|                                                                    | Modulo-Divide 1 ... 65535, default 1                                                                                                                                                    |      |
| Scale                                                              | Float-Scale or Integer-Scale, default 1.0 (Float)                                                                                                                                       | RW-E |
| Value_Set                                                          | the pulse counter is stored to Value_Set,<br>when corresponding key is pressed, default 0                                                                                               | R-E  |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                         |      |

## Group Object 1...3

| Property                                                           | Remark / Value                                    | RW   |
|--------------------------------------------------------------------|---------------------------------------------------|------|
| Object_Type                                                        | GROUP (11)                                        | R    |
| Object_Identifier                                                  | group, instance 1 ... 3                           | R    |
| Object_Name                                                        | max. 42 bytes, default "Group 1" ...              | RW-E |
| Property_List                                                      |                                                   | R    |
| Description                                                        | max. 84 bytes, default ""                         | RW-E |
| Present_Value                                                      | Present_Value of Binary Inputs,<br>see next Table | R    |
| List_Of_Group_Members                                              | see next Table                                    | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                   |      |

| Members of Groups |              |   |   |   |
|-------------------|--------------|---|---|---|
| Group             | Binary Input |   |   |   |
|                   | 1            | 2 | 3 | 4 |
| 1                 | x            | x | x | x |
| 2                 | x            | x |   |   |
| 3                 |              |   | x | x |



## **BMT-DIO4/2**

### **BACnet Protocol Implementation Conformance Statement**

**Date:** 25.02.2020  
**Vendor Name:** METZ CONNECT GmbH  
**Product Name:** BMT-DIO4/2  
**Product Model Number:** 110 883 13 26  
**Application Software Version:** 1.0  
**Firmware Revision:** 2.0  
**BACnet Protocol Revision:** 15

#### **Product Description:**

BACnet MS/TP Application Specific Controller providing 4 Digital Inputs and 2 Relay Outputs.  
Operating modes for fire dampers are supported.

#### **BACnet Standardized Device Profile (Annex L):**

☒ BACnet Application Specific Controller (B-ASC)

#### **List all BACnet Interoperability Building Blocks Supported (Annex K):**

|                                                |                         |
|------------------------------------------------|-------------------------|
| Data Sharing-ReadProperty-B                    | (DS-RP-B)               |
| Data Sharing-WriteProperty-B                   | (DS-WP-B)               |
| Data Sharing-COV-B                             | (DS-COV-B)              |
| 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, no Password) |
| Device Management-ReinitializeDevice-B         | (DM-RD-B, no Password)  |

#### **Segmentation Capability:**

☐ Able to transmit segmented messages      Window Size \_\_\_\_\_  
☐ Able to receive segmented messages      Window Size \_\_\_\_\_

#### **Standard Object Types Supported:**

An object type is supported if it may be present in the device.  
For each standard Object Type supported provide the following data:

- 1) Whether objects of this type are dynamically creatable using the CreateObject service: None
- 2) Whether objects of this type are dynamically deletable using the DeleteObject service: None
- 3) List of the optional properties supported
- 4) List of all properties that are writable where not otherwise required by this standard
- 5) List of all properties that are conditionally writable where not otherwise required by this standard:  
None
- 6) List of proprietary properties and for each its property identifier, datatype, and meaning: None
- 7) List of any property range restrictions

**Data Link Layer Options:**

- ☒ MS/TP master (Clause 9)  
☒ MS/TP slave (Clause 9)      baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200

**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

**Networking Options:**

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

**Network Security Options:**

- ☒ Non-secure Device - is capable of operating without BACnet Network Security

**Character Sets Supported:**

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ☒ ISO 10646 (UTF-8)      ☒ IBM™/Microsoft™ DBCS      ☒ ISO 8859-1  
☒ ISO 10646 (UCS-2)      ☒ ISO 10646 (UCS-4)      ☒ JIS X 0208

Default strings implemented in the objects use UTF-8.  
 Default strings can be restored by writing an empty string.

**If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:**

- ☐ Yes    ☒ No

**Configuration Switches**

Hexadecimal switches x10, x1 define the network address (00 – F9) and baud rate (FA – FF).

| Switches  | FA   | FB    | FC    | FD    | FE    | FF     |
|-----------|------|-------|-------|-------|-------|--------|
| Baud Rate | 9600 | 19200 | 38400 | 57600 | 76800 | 115200 |

- Turn switch x10 to E (device is temporarily configured as slave)
- Turn switch x1 to A – F to select baud rate
- Turn switch x10 to F, wait 1 second
- Red and green LEDs are blinking when baud rate has been stored in EEPROM
- Turn switch x10 to select network address
- Turn switch x1 to select network address

The device works as MS/TP master, if network address 0x00 ... Max\_Master (see Device Object) is used.

The device works as MS/TP slave, if network address Max\_Master + 1 ... 0xF9 is used.

## Device Object

| Property                                                           | Remark / Value                                                                                                                                                                                                       | RW   |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | DEVICE (8)                                                                                                                                                                                                           | R    |
| Object_Identifier                                                  | device, default instance: 421000 + Network-Address, default may be restored by writing 4194303                                                                                                                       | RW-E |
| Object_Name                                                        | max. 63 Bytes, default "BMT-DIO4/2_" + Network-Address (Hexadecimal)                                                                                                                                                 | RW-E |
| Property_List                                                      |                                                                                                                                                                                                                      | R    |
| Description                                                        | max. 127 Bytes, default ""                                                                                                                                                                                           | RW-E |
| Location                                                           | max. 63 Bytes, default ""                                                                                                                                                                                            | RW-E |
| Vendor_Name                                                        | "METZ CONNECT GmbH"                                                                                                                                                                                                  | R    |
| Vendor_Identifier                                                  | 421                                                                                                                                                                                                                  | R    |
| Model_Name                                                         | "BMT-DIO4/2"                                                                                                                                                                                                         | R    |
| Firmware_Revision                                                  | "2.0"                                                                                                                                                                                                                | R    |
| Application_Software_Version                                       | "1.0"                                                                                                                                                                                                                | R    |
| Protocol_Version                                                   | 1                                                                                                                                                                                                                    | R    |
| Protocol_Revision                                                  | 15                                                                                                                                                                                                                   | R    |
| Protocol_Services_Supported                                        | read-property, write-property, subscribe-cov, who-has, who-is, read-range, device-communication-control, reinitialize-device                                                                                         | R    |
| Protocol_Object_Types_Supported                                    | DEVICE, BINARY_OUTPUT, BINARY_INPUT, GROUP, ANALOG_VALUE, MULTISTATE_VALUE                                                                                                                                           | R    |
| Object_List                                                        | device, binary-output 1...2, binary-input 1...4, group 1...3, analog-value 1...7, multistate-value 1...10 (some exist depending on operating mode)                                                                   | R    |
| Max_APDU_Length_Accepted                                           | 480                                                                                                                                                                                                                  | R    |
| Segmentation_Supported                                             | NO_SEGMENTATION (3)                                                                                                                                                                                                  | R    |
| System_Status                                                      | OPERATIONAL (0)                                                                                                                                                                                                      | R    |
| APDU_Timeout                                                       | 1...65535, default 6000                                                                                                                                                                                              | RW-E |
| Number_Of_APDU_Retries                                             | 1...10, default 3                                                                                                                                                                                                    | RW-E |
| Device_Address_Binding                                             | -                                                                                                                                                                                                                    | R    |
| Database_Revision                                                  | 0...65535, default 0                                                                                                                                                                                                 | R-E  |
| Max_Master                                                         | 0...127, default 127                                                                                                                                                                                                 | RW-E |
| Max_Info_Frames                                                    | 1...255, default 1                                                                                                                                                                                                   | RW-E |
| Active_COV_Subscriptions                                           | property only exists if working as MS/TP master, services Read-Property / Read-Range, max. 10 Subscriptions, for binary-input / binary-output / multistate-value, Confirmed / Unconfirmed, Lifetime = 0...65535 sec. | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                                                      |      |

## Binary Output Object 1...2

| Property                                                           | Remark / Value                                                                                                      | RW   |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | BINARY_OUTPUT (4)                                                                                                   | R    |
| Object_Identifier                                                  | binary-output, instance 1 ... 2                                                                                     | R    |
| Object_Name                                                        | max. 42 Bytes, default "Relay 1" ... "Relay 2"                                                                      | RW-E |
| Property_List                                                      |                                                                                                                     | R    |
| Description                                                        | max. 84 Bytes, default ""                                                                                           | RW-E |
| Inactive_Text                                                      | max. 31 Bytes, default "Off"                                                                                        | RW-E |
| Active_Text                                                        | max. 31 Bytes, default "On"                                                                                         | RW-E |
| Present_Value                                                      | NULL (write only) / INACTIVE (0) / ACTIVE (1)                                                                       | RW   |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0 = Switch A (Auto)<br>1 = Switch 0 (Off) or 1 (On)<br>OUT_OF_SERVICE: 0 / 1 | R    |
| Event_State                                                        | NORMAL (0)                                                                                                          | R    |
| Out_Of_Service                                                     | FALSE (0) / TRUE (1)                                                                                                | RW   |
| Polarity                                                           | NORMAL (0) / REVERSE (1)                                                                                            | RW-E |
| Priority_Array [16]                                                | NULL / INACTIVE (0) / ACTIVE (1)                                                                                    | R    |
| Relinquish_Default                                                 | INACTIVE (0)                                                                                                        | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                     |      |

| Function Table for Binary Output |          |        |                                          |                   |                  |                |                   |
|----------------------------------|----------|--------|------------------------------------------|-------------------|------------------|----------------|-------------------|
| Out_Of<br>Service                | Polarity | Switch | Priority_Array and<br>Relinquish_Default | Present_<br>Value | Binary<br>Output | OVER<br>RIDDEN | OUT_OF<br>SERVICE |
| 0                                | 0        | A      | 0 / 1                                    | 0 / 1             | 0 / 1            | 0              | 0                 |
| 0                                | 0        | 0      | 0 / 1                                    | 0                 | 0                | 1              | 0                 |
|                                  |          | 1      | 0 / 1                                    | 1                 | 1                |                |                   |
| 0                                | 1        | A      | 0 / 1                                    | 0 / 1             | 1 / 0            | 0              | 0                 |
| 0                                | 1        | 0      | 0 / 1                                    | 1                 | 0                | 1              | 0                 |
|                                  |          | 1      | 0 / 1                                    | 0                 | 1                |                |                   |
| 1                                | 0        | A      | 0 / 1                                    | 0 / 1             | 0                | 0              | 1                 |
| 1                                | 0        | 0      | 0 / 1                                    | 0 / 1             | 0                | 0              | 1                 |
|                                  |          | 1      | 0 / 1                                    | 0 / 1             | 1                |                |                   |
| 1                                | 1        | A      | 0 / 1                                    | 0 / 1             | 1                | 0              | 1                 |
| 1                                | 1        | 0      | 0 / 1                                    | 0 / 1             | 0                | 0              | 1                 |
|                                  |          | 1      | 0 / 1                                    | 0 / 1             | 1                |                |                   |

If using an operating mode for fire dampers the relay is controlled by special functions. Then Present\_Value shows the state of the relay and Status\_Flag OVERRIDDEN is set (Lines 2 or 4) and the switch is not functional. If Out\_Of\_Service is TRUE the Priority\_Array instead is used for Present\_Value (Lines 5...8).

## Binary Input Object 1...4

Terminals 1...4 = inputs with common ground (GND), Terminals C1 = +24V.  
 Connect switch between input and C1 or  
 connect voltage source between input and GND.

Jumper J may select inputs with common +24V instead of GND.  
 Connect switch between input and GND or  
 connect voltage source between input and +24V.

| Property          | Remark / Value                                                    | RW      |
|-------------------|-------------------------------------------------------------------|---------|
| Object_Type       | BINARY_INPUT (3)                                                  | R       |
| Object_Identifier | binary-input, instance 1 ... 4                                    | R       |
| Object_Name       | max. 42 bytes, default "Input 1" ... "Input 4"                    | RW-E    |
| Property_List     |                                                                   | R       |
| Description       | max. 84 bytes, default ""                                         | RW-E    |
| Inactive_Text     | max. 31 bytes, default "Off"                                      | RW-E    |
| Active_Text       | max. 31 bytes, default "On"                                       | RW-E    |
| Present_Value     | INACTIVE (0) / ACTIVE (1),<br>writable if Out_Of_Service          | R<br>RW |
| Status_Flags      | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0 / 1 | R       |
| Event_State       | NORMAL (0)                                                        | R       |
| Out_Of_Service    | FALSE (0) / TRUE (1)                                              | RW      |
| Polarity          | NORMAL (0) / REVERSE (1)                                          | RW-E    |

R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash

| Function Table for Binary Input |          |              |               |                |
|---------------------------------|----------|--------------|---------------|----------------|
| Out_Of_Service                  | Polarity | Binary Input | Present_Value | OUT_OF_SERVICE |
| 0                               | 0        | 0 / 1        | 0 / 1         | 0              |
| 0                               | 1        | 0 / 1        | 1 / 0         | 0              |
| 1                               | 0        | 0 / 1        | x             | 1              |
| 1                               | 1        | 0 / 1        | x             | 1              |

x: Present\_Value is writable and not affected by inputs

In operating modes for fire dampers the limit switches are connected as follows:

| Input Instance | Limit switch | Operating modes<br>Motorized_SafetyOpen,<br>Motorized_SafetyClose,<br>LimitSwitch_Open_Close<br>(contact closed at each limit) | Limit switch     | Operating modes<br>LimitSwitch_Open<br>(contact closed at open limit),<br>LimitSwitch_Close<br>(contact open at closed limit) |
|----------------|--------------|--------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------|
| 1              | open1        | Damper 1 open                                                                                                                  | open1 / close1   | Damper 1                                                                                                                      |
| 2              | close1       | Damper 1 closed                                                                                                                | open1a / close1a | Damper 1a                                                                                                                     |
| 3              | open2        | Damper 2 open                                                                                                                  | open2 / close2   | Damper 2                                                                                                                      |
| 4              | close2       | Damper 2 closed                                                                                                                | open2a / close2a | Damper 2a                                                                                                                     |

### Group Object 1...3

| Property                                                           | Remark / Value                                    | RW   |
|--------------------------------------------------------------------|---------------------------------------------------|------|
| Object_Type                                                        | GROUP (11)                                        | R    |
| Object_Identifier                                                  | group, instance 1 ... 3                           | R    |
| Object_Name                                                        | max. 42 bytes, default "Group 1" ... "Group 3"    | RW-E |
| Property_List                                                      |                                                   | R    |
| Description                                                        | max. 84 bytes, default ""                         | RW-E |
| Present_Value                                                      | Present_Value of Binary Inputs,<br>see next Table | R    |
| List_Of_Group_Members                                              | see next Table                                    | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                   |      |

| Members of Groups |              |   |   |   |
|-------------------|--------------|---|---|---|
| Group             | Binary Input |   |   |   |
|                   | 1            | 2 | 3 | 4 |
| 1                 | x            | x | x | x |
| 2                 | x            | x |   |   |
| 3                 |              |   | x | x |

## Analog Value Object 1

| Property                                                           | Remark / Value                                                            | RW   |
|--------------------------------------------------------------------|---------------------------------------------------------------------------|------|
| Object_Type                                                        | ANALOG_VALUE (2)                                                          | R    |
| Object_Identifier                                                  | analog-value, instance 1                                                  | R    |
| Object_Name                                                        | max. 42 Bytes, default "Watchdog Time"                                    | RW-E |
| Property_List                                                      |                                                                           | R    |
| Description                                                        | max. 84 Bytes, default ""                                                 | RW-E |
| Present_Value                                                      | Time constant of Watchdog Timer,<br>Special value 0: Watchdog is inactive | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0             | R    |
| Event_State                                                        | NORMAL (0)                                                                | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                 | R    |
| Units                                                              | seconds (73)                                                              | R    |
| Min_Pres_Value                                                     | 0.00                                                                      | R    |
| Max_Pres_Value                                                     | 655.34                                                                    | R    |
| Resolution                                                         | 0.01                                                                      | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                           |      |

In operating mode Direct\_Control the Watchdog Timer resets Present\_Value of all output objects to Relinquish\_Default, if BACnet communication fails permanently.

The timer is restarted, when a BACnet message with an APDU is received.

When the timer times out, the priority arrays of all output objects are completely cleared to NULL.

## Multistate Value Object 1...2

| Property                                                           | Remark / Value                                                                                                                                                                             | RW   |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | MULTISTATE_VALUE (19)                                                                                                                                                                      | R    |
| Object_Identifier                                                  | multistate-value, instance 1 ... 2                                                                                                                                                         | R    |
| Object_Name                                                        | max. 42 Bytes,<br>default "OperMode_1" ... "OperMode_2"                                                                                                                                    | RW-E |
| Property_List                                                      |                                                                                                                                                                                            | R    |
| Description                                                        | max. 84 bytes, default ""                                                                                                                                                                  | RW-E |
| State_Text                                                         | max. 31 Bytes, default<br>1: "Direct_Control"<br>2: "Motorized_SafetyOpen"<br>3: "Motorized_SafetyClose"<br>4: "LimitSwitch_Open_Close"<br>5: "LimitSwitch_Open"<br>6: "LimitSwitch_Close" | RW-E |
| Present_Value                                                      | Operating mode of Inputs 1...2 and Output 1,<br>Operating mode of Inputs 3...4 and Output 2,<br>values 1...6, default 1                                                                    | RW-E |
| Status_Flags                                                       | IN_ALARM:           0<br>FAULT:             0<br>OVERRIDDEN:       0<br>OUT_OF_SERVICE: 0                                                                                                  | R    |
| Event_State                                                        | NORMAL (0)                                                                                                                                                                                 | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                                                                                                                                  | R    |
| Number_Of_States                                                   | 6                                                                                                                                                                                          | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                            |      |

### Mode "Direct\_Control"

The relay output is controlled directly by its Binary Output Object which may be overridden by a switch.

### Mode "Motorized\_SafetyOpen"

The relay output is controlled by specialized functions for motorized smoke control dampers. Two limit switches (contacts closed at limit) for the open and closed position are monitored.

### Mode "Motorized\_SafetyClose"

The relay output is controlled by specialized functions for motorized fire and/or smoke protection dampers.

Two limit switches (contacts closed at limit) for the open and closed position are monitored.

### Mode "LimitSwitch\_Open\_Close"

The relay output is switched off. A mechanical fire damper with two limit switches (contacts closed at limit) for the open and closed position is monitored.

### Mode "LimitSwitch\_Open", "LimitSwitch\_Close"

The relay output is switched off. Up to two mechanical fire dampers, each with only one limit switch are monitored. The limit switch signals the fully open (contact closed) or fully closed (contact open) position. These modes only have different names, but otherwise work identically.

## Analog Value Object 2...7

| Property                                                           | Remark / Value                                                                      | RW   |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|
| Object_Type                                                        | ANALOG_VALUE (2)                                                                    | R    |
| Object_Identifier                                                  | analog-value, instance 2 ... 7                                                      | R    |
| Object_Name                                                        | max. 42 Bytes, default see table below                                              | RW-E |
| Property_List                                                      |                                                                                     | R    |
| Description                                                        | max. 84 Bytes, default ""                                                           | RW-E |
| Present_Value                                                      | Time constant of timer, default see table below, special value 0: Timer is inactive | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                       | R    |
| Event_State                                                        | NORMAL (0)                                                                          | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                           | R    |
| Units                                                              | seconds (73)                                                                        | R    |
| Min_Pres_Value                                                     | 0.0                                                                                 | R    |
| Max_Pres_Value                                                     | 6553.4                                                                              | R    |
| Resolution                                                         | 0.1                                                                                 | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                     |      |

| Instance | Object_Name<br>default | Present_Value<br>default |
|----------|------------------------|--------------------------|
| 2        | "DriveTime_1"          | 240.0                    |
| 3        | "DriveTime_2"          | 240.0                    |
| 4        | "TurnOffTime_1"        | 35.0                     |
| 5        | "TurnOffTime_2"        | 35.0                     |
| 6        | "RcvHeartBeat_1"       | 0.0                      |
| 7        | "RcvHeartBeat_2"       | 0.0                      |

These Analog-Values only exist in operating modes for motorized fire dampers.

With DriveTime\_1/2 the opening time of fire damper 1/2 may be monitored.

With TurnOffTime\_1/2 the closing time of fire damper 1/2 may be monitored.

The timer is started, when the corresponding relay is switched. The timer is stopped, when the limit switches signal the intended position. When the timer expires, the alarm Runtime\_Error is signalled.

With RcvHeartBeat\_1/2 the time between writing Present\_Value of object ActuDrive\_1/2 may be monitored.

This way BACnet communication is monitored.

The timer is restarted, when writing Present\_Value. When the timer expires, the alarm Update\_Error is signalled.

## Multistate Value Object 3...8

| Property          | Remark / Value                                                                          | RW   |
|-------------------|-----------------------------------------------------------------------------------------|------|
| Object_Type       | MULTISTATE_VALUE (19)                                                                   | R    |
| Object_Identifier | multistate-value, instance 3 ... 8                                                      | R    |
| Object_Name       | max. 42 Bytes, default see table below                                                  | RW-E |
| Property_List     |                                                                                         | R    |
| Description       | max. 84 bytes, default ""                                                               | RW-E |
| State_Text        | max. 31 Bytes, default<br>1: "open"<br>2: "close"<br>3: "running" (only instance 5...6) | RW-E |
| Present_Value     | see table below                                                                         |      |
| Status_Flags      | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                           | R    |
| Event_State       | NORMAL (0)                                                                              | R    |
| Out_Of_Service    | FALSE (0)                                                                               | R    |
| Number_Of_States  | see table below                                                                         | R    |

R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash

| Instance | Object_Name default | Present_Value | Number_Of_States |
|----------|---------------------|---------------|------------------|
| 3        | "ActuDrive_1"       | 1...2 RW      | 2                |
| 4        | "ActuDrive_2"       |               |                  |
| 5        | "ActuPos_1"         | 1...3 R       | 3                |
| 6        | "ActuPos_2"         |               |                  |
| 7        | "ActuPos_1a"        | 1...2 R       | 2                |
| 8        | "ActuPos_2a"        |               |                  |

These Multistate-Values exist depending on operating modes:

Multistate-Value 3...4 exist for motorized fire dampers.

Multistate-Value 5...6 exist for all fire dampers.

Multistate-Value 7...8 exist for mechanical fire dampers with only one limit switch.

With ActuDrive\_1/2 the intended position of the fire damper is controlled over the network.

After a reset Present\_Value is the normal position .

ActuPos\_1/2 decodes the fire damper position signalled by its limit switches.

If both switches were activated at once, Present\_Value is set to running and the alarm Manipulation is signalled.

In operating modes LimitSwitch\_Open, LimitSwitch\_Close two dampers may be monitored.

Then ActuPos\_1/2 decodes the first fire damper position signalled by its limit switch

and ActuPos\_1a/2a decodes the second fire damper position signalled by its limit switch.

## Multistate Value Object 9...10

| Property                                                           | Remark / Value                                                                                                                  | RW   |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | MULTISTATE_VALUE (19)                                                                                                           | R    |
| Object_Identifier                                                  | multistate-value, instance 9 ... 10                                                                                             | R    |
| Object_Name                                                        | max. 42 Bytes,<br>default "AlarmCode_1" ... "AlarmCode_2"                                                                       | RW-E |
| Property_List                                                      |                                                                                                                                 | R    |
| Description                                                        | max. 84 bytes, default ""                                                                                                       | RW-E |
| State_Text                                                         | max. 31 Bytes, default<br>1: "OK"<br>2: "Runtime_Error"<br>3: "Manipulation"<br>4: "Update_Error"<br>5: "Alarm"<br>6: "Alarm_a" | RW-E |
| Present_Value                                                      | see table below, default 1                                                                                                      | RW   |
| Status_Flags                                                       | IN_ALARM:           0<br>FAULT:               0<br>OVERRIDDEN:        0<br>OUT_OF_SERVICE: 0                                    | R    |
| Event_State                                                        | NORMAL (0)                                                                                                                      | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                                                                       | R    |
| Number_Of_States                                                   | 6                                                                                                                               | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                 |      |

These Multistate-Values only exist in operating modes for fire dampers to signal an alarm.

Runtime\_Error: The time needed to open or close the fire damper was exceeded.

Used only for motorized dampers.

Possible causes: Damper blocked, limit switch defective, input for limit switch defective,  
cable to limit switch broken, cable to motor broken, Motor defective.

Manipulation: Both limit switches were activated at once.

Possible causes: Limit switch defective, input for limit switch defective,  
cable to limit switch shorted.

Update\_Error: The time between writing Present\_Value of object ActuDrive\_1/2 was exceeded.  
Used only for motorized dampers.

Possible causes: BACnet communication partner nonworking,  
BACnet connection broken (e.g. cable, repeater, router, switch).

Alarm: The limit switches signal the fire position.

Alarm\_a: The limit switch of the second mechanical fire damper signals the fire position.  
Alarm has higher priority than Alarm\_a if both dampers are in fire position.

Even if more than one alarm is present, the first alarm code is stored until it is reset by writing OK to Present\_Value (Alarm-Reset). Only then another alarm code may be signalled.

## Fire-Position

Depending on the operating mode the Fire-Position is derived from the limit switches:

| Operating mode         | Fire-Position if             |
|------------------------|------------------------------|
| Motorized_SafetyClose  | damper not open              |
| Motorized_SafetyOpen   | damper not closed            |
| LimitSwitch_Open_Close | damper not open              |
| LimitSwitch_Open       | at least one damper not open |
| LimitSwitch_Close      | at least one damper closed   |

If the fire damper is in the Fire-Position and no other alarm is signalled, then Alarm or Alarm\_a is signalled.

For motorized fire dampers the Fire-Position causes a latching in the safe position. The relay then is switched to the safe state. To reset the fire damper to its normal position, first the normal position shall be written to ActuDrive and then AlarmCode shall be reset to OK. Then the Alarm-Reset begins, which stops the latching.

### Operating mode Motorized\_SafetyClose

Depending on Alarm-Reset, Fire-Position, ActuDrive\_1/2 and AlarmCode\_1/2 the Relay is switched as follows (evaluation top down):

| other         | ActuDrive_1...2 | AlarmCode_1...2   | Relay 1...2 |
|---------------|-----------------|-------------------|-------------|
| Alarm-Reset   | open (1)        | OK (1)            | On          |
| Fire-Position | any             | any               | Off         |
| -             | any             | Runtime_Error (2) | Off         |
|               | any             | Update_Error (4)  | Off         |
|               | any             | Manipulation (3)  | Off         |
|               | open (1)        | OK (1)            | On          |
|               | close (2)       | OK (1)            | Off         |

Initialisation after power-on / reset: ActuDrive is set to to open. AlarmCode is set to OK. The Alarm-Reset starts, to stop latching the safe position caused by Fire-Position.

### Operating mode Motorized\_SafetyOpen

Depending on Alarm-Reset, Fire-Position, ActuDrive\_1/2 and AlarmCode\_1/2 the Relay is switched as follows (evaluation top down):

| other         | ActuDrive_1...2 | AlarmCode_1...2   | Relay 1...2 |
|---------------|-----------------|-------------------|-------------|
| Alarm-Reset   | close (2)       | OK (1)            | Off         |
| Fire-Position | any             | any               | On          |
| -             | any             | Runtime_Error (2) | On          |
|               | any             | Update_Error (4)  | On          |
|               | any             | Manipulation (3)  | Off         |
|               | open (1)        | OK (1)            | On          |
|               | close (2)       | OK (1)            | Off         |

Initialisation after power-on / reset: ActuDrive is set to to close. AlarmCode is set to OK. The Alarm-Reset starts, to stop latching the safe position caused by Fire-Position.

## **BMT-DIO4/2IP**

### **BACnet Protocol Implementation Conformance Statement**

**Date:** 26.02.2020  
**Vendor Name:** METZ CONNECT GmbH  
**Product Name:** BMT-DIO4/2-IP BMT-DIO4/2-IP 230  
**Product Model Number:** 110 883 13 26 IP 110 883 05 26 IP  
**Application Software Version:** 1.0  
**Firmware Revision:** 2.0  
**BACnet Protocol Revision:** 15

#### **Product Description:**

BACnet MS/TP Application Specific Controller providing 4 Digital Inputs and 2 Relay Outputs.  
 Operating modes for fire dampers are supported.  
 Operating voltage of BMT-DIO4/2-IP is 24V and of BMT-DIO4/2-IP-230 is 230V.

#### **BACnet Standardized Device Profile (Annex L):**

☒ BACnet Application Specific Controller (B-ASC)

#### **List all BACnet Interoperability Building Blocks Supported (Annex K):**

|                                                |                         |
|------------------------------------------------|-------------------------|
| Data Sharing-ReadProperty-B                    | (DS-RP-B)               |
| Data Sharing-WriteProperty-B                   | (DS-WP-B)               |
| Data Sharing-COV-B                             | (DS-COV-B)              |
| 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, no Password) |
| Device Management-ReinitializeDevice-B         | (DM-RD-B, no Password)  |

#### **Segmentation Capability:**

☐ Able to transmit segmented messages Window Size \_\_\_\_\_  
☐ Able to receive segmented messages Window Size \_\_\_\_\_

#### **Standard Object Types Supported:**

An object type is supported if it may be present in the device.  
 For each standard Object Type supported provide the following data:

- 1) Whether objects of this type are dynamically creatable using the CreateObject service: None
- 2) Whether objects of this type are dynamically deletable using the DeleteObject service: None
- 3) List of the optional properties supported
- 4) List of all properties that are writable where not otherwise required by this standard
- 5) List of all properties that are conditionally writable where not otherwise required by this standard: None
- 6) List of proprietary properties and for each its property identifier, datatype, and meaning: None
- 7) List of any property range restrictions

**Data Link Layer Options:**

- ☒ MS/TP master (Clause 9)  
☒ MS/TP slave (Clause 9)      baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200

**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

**Networking Options:**

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

**Network Security Options:**

- ☒ Non-secure Device - is capable of operating without BACnet Network Security

**Character Sets Supported:**

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ☒ ISO 10646 (UTF-8)      ☒ IBM™/Microsoft™ DBCS      ☒ ISO 8859-1  
☒ ISO 10646 (UCS-2)      ☒ ISO 10646 (UCS-4)      ☒ JIS X 0208

Default strings implemented in the objects use UTF-8.  
 Default strings can be restored by writing an empty string.

**If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:**

- ☐ Yes    ☒ No

**Configuration Switches**

Hexadecimal switches x10, x1 define the network address (00 – F9) and baud rate (FA – FF).

| Switches  | FA   | FB    | FC    | FD    | FE    | FF     |
|-----------|------|-------|-------|-------|-------|--------|
| Baud Rate | 9600 | 19200 | 38400 | 57600 | 76800 | 115200 |

- Turn switch x10 to E (device is temporarily configured as slave)
- Turn switch x1 to A – F to select baud rate
- Turn switch x10 to F, wait 1 second
- Red and green LEDs are blinking when baud rate has been stored in EEPROM
- Turn switch x10 to select network address
- Turn switch x1 to select network address

The device works as MS/TP master, if network address 0x00 ... Max\_Master (see Device Object) is used.

The device works as MS/TP slave, if network address Max\_Master + 1 ... 0xF9 is used.

## Device Object

| Property                                                           | Remark / Value                                                                                                                                                                                                       | RW   |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | DEVICE (8)                                                                                                                                                                                                           | R    |
| Object_Identifier                                                  | device, default instance: 421000 + Network-Address, default may be restored by writing 4194303                                                                                                                       | RW-E |
| Object_Name                                                        | max. 63 Bytes, default<br>"BMT-DIO4/2-IP_" + Network-Address (Hexadecimal)                                                                                                                                           | RW-E |
| Property_List                                                      |                                                                                                                                                                                                                      | R    |
| Description                                                        | max. 127 Bytes, default ""                                                                                                                                                                                           | RW-E |
| Location                                                           | max. 63 Bytes, default ""                                                                                                                                                                                            | RW-E |
| Vendor_Name                                                        | "METZ CONNECT GmbH"                                                                                                                                                                                                  | R    |
| Vendor_Identifier                                                  | 421                                                                                                                                                                                                                  | R    |
| Model_Name                                                         | "BMT-DIO4/2-IP"                                                                                                                                                                                                      | R    |
| Firmware_Revision                                                  | "2.0"                                                                                                                                                                                                                | R    |
| Application_Software_Version                                       | "1.0"                                                                                                                                                                                                                | R    |
| Protocol_Version                                                   | 1                                                                                                                                                                                                                    | R    |
| Protocol_Revision                                                  | 15                                                                                                                                                                                                                   | R    |
| Protocol_Services_Supported                                        | read-property, write-property, subscribe-cov, who-has, who-is, read-range, device-communication-control, reinitialize-device                                                                                         | R    |
| Protocol_Object_Types_Supported                                    | DEVICE, BINARY_OUTPUT, BINARY_INPUT, GROUP, ANALOG_VALUE, MULTISTATE_VALUE                                                                                                                                           | R    |
| Object_List                                                        | device, binary-output 1...2, binary-input 1...4, group 1...3, analog-value 1...7, multistate-value 1...10 (some exist depending on operating mode)                                                                   | R    |
| Max_APDU_Length_Accepted                                           | 480                                                                                                                                                                                                                  | R    |
| Segmentation_Supported                                             | NO_SEGMENTATION (3)                                                                                                                                                                                                  | R    |
| System_Status                                                      | OPERATIONAL (0)                                                                                                                                                                                                      | R    |
| APDU_Timeout                                                       | 1...65535, default 6000                                                                                                                                                                                              | RW-E |
| Number_Of_APDU_Retries                                             | 1...10, default 3                                                                                                                                                                                                    | RW-E |
| Device_Address_Binding                                             | -                                                                                                                                                                                                                    | R    |
| Database_Revision                                                  | 0...65535, default 0                                                                                                                                                                                                 | R-E  |
| Max_Master                                                         | 0...127, default 127                                                                                                                                                                                                 | RW-E |
| Max_Info_Frames                                                    | 1...255, default 1                                                                                                                                                                                                   | RW-E |
| Active_COV_Subscriptions                                           | property only exists if working as MS/TP master, services Read-Property / Read-Range, max. 10 Subscriptions, for binary-input / binary-output / multistate-value, Confirmed / Unconfirmed, Lifetime = 0...65535 sec. | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                                                      |      |

## Binary Output Object 1...2

| Property                                                           | Remark / Value                                                                                                      | RW   |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | BINARY_OUTPUT (4)                                                                                                   | R    |
| Object_Identifier                                                  | binary-output, instance 1 ... 2                                                                                     | R    |
| Object_Name                                                        | max. 42 Bytes, default "Relay 1" ... "Relay 2"                                                                      | RW-E |
| Property_List                                                      |                                                                                                                     | R    |
| Description                                                        | max. 84 Bytes, default ""                                                                                           | RW-E |
| Inactive_Text                                                      | max. 31 Bytes, default "Off"                                                                                        | RW-E |
| Active_Text                                                        | max. 31 Bytes, default "On"                                                                                         | RW-E |
| Present_Value                                                      | NULL (write only) / INACTIVE (0) / ACTIVE (1)                                                                       | RW   |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0 = Switch A (Auto)<br>1 = Switch 0 (Off) or 1 (On)<br>OUT_OF_SERVICE: 0 / 1 | R    |
| Event_State                                                        | NORMAL (0)                                                                                                          | R    |
| Out_Of_Service                                                     | FALSE (0) / TRUE (1)                                                                                                | RW   |
| Polarity                                                           | NORMAL (0) / REVERSE (1)                                                                                            | RW-E |
| Priority_Array [16]                                                | NULL / INACTIVE (0) / ACTIVE (1)                                                                                    | R    |
| Relinquish_Default                                                 | INACTIVE (0)                                                                                                        | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                     |      |

| Function Table for Binary Output |          |        |                                       |               |               |            |                |
|----------------------------------|----------|--------|---------------------------------------|---------------|---------------|------------|----------------|
| Out_Of_Service                   | Polarity | Switch | Priority_Array and Relinquish_Default | Present_Value | Binary Output | OVERRIDDEN | OUT_OF_SERVICE |
| 0                                | 0        | A      | 0 / 1                                 | 0 / 1         | 0 / 1         | 0          | 0              |
| 0                                | 0        | 0      | 0 / 1                                 | 0             | 0             | 1          | 0              |
|                                  |          | 1      | 0 / 1                                 | 1             | 1             |            |                |
| 0                                | 1        | A      | 0 / 1                                 | 0 / 1         | 1 / 0         | 0          | 0              |
| 0                                | 1        | 0      | 0 / 1                                 | 1             | 0             | 1          | 0              |
|                                  |          | 1      | 0 / 1                                 | 0             | 1             |            |                |
| 1                                | 0        | A      | 0 / 1                                 | 0 / 1         | 0             | 0          | 1              |
| 1                                | 0        | 0      | 0 / 1                                 | 0 / 1         | 0             | 0          | 1              |
|                                  |          | 1      | 0 / 1                                 | 0 / 1         | 1             |            |                |
| 1                                | 1        | A      | 0 / 1                                 | 0 / 1         | 1             | 0          | 1              |
| 1                                | 1        | 0      | 0 / 1                                 | 0 / 1         | 0             | 0          | 1              |
|                                  |          | 1      | 0 / 1                                 | 0 / 1         | 1             |            |                |

If using an operating mode for fire dampers the relay is controlled by special functions. Then Present\_Value shows the state of the relay and Status\_Flag OVERRIDDEN is set (Lines 2 or 4) and the switch is not functional. If Out\_Of\_Service is TRUE the Priority\_Array instead is used for Present\_Value (Lines 5...8).

## Binary Input Object 1...4

Terminals 1...4 = inputs, Terminals C1 = common.  
Connect switches between inputs and common.

| Property                                                           | Remark / Value                                                    | RW      |
|--------------------------------------------------------------------|-------------------------------------------------------------------|---------|
| Object_Type                                                        | BINARY_INPUT (3)                                                  | R       |
| Object_Identifier                                                  | binary-input, instance 1 ... 4                                    | R       |
| Object_Name                                                        | max. 42 bytes, default "Input 1" ... "Input 4"                    | RW-E    |
| Property_List                                                      |                                                                   | R       |
| Description                                                        | max. 84 bytes, default ""                                         | RW-E    |
| Inactive_Text                                                      | max. 31 bytes, default "Off"                                      | RW-E    |
| Active_Text                                                        | max. 31 bytes, default "On"                                       | RW-E    |
| Present_Value                                                      | INACTIVE (0) / ACTIVE (1),<br>writable if Out_Of_Service          | R<br>RW |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0 / 1 | R       |
| Event_State                                                        | NORMAL (0)                                                        | R       |
| Out_Of_Service                                                     | FALSE (0) / TRUE (1)                                              | RW      |
| Polarity                                                           | NORMAL (0) / REVERSE (1)                                          | RW-E    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                   |         |

| Function Table for Binary Input                         |          |              |               |                |
|---------------------------------------------------------|----------|--------------|---------------|----------------|
| Out_Of_Service                                          | Polarity | Binary Input | Present_Value | OUT_OF_SERVICE |
| 0                                                       | 0        | 0 / 1        | 0 / 1         | 0              |
| 0                                                       | 1        | 0 / 1        | 1 / 0         | 0              |
| 1                                                       | 0        | 0 / 1        | x             | 1              |
| 1                                                       | 1        | 0 / 1        | x             | 1              |
| x: Present_Value is writable and not affected by inputs |          |              |               |                |

In operating modes for fire dampers the limit switches are connected as follows:

| Input Instance | Limit switch | Operating modes<br>Motorized_SafetyOpen,<br>Motorized_SafetyClose,<br>LimitSwitch_Open_Close<br>(contact closed at each limit) | Limit switch     | Operating modes<br>LimitSwitch_Open<br>(contact closed at open limit),<br>LimitSwitch_Close<br>(contact open at closed limit) |
|----------------|--------------|--------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------|
| 1              | open1        | Damper 1 open                                                                                                                  | open1 / close1   | Damper 1                                                                                                                      |
| 2              | close1       | Damper 1 closed                                                                                                                | open1a / close1a | Damper 1a                                                                                                                     |
| 3              | open2        | Damper 2 open                                                                                                                  | open2 / close2   | Damper 2                                                                                                                      |
| 4              | close2       | Damper 2 closed                                                                                                                | open2a / close2a | Damper 2a                                                                                                                     |

### Group Object 1...3

| Property                                                           | Remark / Value                                    | RW   |
|--------------------------------------------------------------------|---------------------------------------------------|------|
| Object_Type                                                        | GROUP (11)                                        | R    |
| Object_Identifier                                                  | group, instance 1 ... 3                           | R    |
| Object_Name                                                        | max. 42 bytes, default "Group 1" ... "Group 3"    | RW-E |
| Property_List                                                      |                                                   | R    |
| Description                                                        | max. 84 bytes, default ""                         | RW-E |
| Present_Value                                                      | Present_Value of Binary Inputs,<br>see next Table | R    |
| List_Of_Group_Members                                              | see next Table                                    | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                   |      |

| Members of Groups |              |   |   |   |
|-------------------|--------------|---|---|---|
| Group             | Binary Input |   |   |   |
|                   | 1            | 2 | 3 | 4 |
| 1                 | x            | x | x | x |
| 2                 | x            | x |   |   |
| 3                 |              |   | x | x |

## Analog Value Object 1

| Property                                                           | Remark / Value                                                            | RW   |
|--------------------------------------------------------------------|---------------------------------------------------------------------------|------|
| Object_Type                                                        | ANALOG_VALUE (2)                                                          | R    |
| Object_Identifier                                                  | analog-value, instance 1                                                  | R    |
| Object_Name                                                        | max. 42 Bytes, default "Watchdog Time"                                    | RW-E |
| Property_List                                                      |                                                                           | R    |
| Description                                                        | max. 84 Bytes, default ""                                                 | RW-E |
| Present_Value                                                      | Time constant of Watchdog Timer,<br>Special value 0: Watchdog is inactive | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0             | R    |
| Event_State                                                        | NORMAL (0)                                                                | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                 | R    |
| Units                                                              | seconds (73)                                                              | R    |
| Min_Pres_Value                                                     | 0.00                                                                      | R    |
| Max_Pres_Value                                                     | 655.34                                                                    | R    |
| Resolution                                                         | 0.01                                                                      | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                           |      |

In operating mode Direct\_Control the Watchdog Timer resets Present\_Value of all output objects to Relinquish\_Default, if BACnet communication fails permanently.

The timer is restarted, when a BACnet message with an APDU is received.

When the timer times out, the priority arrays of all output objects are completely cleared to NULL.

## Multistate Value Object 1...2

| Property                                                           | Remark / Value                                                                                                                                                                             | RW   |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | MULTISTATE_VALUE (19)                                                                                                                                                                      | R    |
| Object_Identifier                                                  | multistate-value, instance 1 ... 2                                                                                                                                                         | R    |
| Object_Name                                                        | max. 42 Bytes,<br>default "OperMode_1" ... "OperMode_2"                                                                                                                                    | RW-E |
| Property_List                                                      |                                                                                                                                                                                            | R    |
| Description                                                        | max. 84 bytes, default ""                                                                                                                                                                  | RW-E |
| State_Text                                                         | max. 31 Bytes, default<br>1: "Direct_Control"<br>2: "Motorized_SafetyOpen"<br>3: "Motorized_SafetyClose"<br>4: "LimitSwitch_Open_Close"<br>5: "LimitSwitch_Open"<br>6: "LimitSwitch_Close" | RW-E |
| Present_Value                                                      | Operating mode of Inputs 1...2 and Output 1,<br>Operating mode of Inputs 3...4 and Output 2,<br>values 1...6, default 1                                                                    | RW-E |
| Status_Flags                                                       | IN_ALARM:           0<br>FAULT:               0<br>OVERRIDDEN:       0<br>OUT_OF_SERVICE: 0                                                                                                | R    |
| Event_State                                                        | NORMAL (0)                                                                                                                                                                                 | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                                                                                                                                  | R    |
| Number_Of_States                                                   | 6                                                                                                                                                                                          | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                            |      |

### Mode "Direct\_Control"

The relay output is controlled directly by its Binary Output Object which may be overridden by a switch.

### Mode "Motorized\_SafetyOpen"

The relay output is controlled by specialized functions for motorized smoke control dampers. Two limit switches (contacts closed at limit) for the open and closed position are monitored.

### Mode "Motorized\_SafetyClose"

The relay output is controlled by specialized functions for motorized fire and/or smoke protection dampers.

Two limit switches (contacts closed at limit) for the open and closed position are monitored.

### Mode "LimitSwitch\_Open\_Close"

The relay output is switched off. A mechanical fire damper with two limit switches (contacts closed at limit) for the open and closed position is monitored.

### Mode "LimitSwitch\_Open", "LimitSwitch\_Close"

The relay output is switched off. Up to two mechanical fire dampers, each with only one limit switch are monitored. The limit switch signals the fully open (contact closed) or fully closed (contact open) position. These modes only have different names, but otherwise work identically.

## Analog Value Object 2...7

| Property                                                           | Remark / Value                                                                      | RW   |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|
| Object_Type                                                        | ANALOG_VALUE (2)                                                                    | R    |
| Object_Identifier                                                  | analog-value, instance 2 ... 7                                                      | R    |
| Object_Name                                                        | max. 42 Bytes, default see table below                                              | RW-E |
| Property_List                                                      |                                                                                     | R    |
| Description                                                        | max. 84 Bytes, default ""                                                           | RW-E |
| Present_Value                                                      | Time constant of timer, default see table below, special value 0: Timer is inactive | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                       | R    |
| Event_State                                                        | NORMAL (0)                                                                          | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                           | R    |
| Units                                                              | seconds (73)                                                                        | R    |
| Min_Pres_Value                                                     | 0.0                                                                                 | R    |
| Max_Pres_Value                                                     | 6553.4                                                                              | R    |
| Resolution                                                         | 0.1                                                                                 | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                     |      |

| Instance | Object_Name<br>default | Present_Value<br>default |
|----------|------------------------|--------------------------|
| 2        | "DriveTime_1"          | 240.0                    |
| 3        | "DriveTime_2"          | 240.0                    |
| 4        | "TurnOffTime_1"        | 35.0                     |
| 5        | "TurnOffTime_2"        | 35.0                     |
| 6        | "RcvHeartBeat_1"       | 0.0                      |
| 7        | "RcvHeartBeat_2"       | 0.0                      |

These Analog-Values only exist in operating modes for motorized fire dampers.

With DriveTime\_1/2 the opening time of fire damper 1/2 may be monitored.

With TurnOffTime\_1/2 the closing time of fire damper 1/2 may be monitored.

The timer is started, when the corresponding relay is switched. The timer is stopped, when the limit switches signal the intended position. When the timer expires, the alarm Runtime\_Error is signalled.

With RcvHeartBeat\_1/2 the time between writing Present\_Value of object ActuDrive\_1/2 may be monitored.

This way BACnet communication is monitored.

The timer is restarted, when writing Present\_Value. When the timer expires, the alarm Update\_Error is signalled.

## Multistate Value Object 3...8

| Property          | Remark / Value                                                                          | RW   |
|-------------------|-----------------------------------------------------------------------------------------|------|
| Object_Type       | MULTISTATE_VALUE (19)                                                                   | R    |
| Object_Identifier | multistate-value, instance 3 ... 8                                                      | R    |
| Object_Name       | max. 42 Bytes, default see table below                                                  | RW-E |
| Property_List     |                                                                                         | R    |
| Description       | max. 84 bytes, default ""                                                               | RW-E |
| State_Text        | max. 31 Bytes, default<br>1: "open"<br>2: "close"<br>3: "running" (only instance 5...6) | RW-E |
| Present_Value     | see table below                                                                         |      |
| Status_Flags      | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                           | R    |
| Event_State       | NORMAL (0)                                                                              | R    |
| Out_Of_Service    | FALSE (0)                                                                               | R    |
| Number_Of_States  | see table below                                                                         | R    |

R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash

| Instance | Object_Name default | Present_Value | Number_Of_States |
|----------|---------------------|---------------|------------------|
| 3        | "ActuDrive_1"       | 1...2 RW      | 2                |
| 4        | "ActuDrive_2"       |               |                  |
| 5        | "ActuPos_1"         | 1...3 R       | 3                |
| 6        | "ActuPos_2"         |               |                  |
| 7        | "ActuPos_1a"        | 1...2 R       | 2                |
| 8        | "ActuPos_2a"        |               |                  |

These Multistate-Values exist depending on operating modes:

Multistate-Value 3...4 exist for motorized fire dampers.

Multistate-Value 5...6 exist for all fire dampers.

Multistate-Value 7...8 exist for mechanical fire dampers with only one limit switch.

With ActuDrive\_1/2 the intended position of the fire damper is controlled over the network.

After a reset Present\_Value is the normal position .

ActuPos\_1/2 decodes the fire damper position signalled by its limit switches.

If both switches were activated at once, Present\_Value is set to running and the alarm Manipulation is signalled.

In operating modes LimitSwitch\_Open, LimitSwitch\_Close two dampers may be monitored.

Then ActuPos\_1/2 decodes the first fire damper position signalled by its limit switch

and ActuPos\_1a/2a decodes the second fire damper position signalled by its limit switch.

## Multistate Value Object 9...10

| Property                                                           | Remark / Value                                                                                                                  | RW   |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | MULTISTATE_VALUE (19)                                                                                                           | R    |
| Object_Identifier                                                  | multistate-value, instance 9 ... 10                                                                                             | R    |
| Object_Name                                                        | max. 42 Bytes,<br>default "AlarmCode_1" ... "AlarmCode_2"                                                                       | RW-E |
| Property_List                                                      |                                                                                                                                 | R    |
| Description                                                        | max. 84 bytes, default ""                                                                                                       | RW-E |
| State_Text                                                         | max. 31 Bytes, default<br>1: "OK"<br>2: "Runtime_Error"<br>3: "Manipulation"<br>4: "Update_Error"<br>5: "Alarm"<br>6: "Alarm_a" | RW-E |
| Present_Value                                                      | see table below, default 1                                                                                                      | RW   |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                                                                   | R    |
| Event_State                                                        | NORMAL (0)                                                                                                                      | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                                                                       | R    |
| Number_Of_States                                                   | 6                                                                                                                               | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                 |      |

These Multistate-Values only exist in operating modes for fire dampers to signal an alarm.

Runtime\_Error: The time needed to open or close the fire damper was exceeded.

Used only for motorized dampers.

Possible causes: Damper blocked, limit switch defective, input for limit switch defective,  
cable to limit switch broken, cable to motor broken, Motor defective.

Manipulation: Both limit switches were activated at once.

Possible causes: Limit switch defective, input for limit switch defective,  
cable to limit switch shorted.

Update\_Error: The time between writing Present\_Value of object ActuDrive\_1/2 was exceeded.

Used only for motorized dampers.

Possible causes: BACnet communication partner nonworking,  
BACnet connection broken (e.g. cable, repeater, router, switch).

Alarm: The limit switches signal the fire position.

Alarm\_a: The limit switch of the second mechanical fire damper signals the fire position.

Alarm has higher priority than Alarm\_a if both dampers are in fire position.

Even if more than one alarm is present, the first alarm code is stored until it is reset by writing OK to Present\_Value (Alarm-Reset). Only then another alarm code may be signalled.

## Fire-Position

Depending on the operating mode the Fire-Position is derived from the limit switches:

| Operating mode         | Fire-Position if             |
|------------------------|------------------------------|
| Motorized_SafetyClose  | damper not open              |
| Motorized_SafetyOpen   | damper not closed            |
| LimitSwitch_Open_Close | damper not open              |
| LimitSwitch_Open       | at least one damper not open |
| LimitSwitch_Close      | at least one damper closed   |

If the fire damper is in the Fire-Position and no other alarm is signalled, then Alarm or Alarm\_a is signalled.

For motorized fire dampers the Fire-Position causes a latching in the safe position. The relay then is switched to the safe state. To reset the fire damper to its normal position, first the normal position shall be written to ActuDrive and then AlarmCode shall be reset to OK. Then the Alarm-Reset begins, which stops the latching.

### Operating mode Motorized\_SafetyClose

Depending on Alarm-Reset, Fire-Position, ActuDrive\_1/2 and AlarmCode\_1/2 the Relay is switched as follows (evaluation top down):

| other         | ActuDrive_1...2 | AlarmCode_1...2   | Relay 1...2 |
|---------------|-----------------|-------------------|-------------|
| Alarm-Reset   | open (1)        | OK (1)            | On          |
| Fire-Position | any             | any               | Off         |
| -             | any             | Runtime_Error (2) | Off         |
|               | any             | Update_Error (4)  | Off         |
|               | any             | Manipulation (3)  | Off         |
|               | open (1)        | OK (1)            | On          |
|               | close (2)       | OK (1)            | Off         |

Initialisation after power-on / reset: ActuDrive is set to to open. AlarmCode is set to OK. The Alarm-Reset starts, to stop latching the safe position caused by Fire-Position.

### Operating mode Motorized\_SafetyOpen

Depending on Alarm-Reset, Fire-Position, ActuDrive\_1/2 and AlarmCode\_1/2 the Relay is switched as follows (evaluation top down):

| other         | ActuDrive_1...2 | AlarmCode_1...2   | Relay 1...2 |
|---------------|-----------------|-------------------|-------------|
| Alarm-Reset   | close (2)       | OK (1)            | Off         |
| Fire-Position | any             | any               | On          |
| -             | any             | Runtime_Error (2) | On          |
|               | any             | Update_Error (4)  | On          |
|               | any             | Manipulation (3)  | Off         |
|               | open (1)        | OK (1)            | On          |
|               | close (2)       | OK (1)            | Off         |

Initialisation after power-on / reset: ActuDrive is set to to close. AlarmCode is set to OK. The Alarm-Reset starts, to stop latching the safe position caused by Fire-Position.

## **BMT-TP**

### **BACnet Protocol Implementation Conformance Statement**

**Date:** 10.01.2020  
**Vendor Name:** METZ CONNECT GmbH  
**Product Name:** BMT-TP  
**Product Model Number:** 110 888 13  
**Application Software Version:** 1.0  
**Firmware Revision:** 2.0  
**BACnet Protocol Revision:** 15

#### **Product Description:**

BACnet MS/TP Application Specific Controller providing  
 - 6 digital inputs (sources 7.2 V, 1.1 mA to a switch),  
 - 2 two-stage relay outputs (250 V AC, 5 A),  
 - 2 transistor outputs (Photo-MOS, 40 V AC/DC, 100 mA).

#### **BACnet Standardized Device Profile (Annex L):**

☒ BACnet Application Specific Controller (B-ASC)

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

|                                                |                         |
|------------------------------------------------|-------------------------|
| Data Sharing-ReadProperty-B                    | (DS-RP-B)               |
| Data Sharing-WriteProperty-B                   | (DS-WP-B)               |
| Data Sharing-COV-B                             | (DS-COV-B)              |
| 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, no Password) |
| Device Management-ReinitializeDevice-B         | (DM-RD-B, no Password)  |

#### **Segmentation Capability:**

☐ Able to transmit segmented messages      Window Size \_\_\_\_\_  
☐ Able to receive segmented messages      Window Size \_\_\_\_\_

#### **Standard Object Types Supported:**

An object type is supported if it may be present in the device.  
 For each standard Object Type supported provide the following data:

- 1) Whether objects of this type are dynamically creatable using the CreateObject service: None
- 2) Whether objects of this type are dynamically deletable using the DeleteObject service: None
- 3) List of the optional properties supported
- 4) List of all properties that are writable where not otherwise required by this standard
- 5) List of all properties that are conditionally writable where not otherwise required by this standard:  
None
- 6) List of proprietary properties and for each its property identifier, datatype, and meaning: None
- 7) List of any property range restrictions

**Data Link Layer Options:**

- ☒ MS/TP master (Clause 9)  
☒ MS/TP slave (Clause 9)      baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200

**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

**Networking Options:**

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

**Network Security Options:**

- ☒ Non-secure Device - is capable of operating without BACnet Network Security

**Character Sets Supported:**

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ☒ ISO 10646 (UTF-8)      ☒ IBM™/Microsoft™ DBCS      ☒ ISO 8859-1  
☒ ISO 10646 (UCS-2)      ☒ ISO 10646 (UCS-4)      ☒ JIS X 0208

Default strings implemented in the objects use UTF-8.  
 Default strings can be restored by writing an empty string.

**If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:**

- ☐ Yes    ☒ No

**Configuration Switches**

Hexadecimal switches x10, x1 define the network address (00 – F9) and baud rate (FA – FF).

| Switches  | FA   | FB    | FC    | FD    | FE    | FF     |
|-----------|------|-------|-------|-------|-------|--------|
| Baud Rate | 9600 | 19200 | 38400 | 57600 | 76800 | 115200 |

- Turn switch x10 to E (device is temporarily configured as slave)
- Turn switch x1 to A – F to select baud rate
- Turn switch x10 to F, wait 1 second
- Red and green LEDs are blinking when baud rate has been stored in EEPROM
- Turn switch x10 to select network address
- Turn switch x1 to select network address

The device works as MS/TP master, if network address 0x00 ... Max\_Master (see Device Object) is used.

The device works as MS/TP slave, if network address Max\_Master + 1 ... 0xF9 is used.

## Device Object

| Property                                                           | Remark / Value                                                                                                                                                                                                        | RW   |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | DEVICE (8)                                                                                                                                                                                                            | R    |
| Object_Identifier                                                  | device, default instance: 421000 + Network-Address, default may be restored by writing 4194303                                                                                                                        | RW-E |
| Object_Name                                                        | max. 63 bytes, default "BMT-TP_" + Network-Address (Hexadecimal)                                                                                                                                                      | RW-E |
| Property_List                                                      |                                                                                                                                                                                                                       | R    |
| Description                                                        | max. 127 bytes, default ""                                                                                                                                                                                            | RW-E |
| Location                                                           | max. 63 bytes, default ""                                                                                                                                                                                             | RW-E |
| Vendor_Name                                                        | "METZ CONNECT GmbH"                                                                                                                                                                                                   | R    |
| Vendor_Identifier                                                  | 421                                                                                                                                                                                                                   | R    |
| Model_Name                                                         | "BMT-TP"                                                                                                                                                                                                              | R    |
| Firmware_Revision                                                  | "2.0"                                                                                                                                                                                                                 | R    |
| Application_Software_Version                                       | "1.0"                                                                                                                                                                                                                 | R    |
| Protocol_Version                                                   | 1                                                                                                                                                                                                                     | R    |
| Protocol_Revision                                                  | 15                                                                                                                                                                                                                    | R    |
| Protocol_Services_Supported                                        | read-property, write-property, subscribe-cov, who-has, who-is, read-range, device-communication-control, reinitialize-device                                                                                          | R    |
| Protocol_Object_Types_Supported                                    | DEVICE, BINARY_OUTPUT, BINARY_INPUT, GROUP, MULTISTATE_OUTPUT, MULTISTATE_VALUE, ANALOG_VALUE                                                                                                                         | R    |
| Object_List                                                        | device, binary-output 1...2, binary-input 1...6, group 1...3, multistate-output 1...2, multistate-value 1...6, analog-value 1...5                                                                                     | R    |
| Max_APDU_Length_Accepted                                           | 480                                                                                                                                                                                                                   | R    |
| Segmentation_Supported                                             | NO_SEGMENTATION (3)                                                                                                                                                                                                   | R    |
| System_Status                                                      | OPERATIONAL (0)                                                                                                                                                                                                       | R    |
| APDU_Timeout                                                       | 1...65535, default 6000                                                                                                                                                                                               | RW-E |
| Number_Of_APDU_Retries                                             | 1...10, default 3                                                                                                                                                                                                     | RW-E |
| Device_Address_Binding                                             | -                                                                                                                                                                                                                     | R    |
| Database_Revision                                                  | 0...65535, default 0                                                                                                                                                                                                  | R-E  |
| Max_Master                                                         | 0...127, default 127                                                                                                                                                                                                  | RW-E |
| Max_Info_Frames                                                    | 1...255, default 1                                                                                                                                                                                                    | RW-E |
| Active_COV_Subscriptions                                           | property only exists if working as MS/TP master, services Read-Property / Read-Range, max. 12 Subscriptions, for binary-input / binary-output / multistate-output, Confirmed / Unconfirmed, Lifetime = 0...65534 sec. | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                                                       |      |

## Multistate Value Object 1...2

| Property                                                           | Remark / Value                                                                                       | RW   |
|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | MULTISTATE_VALUE (19)                                                                                | R    |
| Object_Identifier                                                  | multistate-value, instance 1 ... 2                                                                   | R    |
| Object_Name                                                        | max. 42 bytes,<br>default "Operating Mode 1" ... "Operating Mode 2"                                  | RW-E |
| Property_List                                                      |                                                                                                      | R    |
| Description                                                        | max. 84 bytes, default ""                                                                            | RW-E |
| State_Text                                                         | max. 20 bytes, default<br>1: "Switch 0-1-2"<br>2: "Switch 1-0-2"<br>3: "Sunblind"<br>4: "Sunblind 2" | RW-E |
| Present_Value                                                      | Operating Mode of Multistate Output Object 1...2, default 1                                          | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                                        | R    |
| Event_State                                                        | NORMAL (0)                                                                                           | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                                            | R    |
| Number_Of_States                                                   | 4                                                                                                    | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                      |      |

### Operating Mode 1 "Switch 0-1-2"

The Present\_Value of Multistate Output Objects may be overridden by Switches.  
Position of Switch 1 / 2 ST: Top = Off, Middle = Stage 1, Bottom = Stage 2.

### Operating Mode 2 "Switch 1-0-2"

The Present\_Value of Multistate Output Objects may be overridden by Switches.  
Position of Switch 1 / 2 ST: Top = Stage 1, Middle = Off, Bottom = Stage 2.

### Operating Mode 3 “Sunblind”

Binary Inputs 1 / 2 or 4 / 5 are used for Open / Close pushbutton switches.  
 Short actuation will yield a short pulse of constant duration for the appropriate Multistate Output.  
 Long actuation will yield a long pulse of constant duration for the appropriate Multistate Output.  
 Analog Value 2 defines the duration of short pulses (default 0.5s),  
 Analog Value 3 defines the duration of long pulses (default 60s).  
 Analog Value 5 defines the minimum long key press time (default 2s).

Commands written to Multistate Value 6 may be used for security functions.

The Present\_Value of Multistate Output Objects will not be overridden by Switches.  
 Instead Commands, Switches and pulses generated of Binary Inputs may be mapped to Priority\_Array levels

of Multistate Output Objects. Multistate Value 3 defines the Input Priority, Multistate Value 4 defines the Switch Priority, Multistate Value 5 defines the Command Priority.

If mapped to the same priority level, the relative priority is: network < command < switch < input.

Position of Switch 1 / 2 ST: Top = Stage 1 / Open, Middle = Off, Bottom = Stage 2 / Close.

Input 1 / 2 off: NULL, Input 1 on: Relay 1 Stage 1 / Open, only Input 2 on: Relay 1 Stage 2 / Close.

Input 4 / 5 off: NULL, Input 4 on: Relay 2 Stage 1 / Open, only Input 5 on: Relay 2 Stage 2 / Close.

### Operating Mode 4 “Sunblind 2”

Multistate Value 1 and 2 are forced to the same Operating Mode.

Multistate Output 1 is used for both Relay Outputs.

Multistate Output 2 is disabled.

Binary Inputs 1 / 2 are used for Open / Close pushbutton switches.

Short actuation will yield a short pulse of constant duration for Multistate Output 1.

Long actuation will yield a long pulse of constant duration for Multistate Output 1.

Analog Value 2 defines the duration of short pulses (default 0.5s),

Analog Value 3 defines the duration of long pulses (default 60s).

Analog Value 5 defines the minimum long key press time (default 2s).

Commands written to Multistate Value 6 may be used for security functions.

The Present\_Value of Multistate Output Object 1 will not be overridden by Switches.

Instead Commands, Switches and pulses generated of Binary Inputs may be mapped to Priority\_Array levels

of Multistate Output Object 1. Multistate Value 3 defines the Input Priority, Multistate Value 4 defines the Switch Priority, Multistate Value 5 defines the Command Priority.

If mapped to the same priority level, the relative priority is: network < command < switch < input.

Position of Switch 1 ST: Top = Stage 1 / Open, Middle = Off, Bottom = Stage 2 / Close.

Input 1 / 2 off: NULL, Input 1 on: Relays Stage 1 / Open, only Input 2 on: Relays Stage 2 / Close.

| Wiring                     | Terminals | Wiring                     |
|----------------------------|-----------|----------------------------|
| Motor ( Open – / Close + ) | 31 11     | Motor ( Open + / Close – ) |
| GND                        | 34 24     | GND                        |
| +24V                       | 44 14     | +24V                       |

### Multistate Value Object 3...5

| Property                                                           | Remark / Value                                                                                                 | RW   |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | MULTISTATE_VALUE (19)                                                                                          | R    |
| Object_Identifier                                                  | multistate-value, instance 3, 4, 5                                                                             | R    |
| Object_Name                                                        | max. 42 bytes, default "Input Priority", "Switch Priority", "Command Priority"                                 | RW-E |
| Property_List                                                      |                                                                                                                | R    |
| Description                                                        | max. 84 bytes, default ""                                                                                      | RW-E |
| Present_Value                                                      | Priority_Array level of Multistate Output objects<br>values: 1 ... 16<br>default: Input 9, Switch 7, Command 4 | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                                                  | R    |
| Event_State                                                        | NORMAL (0)                                                                                                     | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                                                      | R    |
| Number_Of_States                                                   | 16                                                                                                             | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                |      |

### Analog Value Object 2...5

| Property                                                           | Remark / Value                                                                                                                                            | RW   |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | ANALOG_VALUE (2)                                                                                                                                          | R    |
| Object_Identifier                                                  | analog-value, instance 2, 3, 4, 5                                                                                                                         | R    |
| Object_Name                                                        | max. 42 bytes, default "Short Pulse", "Long Pulse", "Rotation Pulse", "Key Press Time"                                                                    | RW-E |
| Property_List                                                      |                                                                                                                                                           | R    |
| Description                                                        | max. 84 bytes, default ""                                                                                                                                 | RW-E |
| Present_Value                                                      | Time constant of Multistate Output pulses<br>values: 0 ... 655.34 seconds<br>default: Short 0.5 sec, Long 60 sec, Rotation 1 sec,<br>Key Press Time 2 sec | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                                                                                             | R    |
| Event_State                                                        | NORMAL (0)                                                                                                                                                | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                                                                                                 | R    |
| Units                                                              | seconds (73)                                                                                                                                              | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                           |      |

## Multistate Value Object 6

| Property                                                           | Remark / Value                                                                                                                                                                                                                                                                                                                            | RW   |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | MULTISTATE_VALUE (19)                                                                                                                                                                                                                                                                                                                     | R    |
| Object_Identifier                                                  | multistate-value, instance 6                                                                                                                                                                                                                                                                                                              | R    |
| Object_Name                                                        | max. 42 bytes, default "Command"                                                                                                                                                                                                                                                                                                          | RW-E |
| Property_List                                                      |                                                                                                                                                                                                                                                                                                                                           | R    |
| Description                                                        | max. 84 bytes, default ""                                                                                                                                                                                                                                                                                                                 | RW-E |
| State_Text                                                         | max. 20 bytes, default<br>1: "Open"<br>2: "Close"<br>3: "Close/Rotate"<br>4: "Locked"<br>5: "Normal"                                                                                                                                                                                                                                      | RW-E |
| Present_Value                                                      | Command to Multistate Output objects<br>values: 1 ... 5, default: 5<br>1: Long pulse to open, lock inputs and switches<br>2: Long pulse to close, lock inputs and switches<br>3: Long pulse to close, then rotate pulse to open,<br>lock inputs and switches<br>4: Lock inputs and switches<br>5: Normal operation of inputs and switches | RW   |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                                                                                                                                                                                                                                                                             | R    |
| Event_State                                                        | NORMAL (0)                                                                                                                                                                                                                                                                                                                                | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                                                                                                                                                                                                                                                                                 | R    |
| Number_Of_States                                                   | 5                                                                                                                                                                                                                                                                                                                                         | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                                                                                                                                                                           |      |

## Multistate Output Object 1...2

Relay 1: Terminals 11, 14 (stage 1), 24 (stage 2), Relay 2: Terminals 31, 34 (stage 1), 44 (stage 2).

| Property                                                           | Remark / Value                                                                                             | RW   |
|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | MULTISTATE_OUTPUT (14)                                                                                     | R    |
| Object_Identifier                                                  | multistate-output, instance 1 ... 2                                                                        | R    |
| Object_Name                                                        | max. 42 bytes, default "Relay 1" ... "Relay 2"                                                             | RW-E |
| Property_List                                                      |                                                                                                            | R    |
| Description                                                        | max. 84 bytes, default ""                                                                                  | RW-E |
| State_Text                                                         | max. 20 bytes, default<br>1: "Off",<br>2: "Stage-1/Open",<br>3: "Stage-2/Close"                            | RW-E |
| Present_Value                                                      | NULL (write only) / 1 / 2 / 3                                                                              | RW   |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0 = Switch A (Auto)<br>1 = Switch H (Hand)<br>OUT_OF_SERVICE: 0 / 1 | R    |
| Event_State                                                        | NORMAL (0)                                                                                                 | R    |
| Out_Of_Service                                                     | FALSE (0) / TRUE (1),<br>Output is switched Off when TRUE                                                  | RW   |
| Number_Of_States                                                   | 3                                                                                                          | R    |
| Priority_Array [16]                                                | NULL / 1 / 2 / 3                                                                                           | R    |
| Relinquish_Default                                                 | 1                                                                                                          | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                            |      |

When switching between States 2 and 3 a minimum Off Time of 500ms is inserted.

Operating Mode 1...2: The Present\_Value may be overridden by Switches.

Operating Mode 3...4: Commands, Switches and Binary Inputs may be mapped to Priority\_Array levels.  
For details concerning Operating Mode see Multistate Values 1...2.

| BACnet Standard Priority_Array Levels |                            |       |             |
|---------------------------------------|----------------------------|-------|-------------|
| Level                                 | Application                | Level | Application |
| 1                                     | Manual Life Safety         | 9     | Available   |
| 2                                     | Automatic Life Safety      | 10    | Available   |
| 3                                     | Available                  | 11    | Available   |
| 4                                     | Available                  | 12    | Available   |
| 5                                     | Critical Equipment Control | 13    | Available   |
| 6                                     | Minimum On / Off           | 14    | Available   |
| 7                                     | Available                  | 15    | Available   |
| 8                                     | Manual Operator            | 16    | Available   |

## Binary Output Object 1...2

Terminals S1 = output 1, S2 = output 2.

| Property                                                           | Remark / Value                                                    | RW   |
|--------------------------------------------------------------------|-------------------------------------------------------------------|------|
| Object_Type                                                        | BINARY_OUTPUT (4)                                                 | R    |
| Object_Identifier                                                  | binary-output, instance 1 ... 2                                   | R    |
| Object_Name                                                        | max. 42 bytes, default "Transistor 1" ... "Transistor 2"          | RW-E |
| Property_List                                                      |                                                                   | R    |
| Description                                                        | max. 84 bytes, default ""                                         | RW-E |
| Inactive_Text                                                      | max. 20 bytes, default "Off"                                      | RW-E |
| Active_Text                                                        | max. 20 bytes, default "On"                                       | RW-E |
| Present_Value                                                      | NULL (write only) / INACTIVE (0) / ACTIVE (1)                     | RW   |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0 / 1 | R    |
| Event_State                                                        | NORMAL (0)                                                        | R    |
| Out_Of_Service                                                     | FALSE (0) / TRUE (1)                                              | RW   |
| Polarity                                                           | NORMAL (0) / REVERSE (1)                                          | RW-E |
| Priority_Array [16]                                                | NULL / INACTIVE (0) / ACTIVE (1)                                  | R    |
| Relinquish_Default                                                 | INACTIVE (0)                                                      | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                   |      |

| Function Table for Binary Output |          |                                       |               |               |                |
|----------------------------------|----------|---------------------------------------|---------------|---------------|----------------|
| Out_Of_Service                   | Polarity | Priority_Array and Relinquish_Default | Present_Value | Binary Output | OUT_OF_SERVICE |
| 0                                | 0        | 0 / 1                                 | 0 / 1         | 0 / 1         | 0              |
| 0                                | 1        | 0 / 1                                 | 0 / 1         | 1 / 0         | 0              |
| 1                                | 0        | 0 / 1                                 | 0 / 1         | 0             | 1              |
| 1                                | 1        | 0 / 1                                 | 0 / 1         | 1             | 1              |

## Binary Input Object 1...6

Terminals 1...6 = input, C2 = ground, connect switches.

| Property          | Remark / Value                                                    | RW      |
|-------------------|-------------------------------------------------------------------|---------|
| Object_Type       | BINARY_INPUT (3)                                                  | R       |
| Object_Identifier | binary-input, instance 1 ... 6                                    | R       |
| Object_Name       | max. 42 bytes, default "Input 1" ... "Input 6"                    | RW-E    |
| Property_List     |                                                                   | R       |
| Description       | max. 84 bytes, default ""                                         | RW-E    |
| Inactive_Text     | max. 20 bytes, default "Off"                                      | RW-E    |
| Active_Text       | max. 20 bytes, default "On"                                       | RW-E    |
| Present_Value     | INACTIVE (0) / ACTIVE (1),<br>writable if Out_Of_Service          | R<br>RW |
| Status_Flags      | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0 / 1 | R       |
| Event_State       | NORMAL (0)                                                        | R       |
| Out_Of_Service    | FALSE (0) / TRUE (1)                                              | RW      |
| Polarity          | NORMAL (0) / REVERSE (1)                                          | RW-E    |

R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash

| Function Table for Binary Input |          |              |               |                |
|---------------------------------|----------|--------------|---------------|----------------|
| Out_Of_Service                  | Polarity | Binary Input | Present_Value | OUT_OF_SERVICE |
| 0                               | 0        | 0<br>1       | 0<br>1        | 0              |
| 0                               | 1        | 0<br>1       | 1<br>0        | 0              |
| 1                               | 0        | 0<br>1       | x             | 1              |
| 1                               | 1        | 0<br>1       | x             | 1              |

x: Present\_Value is writable and not affected by inputs

### Group Object 1...3

| Property              | Remark / Value                                    | RW   |
|-----------------------|---------------------------------------------------|------|
| Object_Type           | GROUP (11)                                        | R    |
| Object_Identifier     | group, instance 1 ... 3                           | R    |
| Object_Name           | max. 42 bytes, default "Group 1" ... "Group 3"    | RW-E |
| Property_List         |                                                   | R    |
| Description           | max. 84 bytes, default ""                         | RW-E |
| Present_Value         | Present_Value of Binary Inputs,<br>see next Table | R    |
| List_Of_Group_Members | see next Table                                    | R    |

R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash

| Members of Groups |              |   |   |   |   |   |
|-------------------|--------------|---|---|---|---|---|
| Group             | Binary Input |   |   |   |   |   |
|                   | 1            | 2 | 3 | 4 | 5 | 6 |
| 1                 | x            | x | x | x | x | x |
| 2                 | x            | x | x |   |   |   |
| 3                 |              |   |   | x | x | x |

### Analog Value Object 1

| Property          | Remark / Value                                                                       | RW   |
|-------------------|--------------------------------------------------------------------------------------|------|
| Object_Type       | ANALOG_VALUE (2)                                                                     | R    |
| Object_Identifier | analog-value, instance 1                                                             | R    |
| Object_Name       | max. 42 bytes, default "Watchdog Time"                                               | RW-E |
| Property_List     |                                                                                      | R    |
| Description       | max. 84 bytes, default ""                                                            | RW-E |
| Present_Value     | Time Constant of Watchdog Timer,<br>0: Watchdog is inactive, Maximum: 655.34 seconds | RW-E |
| Status_Flags      | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                        | R    |
| Event_State       | NORMAL (0)                                                                           | R    |
| Out_Of_Service    | FALSE (0)                                                                            | R    |
| Units             | seconds (73)                                                                         | R    |

R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash

The Watchdog Timer resets Present\_Value of all output objects to Relinquish\_Default, if BACnet communication fails permanently.

The timer is restarted, when a BACnet message with an APDU is received.

When the timer times out, the priority arrays of all output objects are completely cleared to NULL.

## **BMT-AO4**

### **BACnet Protocol Implementation Conformance Statement**

**Date:** 20.01.2020  
**Vendor Name:** METZ CONNECT GmbH  
**Product Name:** BMT-AO4  
**Product Model Number:** 110 885 13 02  
**Application Software Version:** 1.0  
**Firmware Revision:** 2.0  
**BACnet Protocol Revision:** 15

#### **Product Description:**

BACnet MS/TP Application Specific Controller providing 4 Analog Outputs 0 – 10 V.

#### **BACnet Standardized Device Profile (Annex L):**

☒ BACnet Application Specific Controller (B-ASC)

#### **List all BACnet Interoperability Building Blocks Supported (Annex K):**

|                                                |                         |
|------------------------------------------------|-------------------------|
| Data Sharing-ReadProperty-B                    | (DS-RP-B)               |
| Data Sharing-WriteProperty-B                   | (DS-WP-B)               |
| Data Sharing-COV-B                             | (DS-COV-B)              |
| 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, no Password) |
| Device Management-ReinitializeDevice-B         | (DM-RD-B, no Password)  |

#### **Segmentation Capability:**

☐ Able to transmit segmented messages      Window Size \_\_\_\_\_  
☐ Able to receive segmented messages      Window Size \_\_\_\_\_

#### **Standard Object Types Supported:**

An object type is supported if it may be present in the device.  
 For each standard Object Type supported provide the following data:

- 1) Whether objects of this type are dynamically creatable using the CreateObject service: None
- 2) Whether objects of this type are dynamically deletable using the DeleteObject service: None
- 3) List of the optional properties supported
- 4) List of all properties that are writable where not otherwise required by this standard
- 5) List of all properties that are conditionally writable where not otherwise required by this standard: None
- 6) List of proprietary properties and for each its property identifier, datatype, and meaning: None
- 7) List of any property range restrictions

### Data Link Layer Options:

- ☒ MS/TP master (Clause 9)  
☒ MS/TP slave (Clause 9)      baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200

### 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

### Networking Options:

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

### Network Security Options:

- ☒ Non-secure Device - is capable of operating without BACnet Network Security

### Character Sets Supported:

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ☒ ISO 10646 (UTF-8)      ☒ IBM™/Microsoft™ DBCS      ☒ ISO 8859-1  
☒ ISO 10646 (UCS-2)      ☒ ISO 10646 (UCS-4)      ☒ JIS X 0208

Default strings implemented in the objects use UTF-8.  
 Default strings can be restored by writing an empty string.

**If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:**

- ☐ Yes    ☒ No

## Configuration Switches

Hexadecimal switches x10, x1 define the network address (00 – F9) and baud rate (FA – FF).

| Switches  | FA   | FB    | FC    | FD    | FE    | FF     |
|-----------|------|-------|-------|-------|-------|--------|
| Baud Rate | 9600 | 19200 | 38400 | 57600 | 76800 | 115200 |

- Turn switch x10 to E (device is temporarily configured as slave)
- Turn switch x1 to A – F to select baud rate
- Turn switch x10 to F, wait 1 second
- Red and green LEDs are blinking when baud rate has been stored in EEPROM
- Turn switch x10 to select network address
- Turn switch x1 to select network address

The device works as MS/TP master, if network address 0x00 ... Max\_Master (see Device Object) is used.

The device works as MS/TP slave, if network address Max\_Master + 1 ... 0xF9 is used.

## Device Object

| Property                                                           | Remark / Value                                                                                                                                                                                      | RW   |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | DEVICE (8)                                                                                                                                                                                          | R    |
| Object_Identifier                                                  | device, default instance: 421000 + Network-Address                                                                                                                                                  | RW-E |
| Object_Name                                                        | max. 63 Bytes,<br>default "BMT-AO4_" + Network-Address (Hexadecimal)                                                                                                                                | RW-E |
| Property_List                                                      |                                                                                                                                                                                                     | R    |
| Description                                                        | max. 127 Bytes, default ""                                                                                                                                                                          | RW-E |
| Location                                                           | max. 63 Bytes, default ""                                                                                                                                                                           | RW-E |
| Vendor_Name                                                        | "METZ CONNECT GmbH"                                                                                                                                                                                 | R    |
| Vendor_Identifier                                                  | 421                                                                                                                                                                                                 | R    |
| Model_Name                                                         | "BMT-AO4"                                                                                                                                                                                           | R    |
| Firmware_Revision                                                  | "2.0"                                                                                                                                                                                               | R    |
| Application_Software_Version                                       | "1.0"                                                                                                                                                                                               | R    |
| Protocol_Version                                                   | 1                                                                                                                                                                                                   | R    |
| Protocol_Revision                                                  | 15                                                                                                                                                                                                  | R    |
| Protocol_Services_Supported                                        | read-property, write-property, subscribe-cov, who-has, who-is, read-range, device-communication-control, reinitialize-device                                                                        | R    |
| Protocol_Object_Types_Supported                                    | DEVICE, ANALOG_OUTPUT, ANALOG_VALUE                                                                                                                                                                 | R    |
| Object_List                                                        | device, analog-output 1...4, analog-value 1                                                                                                                                                         | R    |
| Max_APDU_Length_Accepted                                           | 480                                                                                                                                                                                                 | R    |
| Segmentation_Supported                                             | NO_SEGMENTATION (3)                                                                                                                                                                                 | R    |
| System_Status                                                      | OPERATIONAL (0)                                                                                                                                                                                     | R    |
| APDU_Timeout                                                       | 1...65535, default 6000                                                                                                                                                                             | RW-E |
| Number_Of_APDU_Retries                                             | 1...10, default 3                                                                                                                                                                                   | RW-E |
| Device_Address_Binding                                             | -                                                                                                                                                                                                   | R    |
| Database_Revision                                                  | 0...65535, default 0                                                                                                                                                                                | R-E  |
| Max_Master                                                         | 0...127, default 127                                                                                                                                                                                | RW-E |
| Max_Info_Frames                                                    | 1...255, default 1                                                                                                                                                                                  | RW-E |
| Active_COV_Subscriptions                                           | property only exists if working as MS/TP master,<br>services Read-Property / Read-Range,<br>max. 6 Subscriptions,<br>for analog-output 1...4,<br>Confirmed / Unconfirmed, Lifetime = 0...65534 sec. | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                                     |      |

## Analog Output Object 1...4

| Property                                                           | Remark / Value                                                                                                     | RW   |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | ANALOG_OUTPUT (1)                                                                                                  | R    |
| Object_Identifier                                                  | analog-output, instance 1 ... 4                                                                                    | R    |
| Object_Name                                                        | max. 42 Bytes, default "Output 1" ... "Output 4"                                                                   | RW-E |
| Property_List                                                      |                                                                                                                    | R    |
| Description                                                        | max. 84 Bytes, default ""                                                                                          | RW-E |
| Present_Value                                                      | 0.0 ... 102.4 (0V ... 10.24V)                                                                                      | RW   |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0 / 1<br>OUT_OF_SERVICE: 0 / 1                                              | R    |
| Event_State                                                        | NORMAL (0)                                                                                                         | R    |
| Out_Of_Service                                                     | FALSE (0) / TRUE (1)                                                                                               | RW   |
| Units                                                              | Percent (98)                                                                                                       | R    |
| Priority_Array [16]                                                | NULL / 0.0 ... 102.4 (0V ... 10.24V)                                                                               | R    |
| Relinquish_Default                                                 | 0.0 ... 102.4 (0V ... 10.24V)                                                                                      | RW-E |
| COV_Increment                                                      | Minimum change of Present_Value for COV notification, default 1.0, property only exists if working as MS/TP master | RW-E |
| Resolution                                                         | 0.00625 (0.625 mV)                                                                                                 | -    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                    |      |

| Function Table for Analog Output |                |                    |                    |                |
|----------------------------------|----------------|--------------------|--------------------|----------------|
| Out_Of_Service                   | Priority_Array | Present_Value      | Analog Output      | OUT_OF_SERVICE |
| 0                                | NULL           | Relinquish_Default | Relinquish_Default | 0              |
|                                  | Value          | Value              | Value              |                |
| 1                                | NULL           | Relinquish_Default | unchanged          | 1              |
|                                  | Value          | Value              |                    |                |

## Analog Value Object 1

| Property                                                           | Remark / Value                                                                       | RW   |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------|------|
| Object_Type                                                        | ANALOG_VALUE (2)                                                                     | R    |
| Object_Identifier                                                  | analog-value, instance 1                                                             | R    |
| Object_Name                                                        | max. 42 Bytes, default "Watchdog Time"                                               | RW-E |
| Property_List                                                      |                                                                                      | R    |
| Description                                                        | max. 84 Bytes, default ""                                                            | RW-E |
| Present_Value                                                      | Time Constant of Watchdog Timer,<br>0: Watchdog is inactive, Maximum: 655.34 seconds | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                        | R    |
| Event_State                                                        | NORMAL (0)                                                                           | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                            | R    |
| Units                                                              | seconds (73)                                                                         | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                      |      |

The Watchdog Timer resets Present\_Value of all output objects to Relinquish\_Default, if BACnet communication fails permanently.

The timer is restarted, when a BACnet message with an APDU is received.

When the timer times out, the priority arrays of all output objects are completely cleared to NULL.

## **BMT-AOP4**

### **BACnet Protocol Implementation Conformance Statement**

**Date:** 21.02.2020  
**Vendor Name:** METZ CONNECT GmbH  
**Product Name:** BMT-AOP4  
**Product Model Number:** 110 887 13 02  
**Application Software Version:** 1.0  
**Firmware Revision:** 2.0  
**BACnet Protocol Revision:** 15

#### **Product Description:**

BACnet MS/TP Application Specific Controller providing 4 Analog Outputs 0 – 10 V.

#### **BACnet Standardized Device Profile (Annex L):**

☒ BACnet Application Specific Controller (B-ASC)

#### **List all BACnet Interoperability Building Blocks Supported (Annex K):**

|                                                |                         |
|------------------------------------------------|-------------------------|
| Data Sharing-ReadProperty-B                    | (DS-RP-B)               |
| Data Sharing-WriteProperty-B                   | (DS-WP-B)               |
| Data Sharing-COV-B                             | (DS-COV-B)              |
| 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, no Password) |
| Device Management-ReinitializeDevice-B         | (DM-RD-B, no Password)  |

#### **Segmentation Capability:**

☐ Able to transmit segmented messages      Window Size \_\_\_\_\_  
☐ Able to receive segmented messages      Window Size \_\_\_\_\_

#### **Standard Object Types Supported:**

An object type is supported if it may be present in the device.  
 For each standard Object Type supported provide the following data:

- 1) Whether objects of this type are dynamically creatable using the CreateObject service: None
- 2) Whether objects of this type are dynamically deletable using the DeleteObject service: None
- 3) List of the optional properties supported
- 4) List of all properties that are writable where not otherwise required by this standard
- 5) List of all properties that are conditionally writable where not otherwise required by this standard: None
- 6) List of proprietary properties and for each its property identifier, datatype, and meaning: None
- 7) List of any property range restrictions

**Data Link Layer Options:**

- ☒ MS/TP master (Clause 9)  
☒ MS/TP slave (Clause 9)      baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200

**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

**Networking Options:**

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

**Network Security Options:**

- ☒ Non-secure Device - is capable of operating without BACnet Network Security

**Character Sets Supported:**

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ☒ ISO 10646 (UTF-8)      ☒ IBM™/Microsoft™ DBCS      ☒ ISO 8859-1  
☒ ISO 10646 (UCS-2)      ☒ ISO 10646 (UCS-4)      ☒ JIS X 0208

Default strings implemented in the objects use UTF-8.  
 Default strings can be restored by writing an empty string.

**If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:**

- ☐ Yes    ☒ No

**Configuration Switches**

Hexadecimal switches x10, x1 define the network address (00 – F9) and baud rate (FA – FF).

| Switches  | FA   | FB    | FC    | FD    | FE    | FF     |
|-----------|------|-------|-------|-------|-------|--------|
| Baud Rate | 9600 | 19200 | 38400 | 57600 | 76800 | 115200 |

- Turn switch x10 to E (device is temporarily configured as slave)
- Turn switch x1 to A – F to select baud rate
- Turn switch x10 to F, wait 1 second
- Red and green LEDs are blinking when baud rate has been stored in EEPROM
- Turn switch x10 to select network address
- Turn switch x1 to select network address

The device works as MS/TP master, if network address 0x00 ... Max\_Master (see Device Object) is used.

The device works as MS/TP slave, if network address Max\_Master + 1 ... 0xF9 is used.

## Device Object

| Property                                                           | Remark / Value                                                                                                                                                                          | RW   |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | DEVICE (8)                                                                                                                                                                              | R    |
| Object_Identifier                                                  | device, default instance: 421000 + Network-Address, default may be restored by writing 4194303                                                                                          | RW-E |
| Object_Name                                                        | max. 63 Bytes, default "BMT-AOP4_" + Network-Address (Hexadecimal)                                                                                                                      | RW-E |
| Property_List                                                      |                                                                                                                                                                                         | R    |
| Description                                                        | max. 127 Bytes, default ""                                                                                                                                                              | RW-E |
| Location                                                           | max. 63 Bytes, default ""                                                                                                                                                               | RW-E |
| Vendor_Name                                                        | "METZ CONNECT GmbH"                                                                                                                                                                     | R    |
| Vendor_Identifier                                                  | 421                                                                                                                                                                                     | R    |
| Model_Name                                                         | "BMT-AOP4"                                                                                                                                                                              | R    |
| Firmware_Revision                                                  | "2.0"                                                                                                                                                                                   | R    |
| Application_Software_Version                                       | "1.0"                                                                                                                                                                                   | R    |
| Protocol_Version                                                   | 1                                                                                                                                                                                       | R    |
| Protocol_Revision                                                  | 15                                                                                                                                                                                      | R    |
| Protocol_Services_Supported                                        | read-property, write-property, subscribe-cov, who-has, who-is, read-range, device-communication-control, reinitialize-device                                                            | R    |
| Protocol_Object_Types_Supported                                    | DEVICE, ANALOG_OUTPUT, ANALOG_VALUE                                                                                                                                                     | R    |
| Object_List                                                        | device, analog-output 1...4, analog-value 1                                                                                                                                             | R    |
| Max_APDU_Length_Accepted                                           | 480                                                                                                                                                                                     | R    |
| Segmentation_Supported                                             | NO_SEGMENTATION (3)                                                                                                                                                                     | R    |
| System_Status                                                      | OPERATIONAL (0)                                                                                                                                                                         | R    |
| APDU_Timeout                                                       | 1...65535, default 6000                                                                                                                                                                 | RW-E |
| Number_Of_APDU_Retries                                             | 1...10, default 3                                                                                                                                                                       | RW-E |
| Device_Address_Binding                                             | -                                                                                                                                                                                       | R    |
| Database_Revision                                                  | 0...65535, default 0                                                                                                                                                                    | R-E  |
| Max_Master                                                         | 0...127, default 127                                                                                                                                                                    | RW-E |
| Max_Info_Frames                                                    | 1...255, default 1                                                                                                                                                                      | RW-E |
| Active_COV_Subscriptions                                           | property only exists if working as MS/TP master, services Read-Property / Read-Range, max. 6 Subscriptions, for analog-output 1...4, Confirmed / Unconfirmed, Lifetime = 0...65534 sec. | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                         |      |

## Analog Output Object 1...4

| Property            | Remark / Value                                                                                                     | RW   |
|---------------------|--------------------------------------------------------------------------------------------------------------------|------|
| Object_Type         | ANALOG_OUTPUT (1)                                                                                                  | R    |
| Object_Identifier   | analog-output, instance 1 ... 4                                                                                    | R    |
| Object_Name         | max. 42 Bytes, default "Output 1" ... "Output 4"                                                                   | RW-E |
| Property_List       |                                                                                                                    | R    |
| Description         | max. 84 Bytes, default ""                                                                                          | RW-E |
| Present_Value       | 0.0 ... 102.4 (0V ... 10.24V)                                                                                      | RW   |
| Status_Flags        | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0 / 1<br>OUT_OF_SERVICE: 0 / 1                                              | R    |
| Event_State         | NORMAL (0)                                                                                                         | R    |
| Out_Of_Service      | FALSE (0) / TRUE (1)                                                                                               | RW   |
| Units               | Percent (98)                                                                                                       | R    |
| Priority_Array [16] | NULL / 0.0 ... 102.4 (0V ... 10.24V)                                                                               | R    |
| Relinquish_Default  | 0.0 ... 102.4 (0V ... 10.24V)                                                                                      | RW-E |
| COV_Increment       | Minimum change of Present_Value for COV notification, default 1.0, property only exists if working as MS/TP master | RW-E |
| Resolution          | 0.00625 (0.625 mV)                                                                                                 | -    |

R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash

| Function Table for Analog Output |                        |                |                    |                    |            |                |
|----------------------------------|------------------------|----------------|--------------------|--------------------|------------|----------------|
| Out_Of_Service                   | Potentiometer          | Priority_Array | Present_Value      | Analog Output      | OVERRIDDEN | OUT_OF_SERVICE |
| 0                                | Automatic (Left Stop)  | NULL           | Relinquish_Default | Relinquish_Default | 0          | 0              |
|                                  |                        | Value          | Value              | Value              |            |                |
| 0                                | Manual (Not Left Stop) | NULL           | Manual             | Manual             | 1          | 0              |
|                                  |                        | Value          |                    |                    |            |                |
| 1                                | Automatic (Left Stop)  | NULL           | Relinquish_Default | unchanged          | 0          | 1              |
|                                  |                        | Value          | Value              |                    |            |                |
| 1                                | Manual (Not Left Stop) | NULL           | Relinquish_Default | Manual             | 0          | 1              |
|                                  |                        | Value          | Value              |                    |            |                |

With manual mode at any output the green LED blinks slowly.

## Analog Value Object 1

| Property                                                           | Remark / Value                                                                       | RW   |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------|------|
| Object_Type                                                        | ANALOG_VALUE (2)                                                                     | R    |
| Object_Identifier                                                  | analog-value, instance 1                                                             | R    |
| Object_Name                                                        | max. 42 Bytes, default "Watchdog Time"                                               | RW-E |
| Property_List                                                      |                                                                                      | R    |
| Description                                                        | max. 84 Bytes, default ""                                                            | RW-E |
| Present_Value                                                      | Time Constant of Watchdog Timer,<br>0: Watchdog is inactive, Maximum: 655.34 seconds | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                        | R    |
| Event_State                                                        | NORMAL (0)                                                                           | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                            | R    |
| Units                                                              | seconds (73)                                                                         | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                      |      |

The Watchdog Timer resets Present\_Value of all output objects to Relinquish\_Default, if BACnet communication fails permanently.

The timer is restarted, when a BACnet message with an APDU is received.

When the timer times out, the priority arrays of all output objects are completely cleared to NULL.

## **BMT-AI8**

### **BACnet Protocol Implementation Conformance Statement**

**Date:** 21.02.2020  
**Vendor Name:** METZ CONNECT GmbH  
**Product Name:** BMT-AI8  
**Product Model Number:** 110 882 13  
**Application Software Version:** 1  
**Firmware Revision:** 2.0  
**BACnet Protocol Revision:** 15

#### **Product Description:**

BACnet MS/TP Application Specific Controller providing 8 analog inputs (voltage 0-10 V, resistance 40-4M Ohm, temperature sensors).

#### **BACnet Standardized Device Profile (Annex L):**

☒ BACnet Application Specific Controller (B-ASC)

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

|                                                |                         |
|------------------------------------------------|-------------------------|
| Data Sharing-ReadProperty-B                    | (DS-RP-B)               |
| Data Sharing-WriteProperty-B                   | (DS-WP-B)               |
| Data Sharing-COV-B                             | (DS-COV-B)              |
| 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, no Password) |
| Device Management-ReinitializeDevice-B         | (DM-RD-B, no Password)  |

#### **Segmentation Capability:**

☐ Able to transmit segmented messages      Window Size \_\_\_\_\_  
☐ Able to receive segmented messages      Window Size \_\_\_\_\_

#### **Standard Object Types Supported:**

An object type is supported if it may be present in the device.  
 For each standard Object Type supported provide the following data:

- 1) Whether objects of this type are dynamically creatable using the CreateObject service: None
- 2) Whether objects of this type are dynamically deletable using the DeleteObject service: None
- 3) List of the optional properties supported
- 4) List of all properties that are writable where not otherwise required by this standard
- 5) List of all properties that are conditionally writable where not otherwise required by this standard: None
- 6) List of proprietary properties and for each its property identifier, datatype, and meaning: None
- 7) List of any property range restrictions

**Data Link Layer Options:**

- ☒ MS/TP master (Clause 9)  
☒ MS/TP slave (Clause 9)      baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200

**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

**Networking Options:**

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

**Network Security Options:**

- ☒ Non-secure Device - is capable of operating without BACnet Network Security

**Character Sets Supported:**

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ☒ ISO 10646 (UTF-8)      ☒ IBM™/Microsoft™ DBCS      ☒ ISO 8859-1  
☒ ISO 10646 (UCS-2)      ☒ ISO 10646 (UCS-4)      ☒ JIS X 0208

Default strings implemented in the objects use UTF-8.  
 Default strings can be restored by writing an empty string.

**If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:**

- ☐ Yes    ☒ No

**Configuration Switches**

Hexadecimal switches x10, x1 define the network address (00 – F9) and baud rate (FA – FF).

| Switches  | FA   | FB    | FC    | FD    | FE    | FF     |
|-----------|------|-------|-------|-------|-------|--------|
| Baud Rate | 9600 | 19200 | 38400 | 57600 | 76800 | 115200 |

- Turn switch x10 to E (device is temporarily configured as slave)
- Turn switch x1 to A – F to select baud rate
- Turn switch x10 to F, wait 1 second
- Red and green LEDs are blinking when baud rate has been stored in EEPROM
- Turn switch x10 to select network address
- Turn switch x1 to select network address

The device works as MS/TP master, if network address 0x00 ... Max\_Master (see Device Object) is used.

The device works as MS/TP slave, if network address Max\_Master + 1 ... 0xF9 is used.

## Device Object

| Property                                                           | Remark / Value                                                                                                                                                                          | RW   |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | DEVICE (8)                                                                                                                                                                              | R    |
| Object_Identifier                                                  | device, default instance: 421000 + Network-Address, default may be restored by writing 4194303                                                                                          | RW-E |
| Object_Name                                                        | max. 63 bytes, default "BMT-AI8_" + Network-Address (Hexadecimal)                                                                                                                       | RW-E |
| Property_List                                                      |                                                                                                                                                                                         | R    |
| Description                                                        | max. 127 bytes, default ""                                                                                                                                                              | RW-E |
| Location                                                           | max. 63 bytes, default ""                                                                                                                                                               | RW-E |
| Vendor_Name                                                        | "METZ CONNECT GmbH"                                                                                                                                                                     | R    |
| Vendor_Identifier                                                  | 421                                                                                                                                                                                     | R    |
| Model_Name                                                         | "BMT-AI8"                                                                                                                                                                               | R    |
| Firmware_Revision                                                  | "2.0"                                                                                                                                                                                   | R    |
| Application_Software_Version                                       | "1"                                                                                                                                                                                     | R    |
| Protocol_Version                                                   | 1                                                                                                                                                                                       | R    |
| Protocol_Revision                                                  | 15                                                                                                                                                                                      | R    |
| Protocol_Services_Supported                                        | read-property, write-property, subscribe-cov, who-has, who-is, read-range, device-communication-control, reinitialize-device                                                            | R    |
| Protocol_Object_Types_Supported                                    | DEVICE, ANALOG_INPUT, ANALOG_VALUE, MULTISTATE_VALUE, GROUP                                                                                                                             | R    |
| Object_List                                                        | device, analog-input 1...8, analog-value 1...28, multistate-value 1...9, group 1...3                                                                                                    | R    |
| Max_APDU_Length_Accepted                                           | 480                                                                                                                                                                                     | R    |
| Segmentation_Supported                                             | NO_SEGMENTATION (3)                                                                                                                                                                     | R    |
| System_Status                                                      | OPERATIONAL (0)                                                                                                                                                                         | R    |
| APDU_Timeout                                                       | 1...65535, default 6000                                                                                                                                                                 | RW-E |
| Number_Of_APDU_Retries                                             | 1...10, default 3                                                                                                                                                                       | RW-E |
| Device_Address_Binding                                             | -                                                                                                                                                                                       | R    |
| Database_Revision                                                  | 0...65535, default 0                                                                                                                                                                    | R-E  |
| Max_Master                                                         | 0...127, default 127                                                                                                                                                                    | RW-E |
| Max_Info_Frames                                                    | 1...255, default 1                                                                                                                                                                      | RW-E |
| Active_COV_Subscriptions                                           | property only exists if working as MS/TP master, services Read-Property / Read-Range, max. 10 subscriptions, for analog input 1...8, Confirmed / Unconfirmed, Lifetime = 0...65534 sec. | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                         |      |

## Analog Input Object 1...8

Voltage / resistance inputs: Terminals 1 ... 8,

Common ground: Terminals C2.

Resolution of A/D converter: 15 bits.

Accuracy: 0.1 % for voltage, resistance 40 Ohm ... 12 kOhm,  
 1.0 % for resistance 12 kOhm ... 4 MOhm,  
 0.2 °C for temperature.

| Property                                                           | Remark / Value                                                                                                                                               | RW      |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Object_Type                                                        | ANALOG_INPUT (0)                                                                                                                                             | R       |
| Object_Identifier                                                  | analog-input, instance 1 ... 8                                                                                                                               | R       |
| Object_Name                                                        | max. 42 bytes, default "Input 1" ... "Input 8"                                                                                                               | RW-E    |
| Property_List                                                      |                                                                                                                                                              | R       |
| Description                                                        | max. 84 bytes, default ""                                                                                                                                    | RW-E    |
| Device_Type                                                        | measurement range of input,<br>selected State_Text of Multistate Value 1...8                                                                                 | R       |
| Present_Value                                                      | Measured value,<br>measurement range is defined in Multistate Value 1...8,<br>added offset is defined in Analog Value 21...28,<br>writable if Out_Of_Service | R<br>RW |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0 / 1                                                                                            | R       |
| Event_State                                                        | NORMAL (0)                                                                                                                                                   | R       |
| Out_Of_Service                                                     | FALSE (0) / TRUE (1)                                                                                                                                         | RW      |
| Units                                                              | Defined in Multistate Value 1...8                                                                                                                            | R       |
| COV_Increment                                                      | Minimum change of Present_Value for COV notification,<br>default 1.0,<br>property only exists if working as MS/TP master                                     | RW-E    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                              |         |

## Analog Value Object 21...28

| Property                                                           | Remark / Value                                                        | RW   |
|--------------------------------------------------------------------|-----------------------------------------------------------------------|------|
| Object_Type                                                        | ANALOG_VALUE (2)                                                      | R    |
| Object_Identifier                                                  | analog-value, instance 21 ... 28                                      | R    |
| Object_Name                                                        | max. 42 bytes, default "Offset 1" ... "Offset 8"                      | RW-E |
| Property_List                                                      |                                                                       | R    |
| Description                                                        | max. 84 bytes, default ""                                             | RW-E |
| Present_Value                                                      | Offset is added to measured value (Analog Input 1 ... 8), default 0.0 | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0         | R    |
| Event_State                                                        | NORMAL (0)                                                            | R    |
| Out_Of_Service                                                     | FALSE (0)                                                             | R    |
| Units                                                              | same as Analog Input 1 ... 8                                          | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                       |      |

## Multistate Value Object 1...8

| Property                                                           | Remark / Value                                                                                                                                                                                                        | RW   |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | MULTISTATE_VALUE (19)                                                                                                                                                                                                 | R    |
| Object_Identifier                                                  | multistate-value, instance 1 ... 8                                                                                                                                                                                    | R    |
| Object_Name                                                        | max. 42 bytes, default<br>"Measurement Range 1" ... "Measurement Range 8"                                                                                                                                             | RW-E |
| Property_List                                                      |                                                                                                                                                                                                                       | R    |
| Description                                                        | max. 84 bytes, default ""                                                                                                                                                                                             | RW-E |
| State_Text                                                         | max. 20 bytes, default see next Table                                                                                                                                                                                 | RW-E |
| Present_Value                                                      | Measurement range of Analog Input 1...8, see below<br>- Voltage (% , Volt)<br>- Voltage, pullup resistor 2kOhm to 5V (% PU, Volt PU)<br>- Resistance (Ohm)<br>- User defined sensor<br>- Standard temperature sensors | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                                                                                                                                                         | R    |
| Event_State                                                        | NORMAL (0)                                                                                                                                                                                                            | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                                                                                                                                                             | R    |
| Number_Of_States                                                   | 24                                                                                                                                                                                                                    | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                                                       |      |

| Measurement Ranges |                    |                                     |
|--------------------|--------------------|-------------------------------------|
| State              | State_Text default | Units of Analog Input               |
| 1 default          | "0-10V %"          | percent (98)                        |
| 2                  | "0-5V % PU"        | percent (98)                        |
| 3                  | "0-10 Volt"        | volts (5)                           |
| 4                  | "0-5 Volt PU"      | volts (5)                           |
| 5                  | "Ohm"              | ohms (4)                            |
| 6                  | "User Defined"     | set in Analog Value Object X1...X10 |
| 7                  | "PT100"            | degrees-Celsius (62)                |
| 8                  | "PT500"            | degrees-Celsius (62)                |
| 9                  | "PT1000"           | degrees-Celsius (62)                |
| 10                 | "NI1000-TC5000"    | degrees-Celsius (62)                |
| 11                 | "NI1000-TC6180"    | degrees-Celsius (62)                |
| 12                 | "BALCO500"         | degrees-Celsius (62)                |
| 13                 | "KTY81_110"        | degrees-Celsius (62)                |
| 14                 | "KTY81_210"        | degrees-Celsius (62)                |
| 15                 | "NTC1k8-Thermokon" | degrees-Celsius (62)                |
| 16                 | "NTC5k-Thermokon"  | degrees-Celsius (62)                |
| 17                 | "NTC10k-Thermokon" | degrees-Celsius (62)                |
| 18                 | "NTC20k-Thermokon" | degrees-Celsius (62)                |
| 19                 | "LM235Z"           | degrees-Celsius (62)                |
| 20                 | "NTC10k-Carel"     | degrees-Celsius (62)                |
| 21                 | "NTC5k-Schneider"  | degrees-Celsius (62)                |
| 22                 | "NTC30k-Schneider" | degrees-Celsius (62)                |
| 23                 | "KP250"            | degrees-Celsius (62)                |
| 24                 | "Poti 10k %"       | percent (98)                        |

## Analog Value Object 1...20

| Property          | Remark / Value                                                | RW   |
|-------------------|---------------------------------------------------------------|------|
| Object_Type       | ANALOG_VALUE (2)                                              | R    |
| Object_Identifier | analog-value, instance 1 ... 20                               | R    |
| Object_Name       | max. 42 bytes, default "X 1", "Y 1" ... "X 10", "Y 10"        | RW-E |
| Property_List     |                                                               | R    |
| Description       | max. 84 bytes, default ""                                     | RW-E |
| Present_Value     | Interpolation table in User Defined measurement range         | RW-E |
| Status_Flags      | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0 | R    |
| Event_State       | NORMAL (0)                                                    | R    |
| Out_Of_Service    | FALSE (0)                                                     | R    |
| Units             | X1...X10: Units of Analog Input Object (default °C)           | RW-E |
|                   | Y1...Y10: Defined in Multistate Value 9                       | R    |

R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash

| Interpolation Table |        |               |          |        |               |
|---------------------|--------|---------------|----------|--------|---------------|
| Instance            | Name   | Default Value | Instance | Name   | Default Value |
| 1                   | "X 1"  | -10.0         | 2        | "Y 1"  | 960.86        |
| 3                   | "X 2"  | 10.0          | 4        | "Y 2"  | 1039.03       |
| 5                   | "X 3"  | 30.0          | 6        | "Y 3"  | 1116.73       |
| 7                   | "X 4"  | 50.0          | 8        | "Y 4"  | 1193.97       |
| 9                   | "X 5"  | 70.0          | 10       | "Y 5"  | 1270.75       |
| 11                  | "X 6"  | 0.0           | 12       | "Y 6"  | 0.0           |
| 13                  | "X 7"  | 0.0           | 14       | "Y 7"  | 0.0           |
| 15                  | "X 8"  | 0.0           | 16       | "Y 8"  | 0.0           |
| 17                  | "X 9"  | 0.0           | 18       | "Y 9"  | 0.0           |
| 19                  | "X 10" | 0.0           | 20       | "Y 10" | 0.0           |

The interpolation table by default provides an example for PT1000 temperature sensors. In the example X values are temperature in °C, Y values are resistance in Ohms. X and Y values must be sorted in ascending or descending order. The table ends where both values are 0.0. Measurement range at input must be selected in Multistate Value 9.

## Multistate Value Object 9

| Property                                                           | Remark / Value                                                                                                                                                                                                                                                                                            | RW   |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | MULTISTATE_VALUE (19)                                                                                                                                                                                                                                                                                     | R    |
| Object_Identifier                                                  | multistate-value, instance 9                                                                                                                                                                                                                                                                              | R    |
| Object_Name                                                        | max. 42 bytes, default "User Defined Range"                                                                                                                                                                                                                                                               | RW-E |
| Property_List                                                      |                                                                                                                                                                                                                                                                                                           | R    |
| Description                                                        | max. 84 bytes, default ""                                                                                                                                                                                                                                                                                 | RW-E |
| State_Text                                                         | max. 20 bytes, default see next Table                                                                                                                                                                                                                                                                     | RW-E |
| Present_Value                                                      | Selection of measurement range at input<br>- Voltage (Volt)<br>- Voltage, pullup resistor 2kOhm to 5V (Volt P)<br>- Resistance (Ohm)<br>and usage of interpolation table<br>- approximately linear sensor (e.g. PT1000)<br>- approximately exponential sensor (e.g. NTC)<br>default 3, for PT1000 example | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                                                                                                                                                                                                                                             | R    |
| Event_State                                                        | NORMAL (0)                                                                                                                                                                                                                                                                                                | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                                                                                                                                                                                                                                                 | R    |
| Number_Of_States                                                   | 6                                                                                                                                                                                                                                                                                                         | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                                                                                                                                           |      |

| User Defined Range |               |                          |
|--------------------|---------------|--------------------------|
| State              | State_Text    | Units of Analog Values Y |
| 1                  | "Volt lin"    | volts (5)                |
| 2                  | "Volt P lin"  | volts (5)                |
| 3                  | "Ohm lin"     | ohms (4)                 |
| 4                  | "Volt exp"    | volts (5)                |
| 5                  | "Volt P exp"  | volts (5)                |
| 6                  | "Ohm NTC exp" | ohms (4)                 |

## Group Object 1...3

| Property                                                           | Remark / Value                                    | RW   |
|--------------------------------------------------------------------|---------------------------------------------------|------|
| Object_Type                                                        | GROUP (11)                                        | R    |
| Object_Identifier                                                  | group, instance 1 ... 3                           | R    |
| Object_Name                                                        | max. 42 bytes, default "Group 1" ... "Group 3"    | RW-E |
| Property_List                                                      |                                                   | R    |
| Description                                                        | max. 84 bytes, default ""                         | RW-E |
| Present_Value                                                      | Present_Value of Analog Inputs,<br>see next Table | R    |
| List_Of_Group_Members                                              | see next Table                                    | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                   |      |

| Members of Groups |              |   |   |   |   |   |   |   |
|-------------------|--------------|---|---|---|---|---|---|---|
| Group             | Analog Input |   |   |   |   |   |   |   |
|                   | 1            | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1                 | x            | x | x | x | x | x | x | x |
| 2                 | x            | x | x | x |   |   |   |   |
| 3                 |              |   |   |   | x | x | x | x |

Table for PT and NI Sensors

| Temp | PT100<br>TC3850 | PT500<br>TC3850 | PT1000<br>TC3850 | NI1000<br>TC5000 | NI1000<br>TC6180 | BALCO500 | KP250 |
|------|-----------------|-----------------|------------------|------------------|------------------|----------|-------|
| °C   | Ohm             | Ohm             | Ohm              | Ohm              | Ohm              | Ohm      | Ohm   |
| -50  | 80.306          | 401.53          | 803.06           | 790.88           | 742.55           | 361.65   | 196.5 |
| -30  | 88.222          | 441.11          | 882.22           | 871.69           | 841.46           | 397.05   | 217.9 |
| -10  | 96.086          | 480.43          | 960.86           | 956.24           | 945.82           | 433.96   | 239.3 |
| 10   | 103.903         | 519.51          | 1039.03          | 1044.79          | 1055.52          | 472.91   | 260.7 |
| 30   | 111.673         | 558.36          | 1116.73          | 1137.62          | 1170.56          | 513.89   | 282.1 |
| 50   | 119.397         | 596.99          | 1193.97          | 1234.98          | 1291.05          | 556.90   | 303.5 |
| 70   | 127.075         | 635.38          | 1270.75          | 1337.15          | 1417.21          | 601.94   | 324.9 |
| 90   | 134.707         | 673.53          | 1347.07          | 1444.39          | 1549.34          | 649.02   | 346.3 |
| 110  | 142.293         | 711.46          | 1422.93          | 1556.98          | 1687.89          | 698.13   | 367.7 |
| 130  | 149.832         | 749.16          | 1498.32          | 1675.19          | 1833.35          | 749.27   | 389.1 |
| 150  | 157.325         | 786.63          | 1573.25          | 1799.27          | 1986.35          | 802.44   | 410.5 |

Table for KTY81 and NTC Sensors

| Temp | KTY81<br>-110 | KTY81<br>-210 | NTC1k8<br>Thermokon | NTC5k<br>Thermokon | NTC10k<br>Thermokon | NTC20k<br>Thermokon | NTC10k<br>Carel | NTC5k<br>Schneider | NTC30k<br>Schneider |
|------|---------------|---------------|---------------------|--------------------|---------------------|---------------------|-----------------|--------------------|---------------------|
| °C   | Ohm           | Ohm           | Ohm                 | kOhm               | kOhm                | kOhm                | kOhm            | Ohm                | kOhm                |
| -50  | 515           | 1030          |                     | 333.9              | 667.8               | 1668.0              | 329.5           | 9850               | 2497.83             |
| -40  | 567           | 1135          |                     | 167.8              | 335.7               | 813.4               | 188.5           | 9711               | 1219.17             |
| -30  | 624           | 1247          | 24500               | 88.34              | 176.7               | 415.5               | 111.3           | 9465               | 622.94              |
| -20  | 684           | 1367          | 14000               | 48.49              | 96.97               | 221.3               | 67.77           | 9066               | 331.02              |
| -10  | 747           | 1495          | 8400                | 27.65              | 55.30               | 122.5               | 42.47           | 8471               | 183.56              |
| 0    | 815           | 1630          | 5200                | 16.33              | 32.65               | 70.20               | 27.28           | 7660               | 105.31              |
| 10   | 886           | 1772          | 3330                | 9.952              | 19.90               | 41.56               | 17.96           | 6666               | 62.355              |
| 20   | 961           | 1922          | 2200                | 6.247              | 12.49               | 25.35               | 12.09           | 5573               | 38.022              |
| 30   | 1040          | 2080          | 1480                | 4.028              | 8.06                | 15.89               | 8.31            | 4492               | 23.827              |
| 40   | 1122          | 2245          | 1040                | 2.662              | 5.32                | 10.21               | 5.83            | 3517               | 15.314              |
| 50   | 1209          | 2417          | 740                 | 1.801              | 3.60                | 6.72                | 4.16            | 2702               | 10.077              |
| 60   | 1299          | 2597          | 540                 | 1.244              | 2.49                | 4.52                | 3.02            | 2055               | 6.777               |
| 70   | 1392          | 2785          | 402                 | 0.8758             | 1.75                | 3.10                | 2.23            | 1562               | 4.650               |
| 80   | 1490          | 2980          | 306                 | 0.6281             | 1.26                | 2.12                | 1.67            | 1193               | 3.251               |
| 90   | 1591          | 3182          | 240                 | 0.4581             | 0.92                | 1.54                | 1.27            | 921                | 2.312               |
| 100  | 1696          | 3392          | 187                 | 0.3393             | 0.68                | 1.12                | 0.97            | 721                | 1.670               |
| 110  | 1805          | 3607          | 149                 | 0.2550             | 0.51                | 0.82                | 0.76            | 574                | 1.224               |
| 120  | 1915          | 3817          | 118                 | 0.1943             | 0.39                | 0.61                |                 | 466                | 0.909               |
| 130  | 2023          | 4008          | 95                  | 0.1499             | 0.30                | 0.46                |                 | 380                | 0.690               |
| 140  | 2124          | 4166          | 77                  | 0.1170             | 0.23                | 0.35                |                 | 320                | 0.530               |
| 150  | 2211          | 4280          | 64                  | 0.0924             | 0.18                | 0.27                |                 | 270                | 0.410               |

Table for LM235Z Sensors

| Temp   | °C   | -40   | 0     | 40    | 80    | 120   |
|--------|------|-------|-------|-------|-------|-------|
| LM235Z | Volt | 2.332 | 2.732 | 3.132 | 3.532 | 3.932 |

## **BMT-CI4**

### **BACnet Protocol Implementation Conformance Statement**

**Date:** 09.04.2020  
**Vendor Name:** METZ CONNECT GmbH  
**Product Name:** BMT-CI4  
**Product Model Number:** 110 890 13 32  
**Application Software Version:** 1.0  
**Firmware Revision:** 2.0  
**BACnet Protocol Revision:** 15

#### **Product Description:**

BACnet MS/TP Application Specific Controller providing 4 Analog Inputs 0-10V or 0-20mA or 4-20mA.

#### **BACnet Standardized Device Profile (Annex L):**

☒ BACnet Application Specific Controller (B-ASC)

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

|                                                |                         |
|------------------------------------------------|-------------------------|
| Data Sharing-ReadProperty-B                    | (DS-RP-B)               |
| Data Sharing-WriteProperty-B                   | (DS-WP-B)               |
| Data Sharing-COV-B                             | (DS-COV-B)              |
| 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, no Password) |
| Device Management-ReinitializeDevice-B         | (DM-RD-B, no Password)  |

#### **Segmentation Capability:**

☐ Able to transmit segmented messages      Window Size \_\_\_\_\_  
☐ Able to receive segmented messages      Window Size \_\_\_\_\_

#### **Standard Object Types Supported:**

An object type is supported if it may be present in the device.  
 For each standard Object Type supported provide the following data:

- 1) Whether objects of this type are dynamically creatable using the CreateObject service: None
- 2) Whether objects of this type are dynamically deletable using the DeleteObject service: None
- 3) List of the optional properties supported
- 4) List of all properties that are writable where not otherwise required by this standard
- 5) List of all properties that are conditionally writable where not otherwise required by this standard: None
- 6) List of proprietary properties and for each its property identifier, datatype, and meaning: None
- 7) List of any property range restrictions

**Data Link Layer Options:**

- ☒ MS/TP master (Clause 9)  
☒ MS/TP slave (Clause 9)      baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200

**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

**Networking Options:**

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

**Network Security Options:**

- ☒ Non-secure Device - is capable of operating without BACnet Network Security

**Character Sets Supported:**

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ☒ ISO 10646 (UTF-8)      ☒ IBM™/Microsoft™ DBCS      ☒ ISO 8859-1  
☒ ISO 10646 (UCS-2)      ☒ ISO 10646 (UCS-4)      ☒ JIS X 0208

Default strings implemented in the objects use UTF-8.  
 Default strings can be restored by writing an empty string.

**If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:**

- ☐ Yes    ☒ No

**Configuration Switches**

Hexadecimal switches x10, x1 define the network address (00 – F9) and baud rate (FA – FF).

| Switches  | FA   | FB    | FC    | FD    | FE    | FF     |
|-----------|------|-------|-------|-------|-------|--------|
| Baud Rate | 9600 | 19200 | 38400 | 57600 | 76800 | 115200 |

- Turn switch x10 to E (device is temporarily configured as slave)
- Turn switch x1 to A – F to select baud rate
- Turn switch x10 to F, wait 1 second
- Red and green LEDs are blinking when baud rate has been stored in EEPROM
- Turn switch x10 to select network address
- Turn switch x1 to select network address

The device works as MS/TP master, if network address 0x00 ... Max\_Master (see Device Object) is used.

The device works as MS/TP slave, if network address Max\_Master + 1 ... 0xF9 is used.

## Device Object

| Property                                                           | Remark / Value                                                                                                                                                                         | RW   |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | DEVICE (8)                                                                                                                                                                             | R    |
| Object_Identifier                                                  | device, default instance: 421000 + Network-Address, default may be restored by writing 4194303                                                                                         | RW-E |
| Object_Name                                                        | max. 63 bytes, default "BMT-CI4_" + Network-Address (Hexadecimal)                                                                                                                      | RW-E |
| Property_List                                                      |                                                                                                                                                                                        | R    |
| Description                                                        | max. 127 bytes, default ""                                                                                                                                                             | RW-E |
| Location                                                           | max. 63 bytes, default ""                                                                                                                                                              | RW-E |
| Vendor_Name                                                        | "METZ CONNECT GmbH"                                                                                                                                                                    | R    |
| Vendor_Identifier                                                  | 421                                                                                                                                                                                    | R    |
| Model_Name                                                         | "BMT-CI4"                                                                                                                                                                              | R    |
| Firmware_Revision                                                  | "2.0"                                                                                                                                                                                  | R    |
| Application_Software_Version                                       | "1.0"                                                                                                                                                                                  | R    |
| Protocol_Version                                                   | 1                                                                                                                                                                                      | R    |
| Protocol_Revision                                                  | 15                                                                                                                                                                                     | R    |
| Protocol_Services_Supported                                        | read-property, write-property, subscribe-cov, who-has, who-is, read-range, device-communication-control, reinitialize-device                                                           | R    |
| Protocol_Object_Types_Supported                                    | DEVICE, ANALOG_INPUT, ANALOG_VALUE, GROUP, MULTISTATE_VALUE (only for calibration)                                                                                                     | R    |
| Object_List                                                        | device, analog-input 1...4, analog-value 1...4, group 1...3, (multistate-value 1...2, exist only when calibrating)                                                                     | R    |
| Max_APDU_Length_Accepted                                           | 480                                                                                                                                                                                    | R    |
| Segmentation_Supported                                             | NO_SEGMENTATION (3)                                                                                                                                                                    | R    |
| System_Status                                                      | OPERATIONAL (0)                                                                                                                                                                        | R    |
| APDU_Timeout                                                       | 1...65535, default 6000                                                                                                                                                                | RW-E |
| Number_Of_APDU_Retries                                             | 1...10, default 3                                                                                                                                                                      | RW-E |
| Device_Address_Binding                                             | -                                                                                                                                                                                      | R    |
| Database_Revision                                                  | 0...65535, default 0                                                                                                                                                                   | R-E  |
| Max_Master                                                         | 0...127, default 127                                                                                                                                                                   | RW-E |
| Max_Info_Frames                                                    | 1...255, default 1                                                                                                                                                                     | RW-E |
| Active_COV_Subscriptions                                           | property only exists if working as MS/TP master, services Read-Property / Read-Range, max. 6 subscriptions, for analog input 1...4, Confirmed / Unconfirmed, Lifetime = 0...65534 sec. | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                        |      |

## Analog Input Object 1...4

Terminal U1 ... U4: Voltage, Input Resistance 200 kOhm  
 Terminal I1 ... I4: Current, Input Resistance 100 Ohm  
 Terminal 1- ... 4-: Ground

Accuracy: 0.1 %  
 Resolution: 0.003 %  
 Update interval: 500 ms

| Property                                                           | Remark / Value                                                                                                           | RW      |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|---------|
| Object_Type                                                        | ANALOG_INPUT (0)                                                                                                         | R       |
| Object_Identifier                                                  | analog-input, instance 1 ... 4                                                                                           | R       |
| Object_Name                                                        | max. 42 bytes, default "Input 1" ... "Input 4"                                                                           | RW-E    |
| Property_List                                                      |                                                                                                                          | R       |
| Description                                                        | max. 84 bytes, default ""                                                                                                | RW-E    |
| Device_Type                                                        | max. 31 Bytes, default ""                                                                                                | RW-E    |
| Present_Value                                                      | Measured value,<br>added offset is defined in Analog Value 1...4,<br>writable if Out_Of_Service                          | R<br>RW |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0 / 1<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0 / 1                                                    | R       |
| Event_State                                                        | NORMAL (0)                                                                                                               | R       |
| Out_Of_Service                                                     | FALSE (0) / TRUE (1)                                                                                                     | RW      |
| Units                                                              | Percent (98)                                                                                                             | R       |
| COV_Increment                                                      | Minimum change of Present_Value for COV notification,<br>default 1.0,<br>property only exists if working as MS/TP master | RW-E    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                          |         |

| Measurement Range |               |        |         |         |         |
|-------------------|---------------|--------|---------|---------|---------|
| Input             | 1 / 2 / 3 / 4 | 0-10 V | 0-20 mA | 0-20 mA | 4-20 mA |
| DIP Switch1       | 3 / 5 / 7     | OFF    | ON      | OFF     | ON      |
| DIP Switch2       | 4 / 6 / 8     | OFF    | OFF     | ON      | ON      |
| Value 0 %         |               | 0 V    | 0 mA    | 0 mA    | 4 mA    |
| Value 100 %       |               | 10 V   | 20 mA   | 20 mA   | 20 mA   |
| Value 110 %       |               | 11 V   | 22 mA   | 22 mA   | 21.6 mA |

## Analog Value Object 1...4

| Property                                                           | Remark / Value                                                        | RW   |
|--------------------------------------------------------------------|-----------------------------------------------------------------------|------|
| Object_Type                                                        | ANALOG_VALUE (2)                                                      | R    |
| Object_Identifier                                                  | analog-value, instance 1 ... 4                                        | R    |
| Object_Name                                                        | max. 42 bytes, default "Offset 1" ... "Offset 4"                      | RW-E |
| Property_List                                                      |                                                                       | R    |
| Description                                                        | max. 84 bytes, default ""                                             | RW-E |
| Present_Value                                                      | Offset is added to measured value (Analog Input 1 ... 4), default 0.0 | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0         | R    |
| Event_State                                                        | NORMAL (0)                                                            | R    |
| Out_Of_Service                                                     | FALSE (0)                                                             | R    |
| Units                                                              | Percent (98)                                                          | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                       |      |

## Group Object 1...3

| Property                                                           | Remark / Value                                 | RW   |
|--------------------------------------------------------------------|------------------------------------------------|------|
| Object_Type                                                        | GROUP (11)                                     | R    |
| Object_Identifier                                                  | group, instance 1 ... 3                        | R    |
| Object_Name                                                        | max. 42 bytes, default "Group 1" ... "Group 3" | RW-E |
| Property_List                                                      |                                                | R    |
| Description                                                        | max. 84 bytes, default ""                      | RW-E |
| Present_Value                                                      | Present_Value of Analog Inputs, see next Table | R    |
| List_Of_Group_Members                                              | see next Table                                 | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                |      |

| Members of Groups |              |   |   |   |
|-------------------|--------------|---|---|---|
| Group             | Analog Input |   |   |   |
|                   | 1            | 2 | 3 | 4 |
| 1                 | x            | x | x | x |
| 2                 | x            | x |   |   |
| 3                 |              |   | x | x |

## **BMT-Multi-IO**

### **BACnet Protocol Implementation Conformance Statement**

**Date:** 10.01.2020  
**Vendor Name:** METZ CONNECT GmbH  
**Product Name:** BMT-Multi-IO  
**Product Model Number:** 110 893 13  
**Application Software Version:** 7  
**Firmware Revision:** 2.0  
**BACnet Protocol Revision:** 15

#### **Product Description:**

BACnet MS/TP Application Specific Controller providing  
 - 11 optocoupler inputs (24 V AC/DC, 4.3 mA),  
 - 1 current input (sources 12 V, 15 mA to a switch),  
 - 4 relay outputs (250 V AC, 5 A),  
 - 4 transistor outputs (Photo-MOS, 40 V AC/DC, 100 mA),  
 - 6 analog inputs (voltage 0-10 V, resistance 40-4M Ohm, temperature sensors),  
 - 1 analog input (current 0-20 mA, shunt 200 Ohm),  
 - 2 isolated analog outputs (0-10 V, max. load 2 kOhm).

#### **BACnet Standardized Device Profile (Annex L):**

☒ BACnet Application Specific Controller (B-ASC)

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

|                                                |                         |
|------------------------------------------------|-------------------------|
| Data Sharing-ReadProperty-B                    | (DS-RP-B)               |
| Data Sharing-WriteProperty-B                   | (DS-WP-B)               |
| Data Sharing-COV-B                             | (DS-COV-B)              |
| 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, no Password) |
| Device Management-ReinitializeDevice-B         | (DM-RD-B, no Password)  |

#### **Segmentation Capability:**

☐ Able to transmit segmented messages      Window Size \_\_\_\_\_  
☐ Able to receive segmented messages      Window Size \_\_\_\_\_

#### **Standard Object Types Supported:**

An object type is supported if it may be present in the device.  
 For each standard Object Type supported provide the following data:

- 1) Whether objects of this type are dynamically creatable using the CreateObject service: None
- 2) Whether objects of this type are dynamically deletable using the DeleteObject service: None
- 3) List of the optional properties supported
- 4) List of all properties that are writable where not otherwise required by this standard
- 5) List of all properties that are conditionally writable where not otherwise required by this standard: None
- 6) List of proprietary properties and for each its property identifier, datatype, and meaning: None
- 7) List of any property range restrictions

**Data Link Layer Options:**

- ☒ MS/TP master (Clause 9)  
☒ MS/TP slave (Clause 9)      baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200

**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

**Networking Options:**

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

**Network Security Options:**

- ☒ Non-secure Device - is capable of operating without BACnet Network Security

**Character Sets Supported:**

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ☒ ISO 10646 (UTF-8)      ☒ IBM™/Microsoft™ DBCS      ☒ ISO 8859-1  
☒ ISO 10646 (UCS-2)      ☒ ISO 10646 (UCS-4)      ☒ JIS X 0208

Default strings implemented in the objects use UTF-8.  
 Default strings can be restored by writing an empty string.

**If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:**

- ☐ Yes    ☒ No

**Configuration Switches**

Hexadecimal switches x10, x1 define the network address (00 – F9) and baud rate (FA – FF).

| Switches  | FA   | FB    | FC    | FD    | FE    | FF     |
|-----------|------|-------|-------|-------|-------|--------|
| Baud Rate | 9600 | 19200 | 38400 | 57600 | 76800 | 115200 |

- Turn switch x10 to E (device is temporarily configured as slave)
- Turn switch x1 to A – F to select baud rate
- Turn switch x10 to F, wait 1 second
- Red and green LEDs are blinking when baud rate has been stored in EEPROM
- Turn switch x10 to select network address
- Turn switch x1 to select network address

The device works as MS/TP master, if network address 0x00 ... Max\_Master (see Device Object) is used.

The device works as MS/TP slave, if network address Max\_Master + 1 ... 0xF9 is used.

## Device Object

| Property                                                           | Remark / Value                                                                                                                                                                                                                                | RW   |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | DEVICE (8)                                                                                                                                                                                                                                    | R    |
| Object_Identifier                                                  | device, default instance: 421000 + Network-Address, default may be restored by writing 4194303                                                                                                                                                | RW-E |
| Object_Name                                                        | max. 63 bytes, default "BMT-Multi-IO_" + Network-Address (Hexadecimal)                                                                                                                                                                        | RW-E |
| Property_List                                                      |                                                                                                                                                                                                                                               | R    |
| Description                                                        | max. 127 bytes, default ""                                                                                                                                                                                                                    | RW-E |
| Location                                                           | max. 63 bytes, default ""                                                                                                                                                                                                                     | RW-E |
| Vendor_Name                                                        | "METZ CONNECT GmbH"                                                                                                                                                                                                                           | R    |
| Vendor_Identifier                                                  | 421                                                                                                                                                                                                                                           | R    |
| Model_Name                                                         | "BMT-Multi-IO"                                                                                                                                                                                                                                | R    |
| Firmware_Revision                                                  | "2.0"                                                                                                                                                                                                                                         | R    |
| Application_Software_Version                                       | "7"                                                                                                                                                                                                                                           | R    |
| Protocol_Version                                                   | 1                                                                                                                                                                                                                                             | R    |
| Protocol_Revision                                                  | 15                                                                                                                                                                                                                                            | R    |
| Protocol_Services_Supported                                        | read-property, write-property, subscribe-cov, who-has, who-is, read-range, device-communication-control, reinitialize-device                                                                                                                  | R    |
| Protocol_Object_Types_Supported                                    | DEVICE, BINARY_INPUT, BINARY_OUTPUT, ANALOG_INPUT, ANALOG_OUTPUT, ANALOG_VALUE, MULTISTATE_VALUE, ACCUMULATOR, STRUCTURED_VIEW                                                                                                                | R    |
| Object_List                                                        | device, binary-input 1...12, binary-output 1...8, analog-input 1...7, analog-output 1...2, analog-value 1...28, multistate-value 1...8, accumulator 1, structured-view 1...4                                                                  | R    |
| Structured_Object_List                                             | structured-view 1                                                                                                                                                                                                                             | R    |
| Max_APDU_Length_Accepted                                           | 480                                                                                                                                                                                                                                           | R    |
| Segmentation_Supported                                             | NO_SEGMENTATION (3)                                                                                                                                                                                                                           | R    |
| System_Status                                                      | OPERATIONAL (0)                                                                                                                                                                                                                               | R    |
| APDU_Timeout                                                       | 1...65535, default 6000                                                                                                                                                                                                                       | RW-E |
| Number_Of_APDU_Retries                                             | 1...10, default 3                                                                                                                                                                                                                             | RW-E |
| Device_Address_Binding                                             | -                                                                                                                                                                                                                                             | R    |
| Database_Revision                                                  | 0...65535, default 0                                                                                                                                                                                                                          | R-E  |
| Max_Master                                                         | 0...127, default 127                                                                                                                                                                                                                          | RW-E |
| Max_Info_Frames                                                    | 1...255, default 1                                                                                                                                                                                                                            | RW-E |
| Active_COV_Subscriptions                                           | property only exists if working as MS/TP master, service Read-Property max. 12 subscriptions, service Read-Range max. 30 subscriptions, COV may be used with all input and output objects, Confirmed / Unconfirmed, Lifetime = 0...65534 sec. | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                                                                               |      |

## Structured View Object 1...4

| Property                                                           | Remark / Value                         | RW   |
|--------------------------------------------------------------------|----------------------------------------|------|
| Object_Type                                                        | STRUCTURED_VIEW (29)                   | R    |
| Object_Identifier                                                  | structured-view, instance 1 ... 4      | R    |
| Object_Name                                                        | max. 42 bytes, default see table below | RW-E |
| Property_List                                                      |                                        | R    |
| Description                                                        | max. 84 bytes, default ""              | RW-E |
| Node_Type                                                          | see table below                        | R    |
| Subordinate_List                                                   | see table below                        | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                        |      |

| Subordinate Lists |              |                |                                                                     |
|-------------------|--------------|----------------|---------------------------------------------------------------------|
| Instance          | Object_Name  | Node_Type      | Object References                                                   |
| 1                 | "Device"     | DEVICE (3)     | structured-view 2...4<br>device<br>accumulator 1                    |
| 2                 | "Digital-In" | COLLECTION (8) | binary-input 1...12                                                 |
| 3                 | "Analog-In"  | COLLECTION (8) | analog-input 1...7<br>analog-value 1...27<br>multistate-value 1...8 |
| 4                 | "Outputs"    | COLLECTION (8) | binary-output 1...8<br>analog-output 1...2<br>analog-value 28       |

## Binary Output Object 1...8

Relays: Terminals 11, 12 (NC), 14 (NO) ... 41, 42 (NC), 44 (NO), with hand mode.  
 Transistors: Terminals D1 ... D4, C2 (Common), no hand mode.  
 Auto / Hand keys: Long actuation toggles between auto and hand mode, shown with green LED.  
 Short actuation toggles between relay on and off, shown with yellow LED.

| Property            | Remark / Value                                                                           | RW   |
|---------------------|------------------------------------------------------------------------------------------|------|
| Object_Type         | BINARY_OUTPUT (4)                                                                        | R    |
| Object_Identifier   | binary-output, instance 1 ... 8                                                          | R    |
| Object_Name         | max. 42 bytes, default<br>"Relay 1" ... "Relay 4", "Transistor D1" ... "Transistor D4"   | RW-E |
| Property_List       |                                                                                          | R    |
| Description         | max. 84 bytes, default ""                                                                | RW-E |
| Inactive_Text       | max. 20 bytes, default "Off"                                                             | RW-E |
| Active_Text         | max. 20 bytes, default "On"                                                              | RW-E |
| Present_Value       | NULL (write only) / INACTIVE (0) / ACTIVE (1)                                            | RW   |
| Status_Flags        | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0 / 1 = Auto / Hand mode<br>OUT_OF_SERVICE: 0 / 1 | R    |
| Event_State         | NORMAL (0)                                                                               | R    |
| Out_Of_Service      | FALSE (0) / TRUE (1)                                                                     | RW   |
| Polarity            | NORMAL (0) / REVERSE (1)                                                                 | RW-E |
| Priority_Array [16] | NULL / INACTIVE (0) / ACTIVE (1)                                                         | R    |
| Relinquish_Default  | INACTIVE (0)                                                                             | R    |

R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash

| Function Table for Binary Output |          |                  |                                       |                |               |             |                 |
|----------------------------------|----------|------------------|---------------------------------------|----------------|---------------|-------------|-----------------|
| Out_Of_Service                   | Polarity | mode key         | Priority_Array and Relinquish_Default | Present_Value  | Binary Output | OVER RIDDEN | OUT_OF _SERVICE |
| 0                                | 0        | Auto             | 0 / 1                                 | 0 / 1          | 0 / 1         | 0           | 0               |
| 0                                | 1        | Auto             | 0 / 1                                 | 0 / 1          | 1 / 0         | 0           | 0               |
| 1                                | 0        | Auto             | 0 / 1                                 | 0 / 1          | 0             | 0           | 1               |
| 1                                | 1        | Auto             | 0 / 1                                 | 0 / 1          | 1             | 0           | 1               |
| 0                                | 0        | Hand 0<br>Hand 1 | 0 / 1<br>0 / 1                        | 0<br>1         | 0<br>1        | 1           | 0               |
| 0                                | 1        | Hand 0<br>Hand 1 | 0 / 1<br>0 / 1                        | 1<br>0         | 0<br>1        | 1           | 0               |
| 1                                | 0        | Hand 0<br>Hand 1 | 0 / 1<br>0 / 1                        | 0 / 1<br>0 / 1 | 0<br>1        | 0           | 1               |
| 1                                | 1        | Hand 0<br>Hand 1 | 0 / 1<br>0 / 1                        | 0 / 1<br>0 / 1 | 0<br>1        | 0           | 1               |

## Binary Input Object 1...12

Optocoupler inputs: Terminals 1+, 1- ... 11+, 11-.

Current input: Terminals S0+, S0-, this is the pulse input of the Accumulator object.  
Input states are shown with yellow LEDs.

| Property                                                           | Remark / Value                                                                      | RW      |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------|
| Object_Type                                                        | BINARY_INPUT (3)                                                                    | R       |
| Object_Identifier                                                  | binary-input, instance 1 ... 12                                                     | R       |
| Object_Name                                                        | max. 42 bytes, default<br>"Binary Input 1" ... "Binary Input 11", "Binary Input S0" | RW-E    |
| Property_List                                                      |                                                                                     | R       |
| Description                                                        | max. 84 bytes, default ""                                                           | RW-E    |
| Inactive_Text                                                      | max. 20 bytes, default "Off"                                                        | RW-E    |
| Active_Text                                                        | max. 20 bytes, default "On"                                                         | RW-E    |
| Present_Value                                                      | INACTIVE (0) / ACTIVE (1),<br>writable if Out_Of_Service                            | R<br>RW |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0 / 1                   | R       |
| Event_State                                                        | NORMAL (0)                                                                          | R       |
| Out_Of_Service                                                     | FALSE (0) / TRUE (1)                                                                | RW      |
| Polarity                                                           | NORMAL (0) / REVERSE (1)                                                            | RW-E    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                     |         |

| Function Table for Binary Input                         |          |              |               |                |
|---------------------------------------------------------|----------|--------------|---------------|----------------|
| Out_Of_Service                                          | Polarity | Binary Input | Present_Value | OUT_OF_SERVICE |
| 0                                                       | 0        | 0<br>1       | 0<br>1        | 0              |
| 0                                                       | 1        | 0<br>1       | 1<br>0        | 0              |
| 1                                                       | 0        | 0<br>1       | x             | 1              |
| 1                                                       | 1        | 0<br>1       | x             | 1              |
| x: Present_Value is writable and not affected by inputs |          |              |               |                |

## Accumulator Object 1

This object counts pulses at the current input. An external contact is connected to terminals S0+ and S0-.

Input pulses must have minimum High and Low times of 10ms, the maximum frequency is 50 Hz. Pulses are counted when the contact is closing.

| Property                                                           | Remark / Value                                                                                                                                                                          | RW        |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Object_Type                                                        | ACCUMULATOR (23)                                                                                                                                                                        | R         |
| Object_Identifier                                                  | accumulator, instance 1                                                                                                                                                                 | R         |
| Object_Name                                                        | max. 42 bytes, default "Accumulator 1"                                                                                                                                                  | RW-E      |
| Property_List                                                      |                                                                                                                                                                                         | R         |
| Description                                                        | max. 84 bytes, default ""                                                                                                                                                               | RW-E      |
| Present_Value                                                      | pulse counter of corresponding input<br>writable if Out_Of_Service (pulse counter remains unchanged)<br>value range is 0 ... Max_Pres_Value<br>value is set modulo (Max_Pres_Value + 1) | R-E<br>RW |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0 / 1                                                                                                                       | R         |
| Event_State                                                        | NORMAL (0)                                                                                                                                                                              | R         |
| Out_Of_Service                                                     | FALSE (0) / TRUE (1)                                                                                                                                                                    | RW        |
| Max_Pres_Value                                                     | 0 ... 4294967295, default 4294967295                                                                                                                                                    | RW-E      |
| Units                                                              | default no-units (95)                                                                                                                                                                   | RW-E      |
| Prescale                                                           | Multiplier 0 ... 65535, default 1<br>Modulo-Divide 1 ... 65535, default 1                                                                                                               | RW-E      |
| Scale                                                              | Float-Scale or Integer-Scale, default 1.0 (Float)                                                                                                                                       | RW-E      |
| Value_Set                                                          | the pulse counter is stored to Value_Set,<br>when key "S0" is pressed, default 0                                                                                                        | R-E       |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                         |           |

## Analog Value Object 28

| Property                                                           | Remark / Value                                                            | RW   |
|--------------------------------------------------------------------|---------------------------------------------------------------------------|------|
| Object_Type                                                        | ANALOG_VALUE (2)                                                          | R    |
| Object_Identifier                                                  | analog-value, instance 28                                                 | R    |
| Object_Name                                                        | max. 42 bytes, default "Watchdog Time"                                    | RW-E |
| Property_List                                                      |                                                                           | R    |
| Description                                                        | max. 84 bytes, default ""                                                 | RW-E |
| Present_Value                                                      | Time constant of Watchdog Timer,<br>Special value 0: Watchdog is inactive | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0             | R    |
| Event_State                                                        | NORMAL (0)                                                                | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                 | R    |
| Units                                                              | seconds (73)                                                              | R    |
| Min_Pres_Value                                                     | 0.00                                                                      | -    |
| Max_Pres_Value                                                     | 655.35                                                                    | -    |
| Resolution                                                         | 0.01                                                                      | -    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                           |      |

The Watchdog Timer resets Present\_Value of all output objects to Relinquish\_Default, if BACnet communication fails permanently.

The timer is restarted, when a BACnet message with an APDU is received.

When the timer times out, the priority arrays of all output objects are completely cleared to NULL.

## Analog Output Object 1...2

Analog outputs:      Terminals O1+, O1– ... O2+, O2–.  
The outputs are isolated from other circuits.  
Terminals O1– ... O2– are connected.  
Output voltages are shown with yellow LEDs.

| Property                                                           | Remark / Value                                                                                                           | RW   |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | ANALOG_OUTPUT (1)                                                                                                        | R    |
| Object_Identifier                                                  | analog-output, instance 1 ... 2                                                                                          | R    |
| Object_Name                                                        | max. 42 bytes, default<br>"Analog Output O1" ... "Analog Output O2"                                                      | RW-E |
| Property_List                                                      |                                                                                                                          | R    |
| Description                                                        | max. 84 bytes, default ""                                                                                                | RW-E |
| Present_Value                                                      | 0.0 ... 102.4 (0V ... 10.24V)                                                                                            | RW   |
| Status_Flags                                                       | IN_ALARM:            0<br>FAULT:                0<br>OVERRIDDEN:        0<br>OUT_OF_SERVICE: 0 / 1                       | R    |
| Event_State                                                        | NORMAL (0)                                                                                                               | R    |
| Out_Of_Service                                                     | FALSE (0) / TRUE (1)                                                                                                     | RW   |
| Units                                                              | Percent (98)                                                                                                             | R    |
| Priority_Array [16]                                                | NULL / 0.0 ... 102.4 (0V ... 10.24V)                                                                                     | R    |
| Relinquish_Default                                                 | 0.0 ... 102.4 (0V ... 10.24V)                                                                                            | RW-E |
| COV_Increment                                                      | Minimum change of Present_Value for COV notification,<br>default 1.0,<br>property only exists if working as MS/TP master | RW-E |
| Min_Pres_Value                                                     | 0.0                                                                                                                      | -    |
| Max_Pres_Value                                                     | 102.4                                                                                                                    | -    |
| Resolution                                                         | 0.025 (2.5 mV)                                                                                                           | -    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                          |      |

| Function Table for Analog Output |                |                    |                    |                |
|----------------------------------|----------------|--------------------|--------------------|----------------|
| Out_Of_Service                   | Priority_Array | Present_Value      | Analog Output      | OUT_OF_SERVICE |
| 0                                | NULL           | Relinquish_Default | Relinquish_Default | 0              |
|                                  | Value          | Value              | Value              |                |
| 1                                | NULL           | Relinquish_Default | unchanged          | 1              |
|                                  | Value          | Value              |                    |                |

## Analog Input Object 1...7

Voltage / resistance inputs: Terminals E1 ... E6,

Current input: Terminal I,

Common ground: Terminals –.

Resolution of A/D converter: 15 bits.

Accuracy: 0.1 % for voltage, current, resistance 40 Ohm ... 12 kOhm,  
 1.0 % for resistance 12 kOhm ... 4 MOhm,  
 0.2 °C for temperature.

| Property                                                           | Remark / Value                                                                                                                                               | RW      |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Object_Type                                                        | ANALOG_INPUT (0)                                                                                                                                             | R       |
| Object_Identifier                                                  | analog-input, instance 1 ... 7                                                                                                                               | R       |
| Object_Name                                                        | max. 42 bytes, default<br>"Analog Input E1" ... "Analog Input E6", "Analog Input I"                                                                          | RW-E    |
| Property_List                                                      |                                                                                                                                                              | R       |
| Description                                                        | max. 84 bytes, default ""                                                                                                                                    | RW-E    |
| Device_Type                                                        | max. 20 bytes, measurement range of input,<br>selected State_Text of Multistate Value 1...7                                                                  | R       |
| Present_Value                                                      | Measured value,<br>measurement range is defined in Multistate Value 1...7,<br>added offset is defined in Analog Value 21...27,<br>writable if Out_Of_Service | R<br>RW |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0 / 1                                                                                            | R       |
| Event_State                                                        | NORMAL (0)                                                                                                                                                   | R       |
| Out_Of_Service                                                     | FALSE (0) / TRUE (1)                                                                                                                                         | RW      |
| Units                                                              | Defined in Multistate Value 1...7                                                                                                                            | R       |
| COV_Increment                                                      | Minimum change of Present_Value for COV notification,<br>default 1.0,<br>property only exists if working as MS/TP master                                     | RW-E    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                              |         |

## Analog Value Object 21...27

| Property                                                           | Remark / Value                                                        | RW   |
|--------------------------------------------------------------------|-----------------------------------------------------------------------|------|
| Object_Type                                                        | ANALOG_VALUE (2)                                                      | R    |
| Object_Identifier                                                  | analog-value, instance 21 ... 27                                      | R    |
| Object_Name                                                        | max. 42 bytes, default "Offset E1" "Offset E6", "Offset I"            | RW-E |
| Property_List                                                      |                                                                       | R    |
| Description                                                        | max. 84 bytes, default ""                                             | RW-E |
| Present_Value                                                      | Offset is added to measured value (Analog Input 1 ... 7), default 0.0 | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0         | R    |
| Event_State                                                        | NORMAL (0)                                                            | R    |
| Out_Of_Service                                                     | FALSE (0)                                                             | R    |
| Units                                                              | same as Analog Input 1 ... 7                                          | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                       |      |

## Multistate Value Object 1...7

| Property                                                           | Remark / Value                                                                                                                                                                                                                              | RW   |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | MULTISTATE_VALUE (19)                                                                                                                                                                                                                       | R    |
| Object_Identifier                                                  | multistate-value, instance 1 ... 7                                                                                                                                                                                                          | R    |
| Object_Name                                                        | max. 42 bytes, default "Measurement Range E1" ... "Measurement Range E6", "Measurement Range I"                                                                                                                                             | RW-E |
| Property_List                                                      |                                                                                                                                                                                                                                             | R    |
| Description                                                        | max. 84 bytes, default ""                                                                                                                                                                                                                   | RW-E |
| State_Text                                                         | max. 20 bytes, default see next Table                                                                                                                                                                                                       | RW-E |
| Present_Value                                                      | Measurement range of Analog Input 1...7, see below<br>- Voltage (% , Volt)<br>- Voltage, pullup resistor 2kOhm to 5V (% PU, Volt PU)<br>- Resistance (Ohm)<br>- User defined sensor<br>- Standard temperature sensors<br>- Current (% , mA) | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                                                                                                                                                                               | R    |
| Event_State                                                        | NORMAL (0)                                                                                                                                                                                                                                  | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                                                                                                                                                                                   | R    |
| Number_Of_States                                                   | 24 (Input E1...E6), 3 (Input I)                                                                                                                                                                                                             | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                                                                             |      |



| Measurement Ranges E1...E6 |                    |                                     |
|----------------------------|--------------------|-------------------------------------|
| State                      | State_Text default | Units of Analog Input               |
| 1 default                  | "0-10V %"          | percent (98)                        |
| 2                          | "0-5V % PU"        | percent (98)                        |
| 3                          | "0-10 Volt"        | volts (5)                           |
| 4                          | "0-5 Volt PU"      | volts (5)                           |
| 5                          | "Ohm"              | ohms (4)                            |
| 6                          | "User Defined"     | set in Analog Value Object X1...X10 |
| 7                          | "PT100"            | degrees-Celsius (62)                |
| 8                          | "PT500"            | degrees-Celsius (62)                |
| 9                          | "PT1000"           | degrees-Celsius (62)                |
| 10                         | "NI1000-TC5000"    | degrees-Celsius (62)                |
| 11                         | "NI1000-TC6180"    | degrees-Celsius (62)                |
| 12                         | "BALCO500"         | degrees-Celsius (62)                |
| 13                         | "KTY81_110"        | degrees-Celsius (62)                |
| 14                         | "KTY81_210"        | degrees-Celsius (62)                |
| 15                         | "NTC1k8-T"         | degrees-Celsius (62)                |
| 16                         | "NTC5k-T"          | degrees-Celsius (62)                |
| 17                         | "NTC10k-T"         | degrees-Celsius (62)                |
| 18                         | "NTC20k-T"         | degrees-Celsius (62)                |
| 19                         | "LM235Z"           | degrees-Celsius (62)                |
| 20                         | "NTC10k-C"         | degrees-Celsius (62)                |
| 21                         | "NTC5k-S"          | degrees-Celsius (62)                |
| 22                         | "NTC30k-S"         | degrees-Celsius (62)                |
| 23                         | "KP250"            | degrees-Celsius (62)                |
| 24                         | "Poti 10k %"       | percent (98)                        |

| Measurement Ranges I |                    |                       |
|----------------------|--------------------|-----------------------|
| State                | State_Text default | Units of Analog Input |
| 1 default            | "0-20mA %"         | percent (98)          |
| 2                    | "4-20mA %"         | percent (98)          |
| 3                    | "0-20 mA"          | milliamperes (2)      |

## Analog Value Object 1...20

| Property          | Remark / Value                                                | RW   |
|-------------------|---------------------------------------------------------------|------|
| Object_Type       | ANALOG_VALUE (2)                                              | R    |
| Object_Identifier | analog-value, instance 1 ... 20                               | R    |
| Object_Name       | "X 1", "Y 1" ... "X 10", "Y 10"                               | R    |
| Property_List     |                                                               | R    |
| Description       | "                                                             | R    |
| Present_Value     | Interpolation table in User Defined measurement range         | RW-E |
| Status_Flags      | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0 | R    |
| Event_State       | NORMAL (0)                                                    | R    |
| Out_Of_Service    | FALSE (0)                                                     | R    |
| Units             | X1...X10: Units of Analog Input Object (default °C)           | RW-E |
|                   | Y1...Y10: Defined in Multistate Value 8                       | R    |

R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash

| Interpolation Table |        |               |          |        |               |
|---------------------|--------|---------------|----------|--------|---------------|
| Instance            | Name   | Default Value | Instance | Name   | Default Value |
| 1                   | "X 1"  | -10.0         | 2        | "Y 1"  | 960.86        |
| 3                   | "X 2"  | 10.0          | 4        | "Y 2"  | 1039.03       |
| 5                   | "X 3"  | 30.0          | 6        | "Y 3"  | 1116.73       |
| 7                   | "X 4"  | 50.0          | 8        | "Y 4"  | 1193.97       |
| 9                   | "X 5"  | 70.0          | 10       | "Y 5"  | 1270.75       |
| 11                  | "X 6"  | 0.0           | 12       | "Y 6"  | 0.0           |
| 13                  | "X 7"  | 0.0           | 14       | "Y 7"  | 0.0           |
| 15                  | "X 8"  | 0.0           | 16       | "Y 8"  | 0.0           |
| 17                  | "X 9"  | 0.0           | 18       | "Y 9"  | 0.0           |
| 19                  | "X 10" | 0.0           | 20       | "Y 10" | 0.0           |

The interpolation table by default provides an example for PT1000 temperature sensors. In the example X values are temperature in °C, Y values are resistance in Ohms. X and Y values must be sorted in ascending or descending order. The table ends where both values are 0.0. Measurement range at input must be selected in Multistate Value 8.

## Multistate Value Object 8

| Property                                                           | Remark / Value                                                                                                                                                                                                                                                                                                                                                                                                      | RW   |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Object_Type                                                        | MULTISTATE_VALUE (19)                                                                                                                                                                                                                                                                                                                                                                                               | R    |
| Object_Identifier                                                  | multistate-value, instance 8                                                                                                                                                                                                                                                                                                                                                                                        | R    |
| Object_Name                                                        | max. 42 bytes, default "User Defined Range"                                                                                                                                                                                                                                                                                                                                                                         | RW-E |
| Property_List                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                     | R    |
| Description                                                        | max. 84 bytes, default ""                                                                                                                                                                                                                                                                                                                                                                                           | RW-E |
| State_Text                                                         | max. 20 bytes, default see next Table                                                                                                                                                                                                                                                                                                                                                                               | RW-E |
| Present_Value                                                      | Selection of measurement range at input <ul style="list-style-type: none"> <li>- Voltage (Volt)</li> <li>- Voltage, pullup resistor 2kOhm to 5V (Volt P)</li> <li>- Resistance (Ohm)</li> </ul> and usage of interpolation table <ul style="list-style-type: none"> <li>- approximately linear sensor (e.g. PT1000)</li> <li>- approximately exponential sensor (e.g. NTC)</li> </ul> default 3, for PT1000 example | RW-E |
| Status_Flags                                                       | IN_ALARM: 0<br>FAULT: 0<br>OVERRIDDEN: 0<br>OUT_OF_SERVICE: 0                                                                                                                                                                                                                                                                                                                                                       | R    |
| Event_State                                                        | NORMAL (0)                                                                                                                                                                                                                                                                                                                                                                                                          | R    |
| Out_Of_Service                                                     | FALSE (0)                                                                                                                                                                                                                                                                                                                                                                                                           | R    |
| Number_Of_States                                                   | 6                                                                                                                                                                                                                                                                                                                                                                                                                   | R    |
| R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash |                                                                                                                                                                                                                                                                                                                                                                                                                     |      |

| User Defined Range |               |                          |
|--------------------|---------------|--------------------------|
| State              | State_Text    | Units of Analog Values Y |
| 1                  | "Volt lin"    | volts (5)                |
| 2                  | "Volt P lin"  | volts (5)                |
| 3                  | "Ohm lin"     | ohms (4)                 |
| 4                  | "Volt exp"    | volts (5)                |
| 5                  | "Volt P exp"  | volts (5)                |
| 6                  | "Ohm NTC exp" | ohms (4)                 |

Table for PT and NI Sensors

| Temp | PT100<br>TC3850 | PT500<br>TC3850 | PT1000<br>TC3850 | NI1000<br>TC5000 | NI1000<br>TC6180 | BALCO500 | KP250 |
|------|-----------------|-----------------|------------------|------------------|------------------|----------|-------|
| °C   | Ohm             | Ohm             | Ohm              | Ohm              | Ohm              | Ohm      | Ohm   |
| -50  | 80.306          | 401.53          | 803.06           | 790.88           | 742.55           | 361.65   | 196.5 |
| -30  | 88.222          | 441.11          | 882.22           | 871.69           | 841.46           | 397.05   | 217.9 |
| -10  | 96.086          | 480.43          | 960.86           | 956.24           | 945.82           | 433.96   | 239.3 |
| 10   | 103.903         | 519.51          | 1039.03          | 1044.79          | 1055.52          | 472.91   | 260.7 |
| 30   | 111.673         | 558.36          | 1116.73          | 1137.62          | 1170.56          | 513.89   | 282.1 |
| 50   | 119.397         | 596.99          | 1193.97          | 1234.98          | 1291.05          | 556.90   | 303.5 |
| 70   | 127.075         | 635.38          | 1270.75          | 1337.15          | 1417.21          | 601.94   | 324.9 |
| 90   | 134.707         | 673.53          | 1347.07          | 1444.39          | 1549.34          | 649.02   | 346.3 |
| 110  | 142.293         | 711.46          | 1422.93          | 1556.98          | 1687.89          | 698.13   | 367.7 |
| 130  | 149.832         | 749.16          | 1498.32          | 1675.19          | 1833.35          | 749.27   | 389.1 |
| 150  | 157.325         | 786.63          | 1573.25          | 1799.27          | 1986.35          | 802.44   | 410.5 |

Table for KTY81 and NTC Sensors

| Temp | KTY81<br>-110 | KTY81<br>-210 | NTC1k8<br>Thermokon | NTC5k<br>Thermokon | NTC10k<br>Thermokon | NTC20k<br>Thermokon | NTC10k<br>Carel | NTC5k<br>Schneider | NTC30k<br>Schneider |
|------|---------------|---------------|---------------------|--------------------|---------------------|---------------------|-----------------|--------------------|---------------------|
| °C   | Ohm           | Ohm           | Ohm                 | kOhm               | kOhm                | kOhm                | kOhm            | Ohm                | kOhm                |
| -50  | 515           | 1030          |                     | 333.9              | 667.8               | 1668.0              | 329.5           | 9850               | 2497.83             |
| -40  | 567           | 1135          |                     | 167.8              | 335.7               | 813.4               | 188.5           | 9711               | 1219.17             |
| -30  | 624           | 1247          | 24500               | 88.34              | 176.7               | 415.5               | 111.3           | 9465               | 622.94              |
| -20  | 684           | 1367          | 14000               | 48.49              | 96.97               | 221.3               | 67.77           | 9066               | 331.02              |
| -10  | 747           | 1495          | 8400                | 27.65              | 55.30               | 122.5               | 42.47           | 8471               | 183.56              |
| 0    | 815           | 1630          | 5200                | 16.33              | 32.65               | 70.20               | 27.28           | 7660               | 105.31              |
| 10   | 886           | 1772          | 3330                | 9.952              | 19.90               | 41.56               | 17.96           | 6666               | 62.355              |
| 20   | 961           | 1922          | 2200                | 6.247              | 12.49               | 25.35               | 12.09           | 5573               | 38.022              |
| 30   | 1040          | 2080          | 1480                | 4.028              | 8.06                | 15.89               | 8.31            | 4492               | 23.827              |
| 40   | 1122          | 2245          | 1040                | 2.662              | 5.32                | 10.21               | 5.83            | 3517               | 15.314              |
| 50   | 1209          | 2417          | 740                 | 1.801              | 3.60                | 6.72                | 4.16            | 2702               | 10.077              |
| 60   | 1299          | 2597          | 540                 | 1.244              | 2.49                | 4.52                | 3.02            | 2055               | 6.777               |
| 70   | 1392          | 2785          | 402                 | 0.8758             | 1.75                | 3.10                | 2.23            | 1562               | 4.650               |
| 80   | 1490          | 2980          | 306                 | 0.6281             | 1.26                | 2.12                | 1.67            | 1193               | 3.251               |
| 90   | 1591          | 3182          | 240                 | 0.4581             | 0.92                | 1.54                | 1.27            | 921                | 2.312               |
| 100  | 1696          | 3392          | 187                 | 0.3393             | 0.68                | 1.12                | 0.97            | 721                | 1.670               |
| 110  | 1805          | 3607          | 149                 | 0.2550             | 0.51                | 0.82                | 0.76            | 574                | 1.224               |
| 120  | 1915          | 3817          | 118                 | 0.1943             | 0.39                | 0.61                |                 | 466                | 0.909               |
| 130  | 2023          | 4008          | 95                  | 0.1499             | 0.30                | 0.46                |                 | 380                | 0.690               |
| 140  | 2124          | 4166          | 77                  | 0.1170             | 0.23                | 0.35                |                 | 320                | 0.530               |
| 150  | 2211          | 4280          | 64                  | 0.0924             | 0.18                | 0.27                |                 | 270                | 0.410               |

**Table for LM235Z Sensors**

| Temp   | °C   | -40   | 0     | 40    | 80    | 120   |
|--------|------|-------|-------|-------|-------|-------|
| LM235Z | Volt | 2.332 | 2.732 | 3.132 | 3.532 | 3.932 |

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