

Software description Modbus RTU – BACnet MS-TP MB - Modulfamily

Summary

Description of the standard software of the MB modules:

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1. MB-DIO4/2-IP65 / MB-DIO2/1-IP65

1.1. General

The MB-DIO4/2 has 4 digital inputs and 2 relay outputs.
 The MB-DIO2/1 has 2 digital inputs and 1 relay output.
 There are variants for the operating voltages 24V and 230V.

Both have operating modes for controlling and monitoring fire dampers.
 Their inputs are without potential isolation and are suitable for connecting the limit switches.
 Their outputs are suitable for connection of motors with spring return.

In Modbus-RTU mode, the MB-DIO4/2 has an additional operating mode in which a logical linking of the digital inputs with the relay outputs is possible. Furthermore, in Modbus-RTU mode, status changes of the inputs are recorded and temporarily stored in registers (toggle function).

Communication is via an RS485 interface with either BACnet-MS/TP or Modbus-RTU. For BACnet, see also the PICS (BACnet Protocol Implementation Conformance Statement) documents for the devices.

Inputs: terminals S6, S2 for connection of switches
 Ground: Terminals S4, S1 connection to 0V
 Terminals S5, S3 connection to socket only

Relay: terminals 0V socket M1, 0V for motor
 Terminals MOT socket M2, 24V via normally open contact (NO)
 Terminals \overline{MOT} socket M3, 24V via NC contact (NC)

S	S	S
1	3	6
S	S	S
4	5	2

M	M	M
2	1	3

Socket for limit switch

Socket for motor

Status-LEDs

BUSY: The green LED is on when the device is in operation.
It flashes when reception via the bus is working.

ERROR: The red LED flashes when reception via the bus is not working.
It is lit continuously when an invalid device address is set.
It is permanently on when the Modbus connection monitoring is activated.

Operation of the rotary switches

The two hexadecimal rotary switches are used to set the bus protocol (BACnet-MS/TP or Modbus-RTU), the device address (MAC address), the baud rate and parity. A setting of the switches is always valid only when they stand still for one second after rotation.

The switch positions 0xF0, 0xF9, 0xFE and 0xFF have no function and the device remains completely inactive. The red LED is then continuously lit and the green one is off.

Switching between BACnet and Modbus is only possible with the rotary switches. Only if Modbus is already the bus protocol (factory setting), the Modbus configuration tool can be used. Then baud rate and parity can also be set with it.

Setting bus protocol and parity

- First you set switch x10 to E (for BACnet a slave address).
- Then switch x1 is set to the desired position, see table.
- Finally switch x10 is set to F to store the new value non-volatile.
- The red and green LEDs then flash alternately.

Switch x10,x1	FA	FB	FC	FD
Busprotokoll	BACnet	Modbus	Modbus	Modbus
Parity	-	even	odd	none

BACnet-MS/TP basically does not use parity.

Modbus-RTU improves the error tolerance of the data transmission with a parity bit, the recommended default setting is even. However, the parity bit may also be omitted, the devices then send a second stop bit, but only one stop bit is required on reception.

The factory setting is Modbus with even parity.

Setting the baud rate

- First set switch x10 to E (for BACnet a slave address).
- Then switch x1 is set to the desired position, see table.
- Finally switch x10 is set to F to store the new value non-volatile.
- The red and green LEDs flash alternately.

Switch x10,x1	F1	F2	F3	F4	F5	F6	F7	F8
Baud BACnet	9600	19200	38400	57600	76800	115200	(9600)	(9600)
Baud Modbus	1200	2400	4800	9600	19200	38400	57600	115200

The factory setting is 9600 baud for BACnet and 19200 baud for Modbus.

Setting the device address

Switch x10 is set to 0...E, switch x1 is set to 0...F. Thus the addresses 0x00...0xEF (0...239) can be set, with which the device participates in the communication.

The following address settings are special cases.

BACnet:

- Address 0xFF is reserved for broadcast, communication is blocked.
- Address 0x00 is normally used for the router, but it is not excluded, communication is possible.

Modbus:

- Address 0x00 is reserved for broadcast, communication is blocked.
- Address 0xF8...0xFF are reserved for other purposes according to the standard.

Both:

- Address 0xF0...0xFF are used for setting the communication, see above.

The device addresses 0xF0...0xFF (240...255) are not adjustable. This is not a limitation because so many devices on one bus make the communication very slow and therefore normally less are used.

The decimal device addresses can be taken from this table, with switch x10 in the rows and switch x1 in the columns:

0x	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
10	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
20	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
30	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
40	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
50	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
60	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
70	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
80	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
90	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
A0	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
B0	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
C0	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
D0	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
E0	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
F0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1.2. Modbus-Functions

Function Diagnostics is used to check the Modbus communication.

Function Read Device Identification provides the following data to identify the device:

```
VendorName = "METZ CONNECT GmbH"
ProductCode = "MB-DIO4/2" or "MB-DIO2/1"
MajorMinorRevision = "V1.3"
```

The following functions are used to read and write the registers. Valid address ranges are in brackets, but depending on the operating mode not all registers have a function.

```
Read Discrete Inputs      (0 - 15)
Read Input Registers      (0, 1, 2)

Read Coils                (0 - 15)
Write Single Coil         (0 - 15)
Write Multiple Coils      (0 - 15)

Read Holding Registers    (0 - 19, 65, 66)
Write Single Register     (0 - 19, 65, 66)
Write Multiple Registers  (0 - 19, 65, 66)
```

Modbus Registers

The purpose of the registers of the MB-DIO4/2 is briefly described here. At the MB-DIO2/1 the registers for channel 2 (input 3 - 4) have no function. They are described in more detail at the operating modes, there they are named without the channel number appended at the back.

In operating modes for fire dampers, the registers are read out and updated with a cycle of 100 ms.

Discrete Inputs (Read-Only)		
Addr.	Name	Description
0	Input_1	Switching state of input 1...4, Values: 0: Off, 1: On
1	Input_2	
2	Input_3	
3	Input_4	
8	Fault_1	Group error in channel 1/2 in Fire_Damper operating mode: The following single error bits are collected here.
9	Fault_2	
10	FaultRun_1	

11	FaultRun_2	Single error Runtime_Error in channel 1/2 in Fire_Damper operating mode: The damper movement took too long.
12	FaultMan_1	Single error Manipulation in channel 1/2 in Fire_Damper operating mode: Both limit switches are switched on at the same time.
13	FaultMan_2	
14	FaultCom_1	Single error Update_Error in channel 1/2 at operation mode Fire_Damper: No communication from the Modbus master for too long.
15	FaultCom_2	

Input Registers (Read-Only)		
Addr.	Name	Description
0	InputReg	Bits 0...15 include Discrete Inputs 0...15 and error bits.
1	InputRegToggelLH	Bits 0...15 include the cached Discrete Inputs 0...3 and error bits. With each detected change from low to high , the respective register bit is inverted (toggled) and the state is retained until the next change from low to high.
2	InputRegToggelHL	Bits 0...15 include the cached Discrete Inputs 0...3 and error bits. With each detected change from high to low , the respective register bit is inverted (toggled) and the state is retained until the next change from high to low.

Coils		
Addr.	Name	Description
0	Relay_1	Read: Actual switching state of relay 1...2 Write: Intended switching state of relay 1...2 Values: 0: Off, 1: On
1	Relay_2	
2	Hand_1	Read: Cause of switching state of relay 1...2 Write: --- Values: 0: Modbus, 1: Toggle switch No manual operation for operating modes Motorized and LimitSwitch
3	Hand_2	
4	RelaySet_1	Read: Intended switching state of relay 1...2 Write: Intended switching state of relay 1...2 Values: 0: Off, 1: On
5	RelaySet_2	
8	FaultReset_1	Read: 1: remains until errors are reset, 0: afterwards

9	FaultReset_2	Write: 0: no function, 1: reset all errors Only for Fire_Damper operating mode
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Holding Registers		
Addr.	Name	Description
0	OutputReg	Read: Bits 0...15 = Coils 0...15 Write: Bits 0...1 = Intended switching state of relay 1...2 Bits 8...9 = Clear alarm if bit is set
1	RelayDefault	Bits 0...1 contain the basic setting for relay 1...2, factory setting 0, storage in EEPROM, for operating mode Direct_Control, Fire_Damper and Input_Logic_Control
2	OperMode_1	Operating mode for channel 1...2, Values 0...8 see below, Factory setting 0, storage in EEPROM
3	OperMode_2	
4	DriveTime_1	Maximum duration of fire damper opening, values: 0...6553.5 seconds, resolution 0.1 seconds, factory setting 240 seconds, stored in EEPROM
5	DriveTime_2	
6	TurnOffTime_1	Maximum time of fire damper closing, Values: 0...6553,5 seconds, resolution 0,1 seconds, factory setting 35 seconds, storage in EEPROM
7	TurnOffTime_2	
8	RcvHeartBeat_1	Maximum duration between write accesses to ActuDrive_1...2, values: 0...6553,5 seconds, resolution 0,1 seconds, Factory setting 0 seconds, storage in EEPROM
9	RcvHeartBeat_2	
10	ActuDrive_1	The position of the fire protection damper is controlled, Values: open (1), close (2)
11	ActuDrive_2	
12	ActuPos_1	The position of the fire protection damper is reported, Values: open (1), close (2), running (3).
13	ActuPos_2	
14	ActuPos_1a	The position of the second fire damper is reported, Values: inactive (0), open (1), close (2).
15	ActuPos_2a	
16	AlarmCode_1	Alarm codes are reported and reset, values: OK (1), Runtime_Error (3), Manipulation (4), Update_Error (5), Alarm (6), Alarm_a (7)
17	AlarmCode_2	
18	RelayLogic_1	Allocation of the inputs 1..4 to relay 1 Bit 0..3: Relay 1 changes its state at 0 to 1 toggle from one of the marked inputs Bit 8..11: Relay 1 follows the state of the marked inputs. If more than one inputs is marked, an OR link of the inputs takes place. If a fire damper mode is set for relay 2, inputs 3 and 4 are no longer available for the logic and are no longer considered.

Holding Registers																												
Addr.	Name	Description																										
19	RelayLogic_2	<p>Allocation of the inputs 1..4 to relay 2</p> <p>Bit 0..3: Relay 2 changes its state at 0 to 1 toggle from one of the marked inputs</p> <p>Bit 8..11: Relay 2 follows the state of the marked inputs. If more than one inputs is marked, an OR link of the inputs takes place.</p> <p>If a fire damper mode is set for relay 1, inputs 1 and 2 are no longer available for the logic and are no longer considered.</p>																										
65	BaudCode	<p>Codes for Baudrate and Parity, Factory setting 19200 baud, even parity, storage in EEPROM.</p> <p>Bit 0-3: Code for the Baudrate.</p> <table border="0"> <tr> <td>Code</td> <td>0x01</td> <td>0x02</td> <td>0x03</td> <td>0x04</td> <td>0x05</td> <td>0x06</td> <td>0x07</td> <td>0x08</td> </tr> <tr> <td>Baud</td> <td>1200</td> <td>2400</td> <td>4800</td> <td>9600</td> <td>19200</td> <td>38400</td> <td>57600</td> <td>115200</td> </tr> </table> <p>Bit 4-7: Code for the Parity.</p> <table border="0"> <tr> <td>Code</td> <td>0x10</td> <td>0x20</td> <td>0x30</td> </tr> <tr> <td>Parity</td> <td>Even</td> <td>Odd</td> <td>None</td> </tr> </table> <p>Bit 8-15: Value 0x53 enables change with the commands Write Single/Multiple register, then write only to this register.</p>	Code	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	Baud	1200	2400	4800	9600	19200	38400	57600	115200	Code	0x10	0x20	0x30	Parity	Even	Odd	None
Code	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08																				
Baud	1200	2400	4800	9600	19200	38400	57600	115200																				
Code	0x10	0x20	0x30																									
Parity	Even	Odd	None																									
66	BusTimeout	<p>Time constant for connection monitoring for operating mode Direct_Control</p> <p>Values 0: inactive</p> <p>1...65535: 0.01...655.35 seconds</p> <p>Factory setting 0, storage in EEPROM</p>																										

Overview of the operating modes

In register OperMode the operating mode of the respective channel is set.

Channel 1: Input 1...2 and relay 1, Channel 2: Input 3...4 and relay 2.

Value	Name	Description
0	Direct_Control	Direct control of inputs and outputs, factory setting
1	Motorized_SafetyOpen	motor-driven fire damper, safe position open (smoke extraction damper)
2	Motorized_SafetyClose	motor-driven fire damper, safe position closed
3	LimitSwitch_Open_Close	mechanical fire damper with OPEN and CLOSED limit switches
4	LimitSwitch_Open	2 mechanical fire dampers only with OPEN limit switch (normally open contact)
5	LimitSwitch_Close	2 mechanical fire dampers only with CLOSED limit switch (NC contact)
6	Fire_Damper	motor-driven fire protection damper
7	Motor_SafetyOpen_2	motor-operated fire damper, safe position open (smoke extraction damper)
8	Motor_SafetyClose_2	motor operated fire damper, safe position closed
9	Input_Logic_Control	Relay is controlled depending on the input states

Direct_Control operating mode

Input 1	Terminals IN1 / S6 – S4
Input 2	Terminals IN1 / S2 – S1
Input 3	Terminals IN2 / S6 – S4
Input 4	Terminals IN2 / S2 – S1

Address 0: The status of the digital inputs is reported. (Input-Register InputReg)

Address 1: The toggle status if the digital inputs change from **low to high** is reported. (Input-Register InputRegToggelLH)

Address 2: The toggle status if the digital inputs change from **high to low** is reported. (Input-Register InputRegToggelHL)

The relay is controlled via the Modbus (OutputReg holding register) and the toggle switches. The toggle switches have priority.

There is no link between the inputs and the relay.

After switching on or after the expiration of the connection monitoring (holding register BusTimeout), the default setting of the relay (holding register RelayDefault) is valid. The connection to the Modbus master can be monitored with a watchdog timer. If the master or the connection fails, the outputs are switched to their basic state (safe state) and the red LED lights up. The timer restarts with every valid message sent to the device, only the device address is of importance, not the rest of the message content.

Fire_Damper operating mode for fire dampers

The state of the digital inputs is reported (Input register InputReg). The limit switches (normally open contact) of the dampers are connected to the inputs.

The relay is controlled via the Modbus (holding register OutputReg) and the toggle switches. The toggle switches have priority. The relay switches the motor of the damper. When it is switched on, the damper is opened, when it is switched off, the damper closes.

The inputs and the error messages do not influence the relay. Only after switching on the basic setting of the relay is valid (holding register RelayDefault).

The fire dampers are connected as follows:

Fire damper1		Fire damper2	
Input 1 (IN1 / S6 – S4)	Limit switch OPEN	Input 3 (IN2 / S6 – S4)	Limit switch OPEN
Input 2 (IN1 / S2 – S1)	Limit switch CLOSED	Input 4 (IN2 / S2 – S1)	Limit switch CLOSED
Relay 1	Motor	Relay 2	Motor

To support commissioning and maintenance there is an error monitoring (register InputReg and OutputReg). Only one of the single errors listed below is reported, after that the error detection is disabled. Simultaneously with the single error, the collective error is reported. The error is acknowledged by the Modbus master by setting Coil FaultReset.

The FaultRun error is reported when the adjustable maximum duration of opening (DriveTime) or closing (TurnOffTime) of the damper is exceeded.

The time measurement starts when the relay is switched. Only outside the time measurement the position of the dampers is checked by means of the limit switches and

the error is signaled if the position is not as expected. The check can be switched off with the time constant 0. With manual operation the check is also switched off.

The **FaultMan** error is reported if both limit switches are switched on at the same time.

The error **FaultCom** is reported if the adjustable maximum duration between Modbus commands (RcvHeartBeat) is exceeded. With this a connection monitoring can be realized. The timer restarts with every valid message directed to the device, only the device address is of importance, not the rest of the message content. The time measurement can be switched off with the time constant 0.

Motor... and LimitSwitch... operating modes for fire dampers

In the Motor... operating modes, the relay is also controlled depending on the inputs and the error monitoring.

Registers for these operating modes

ActuDrive

Only for Motor... operating modes

In this register the damper position is controlled.

Values: open (1), close (2), default setting after reset is the normal position.

ActuPos

Operating modes Motor... and LimitSwitch_Open_Close:

The damper position is reported in this register.

The feedback comes from limit switches OPEN1, CLOSE1, OPEN2, CLOSE2 (normally open contact).

Values: open (1), close (2), running (3).

Operating modes LimitSwitch_Open and LimitSwitch_Close:

In this register the damper position is reported back.

The feedback comes from limit switches at the inputs OPEN1/CLOSE1, OPEN2/CLOSE2 (normally open contact for LimitSwitch_Open, normally closed contact for LimitSwitch_Close).

Values: open (1), close (2).

ActuPos_a

Operating modes Motor... and LimitSwitch_Open_Close:

Values: inactive (0).

Operating modes LimitSwitch_Open and Limit_Switch_Close:

The position of the second fire damper is reported in this register.

The feedback comes from limit switches at the inputs OPEN1a/CLOSE1a, OPEN2a/CLOSE2a (normally open contact for LimitSwitch_Open, normally closed contact for LimitSwitch_Close).

Values: open (1), close (2).

AlarmCode

Error states are reported in this register. The first error code (3...7) remains stored until it is eliminated, only after that another error message is possible. The values and resetting of errors are described below.

Values for operating modes Motor...:

OK (1), Runtime_Error (3), Manipulation (4), Update_Error (5), Alarm (6).

Values at operation mode LimitSwitch_Open_Close:

OK (1), Manipulation (4), Alarm (6).

Values for LimitSwitch_Open and LimitSwitch_Close operating modes:

OK (1), alarm (6) at inputs OPEN1/CLOSE1, OPEN2/CLOSE2,

Alarm_a (7) for inputs OPEN1a/CLOSE1a, OPEN2a/CLOSE2a.

Alarm (6) has priority over Alarm_a (7) if both dampers are in Fire position.

DriveTime

Only for operating modes Motor...:

In this register the maximum duration of damper opening is set.

If the time is exceeded, the alarm code Runtime_Error is reported.

At value 0 the time measurement is switched off.

Values: 0...6553,5 seconds, resolution 0,1 seconds, factory setting 240 seconds.

TurnOffTime

Only for operating modes Motor...:

In this register the maximum time of closing the damper is set.

If the time is exceeded, the alarm code Runtime_Error is reported.

At value 0 the time measurement is switched off.

Values: 0...6553,5 seconds, resolution 0,1 seconds, factory setting 35 seconds.

RcvHeartBeat

Only for operating modes Motor...:

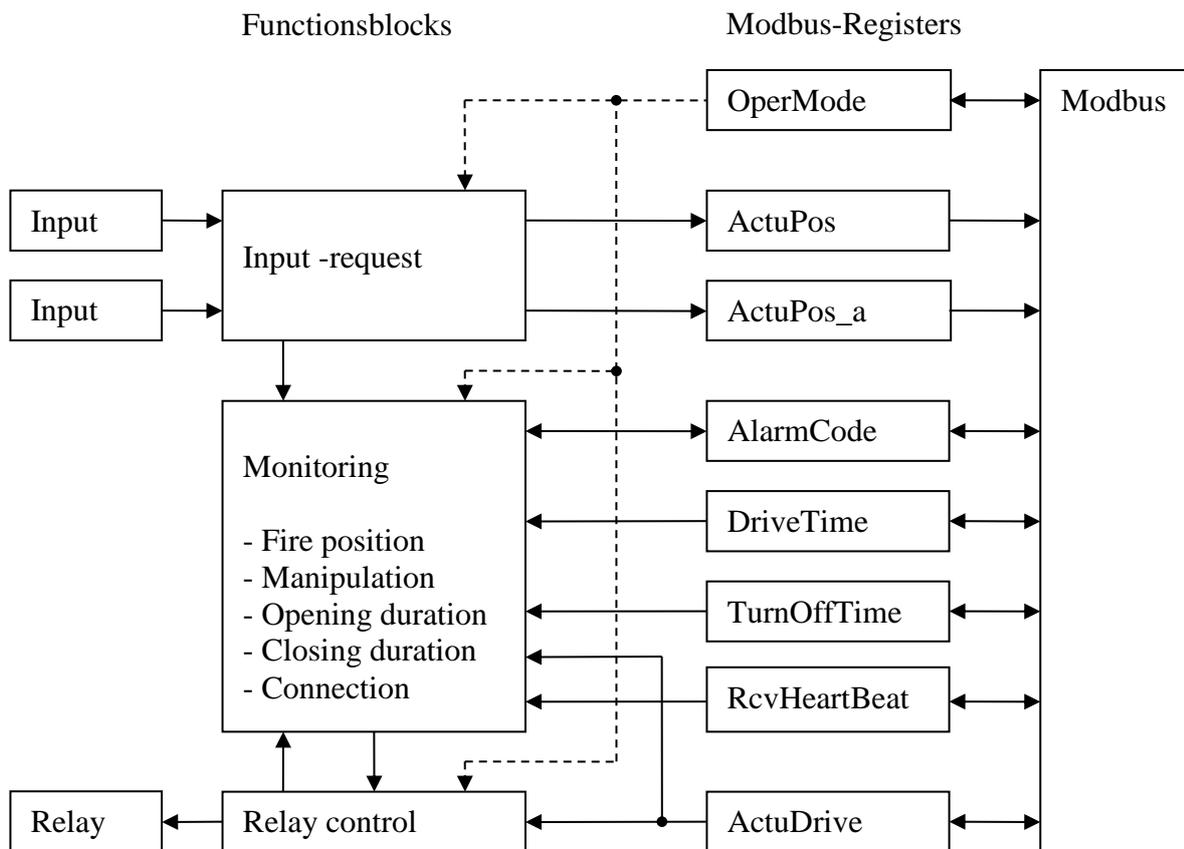
This register is used to set the maximum time between write accesses to ActuDrive

is set. This can be used to implement connection monitoring.
 If the time is exceeded, the alarm code Update_Error is reported.
 At value 0 the time measurement is switched off.

Values: 0...6553.5 seconds, resolution 0.1 seconds, factory setting 0 seconds.

Overview of operating modes for fire dampers

Both channels are the same, their numbers are omitted in the picture.



Limit switches of the fire dampers

The limit switches are connected to the input terminals as follows:

Terminals	Damper	Operating modes Motor..., LimitSwitch_Open_Close (normally open contact in each case)	Damper	Operating modes LimitSwitch_Open (normally open contact), LimitSwitch_Close (normally closed contact)
1 – C1	OPEN1	Damper 1 open	OPEN1/CLOSE1	Damper 1

2 – C1	CLOSE1	Damper 1 close	OPEN1a/CLOSE1a	Damper 1a
3 – C1	OPEN2	Damper 2 open	OPEN2/CLOSE2	Damper 2
4 – C1	CLOSE2	Damper 2 close	OPEN2a/CLOSE2a	Damper 2a

The operating modes LimitSwitch_Open and LimitSwitch_Close differ only in the name, the MB-DIO4/2 and MB-DIO2/1 behave identically in both.

- When the damper is completely open, the contact is closed.
- With completely closed flap the contact is open.
- When the damper is partially open, the state of the corresponding end position applies.

Fire-Position

The Fire position is derived from the limit switches depending on the operating mode.

Operating mode	Fire position when
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 1 damper not OPEN
LimitSwitch_Close	at least 1 damper CLOSED

If the position of the damper is the Fire position and no other alarm code is reported yet, alarm is reported in the AlarmCode register.

In the LimitSwitch_Open and LimitSwitch_Close operating modes, Alarm is reported for the first damper or Alarm_a for the second damper. Alarm has priority over Alarm_a.

In the Motor... operating modes, there is latching in the safe position via the Fire position. The relay is then switched to the safe state. To move the fire damper to the normal position, first the normal position is written to ActuDrive and then AlarmCode is reset to OK. Then the alarm reset begins, during which the self-retaining function is interrupted.

For the fire dampers with motor, there is this difference when intentionally controlling with register ActuDrive to the safe position and back to the normal one:

Motorized... operating modes: The Fire position is reported as an alarm.

Operating modes Motorized_..._2: The Fire position is not reported as an alarm.

Error detection and alarm codes

There are 3 error sources that are reported as alarm codes and partially lead to an automatic control of the motorized fire damper.

Runtime_Error

(Motor operating modes...)

The time during which the damper opens or closes can be measured. If the permitted duration is exceeded, this error is reported.

Time measurement with DriveTime starts when the relay is switched on (damper open) and ends when the limit switches report the OPEN position.

The time measurement with TurnOffTime starts when the relay is switched off (damper closes) and ends when the limit switches report the CLOSED position.

The 2 time measurements can be switched off individually with the value 0.
An error remains stored, the relay then switches to the safe position.

Possible causes: Damper jammed, limit switch defective, input for limit switch defective, cable to limit switch interrupted, cable to motor interrupted, motor defective.

Manipulation

(Operating modes Motor..., LimitSwitch_Open_Close)

If both limit switches are switched on at the same time, this error is reported.
In ActuPos the value running is reported at the same time.
An error remains stored, the relay is then switched off.

Possible causes: Limit switch defective, input for limit switch defective, cable to limit switch short-circuited.

Update_Error

(Operating modes Motor...)

The time interval of write accesses to ActuDrive can be monitored. If the allowed duration (RcvHeartBeat) is exceeded, this error is reported.

Monitoring also starts when the error is reset or RcvHeartBeat is set unequal to 0.

The time measurement can be switched off with the value 0.

An error remains stored, the relay then switches to the safe position.

Possible causes: Remote station on bus out of order, bus connection interrupted (e.g. cable, repeater, switch).

Several simultaneous errors

Even if several errors are present at the same time on one channel, error handling is carried out exclusively for the error detected first. Only after this error has been confirmed by resetting it to OK (alarm reset), another error can be detected.

Control of the relays

Fire protection damper (Motorized_SafetyClose)

Depending on alarm reset, fire position, ActuDrive and the error status, the relay is switched as follows (evaluation from top to bottom):

other	ActuDrive	AlarmCode	Relay
Alarm-Reset	open (1)	OK (1)	On
Fire-Position	any	any	Off
-	any	Runtime_Error (3)	Off
	any	Update_Error (5)	Off
	any	Manipulation (4)	Off
	open (1)	OK (1)	On
	close (2)	OK (1)	Off

Initialization after power on / reset:

ActuDrive is set to open. AlarmCode is set to OK.

The alarm reset then starts to interrupt the self-retaining via Fire position in the safe state. It ends when the normal position is reached or in the event of a fault.

Smoke damper (Motorized_SafetyOpen)

Depending on Alarm-Reset, Fire-Position, ActuDrive and the error condition the relay is switched as follows (evaluation from top to bottom):

other	ActuDrive	AlarmCode	Relais
Alarm-Reset	close (2)	OK (1)	Off
Fire-Position	any	any	On
-	any	Runtime_Error (3)	On
	any	Update_Error (5)	On
	any	Manipulation (4)	Off
	close (2)	OK (1)	Off
	open (1)	OK (1)	On

Initialization after power on / reset:

ActuDrive is set to close. AlarmCode is set to OK.

The alarm reset then starts to interrupt the self-retaining via Fire position in the safe state. It ends when the normal position is reached or in the event of an error.

Fire damper (Motor_SafetyClose_2)

Depending on Alarm-Reset, Fire-Position, ActuDrive and the error condition the relay is switched as follows (evaluation from top to bottom):

other	ActuDrive	AlarmCode	Relais
Alarm-Reset	open (1)	OK (1)	On
Fire-Position	open (1)	any	Off
-	any	Runtime Error (3)	Off
	any	Update Error (5)	Off
	any	Manipulation (4)	Off
	open (1)	OK (1)	On
	close (2)	OK (1)	Off

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

The Fire position (ActuPos = close, running) is then not reported as an alarm.

Initialization after switch-on / reset:

ActuDrive is set to open. AlarmCode is set to OK.

The alarm reset then starts to interrupt the self-retaining via Fire position in the safe state.

It ends when the normal position is reached or in case of an error.

Smoke damper (Motor_SafetyOpen_2)

Depending on Alarm-Reset, Fire-Position, ActuDrive and the error state, the relay is switched as follows (evaluation from top to bottom):

other	ActuDrive	AlarmCode	Relais
Alarm-Reset	close (2)	OK (1)	Off
Fire-Position	close (2)	any	On
-	any	Runtime Error (3)	On
	any	Update Error (5)	On
	any	Manipulation (4)	Off
	close (2)	OK (1)	Off
	open (1)	OK (1)	On

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

The Fire position (ActuPos = open, running) is then not reported as an alarm.

Initialization after switch-on / reset:

ActuDrive is set to close. AlarmCode is set to OK.

The alarm reset then starts to interrupt the self-retaining via Fire position in the safe state.

It ends when the normal position is reached or in the event of an error.

Damper without motor (LimitSwitch...)

The relay is permanently switched off.

Operating mode Input_Logic_Control

In this operating mode the digital inputs are logically linked with the relay outputs.

There are two basic functions:

- Impulse switch function
- SPST switch function

The two functions are mutually exclusive. Therefore, the program automatically prevents the functions from being mixed up.

The relays can also be controlled via the toggle switches. In this case the switches have priority.

With the impulse switch function, the default setting of the respective relay (holding register RelayDefault) applies after switching on the device.

At SPST switching function, the status of the assigned inputs always applies.

If the connection monitoring (holding register BusTimeout) expires, there is **no** change to the default setting of the respective relay.

Impulse switch function

Here, a 0 to 1 change at one or more inputs causes the relay(s) to change the current state. Each 0 to 1 change toggle the state of the respective relay output, regardless of whether one or more inputs are selected to switch the relay.

SPST switch function

Here the relay output follows one or more inputs, that means the relay output has the same status as the assigned inputs:

Input = 0 → Relay OFF

Input = 1 → Relay ON

If several inputs are assigned to a relay, there is an OR link, that means as long as at least one assigned input is 1, the relay is switched on and only if all assigned inputs are 0 the relay switched off.

If a fire damper operating mode is set for a relay, the inputs assigned to the relay (see fire damper operating mode) are no longer available for the logic of the other relay and are no longer considered and are automatically deactivated by the program.

1.3. BACnet – PICS

1.3.1. Product Description: MB-DIO 2/1 IP65

BACnet Protocol Implementation Conformance Statement

Date: 08.09.2022
Vendor Name: METZ CONNECT GmbH
Product Name: MB-DIO2/1 IP65 24VMB-DIO2/1 IP65 230V
Product Model Number: 110 811 13 26 IP 110 811 05 26 IP
Application Software Version: 1.1
Firmware Revision: 2.0
BACnet Protocol Revision: 15

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

Device Address Binding:

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

Networking Options:

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

Network Security Options:

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

Character Sets Supported:

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

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

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

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

Yes No

Configuration Switches

Hexadecimal switches x10, x1 define the network address (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 keeps 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-DIO2/1_" + 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-DIO2/1"	R
Firmware_Revision	"2.0"	R
Application_Software_Version	"1.1"	R
Protocol_Version	1	R
Protocol_Revision	15	R
Protocol_Services_Supported	read-property, write-property, subscribe-cov, who-has, who-is, read-range, device-communication-control, reinitialize-device	R
Protocol_Object_Types_Supported	DEVICE, BINARY_OUTPUT, BINARY_INPUT, GROUP, ANALOG_VALUE, MULTISTATE_VALUE	R
Object_List	device, 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, max. 6 Subscriptions, for binary-input / binary-output / multistate-value, Confirmed / Unconfirmed, Lifetime = 0...65535 sec.	R
R: Read Property, W: Write Property, -E: Storage in EEPROM / Flash		

Binary Output Object 1

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
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...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.

1.3.2. Product Description: MB-DIO 4/2 IP65

BACnet Protocol Implementation Conformance Statement

Date: 08.09.2022
Vendor Name: METZ CONNECT GmbH
Product Name: MB-DIO4/2 IP65 24VMB-DIO4/2 IP65 230V
Product Model Number: 110 812 13 26 IP 110 812 05 26 IP
Application Software Version: 1.1
Firmware Revision: 2.0
BACnet Protocol Revision: 15

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

Device Address Binding:

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

Networking Options:

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

Network Security Options:

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

Character Sets Supported:

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

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

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

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

- Yes No

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 keeps 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	"2.0"	R
Application_Software_Version	"1.1"	R
Protocol_Version	1	R
Protocol_Revision	15	R
Protocol_Services_Supported	read-property, write-property, subscribe-cov, who-has, who-is, read-range, device-communication-control, reinitialize-device	R
Protocol_Object_Types_Supported	DEVICE, BINARY_OUTPUT, BINARY_INPUT, GROUP, ANALOG_VALUE, MULTISTATE_VALUE	R
Object_List	device, 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		

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

Function Table for Binary Output							
Out_O f_ Servic e	Polarit y	Switc h	Priority_Array and Relinquish_Def ault	Present_ Value	Binary Output	OVER RIDDEN	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,
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.