# BAS Integration Manual

# BACnet Snow/Ice Sensor Interface 681

The BACnet Snow/Ice Sensor Interface 681 communicates with a Building Automation System (BAS) using BACnet® MSTP.

This manual provides information about control parameters that can be accessed by building automation or management systems that use BACnet.




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# BACnet Protocol Implementation Conformance Statement (PICS)

**Vendor Name:** tekmar Control Systems Ltd.

**Vendor ID**: 585

**Product Name:** BACnet Snow/Ice Sensor Interface 681

**Product Model Number:** 681

**Application Software Version: J1297 Firmware Revision: 0.0.2 BACnet Protocol Revision: 14**

**Product Description:**

The 681 is a interface that automatically measures the presence of snow or ice and interfaces with a Building Automation System through BACnet to operate an automatic snow melting system.

| BACNET STANDARDIZED DEVICE PROFILE |
|---|
| BACnet Application Specific Controller (B-ASC) |

| SUPPORTED BIBBS (ANNEX K) | NAME |
|---|---|
| DS-RP-B | Data Sharing-ReadProperty-B |
| DS-RPM-B | Data Sharing-ReadPropertyMultiple-B |
| DS-WP-B | Data Sharing-WriteProperty-B |
| DM-DDB-B | Device Management-Dynamic Device Binding-B |
| DM-DOB-B | Device Management-Dynamic Object Binding-B |
| DM-DCC-B | Device Management-Device Communication Control-B |

*Device Communication Control password is tekmar1151.

| SEGMENTATION CAPABILITY | SUPPORTED | WINDOW SIZE |
|---|---|---|
| Able to transmit segmented messages | No | |
| Able to receive segmented messages | No | |

| STANDARD OBJECT TYPES SUPPORTED | CREATABLE | DELETABLE |
|---|---|---|
| Analog Input | No | No |
| Analog Value | No | No |
| Binary Input | No | No |
| Binary Value | No | No |
| Device | No | No |

| DATA LINK LAYER | SUPPORTED |
|---|---|
| BACnet MSTP | Yes |

| DEVICE ADDRESS BINDING | SUPPORTED |
|---|---|
| Static Device Address Binding | No |

| NETWORK SECURITY OPTIONS | |
|---|---|
| Non-secure Device | - |

| CHARACTER SET | SUPPORTED |
|---|---|
| ANSI X3.4 | Yes |

| DATA LINK LAYER OPTION | SUPPORTED |
|---|---|
| BACnet MSTP | Yes |

| SPECIAL FUNCTIONALITY | SUPPORTED |
|---|---|
| Maximum Address Size in Octets | Yes |

| DEVICE ADDRESS BINDING OPTION | SUPPORTED |
|---|---|
| Device Address Binding | No |

# BACnet MSTP Connection

| SERVICE NAME | INITIATE | EXECUTE |
|---|---|---|
| ReadProperty | - | Yes |
| ReadPropertyMultiple | - | Yes |
| DeviceCommunicationControl | - | Yes |
| Who-Is | - | Yes |
| I-Am | Yes | - |
| Who-Has | - | Yes |
| I-Have | Yes | - |

## BACnet-MSTP Connection

Use the 681 terminal block to connect a shielded twisted pair wire from the BACnet RS485 connection point. Wire the A, B & G conductors from the BACnet point to the 681 A, B & Ref terminals.

• Gnd should not be connected to the ground screws in the 681.

| STATUS FLAG | |
|---|---|
| In Alarm Flag | F |
| Fault Flag | F |
| Overridden Flag | F |
| Out of Service Flag | F/T |

| RELIABILITY | |
|---|---|
| No Fault | 0 |
| No Sensor | 1 |
| Open Loop | 4 |
| Shorted Loop | 5 |

## BACnet Analog Parameters

Analog Input Object = AI  Analog Value Object = AV  Read = R  Read/Write = R/W

| OBJECT ID | NAME | DATA TYPE | READ/ WRITE | STATUS FLAG | EVENT STATE | RELIABILITY | OUT OF SERVICE | UNITS | RANGE/ VALUE |
|---|---|---|---|---|---|---|---|---|---|
| Analog Input Objects | | | | | | | | | |
| 1 | Outdoor Air Temperature | AI | R | FFF(F/T) | Normal | 0, 1, 4, 5 | False or True | °F (64) | -76 to 266°F |
| 2 | Slab Temperature | AI | R | FFF(F/T) | Normal | 0, 1 | False or True | °F (64) | - |
| 3 | Slab Target Temperature | AI | R | FFF(F/T) | Normal | 0 | False or True | °F (64) | - |
| 4 | Error Code | AI | R | FFF(F/T) | Normal | 0 | False or True | No Units (95) | See Error Codes list |
| Analog Value Objects | | | | | | | | | |
| 1 | BAS Outdoor Air Temperature | AV | R/W | FFF(F/T) | Normal | - | False or True | °F (64) | -76 to 266°F |
| 2 | Melt Setpoint | AV | R/W | FFF(F/T) | Normal | - | False or true | °F (64) | 32 to 95°F |
| 3 | Snow/Ice Sensitivity | AV | R/W | FFF(F/T) | Normal | - | - | No Units (95) | 0 = Auto, 1 = Min, 2 = -2, 3 = -1, 4 = Mid, 5 = +1, 6 = +2, 7 = Max |
| 4 | Warm Weather Shut Down | AV | R/W | FFF(F/T) | Normal | - | False or True | °F (64) | 32 to 95°F |
| 5 | Cold Weather Cut Off | AV | R/W | FFF(F/T) | Normal | - | False or True | °F (64) | -30 to 50°F |

## BACnet Binary Parameters

Binary Input Object = BI  Binary Value Object = BV  Read = R  Write = W

| OBJECT ID | NAME | DATA TYPE | READ / WRITE | STATUS FLAG | EVENT STATE | OUT OF SERVICE | PRESENT VALUE |
|---|---|---|---|---|---|---|---|
| Binary Input Objects | | | | | | | |
| 1 | Snow Detected | BI | R/W | FFF/(F/T) | Normal | False or True | 0 = False<br>1 = True |
| 2 | Cold Weather Cut Off | BI | R/W | FFF(F/T) | Normal | False or True | 0 = False<br>1 = True |
| 3 | Warm Weather Shut Down | BI | R/W | FFF(F/T) | Normal | False or True | 0 = False<br>1 = True |
| 4 | Melt Pending Detected | BI | R/W | FFF(F/T) | Normal | False or True | 0 = False<br>1 = True |
| 5 | Wet Detected | BI | R/W | FFF(F/T) | Normal | False or True | 0 = False<br>1 = True |
| 6 | Sensor Mode | BI | R/W | FFF(F/T) | Normal | False or True | 0 = 090 Sensor Configured<br>1 = 095 Sensor Configured |

*BACnet Binary Parameters (continued)*

| OBJECT ID | NAME | DATA TYPE | READ / WRITE | STATUS FLAG | EVENT STATE | OUT OF SERVICE | PRESENT VALUE |
|---|---|---|---|---|---|---|---|
| *BACnet Binary Parameters (continued)* | | | | | | | |
| Binary Value Objects | | | | | | | |
| 1 | Outdoor Sensor Enable | BV | R/W | FFF(F/T) | Normal | False or True | 0 = BAS Outdoor Temperature<br>1 = Control Interface Sensor |
| 2 | Warm Weather Shut Down Type | BV | R/W | FFF(F/T) | Normal | False or True | 0 = Auto, 1 = Setting |
| 3 | Cold Weather Cut Off Type | BV | R/W | FFF(F/T) | Normal | False or True | 0 = Auto, 1 = Setting |
| 4 | Reset Snow Detection Request | BV | R/W | FFF(F/T) | Normal | False or True | 0 = Do nothing,<br>1 = Reset Snow Detection |

Refer to the *Installation & Operation Manual 681_D* for additional information.

## BACnet MSTP Troubleshooting

**If there is no communication, check the following:**

- Check that the polarity on the BACnet MSTP A & B terminals is correct.
- Check that BACnet MSTP Ref terminal is securely connected.
- Check that the baud rate is the same on both devices.

## BACnet MSTP Specification

| | |
|---|---|
| Communication Protocol | MSTP over RS-485 |
| Physical Layer | TIA-485 two-wire plus signal ground |
| Baud Rate | 9600, 19200, 38400, 57600, 76800, 115200 (default: 76800 bps) |
| Recommended Cable | 18 AWG Shielded Twisted pair (STP) |
| Maximum Cable Length | 9600 bps: 1200 meters (4000 feet)<br>19200 bps: 1200 meters (4000 feet)<br>38400 bps: 1200 meters (4000 feet)<br>57600 bps: 1200 meters (4000 feet)<br>76800 bps: 1200 meters (4000 feet)<br>115200 bps: 1000 meters (3280 feet) |
| Parity | Even (1 stop bit) |
| Addressing | 0 to 127 (default: 60) |

## Error Codes

| CODE | DESCRIPTION |
|---|---|
| 1 | Settings Memory Error |
| 2 | Local and BAS Outdoor Sensor Error |
| 3 | Slab Sensor Error |
| 4 | Snow Sensor Yellow Wire Error |
| 5 | Snow Sensor Blue Wire Error |
| 6 | Snow Sensor Brown Wire Error |
| 7 | Snow/Ice Sensor |
| 8 | Snow Sensor Error |

Detailed information on how to correct the error is included in the *Installation & Operation Manual 681_D* available at watts.com/tekmar

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