



E E ELEKTRONIK EE212D Modular Humidity and Temperature Sensor Instruction Manual

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GENERAL INFORMATION

- **Date:** 02.06.2022
- **Vendor Name:** E+E Elektronik
- **Product Name:** EE212D
- **Product Model Number:** EE212D

This is the generic denomination for EE212 devices with digital output (RS485) and BACnet MS/TP protocol.

For type number of specific EE212D devices see the respective data sheet at:

https://www.epluse.com/fileadmin/data/product/ee212/datasheet_EE212.pdf

- **Application Software Version:** 2.0
- **Firmware Revision:** 2.0
- **BACnet Protocol Version:** 1
- **BACnet Protocol Revision:** 14

Product Description:

Humidity and Temperature BACNet MS/TP Smart Sensor Master device EE212D.

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)

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-BData 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-BData Management – Reinitialize Device – B

SEGMENTATION CAPABILITY

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

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

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:

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
- 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

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)

CHARACTER SETS SUPPORTED

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

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

TRANSMITTER DIFFERENCES

- BACnet Objects.
- Device Object.
- Analog Input Object: Temperature .
- Analog Input Object: Relative Humidity .
- Analog Input Object: Water Vapor Partial Pressure .
- Analog Input Object: Dew Point temperature .
- Analog Input Object: Absolute humidity .
- Analog Input Object: Mixing Ratio.
- Analog Input Object: Enthalpy.
- Analog Input Object: Frost Point Temperature.
- Analog Input Object: Wet Bulb Temperature.

BACNET OBJECTS

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

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]	“EE212D_XXXXXXXX”(X ... Unique characters)	R (W)	Non Volatile
Object Type	BACnetObjectType (Enum.)	OBJECT_DEVICE	R (R)	Fixed
Description	CharacterString[15]	“EE212D”	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	“EE212D”	R (R)	Fixed
Firmware Revision	CharacterString	“2.0”	R (R)	Fixed
Application Software Version	CharacterString	“2.0”	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 PropertyRead Property Multiple Write PropertyDevice Comm. Control Reinitialize Device Unconfirmed COV Who-IsWho-Has	R (R)	Fixed
Protocol Object Types Supported	BACnetObjectTypes Supported (Bit-String)	Device Analog Input	R (R)	Fixed
Object List	BACnetARRAY[N] of BACnetPropertyIdentifier	EE212D: Device ObjectAI0 (Temperature)AI1 (Relative Humidity) AI2 (Water Vap. Press.) AI3 (Dew Point Temp.) AI4 (Absolute Humidity) AI5 (Mixing Ratio)AI6 (Enthalpy)AI7 (Frost Point Temp.) AI8 (Wet Bulb Temp.)	R (R)	Fixed
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 Retrievals, Device Address Binding, Database Revision,Max Info Frames, Max Master,512 (proprietary prop.: Comm.Settings)	R (R)	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-/Writable)
- P (R) Proprietary Property (Readable)
- P (W)..... Proprietary Property (Read-/Writable)

Max Master Property:

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

Communication Parameter:

For changing the RS485 communication parameters it is relevant to observe the character string format.

The character string consists of following 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: The character string shall end with the terminating 0.

Analog Input Objects

All analog input object have the same structure:

Property	Data Type	Initial Value	R/O/P	Persistence
Object Identifier	BACnetObjectIdentifier	0 ... Temperature 1 ... Relative Humidity 2 ... Water Vap. Press. 3 ... Dew Point Temp. 4 ... Absolute Humidity 5 ... Mixing Ratio 6 ... Enthalpy 7 ... Frost Point Temp. 8 ... Wet Bulb Temp.	R	Fixed
Object Name	CharacterString	“T” ... Temperature “RH”... Rel. Humidity “e” ... Wat. Vap. Press. “Td” ... Dew Pnt. Temp. “dv” ... Abs. Humidity “r” ... Mixing Ratio “h” ... E nthalpy “Tf” ... Frost Pnt. Temp. “Tw” ... Wet Bulb Temp.	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 BACnetPro pertyIdentifier		R (R)	Fixed

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

- R (**R**) Required Property (Readable)
- R (**W**) Required Property (Read-/Writable)
- O (**R**)..... Optional Property (Readable)
- O (**W**) Optional Property (Read-/Writable)
- P (**R**) Proprietary Property (Readable)
- P (**W**)..... Proprietary Property (Read-/Writable)

Description Property:

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

Initial Value	Alternative 1	Alternative 2
"Temperature [deg. C]"	"Temperature [deg. F]"	"Temperature [deg. K]"
"Relative humidity [%rH]"		
"Water vapor partial pressure [mbar]"	"Water vapor partial pressure [psi]"	
"Dew point temperature [deg. C]"	"Temperature [deg. F]"	"Temperature [deg. K]"
"Absolute humidity [g/m3]"	"Absolute humidity [g/ft3]"	
"Mixing ratio [g/kg]"	"Mixing ratio [gr/lb]"	
"Enthalpy [kJ/kg]"	"Enthalpy [ft lbf/lb]"	"Enthalpy [BTU/lb]"
"Frost point temperature [deg. C]"	"Temperature [deg. F]"	"Temperature [deg. K]"
"Wet bulb temperature [deg. C]"	"Wet bulb temperature [deg. F]"	"Wet bulb temperature [deg. K]"

Present Value Property:

This property represents the actual measured value or actual calculated value. When the "Out of Service" flag is true, the Present Value Property is writable. The default Present Value Property is 50.0 when "Out of Service" is true.

Status Flags Property:

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 Property:

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 Property:

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

Initial Value	Alternative 1	Alternative 2
Degrees Celsius (62)	Degrees Fahrenheit (64)	Degrees Kelvin (63)
Relative Humidity (29)	–	–
Millibars (134)	Pounds Force per Square Inch (56)	–
Degrees Celsius (62)	Degrees Fahrenheit (64)	Degrees Kelvin (63)
Grams per Cubic Meter (217)	Grains per Cubic Foot (256)a.)	–
Grams per Kilogram (210)	Grains per Pound (257)a.)	–
Kilojoules per Kilogram Dry Air (149)	Footpound per Pound Dry Air (258)a.)	BTU per Pound Dry Air (24)
Degrees Celsius (62)	Degrees Fahrenheit (64)	Degrees Kelvin (63)
Degrees Celsius (62)	Degrees Fahrenheit (64)	Degrees Kelvin (63)

a.) Not an ASHRAE defined unit.

Reliability Property:

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 Property:

Default value is NaN (not a number). When the “COV Increment Property” is NaN or greater than 1000,000,000.0 then COV reporting is disabled.

MISCELLANEOUS INFORMATION

Reinitialize Device (RD):

The RD function is used to restart/ reboot the entire transmitter 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 respond 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. outdoor temperature)

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Documents / Resources

 PICS EE212D BACnet Protocol Implementation Conformance Statement 	E E ELEKTRONIK EE212D Modular Humidity and Temperature Sensor [pdf] Instruction Manual EE212D Modular Humidity and Temperature Sensor, EE212D, Modular Humidity and Temperature Sensor, Humidity and Temperature Sensor, Temperature Sensor, Sensor
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