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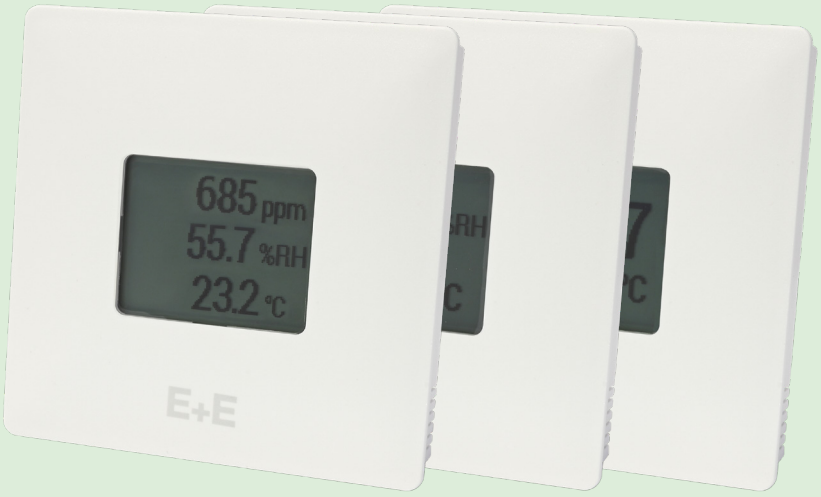
BACnet PICS
Room Sensor RS485

Protocol Implementation
Conformance Statement



BACnet

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Content

1 General Information

Date:	25.06.2021
Vendor Name:	E+E Elektronik
Product Name:	Roomsensor RS485
Product Model Number:	Roomsensor RS485 This is the generic denomination for Roomsensor devices with RS485 interface and BACnet MS/TP protocol. For type number of specific Roomsensor see the respective data sheet at www.epluse.com/cds201 | www.epluse.com/hts201 | www.epluse.com/tes201
Application Software Version:	1.0
Firmware Revision:	1.0
BACnet Protocol Version:	1
BACnet Protocol Revision:	14
Product Description:	CO_2, Temperature and Humidity BACNet MS/TP Smart Sensor Master device.

2 BACnet Standardized Device Profile (Annex L)

- ☐ BACnet Operator Workstation (B-OWS)
- ☐ BACnet Advanced Operator Workstation (B-AWS)
- ☐ BACnet Operator Display (B-OD)
- ☐ BACnet Building Controller (B-BC)
- ☐ BACnet Advanced Application Controller (B-AAC)
- ☐ BACnet Application Specific Controller (B-ASC)
- ☒ BACnet Smart Sensor (B-SS)
- ☐ BACnet Smart Actuator (B-SA)

3 List of all Supported BACnet Interoperability Building Blocks (Annex K)

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-Unsolicited – B
DM-DDB-B	…	Data Management – Dynamic Device Binding – B
DM-DOB-B	…	Data Management – Dynamic Object Binding – B
DM-DCC-B	…	Data Management – Device Communication Control – B
DM-RD-B	…	Data Management – Reinitialize Device – B

4 Segmentation Capability

- ☐ Able to transmit segmented messages
- ☐ Able to receive segmented messages

5 BACnet Standard Object types Supported

- ☐ Accumulator
- ☒ Analog Input
- ☐ Analog Output
- ☐ Analog Value
- ☐ Averaging
- ☐ Binary Input
- ☐ Binary Output
- ☐ Binary Value
- ☐ Calendar
- ☐ Command
- ☒ Device
- ☐ Event Enrollment
- ☐ File
- ☐ Group
- ☐ Life Safety Point
- ☐ Life Safety Zone
- ☐ Loop
- ☐ Multistate Input
- ☐ Multistate Output
- ☐ Multistate Value
- ☐ Notification Class
- ☐ Program
- ☐ Pulse Converter
- ☐ Schedule
- ☐ Trend Log

6 Data Link Layer Options

- ☐ BACnet IP, (Annex J):
- ☐ BACnet IP, (Annex J), Foreign Device:
- ☐ ISO 8802-3, Ethernet (Clause 7):
- ☐ ATA 878.1, 2.5 Mb. ARCNET (Clause 8):
- ☐ ATA 878.1, EIA-485 ARCNET (Clause 8), baud rate(s):
- ☒ MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200
- ☐ MS/TP slave (Clause 9), baud rate(s):
- ☐ Point-To-Point, EIA 232 (Clause 10), baud rate(s):
- ☐ Point-To-Point, modem, (Clause 10), baud rate(s):
- ☐ LonTalk, (Clause 11), medium:
- ☐ BACnet/Zigbee (Annex O):
- ☐ Other:

7 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

8 Networking Options

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

Does the BBMD support registrations by Foreign Devices? ☐ Yes ☐ No

Does the BBMD support network address translation? ☐ Yes ☐ No

9 Network Security Options

- ☒ Non-secure Device - is capable of operating without BACnet Network Security
- ☐ Secure Device - is capable of using BACnet Network Security (NS-SD BIBB)
  - ☐ Multiple Application-Specific Keys
  - ☐ Supports encryption (NS-ED BIBB)
  - ☐ Key Server (NS-KS BIBB)

10 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

11 Connected Transmitter Differences

BACnet Objects	TES201	HTS201	CDS201
Device Object	☒	☒	☒
Analog Input Object: Temperature	☒	☒	☒
Analog Input Object: Relative Humidity		☒	☒
Analog Input Object: Dew Point temperature		☒	☒
Analog Input Object: CO_2 (Average)			☒
Analog Input Object: CO_2 (Raw)			☒

12 BACnet Objects

This part describes the various BACnet objects in detail. In the following sections the main properties of the individual objects are explained.

12.1 Device Object:

Property	Data Type	Initial Value	R/O/P	Persistence
Object Identifier	BACnetObjectIdentifier	Unique Object Instance (0 – 4194302)	R (W)	Non Volatile
Object Name	CharacterString[15]	“TES201_XXXXXXXX” “HTS201_XXXXXXXX” “CDS201_XXXXXXXX” (X … Unique characters)	R (W)	Non Volatile
Object Type	BACnetObjectType (Enum.)	OBJECT_DEVICE	R (R)	Fixed
Description	CharacterString[15]	“Roomsensor”	O (W)	Non Volatile
System Status	BACnetDeviceStatus (Enum.)	STATUS_OPERATIONAL	R (R)	Volatile
Vendor Name	CharacterString	“E+E Elektronik”	R (R)	Fixed
Vendor Identifier	Unsigned16	623	R (R)	Fixed
Model Name	CharacterString	“TES201” “HTS201” “CDS201”	R (R)	Fixed
Firmware Revision	CharacterString	“1.0”	R (R)	Fixed
Application Software Version	CharacterString	“1.0”	R (R)	Fixed
Location	CharacterString[15]	“AUT”	O (W)	Non Volatile
Protocol Version	Unsigned	1	R (R)	Fixed
Protocol Revision	Unsigned	14	R (R)	Fixed
Protocol Services Supported	BACnetProtocolServices Supported (Bit-String)	Read Property Read Property Multiple Write Property Device Comm. Control Reinitialize Device Who-Is Who-Has	R (R)	Fixed
Protocol Object Types Supported	BACnetObjectTypes Supported (Bit-String)	Device Analog Input	R (R)	Fixed
Object List	BACnetARRAY[N] of BACnetObjectIdentifier	TES201: Device Object AI0 (Temperature) HTS201: Device Object AI0 (Temperature) AI1 (Relative Humidity) AI2 (Dew Point Temp.) CDS201: Device Object AI0 (Temperature) AI1 (Relative Humidity) AI2 (Dew Point Temp.) AI3 (CO_2 Average) AI4 (CO_2 Raw)	R (R)	Fixed

Property	Data Type	Initial Value	R/O/P	Persistence
Property List	BACnetARRAY[N] of BACnetPropertyIdentifier	System Status, Vendor Name, Vendor Identifier, Model Name, Firmware Revision, Application Software Version, Location, Description, Protocol Version, Protocol Revision, Protocol Services Supported, Protocol Object Types Supported, Object List, Max APDU Length Accepted, APDU Timeout, Segmentation Supported, Number of APDU Retries, Device Address Binding, Database Revision, Max Info Frames, Max Master, 512 (proprietary prop.: Comm. Settings)	R (W)	Fixed
Max APDU Length Accepted	Unsigned16	480	R (R)	Fixed
Segmentation Supported	BACnetSegmentation (Enum.)	NO_SEGMENTATION	R (R)	Fixed
APDU Timeout	Unsigned	3000	R (R)	Fixed
Number of APDU Retries	Unsigned	3	R (R)	Fixed
Device Address Binding	List of BACnetAddressBinding	NULL	R (R)	Fixed
Database Revision	Unsigned	0	R (W)	Non Volatile
Max Info Frames	Unsigned	1	O (R)	Fixed
Max Master	Unsigned	127	O (W)	Non Volatile
Communication Parameter	CharacterString	“38400-8n1”	P (W)	Non Volatile

R (R) … Required Property (Readable)

R (W) … Required Property (Read-/Writable)

O (R) … Optional Property (Readable)

O (W) … Optional Property (Read-/Writeable)

P (R) … Proprietary Property (Readable)

P (W) … Proprietary Property (Read-/Writeable)

Max Master:

The maximum “Max Master” value is 127. This value is writable via BACnet write property.

Communication Parameter:

To change the RS485 communication parameters it’s important to be careful of the character string format. The string consists of various parts:

1. Baud rate (9600, 19200, 38400, 57600, 76800, 115200)
2. “-“
3. Number of data bits (8)
4. Parity (none)
5. Number of stop bits (1)

Example:

- Change parameters to: Baud = 76800, 8 data bits, no parity, 1 stop bit:

String: “76800-8n1”

ATTENTION: Don’t forget the terminating 0 in the end of the string!

12.2 Analog Input Objects

Each analog input object has the same structure.

Property	Data Type	Initial Value	R/O/P	Persistence
Object Identifier	BACnetObjectIdentifier	0 … Temperature 1 … Relative Humidity 2 … Dew Point Temp. 3 … CO_2 Average 4 … CO_2 Raw	R	Fixed
Object Name	CharacterString	“T” … Temperature “RH”… Rel. Humidity “Td” … Dew Pnt. Temp. “CO2” … CO_2 Average “CO2raw” … CO_2 Raw	R	Fixed
Description	CharacterString	(see below)	O	Fixed
Object Type	BACnetObjectType (Enum.)	OBJECT_ANALOG_INPUT	R	Fixed
Present Value	Real	0.0	R (W) a.)	Volatile
Status Flags	BACnetStatusFlags (Bit-String)	false, false, false, false	R	Volatile
Event State	BACnetEventState	NORMAL	R	Volatile
Out of Service	Boolean	false	R (W)	Volatile
Units	BACnetEngineeringUnits (Enum.)	(see below)	R (W)	Non Volatile
Reliability	BACnetReliability (Enum.)	NO_FAULT_DETECTED	R (W) a.)	Volatile
COV Increment	Real	Not a Number (NaN)	O (W)	Non Volatile
Property List	BACnetARRAY[N] of BACnetPropertyIdentifier		R (R)	Fixed

a.) When “Out of Service” flag is true, value is writable.

The following table lists the possible object descriptions depending on the set units:

Measurand	Description		
T	“Temperature [deg. C]”	“Temperature [deg. F]”	“Temperature [deg. K]”
RH	“Relative humidity [%rH]”	-	-
Td	“Dew point temp. [deg. C]”	“Dew point temp. [deg. F]”	“Dew point temp. [deg. K]”
CO_2 average	“CO2 [ppm]”	-	-
CO_2 raw	“CO2 raw [ppm]”	-	-

Present Value:

This property represents the actual sensor or actual calculation value. When the “Out of Service” flag is true, this value is writable. The default values when “Out of Service” is set are 50.0.

Status Flags:

The following table describes the possible states of the “Status Flags” property:

Flag	State	Reason
IN_ALARM	false	Value of “Event State” property is NORMAL (0)
	true	Value of “Event State” property is not NORMAL (0)
FAULT	false	Value of “Reliability” property is NO_FAULT_DETECTED
	true	Value of “Reliability” property is not NO_FAULT_DETECTED
OVERRIDDEN	false	Always false
OUT_OF_SERVICE	false	“Present Value” and “Reliability” properties are not writeable via BACnet
	true	“Present Value” and “Reliability” properties are writeable via BACnet

Event State:

The following table describes the possible states of the “Event State” property:

State	Reason
NORMAL (0)	Value of “Reliability” property is NO_FAULT_DETECTED
FAULT (1)	Value of “Reliability” property is not NO_FAULT_DETECTED

Units:

The following table lists the possible units for each analog input object:

Measurand	Units		
T	Degrees Celsius (62)	Degrees Fahrenheit (64)	Degrees Kelvin (63)
RH	Relative Humidity (29)	-	-
Td	Degrees Celsius (62)	Degrees Fahrenheit (64)	Degrees Kelvin (63)
CO_2	Parts per Million (96)	-	-
CO_2raw	Parts per Million (96)	-	-

Reliability:

The following table describes the possible states of the “Reliability” property:

State	Reason
NO_FAULT_DETECTED (0)	No fault detected
NO SENSOR (1)	Sensor is damaged or not connected

COV Increment:

Default value is NaN (not a number). When the “COV Increment” value is NaN or greater than 1,000,000,000.0 then COV reporting is disabled.

13 Misc Information

Reinitialize Device (RD):

The RD function is used to restart/ reboot the entire device via BACnet. To use reinitialize device functionality a password is needed. The password is: “BACnet123”.

Device Communication Control (DCC):

The DCC functionality is used to stop initiating messages on the BACnet network. After receiving a DCC stop initiate message, the device does not response to a request any more, except to RD or DCC requests. The use of the device communication control functionality is password protected. The password is: “BACnet123”.

Unsolicited COV Reporting:

When COV reporting is activated, a BACnet message is broadcasted every time when the difference between actual “Present Value” and the previous measured “Present Value” since last COV message exceeds the “COV Increment” value. Since no subscription list is supported, the COV message is always broadcasted. This function is useful for many BACnet clients which need the same information of one BACnet device (e.g. room temperature, room humidity, …).

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