# VN2000 Flow Meters

## BACnet® MS/TP Communication Protocol

## INTRODUCTION

BACnet MS/TP is a communication protocol for building automation and control networks for up to 128 devices on an EIA-485 wired system. The protocol is supported and maintained by the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Standing Standard Project Committee 135.

The VN2000 transmitter offers optional BACnet MS/TP communications with these features:

- The connection is not terminated and operates at 9600, 19.2k, 38.4k and 76.8k baud
- The maximum length is 4000 ft (1200 m)
- Valid MAC addresses are 0…127
- Valid device IDs (Device Object Identifiers) are 0…4194302

The baud rate, address and device ID can be programmed through the keypad interface in program mode level 2 (-C). See the VN2000 Transmitter user manual VRX-UM-02233-EN for setup and wiring instructions.

| Object Description | BACnet Object (Access Point) | Notes | Available Units |
|---|---|---|---|
| Reset Totalizer | BV-1 | Binary Value 1 | — |
| Flow Rate(Flow Model)<br>Energy Rate (BTU Model) | AI1 | Analog Input 1 | Gallons, Liters, Cubic Feet, Cubic Meters, Lb, Kg, BTU, KBTU, TON, TNN Per Second, Minute, Hour, Day |
| Net Totalizer | PIV-2 | Positive Integer Value 2 | |
| Temperature 1 | AI3 | Analog Input 3 | °C or °F |
| Temperature 2 (BTU) | AI4 | Analog Input 4 | °C or °F |
| Pressure | AI5 | Analog Input 5 | Psig or bar |

*Table 1: VN2000 BACnet object model*

## TEMPERATURE1 (AI-3)

For BTU/energy meters (where two temperatures are used), *Temperature* is the supply temperature. The register value will not be a live reading for meters that do not have an RTD temperature or are overwritten.

For Gas and BTU/energy meters, if the temperature is overridden with a manual temperature override, this register returns the value set in the manual temperature override.

For steam meters, if the temperature sensor is overwritten with a manual pressure input, the register value will be invalid.

## RETURN TEMPERATURE2 (AI-4)

For BTU/energy applications, *Return Temperature* reports the return temperature used in the BTU rate calculation determination. If the temperature is overridden with a manual temperature override, this register returns the value set in the manual temperature override.

## PRESSURE (AI-5)

For meters with a pressure input, *Pressure* reports the pressure used in the flow rate calculation.

For meters without a pressure input, the value will not be a live reading for meters.

For steam meters, if the temperature is overridden with a manual pressure input, this register returns the value set in the manual pressure override.

Similarly, for gas applications, if the pressure sensor is overridden with a manual pressure override, the register returns the value set in the manual pressure override.

Badger Meter

VRX-UM-02583-EN-03 (June 2022)

User Manual

# ANNEX A—PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (NORMATIVE)

## BACnet Protocol Implementation Conformance Statement

| | |
|---|---|
| **Date:** | 010/27/2017 |
| **Vendor Name:** | Badger Meter, Inc |
| **Product Name:** | Vortex Flow meter |
| **Product Model Number:** | VN2000 |
| **Application Software Version:** | 3.00 |
| **Firmware Revision:** | 14.01 |
| **BACnet Protocol Revision:** | 14 |
| **Product Description:** | Vortex flow meter |

Vortex Flow Meter Measure volumetric, mass flow rate or BTU/energy of steam, gas or liquids.

## 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)

## List all BACnet Interoperability Building Blocks Supported (Annex K)

- Data Sharing-ReadProperty-B (DS-RP-B)
- Data Sharing-WriteProperty-B (DS-WP-B)
- Data Sharing-ReadProperty Multiple-B (DS-RPM-B)
- Data Sharing-WriteProperty Multiple-B (DS-WPM-B)
- Device Management-Dynamic Device Binding-B (DM-DDB-B)
- Device Management-Dynamic Object Binding-B (DM-DOB-B)
- Device Management-DeviceCommunicationControl-B (DM-DCC-B)
- Device Management-Reinitialize Device-B (DM-RD-B)

## Segmentation Capability: (Segmentation is not supported)

☐ Segmented requests supported Window Size_____

☐ Segmented responses supported Window Size_____

## Standard Object Types Supported

- 1 Device Object
- 4 Analog Input Objects
- 1 Positive Integer Value Object
- 1 Binary Output Object

## Data Link Layer Options

☐ BACnet IP, (Annex J)

☐ BACnet IP, (Annex J), Foreign Device

☐ ISO 8802-3, Ethernet (Clause 7)

☐ ANSI/ATA 878 1, 2 5 Mb ARCNET (Clause 8)

☐ ANSI/ATA 878 1, RS-485 ARCNET (Clause 8), baud rate(s):_____

■ MS/TP master (Clause 9), baud rate(s): 19200, 38400, 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:_____

☐ 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

## Character Sets Supported

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

☐ ANSI X3 4 ☐ IBM ☐ Microsoft ☐ DBCS ☐ ISO 8859-1

☐ ISO 10646 (UCS-2) ☐ ISO 10646 (UCS-4) ☐ JIS C 6226 ■ UTF-8

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

Not supported

**Control. Manage. Optimize.**

Trademarks appearing in this document are the property of their respective entities. Due to continuous research, product improvements and enhancements, Badger Meter reserves the right to change product or system specifications without notice, except to the extent an outstanding contractual obligation exists. © 2022 Badger Meter, Inc. All rights reserved.

**www.badgermeter.com**