

**Description of  
BACnet MS/TP interface**

WRF06 AQ BACnet  
FTW06 BACnet

## Revision

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## 1 General

This document describes the BACnet MS/TP interface for the following devices:

- WRF06 AQ BACnet
- FTW06 BACnet

### **Note:**

Depending on the device type and configuration level not all measuring values and configuration parameters shown in this document are available. The corresponding values are defined in the data sheets of the product in question. The availability of the measuring values can be displayed via the "Out of Service" Flag of the corresponding objects.

	Temperatur	relative Feuchte	absolute Feuchte	Enthalpie	Taupunkt	CO2	VOC	CO2 VOC Mix
WRF06 CO2						•		
WRF06 CO2 Temp	•					•		
WRF06 CO2 Temp_rH	•	•	•	•	•	•		
WRF06 CO2+VOC						•	•	•
WRF06 VOC Temp	•						•	
WRF06 CO2+VOC Temp_rH	•	•	•	•	•	•	•	•
FTW06	•	•	•	•	•			

## **1.1 Hardware Installation**

The device can be connected by means of a twisted-pair cable (line resistance 120 Ohm). Detailed information on the installation and mounting can be found in the product data sheet of the corresponding device and the data sheet wiring\_rs485\_network.pdf.

## **1.2 RS485 Transceiver**

The maximal number of bus participants without the use of a repeater is default by the RS485 transceiver. The transceiver used in the device enables 32 devices per bus segment.

## **1.3 Protocol**

The protocol used is the internationally standardized BACnet MS / TP protocol. This allows the connection to corresponding counterparts, e.g. an automation station or a BMS that supports the BACnet MS / TP protocol. The transmission parameters are set to 8N1 (8 data bits, no parity, 1 stop bit) according to the standard. The baud rate is freely selectable (9600, 19200, 38400, 76800) and can be set via dip switch.

## **1.4 Configuration Options**

The device can be adapted to the corresponding bus topology by means of a dip switch.

- MAC-Address of the device (1 - 127)
- Baud rate 9600, 19200, 38400 or 76800

### 1.5 Dip switch and LED

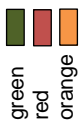
Address								Baud		
1	2	3	4	5	6	7	8	9	0	
ADR 1*	ADR 2	ADR 4	ADR 8	ADR 16	ADR 32	ADR 64				
Adresse 1-127								0	0	9600
								1	0	19200
								0	1	38400*
								1	1	76800

\*default settings

1 = Switch position ON

0 = Switch position OFF

### LEDs



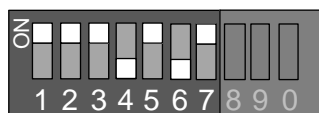
Via the integrated LEDs the current operating status of the BACnet interface is indicated.

LED	Description
Green	Lights up permanently during normal operation
Red	Lights up in case of a corrupt bus configuration and internal errors
Orange	Blinks when RS485 BACnet telegrams are received

## MAC Address

The MAC address of the device is set via the dip switches, binary coded in the range of 1...127.  
 (The address 0 is reserved and cannot be selected).

Dip switch	1	2	3	4	5	6	7
Address	$2^0$ (1)	$2^1$ (2)	$2^2$ (4)	$2^3$ (8)	$2^4$ (16)	$2^5$ (32)	$2^6$ (64)



i.e.: MAC->Address 87

## Baud rate

Dip switch	9	0	Baud rate
	off	off	9600
	on	off	19200
	off	on	38400
	on	on	76800



i.e.: Baud rate: 38400

Dip switch 8 is reserved.

## 2 Description of the BACnet Objects

### 2.1 Device Object

Property	Access	Range	Default
Object Identifier (Device ID)	R	0...4194302	Device Offset ID + MAC-Adresse
Object Name	R		DeviceID_ModelName <i>Bsp.: "123_WRF06 AQ + BACnet MSTP"</i>
Object Type	R		Device
Description	RW	Max. 32 Zeichen	"Thermokon Sensor"
System Status	R		Operational
Vendor Name	R		Thermokon Sensortechnik GmbH
Model Name	R		WRF06 AQ BACnet MSTP
Protocol Version	R		1
Protocol Revision	R		12
Max. APDU Length	R		480
Segmentation Support	R		no
APDU Timeout	R		3000 ms
Number APDU Retries	R		3
Max Masters	R		127
Max Info Frames	R		1



## 2.2 Sensor value

Via the following Analog Input Objects different measuring values can be read out.

Object	Access	Description	Notes
AV-38	RW	Unit system	1: SI 2: Imperial

Object	Access	Description	COV Increment	Unit
AI-1	R	Relative humidity	0 ... 100 %	%rF
AI-5	R	CO2	0 ... 5000 ppm	ppm
AI-6	R	VOC	0 ... 100 %	%
AI-7	R	CO2 VOC Mix	0 ... 100 %	

### Object AV-38 = 1 (Unit SI)

Object	Access	Description	COV Increment	Unit	
AI-0	R	Temperature	0 ... 50 °C	SI	°C
AI-2	R	Absolute humidity	0 ... 83 g/m³	SI	g/m³
AI-3	R	Enthalpy	0 ... 274 kJ/kg	SI	kJ/kg
AI-4	R	Dew point	-110 ... 50 °C	SI	°C

### Object AV-38 = 2 (Unit Imperial)

Object	Access	Description	COV Increment	Unit	
AI-0	R	Temperature	0 ... 122 °F	Imperial	°F
AI-2	R	Absolute humidity	0 ... 36 gr/ft	Imperial	gr/ft³
AI-3	R	Enthalpy	0 ... 118 BTU/lb	Imperial	BTU/lb
AI-4	R	Dew point	-166 ... 122 °F	Imperial	°F

## 2.3 Offset-/Correction Values

Via the following analog value objects the offset/correction values for the single measuring values can be default.

Object	Access	Description	Values
AV-1	RW	Offset relative humidity	-5 ... +5 %rF
AV-2	RW	Offset CO2	-150 ... +150 ppm
AV-3	RW	Offset VOC	-15 ... +15 %

### Object AV-38 = 1 (Unit SI)

Object	Access	Description	Values
AV-0	RW	Offset temperature	-3 ... +3 °C

### Object AV-38 = 2 (Unit Imperial)

Object	Access	Description	Values
AV-0	RW	Offset temperature	-6 ... +6 °F

## 2.4 Measuring Values Upper-/Lower Limits

Via the measuring values upper-/lower limits values in a special range can be localized.

Object	Access	Description	Values
AV-8	RW	Relative humidity lower limit	0 ... 100 %rF
AV-9	RW	Relative humidity upper limit	
AV-16	RW	CO2 lower limit	0 ... 5000 ppm
AV-17	RW	CO2 upper limit	
AV-18	RW	VOC lower limit	0 ... 100 %
AV-19	RW	VOC upper limit	
AV-20	RW	CO2 VOC Mix lower limit	0 ... 100 %
AV-21	RW	CO2 VOC Mix upper limit	

### Object AV-38 = 1 (Unit SI)

Object	Access	Description	Values
AV-6	RW	Temperature lower limit	0 ... 50 °C
AV-7	RW	Temperature upper limit	
AV-10	RW	Absolute humidity lower limit	0 ... 83 g/m <sup>3</sup>
AV-11	RW	Absolute humidity upper limit	
AV-12	RW	Enthalpy lower limit	0 ... 274 kJ/kg
AV-13	RW	Enthalpy upper limit	
AV-14	RW	Dew point lower limit	-110 ... +50 °C
AV-15	RW	Dew point upper limit	

### Object AV-38 = 2 (Unit Imperial)

Object	Access	Description	Values
AV-6	RW	Temperature lower limit	32 ... 122 °F
AV-7	RW	Temperature upper limit	
AV-10	RW	Absolute humidity lower limit	0 ... 36 gr/ft
AV-11	RW	Absolute humidity upper limit	
AV-12	RW	Enthalpy lower limit	0 ... 118 BTU/lb
AV-13	RW	Enthalpy upper limit	
AV-14	RW	Dew point lower limit	-166 ... 122 °F
AV-15	RW	Dew point upper limit	

## 2.5 Sensor Configuration

Via the following analogue value objects the requested unit system can be selected and further sensor parameters can be default.

Object	Access	Description	Notes
AV-38	RW	Unit system	1: SI 2: Imperial
AV-82	RW	Percentage of CO2 sensor value in CO2 VOC Mix signal	0...100% i.e.: 25%: CO2 VOC Mix = 25% CO2 und 75% VOC

## 2.6 General Registers

Via the following analog value objects general device information can be read out and written.

Object	Access	Description	Notes
AV-46	RW	Offset Device ID	Valid range: 0...4194175 Device ID = <b>Offset Device ID</b> + MAC Adresse
AV-47	RW	Unconfirmed COV	0: not active 1: active
AV-48	RW	Reset to default	Factory reset with value 9999

## 2.7 TLF Configuration

The TLF (Traffic Light Function) parameters can be adjusted via the analog value objects described below..

Object	Access	Description	Notes
AV-62	RW	Channel assignment for TLF (Available sensor values are type-dependent)	Defines the sensor values signalised with the TLF function. 0: AI-0 (Temperature) 1: AI-1 (relative humidity) 2: AI-2 (absolute humidity) 3: AI-3 (Enthalpy) 4: AI-4 (Dew point) 5: AI-5 (CO2) 6: AI-6 (VOC) 7: AI-7 (CO2 VOC Mix)
AV-63	RW	Traffic light function LED range 1	0: LED OFF 1: LED green 2: LED yellow 3: LED red
AV-64	RW	Traffic light function LED range 2	
AV-65	RW	Traffic light function LED range 3	
AV-66	RW	Traffic light function threshold Range 1→2	Setting of thresholds for colour change of the TLF LED's. Indications are made in the corresponding basis units.
AV-67	RW	Traffic light function threshold Range 2→3	Example: Change from LED <b>green</b> to LED <b>yellow</b> at 750ppm. Change from LED <b>yellow</b> to <b>red</b> at 1250ppm:  <b>Channel assignment AV-62 = 5 (AI-5 CO2)</b> <b>Range 1, AV-63 = 1</b> <b>Range 2, AV-64 = 2</b> <b>Range 3, AV-65 = 3</b> <b>Threshold AV-66 = 750</b> <b>Threshold AV-67 = 1250</b>

### 3 BACnet PICS

#### BACnet Protocol Implementation Conformance Statement

Date:	04.03.2018
Vendor Name:	Thermokon Sensortechnik GmbH (Vendor ID: 396)
Product Names:	WRF06 AQ RS485 BACnet MS/TP FTW06 RS485 BACnet MS/TP
Firmware Revision:	1.1
Application Software Version:	1.1
BACnet Protocol Revision:	1.12
Product Description:	Sensor device with BACnet MS/TP RS485 interface.
BACnet Standardized Device Profile:	BACnet Smart Sensor (B-SS)

## 4 BACnet BIBBs

Supported BIBBS	BIBB Name
DS-RP-B	Data Sharing, Read Property, B
DS-RPM-B	Data Sharing, Read Property Multiple, B
DS-WP-B	Data Sharing, Write Property, B
DS-COVU-B	Data Sharing, COV Unsubscribed, B
DM-DOB-B	Device Management, Dynamic Object Binding, B
DM-DCC-B	Device Management, Device Communication Control, B
DM-DDB-B	Device Management, Dynamic Device Binding, B

### BACnet Standard Application Services Supported:

ReadProperty  
 ReadPropertyMultiple  
 WriteProperty  
 DeviceCommunicationControl  
 WhoHas  
 WhoIs

### Standard Object Types Supported:

Object-Type	Dynamically Creatable Deleteable	Optional Properties supported	Writable Properties
Analog Input	<input type="checkbox"/>	Description, COV Increment	COV Increment
Analog Value	<input type="checkbox"/>	Description	Present Value
Device	<input type="checkbox"/>	Description	Description

### Data Link Layer Option:

MS/TP master. Baud rate(s): [9600, 19200, 38400, 76800]

### Device Address Binding:

Is static device binding supported?

Yes

☐

No

☒

### Character Sets Supported:

UTF-8

### Special Functionality:

Maximum APDU size in octets: 480