

Software description PICS BACnet MS/TP



Summary

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

BMT-DO4.....	3
BMT-TO4.....	10
BMT-DI4.....	20
BMT-DI10.....	27
BMT-SI4.....	34
BMT-DIO4/2.....	45
BMT-DIO4/2 IP.....	62
BMT-TP.....	79
BMT-AO4.....	94
BMT-AOP4.....	101
BMT-AOP2.....	108
BMT-AI8.....	116
BMT-CI4.....	129
BMT-Multi-IO.....	137
MB-DIO2/1.....	157
MB-DIO4/2.....	175

BACnet Protocol Implementation Conformance Statement

Date: 06.03.2025
Vendor Name: METZ CONNECT GmbH
Product Name: BMT-DO4
Product Model Number: 110 886 13 21
Application Software Version: 2.1
Firmware Revision: 2.2
BACnet Protocol Revision: 21

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 (Clause 9)
- Master Slave
- Non-isolated transceiver Isolated transceiver
- Local 47K ohms bias resistors None Other: _____
- Transceiver unit loading: 1 1/2 1/4 1/8
- Data rates: 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

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 object names can be restored by writing an empty string.

Gateway Options:

- None
-

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	"2.2"	R
Application_Software_Version	"2.1"	R
Protocol_Version	1	R
Protocol_Revision	21	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, NETWORK_PORT, BINARY_OUTPUT, ANALOG_VALUE	R
Object_List	device, network-port 1, 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		

Network Port Object 1

Property	Remark / Value	RW
Object_Type	NETWORK_PORT (56)	R
Object_Identifier	network-port, instance 1	R
Object_Name	max. 42 Bytes, default "MS/TP-Port"	RW-E
Property_List		R
Description	max. 84 Bytes, default ""	RW-E
Network_Number	0 (unknown)	R



Network_Number_Quality	UNKNOWN (0)	R
Changes_Pending	FALSE (0) / TRUE (1) see footnote *1	R
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE:0	R
Reliability	NO_FAULT_DETECTED (0)	R
Out_Of_Service	FALSE (0)	R
Protocol_Level	BACNET_APPLICATION (2)	R
Network_Type	MSTP (2)	R
MAC_Address	Network address from hexadecimal switches (0...249)	R
APDU_Length	480	R
Link_Speed	default 9600 *1	RW-E
Link_Speeds	9600, 19200, 38400, 57600, 76800, 115200	R
Max_Master	0...127, default 127 *1	RW-E
Max_Info_Frames	1...255, default 1 *1	RW-E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

*1 Writing stores values temporarily and sets property Changes_Pending to true. Changes are activated together by service Reinitialize-Device / Warmstart or Activate_Changes. Changes are discarded by service Reinitialize-Device / Coldstart or power-down.

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" ...	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 FAULT: 0 OVERRIDDEN: 0 = Switch A (Auto) 1 = Switch 0 (Off) or 1 (On) 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
Current_Command_Priority		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
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, 0: Watchdog is inactive, Maximum: 655.34 seconds	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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.

BACnet Protocol Implementation Conformance Statement

Date: 06.03.2025
Vendor Name: METZ CONNECT GmbH
Product Name: BMT-TO4
Product Model Number: 110 880 13
Application Software Version: 2.1
Firmware Revision: 2.2
BACnet Protocol Revision: 21

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 (Clause 9)
- Master Slave
 - Non-isolated transceiver Isolated transceiver
 - Local 47K ohms bias resistors None Other: _____
 - Transceiver unit loading: 1 1/2 1/4 1/8
 - Data rates: 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

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 object names can be restored by writing an empty string.

Gateway Options:

- None

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-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	"2.2"	R
Application_Software_Version	"2.1"	R
Protocol_Version	1	R
Protocol_Revision	21	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, NETWORK_PORT, BINARY_OUTPUT, ANALOG_VALUE, ANALOG_OUTPUT, MULTISTATE_VALUE	R
Object_List	device, network-port 1, binary-output 1...4, analog-value 1...5, 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, services Read-Property / Read-Range, max. 10 Subscriptions, for binary-output 1...4 and analog-output 1...4, Confirmed / Unconfirmed, Lifetime = 0...65535 sec.	R
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

Network Port Object 1

Property	Remark / Value	RW
Object_Type	NETWORK_PORT (56)	R
Object_Identifier	network-port, instance 1	R
Object_Name	max. 42 Bytes, default "MS/TP-Port"	RW-E
Property_List		R
Description	max. 84 Bytes, default ""	RW-



		E
Network_Number	0 (unknown)	R
Network_Number_Quality	UNKNOWN (0)	R
Changes_Pending	FALSE (0) / TRUE (1) see footnote *1	R
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE:0	R
Reliability	NO_FAULT_DETECTED (0)	R
Out_Of_Service	FALSE (0)	R
Protocol_Level	BACNET_APPLICATION (2)	R
Network_Type	MSTP (2)	R
MAC_Address	Network address from hexadecimal switches (0...249)	R
APDU_Length	480	R
Link_Speed	default 9600 *1	RW-E
Link_Speeds	9600, 19200, 38400, 57600, 76800, 115200	R
Max_Master	0...127, default 127 *1	RW-E
Max_Info_Frames	1...255, default 1 *1	RW-E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

*1 Writing stores values temporarily and sets property Changes_Pending to true. Changes are activated together by service Reinitialize-Device / Warmstart or Activate_Changes. Changes are discarded by service Reinitialize-Device / Coldstart or power-down.

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, default "Operating Mode 1" ...	RW-E
Property_List		R

Description	max. 84 bytes, default ""	RW-E
State_Text	max. 20 bytes, default 1: "Binary Output" 2: "Pulse Width Control"	RW-E
Present_Value	Operating Mode of Triac Output 1...4, default 1	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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" ...	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 FAULT: 0 OVERRIDDEN: 0 = Switch A (Auto) 1 = Switch 0 (Off) or 1 (On) 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
Current_Command_Priority		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
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

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 “Pulse Ratio 1” ...	RW-E
Property_List		R
Description	max. 84 bytes, default “”	RW-E
Present_Value	0.0 ... 100.0	RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 / 1 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
Current_Command_Priority		R
COV_Increment	Minimum change of Present_Value for COV notification, default 1.0, 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	OVERRIDEN	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 1” ...	RW-E
Property_List		R
Description	max. 84 Bytes, default “”	RW-E
Present_Value	Time Constant of Pulse Timer, Minimum 0, maximum: 655.34 seconds	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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, 0: Watchdog is inactive, Maximum: 655.34 seconds	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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.

BACnet Protocol Implementation Conformance Statement

Date: 21.02.2025
Vendor Name: METZ CONNECT GmbH
Product Name: BMT-DI4
Product Model Number: 110 884 13 19
Application Software Version: 2.1
Firmware Revision: 2.2
BACnet Protocol Revision: 21

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 (Clause 9)
- Master Slave
 - Non-isolated transceiver Isolated transceiver
 - Local 47K ohms bias resistors None Other: _____
 - Transceiver unit loading: 1 1/2 1/4 1/8
 - Data rates: 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

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 object names can be restored by writing an empty string.

Gateway Options:

- None
-

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	"2.2"	R
Application_Software_Version	"2.1"	R
Protocol_Version	1	R

Protocol_Revision	21	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, NETWORK_PORT, BINARY_INPUT, GROUP	R
Object_List	device, network-port 1, 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		

Network Port Object 1

Property	Remark / Value	RW
Object_Type	NETWORK_PORT (56)	R
Object_Identifier	network-port, instance 1	R
Object_Name	max. 42 Bytes, default "MS/TP-Port"	RW-E
Property_List		R
Description	max. 84 Bytes, default ""	RW-E
Network_Number	0 (unknown)	R

Network_Number_Quality	UNKNOWN (0)	R
Changes_Pending	FALSE (0) / TRUE (1) see footnote *1	R
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE:0	R
Reliability	NO_FAULT_DETECTED (0)	R
Out_Of_Service	FALSE (0)	R
Protocol_Level	BACNET_APPLICATION (2)	R
Network_Type	MSTP (2)	R
MAC_Address	Network address from hexadecimal switches (0...249)	R
APDU_Length	480	R
Link_Speed	default 9600 *1	RW-E
Link_Speeds	9600, 19200, 38400, 57600, 76800, 115200	R
Max_Master	0...127, default 127 *1	RW-E
Max_Info_Frames	1...255, default 1 *1	RW-E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

*1 Writing stores values temporarily and sets property Changes_Pending to true. Changes are activated together by service Reinitialize-Device / Warmstart or Activate_Changes. Changes are discarded by service Reinitialize-Device / Coldstart or power-down.

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" ...	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), writable if Out_Of_Service	R RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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	0	0
		1	1	
0	1	0	1	0
		1	0	
1	0	0	x	1
		1		
1	1	0	x	1
		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" ...	RW-E
Property_List		R
Description	max. 84 bytes, default ""	RW-E
Present_Value	Present_Value of Binary 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 p	Binary Input			
	1	2	3	4
1	x	x	x	x
2	x	x		
3			x	x

BACnet Protocol Implementation Conformance Statement

Date: 20.02.2025
Vendor Name: METZ CONNECT GmbH
Product Name: BMT-DI10
Product Model Number: 110 881 13 19
Application Software Version: 2.1
Firmware Revision: 2.2
BACnet Protocol Revision: 21

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 (Clause 9)
- Master Slave
 - Non-isolated transceiver Isolated transceiver
 - Local 47K ohms bias resistors None Other: _____
 - Transceiver unit loading: 1 1/2 1/4 1/8
 - Data rates: 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

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 object names can be restored by writing an empty string.

Gateway Options:

- None

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	"2.2"	R
Application_Software_Version	"2.1"	R
Protocol_Version	1	R

Protocol_Revision	21	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, NETWORK_PORT, BINARY_INPUT, GROUP	R
Object_List	device, network-port 1, 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		

Network Port Object 1

Property	Remark / Value	RW
Object_Type	NETWORK_PORT (56)	R
Object_Identifier	network-port, instance 1	R
Object_Name	max. 42 Bytes, default "MS/TP-Port"	RW-E
Property_List		R
Description	max. 84 Bytes, default ""	RW-E
Network_Number	0 (unknown)	R

Network_Number_Quality	UNKNOWN (0)	R
Changes_Pending	FALSE (0) / TRUE (1) see footnote *1	R
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE:0	R
Reliability	NO_FAULT_DETECTED (0)	R
Out_Of_Service	FALSE (0)	R
Protocol_Level	BACNET_APPLICATION (2)	R
Network_Type	MSTP (2)	R
MAC_Address	Network address from hexadecimal switches (0...249)	R
APDU_Length	480	R
Link_Speed	default 9600	*1 RW-E
Link_Speeds	9600, 19200, 38400, 57600, 76800, 115200	R
Max_Master	0...127, default 127	*1 RW-E
Max_Info_Frames	1...255, default 1	*1 RW-E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

*1 Writing stores values temporarily and sets property Changes_Pending to true. Changes are activated together by service Reinitialize-Device / Warmstart or Activate_Changes. Changes are discarded by service Reinitialize-Device / Coldstart or power-down.

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" ...	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), writable if Out_Of_Service	R RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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	0	0
		1	1	
0	1	0	1	0
		1	0	
1	0	0	x	1
		1		
1	1	0	x	1
		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" ...	RW-E
Property_List		R
Description	max. 84 bytes, default ""	RW-E
Present_Value	Present_Value of Binary 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 P	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			

BACnet Protocol Implementation Conformance Statement

Date: 24.02.2025
Vendor Name: METZ CONNECT GmbH
Product Name: BMT-SI4
Product Model Number: 110 889 13
Application Software Version: 2.3
Firmware Revision: 2.2
BACnet Protocol Revision: 21

Product Description:

BACnet MS/TP Application Specific Controller providing 4 digital inputs.
 Accumulator objects 1...4 count input pulses with minimum high and low times of 10 ms (50 Hz).
 Accumulator objects 5...8 provide separate counters with writable Value_Set property.
 Pulse-Converter objects 1...4 count input pulses with minimum high and low times of 1 ms (500 Hz).

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)
Device Management-TimeSynchronization-B	(DM-TS-B)
Device Management-UTCTimeSynchronization-B	(DM-UTC-B)

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 (Clause 9)
- Master Slave
 - Non-isolated transceiver Isolated transceiver
 - Local 47K ohms bias resistors None Other: _____
 - Transceiver unit loading: 1 1/2 1/4 1/8
 - Data rates: 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

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 object names can be restored by writing an empty string.

Gateway Options:

- None



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, must be set unique in the whole BACnet network, 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	"2.2"	R
Application_Software_Version	"2.3"	R
Protocol_Version	1	R

Protocol_Revision	21	R
Protocol_Services_Supported	read-property, write-property, subscribe-cov, who-has, who-is, read-range, device-communication-control, reinitialize-device, time-synchronisation, utc-time-synchronisation	R
Protocol_Object_Types_Supported	DEVICE, NETWORK_PORT, BINARY_INPUT, GROUP, ACCUMULATOR, PULSE_CONVERTER	R
Object_List	device, network-port 1, binary-input 1...4, group 1...3, accumulator 1...8, pulse-converter 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
Local_Time	*1	O
Local_Date	*1	O
UTC_Offset	*1	O
Daylight_Savings_Status	*1	O
Active_COV_Subscriptions	property only exists if working as MS/TP master, services Read-Property / Read-Range, max. 10 Subscriptions, for binary-input and pulse-converter, Confirmed / Unconfirmed, Lifetime = 0...65534 sec.	R
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

*1

The clock was implemented only due to BTL requirements for the accumulator and pulse converter object. It is recommended not to use the clock as it is not battery-backed and loses date and time with every device reset. Observing the function of the clock and setting date and time if necessary would cause a communication overhead on the MS/TP bus. If the clock is never set, all dates and times remain unspecified.

Network Port Object 1

Property	Remark / Value	RW
Object_Type	NETWORK_PORT (56)	R
Object_Identifier	network-port, instance 1	R
Object_Name	max. 42 Bytes, default "MS/TP-Port"	RW-E
Property_List		R
Description	max. 84 Bytes, default ""	RW-E
Network_Number	0 (unknown)	R
Network_Number_Quality	UNKNOWN (0)	R
Changes_Pending	FALSE (0) / TRUE (1) see footnote *1	R
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE: 0	R
Reliability	NO_FAULT_DETECTED (0)	R
Out_Of_Service	FALSE (0)	R
Protocol_Level	BACNET_APPLICATION (2)	R
Network_Type	MSTP (2)	R
MAC_Address	Network address from hexadecimal switches (0...249)	R
APDU_Length	480	R
Link_Speed	default 9600 *1	RW-E
Link_Speeds	9600, 19200, 38400, 57600, 76800, 115200	R
Max_Master	0...127, default 127 *1	RW-E
Max_Info_Frames	1...255, default 1 *1	RW-E

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

*1 Writing stores values temporarily and sets property Changes_Pending to true. Changes are activated together by service Reinitialize-Device / Warmstart or Activate_Changes. Changes are discarded by service Reinitialize-Device / Coldstart or power-down.

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), writable if Out_Of_Service	R RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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

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 10 ms, 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 value range is 0 ... Max_Pres_Value value is set modulo (Max_Pres_Value + 1) writable if Out_Of_Service (pulse counter remains unchanged)	R-E RW
Status_Flags	IN_ALARM: 0	R

	FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE: 0 / 1	
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 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, when corresponding key is pressed, default 0	R-E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

Accumulator Object 5...8

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 10 ms, 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 5...8	R
Object_Name	max. 42 bytes, default "Accumulator 5" ...	RW-E
Property_List		R
Description	max. 84 bytes, default ""	RW-E
Present_Value	pulse counter of corresponding input value range is 0 ... Max_Pres_Value value is set modulo (Max_Pres_Value + 1) writable if Out_Of_Service (pulse counter remains unchanged)	R-E RW
Status_Flags	IN_ALARM: 0	R

	FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE: 0 / 1	
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 Modulo-Divide 1 ... 65535, default 1	RW-E
Scale	Float-Scale or Integer-Scale, default 1.0 (Float)	RW-E
Value_Change_Time	see Device object *1	R
Value_Before_Change	Present_Value before Value_Set was written, default 0	R-E
Value_Set	May be written to change Present_Value, default 0	RW-E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

When Value_Set is written, the following series of operations is performed.

- Present_Value is copied to Value_Before_Change.
- The written Value is first calculated modulo (Max_Pres_Value + 1),
- which is then written to Value_Set, Present_Value and the pulse counter.

Pulse Converter 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 1 ms, the maximum frequency is 500 Hz.

Pulses are counted when the contact is closing.

Property	Remark / Value	RW
Object_Type	PULSE_CONVERTER (24)	R
Object_Identifier	pulse-converter, instance 1...4	R
Object_Name	max. 42 bytes, default "Pulse Converter 1" ...	RW-E
Property_List		R

Description	max. 84 bytes, default ""	RW-E
Present_Value	real value of corresponding input, is computed (Count • Scale_Factor), is contained in COV notifications, writable if Out_Of_Service (pulse counter is not affected)	R RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE: 0 / 1	R
Event_State	NORMAL (0)	R
Out_Of_Service	FALSE (0) / TRUE (1)	RW
Units	default no-units (95)	RW-E
Scale_Factor	real factor to compute Present_Value	RW-E
Adjust_Value	real value to adjust Present_Value and Count, see below	RW-E
Count	integer pulse counter of corresponding input, value range 0...4294967295, overflows to 0	R-E
Update_Time	see Device object *1	R
Count_Change_Time	see Device object *1	R
Count_Before_Change	Count before Adjust_Value was written	R-E
COV_Increment	minimum change in Present_Value to cause a COV notification	RW-E
COV_Period	1...65535:seconds between periodic COV notifications 0: no periodic COV notifications	RW-E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

Present_Value is a real number with 23 mantissa bits, whereas Count is an integer with 32 bits. So the Present_Value can become too big to represent every input pulse Count exactly. Therefore Present_Value should be reset to zero or another smaller value either periodically or when it becomes unwieldy. Especially with high input pulse frequency this can happen soon.

For this purpose Adjust_Value may be written. The following series of operations is performed then.

- Adjust_Value is stored.
- Count is copied to Count_Before_Change.

- Count is decremented by (Adjust_Value / Scale_Factor), discarding the division remainder.
 - Present_Value is recomputed as (Count • Scale_Factor).
- It is a VALUE_OUT_OF_RANGE error, if Count would overflow or underflow.

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, 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

BACnet Protocol Implementation Conformance Statement

Date: 06.03.2025
Vendor Name: METZ CONNECT GmbH
Product Name: BMT-DIO4/2
Product Model Number: 110 883 13 26
Application Software Version: 2.2
Firmware Revision: 2.2
BACnet Protocol Revision: 21

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 (Clause 9)
- Master Slave
 - Non-isolated transceiver Isolated transceiver
 - Local 47K ohms bias resistors None Other: _____
 - Transceiver unit loading: 1 1/2 1/4 1/8
 - Data rates: 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

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 object names can be restored by writing an empty string.

Gateway Options:

- None

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	"2.2"	R
Application_Software_Version	"2.2"	R
Protocol_Version	1	R
Protocol_Revision	21	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, NETWORK_PORT, BINARY_OUTPUT, BINARY_INPUT, GROUP, ANALOG_VALUE, MULTISTATE_VALUE	R
Object_List	device, network-port 1, 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		

Network Port Object 1

Property	Remark / Value	RW
Object_Type	NETWORK_PORT (56)	R
Object_Identifier	network-port, instance 1	R
Object_Name	max. 42 Bytes, default "MS/TP-Port"	RW-E



Property_List		R
Description	max. 84 Bytes, default ""	RW-E
Network_Number	0 (unknown)	R
Network_Number_Quality	UNKNOWN (0)	R
Changes_Pending	FALSE (0) / TRUE (1) see footnote *1	R
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE:0	R
Reliability	NO_FAULT_DETECTED (0)	R
Out_Of_Service	FALSE (0)	R
Protocol_Level	BACNET_APPLICATION (2)	R
Network_Type	MSTP (2)	R
MAC_Address	Network address from hexadecimal switches (0...249)	R
APDU_Length	480	R
Link_Speed	default 9600 *1	RW-E
Link_Speeds	9600, 19200, 38400, 57600, 76800, 115200	R
Max_Master	0...127, default 127 *1	RW-E
Max_Info_Frames	1...255, default 1 *1	RW-E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

*1 Writing stores values temporarily and sets property Changes_Pending to true. Changes are activated together by service Reinitialize-Device / Warmstart or Activate_Changes. Changes are discarded by service Reinitialize-Device / Coldstart or power-down.

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 FAULT: 0 OVERRIDDEN: 0 = Switch A (Auto) 1 = Switch 0 (Off) or 1 (On) 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
Current_Command_Priority		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
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



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), writable if Out_Of_Service	R RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 Motorized_SafetyOpen, Motorized_SafetyClose, Motor_SafetyOpen_2, Motor_SafetyClose_2, LimitSwitch_Open_Close (contact closed at each limit)	Limit switch	Operating modes LimitSwitch_Open (contact closed at open limit), LimitSwitch_Close (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, 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, Special value 0: Watchdog is inactive	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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, default "OperMode_1" ... "OperMode_2"	RW-E
Property_List		R
Description	max. 84 bytes, default ""	RW-E
State_Text	max. 31 Bytes, default 1: "Direct_Control" 2: "Motorized_SafetyOpen" 3: "Motorized_SafetyClose" 4: "LimitSwitch_Open_Close" 5: "LimitSwitch_Open" 6: "LimitSwitch_Close" 7: "Motor_SafetyOpen_2" 8: "Motor_SafetyClose_2"	RW-E
Present_Value	Operating mode of Inputs 1...2 and Output 1, Operating mode of Inputs 3...4 and Output 2, values 1...8, default 1	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE:0	R
Event_State	NORMAL (0)	R

Out_Of_Service	FALSE (0)	R
Number_Of_States	8	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” and “Motor_SafetyOpen_2”

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 positions are monitored. For differences between these modes see the last chapter.

Mode “Motorized_SafetyClose” and “Motor_SafetyClose_2”

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 positions are monitored. For differences between these modes see the last chapter.

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 FAULT: 0 OVERRIDDEN: 0 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 default	Present_Value 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 signaled.

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 signaled.

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 1: "open" 2: "close" 3: "running" (only instance 5...6)	RW-E
Present_Value	see table below	
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 signaled by its limit switches.
If both switches were activated at once, Present_Value is set to running and the alarm Manipulation is signaled.

In operating modes LimitSwitch_Open, LimitSwitch_Close two dampers may be monitored.
Then ActuPos_1/2 decodes the first fire damper position signaled by its limit switch and ActuPos_1a/2a decodes the second fire damper position signaled 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, default "AlarmCode_1" ... "AlarmCode_2"	RW-E
Property_List		R
Description	max. 84 bytes, default ""	RW-E
State_Text	max. 31 Bytes, default 1: "OK" 2: "Runtime_Error" 3: "Manipulation" 4: "Update_Error" 5: "Alarm" 6: "Alarm_a"	RW-E
Present_Value	see table below, default 1	RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 signaled.

Fire-Position

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

Operating mode	Fire-Position if
Motorized_SafetyClose, Motor_SafetyClose_2	damper not open
Motorized_SafetyOpen, Motor_SafetyOpen_2	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 signaled, then Alarm or Alarm_a is signaled.

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.

In motorized fire dampers there is this difference in intentionally controlling with register ActuDrive to the safe position and back to the normal one:

Operating modes Motorized_...: The fire position is reported as an alarm.

Operating modes Motor_...: The fire position is not reported as an alarm.

Operating Modes for Motorized Fire Dampers

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

When controlled via ActuDrive, the first and second lines apply.
The Fire-Position (ActuPos = close, running) is then reported as Alarm.

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

Operating mode Motor_SafetyClose_2

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	open (1)	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

When controlled via ActuDrive, the first and last lines apply.

The Fire-Position (ActuPos = close, running) is then not reported as Alarm.

Initialization after power-on / reset: ActuDrive is set 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
	close (2)	OK (1)	Off
	open (1)	OK (1)	On

When controlled via ActuDrive, the first and second lines apply.
The Fire-Position (ActuPos = close, running) is then reported as Alarm.

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

Operating mode Motor_SafetyOpen_2

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	close (2)	any	On
-	any	Runtime_Error (2)	On
	any	Update_Error (4)	On
	any	Manipulation (3)	Off
	close (2)	OK (1)	Off
	open (1)	OK (1)	On

When controlled via ActuDrive, the first and last lines apply.
The Fire-Position (ActuPos = close, running) is then not reported as Alarm.

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

BACnet Protocol Implementation Conformance Statement

Date: 06.03.2025
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: 2.2
Firmware Revision: 2.2
BACnet Protocol Revision: 21

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 (Clause 9)
- Master Slave
 - Non-isolated transceiver Isolated transceiver
 - Local 47K ohms bias resistors None Other: _____
 - Transceiver unit loading: 1 1/2 1/4 1/8
 - Data rates: 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

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 object names can be restored by writing an empty string.

Gateway Options:

- None

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-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	“2.2”	R
Application_Software_Version	“2.2”	R
Protocol_Version	1	R



Protocol_Revision	21	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, NETWORK_PORT, BINARY_OUTPUT, BINARY_INPUT, GROUP, ANALOG_VALUE, MULTISTATE_VALUE	R
Object_List	device, network-port 1, 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		

Network Port Object 1

Property	Remark / Value	RW
Object_Type	NETWORK_PORT (56)	R
Object_Identifier	network-port, instance 1	R

Object_Name	max. 42 Bytes, default “MS/TP-Port”	RW-E
Property_List		R
Description	max. 84 Bytes, default “”	RW-E
Network_Number	0 (unknown)	R
Network_Number_Quality	UNKNOWN (0)	R
Changes_Pending	FALSE (0) / TRUE (1) see footnote *1	R
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE:0	R
Reliability	NO_FAULT_DETECTED (0)	R
Out_Of_Service	FALSE (0)	R
Protocol_Level	BACNET_APPLICATION (2)	R
Network_Type	MSTP (2)	R
MAC_Address	Network address from hexadecimal switches (0...249)	R
APDU_Length	480	R
Link_Speed	default 9600 *1	RW-E
Link_Speeds	9600, 19200, 38400, 57600, 76800, 115200	R
Max_Master	0...127, default 127 *1	RW-E
Max_Info_Frames	1...255, default 1 *1	RW-E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

*1 Writing stores values temporarily and sets property Changes_Pending to true. Changes are activated together by service Reinitialize-Device / Warmstart or Activate_Changes. Changes are discarded by service Reinitialize-Device / Coldstart or power-down.

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 FAULT: 0 OVERRIDDEN: 0 = Switch A (Auto) 1 = Switch 0 (Off) or 1 (On) 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
Current_Command_Priority		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
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	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), writable if Out_Of_Service	R RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 Motorized_SafetyOpen, Motorized_SafetyClose, Motor_SafetyOpen_2, Motor_SafetyClose_2, LimitSwitch_Open_Close (contact closed at each limit)	Limit switch	Operating modes LimitSwitch_Open (contact closed at open limit), LimitSwitch_Close (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, 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, Special value 0: Watchdog is inactive	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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, default "OperMode_1" ... "OperMode_2"	RW-E
Property_List		R
Description	max. 84 bytes, default ""	RW-E
State_Text	max. 31 Bytes, default 1: "Direct_Control" 2: "Motorized_SafetyOpen" 3: "Motorized_SafetyClose" 4: "LimitSwitch_Open_Close" 5: "LimitSwitch_Open" 6: "LimitSwitch_Close" 7: "Motor_SafetyOpen_2" 8: "Motor_SafetyClose_2"	RW-E
Present_Value	Operating mode of Inputs 1...2 and Output 1, Operating mode of Inputs 3...4 and Output 2, values 1...8, default 1	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE:0	R
Event_State	NORMAL (0)	R

Out_Of_Service	FALSE (0)	R
Number_Of_States	8	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” and “Motor_SafetyOpen_2”

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 positions are monitored. For differences between these modes see the last chapter.

Mode “Motorized_SafetyClose” and “Motor_SafetyClose_2”

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 positions are monitored. For differences between these modes see the last chapter.

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 FAULT: 0 OVERRIDDEN: 0 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 default	Present_Value 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 signaled.

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 signaled.

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 1: "open" 2: "close" 3: "running" (only instance 5...6)	RW-E
Present_Value	see table below	
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 signaled by its limit switches.
If both switches were activated at once, Present_Value is set to running and the alarm Manipulation is signaled.

In operating modes LimitSwitch_Open, LimitSwitch_Close two dampers may be monitored.
Then ActuPos_1/2 decodes the first fire damper position signaled by its limit switch and ActuPos_1a/2a decodes the second fire damper position signaled 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, default "AlarmCode_1" ... "AlarmCode_2"	RW-E
Property_List		R
Description	max. 84 bytes, default ""	RW-E
State_Text	max. 31 Bytes, default 1: "OK" 2: "Runtime_Error" 3: "Manipulation" 4: "Update_Error" 5: "Alarm" 6: "Alarm_a"	RW-E
Present_Value	see table below, default 1	RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 signaled.

Fire-Position

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

Operating mode	Fire-Position if
Motorized_SafetyClose, Motor_SafetyClose_2	damper not open
Motorized_SafetyOpen, Motor_SafetyOpen_2	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 signaled, then Alarm or Alarm_a is signaled.

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.

In motorized fire dampers there is this difference in intentionally controlling with register ActuDrive to the safe position and back to the normal one:

Operating modes Motorized_...: The fire position is reported as an alarm.

Operating modes Motor_...: The fire position is not reported as an alarm.

Operating Modes for Motorized Fire Dampers

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

When controlled via ActuDrive, the first and second lines apply.
The Fire-Position (ActuPos = close, running) is then reported as Alarm.

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

Operating mode Motor_SafetyClose_2

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	open (1)	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

When controlled via ActuDrive, the first and last lines apply.

The Fire-Position (ActuPos = close, running) is then not reported as Alarm.

Initialization after power-on / reset: ActuDrive is set 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
	close (2)	OK (1)	Off
	open (1)	OK (1)	On

When controlled via ActuDrive, the first and second lines apply.
The Fire-Position (ActuPos = close, running) is then reported as Alarm.

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

Operating mode Motor_SafetyOpen_2

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	close (2)	any	On
-	any	Runtime_Error (2)	On
	any	Update_Error (4)	On
	any	Manipulation (3)	Off
	close (2)	OK (1)	Off
	open (1)	OK (1)	On

When controlled via ActuDrive, the first and last lines apply.
The Fire-Position (ActuPos = close, running) is then not reported as Alarm.

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

BACnet Protocol Implementation Conformance Statement

Date: 18.12.2024
Vendor Name: METZ CONNECT GmbH
Product Name: BMT-TP
Product Model Number: 110 888 13
Application Software Version: 2.1
Firmware Revision: 2.2
BACnet Protocol Revision: 21

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 (Clause 9)
- Master Slave
- Non-isolated transceiver Isolated transceiver
- Local 47K ohms bias resistors None Other: _____
- Transceiver unit loading: 1 1/2 1/4 1/8
- Data rates: 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

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 object names can be restored by writing an empty string.

Gateway Options:

- None

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	"2.2"	R
Application_Software_Version	"2.1"	R
Protocol_Version	1	R

Protocol_Revision	21	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, NETWORK_PORT, BINARY_OUTPUT, BINARY_INPUT, GROUP, MULTISTATE_OUTPUT, MULTISTATE_VALUE, ANALOG_VALUE	R
Object_List	device, network-port 1, 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		

Network Port Object 1

Property	Remark / Value	RW
Object_Type	NETWORK_PORT (56)	R
Object_Identifier	network-port, instance 1	R
Object_Name	max. 42 Bytes, default "MS/TP-Port"	RW-

		E
Property_List		R
Description	max. 84 Bytes, default ""	RW-E
Network_Number	0 (unknown)	R
Network_Number_Quality	UNKNOWN (0)	R
Changes_Pending	FALSE (0) / TRUE (1) see footnote *1	R
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE:0	R
Reliability	NO_FAULT_DETECTED (0)	R
Out_Of_Service	FALSE (0)	R
Protocol_Level	BACNET_APPLICATION (2)	R
Network_Type	MSTP (2)	R
MAC_Address	Network address from hexadecimal switches (0...249)	R
APDU_Length	480	R
Link_Speed	default 9600 *1	RW-E
Link_Speeds	9600, 19200, 38400, 57600, 76800, 115200	R
Max_Master	0...127, default 127 *1	RW-E
Max_Info_Frames	1...255, default 1 *1	RW-E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

*1 Writing stores values temporarily and sets property Changes_Pending to true. Changes are activated together by service Reinitialize-Device / Warmstart or Activate_Changes. Changes are discarded by service Reinitialize-Device / Coldstart or power-down.

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, 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 1: "Switch 0-1-2" 2: "Switch 1-0-2" 3: "Sunblind" 4: "Sunblind 2"	RW- E
Present_Value	Operating Mode of Multistate Output Object 1...2, default 1	RW- E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 values: 1 ... 16 default: Input 9, Switch 7, Command 4	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 values: 0 ... 655.34 seconds default: Short 0.5 sec, Long 60 sec, Rotation 1 sec, Key Press Time 2 sec	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 1: “Open” 2: “Close” 3: “Close/Rotate”	RW-E

	4: "Locked" 5: "Normal"	
Present_Value	Command to Multistate Output objects values: 1 ... 5, default: 5 1: Long pulse to open, lock inputs and switches 2: Long pulse to close, lock inputs and switches 3: Long pulse to close, then rotate pulse to open, lock inputs and switches 4: Lock inputs and switches 5: Normal operation of inputs and switches	RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 1: "Off", 2: "Stage-1/Open", 3: "Stage-2/Close"	RW-E
Present_Value	NULL (write only) / 1 / 2 / 3	RW

Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 = Switch A (Auto) 1 = Switch H (Hand) OUT_OF_SERVICE: 0 / 1	R
Event_State	NORMAL (0)	R
Out_Of_Service	FALSE (0) / TRUE (1), Output is switched Off when TRUE	RW
Number_Of_States	3	R
Priority_Array [16]	NULL / 1 / 2 / 3	R
Relinquish_Default	1	R
Current_Command_Priority		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 FAULT: 0 OVERRIDDEN: 0 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
Current_Command_Priority		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), writable if Out_Of_Service	R RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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

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, 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, 0: Watchdog is inactive, Maximum: 655.34 seconds	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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.

BACnet Protocol Implementation Conformance Statement

Date: 07.03.2025
Vendor Name: METZ CONNECT GmbH
Product Name: BMT-AO4
Product Model Number: 110 885 13 02
Application Software Version: 2.1
Firmware Revision: 2.2
BACnet Protocol Revision: 21

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 (Clause 9)
- Master Slave
 - Non-isolated transceiver Isolated transceiver
 - Local 47K ohms bias resistors None Other: _____
 - Transceiver unit loading: 1 1/2 1/4 1/8
 - Data rates: 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

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 object names can be restored by writing an empty string.

Gateway Options:

- None

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, 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	"2.2"	R
Application_Software_Version	"2.1"	R
Protocol_Version	1	R
Protocol_Revision	21	R
Protocol_Services_Supported	read-property, write-property, subscribe-cov,	R

	who-has, who-is, read-range, device-communication-control, reinitialize-device	
Protocol_Object_Types_Supported	DEVICE, NETWORK_PORT, ANALOG_OUTPUT, ANALOG_VALUE	R
Object_List	device, network-port 1, 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		

Network Port Object 1

Property	Remark / Value	RW
Object_Type	NETWORK_PORT (56)	R
Object_Identifier	network-port, instance 1	R
Object_Name	max. 42 Bytes, default "MS/TP-Port"	RW-E
Property_List		R
Description	max. 84 Bytes, default ""	RW-E
Network_Number	0 (unknown)	R
Network Number Quality	UNKNOWN (0)	R



Changes_Pending	FALSE (0) / TRUE (1) see footnote *1	R
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE: 0	R
Reliability	NO_FAULT_DETECTED (0)	R
Out_Of_Service	FALSE (0)	R
Protocol_Level	BACNET_APPLICATION (2)	R
Network_Type	MSTP (2)	R
MAC_Address	Network address from hexadecimal switches (0...249)	R
APDU_Length	480	R
Link_Speed	default 9600 *1	RW-E
Link_Speeds	9600, 19200, 38400, 57600, 76800, 115200	R
Max_Master	0...127, default 127 *1	RW-E
Max_Info_Frames	1...255, default 1 *1	RW-E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

*1 Writing stores values temporarily and sets property Changes_Pending to true. Changes are activated together by service Reinitialize-Device / Warmstart or Activate_Changes. Changes are discarded by service Reinitialize-Device / Coldstart or power-down.

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 % (0 ... 10.24 V)	RW
Status_Flags	IN_ALARM: 0	R

	FAULT: 0 OVERRIDDEN: 0 / 1 OUT_OF_SERVICE: 0 / 1	
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 % (0 ... 10.24 V)	R
Relinquish_Default	0.0 ... 102.4 % (0 ... 10.24 V)	RW-E
Current_Command_Priority		R
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, 0: Watchdog is inactive, Maximum: 655.34 seconds	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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.

BACnet Protocol Implementation Conformance Statement

Date: 07.03.2025
Vendor Name: METZ CONNECT GmbH
Product Name: BMT-AOP4
Product Model Number: 110 887 13 02
Application Software Version: 2.1
Firmware Revision: 2.2
BACnet Protocol Revision: 21

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 (Clause 9)
- Master Slave
 - Non-isolated transceiver Isolated transceiver
 - Local 47K ohms bias resistors None Other: _____
 - Transceiver unit loading: 1 1/2 1/4 1/8
 - Data rates: 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

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 object names can be restored by writing an empty string.

Gateway Options:

- None

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	"2.2"	R
Application_Software_Version	"2.1"	R
Protocol_Version	1	R
Protocol_Revision	21	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, NETWORK_PORT, ANALOG_OUTPUT, ANALOG_VALUE	R
Object_List	device, network-port 1, 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		

Network Port Object 1

Property	Remark / Value	RW
Object_Type	NETWORK_PORT (56)	R
Object_Identifier	network-port, instance 1	R
Object_Name	max. 42 Bytes, default "MS/TP-Port"	RW-E
Property_List		R
Description	max. 84 Bytes, default ""	RW-E
Network_Number	0 (unknown)	R



Network_Number_Quality	UNKNOWN (0)	R
Changes_Pending	FALSE (0) / TRUE (1) see footnote *1	R
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE:0	R
Reliability	NO_FAULT_DETECTED (0)	R
Out_Of_Service	FALSE (0)	R
Protocol_Level	BACNET_APPLICATION (2)	R
Network_Type	MSTP (2)	R
MAC_Address	Network address from hexadecimal switches (0...249)	R
APDU_Length	480	R
Link_Speed	default 9600 *1	RW-E
Link_Speeds	9600, 19200, 38400, 57600, 76800, 115200	R
Max_Master	0...127, default 127 *1	RW-E
Max_Info_Frames	1...255, default 1 *1	RW-E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

*1 Writing stores values temporarily and sets property Changes_Pending to true. Changes are activated together by service Reinitialize-Device / Warmstart or Activate_Changes. Changes are discarded by service Reinitialize-Device / Coldstart or power-down.

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 % (0 ... 10.24 V)	RW

Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 / 1 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 % (0 ... 10.24 V)	R
Relinquish_Default	0.0 ... 102.4 % (0 ... 10.24 V)	RW-E
Current_Command_Priority		R
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, 0: Watchdog is inactive, Maximum: 655.34 seconds	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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.

BACnet Protocol Implementation Conformance Statement

Date: 14.03.2025
Vendor Name: METZ CONNECT GmbH
Product Name: BMT-AOP2
Product Model Number: 110 887 13 03
Application Software Version: 2.0
Firmware Revision: 2.2
BACnet Protocol Revision: 21

Product Description:

BACnet MS/TP Application Specific Controller providing 2 Analog Outputs 0 – 10 V or 12V.

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 (Clause 9)
- Master Slave
 - Non-isolated transceiver Isolated transceiver
 - Local 47K ohms bias resistors None Other: _____
 - Transceiver unit loading: 1 1/2 1/4 1/8
 - Data rates: 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

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 object names can be restored by writing an empty string.

Gateway Options:

- None
-

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-AOP2_" + 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-AOP2"	R
Firmware_Revision	"2.2"	R
Application_Software_Version	"2.0"	R
Protocol_Version	1	R
Protocol_Revision	21	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, NETWORK_PORT, ANALOG_OUTPUT, ANALOG_VALUE, MULTISTATE_VALUE	R
Object_List	device, network-port 1, analog-output 1...2, analog-value 1, multistate-value 1...2	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. 5 Subscriptions, for analog-output 1...2, Confirmed / Unconfirmed, Lifetime = 0...65534 sec.	R
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

Network Port Object 1

Property	Remark / Value	RW
Object_Type	NETWORK_PORT (56)	R
Object_Identifier	network-port, instance 1	R
Object_Name	max. 42 Bytes, default "MS/TP-Port"	RW-E
Property_List		R
Description	max. 84 Bytes, default ""	RW-E



Network_Number	0 (unknown)	R
Network_Number_Quality	UNKNOWN (0)	R
Changes_Pending	FALSE (0) / TRUE (1) see footnote *1	R
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE: 0	R
Reliability	NO_FAULT_DETECTED (0)	R
Out_Of_Service	FALSE (0)	R
Protocol_Level	BACNET_APPLICATION (2)	R
Network_Type	MSTP (2)	R
MAC_Address	Network address from hexadecimal switches (0...249)	R
APDU_Length	480	R
Link_Speed	default 9600 *1	RW-E
Link_Speeds	9600, 19200, 38400, 57600, 76800, 115200	R
Max_Master	0...127, default 127 *1	RW-E
Max_Info_Frames	1...255, default 1 *1	RW-E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

*1 Writing stores values temporarily and sets property Changes_Pending to true. Changes are activated together by service Reinitialize-Device / Warmstart or Activate_Changes. Changes are discarded by service Reinitialize-Device / Coldstart or power-down.

Analog Output Object 1 ... 2

Property	Remark / Value	RW
Object_Type	ANALOG_OUTPUT (1)	R
Object_Identifier	analog-output, instance 1 ... 2	R
Object_Name	max. 42 Bytes, default "Output 1" ... "Output 2"	RW-E
Property_List		R
Description	max. 84 Bytes, default ""	RW-E



Present_Value	0.0 ... 102.4 %	RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 / 1 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 %	R
Relinquish_Default	0.0 ... 102.4 %	RW-E
Current_Command_Priority		R
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	0.73 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	OVERRIDEN	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.

10V Mode: 100 % corresponds to 10 V. The output voltage is limited to 10.24 V.
Below 0.7 V the output is switched to 0 V (max. 1.7 V adjustable with trim pot).

12V Mode: 100 % corresponds to 12 V. The output voltage is limited to 11.4 V.
12 V can only be reached by using a pullup resistor.
Below 0.7 V the output is switched to 0 V (max. 1.7 V adjustable with trim pot).

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, 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 1: "10V Mode" 2: "12V Mode"	R
Present_Value	Operating Mode of Analog Output 1...2, default 1	RW- E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 "10V Mode"

100 % corresponds to 10 V. The output voltage is limited to 10.24 V.
The value can be controlled via percentage in Analog Output Object 1...2.

Operating Mode “12V Mode”

100 % corresponds to 12 V. The output voltage is limited to 11.4 V.

12 V can only be reached by using a pullup resistor.

The value can be controlled via percentage in Analog Output Object 1...2.

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, 0: Watchdog is inactive, Maximum: 655.34 seconds	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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.

BACnet Protocol Implementation Conformance Statement

Date: 17.03.2025
Vendor Name: METZ CONNECT GmbH
Product Name: BMT-AI8
Product Model Number: 110 882 13
Application Software Version: 2.2
Firmware Revision: 2.2
BACnet Protocol Revision: 21

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 (Clause 9)
- Master Slave
 - Non-isolated transceiver Isolated transceiver
 - Local 47K ohms bias resistors None Other: _____
 - Transceiver unit loading: 1 1/2 1/4 1/8
 - Data rates: 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

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 object names can be restored by writing an empty string.

Gateway Options:

- None

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	"2.2"	R
Application_Software_Version	"2.2"	R
Protocol_Version	1	R
Protocol_Revision	21	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, NETWORK_PORT, ANALOG_INPUT, ANALOG_VALUE, MULTISTATE_VALUE, GROUP	R
Object_List	device, network-port 1, 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		

Network Port Object 1

Property	Remark / Value	RW
Object_Type	NETWORK_PORT (56)	R
Object_Identifier	network-port, instance 1	R
Object_Name	max. 42 Bytes, default "MS/TP-Port"	RW-E
Property_List		R
Description	max. 84 Bytes, default ""	RW-

		E
Network_Number	0 (unknown)	R
Network_Number_Quality	UNKNOWN (0)	R
Changes_Pending	FALSE (0) / TRUE (1) see footnote *1	R
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE:0	R
Reliability	NO_FAULT_DETECTED (0)	R
Out_Of_Service	FALSE (0)	R
Protocol_Level	BACNET_APPLICATION (2)	R
Network_Type	MSTP (2)	R
MAC_Address	Network address from hexadecimal switches (0...249)	R
APDU_Length	480	R
Link_Speed	default 9600 *1	RW-E
Link_Speeds	9600, 19200, 38400, 57600, 76800, 115200	R
Max_Master	0...127, default 127 *1	RW-E
Max_Info_Frames	1...255, default 1 *1	RW-E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

*1 Writing stores values temporarily and sets property Changes_Pending to true. Changes are activated together by service Reinitialize-Device / Warmstart or Activate_Changes. Changes are discarded by service Reinitialize-Device / Coldstart or power-down.

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, selected State_Text of Multistate Value 1...8	R
Present_Value	Measured value, measurement range is defined in Multistate Value 1...8, added offset is defined in Analog Value 21...28, writable if Out_Of_Service	R RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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, writable if temperature sensor was selected, written unit (°C or °F) affects all temperature sensor inputs	R 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
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 FAULT: 0 OVERRIDDEN: 0 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 "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 <ul style="list-style-type: none"> - Voltage (% , Volt) - Voltage, pullup resistor 2kOhm to 5V (% PU, Volt PU) - Resistance (Ohm) - User defined sensor - Standard temperature sensors 	RW-E

Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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) or degrees-Fahrenheit (64)
8	"PT500"	degrees-Celsius (62) or degrees-Fahrenheit (64)
9	"PT1000"	degrees-Celsius (62) or degrees-Fahrenheit (64)
10	"NI1000-TC5000"	degrees-Celsius (62) or degrees-Fahrenheit (64)
11	"NI1000-TC6180"	degrees-Celsius (62) or degrees-Fahrenheit (64)
12	"BALCO500"	degrees-Celsius (62) or degrees-Fahrenheit (64)
13	"KTY81_110"	degrees-Celsius (62) or degrees-Fahrenheit (64)
14	"KTY81_210"	degrees-Celsius (62) or degrees-Fahrenheit (64)
15	"NTC1k8-Thermokon"	degrees-Celsius (62) or degrees-Fahrenheit (64)
16	"NTC5k-Thermokon"	degrees-Celsius (62) or degrees-Fahrenheit (64)
17	"NTC10k-Thermokon"	degrees-Celsius (62) or degrees-Fahrenheit (64)
18	"NTC20k-Thermokon"	degrees-Celsius (62) or degrees-Fahrenheit (64)
19	"LM235Z"	degrees-Celsius (62) or degrees-Fahrenheit (64)
20	"NTC10k-Carel"	degrees-Celsius (62) or degrees-Fahrenheit (64)
21	"NTC5k-Schneider"	degrees-Celsius (62) or degrees-Fahrenheit (64)
22	"NTC30k-Schneider"	degrees-Celsius (62) or degrees-Fahrenheit (64)
23	"KP250"	degrees-Celsius (62) or degrees-Fahrenheit (64)
24	"Poti 10k %"	percent (98)

If a standard temperature sensor is selected, the temperature unit °C or °F may be selected by writing to property Units of the Analog Input object. Then all inputs with standard temperature sensors are affected together. Value tables for these sensors are given at the end.

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 entry in User Defined measurement range, default 0.0	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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	Example	Instance	Name	Example
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 above Interpolation Table provides an example for PT1000 temperature sensors. In the example X values are temperature in °C, Y values are resistance in Ohms. The table is filled from the beginning, at least 2, at most 10 pairs of values. The table ends where both values are 0.0, if there are less than 10 pairs of values. X and Y values must be sorted in ascending or descending order. 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 - Voltage (Volt) - Voltage, pullup resistor 2kOhm to 5V (Volt P) - Resistance (Ohm) and usage of interpolation table - approximately linear sensor (e.g. PT1000) - approximately exponential sensor (e.g. NTC) default 3 (Ohm lin, for many temperature sensors)	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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, 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 TC3850	PT500 TC3850	PT1000 TC3850	NI1000 TC5000	NI1000 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 -110	KTY81 -210	NTC1k8 Thermokon	NTC5k Thermokon	NTC10k Thermokon	NTC20k Thermokon	NTC10k Carel	NTC5k Schneider	NTC30k 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

BACnet Protocol Implementation Conformance Statement

Date: 05.03.2025
Vendor Name: METZ CONNECT GmbH
Product Name: BMT-CI4
Product Model Number: 110 890 13 32
Application Software Version: 2.1
Firmware Revision: 2.2
BACnet Protocol Revision: 21

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 (Clause 9)
- Master Slave
 - Non-isolated transceiver Isolated transceiver
 - Local 47K ohms bias resistors None Other: _____
 - Transceiver unit loading: 1 1/2 1/4 1/8
 - Data rates: 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

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 object names can be restored by writing an empty string.

Gateway Options:

- None

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	"2.2"	R
Application_Software_Version	"2.1"	R
Protocol_Version	1	R
Protocol_Revision	21	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, NETWORK_PORT, ANALOG_INPUT, ANALOG_VALUE, GROUP	R
Object_List	device, network-port 1, analog-input 1...4, analog-value 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 analog input1...4, Confirmed / Unconfirmed, Lifetime = 0...65534 sec.	R
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

Network Port Object 1

Property	Remark / Value	RW
Object_Type	NETWORK_PORT (56)	R
Object_Identifier	network-port, instance 1	R
Object_Name	max. 42 Bytes, default "MS/TP-Port"	RW-E
Property_List		R

Description	max. 84 Bytes, default ""	RW-E
Network_Number	0 (unknown)	R
Network_Number_Quality	UNKNOWN (0)	R
Changes_Pending	FALSE (0) / TRUE (1) see footnote *1	R
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE:0	R
Reliability	NO_FAULT_DETECTED (0)	R
Out_Of_Service	FALSE (0)	R
Protocol_Level	BACNET_APPLICATION (2)	R
Network_Type	MSTP (2)	R
MAC_Address	Network address from hexadecimal switches (0...249)	R
APDU_Length	480	R
Link_Speed	default 9600 *1	RW-E
Link_Speeds	9600, 19200, 38400, 57600, 76800, 115200	R
Max_Master	0...127, default 127 *1	RW-E
Max_Info_Frames	1...255, default 1 *1	RW-E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

*1 Writing stores values temporarily and sets property Changes_Pending to true. Changes are activated together by service Reinitialize-Device / Warmstart or Activate_Changes. Changes are discarded by service Reinitialize-Device / Coldstart or power-down.

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, added offset is defined in Analog Value 1...4, writable if Out_Of_Service	R RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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, default 1.0, 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 Switch	1 / 3 / 5 / 7	OFF	ON	OFF	ON
DIP Switch	2 / 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

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 FAULT: 0 OVERRIDDEN: 0 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

BACnet Protocol Implementation Conformance Statement

Date: 18.12.2024
Vendor Name: METZ CONNECT GmbH
Product Name: BMT-Multi-IO
Product Model Number: 110 893 13
Application Software Version: 2.2
Firmware Revision: 2.2
BACnet Protocol Revision: 21

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 (Clause 9)
- Master Slave
 - Non-isolated transceiver Isolated transceiver
 - Local 47K ohms bias resistors None Other: _____
 - Transceiver unit loading: 1 1/2 1/4 1/8
 - Data rates: 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

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 object names can be restored by writing an empty string.

Gateway Options:

- None



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	"2.2"	R
Application_Software_Version	"2.2"	R
Protocol_Version	1	R
Protocol_Revision	21	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, NETWORK_PORT, BINARY_INPUT, BINARY_OUTPUT, ANALOG_INPUT, ANALOG_OUTPUT, ANALOG_VALUE, MULTISTATE_VALUE, ACCUMULATOR, STRUCTURED_VIEW	R
Object_List	device, network-port 1, 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		

Network Port Object 1

Property	Remark / Value	RW
Object_Type	NETWORK_PORT (56)	R
Object_Identifier	network-port, instance 1	R
Object_Name	max. 42 Bytes, default "MS/TP-Port"	RW-E
Property_List		R
Description	max. 84 Bytes, default ""	RW-E
Network_Number	0 (unknown)	R
Network_Number_Quality	UNKNOWN (0)	R
Changes_Pending	FALSE (0) / TRUE (1) see footnote *1	R
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE: 0	R
Reliability	NO_FAULT_DETECTED (0)	R
Out_Of_Service	FALSE (0)	R
Protocol_Level	BACNET_APPLICATION (2)	R
Network_Type	MSTP (2)	R
MAC_Address	Network address from hexadecimal switches (0...249)	R
APDU_Length	480	R
Link_Speed	default 9600 *1	RW-E
Link_Speeds	9600, 19200, 38400, 57600, 76800, 115200	R
Max_Master	0...127, default 127 *1	RW-E
Max_Info_Frames	1...255, default 1 *1	RW-E

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

*1 Writing stores values temporarily and sets property Changes_Pending to true. Changes are activated together by service Reinitialize-Device / Warmstart or Activate_Changes. Changes are discarded by service Reinitialize-Device / Coldstart or power-down.

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 device network-port 1 accumulator 1
2	"Digital-In"	COLLECTION (8)	binary-input 1...12
3	"Analog-In"	COLLECTION (8)	analog-input 1...7 analog-value 1...27 multistate-value 1...8
4	"Outputs"	COLLECTION (8)	binary-output 1...8 analog-output 1...2 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 "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 FAULT: 0 OVERRIDDEN: 0 / 1 = Auto / Hand mode 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
Current_Command_Priority		R
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

Function Table for Binary Output							
Out_Of _Service	Polarit y	mode key	Priority_Array and Relinquish_Defau lt	Present_ Value	Binary Output	OVER RIDDEN	OUT_O F_ SERVIC E
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	0 / 1	0	0	1	0
		Hand 1	0 / 1	1	1		
0	1	Hand 0	0 / 1	1	0	1	0
		Hand 1	0 / 1	0	1		
1	0	Hand 0	0 / 1	0 / 1	0	0	1
		Hand 1	0 / 1	0 / 1	1		
1	1	Hand 0	0 / 1	0 / 1	0	0	1
		Hand 1	0 / 1	0 / 1	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 "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), writable if Out_Of_Service	R RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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	0	0



		1	1	
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

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 writable if Out_Of_Service (pulse counter remains unchanged) value range is 0 ... Max_Pres_Value value is set modulo (Max_Pres_Value + 1)	R-E RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 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, 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, Special value 0: Watchdog is inactive	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 "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 FAULT: 0 OVERRIDDEN: 0 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
Current_Command_Priority		R
COV_Increment	Minimum change of Present_Value for COV notification, default 1.0, 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 “Analog Input E1” ... “Analog Input E6”, “Analog Input I”	RW-E
Property_List		R
Description	max. 84 bytes, default “”	RW-E
Device_Type	measurement range of input, selected State_Text of Multistate Value 1...7	R
Present_Value	Measured value, measurement range is defined in Multistate Value 1...7, added offset is defined in Analog Value 21...27, writable if Out_Of_Service	R RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0	R

	OUT_OF_SERVICE: 0 / 1	
Event_State	NORMAL (0)	R
Out_Of_Service	FALSE (0) / TRUE (1)	RW
Units	Defined in Multistate Value 1...7, writable if temperature sensor was selected, written unit (°C or °F) affects all temperature sensor inputs	R 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
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 FAULT: 0 OVERRIDDEN: 0 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 <ul style="list-style-type: none"> - Voltage (% , Volt) - Voltage, pullup resistor 2kOhm to 5V (% PU, Volt PU) - Resistance (Ohm) - User defined sensor - Standard temperature sensors - Current (% , mA) 	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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) or degrees-Fahrenheit (64)
8	"PT500"	degrees-Celsius (62) or degrees-Fahrenheit (64)
9	"PT1000"	degrees-Celsius (62) or degrees-Fahrenheit (64)
10	"NI1000-TC5000"	degrees-Celsius (62) or degrees-Fahrenheit (64)
11	"NI1000-TC6180"	degrees-Celsius (62) or degrees-Fahrenheit (64)
12	"BALCO500"	degrees-Celsius (62) or degrees-Fahrenheit (64)
13	"KTY81_110"	degrees-Celsius (62) or degrees-Fahrenheit (64)
14	"KTY81_210"	degrees-Celsius (62) or degrees-Fahrenheit (64)
15	"NTC1k8-T"	degrees-Celsius (62) or degrees-Fahrenheit (64)
16	"NTC5k-T"	degrees-Celsius (62) or degrees-Fahrenheit (64)
17	"NTC10k-T"	degrees-Celsius (62) or degrees-Fahrenheit (64)
18	"NTC20k-T"	degrees-Celsius (62) or degrees-Fahrenheit (64)
19	"LM235Z"	degrees-Celsius (62) or degrees-Fahrenheit (64)
20	"NTC10k-C"	degrees-Celsius (62) or degrees-Fahrenheit (64)
21	"NTC5k-S"	degrees-Celsius (62) or degrees-Fahrenheit (64)
22	"NTC30k-S"	degrees-Celsius (62) or degrees-Fahrenheit (64)
23	"KP250"	degrees-Celsius (62) or degrees-Fahrenheit (64)
24	"Poti 10k %"	percent (98)

If a standard temperature sensor is selected, the temperature unit °C or °F may be selected by writing to property Units of the Analog Input object. Then all inputs with standard temperature sensors are affected together. Value tables for these sensors are given at the end.

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 entry in User Defined measurement range, default 0.0	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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	Example	Instance	Name	Example
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 above Interpolation Table provides an example for PT1000 temperature sensors. In the example X values are temperature in °C, Y values are resistance in Ohms. The table is filled from the beginning, at least 2, at most 10 pairs of values. The table ends where both values are 0.0, if there are less than 10 pairs of values. X and Y values must be sorted in ascending or descending order. 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"> - Voltage (Volt) - Voltage, pullup resistor 2kOhm to 5V (Volt P) - Resistance (Ohm) and usage of interpolation table <ul style="list-style-type: none"> - approximately linear sensor (e.g. PT1000) - approximately exponential sensor (e.g. NTC) default 3 (Ohm lin, for many temperature sensors)	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 TC3850	PT500 TC3850	PT1000 TC3850	NI1000 TC5000	NI1000 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 -110	KTY81 -210	NTC1k8 Thermokon	NTC5k Thermokon	NTC10k Thermokon	NTC20k Thermokon	NTC10k Carel	NTC5k Schneider	NTC30k 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

BACnet Protocol Implementation Conformance Statement

Date: 24.04.2025
Vendor Name: METZ CONNECT GmbH
Product Name: MB-DIO2/1 IP65 24V MB-DIO2/1 IP65 230V
Product Model Number: 110 811 13 26 IP 110 811 05 26 IP
Application Software Version: 2.0
Firmware Revision: 2.2
BACnet Protocol Revision: 21

Product Description:

BACnet MS/TP Application Specific Controller providing 2 Digital Inputs and 1 Relay Output. Operating modes for fire dampers are supported. There are two variants with operating voltage of 24V and 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 (Clause 9)
- Master Slave
 - Non-isolated transceiver Isolated transceiver
 - Local 47K ohms bias resistors None Other: _____
 - Transceiver unit loading: 1 1/2 1/4 1/8
 - Data rates: 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

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 object names can be restored by writing an empty string.

Gateway Options:

- None



Configuration Switches

Hexadecimal switches x10, x1 define the network address (0x00 – 0xEF), bus mode BACnet-MS/TP or Modbus-RTU, parity and baud rate (0xF0 – 0xFF).

Switches	FA	FB	FC	FD
Bus	BACnet		Modbus	Modbus
Parity	-	even	odd	none

Switches	F1	F2	F3	F4	F5	F6	F7	F8
BACnet baud rate	9600	19200	38400	57600	76800	115200	(9600)	(9600)
Modbus baud rate	1200	2400	4800	9600	19200	38400	57600	115200

Switches set to F0, F9, FE or FF keep the device inactive, the red LED is on.
A switch setting only applies one second after its rotation has stopped.
Factory defaults are Modbus, parity even, Modbus baud rate 19200, BACnet baud rate 9600.

- Turn switch x10 to E (device is temporarily configured as slave)
- Turn switch x1 to A – D to select bus mode and parity
- Turn switch x10 to F, wait 1 second
- Red and green LEDs are blinking when bus mode and parity have been stored in EEPROM

- Turn switch x10 to E (device is temporarily configured as slave)
- Turn switch x1 to 1 – 8 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 0 – E to select network address
- Turn switch x1 to 0 – F 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 ... 0xEF 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	RW-

	“MB-DIO2/1_” + Network-Address (Hexadecimal)	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	“MB-DIO2/1”	R
Firmware_Revision	“2.2”	R
Application_Software_Version	“2.0”	R
Protocol_Version	1	R
Protocol_Revision	21	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, NETWORK_PORT, BINARY_OUTPUT, BINARY_INPUT, GROUP, ANALOG_VALUE, MULTISTATE_VALUE	R
Object_List	device, network-port 1, binary-output 1, binary- input 1...2, group 1, analog-value 1,2,4,6, multistate-value 1,3,5,7,9 (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,	R

	max. 6 Subscriptions, for binary-input / binary-output / multistate- value, Confirmed / Unconfirmed, Lifetime = 0...65535 sec.	
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

Network Port Object 1

Property	Remark / Value	RW
Object_Type	NETWORK_PORT (56)	R
Object_Identifier	network-port, instance 1	R
Object_Name	max. 42 Bytes, default "MS/TP-Port"	RW- E
Property_List		R
Description	max. 84 Bytes, default ""	RW- E
Network_Number	0 (unknown)	R
Network_Number_Quality	UNKNOWN (0)	R
Changes_Pending	FALSE (0) / TRUE (1) see footnote *1	R
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE:0	R
Reliability	NO_FAULT_DETECTED (0)	R
Out_Of_Service	FALSE (0)	R
Protocol_Level	BACNET_APPLICATION (2)	R
Network_Type	MSTP (2)	R
MAC_Address	Network address from hexadecimal switches (0...239)	R
APDU_Length	480	R
Link_Speed	default 9600 *1	RW- E
Link_Speeds	9600, 19200, 38400, 57600, 76800, 115200	R
Max_Master	0...127, default 127 *1	RW- E
Max_Info_Frames	1...255, default 1 *1	RW- E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

*1 Writing stores values temporarily and sets property Changes_Pending to true. Changes are activated together by service Reinitialize-Device / Warmstart or Activate_Changes. Changes are discarded by service Reinitialize-Device / Coldstart or power-down.

Binary Output Object 1

Terminal 0V = voltage 0V for motor Terminal N = voltage N for motor
Terminal M = voltage 24V over relay contact NO Terminal M = voltage L over relay contact NO
Terminal M/ = voltage 24V over relay contact NC Terminal M/ = voltage L over relay contact NC

Property	Remark / Value	RW
Object_Type	BINARY_OUTPUT (4)	R
Object_Identifier	binary-output, instance 1	R
Object_Name	max. 42 Bytes, default "Relay"	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 FAULT: 0 OVERRIDDEN: 0 = Switch A (Auto) 1 = Switch 0 (Off) or 1 (On) 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
Current_Command_Priority		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 1	0 / 1 0 / 1	0 1	0 1	1	0
0	1	A	0 / 1	0 / 1	1 / 0	0	0
0	1	0 1	0 / 1 0 / 1	1 0	0 1	1	0
1	0	A	0 / 1	0 / 1	0	0	1
1	0	0 1	0 / 1 0 / 1	0 / 1 0 / 1	0 1	0	1
1	1	A	0 / 1	0 / 1	1	0	1
1	1	0 1	0 / 1 0 / 1	0 / 1 0 / 1	0 1	0	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...2

Terminal S6 = input 1, Terminal S2 = input 2, Terminals S4 = S1 = common.
Connect switches between inputs and common ground.

Property	Remark / Value	RW
Object_Type	BINARY_INPUT (3)	R
Object_Identifier	binary-input, instance 1 ... 2	R
Object_Name	max. 42 bytes, default "Input 1" ... "Input 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	INACTIVE (0) / ACTIVE (1), writable if Out_Of_Service	R RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 Motorized_SafetyOpen, Motorized_SafetyClose, Motor_SafetyOpen_2, Motor_SafetyClose_2, LimitSwitch_Open_Close (contact closed at each limit)	Limit switch	Operating modes LimitSwitch_Open (contact closed at open limit), LimitSwitch_Close (contact open at closed limit)
1	open	Damper open	open / close	Damper
2	close	Damper closed	open a / close a	Damper a

Group Object 1

Property	Remark / Value	RW
Object_Type	GROUP (11)	R
Object_Identifier	group, instance 1	R
Object_Name	max. 42 bytes, default "Group"	RW-E
Property_List		R
Description	max. 84 bytes, default ""	RW-E
Present_Value	Present_Value of Binary Inputs 1...2	R
List_Of_Group_Members	Binary Inputs 1...2	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, Special value 0: Watchdog is inactive	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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

Property	Remark / Value	RW
Object_Type	MULTISTATE_VALUE (19)	R
Object_Identifier	multistate-value, instance 1	R
Object_Name	max. 42 Bytes, default "OperMode"	RW-E
Property_List		R
Description	max. 84 bytes, default ""	RW-E
State_Text	max. 31 Bytes, default 1: "Direct_Control" 2: "Motorized_SafetyOpen" 3: "Motorized_SafetyClose" 4: "LimitSwitch_Open_Close" 5: "LimitSwitch_Open" 6: "LimitSwitch_Close" 7: "Motor_SafetyOpen_2" 8: "Motor_SafetyClose_2"	RW-E

Present_Value	Operating mode of Inputs 1...2 and Output 1, values 1...8, default 1	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE:0	R
Event_State	NORMAL (0)	R
Out_Of_Service	FALSE (0)	R
Number_Of_States	8	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” and “Motor_SafetyOpen_2”

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 positions are monitored. For differences between these modes see the last chapter.

Mode “Motorized_SafetyClose” and “Motor_SafetyClose_2”

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 positions are monitored. For differences between these modes see the last chapter.

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, 4, 6

Property	Remark / Value	RW
Object_Type	ANALOG_VALUE (2)	R
Object_Identifier	analog-value, instance 2, 4, 6	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 FAULT: 0 OVERRIDDEN: 0 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 default	Present_Value default
2	"DriveTime"	240.0
4	"TurnOffTime"	35.0
6	"RcvHeartBeat"	0.0

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

With DriveTime the opening time of the fire damper may be monitored.

With TurnOffTime the closing time of the fire damper 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 signaled.

With RcvHeartBeat the time between writing Present_Value of object ActuDrive 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 signaled.

Multistate Value Object 3, 5, 7

Property	Remark / Value	RW
Object_Type	MULTISTATE_VALUE (19)	R
Object_Identifier	multistate-value, instance 3, 5, 7	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 1: "open" 2: "close" 3: "running" (only instance 5)	RW-E
Present_Value	see table below	
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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...2 RW	2
5	"ActuPos"	1...3 R	3
7	"ActuPos_a"	1...2 R	2

These Multistate-Values exist depending on operating modes:



Multistate-Value 3 exists for motorized fire dampers.
 Multistate-Value 5 exists for all fire dampers.
 Multistate-Value 7 exists for mechanical fire dampers with only one limit switch.

With ActuDrive the intended position of the fire damper is controlled over the network.
 After a reset Present_Value is the normal position.

ActuPos decodes the fire damper position signaled by its limit switches.
 If both switches were activated at once, Present_Value is set to running and the alarm Manipulation is signaled.

In operating modes LimitSwitch_Open, LimitSwitch_Close two dampers may be monitored.
 Then ActuPos decodes the first fire damper position signaled by its limit switch and ActuPos_a decodes the second fire damper position signaled by its limit switch.

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 "AlarmCode"	RW-E
Property_List		R
Description	max. 84 bytes, default ""	RW-E
State_Text	max. 31 Bytes, default 1: "OK" 2: "Runtime_Error" 3: "Manipulation" 4: "Update_Error" 5: "Alarm" 6: "Alarm_a"	RW-E
Present_Value	see table below, default 1	RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 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 signaled.

Fire-Position

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

Operating mode	Fire-Position if
Motorized_SafetyClose, Motor_SafetyClose_2	damper not open
Motorized_SafetyOpen, Motor_SafetyOpen_2	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 signaled, then Alarm or Alarm_a is signaled.

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.

In motorized fire dampers there is this difference in intentionally controlling with register ActuDrive to the safe position and back to the normal one:

Operating modes Motorized_...: The fire position is reported as an alarm.

Operating modes Motor_...: The fire position is not reported as an alarm.

Operating Modes for Motorized Fire Dampers

Operating mode Motorized_SafetyClose

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

other	ActuDrive	AlarmCode	Relay
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

When controlled via ActuDrive, the first and second lines apply.
The Fire-Position (ActuPos = close, running) is then reported as Alarm.

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

Operating mode Motor_SafetyClose_2

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

other	ActuDrive	AlarmCode	Relay
Alarm-Reset	open (1)	OK (1)	On
Fire-Position	open (1)	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

When controlled via ActuDriVe, the first and last lines apply.
The Fire-Position (ActuPos = close, running) is then not reported as Alarm.

Initialization after power-on / reset: ActuDriVe is set 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 and AlarmCode the Relay is switched as follows (evaluation top down):

other	ActuDriVe	AlarmCode	Relay
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
	close (2)	OK (1)	Off
	open (1)	OK (1)	On

When controlled via ActuDriVe, the first and second lines apply.
The Fire-Position (ActuPos = close, running) is then reported as Alarm.

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

Operating mode Motor_SafetyOpen_2

Depending on Alarm-Reset, Fire-Position, ActuDriVe and AlarmCode the Relay is switched as follows (evaluation top down):

other	ActuDriVe	AlarmCode	Relay
Alarm-Reset	close (2)	OK (1)	Off
Fire-Position	close (2)	any	On
-	any	Runtime_Error (2)	On
	any	Update_Error (4)	On
	any	Manipulation (3)	Off
	close (2)	OK (1)	Off
	open (1)	OK (1)	On

When controlled via ActuDriVe, the first and last lines apply.
The Fire-Position (ActuPos = close, running) is then not reported as Alarm.

Initialization after power-on / reset: ActuDriVe is set to close. AlarmCode is set to OK.

The Alarm-Reset starts, to stop latching the safe position caused by Fire-Position.



BACnet Protocol Implementation Conformance Statement

Date: 24.04.2025
Vendor Name: METZ CONNECT GmbH
Product Name: MB-DIO4/2 IP65 24V MB-DIO4/2 IP65 230V
Product Model Number: 110 812 13 26 IP 110 812 05 26 IP
Application Software Version: 2.0
Firmware Revision: 2.2
BACnet Protocol Revision: 21

Product Description:

BACnet MS/TP Application Specific Controller providing 4 Digital Inputs and 2 Relay Outputs.

Operating modes for fire dampers are supported.

There are two variants with operating voltage of 24V and 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 (Clause 9)
- Master Slave
 - Non-isolated transceiver Isolated transceiver
 - Local 47K ohms bias resistors None Other: _____
 - Transceiver unit loading: 1 1/2 1/4 1/8
 - Data rates: 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

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 object names can be restored by writing an empty string.

Gateway Options:

- None

Configuration Switches

Hexadecimal switches x10, x1 define the network address (0x00 – 0xEF), bus mode BACnet-MS/TP or Modbus-RTU, parity and baud rate (0xF0 – 0xFF).

Switches	FA	FB	FC	FD
Bus	BACnet		Modbus	Modbus
Modbus				
Parity	-	even	odd	none

Switches	F1	F2	F3	F4	F5	F6	F7	F8
BACnet baud rate	9600	19200	38400	57600	76800	115200	(9600)	(9600)
Modbus baud rate	1200	2400	4800	9600	19200	38400	57600	115200

Switches set to F0, F9, FE or FF keep the device inactive, the red LED is on.

A switch setting only applies one second after its rotation has stopped.

Factory defaults are Modbus, parity even, Modbus baud rate 19200, BACnet baud rate 9600.

- Turn switch x10 to E (device is temporarily configured as slave)
- Turn switch x1 to A – D to select bus mode and parity
- Turn switch x10 to F, wait 1 second
- Red and green LEDs are blinking when bus mode and parity have been stored in EEPROM

- Turn switch x10 to E (device is temporarily configured as slave)
- Turn switch x1 to 1 – 8 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 0 – E to select network address
- Turn switch x1 to 0 – F 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 ... 0xEF 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 “MB-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	“MB-DIO4/2”	R
Firmware_Revision	“2.2”	R
Application_Software_Version	“2.0”	R
Protocol_Version	1	R
Protocol_Revision	21	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, NETWORK_PORT, BINARY_OUTPUT, BINARY_INPUT, GROUP, ANALOG_VALUE, MULTISTATE_VALUE	R
Object_List	device, network-port 1, binary-output 1...2, binary-input 1...4, group 1, 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		

Network Port Object 1

Property	Remark / Value	RW
Object_Type	NETWORK_PORT (56)	R
Object_Identifier	network-port, instance 1	R
Object_Name	max. 42 Bytes, default "MS/TP-Port"	RW-E
Property_List		R
Description	max. 84 Bytes, default ""	RW-E
Network_Number	0 (unknown)	R
Network_Number_Quality	UNKNOWN (0)	R
Changes_Pending	FALSE (0) / TRUE (1) see footnote *1	R
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE:0	R
Reliability	NO_FAULT_DETECTED (0)	R
Out_Of_Service	FALSE (0)	R
Protocol_Level	BACNET_APPLICATION (2)	R
Network_Type	MSTP (2)	R
MAC_Address	Network address from hexadecimal switches	R

	(0...239)	
APDU_Length	480	R
Link_Speed	default 9600	*1 RW-E
Link_Speeds	9600, 19200, 38400, 57600, 76800, 115200	R
Max_Master	0...127, default 127	*1 RW-E
Max_Info_Frames	1...255, default 1	*1 RW-E
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

*1 Writing stores values temporarily and sets property Changes_Pending to true. Changes are activated together by service Reinitialize-Device / Warmstart or Activate_Changes. Changes are discarded by service Reinitialize-Device / Coldstart or power-down.

Binary Output Object 1...2

Terminal 0V = voltage 0V for motor Terminal 0V = voltage N for motor
Terminal MOT = voltage 24V over relay contact NO Terminal MOT = voltage L over relay contact NO
Terminal MOT/ = voltage 24V over relay contact NC Terminal MOT/ = voltage L over relay contact NC

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 FAULT: 0 OVERRIDDEN: 0 = Switch A (Auto)	R

	1 = Switch 0 (Off) or 1 (On) OUT_OF_SERVICE: 0 / 1	
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
Current_Command_Priority		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

Terminal IN1 / S6 = input 1, Terminal IN1 / S2 = input 2, Terminals IN1 / S4 = S1 = common.
Terminal IN2 / S6 = input 3, Terminal IN2 / S2 = input 4, Terminals IN2 / S4 = S1 = common.
Connect switches between inputs and common ground.

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), writable if Out_Of_Service	R RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 Motorized_SafetyOpen, Motorized_SafetyClose, Motor_SafetyOpen_2, Motor_SafetyClose_2, LimitSwitch_Open_Close (contact closed at each limit)	Limit switch	Operating modes LimitSwitch_Open (contact closed at open limit), LimitSwitch_Close (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

Property	Remark / Value	RW
Object_Type	GROUP (11)	R
Object_Identifier	group, instance 1	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 1...4	R
List_Of_Group_Members	Binary Inputs 1...4	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, Special value 0: Watchdog is inactive	RW-E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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, default "OperMode_1" ... "OperMode_2"	RW- E
Property_List		R
Description	max. 84 bytes, default ""	RW- E
State_Text	max. 31 Bytes, default 1: "Direct_Control" 2: "Motorized_SafetyOpen" 3: "Motorized_SafetyClose" 4: "LimitSwitch_Open_Close" 5: "LimitSwitch_Open" 6: "LimitSwitch_Close" 7: "Motor_SafetyOpen_2" 8: "Motor_SafetyClose_2"	RW- E
Present_Value	Operating mode of Inputs 1...2 and Output 1, Operating mode of Inputs 3...4 and Output 2, values 1...8, default 1	RW- E
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 OUT_OF_SERVICE:0	R
Event_State	NORMAL (0)	R
Out_Of_Service	FALSE (0)	R
Number_Of_States	8	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" and "Motor_SafetyOpen_2"

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 positions are monitored.

For differences between these modes see the last chapter.

Mode “Motorized_SafetyClose” and “Motor_SafetyClose_2”

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 positions are monitored. For differences between these modes see the last chapter.

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 FAULT: 0 OVERRIDDEN: 0 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 default	Present_Value 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 signaled.

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 signaled.

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 1: "open" 2: "close" 3: "running" (only instance 5...6)	RW-E
Present_Value	see table below	
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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 signaled by its limit switches.

If both switches were activated at once, Present_Value is set to running and the alarm Manipulation is signaled.

In operating modes LimitSwitch_Open, LimitSwitch_Close two dampers may be monitored.
Then ActuPos_1/2 decodes the first fire damper position signaled by its limit switch
and ActuPos_1a/2a decodes the second fire damper position signaled 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, default "AlarmCode_1" ... "AlarmCode_2"	RW-E
Property_List		R
Description	max. 84 bytes, default ""	RW-E
State_Text	max. 31 Bytes, default 1: "OK" 2: "Runtime_Error" 3: "Manipulation" 4: "Update_Error" 5: "Alarm" 6: "Alarm_a"	RW-E
Present_Value	see table below, default 1	RW
Status_Flags	IN_ALARM: 0 FAULT: 0 OVERRIDDEN: 0 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,

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 signaled.

Fire-Position

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

Operating mode	Fire-Position if
Motorized_SafetyClose, Motor_SafetyClose_2	damper not open
Motorized_SafetyOpen, Motor_SafetyOpen_2	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 signaled, then Alarm or Alarm_a is signaled.

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.

In motorized fire dampers there is this difference in intentionally controlling with register ActuDrive to the safe position and back to the normal one:

Operating modes Motorized_...: The fire position is reported as an alarm.

Operating modes Motor_...: The fire position is not reported as an alarm.

Operating Modes for Motorized Fire Dampers

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

When controlled via ActuDrive, the first and second lines apply.
The Fire-Position (ActuPos = close, running) is then reported as Alarm.

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

Operating mode Motor_SafetyClose_2

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	open (1)	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

When controlled via ActuDrive, the first and last lines apply.
The Fire-Position (ActuPos = close, running) is then not reported as Alarm.

Initialization after power-on / reset: ActuDrive is set 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
	close (2)	OK (1)	Off
	open (1)	OK (1)	On

When controlled via ActuDrive, the first and second lines apply.
The Fire-Position (ActuPos = close, running) is then reported as Alarm.

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

Operating mode Motor_SafetyOpen_2

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	close (2)	any	On
-	any	Runtime_Error (2)	On
	any	Update_Error (4)	On
	any	Manipulation (3)	Off
	close (2)	OK (1)	Off
	open (1)	OK (1)	On

When controlled via ActuDrive, the first and last lines apply.
The Fire-Position (ActuPos = close, running) is then not reported as Alarm.

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