

TEC2645-2, TEC26x6(H)-2, and TEC26x7(VVT)-2 Series Network Thermostat Protocol Implementation Conformance Statement

Technical Bulletin

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TEC2645-2, TEC26x6(H)-2, TEC26x7(VVT)-2

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Document Introduction

This document contains the Protocol Implementation Conformance Statement (PICS) and BACnet® Interoperability Building Blocks (BIBBs) for the Network Thermostat as required by the American National Standards Institute/American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ANSI/ASHRAE) Standard 135-2001, BACnet protocol.

The PICS is a written document created by the manufacturer of a device to identify the particular options specified in the BACnet standard and implemented in the device.

BACnet Interoperability Building Blocks are collections of one or more BACnet services. This document includes a listing of the BIBBs currently supported by the Network Thermostat.

Annex A - Protocol Implementation Conformance Statement (Normative)

Table 1: BACnet Protocol Implementation Conformance Statement

Date	December 9, 2005
Vendor Name	Johnson Controls, Inc.
Product Name	TEC2645-2, TEC26x6(H)-2, TEC26x7(VVT)-2 Thermostat Series
Product Model Numbers	TEC2645-2, TEC2616-2, TEC2616H-2, TEC2626-2, TEC2626H-2, TEC2636-2, TEC2636H-2, TEC2646-2, TEC2646-2ME, TEC2646H-2, TEC2656-2, TEC2656H-2, TEC2627-2, TEC2627VVT-2, TEC2647-2, TEC2647VVT-2
Applications Software Version	Not Applicable
Firmware Version	1.2.05
BACnet Protocol Revision	Version 1, Revision 2

Product Description

The TEC2645-2, TEC26x6(H)-2, and TEC26x7(VVT)-2 Series BACnet communicating thermostats are for heating and cooling equipment specifically designed to be monitored on a BACnet Master-Slave/Token-Passing (MS/TP) network.

BACnet Standardized Device Profile (Annex L)

- BACnet Operator Workstation (B-OWS)
- 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)

Note: For a complete listing of the additional BIBBs supported (Annex K), see the *Annex K - BACnet Interoperability Building Blocks (BIBBs) (Normative)* section of this document.

Segmentation Capability

- Segmentation Requests Supported Window Size 127
- Segmentation Responses Supported Window Size 127

Standard Object Types Supported

The following is a list of the standard object types as defined by ASHRAE. See the section in this document for the supported object type for details.

- 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
- Schedule
- Trend Log

Analog Input

Table 2: Analog Input

Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Properties
<input type="checkbox"/>	<input type="checkbox"/>	Reliability	Out of Service

Analog Value

Table 3: Analog Value

Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Properties
<input type="checkbox"/>	<input type="checkbox"/>	Reliability	Object Name ¹ Out of Service ² Present Value ³

1. For TEC26x6(H)-2 and TEC2645-2, Object Name is writable for Room Temperature (AV6) only. For TEC26x7(VVT)-2, Object Name is writable for Room Temperature (AV6) and Outdoor Temperature (AV8) only.
2. Out of Service is writable for every Analog Value object except PI Heating Demand (AV54) and PI Cooling Demand (AV55).
3. Present Value is writable for every Analog Value object except PI Heating Demand (AV54) and PI Cooling Demand (AV55).

Binary Input

Table 4: Binary Input

Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Properties
<input type="checkbox"/>	<input type="checkbox"/>	Active Text Inactive Text Reliability	Out of Service

Binary Value

Table 5: Binary Value

Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Properties
<input type="checkbox"/>	<input type="checkbox"/>	Active Text Inactive Text Reliability	Out of Service Present Value

Device

Table 6: Device

Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Properties
<input type="checkbox"/>	<input type="checkbox"/>	Max Info Frames Max Master	Max Master Object Identifier Object Name

Group

Table 7: Group

Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Properties
<input type="checkbox"/>	<input type="checkbox"/>	N/A	N/A

Multistate Value

Table 8: Multistate Value

Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Properties
<input type="checkbox"/>	<input type="checkbox"/>	Reliability States Text	Out of Service ¹ Present Value ²

- For TEC26x6(H)-2 and TEC2645-2, Out of Service is writable for every Multistate Value object except Heating Valve Status (MV66), Cooling Valve Status (MV67), and Fan Status (MV68). For TEC26x7(VVT)-2, Out of Service is writable for every Multistate Value object except Heating Valve Status (MV66) and Cooling Valve Status (MV67).
- For TEC26x6(H)-2 and TEC2645-2, Present Value is writable for every Multistate Value object except Heating Valve Status (MV66), Cooling Valve Status (MV67), and Fan Status (MV68). For TEC26x7(VVT)-2, Present Value is writable for every Multistate Value object except Heating Valve Status (MV66) and Cooling Valve Status (MV67).

Data Link Layer Option

- BACnet Internet Protocol (IP) (Annex J)
- BACnet IP (Annex J), Foreign Device
- ISO 8802-3, Ethernet (Clause 7)
- ANSI/ATA 878.1, 2.5 MB ARCNET network (Clause 8)
- ANSI/ATA 878.1, RS-485 ARCNET network (Clause 8), baud rates: _____
- Master-Slave/Token-Passing (MS/TP) master (Clause 9), baud rates: 9600, 19,200, 38,400, 76,800 (auto-detect)
- MS/TP slave (Clause 9), baud rates: _____
- Point-To-Point, EIA 232 (Clause 10), baud rates: _____
- Point-To-Point, modem (Clause 10), baud rates: _____
- LonTalk® protocol (Clause 11), medium: _____
- Other: _____

Device Address Binding

- Yes No **Is static device binding supported?** (required for two-way communication between MS/TP slaves and other devices)

Networking Options

- Router, Clause 6: _____
 - Annex H, BACnet Tunneling Router over IP
 - BACnet/IP Broadcast Management Device (BBMD)
- Does the BBMD support registrations by Foreign Devices? Yes No

Character Sets Supported

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

- | | | |
|--|---|--|
| <input checked="" type="checkbox"/> ANSI X3.4 | <input type="checkbox"/> IBM®/Microsoft® Double-Byte Character Set (DBCS) | <input type="checkbox"/> ISO 8859-1 |
| <input type="checkbox"/> ISO 10646 Universal Character Set-2 (UCS-2) | <input type="checkbox"/> ISO 10646 (UCS-4) | <input type="checkbox"/> Japanese Industrial Standard (JIS) C 6226 |

If this product is a communication gateway, describe the types of non BACnet equipment/network(s) that the gateway supports:

Objects Table

Table 9: Objects Table (Part 1 of 3)

Object Name	Type and Instance	Object Property	Thermostat Parameter													
			TEC2627-2 ¹	TEC2647-2 ¹	TEC2616-2	TEC2616H-2	TEC2626-2	TEC2626H-2	TEC2636-2	TEC2636H-2	TEC2646-2	TEC2646H-2	TEC2656-2	TEC2656H-2	TEC2645-2	
TEC26MM-AAA MM: last two digits of model number AAA: address of device on MS/TP network (from 4 to 127)	Device 7xbbb ²	Model_Name (R)	Thermostat model number (TEC2645, TEC26x6(H), TEC26x7)													
	bbb: address of device on MS/TP network (from 004 to 127)	Application_Software_Version (R)	Thermostat version													
		Object_Identifier (R,W)	Unique ID number of a device on a network													
		Object_Name (R,W)	Unique name of a device on a network													
		Max_Master (R,W)	Maximum master devices allowed to be part of the network													
Room Temperature	AV 6	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Room Temp Override	BV 7	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Outdoor Temperature	AV 8	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Room Humidity	AV 9	Present_Value (R,W)							X	X			X	X		
Room Humidity Override	BV 10	Present_Value (R,W)							X	X			X	X		
Dehumidification Lockout	BV 46	Present_Value (R,W)							X	X			X	X		
AUX Output	BV 47	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sequence of Operation	MSV 39	Present_Value (R, W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
System Mode	MSV 13	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fan Mode	MSV 14	Present_Value (R,W)			X	X	X	X	X	X	X	X	X	X	X	X
Occupancy	MSV 12	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Control Output	GRP 53	Present_Value (R)	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Table 9: Objects Table (Part 2 of 3)

Object Name	Type and Instance	Object Property	Thermostat Parameter														
			TEC2627-2 ¹	TEC2647-2 ¹	TEC2616-2	TEC2616H-2	TEC2626-2	TEC2626H-2	TEC2636-2	TEC2636H-2	TEC2646-2	TEC2646H-2	TEC2656-2	TEC2656H-2	TEC2645-2		
PI Heating Demand	AV 54	Present_Value (R)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PI Cooling Demand	AV 55	Present_Value (R)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Humidification Status	BV 56	Present_Value (R)								X	X			X	X		
Supply Temperature	AI 11	Present_Value (R)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Controller Status	GRP 64	Present_Value (R)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
AUX Status	BI 65	Present_Value (R)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Heating Valve Status	MSV 66	Present_Value (R)	X		X	X	X	X	X	X	X						
Cooling Valve Status	MSV 67	Present_Value (R)	X		X	X	X	X	X	X	X						
Fan Status	MSV 68	Present_Value (R)			X	X	X	X	X	X	X	X	X	X	X	X	X
BI 1 Status	BI 62	Present_Value (R)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BI 2 Status	BI 63	Present_Value (R)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
UI 3 Status	BI 64	Present_Value (R)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Controller Alarms	GRP 57	Present_Value (R)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Window Alarm	BI 58	Present_Value (R)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Filter Alarm	BI 59	Present_Value (R)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Service Alarm	BI 60	Present_Value (R)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Temperature Setpoints	GRP 48	Present_Value (R)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Occupied Heat Setpoint	AV 49	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Occupied Cool Setpoint	AV 50	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Unoccupied Heat Setpoint	AV 51	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Unoccupied Cool Setpoint	AV 52	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Keypad Lockout	MSV 40	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
General Options 1	GRP 15	Present_Value (R)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BI 1 Configuration	MSV 16	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
BI 2 Configuration	MSV 17	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
UI 3 Configuration	MSV 18	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Menu Scroll	BV 19	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Auto Mode Enable	BV 20	Present_Value (R,W)			X	X	X	X	X	X	X	X	X	X	X	X	X
Temperature Scale	BV 21	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pipe Number	MSV 22	Present_Value (R,W)			X	X	X	X	X	X	X	X	X	X	X	X	X
Out#1 Config	MSV 23	Present_Value (R,W)	X	X													
AUX Configuration	MSV 24	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
General Options 2	GRP 25	Present_Value (R)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fan Mode Sequence	MSV 26	Present_Value (R,W)			X	X	X	X	X	X	X	X	X	X	X	X	X
Heating Setpoint Limit	AV 27	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cooling Setpoint Limit	AV 28	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Setpoint Type	BV 29	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Table 9: Objects Table (Part 3 of 3)

Object Name	Type and Instance	Object Property	Thermostat Parameter														
			TEC2627-2 ¹	TEC2647-2 ¹	TEC2616-2	TEC2616H-2	TEC2626-2	TEC2626H-2	TEC2636-2	TEC2636H-2	TEC2646-2	TEC2646H-2	TEC2656-2	TEC2656H-2	TEC2645-2		
Temporary Occupancy Time	MSV 30	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Door Time	MSV 31	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Deadband	AV 32	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Reheat Time Base	BV 33	Present_Value (R,W)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Humidity Options	GRP 41	Present_Value (R)							X	X				X	X		
Relative Humidity (RH) Display	BV42	Present_Value (R,W)							X	X				X	X		
RH Setpoint	BV43	Present_Value (R,W)							X	X				X	X		
Dehumidification Hysteresis	AV 44	Present_Value (R,W)							X	X				X	X		
Dehumidification MaxCool	AV 45	Present_Value (R,W)							X	X				X	X		
Output Options	GRP 34	Present_Value (R)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Control Type	BV 35	Present_Value (R,W)	X				X	X	X	X							
Floating Motor Timing	MSV 36	Present_Value (R,W)	X				X	X	X	X							
On Off Control CPH	MSV 37	Present_Value (R,W)	X		X	X	X	X	X	X							
Direct Reverse Acting	BV 38	Present_Value (R,W)		X									X	X	X	X	X

1. The TEC2627VVT-2 and TEC2647VVT-2 models have the same characteristics as the The TEC2627-2 and TEC2647-2 models, respectively.
2. In the current TEC2600 series models, when x = 2, the 72bbb models refer to TEC26x7(VVT); when x = 3, the 73bbb models refer to TEC2645 and TEC26x6(H).

Annex K - BACnet Interoperability Building Blocks (BIBBs) (Normative)

Table 10 lists all the BIBBs which, per ANSI/ASHRAE Standard 135-2001, could be supported by a BACnet Application Specific Controller (B-ASC). The checked BIBBs are supported by the TEC2645-2, TEC26x6(H)-2, and TEC26x7(VVT)-2 Series controllers.

Table 10: BACnet Application Specific Controller BIBBs Support

Application Service (B-ASC)	Designation	Supported
Data Sharing - Read Property - B	DS-RP-B	<input checked="" type="checkbox"/>
Data Sharing - Read Property Multiple - B	DS-RPM-B	<input checked="" type="checkbox"/>
Data Sharing - Write Property - B	DS-WP-B	<input checked="" type="checkbox"/>
Device Management - Dynamic Device Binding - B	DM-DDB-B	<input checked="" type="checkbox"/>
Device Management - Dynamic Object Binding - B	DM-DOB-B	<input checked="" type="checkbox"/>
Device Management - Device Communication Control - B	DM-DCC-B	<input checked="" type="checkbox"/>

Table 11 lists all the BACnet standard application services. The checked services are supported by the TEC2645-2, TEC26x6(H)-2, and TEC26x7(VVT)-2 Series controllers.

Table 11: BACnet Standard Application Services Support (Part 1 of 2)

Application Service	Initiates Requests	Executes Requests
AcknowledgeAlarm	<input type="checkbox"/>	<input type="checkbox"/>
AddListElement	<input type="checkbox"/>	<input type="checkbox"/>
AtomicReadFile	<input type="checkbox"/>	<input type="checkbox"/>
AtomicWriteFile	<input type="checkbox"/>	<input type="checkbox"/>
ConfirmedCOVNotification	<input type="checkbox"/>	<input type="checkbox"/>
ConfirmedEventNotification	<input type="checkbox"/>	<input type="checkbox"/>
ConfirmedPrivateTransfer	<input type="checkbox"/>	<input type="checkbox"/>
ConfirmedTextMessage	<input type="checkbox"/>	<input type="checkbox"/>
CreateObject	<input type="checkbox"/>	<input type="checkbox"/>
DeleteObject	<input type="checkbox"/>	<input type="checkbox"/>
DeviceCommunicationControl	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Disconnect-Connection-To-Network	<input type="checkbox"/>	<input type="checkbox"/>
Establish-Connection-To-Network	<input type="checkbox"/>	<input type="checkbox"/>
GetAlarmSummary	<input type="checkbox"/>	<input type="checkbox"/>
GetEnrollmentSummary	<input type="checkbox"/>	<input type="checkbox"/>
GetEventInformation	<input type="checkbox"/>	<input type="checkbox"/>
I-Am	<input checked="" type="checkbox"/>	<input type="checkbox"/>
I-Am-Router-To-Network	<input type="checkbox"/>	<input type="checkbox"/>
I-Could-Be-Router-To-Network	<input type="checkbox"/>	<input type="checkbox"/>
I-Have	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Initialize-Routing-Table	<input type="checkbox"/>	<input type="checkbox"/>

Table 11: BACnet Standard Application Services Support (Part 2 of 2)

Application Service	Initiates Requests	Executes Requests
Initialize-Routing-Table-Ack	<input type="checkbox"/>	<input type="checkbox"/>
LifeSafetyOperation	<input type="checkbox"/>	<input type="checkbox"/>
ReadProperty	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ReadPropertyConditional	<input type="checkbox"/>	<input type="checkbox"/>
ReadPropertyMultiple	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ReadRange	<input type="checkbox"/>	<input type="checkbox"/>
ReinitializeDevice	<input type="checkbox"/>	<input type="checkbox"/>
RemoveListElement	<input type="checkbox"/>	<input type="checkbox"/>
SubscribeCOV	<input type="checkbox"/>	<input type="checkbox"/>
SubscribeCOVProperty	<input type="checkbox"/>	<input type="checkbox"/>
TimeSynchronization	<input type="checkbox"/>	<input type="checkbox"/>
UnconfirmedCOVNotification	<input type="checkbox"/>	<input type="checkbox"/>
UnconfirmedEventNotification	<input type="checkbox"/>	<input type="checkbox"/>
UnconfirmedPrivateTransfer	<input type="checkbox"/>	<input type="checkbox"/>
UnconfirmedTextMessage	<input type="checkbox"/>	<input type="checkbox"/>
UTCTimeSynchronization	<input type="checkbox"/>	<input type="checkbox"/>
VT-Close	<input type="checkbox"/>	<input type="checkbox"/>
VT-Data	<input type="checkbox"/>	<input type="checkbox"/>
VT-Open	<input type="checkbox"/>	<input type="checkbox"/>
Who-Has	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Who-Is	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Who-Is-Router-To-Network	<input type="checkbox"/>	<input type="checkbox"/>
WriteProperty	<input type="checkbox"/>	<input checked="" type="checkbox"/>
WritePropertyMultiple	<input type="checkbox"/>	<input type="checkbox"/>



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