PICS EE650D & EE660D
BACnet Protocol Implementation
Conformance Statement
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1. GENERAL INFORMATION

Date: 04.07.2018
Vendor Name: E+E Elektronik
Product Name: EE650D or EE660D
Product Model Number: EE650D or EE660D

These are the generic denominations for EE650 or EE660 devices with digital output (RS485) and BACnet MS/TP protocol. For type number of specific EE650D or EE660D devices see the respective data sheets at:

Application Software Version: 1.0
Firmware Revision: 1.0
BACnet Protocol Version: 1
BACnet Protocol Revision: 10

Product Description:
Air velocity BACNet MS/TP Smart Sensor Master device EE650D ("high flow type", 0-20m/s) or EE660D ("low flow type", 0-2m/s, derived from EE650D).

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
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

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6. DATA LINK LAYER OPTIONS

- 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. BACNET OBJECTS

This part describes the various BACnet objects in detail (initial values for EE660D in brackets). In the following sections the main properties of the individual objects are explained.

### 11.1 Device Object

<table>
<thead>
<tr>
<th>Property</th>
<th>Data Type</th>
<th>Initial Value</th>
<th>R/O/P</th>
<th>Persistence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object Identifier</td>
<td>BACnetObjectIdentifier</td>
<td>Unique Object Instance (0 – 4194302)</td>
<td>R (W)</td>
<td>Non Volatile</td>
</tr>
<tr>
<td>Object Name</td>
<td>CharacterString[15]</td>
<td>“EE650D_XXXXXXXX” or “EE660D_XXXXXXXX” (X … Unique characters)</td>
<td>R (W)</td>
<td>Non Volatile</td>
</tr>
<tr>
<td>Object Type</td>
<td>BACnetObjectType (Enum.)</td>
<td>OBJECT_DEVICE</td>
<td>R (R)</td>
<td>Fixed</td>
</tr>
<tr>
<td>Description</td>
<td>CharacterString[15]</td>
<td>“EE650D” (“EE660D”)</td>
<td>O (W)</td>
<td>Non Volatile</td>
</tr>
<tr>
<td>System Status</td>
<td>BACnetDeviceStatus (Enum.)</td>
<td>STATUS_OPERATIONAL</td>
<td>R (R)</td>
<td>Volatile</td>
</tr>
<tr>
<td>Vendor Name</td>
<td>CharacterString</td>
<td>“E+E Elektronik”</td>
<td>R (R)</td>
<td>Fixed</td>
</tr>
<tr>
<td>Vendor Identifier</td>
<td>Unsigned16</td>
<td>623</td>
<td>R (R)</td>
<td>Fixed</td>
</tr>
<tr>
<td>Model Name</td>
<td>CharacterString</td>
<td>“EE650D” (“EE660D”)</td>
<td>R (R)</td>
<td>Fixed</td>
</tr>
<tr>
<td>Firmware Revision</td>
<td>CharacterString</td>
<td>“1.0”</td>
<td>R (R)</td>
<td>Fixed</td>
</tr>
<tr>
<td>Application Software Version</td>
<td>CharacterString</td>
<td>“1.0”</td>
<td>R (R)</td>
<td>Fixed</td>
</tr>
<tr>
<td>Location</td>
<td>CharacterString[15]</td>
<td>“AUT”</td>
<td>O (W)</td>
<td>Non Volatile</td>
</tr>
<tr>
<td>Protocol Version</td>
<td>Unsigned</td>
<td>1</td>
<td>R (R)</td>
<td>Fixed</td>
</tr>
<tr>
<td>Protocol Revision</td>
<td>Unsigned</td>
<td>10</td>
<td>R (R)</td>
<td>Fixed</td>
</tr>
<tr>
<td>Protocol Services Supported</td>
<td>BACnetProtocolServices Supported (Bit-String)</td>
<td>Read Property, Read Property Multiple, Write Property, Device Comm. Control, Reinitialize Device, Who-Is, Who-Has</td>
<td>R (R)</td>
<td>Fixed</td>
</tr>
<tr>
<td>Protocol Object Types Supported</td>
<td>BACnetObjectTypes Supported (Bit-String)</td>
<td>Device, Analog Input</td>
<td>R (R)</td>
<td>Fixed</td>
</tr>
<tr>
<td>Object List</td>
<td>BACnetARRAY[N] of BACnetObjectIdentifier</td>
<td>EE650D and EE660D: Analog Input AI0 (Temperature) AI1 (Air velocity)</td>
<td>R (R)</td>
<td>Fixed</td>
</tr>
<tr>
<td>Max APDU Length Accepted</td>
<td>Unsigned16</td>
<td>480</td>
<td>R (R)</td>
<td>Fixed</td>
</tr>
<tr>
<td>Segmentation Supported</td>
<td>BACnetSegmentation (Enum.)</td>
<td>NO_SEGMENTATION</td>
<td>R (R)</td>
<td>Fixed</td>
</tr>
<tr>
<td>APDU Timeout</td>
<td>Unsigned</td>
<td>3000</td>
<td>R (R)</td>
<td>Fixed</td>
</tr>
<tr>
<td>Number of APDU Retries</td>
<td>Unsigned</td>
<td>3</td>
<td>R (R)</td>
<td>Fixed</td>
</tr>
<tr>
<td>Device Address Binding</td>
<td>List of BACnetAddressBinding</td>
<td>NULL</td>
<td>R (R)</td>
<td>Fixed</td>
</tr>
<tr>
<td>Database Revision</td>
<td>Unsigned</td>
<td>0</td>
<td>R (W)</td>
<td>Non Volatile</td>
</tr>
<tr>
<td>Max Info Frames</td>
<td>Unsigned</td>
<td>1</td>
<td>O (R)</td>
<td>Fixed</td>
</tr>
<tr>
<td>Max Master</td>
<td>Unsigned</td>
<td>127</td>
<td>O (W)</td>
<td>Non Volatile</td>
</tr>
<tr>
<td>Communication Parameter</td>
<td>CharacterString</td>
<td>“9600-8n1”</td>
<td>P (W)</td>
<td>Non Volatile</td>
</tr>
</tbody>
</table>

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:**
The maximum “Max Master” Property 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 (fixed: 8)
4. Parity (fixed: no)
5. Number of stop bits (fixed: 1)

Example:
• Change parameters to: Baud = 38400, 8 data bits, no parity, 1 stop bit:
  String: “38400-8n1”

ATTENTION: The character string shall end with the terminating 0.

11.2 Analog Input Objects

Each analog input object has the same structure. It is the same for both EE650D and EE660D.

<table>
<thead>
<tr>
<th>Property</th>
<th>Data Type</th>
<th>Initial Value</th>
<th>R/O/P</th>
<th>Persistence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object Identifier</td>
<td>BACnetObjectIdentifier</td>
<td>0 … Temperature 1 … Air velocity</td>
<td>R</td>
<td>Fixed</td>
</tr>
<tr>
<td>Object Name</td>
<td>CharacterString</td>
<td>“T” … Temperature “v” … Air velocity</td>
<td>R</td>
<td>Fixed</td>
</tr>
<tr>
<td>Description</td>
<td>CharacterString</td>
<td>(see below)</td>
<td>O</td>
<td>Fixed</td>
</tr>
<tr>
<td>Object Type</td>
<td>BACnetObjectType (Enum.)</td>
<td>OBJECT_ANALOG_INPUT</td>
<td>R</td>
<td>Fixed</td>
</tr>
<tr>
<td>Present Value</td>
<td>Real</td>
<td>0.0</td>
<td>R (W)</td>
<td>Volatile</td>
</tr>
<tr>
<td>Status Flags</td>
<td>BACnetStatusFlags (Bit-String)</td>
<td>false, false, false, false</td>
<td>R</td>
<td>Volatile</td>
</tr>
<tr>
<td>Event State</td>
<td>BACnetEventState</td>
<td>NORMAL</td>
<td>R</td>
<td>Volatile</td>
</tr>
<tr>
<td>Out of Service</td>
<td>Boolean</td>
<td>false</td>
<td>R (W)</td>
<td>Volatile</td>
</tr>
<tr>
<td>Units</td>
<td>BACnetEngineeringUnits (Enum.)</td>
<td>(see below)</td>
<td>R (W)</td>
<td>Non Volatile</td>
</tr>
<tr>
<td>Reliability</td>
<td>BACnetReliability (Enum.)</td>
<td>NO_FAULT_DETECTED</td>
<td>R (W)</td>
<td>Volatile</td>
</tr>
</tbody>
</table>

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

Description Property:
The following table shows the possible object descriptions depending on the selected units:

<table>
<thead>
<tr>
<th>Initial Value</th>
<th>Alternative 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Air velocity [m/s]”</td>
<td>“Air velocity [ft/min]”</td>
</tr>
</tbody>
</table>

Present Value Property:
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 Property:**
The following table describes the possible states of the “Status Flags” property:

<table>
<thead>
<tr>
<th>Flag</th>
<th>State</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN_ALARM</td>
<td>false</td>
<td>Value of “Event State” property is NORMAL (0)</td>
</tr>
<tr>
<td></td>
<td>true</td>
<td>Value of “Event State” property is not NORMAL (0)</td>
</tr>
<tr>
<td>FAULT</td>
<td>false</td>
<td>Value of “Reliability” property is NO_FAULT_DETECTED</td>
</tr>
<tr>
<td></td>
<td>true</td>
<td>Value of “Reliability” property is not NO_FAULT_DETECTED</td>
</tr>
<tr>
<td>OVERRIDDEN</td>
<td>false</td>
<td>Always false</td>
</tr>
<tr>
<td>OUT_OF_SERVICE</td>
<td>false</td>
<td>“Present Value” and “Reliability” properties are not writeable via BACnet</td>
</tr>
<tr>
<td></td>
<td>true</td>
<td>“Present Value” and “Reliability” properties are writeable via BACnet</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>State</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORMAL (0)</td>
<td>Value of “Reliability” property is NO_FAULT_DETECTED</td>
</tr>
<tr>
<td>FAULT (1)</td>
<td>Value of “Reliability” property is not NO_FAULT_DETECTED</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Initial Value</th>
<th>Alternative 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degrees Celsius (62)</td>
<td>Degrees Fahrenheit (64)</td>
</tr>
<tr>
<td>Velocity Meter per Second (74)</td>
<td>Velocity Feet per Minute (77)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>State</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO_FAULT_DETECTED (0)</td>
<td>No fault detected</td>
</tr>
<tr>
<td>NO SENSOR (1)</td>
<td>Sensor is damaged or not connected</td>
</tr>
</tbody>
</table>

12. 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 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”.