



PICS EE160D & EE210D
BACnet Protocol
Implementation
Conformance Statement

YOUR PARTNER IN SENSOR TECHNOLOGY



ELEKTRONIK®
Ges.m.b.H.

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1. GENERAL INFORMATION

Date: 28.10.2014
Vendor Name: E+E Elektronik
Product Name: EE210D or EE160D
Product Model Number: EE210D or EE160D

These are is the generic denominations for EE210 or EE160 devices with digital output (RS485) and BACnet MS/TP protocol. For type number of specific EE210D or EE160D devices see the respective data sheets at:
www.epluse.com/fileadmin/data/product/ee210/Datasheet_EE210.pdf
www.epluse.com/fileadmin/data/product/ee160/Datasheet_EE160.pdf

Application Software Version: 1.8
Firmware Revision: 1.8
BACnet Protocol Version: 1
BACnet Protocol Revision: 10

Product Description:

Humidity and Temperature BACNet MS/TP Smart Sensor Master device EE210D or EE160D (derived from EE210D).

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

- | | | |
|--|--|---|
| <input type="checkbox"/> Accumulator | <input type="checkbox"/> Command | <input type="checkbox"/> Multistate Output |
| <input checked="" type="checkbox"/> Analog Input | <input checked="" type="checkbox"/> Device | <input type="checkbox"/> Multistate Value |
| <input type="checkbox"/> Analog Output | <input type="checkbox"/> Event Enrollment | <input type="checkbox"/> Notification Class |
| <input type="checkbox"/> Analog Value | <input type="checkbox"/> File | <input type="checkbox"/> Program |
| <input type="checkbox"/> Averaging | <input type="checkbox"/> Group | <input type="checkbox"/> Pulse Converter |
| <input type="checkbox"/> Binary Input | <input type="checkbox"/> Life Safety Point | <input type="checkbox"/> Schedule |
| <input type="checkbox"/> Binary Output | <input type="checkbox"/> Life Safety Zone | <input type="checkbox"/> Trend Log |
| <input type="checkbox"/> Binary Value | <input type="checkbox"/> Loop | |
| <input type="checkbox"/> Calendar | <input type="checkbox"/> Multistate Input | |

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) SO 10646 (UCS-4) JIS X 0208

11. TRANSMITTER DIFFERENCES

| BACnet Objects | EE210D | EE160D |
|---|-------------------------------------|-------------------------------------|
| Device Object | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Analog Input Object: Temperature | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Analog Input Object: Relative Humidity | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Analog Input Object: Water Vapor Partial Pressure | <input checked="" type="checkbox"/> | |
| Analog Input Object: Dew Point temperature | <input checked="" type="checkbox"/> | |
| Analog Input Object: Absolute humidity | <input checked="" type="checkbox"/> | |
| Analog Input Object: Mixing Ratio | <input checked="" type="checkbox"/> | |
| Analog Input Object: Enthalpy | <input checked="" type="checkbox"/> | |
| Analog Input Object: Frost Point Temperature | <input checked="" type="checkbox"/> | |

12. BACNET OBJECTS

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

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] | “EE210D_XXXXXXXX” “EE160D_XXXXXXXX” (X ... Unique characters) | R (W) | Non Volatile |
| Object Type | BACnetObjectType (Enum.) | OBJECT_DEVICE | R (R) | Fixed |
| Description | CharacterString[15] | “EE210D” “EE160D” | 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 | “EE210D” “EE160D2” | R (R) | Fixed |
| Firmware Revision | CharacterString | “1.8” | R (R) | Fixed |
| Application Software Version | CharacterString | “1.8” | R (R) | Fixed |
| Location | CharacterString[15] | “AUT” | O (W) | Non Volatile |
| Protocol Version | Unsigned | 1 | R (R) | Fixed |
| Protocol Revision | Unsigned | 10 | R (R) | Fixed |
| Protocol Services Supported | BACnetProtocolServices Supported (Bit-String) | Read Property Read Property Multiple Write Property Device Comm. Control Reinitialize Device Unconfirmed COV 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 BACnetPbjectIdentifier | EE210D: Device Object AI0 (Temperature) AI1 (Relative Humidity) AI2 (Water Vap. Press.) AI3 (Dew Point Temp.) AI4 (Absolute Humidity) AI5 (Mixing Ratio) AI6 (Enthalpy) AI7 (Frost Point Temp.) EE160D: Device Object AI0 (Temperature) AI1 (Relative Humidity) | 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-/Writeable)
- P (R)..... Proprietary Property (Readable)
- P (W)..... Proprietary Property (Read-/Writeable)

Max Master Property:

The maximum “Max Master” Property is 127. This Property is writable via BACnet.

Communication Parameter Property:

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 (7, 8)
4. Parity (no, even, odd)
5. Number of stop bits (1, 2)

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.

12.2 Analog Input Objects

All analog input object have the same structure. The only difference between the EE210D and the EE160D transmitter is the count of the analog input objects (see 11).

| 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. | 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” ... Enthalpy “Tf” ... Frost Pnt. 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 |

a.) When “Out of Service” flag is true, value is 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/m^3]” | “Absolute humidity [g/ft^3]” | |
| “Mixing ratio [g/kg]” | “Mixing ratio [g/lb]” | |
| “Enthalpy [kJ/kg]” | “Enthalpy [ft lbf/lb]” | “Enthalpy [BTU/lb]” |
| “Frost point temperature [deg. C]” | “Temperature [deg. F]” | “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) | Grams 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) |

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.

13. MISCELLANEOUS INFORMATION

Reinitialize Device (RD):

The RD function is used to restart/ reboot the entire transmitter via BACnet. A password is required for using the RD function. The password is: “BACnet123”.

Device Communication Control (DCC):

The DCC function is used to stop initiating messages on the BACnet network. After receiving a DCC stop initiate message, the device does not respond to any request any longer, except to RD or DCC requests. The use of the DCC function 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 and the previous “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 necessary when several BACnet clients need same information from one certain B



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