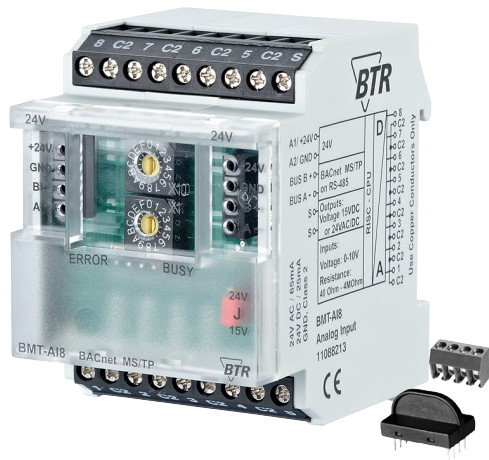


# Analog Input Module BMT-AI8 11088213

7603/889299-03



## 1. Description

The BACnet MS/TP module with 8 individually configurable resistance or voltage inputs is designed for local switching operations. It is suitable to record resistance or voltage values of for example passive and active temperature sensors electrical ventilation or mixing valves, valve positions etc. The inputs are universally configurable by standard object via a BACnet-Client. Addressing of the module and baud rate setting are done with the two address switches (x1 / x10) on the front. Possible settings are addresses 00 to F9 and baud rates 9600 Bd, 19200 Bd, 38400 Bd, 57600, 76800 Bd and 115200 Bd.

## 2. Declaration of Conformity

The device was tested according to the applicable standards. Conformity was proofed. The declaration of conformity is available at the manufacturer METZ CONNECT GmbH.

### Notes Regarding Device Description

These instructions include indications for use and mounting of the device. In case of questions that cannot be answered with these instructions please consult supplier or manufacturer.

The indicated installation directions or rules are applicable to the Federal Republic of Germany. If the device is used in other countries it applies to the equipment installer or the user to meet the national directions.

### Safety Instructions

Keep the applicable directions for industrial safety and prevention of accidents as well as the VDE rules.

Technicians and/or installers are informed that they have to electrically discharge themselves as prescribed before installation or maintenance of the devices.


Only qualified personnel shall do mounting and installation work with the devices, see section "qualified personnel".

The information of these instructions have to be read and understood by every person using this device.

### Symbols

Warning of dangerous electrical voltage

### Danger

 means that non-observance may cause risk of life, grievous bodily harm or heavy material damage.

### Qualified Personnel

Qualified personnel in the sense of these instructions are persons who are well versed in the use and installation of such devices and whose professional qualification meets the requirements of their work.

This includes for example:

- Qualification to connect the device according to the VDE specifications and the local regulations and a qualification to put this device into operation, to power it down or to activate it by respecting the internal directions.
- Knowledge of safety rules.
- Knowledge about application and use of the device within the equipment system etc.

## 3. Technical Data

### BACnet Interface

Protocoll BACnet MS/TP  
Transmission rate 9600 ... 115200 Bd (factory setting 9600 Bd)  
Cabling RS485 two wire bus with voltage equalizing cable in bus / line topology; terminate with 120 Ohms

### Supply

Operating voltage range 20 ... 28 V AC/DC (SELV)  
Current consumption 65 mA (AC) / 25 mA (DC)  
Relative duty cycle 100 %

### Input

Resistance range 40 Ohms to 4 MOhms  
Voltage input 0 ... 10 V DC  
Resolution 10 mV  
Error about ±100 mV

### Housing

Dimensions WxHxD 2.0 x 2.8 x 2.6 in. (50 x 70 x 65 mm)  
Weight 104 g  
Mounting position any  
Mounting standard rail TH35 per IEC 60715  
Mounting in series the maximum quantity of modules connected in line is limited to 15 or to a maximum power consumption of 2 Amps (AC or DC) per connection to the power supply. For any similar block of additional modules a separate connection to the power supply is mandatory.

### Material

Housing Polyamide 6.6 V0  
Terminal blocks Polyamide 6.6 V0  
Cover plate Polycarbonate

### Type of protection (IEC 60529)

Housing IP40  
Terminal blocks IP20

### Terminal blocks

Supply and bus 4 pole terminal block max. AWG 16 (1.5 mm<sup>2</sup>) solid wire max. AWG 18 (1.0 mm<sup>2</sup>) stranded wire  
Wire diameter min. 0.3 mm up to max. 1.4 mm (terminal block and jumper plug are included to each packing unit)

### Module connection

Input/Output max. AWG 12 (4.0 mm<sup>2</sup>) solid wire max. AWG 14 (2.5 mm<sup>2</sup>) stranded wire  
Wire diameter min. 0.3 mm up to max 2.7 mm  
Protective circuitry polarity reversal protection of operating voltage polarity reversal protection of supply and bus

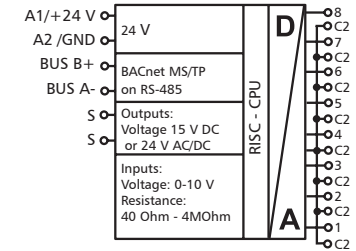
### Temperature range

Operation -5 °C ... +55 °C  
Storage -20 °C ... +70 °C

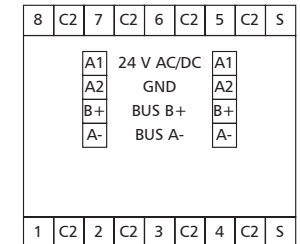
### Display

Operating and bus activity green LED  
Error indication red LED

## 4. Wiring Diagram



## 5. Connection Diagram



## 6. Mounting

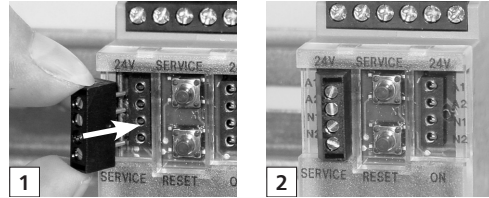
### Power down the equipment

Mount the module on standard rail (TH35 per IEC 60715 in junction boxes and/or on distribution panels).

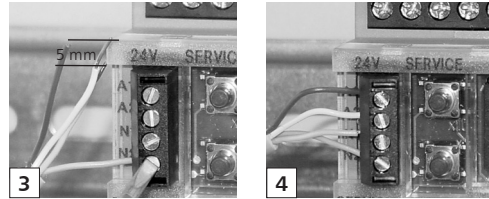
### Installation

Electric installation and device termination shall be done by qualified persons only, by respecting all applicable specifications and regulations.

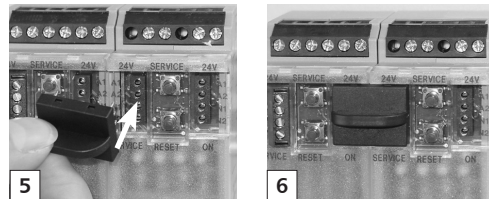
### Plug in the terminal block for bus connection



### Connect the cable for bus supply



### Mounting in series



The module can be aligned without interspace. Use the jumper plug to connect bus and supply voltage when the modules are mounted in series.

The maximum quantity of modules connected in line is limited to 15 or to a maximum power consumption of 2 Amps (AC or DC) per connection to the power supply. For any similar block of additional modules a separate connection to the power supply is mandatory.

## 7. Network address and Bit rate setting

### Configuration Switches

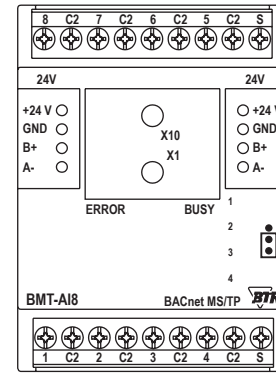
Hexadecimal Switches x10, x1 define the Network Address (00 - F9; e.g. F9h =  $15 \times 16 + 9 = 249d$ ) and Baud rate (FA - FF).

- 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 is stored in EEPROM
  - Turn Switch x10 to select Network Address
  - Turn Switch x1 to select Network Address
- MS/TP Master if using Network Address 0x00 ... Max\_Master,  
MS/TP Slave if using Network Address Max\_Master + 1 ... 0xF9.

Address switch x10	F	F	F	F	F	F
Address switch x1	A	B	C	D	E	F
Bit rate (Bit/s)	9600	19200	38400	57600	76800	115200

Factory setting: 9600 Bit/s

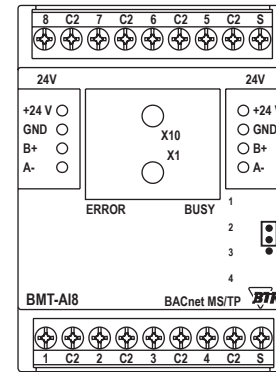
## 8. Jumper positions for voltage feeding of active sensors



Jumper unter der Blende  
Jumper below the faceplate

Jumper unten:  
Klemmen S = 15 V DC  
(Werkseinstellung)

Jumper in bottom position:  
Contacts S = 15 V DC  
(Factory setting)

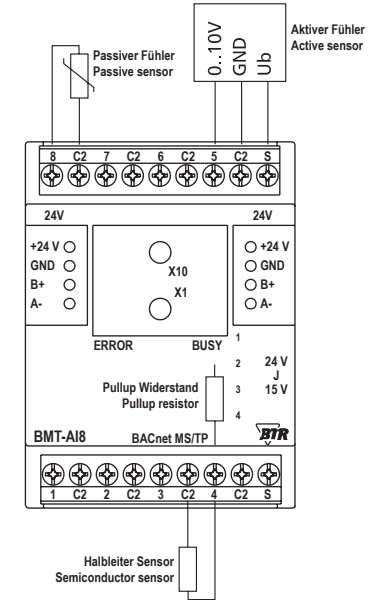


Jumper unter der Blende  
Jumper below the faceplate

Jumper oben:  
Klemmen S = 24 V AC/DC

Jumper in top position:  
Contacts S = 24 V AC/DC

## 9. Connection examples



## 10. Software Description

### Device Object

Property	Remark / Value	RW
Object_Identifier	device, default instance: 421000 + Network-Address	RW-E
Object_Name	max. 63 Bytes, default "BMT-AI8_" + Network-Address (Hexadecimal)	RW-E
Object_Type	DEVICE (8)	R
System_Status	OPERATIONAL (0)	R
Vendor_Name	"BTR Netcom GmbH"	R
Vendor_Identifier	421	R
Model_Name	"BMT-AI8"	R
Description	max. 127 Bytes, default ""	RW-E
Location	max. 63 Bytes, default ""	RW-E
Firmware_Revision	"1.2"	R
Application_Software_Version	"1"	R
Protocol_Version	1	R
Protocol_Revision	12	R
Protocol_Services_Supported	read-property, write-property, subscribe-cov, who-has, who-is, device-communication-control, reinitialize-device	R
Protocol_Object_Types_Supported	DEVICE, ANALOG_INPUT, ANALOG_VALUE, MULTISTATE_VALUE, GROUP	R
Object_List [49]	device, analog-input 1...8, analog-value 1...28, multistate-value 1...9, group 1...3	R
Max_APDU_Length_Accepted	480	R
Segmentation_Supported	NO_SEGMENTATION (3)	R
APDU_Timeout	10000	R
Number_Of_APDU_Retries	3	R
Device_Address_Binding	-	R
Database_Revision	0	R
Max_Master	0...127, default 127	RW-E
Max_Info_Frames	1...255, default 1	RW-E
Active_COV_Subscriptions	max. 10 Subscriptions, for analog-input 1...8, Confirmed / Unconfirmed, Lifetime = 0...65535 sec.	R

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

### Analog Input Object 1...8

Property	Remark / Value	RW
Object_Identifier	analog-input, instance 1 ... 8	R
Object_Type	ANALOG_INPUT (0)	R
Object_Name	max. 42 Bytes, default "Input 1" ... "Input 8"	RW-E
Description	max. 84 Bytes, default ""	RW-E
Present_Value	Measured value, writable if Out_Of_Service, Measurement Range defined in Multistate Value 1...8	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	R
COV_Increment	Minimum change of Present_Value for COV notification, default 1.0	RW-E
Notification_Class	Unsubscribed UnconfirmedCOVNotification 0: no COV notification, default, 1: local broadcast, 2: global broadcast	RW-E

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

## Continuation Software Description

### Analog Value Object 21...28

Property	Remark / Value	RW
Object_Identifier	analog-value, instance 21 ... 28	R
Object_Type	ANALOG_VALUE (2)	R
Object_Name	max. 42 Bytes, default "Offset 1" ... "Offset 8"	RW-E
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_Identifier	multistate-value, instance 1 ... 8	R
Object_Type	MULTISTATE_VALUE (19)	R
Object_Name	max. 42 Bytes, default "Measurement Range 1" ... "Measurement Range 8"	RW-E
Description	max. 84 Bytes, default ""	RW-E
Present_Value	Measurement Range of Analog Input 1...8 Voltage (% Volt) Voltage, Pullup Resistor 2kOhm to 5V (% P, Volt P) 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	19	R
State_Text	max. 20 Bytes, default see next Table	RW-E

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



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Mounting instruction see [www.metz-connect.com](http://www.metz-connect.com)

## Continuation Software Description

Measurement Ranges		
State	State_Text	Units of Analog Input
1	default	„0-10V %“
2		percent (98)
3		percent (98)
4		volts (5)
5		volts (5)
6		ohms (4)
7	„User Defined“	set in Analog Value Object X1...X10
8	„PT100“	degrees-Celsius (62)
9	„PT500“	degrees-Celsius (62)
10	„PT1000“	degrees-Celsius (62)
11	„NI1000-TC5000“	degrees-Celsius (62)
12	„NI1000-TC6180“	degrees-Celsius (62)
13	„BALCO500“	degrees-Celsius (62)
14	„KTY81_110“	degrees-Celsius (62)
15	„KTY81_210“	degrees-Celsius (62)
16	„NTC1k8-T“	degrees-Celsius (62)
17	„NTC5k-T“	degrees-Celsius (62)
18	„NTC10k-T“	degrees-Celsius (62)
19	„NTC20k-T“	degrees-Celsius (62)
20	„LM235Z“	degrees-Celsius (62)

## Analog Value Object 1...20

Property	Remark / Value	RW
Object_Identifier	analog-value, instance 1 ... 20	R
Object_Type	ANALOG_VALUE (2)	R
Object_Name	max. 42 Bytes, default "X 1", "Y 1" ... "X 10", "Y 10"	RW-E
Description	max. 84 Bytes, default ""	RW-E
Present_Value	Interpolation Table in User Defined Measurement Range	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) Y1...Y10: Defined in Multistate Value 9	RW-E R

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

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

The Interpolation Table by default provides an example for PT1000 Temperature Sensors. In the example X values are Temperature in °C, Y values are Resistance in Ohms. X and Y values must be sorted in ascending or descending order. The table ends where both values are 0.0. Measurement Range at Input must be selected in Multistate Value 9.

## Continuation Software Description

### Multistate Value Object 9

Property	Remark / Value	RW
Object_Identifier	multistate-value, instance 9	R
Object_Type	MULTISTATE_VALUE (19)	R
Object_Name	max. 42 Bytes, default "User Defined Range"	RW-E
Description	max. 84 Bytes, default ""	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, for PT1000 example	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
State_Text	max. 20 Bytes, default see next Table	RW-E

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_Identifier	group, instance 1 ... 3	R
Object_Type	GROUP (11)	R
Object_Name	max. 42 Bytes, default "Group 1" ... "Group 3"	RW-E
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



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