

MICROTRANS^{EQ}
MICROTRANS^{II}
SPM-3000
SPM-4000

BACnet Communication
Operation & Maintenance Manual

*Engineered for accuracy, applicability,
durability and simplicity*

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1. INTRODUCTION

1.1. DESCRIPTION

The MicroTrans^{EQ}, MicroTrans^{II}, SPM-3000 (Micro Guardian), SPM-4000 (Guardian Infinity), and SPM-4000 (Dual Controller), utilize the MS/TP (Master Slave / Token Passing) BACnet type protocol. BACnet is implemented using the EIA-485 signaling standards through a shielded twisted pair wire.

1.2. SAFETY

1.2.1. Electrical Connections

Before any electrical connections are made, ensure the **POWER SWITCH** is in the **OFF** position.

1.2.2. Static Electricity

The circuit board contains components which are susceptible to damage caused by static electrical discharge. Should it be necessary to remove the circuit board from the enclosure, appropriate precautions must first be taken to ensure that the operator and the circuit board are at the same electrical potential.

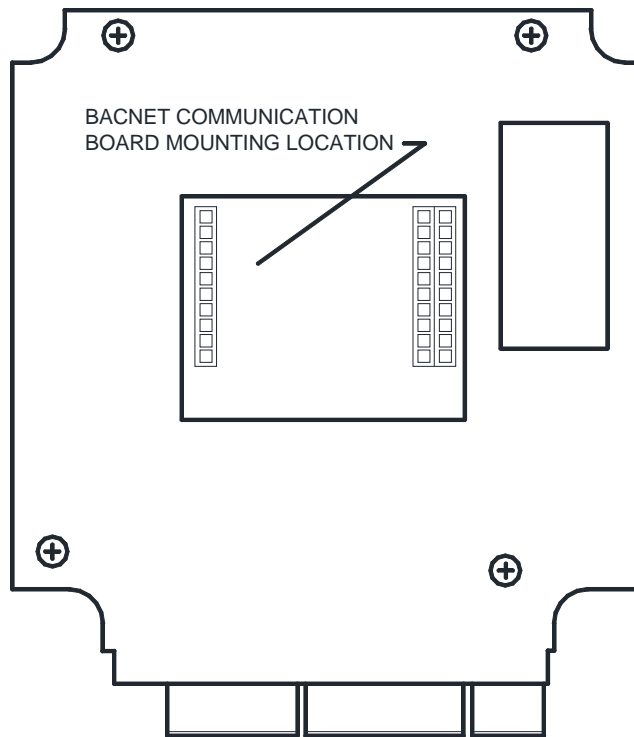
2. BACnet FIELD INSTALLATION

If a BACnet board is being added or replaced, follow the appropriate product installation instructions shown below.

2.1. MICROTRANS^{EQ} BACnet INSTALLATION INSTRUCTIONS

- Step 1. Remove the 4 cover screws
- Step 2. Verify MicroTrans^{EQ} power switch is in the OFF position.
- Step 3. Remove all removable wiring plugs from the MicroTrans^{EQ} board.
- Step 4. Remove the 4 MicroTrans^{EQ} board mounting screws and carefully flip the board over to view the back side.
- Step 5. Install the BACnet communication board making sure the connectors are aligned correctly and not offset (see drawing below).
- Step 6. Reinstall the MicroTrans^{EQ} board using the 4 mounting screws
- Step 7. Set MicroTrans^{EQ} power switch to the ON position.

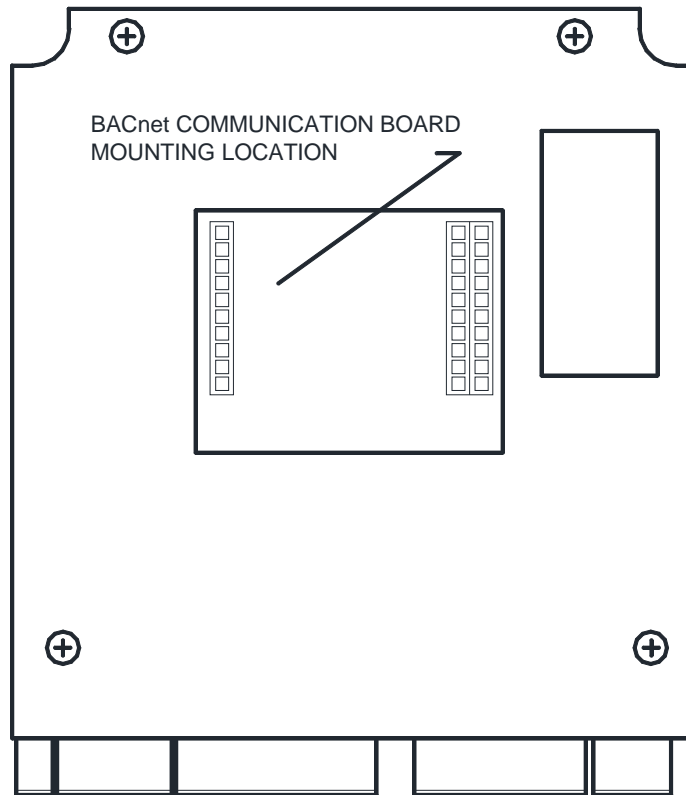
BACK SIDE OF MICROTRANS^{EQ} BOARD



2.2. MICROTRANS^{II} BACnet INSTALLATION INSTRUCTIONS

- Step 1. Remove the 4 cover screws
- Step 2. Verify MicroTrans^{II} power switch is in the OFF position.
- Step 3. Remove all removable wiring plugs from the MicroTrans^{II} board.
- Step 4. Remove the 4 MicroTrans^{II} board mounting screws and carefully flip the board over to view the back side.
- Step 5. Install the BACnet communication board making sure the connectors are aligned correctly and not offset (see drawing below).
- Step 6. Reinstall the MicroTrans^{II} board using the 4 mounting screws
- Step 7. Set MicroTrans^{II} power switch to the ON position.

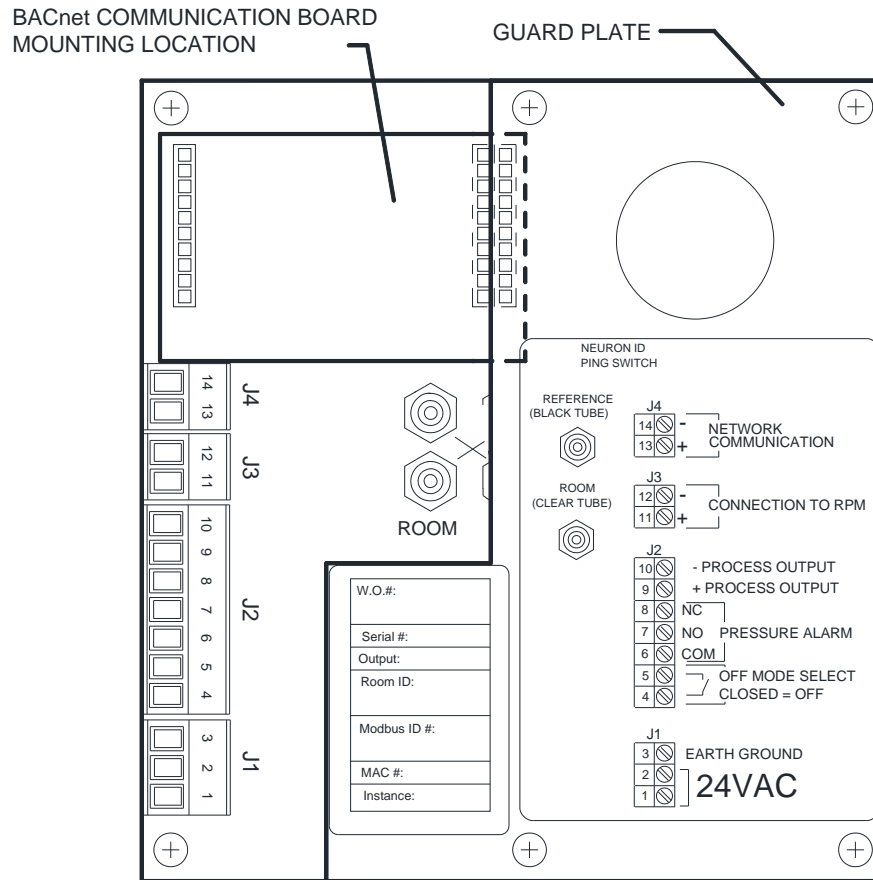
BACK SIDE OF MICROTRANS^{II} BOARD



2.3. SPM-3000 BACnet INSTALLATION INSTRUCTIONS

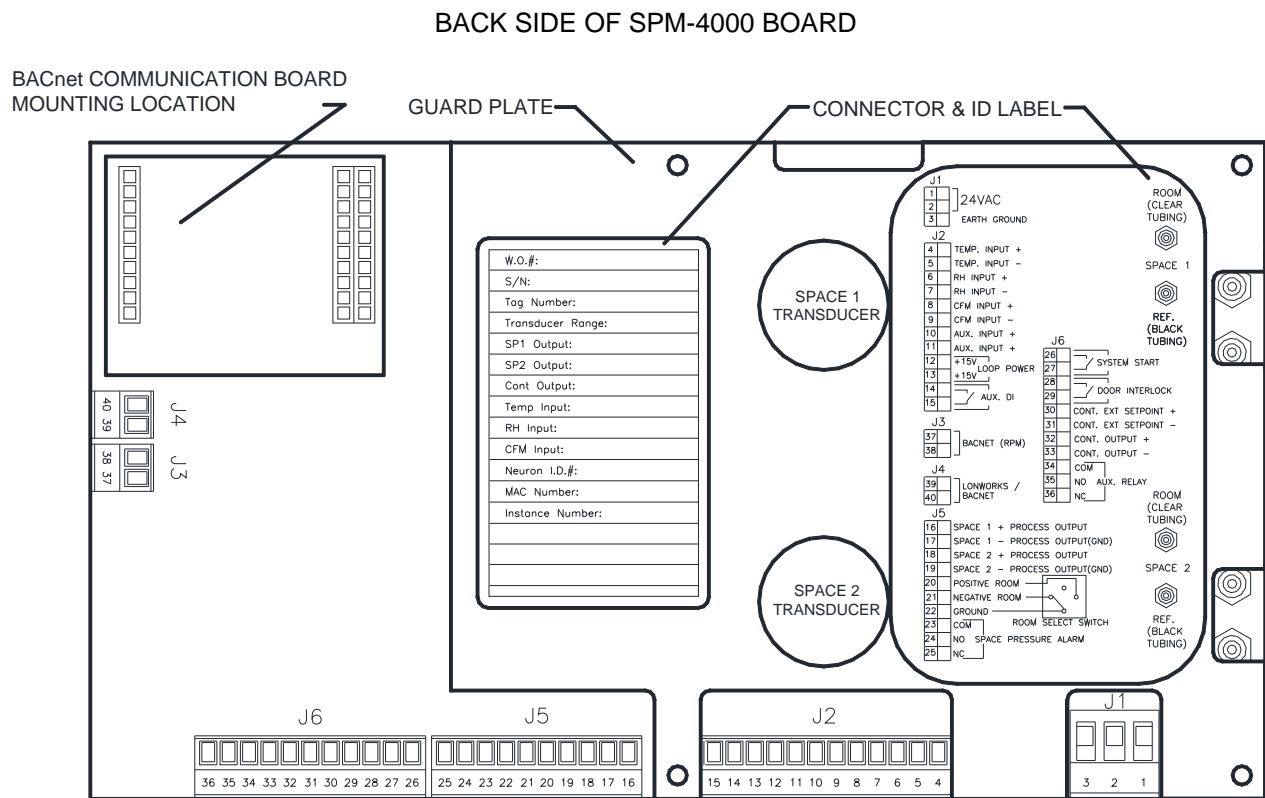
- Step 1. Remove the 4 cover screws
- Step 2. Verify SPM-3000 power switch is in the OFF position.
- Step 3. Remove the 4 countersink screws securing the SPM-3000 to the wall box.
- Step 4. Remove the SPM-3000 board and carefully flip the board over to view the back side.
- Step 5. Remove the 4 guard plate mounting screws and guard plate.
- Step 6. Install the BACnet communication board making sure the connectors are aligned correctly and not offset (see drawing below).
- Step 7. Reinstall the guard plate using the 4 mounting screws.
- Step 8. Reinstall the SPM-3000 board into the wall box using the 4 countersink mounting screws
- Step 9. Set SPM-3000 power switch to the ON position.

BACK SIDE OF SPM-3000 BOARD



2.4. SPM-4000 BACnet INSTALLATION INSTRUCTIONS

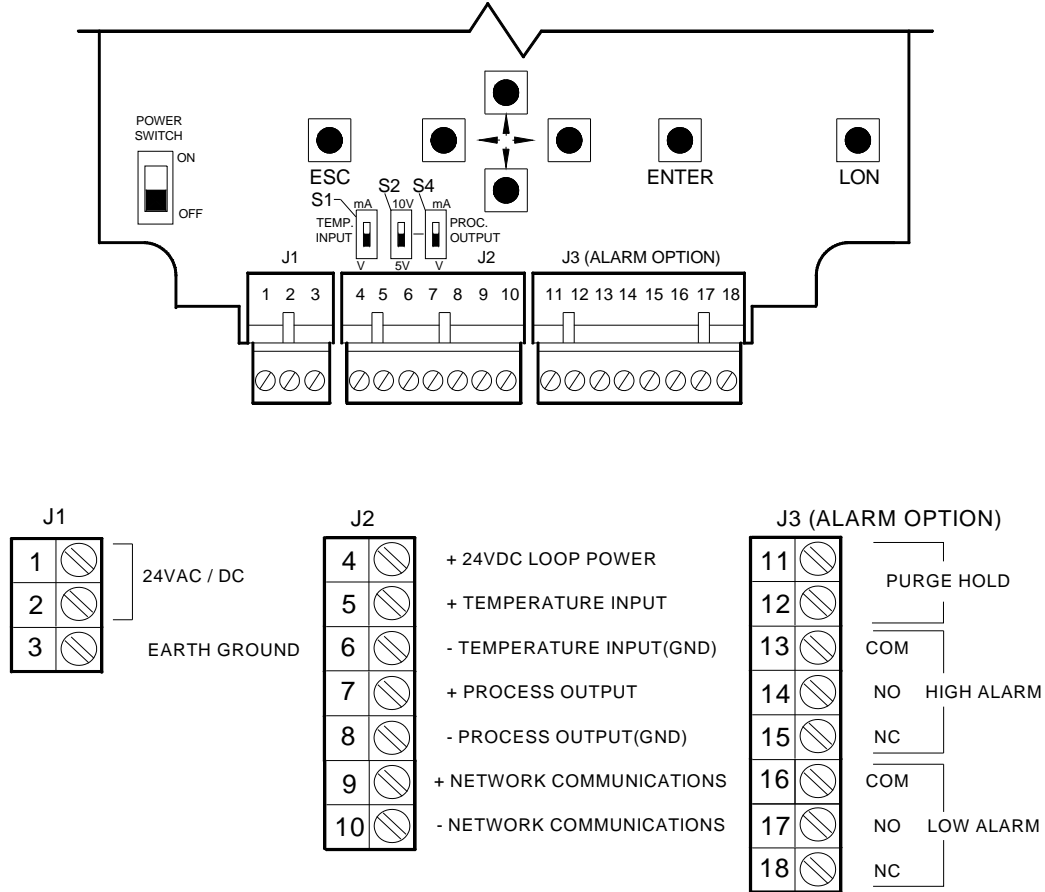
- Step 1. Remove the 6 cover screws
- Step 2. Verify SPM-4000 power switch is in the OFF position.
- Step 3. Remove the 6 countersink screws securing the SPM-4000 to the wall box.
- Step 4. Remove the SPM-4000 board and carefully flip the board over to view the back side.
- Step 5. Install the BACnet communication board making sure the connectors are aligned correctly and not offset (see drawing below).
- Step 6. Reinstall the SPM-4000 board into the wall box using the 6 countersink mounting screws
- Step 7. Set SPM-4000 power switch to the ON position.



3. BACnet FIELD CONNECTIONS

3.1. MICROTRANS^{EQ} BACnet CONNECTION

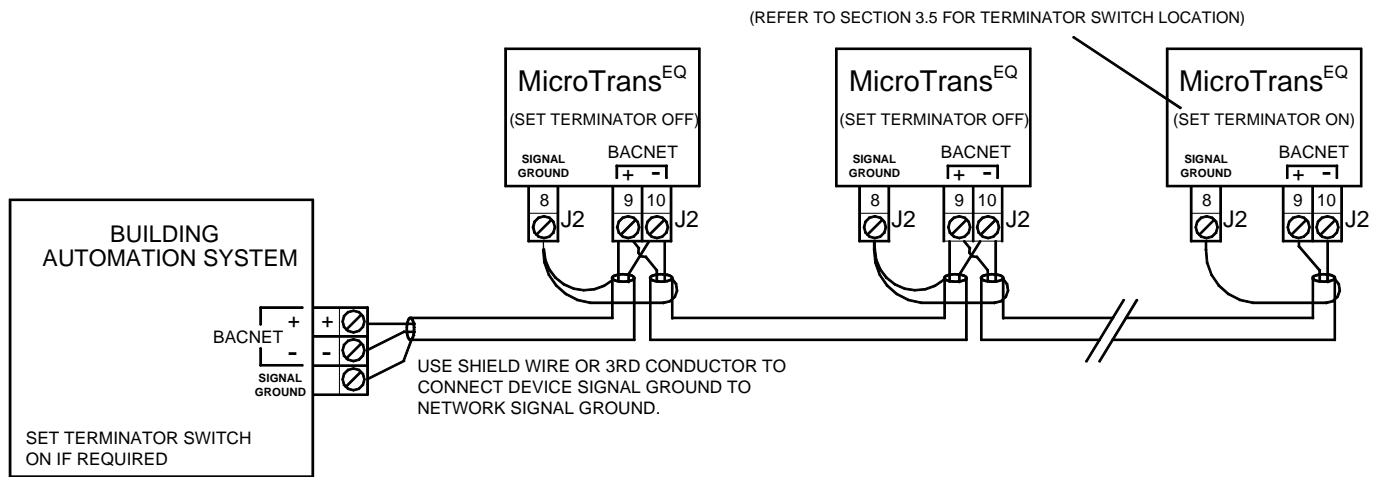
Attach the BACnet network to MicroTrans^{EQ} connector J2 pin 9 (Data B+) and pin 10 (Data A-).



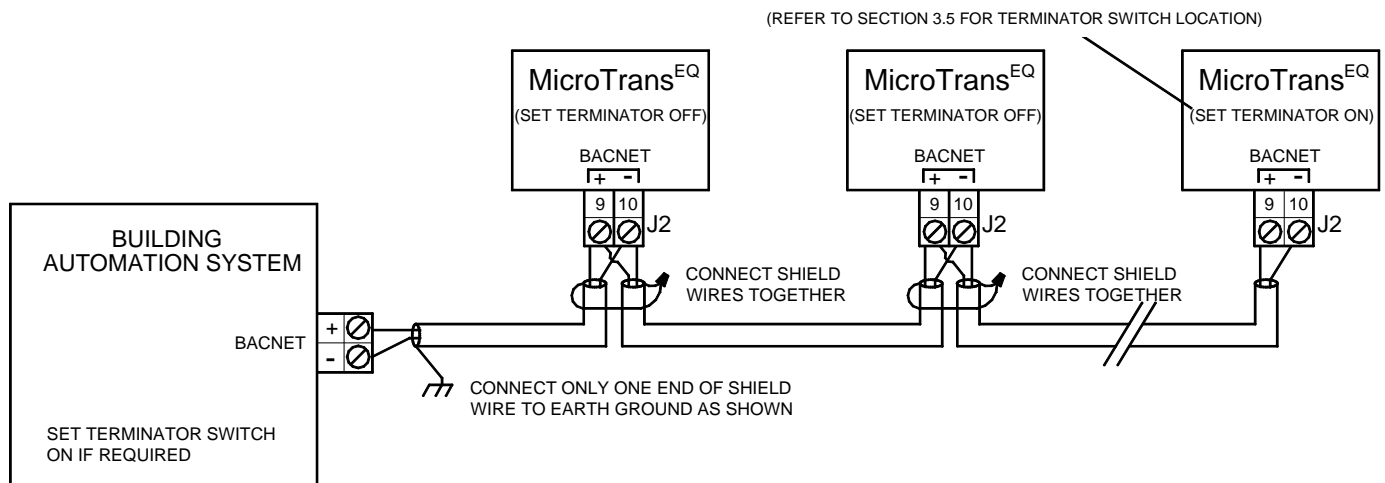
3.1.1. Connecting MicroTrans^{EQ} to a Network Communications Device That Requires Common Signal Grounds.

(Note: Network wire must be low capacitance, shielded 22 or 24 AWG twisted wire with PVC jacket such as Belden Part numbers 9841 for 2 wire conductor and 9925 for 3 wire conductor or equivalent. Recommended maximum wire length of 4,000 feet).

(Note: If using 2 conductor communication wire, use the shield wire to connect all device signal grounds together as shown in figure below. If using 3 conductor communication wire, use the 3rd conductor to connect all device signal grounds together and connect one side of the shield to earth ground.)

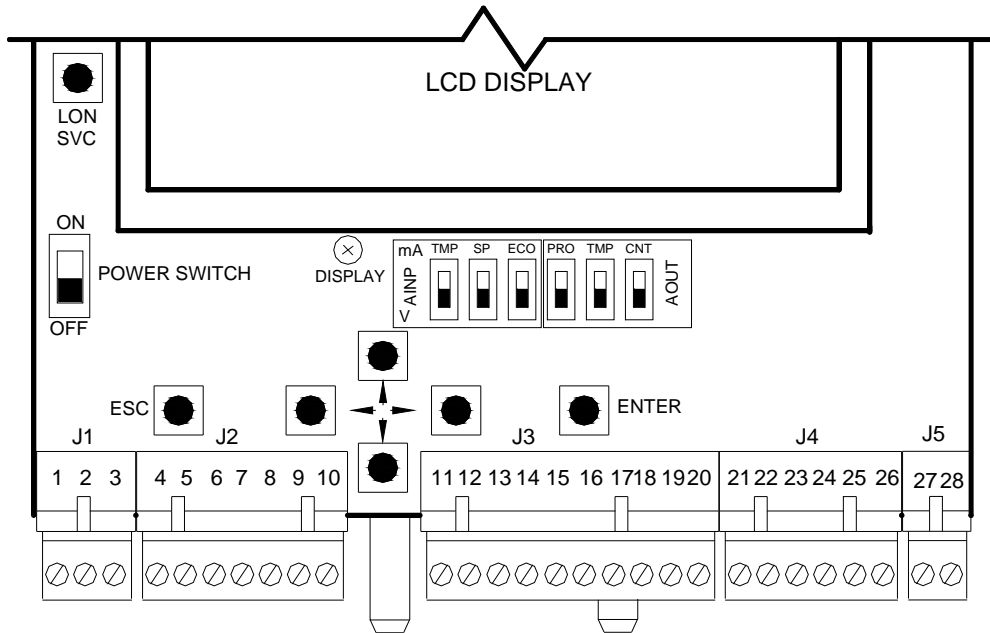


3.1.2. Connecting MicroTrans^{EQ} to a Network Communications Device Not Requiring Common Signal Grounds.



3.2. MICROTRANS^{II} BACnet CONNECTION

Attach the BACnet network to MicroTrans^{II} connector J5 pin 27 (Data +) and pin 28 (Data -).

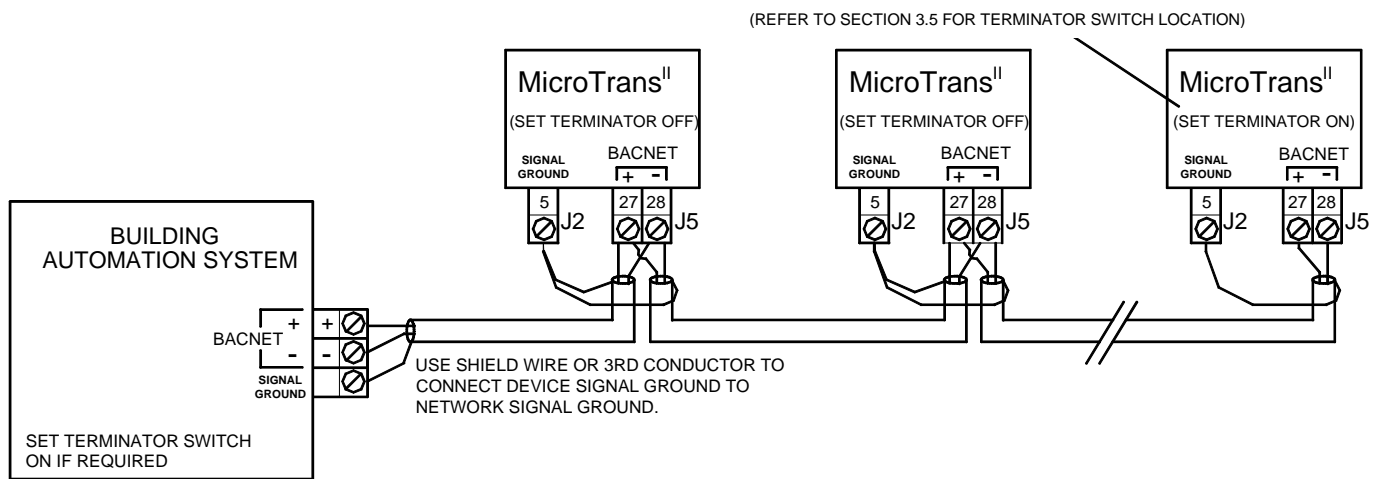


| Terminal | Description |
|----------|--------------------------|
| J1 1 | 24VAC / DC |
| J1 2 | |
| J1 3 | |
| J2 4 | + PROCESS OUTPUT |
| J2 5 | - PROCESS OUTPUT(GND) |
| J2 6 | + 24VDC LOOP POWER |
| J2 7 | + TEMPERATURE INPUT |
| J2 8 | - TEMPERATURE INPUT(GND) |
| J2 9 | + TEMP. OUTPUT |
| J2 10 | - TEMP. OUTPUT(GND) |
| J3 11 | + PURGE HOLD |
| J3 12 | - PURGE HOLD |
| J3 13 | + SYSTEM START |
| J3 14 | - SYSTEM START |
| J3 15 | + CONT. SP |
| J3 16 | - CONT. SP |
| J3 17 | + ECON. OVERRIDE |
| J3 18 | - ECON. OVERRIDE |
| J3 19 | + CONT. OUTPUT |
| J3 20 | - CONT. OUTPUT |
| J4 21 | COM |
| J4 22 | NO HIGH ALARM |
| J4 23 | NC |
| J4 24 | COM |
| J4 25 | NO LOW ALARM |
| J4 26 | NC |
| J5 27 | + NETWORK COMMUNICATIONS |
| J5 28 | - NETWORK COMMUNICATIONS |

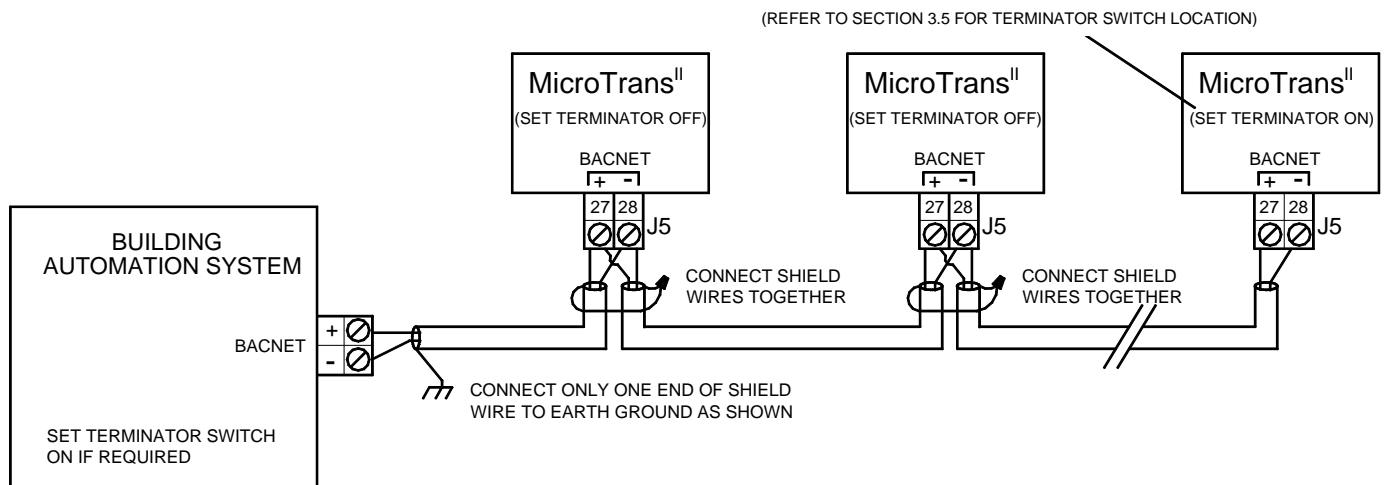
3.2.1. Connecting MicroTrans^{II} to a Network Communications Device That Requires Common Signal Grounds.

(Note: Network wire must be low capacitance, shielded 22 or 24 AWG twisted wire with PVC jacket such as Belden Part numbers 9841 for 2 wire conductor and 9925 for 3 wire conductor or equivalent. Recommended maximum wire length of 4,000 feet).

(Note: If using 2 conductor communication wire, use the shield wire to connect all device signal grounds together as shown in figure below. If using 3 conductor communication wire, use the 3rd conductor to connect all device signal grounds together and connect one side of the shield to earth ground.)

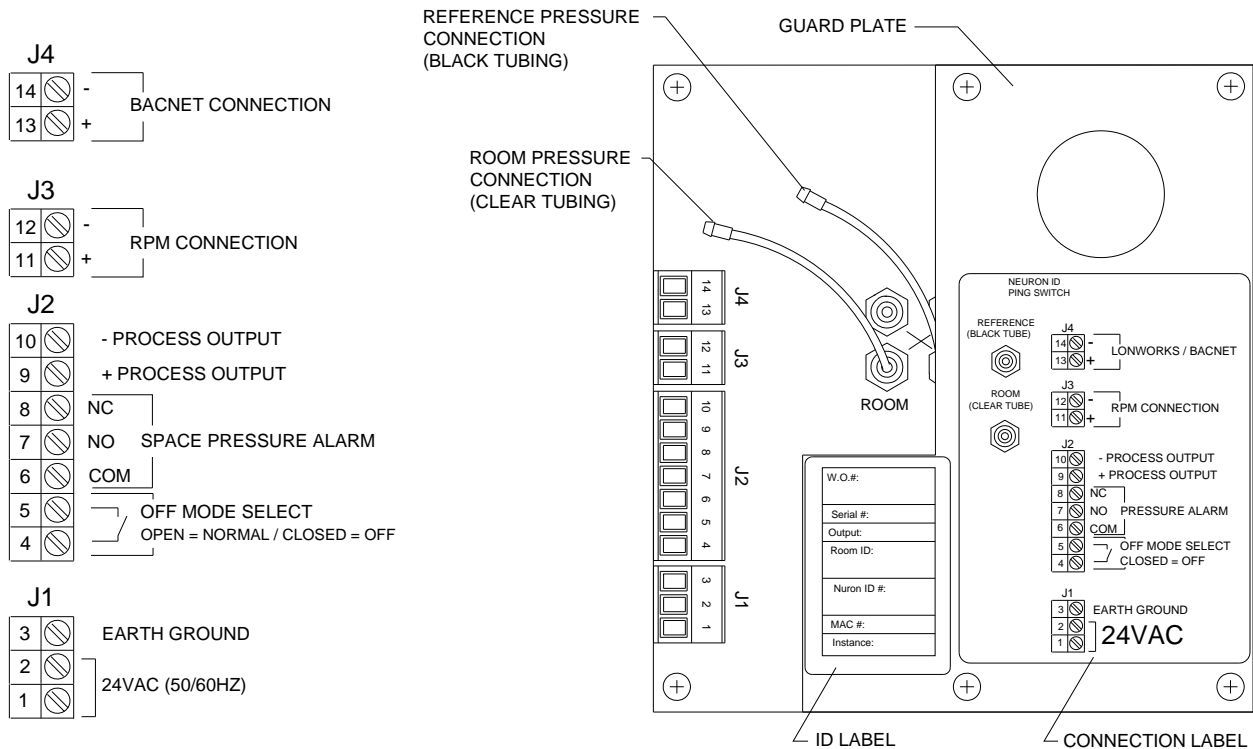


3.2.2. Connecting MicroTrans^{II} to a Network Communications Device Not Requiring Common Signal Grounds.



3.3. SPM-3000 BACnet CONNECTION

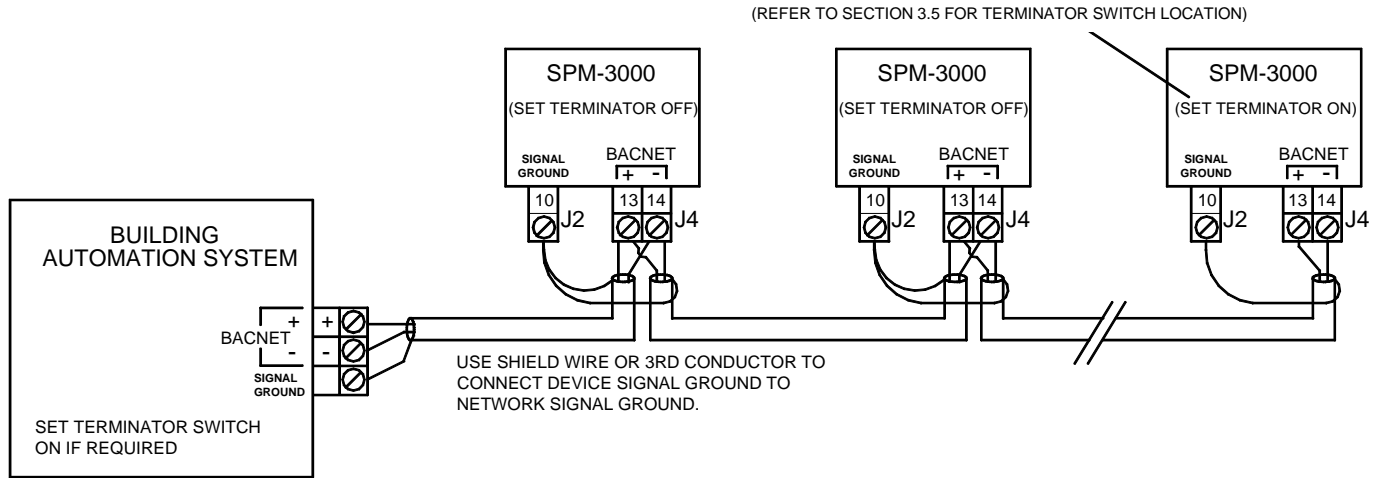
To connect the SPM-3000 (Micro Guardian) to the BACnet network, attach the network wires to J4 Pin 13 (Data B+) and Pin 14 (Data A-). Refer to the drawing below for connector location.



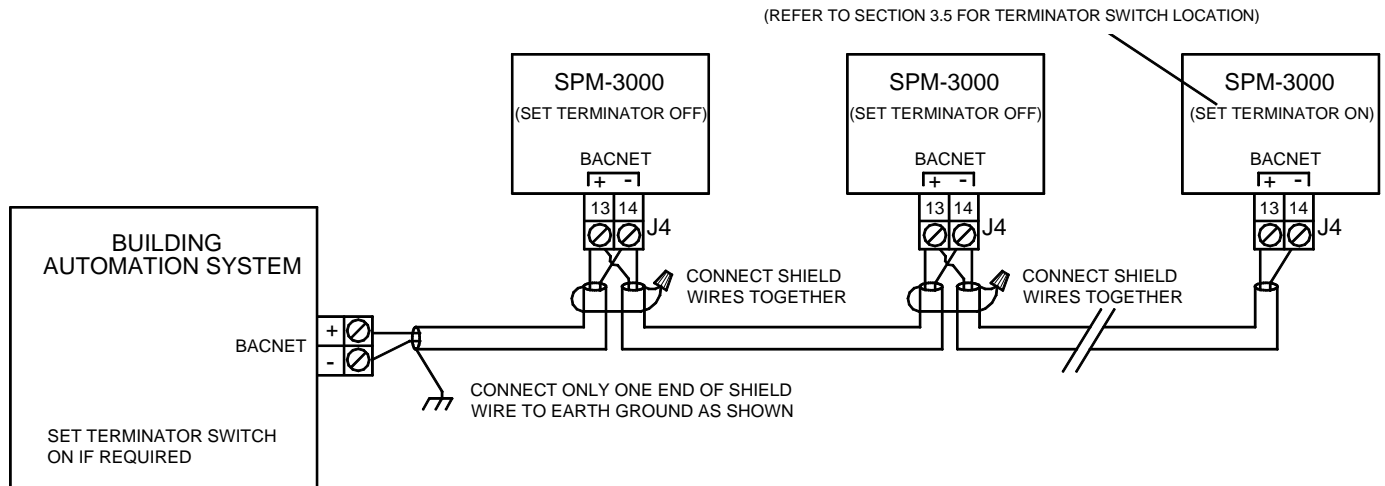
3.3.1. Connecting SPM-3000 to a Network Communications Device That Requires Common Signal Grounds.

(Note: Network wire must be low capacitance, shielded 22 or 24 AWG twisted wire with PVC jacket such as Belden Part numbers 9841 for 2 wire conductor and 9925 for 3 wire conductor or equivalent. Recommended maximum wire length of 4,000 feet).

(Note: If using 2 conductor communication wire, use the shield wire to connect all device signal grounds together as shown in figure below. If using 3 conductor communication wire, use the 3rd conductor to connect all device signal grounds together and connect one side of the shield to earth ground.)

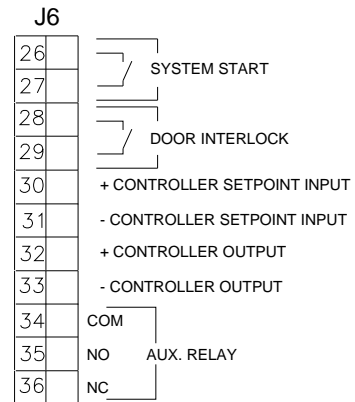
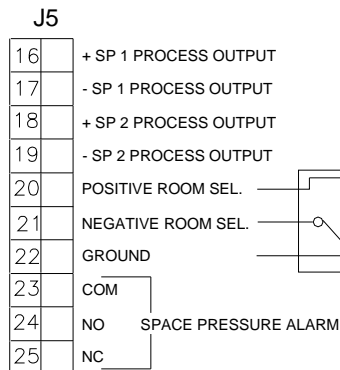
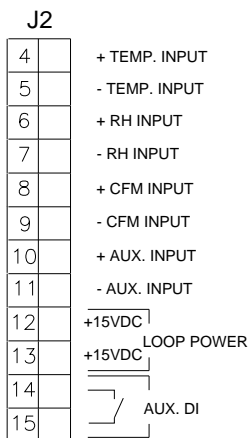
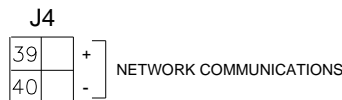
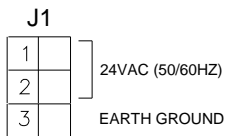
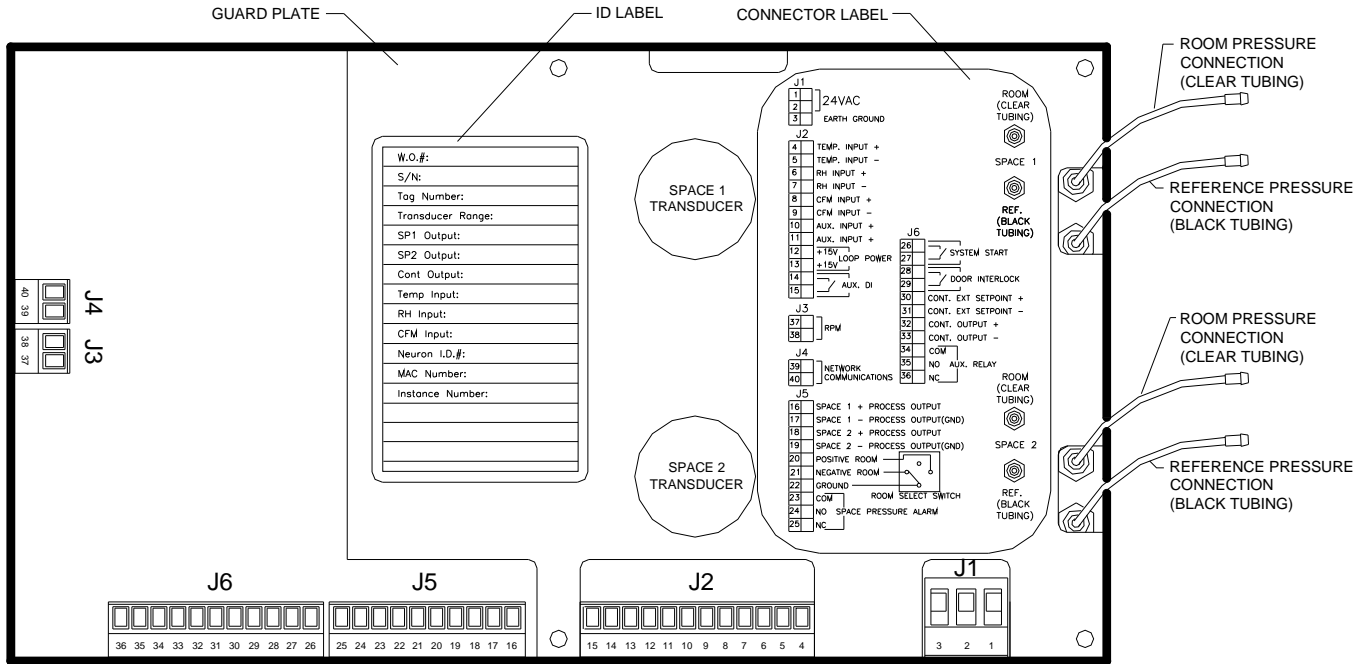


3.3.2. Connecting SPM-3000 to a Network Communications Device Not Requiring Common Signal Grounds.



3.4. SPM-4000 & SPM-4000 BACnet CONNECTION

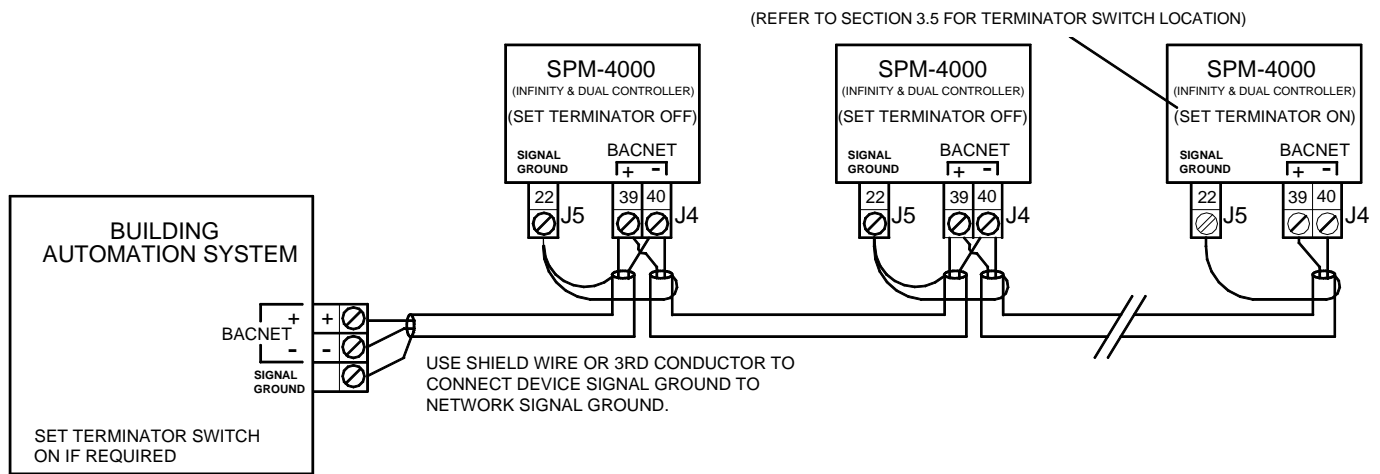
To connect the SPM-4000 (Guardian Infinity) or SPM-4000 (Dual Controller) to the BACnet network, attach the network wires to J4 Pin 39 (Data B+) and Pin 40 (Data A-). Refer to the drawing below for connector location.



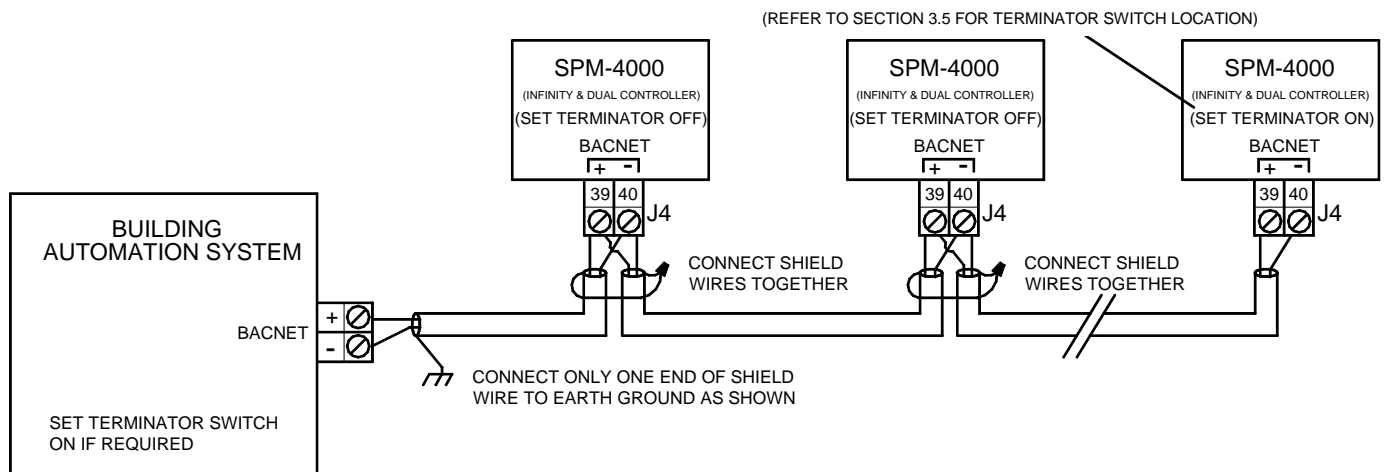
3.4.1. Connecting SPM-4000 and SPM-4000 Dual Controller to a Network Communications Device That Requires Common Signal Grounds.

(Note: Network wire must be low capacitance, shielded 22 or 24 AWG twisted wire with PVC jacket such as Belden Part numbers 9841 for 2 wire conductor and 9925 for 3 wire conductor or equivalent. Recommended maximum wire length of 4,000 feet).

(Note: If using 2 conductor communication wire, use the shield wire to connect all device signal grounds together as shown in figure below. If using 3 conductor communication wire, use the 3rd conductor to connect all device signal grounds together and connect one side of the shield to earth ground.)

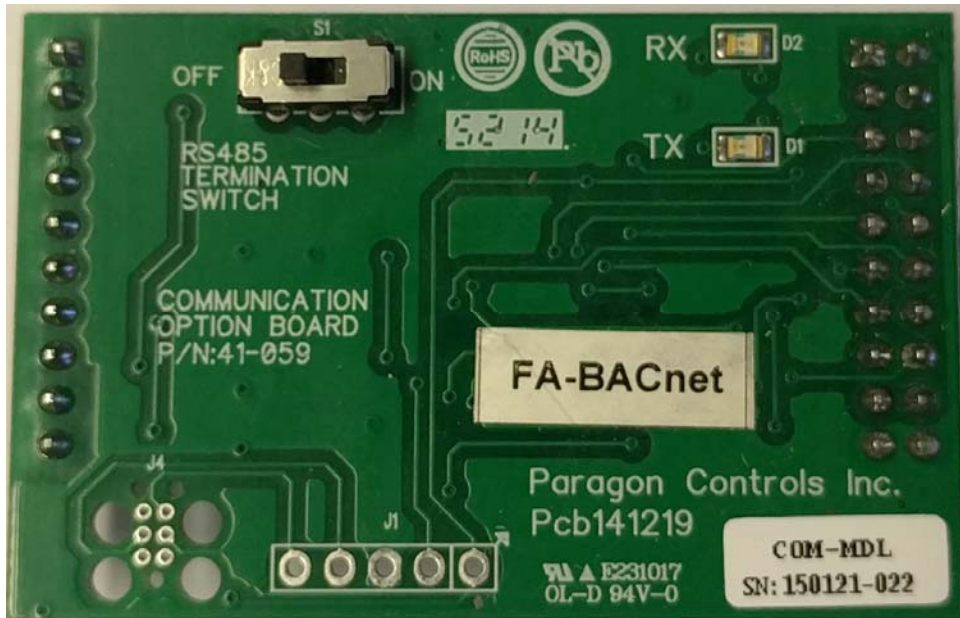


3.4.2. Connecting SPM-4000 and SPM-4000 Dual Controller's to a Network Communications Device Not Requiring Common Signal Grounds.



3.5. BACnet COMMUNICATION BOARD & TERMINATOR SWITCH

For proper BACnet operation, the device that is electrically installed at the end of the network may require the Terminator Switch be moved to the ON position to prevent line and data reflection. If Terminator is required, it must be applied to both physical ends of the network at the two end devices. All other devices should have the Terminator Switch in the OFF position. The communication board is located on the back side of the main board. See picture below for switch location.



3.6. MAC CODE (ADDRESS) & INSTANCE NUMBER SELECTION

Each device (MicroTrans^{EQ}, MicroTrans^{II}, Micro Guardian, Guardian Infinity, and Dual Controller,) will have a MAC Code and Instance number assigned to it (refer to the device O&M for instructions to change the MAC Code, Instance Number and Baud Rate if required). The MAC Code identifies each device on a branch of the network and can range from 2 to 127. The MAC Code must be unique within a particular branch of a network however, MAC Codes can repeat if on another branch of the network.

The Instance Number is a unique device ID that identifies the device on the entire network; Instance Numbers cannot repeat within any part of a network. The Instance Numbers for the Micro Guardian, Guardian Infinity, and Dual Controller can range from a value of 1,002 to 65,535. The Instance Numbers for the MicroTrans^{EQ} and MicroTrans^{II} can range from a value of 1,002 to 4,194,302.

4. PICS (Protocol Implementation Conformance Statements)

4.1. MICROTRANS^{EQ}

BACnet Standardized Device Profile (Annex L):
 BACnet Application Specific Controller (B-ASC)

BACnet Interoperability Building Blocks Supported (Annex K):
 DS-RP-B
 DS-RPM-B
 DS-WP-B
 DS-WPM-B
 DM-RD-B
 DM-DDB-B
 DM-DOB-B
 DM-DCC-B

Segmentation Capability:
 NONE

Standard Object Types Supported: (See Table 1 for details)
 Analog Input
 Analog Value
 Multistate Value

Data Link Layer Options:
 MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800

Device Address Binding:
 NO

Networking Options:
 NONE

Character Sets Supported:
 ANSI 3.4

Supported Services:

| | |
|----------------------------|-------------------|
| ReadProperty | Execute |
| ReadPropertyMultiple | Execute |
| WriteProperty | Execute |
| WritePropertyMultiple | Execute |
| DeviceCommunicationControl | Execute |
| Who-Is | Initiate, Execute |
| Who-Has | Execute |
| I-Am | Initiate, Execute |
| I-Have | Execute |

Gateway:
 This product does not support gateway functionality for any types of non-BACnet equipment/network(s).

TABLE 1 - Standard Object Types Supported – EQ device

| Object | Create Object Service | Delete Object Service | Optional Properties Supported | Writeable Properties | Property Data Type | Data Value Description (State_Text) |
|---|-----------------------|-----------------------|--|---|--------------------|---|
| Device | No | No | <ul style="list-style-type: none"> Object Name Description Location Object Identifier APDU Timeout Max Info Frames Max Master | <ul style="list-style-type: none"> Description Location | | |
| Analog Input 1 – Pressure | No | No | <ul style="list-style-type: none"> Description Eng Units | Read Only | REAL | |
| Analog Input 2 – Flow | No | No | <ul style="list-style-type: none"> Description Eng Units | Read Only | REAL | |
| Analog Input 3 – Temperature | No | No | <ul style="list-style-type: none"> Description Eng Units | Present Value | REAL | |
| Analog Value 1 – Pressure Operating Range | No | No | Description | Present Value | REAL | |
| Analog Value 2 – Pressure Hi Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 3 – Pressure Lo Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 4 – Flow Operating Range | No | No | Description | Present Value | REAL | |
| Analog Value 5 – Flow Hi Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 6 – Flow Lo Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 7 – Hi Alarm Delay | No | No | Description | Present Value | Unsigned Integer | |
| Analog Value 8 – Lo Alarm Delay | No | No | Description | Present Value | Unsigned Integer | |
| Multistate Value 1 – Hi Alarm Enable | No | No | Description | Present Value | Unsigned Integer | 1 = Disable 2 = Enable |
| Multistate Value 2 – Hi Alarm Status | No | No | Description | Read Only | Unsigned Integer | 1 = No Alarm 2 = Alarm |
| Multistate Value 3 – Lo Alarm Enable | No | No | Description | Present Value | Unsigned Integer | 1 = Disable 2 = Enable |
| Multistate Value 4 – Lo Alarm Status | No | No | Description | Read Only | Unsigned Integer | 1 = No Alarm 2 = Alarm |
| Multistate Value 5 – Engineering Units | No | No | Description | Present Value | Unsigned Integer | See Table 2 |
| Multistate Value 6 – Temperature Units | No | No | Description | Present Value | Unsigned Integer | 1 = Fahrenheit 2 = Celsius |
| Multistate Value 7 – Temperature Source | No | No | Description | Present Value | Unsigned Integer | 1 = Temp. Input 2 = Fixed Temp. 3 = Network |
| Multistate Value 8 – Process Type | No | No | Description | Read Only | Unsigned Integer | 1 = Flow 2 = Pressure |
| Multistate Value 9 – Process Unit | No | No | Description | Read Only | Unsigned Integer | 1 = Flow 2 = Velocity |
| Multistate Value 10 – Flow Type | No | No | Description | Read Only | Unsigned Integer | 1 = Actual 2 = Standard |

Note: All BACnet required properties are supported. The table above lists optional & writable properties supported.

TABLE 2 - MSV5 Engineering Units State_Text List**MSV8 = 1 – Flow, MSV9 = 1 - Flow**

- 1: CFM
- 2: L/S
- 3: m³/S
- 4: m³/HR
- 5: % (Flow %)

MSV8 = 1 - Flow, MSV9 = 2 - Velocity

- 1: FPM
- 2: m/s
- 3: % (Velocity %)

MSV8 = 2 - Pressure

- 1: Inch W.C.
- 2: Pa
- 3: KPa
- 4: mm W.C.
- 5: % (Pressure %)

4.2. MICROTRANS^{II}

BACnet Standardized Device Profile (Annex L):

BACnet Application Specific Controller (B-ASC)

BACnet Interoperability Building Blocks Supported (Annex K):

DS-RP-B
 DS-RPM-B
 DS-WP-B
 DS-WPM-B
 DM-RD-B
 DM-DDB-B
 DM-DOB-B
 DM-DCC-B

Segmentation Capability:

NONE

Standard Object Types Supported: (See Table 3 for details)

Analog Input
 Analog Value
 Multistate Value

Data Link Layer Options:

MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800

Device Address Binding:

NO

Networking Options:

NONE

Character Sets Supported:

ANSI 3.4

Supported Services:

| | |
|----------------------------|-------------------|
| ReadProperty | Execute |
| ReadPropertyMultiple | Execute |
| WriteProperty | Execute |
| WritePropertyMultiple | Execute |
| DeviceCommunicationControl | Execute |
| Who-Is | Initiate, Execute |
| Who-Has | Execute |
| I-Am | Initiate, Execute |
| I-Have | Execute |

Gateway:

This product does not support gateway functionality for any types of non-BACnet equipment/network(s).

TABLE 3 - Standard Object Types Supported – MT2 device

| Object | Create Object Service | Delete Object Service | Optional Properties Supported | Writeable Properties | Property Data Type | Data Value Description (State_Text) |
|--|-----------------------|-----------------------|--|---|--------------------|-------------------------------------|
| Device | No | No | <ul style="list-style-type: none"> Object Name Description Location Object Identifier APDU Timeout Max Info Frames Max Master | <ul style="list-style-type: none"> Description Location | | |
| Analog Input 1 – Pressure | No | No | <ul style="list-style-type: none"> Description Eng Units | Read Only | REAL | |
| Analog Input 2 – Flow | No | No | <ul style="list-style-type: none"> Description Eng Units | Read Only | REAL | |
| Analog Input 3 – Temperature | No | No | <ul style="list-style-type: none"> Description Eng Units | Present Value | REAL | |
| Analog Output 1 – Controller Output | No | No | <ul style="list-style-type: none"> Description Eng Units | Read Only | REAL | |
| Analog Value 1 – Pressure Operating Range | No | No | Description | Present Value | REAL | |
| Analog Value 2 – Pressure Hi Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 3 – Pressure Lo Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 4 – Flow Operating Range | No | No | Description | Present Value | REAL | |
| Analog Value 5 – Flow Hi Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 6 – Flow Lo Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 7 – Pressure Controller | No | No | Description | Present Value | REAL | |
| Analog Value 8 – Flow Controller Setpoint | No | No | Description | Present Value | REAL | |
| Analog Value 9 – Controller Prop Band | No | No | Description | Present Value | REAL | |
| Analog Value 10 – Controller Integrator Time | No | No | Description | Present Value | REAL | |
| Analog Value 11 – Cnt. Inverse Derivative | No | No | Description | Present Value | REAL | |
| Analog Value 12 – Economizer Value | No | No | Description | Present Value | REAL | |
| Analog Value 13 – Hi Alarm Delay | No | No | Description | Present Value | Unsigned Integer | |
| Analog Value 14 – Lo Alarm Delay | No | No | Description | Present Value | Unsigned Integer | |
| Binary Input 1 – Sys Start In Status | No | No | Description | Read Only | BACnetBinary PV | 0 = Off 1 = Run |
| Binary Input 2 – Sys Hold Out Status | No | No | Description | Read Only | BACnetBinary PV | 0 = Off 1 = On |
| Multistate Value 1 – Hi Alarm Enable | No | No | Description | Present Value | Unsigned Integer | 1 = Disable 2 = Enable |
| Multistate Value 2 – Hi Alarm Status | No | No | Description | Read Only | Unsigned Integer | 1 = No Alarm 2 = Alarm |

| Object | Create Object Service | Delete Object Service | Optional Properties Supported | Writeable Properties | Property Data Type | Data Value Description (State_Text) |
|---|-----------------------|-----------------------|-------------------------------|----------------------|--------------------|---|
| Multistate Value 3 – Lo Alarm Enable | No | No | Description | Present Value | Unsigned Integer | 1 = Disable 2 = Enable |
| Multistate Value 4 – Lo Alarm Status | No | No | Description | Read Only | Unsigned Integer | 1 = No Alarm 2 = Alarm |
| Multistate Value 5 – Controller Action | No | No | Description | Read Only | Unsigned Integer | 1 = Direct 2 = Reverse |
| Multistate Value 6 – Engineering Units | No | No | Description | Present Value | Unsigned Integer | See Table 4 |
| Multistate Value 7 – Temperature Units | No | No | Description | Present Value | Unsigned Integer | 1 = Fahrenheit 2 = Celsius |
| Multistate Value 8 – Temperature Source | No | No | Description | Present Value | Unsigned Integer | 1 = Temp. Input 2 = Fixed Temp. 3 = Network |
| Multistate Value 9 – Process Type | No | No | Description | Read Only | Unsigned Integer | 1 = Flow 2 = Pressure |
| Multistate Value 10 – Process Unit | No | No | Description | Read Only | Unsigned Integer | 1 = Flow 2 = Velocity |
| Multistate Value 11 – Flow Type | No | No | Description | Read Only | Unsigned Integer | 1 = Actual 2 = Standard |

Note: All BACnet required properties are supported. The table above lists optional & writable properties supported.

TABLE 4 – MSV6 Engineering Units State_Text List

MSV9 = 1 – Flow, MSV10 = 1 - Flow

- 1: CFM
- 2: L/S
- 3: m³/S
- 4: m³/M
- 5: m³/HR
- 6: % (Flow %)

MSV9 = 1 - Flow, MSV10 = 2 - Velocity

- 1: FPM
- 2: m/s
- 3: % (Velocity %)

MSV9 = 2 - Pressure

- 1: Inch W.C.
- 2: Pa
- 3: KPa
- 4: mm W.C.
- 5: % (Pressure %)

4.3. SPM-3000 (MICRO GUARDIAN)

BACnet Standardized Device Profile (Annex L):

BACnet Application Specific Controller (B-ASC)

BACnet Interoperability Building Blocks Supported (Annex K):

- DS-RP-B
- DS-RPM-B
- DS-WP-B
- DS-WPM-B
- DM-RD-B
- DM-DDB-B
- DM-DOB-B
- DM-DCC-B

Segmentation Capability:

NONE

Standard Object Types Supported: (See Table 5 for details)

- Analog Input
- Analog Value
- Multistate Value
- Binary Value

Data Link Layer Options:

MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800
 (Default Baud Rate: 38400)

Device Address Binding:

NO

Networking Options:

NONE

Character Sets Supported:

ANSI 3.4

Supported Services:

| | |
|----------------------------|-------------------|
| ReadProperty | Execute |
| ReadPropertyMultiple | Execute |
| WriteProperty | Execute |
| WritePropertyMultiple | Execute |
| DeviceCommunicationControl | Execute |
| Who-Is | Initiate, Execute |
| Who-Has | Execute |
| I-Am | Initiate, Execute |
| I-Have | Execute |

Gateway:

This product does not support gateway functionality for any types of non-BACnet equipment/network(s).

TABLE 5 - Standard Object Types Supported – SPM3000 device

| Object | Create Object Service | Delete Object Service | Optional Properties Supported | Writeable Properties | Property Data Type | Data Value Description (State_Text) |
|--|-----------------------|-----------------------|--|---|--------------------|--|
| Device | No | No | <ul style="list-style-type: none"> Object Name Description Location Object Identifier APDU Timeout Max Info Frames Max Master | <ul style="list-style-type: none"> Description Location | | |
| Analog Input 1 – Process Value | No | No | <ul style="list-style-type: none"> Description Eng. Units | Read Only | REAL | |
| Analog Value 1 – Operating Range | No | No | Description | Read Only | REAL | |
| Analog Value 2 – Pos Lo Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 3 – Pos Hi Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 4 – Neg Lo Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 5 – Neg Hi Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 6 – Alarm Delay | No | No | Description | Present Value | REAL | |
| Analog Value 7 – Field Password | No | No | Description | Present Value | REAL | |
| Analog Value 8 – Process Filter | No | No | Description | Present Value | REAL | |
| Analog Value 9 – Decimal Point | No | No | Description | Present Value | REAL | |
| Binary Value 1 – Audible Alarm Enable | No | No | Description | Present Value | Enumerated | 0 = Off 1 = On |
| Multistate Value 1 – Operating Mode | No | No | Description Number_Of_States = 3 State_Text | Present Value | Unsigned Integer | 1 = Off 2 = Pos 3 = Neg |
| Multistate Value 2 – Alarm Status | No | No | Description Number_Of_States = 3 State_Text | Read Only | Unsigned Integer | 1 = No Alarms 2 = High 3 = Low |
| Multistate Value 3 – Engineering Units | No | No | Description Number_Of_States = 4 State_Text | Present Value | Unsigned Integer | 1 = "W.C. 2 = Pa 3 = KPa 4 = mmW.C. |

Note: All BACnet required properties are supported. This table lists optional & writable properties supported.

4.4. SPM-4000 (GUARDIAN INFINITY)

BACnet Standardized Device Profile (Annex L):

BACnet Application Specific Controller (B-ASC)

BACnet Interoperability Building Blocks Supported (Annex K):

- DS-RP-B
- DS-RPM-B
- DS-WP-B
- DS-WPM-B
- DM-RD-B
- DM-DDB-B
- DM-DOB-B
- DM-DCC-B

Segmentation Capability:

NONE

Standard Object Types Supported: (See Table 6 for details)

- Analog Input
- Analog Value
- Analog Output
- Binary Input
- Binary Value
- Multistate Value

Data Link Layer Options:

MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800

Device Address Binding:

NO

Networking Options:

NONE

Character Sets Supported:

ANSI 3.4

Supported Services:

- | | |
|----------------------------|-------------------|
| ReadProperty | Execute |
| ReadPropertyMultiple | Execute |
| WriteProperty | Execute |
| WritePropertyMultiple | Execute |
| DeviceCommunicationControl | Execute |
| Who-Is | Initiate, Execute |
| Who-Has | Execute |
| I-Am | Initiate, Execute |
| I-Have | Execute |

Gateway:

This product does not support gateway functionality for any types of non-BACnet equipment/network(s).

TABLE 6 - Standard Object Types Supported – SPM-4000 device

| Object | Create Object Service | Delete Object Service | Optional Properties Supported | Writeable Properties | Property Data Type | Data Value Description (State_Text |
|---------------------------------------|-----------------------|-----------------------|--|---|--------------------|------------------------------------|
| Device | No | No | <ul style="list-style-type: none"> Object Name Description Location Object Identifier APDU Timeout Max Info Frames Max Master | <ul style="list-style-type: none"> Description Location | | |
| Analog Input 1 – Sp1 Process Value | No | No | <ul style="list-style-type: none"> Description Eng Units | Read Only | REAL | |
| Analog Input 2 – Sp2 Process Value | No | No | <ul style="list-style-type: none"> Description Eng Units | Read Only | REAL | |
| Analog Input 3 – Temperature Input | No | No | <ul style="list-style-type: none"> Description Eng Units | Read Only | REAL | |
| Analog Input 4 – Humidity Input | No | No | <ul style="list-style-type: none"> Description Eng Units | Read Only | REAL | |
| Analog Input 5 – Flow Input | No | No | <ul style="list-style-type: none"> Description Eng Units | Read Only | REAL | |
| Analog Value 1 – Sp1 Operating Range | No | No | Description | Read Only | REAL | |
| Analog Value 2 – Sp1 Pos High Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 3 – Sp1 Pos Low Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 4 – Sp1 Neg High Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 5 – Sp1 Neg Low Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 6 – Sp2 Operating Range | No | No | Description | Read Only | REAL | |
| Analog Value 7 – Sp2 Pos High Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 8 – Sp2 Pos Low Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 9 – Sp2 Neg High Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 10 – Sp2 Neg Low Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 11 – Cnt Pos Setpoint | No | No | Description | Present Value | REAL | |
| Analog Value 12 – Cnt Neg Setpoint | No | No | Description | Present Value | REAL | |
| Analog Value 13 – Cnt Off Setpoint | No | No | Description | Present Value | REAL | |
| Analog Value 14 – Cnt Prop Band | No | No | Description | Present Value | REAL | |
| Analog Value 15 – Cnt Integral Time | No | No | Description | Present Value | REAL | |
| Analog Value 16 – Cnt Derivative Time | No | No | Description | Present Value | REAL | |

| Object | Create Object Service | Delete Object Service | Optional Properties Supported | Writeable Properties | Property Data Type | Data Value Description (State_Text) |
|---|-----------------------|-----------------------|---|----------------------|--------------------|--|
| Analog Value 17 – ACH Value | No | No | Description | Read Only | REAL | |
| Analog Value 18 – Sp1 Alarm Delay | No | No | Description | Present Value | REAL | |
| Analog Value 19 – Sp2 Alarm Delay | No | No | Description | Present Value | REAL | |
| Analog Value 20 – Field Password | No | No | Description | Present Value | REAL | |
| Analog Value 21 – Decimal Point | No | No | Description | Present Value | REAL | |
| Binary Input 1 – Sys Start In Status | No | No | Description | Read Only | BACnetBinaryPV | 0 = Off 1 = Run |
| Binary Input 2 – Sys Hold In Status | No | No | Description | Read Only | BACnetBinaryPV | 0 = Off 1 = On |
| Binary Value 1 – Audible Alarm Enable | No | No | Description | Present Value | Enumerated | 0 = Off 1 = On |
| Multistate Value 1 – Sp1 Operating Mode | No | No | Description Number_Of_States = 3 State_Text | Present Value | Unsigned Integer | 1 = Off 2 = Pos 3 = Neg |
| Multistate Value 2 – Sp1 Alarm Status | No | No | Description Number_Of_States = 3 State_Text | Read Only | Unsigned Integer | 1 = No Alarms 2 = High 3 = Low |
| Multistate Value 3 – Sp2 Operating Mode | No | No | Description Number_Of_States = 3 State_Text | Present Value | Unsigned Integer | 1 = Off 2 = Pos 3 = Neg |
| Multistate Value 4 – Sp2 Alarm Status | No | No | Description Number_Of_States = 3 State_Text | Read Only | Unsigned Integer | 1 = No Alarms 2 = High 3 = Low |
| Multistate Value 5 – Engineering Units | No | No | Description Number_Of_States = 4 State_Text | Present Value | Unsigned Integer | 1 = "W.C. 2 = Pa 3 = KPa 4 = mmW.C. |
| Multistate Value 6 – Temp Eng Units | No | No | Description Number_Of_States = 2 State_Text | Present Value | Unsigned Integer | 1 = F° 2 = C° |

Note: All BACnet required properties are supported. This table lists optional & writable properties supported.

4.5. SPM-4000 DUAL CONTROLLER

BACnet Standardized Device Profile (Annex L):

BACnet Application Specific Controller (B-ASC)

BACnet Interoperability Building Blocks Supported (Annex K):

DS-RP-B
 DS-RPM-B
 DS-WP-B
 DS-WPM-B
 DM-RD-B
 DM-DDB-B
 DM-DOB-B
 DM-DCC-B

Segmentation Capability:

NONE

Standard Object Types Supported: (See Table 7 for details)

Analog Input
 Analog Value
 Analog Output
 Binary Input
 Binary Value
 Multistate Value

Data Link Layer Options:

MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800

Device Address Binding:

NO

Networking Options:

NONE

Character Sets Supported:

ANSI 3.4

Supported Services:

| | |
|----------------------------|-------------------|
| ReadProperty | Execute |
| ReadPropertyMultiple | Execute |
| WriteProperty | Execute |
| WritePropertyMultiple | Execute |
| DeviceCommunicationControl | Execute |
| Who-Is | Initiate, Execute |
| Who-Has | Execute |
| I-Am | Initiate, Execute |
| I-Have | Execute |

Gateway:

This product does not support gateway functionality for any types of non-BACnet equipment/network(s).

TABLE 7 - Standard Object Types Supported – SPM4000 Dual Controller device

| Object | Create Object Service | Delete Object Service | Optional Properties Supported | Writeable Properties | Property Data Type | Data Value Description (State_Text) |
|--|-----------------------|-----------------------|--|---|--------------------|-------------------------------------|
| Device | No | No | <ul style="list-style-type: none"> Object Name Description Location Object Identifier APDU Timeout Max Info Frames Max Master | <ul style="list-style-type: none"> Description Location | | |
| Analog Input 1 – Sp1 Process Value | No | No | <ul style="list-style-type: none"> Description Eng Units | Read Only | REAL | |
| Analog Input 2 – Sp2 Process Value | No | No | <ul style="list-style-type: none"> Description Eng Units | Read Only | REAL | |
| Analog Output 1 – Controller Output 1 | No | No | <ul style="list-style-type: none"> Description Eng Units | Read Only | REAL | |
| Analog Output 2 – Controller Output 2 | No | No | <ul style="list-style-type: none"> Description Eng Units | Read Only | REAL | |
| Analog Value 1 – Sp1 Operating Range | No | No | Description | Read Only | REAL | |
| Analog Value 2 – Sp1 Pos High Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 3 – Sp1 Pos Low Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 4 – Sp1 Neg High Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 5 – Sp1 Neg Low Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 6 – Sp2 Operating Range | No | No | Description | Read Only | REAL | |
| Analog Value 7 – Sp2 Pos High Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 8 – Sp2 Pos Low Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 9 – Sp2 Neg High Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 10 – Sp2 Neg Low Alarm | No | No | Description | Present Value | REAL | |
| Analog Value 11 – Cnt1 Pos Setpoint | No | No | Description | Present Value | REAL | |
| Analog Value 12 – Cnt1 Neg Setpoint | No | No | Description | Present Value | REAL | |
| Analog Value 13 – Cnt1 Off Setpoint | No | No | Description | Present Value | REAL | |
| Analog Value 14 – Cnt1 Prop Band | No | No | Description | Present Value | REAL | |
| Analog Value 15 – Cnt1 Integral Time | No | No | Description | Present Value | REAL | |
| Analog Value 16 – Cnt1 Derivative Time | No | No | Description | Present Value | REAL | |
| Analog Value 17 – Cnt2 Pos Setpoint | No | No | Description | Present Value | REAL | |

| Object | Create Object Service | Delete Object Service | Optional Properties Supported | Writeable Properties | Property Data Type | Data Value Description (State_Text) |
|---|-----------------------|-----------------------|---|----------------------|--------------------|--|
| Analog Value 18 – Cnt2 Neg Setpoint | No | No | Description | Present Value | REAL | |
| Analog Value 19 – Cnt2 Off Setpoint | No | No | Description | Present Value | REAL | |
| Analog Value 20 – Cnt2 Prop Band | No | No | Description | Present Value | REAL | |
| Analog Value 21 – Cnt2 Integral Time | No | No | Description | Present Value | REAL | |
| Analog Value 22 – Cnt2 Derivative Time | No | No | Description | Present Value | REAL | |
| Analog Value 23 – Sp1 Alarm Delay | No | No | Description | Present Value | REAL | |
| Analog Value 24 – Sp2 Alarm Delay | No | No | Description | Present Value | REAL | |
| Analog Value 25 – Field Password | No | No | Description | Present Value | REAL | |
| Analog Value 26 – Decimal Point | No | No | Description | Present Value | REAL | |
| Binary Input 1 – Sys Start In Status | No | No | Description | Read Only | BACnetBinaryPV | 0 = Off 1 = Run |
| Binary Input 2 – Sys Hold In Status | No | No | Description | Read Only | BACnetBinaryPV | 0 = Off 1 = On |
| Binary Value 1 – Audible Alarm Enable | No | No | Description | Present Value | Enumerated | 0 = Off 1 = On |
| Multistate Value 1 – Sp1 Operating Mode | No | No | Description Number_Of_States = 3 | Present Value | Unsigned Integer | 1 = Off 2 = Pos 3 = Neg |
| Multistate Value 2 – Sp1 Alarm Status | No | No | Description Number_Of_States = 3 | Read Only | Unsigned Integer | 1 = No Alarms 2 = High 3 = Low |
| Multistate Value 3 – Sp2 Operating Mode | No | No | Description Number_Of_States = 3 | Present Value | Unsigned Integer | 1 = Off 2 = Pos 3 = Neg |
| Multistate Value 4 – Sp2 Alarm Status | No | No | Description Number_Of_States = 3 | Read Only | Unsigned Integer | 1 = No Alarms 2 = High 3 = Low |
| Multistate Value 5 – Engineering Units | No | No | Description Number_Of_States = 4 State_Text | Present Value | Unsigned Integer | 1 = "W.C. 2 = Pa 3 = KPa 4 = mmW.C. |

Note: All BACnet required properties are supported. This table lists optional & writable properties supported.

5. TROUBLESHOOTING GUIDE

| TROUBLESHOOTING TABLE | |
|--|--|
| SYMPTOM | SOLUTION |
| <p>1. Building Management System not communicating with any of the devices</p> | 1. Verify each device has a unique MAC Code and Instance Number |
| | 2. Verify data +&- connections on all devices and the Building Management System are wired correctly. |
| | 3. Verify the communications Baud Rate is set the same for all devices |
| | 4. Verify all common signal grounds are connected together if required. |
| | 5. Contact Factory Service Department. |
| <p>2. Building Management System communicating with some devices but not others.</p> | 1. Verify each device has a unique MAC Code and Instance Number |
| | 2. Verify data +&- wires are connected correctly on those devices not communicating. |
| | 3. Verify the communications Baud Rate is set the same for all devices |
| | 4. Try setting the BACnet terminator switch on the last device in the communication chain to the ON position (see Section 3.5). |
| | 5. Contact Factory Service Department. |
| <p>3. A device on the trunk stops communicating</p> | 1. Verify last device on trunk has terminator jumper in the ON position. |
| | 2. Verify jumper is making contact by measuring resistance between network wires. If connection is made, the resistance will be approx. 200 ohms and if connection is not made the resistance will be approx. 7.5K ohms. |
| | 3. Contact Factory Service Department. |

