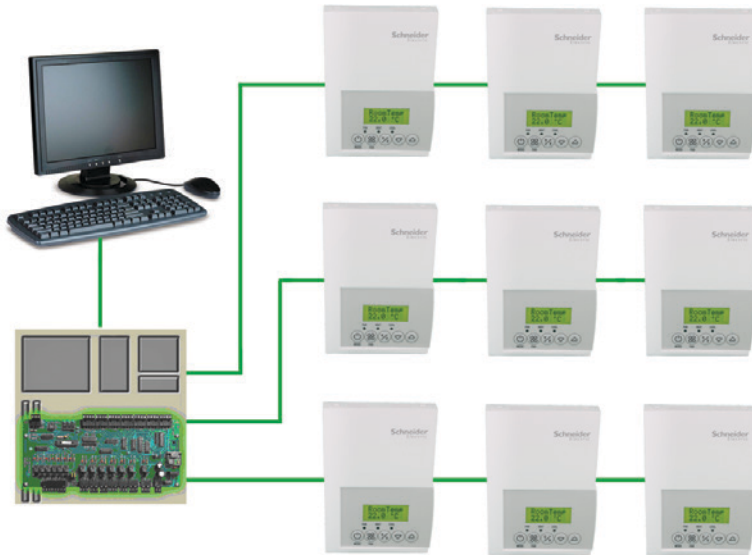


# BACnet® Integration Manual

PIR Ready SE76xx Series  
With & Without Scheduling Controllers  
For Commercial HVAC Applications



## CONTENTS

SE7600 Series Product Overview Protocol Implementation	2
Conformance Statements (PICS)	3
Device Object Table	3
Standard Object Types Supported	8
List of Proprietary Properties	8
Property Value Range Restrictions for AI and AV Objects	9
Property Enumeration Set for BI and BV Objects	10
List of Property Enumeration Set for MV Objects	12
Integration - Global commands	14
Integration - Graphic User Interface (GUI) Objects	15
Integration - Configuration Objects	15
Wiring Guide	16
Network Configuration	17
Default Device Name and ID	20
Integrating Schneider Devices on MS/TP Network	20
Tips and Things You Need to Know	21
Troubleshooting	22

**PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (PICS)**

**Vendor Name:** Schneider Electric

**Supported BACnet® Services:** The BACnet® communicating controller meets all requirements for designation as an Application Specific Controller (B-ASC). The BACnet® controller series supports the following BACnet® Interoperability Building Blocks (BIBBs).

Application Service	Designation
Data Sharing – Read Property - B	DS-RP-B
Data Sharing – Read Property Multiple - B	DS-RPM-B
Data Sharing – Write Property - B	DS-WP-B
Device Management - Device Communication Control - B	DM-DCC-B
Device Management – Dynamic Device Binding - B	DM-DDB-B
Device Management – Dynamic Object Binding - B	DM-DOB-B

Note 1: The controller does not support segmented requests or responses.

Note 2: Time synchronization can be made through a network even if the controller does not support the full date. Therefore, the device cannot claim conformance to the DeviceManagement – TimeSynchronization - B (DM-TS-B) service. The device object does not have the Local\_Time or Local\_Date properties.



SE7600 Series

OBJECTS TABLE

Object Name	Type and Instance	Object Property	Controller Parameter
SE76xxX5x45B	Device	Object_Identifier Property 75 (R,W)	Unique ID number of a device on a network
		Object_Name Property 77 (R,W)	Unique name of a Device on a network
		Model Name Property 70 (R)	Controller Model number
		Firmware Revision Property 44 (R)	Current BACnet® firmware revision used by the controller
		Protocol Version Property 98 (R)	Current BACnet® firmware protocol version Default is Version 1
		Protocol Revision Property 139 (R)	Current BACnet® firmware protocol revision Default is Version 2
		Max ADPU Length Property 62 (R)	Maximum ADPU Length accepted Default is 244
		ADPU Timeout Property 10 (R)	ADPU timeout value Default is 60 000 ms
		Application-Software-Version Property 12 (R)	Controller base application software version Default is based on current released version
		Max_Master (R,W)	Maximum master devices allowed to be part of the network. 0 to 127, default is 127
		MS/TP_Address Property 1001 (R,W)	BACnet® MS/TP MAC Address. Proprietary attribute. Default is as assigned by configuration.
		MS/TP_Baud_Rate Property 1002 (R,W)	BACnet® MS/TP Baud-Rate. Proprietary attribute. Range is: 1 = 9.6 Kbps, 2 = 19.2 Kbps, 3 = 38.4 Kbps, 4 = 76.8 Kbps and 5 = Auto Baud Rate. Index 5 is <i>Write only</i> . Reading attribute will state current Baud rate used. Writing index 1 to 4 will fix the Baud rate to the desired value.

OBJECTS TABLE

Object Name	Type and Instance	Object Property	SE7600A5x45B	SE7652A5x45B	SE7600B5x45B	SE7652B5x45B	SE7605B5x45B	SE7656B5x45B	SE7607B5x45B	SE7657B5x45B	SE7600H5x45B	SE7652H5x45B	SE7600W5x45B	SE7652W5x45B	SE7606E5x45B	SE7656E5x45B	SE7600F5x45B	SE7652F5x45B
Room Temperature	AV 7	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Room Temp Override	BV 8	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Outdoor Temperature	AV 9	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Outdoor Temp Override	BV 10	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Room Humidity	AV 11	Present_Value (R,W)							√	√			√	√				
Room Humidity Override	BV 13	Present_Value (R,W)											√	√				
Occupancy Command	MV 12	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
System Mode HP	MV 13	Present_Value (R,W)									√	√						
System Mode RTU	MV 14	Present_Value (R,W)	√	√	√	√	√	√	√	√			√	√	√	√	√	√
Fan Mode	MV 15	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Supply Temperature	AI 16	Present_Value (R)	√	√	√	√	√	√			√	√	√	√	√	√	√	√
Supply RH	AV 17	Present_Value (R)							√	√								
Water Temperature	AV 17	Present_Value (R,W)											√	√				
Keypad Lockout	MV 18	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Fresh Air Level	AI 46	Present_Value (R)													√	√		
Control Output	GR 19	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
PI Heating Demand	AV 20	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
PI Cooling Demand	AV 21	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
AI1 Value	AI 23	Present_Value (R)													√	√		
Economizer Output	AV 22	Present_Value (R)						√	√						√	√		
Analog Heat Output	AV 35	Present_Value (R)													√	√	√	√
Controller Status	GRP 23	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
AUX	BI 24	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√			√	√
G Fan	BI 25	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Y1 Cool	BI 26	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Y2 Cool	BI 27	Present_Value (R)			√	√	√	√	√	√	√	√	√	√	√	√	√	√
W1 Heat	BI 28	Present_Value (R)	√	√	√	√	√	√	√	√	√	√			√	√		
W2 Heat	BI 29	Present_Value (R)			√	√	√	√	√	√					√	√		
Reversing Valve	BI 30	Present_Value (R)									√	√	√	√				
DI 1 Status	BI 31	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√			√	√
DI 2 Status	BI 32	Present_Value (R)	√	√	√	√	√	√			√	√	√	√			√	√
Local Motion	BI 33	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Effective Occupancy	MV 34	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Controller Alarms	GRP 35	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Analog Heat Output	AV 35	Present_Value (R)													√	√	√	√
Frost Alarm	BI 36	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Clock Alarm	BI 37	Present_Value (R)		√		√		√		√		√		√		√		√
Filter Alarm	BI 38	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√			√	√
Service Alarm	BI 39	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√			√	√
Fan Lock Alarm	BI 40	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Temperature Setpoints	GRP 41	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

OBJECTS TABLE

Object Name	Type and Instance	Object Property	SE7600A5x45B	SE7652A5x45B	SE7600B5x45B	SE7652B5x45B	SE7605B5x45B	SE7656B5x45B	SE7607B5x45B	SE7657B5x45B	SE7600H5x45B	SE7652H5x45B	SE7600W5x45B	SE7652W5x45B	SE7606E5x45B	SE7656E5x45B	SE7600F5x45B	SE7652F5x45B
Occupied Heat Setpoint	AV 42	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Occupied Cool Setpoint	AV 43	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Unoccupied Heat Setpoint	AV 44	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Unoccupied Cool Setpoint	AV 45	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Fresh Air Level	AI 46	Present_Value (R,W)													√	√		
General Options 1-	GRP 46	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Temperature Scale	BV 47	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Heating Setpoint Limit	AV 48	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Cooling Setpoint Limit	AV 49	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Heating Lockout Temperature	AV 50	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Cooling Lockout Temperature	AV 51	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Deadband	AV 52	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Heating CPH	MV 53	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√			√	√		
Cooling CPH	MV 54	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Frost Protection	BV 55	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Aux Contact	BV 56	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√				√	√
Menu Scroll	BV 57	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Supply Heat Lockout Status	BV 58	Present_Value (R,W)													√	√	√	√
General Options 2-	GRP 58	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Password Value	AV 59	Present_Value (R)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Power-up Delay	AV 60	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Temporary Occ. Time	MV 61	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Fan Control	BV 62	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Anticycle	MV 63	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Fan Purge Delay	BV 64	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
DI 1 Configuration	MV 65	Present_Value (R,W)	√	√	√	√	√	√			√	√	√	√			√	√
DI 2 Configuration	MV 66	Present_Value (R,W)	√	√	√	√	√	√			√	√	√	√			√	√
Proportional Band	MV 67	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Unoccupied Time	AV 68	Present_Value (R,W)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
CO2 Level	AI 69	Present_Value (R,W)													√	√		
With schedule Model Configuration Options	GRP 69	Present_Value (R,W)		√		√		√		√		√		√		√		√
Progressive Recovery	BV 70	Present_Value (R,W)		√		√		√		√		√		√		√		√
Event Display	MV 71	Present_Value (R,W)		√		√		√		√		√		√		√		√
Stages Configuration Options	GRP 72	Present_Value (R,W)			√	√	√	√	√	√	√	√	√	√	√	√	√	√
Discharge Air Alarm	BI 72	Present_Value (R,W)													√	√	√	√

OBJECTS TABLE

Object Name	Type and Instance	Object Property	SE7600A5x45B	SE7652A5x45B	SE7600B5x45B	SE7652B5x45B	SE7605B5x45B	SE7656B5x45B	SE7607B5x45B	SE7657B5x45B	SE7600H5x45B	SE7652H5x45B	SE7600W5x45B	SE7652W5x45B	SE7606E5x45B	SE7656E5x45B	SE7600F5x45B	SE7652F5x45B
Heating Stages	MV 73	Present_Value (R,W)			√	√	√	√	√	√					√	√		
Cooling Stages	MV 74	Present_Value (R,W)			√	√	√	√	√	√					√	√	√	√
Heatpump Stages	MV 75	Present_Value (R,W)									√	√	√	√				
Economizer Model Configuration Options	GRP 76	Present_Value (R)					√	√							√	√		
Fresh Air Max Range	AV 76	Present_Value (R,W)													√	√		
Economizer Changeover Setpoint	AV 77	Present_Value (R,W)					√	√							√	√		
Economizer Minimum Position	AV 78	Present_Value (R,W)					√	√							√	√		
Mechanical Cooling Enabled	BV 79	Present_Value (R,W)					√	√							√	√		
Mixed Air Setpoint	AV 80	Present_Value (R,W)					√	√							√	√		
Heatpump Model Configuration Options	GRP 81	Present_Value (R)									√	√						
Economizer Max Position	AV 81	Present_Value (R,W)													√	√		
High Balance Point	AV 82	Present_Value (R,W)									√	√						
Discharge High Limit Setpoint	AV 82	Present_Value (R,W)													√	√	√	√
Low Balance Point	AV 83	Present_Value (R,W)									√	√						
Discharge Low Limit Setpoint	AV 83	Present_Value (R,W)													√	√	√	√
Comfort Mode	BV 84	Present_Value (R,W)									√	√						
High CO2 Alarm	BI 84	Present_Value (R,W)													√	√		
Reversing Valve Configuration	BV 85	Present_Value (R,W)									√	√	√	√				
Compressor Interlock	BV 86	Present_Value (R,W)									√	√						
Fresh Air Alarm	BI 86														√	√		
Dehumidification Model Configuration Options	GRP 87	Present_Value (R)							√	√								
RH Display	BV 88	Present_Value (R,W)							√	√			√	√				
Dehumidification RH Setpoint	AV 89	Present_Value (R,W)							√	√			√	√				
Dehumidification Hysterisys	AV 90	Present_Value (R,W)							√	√			√	√				
Dehumidification Low OA Lockout	AV 91	Present_Value (R,W)							√	√			√	√				
Dehumidification Lockout Functions	BV 92	Present_Value (R,W)							√	√								
Dehumidification Lockout Functions	MV 92	Present_Value (R,W)											√	√				
Dehumidification Output Status	BI 93	Present_Value (R)							√	√			√	√				
Humidification Model Configuration Options	GRP 94	Present_Value (R)							√	√								
A11 Config	BV 94	Present_Value (R,W)													√	√		
Humidification RH Setpoint	AV 95	Present_Value (R,W)							√	√								
Minimum Supply Heat Setpoint	AV 95	Present_Value (R,W)													√	√	√	√

OBJECTS TABLE

Object Name	Type and Instance	Object Property	SE7600A5x45B	SE7652A5x45B	SE7600B5x45B	SE7652B5x45B	SE7605B5x45B	SE7656B5x45B	SE7607B5x45B	SE7657B5x45B	SE7600H5x45B	SE7652H5x45B	SE7600W5x45B	SE7652W5x45B	SE7606E5x45B	SE7656E5x45B	SE7600F5x45B	SE7652F5x45B
Eff (Effective) Reset Humidification RH Spt (Setpoint)	AV 96	Present_Value (R)							√	√								
Supply Heat Lockout temperature	AV 96	Present_Value (R,W)													√	√	√	√
Humidification High Limit Spt (Setpoint)	AV 97	Present_Value (R,W)							√	√								
Supply PI Heat Demand	AV 97	Present_Value (R)													√	√	√	√
Low RH Setpoint	AV 98	Present_Value (R,W)							√	√								
Minimum Fresh Air	AV 98	Present_Value (R,W)													√	√		
Low Temp Reset RH Setpoint	AV 99	Present_Value (R,W)							√	√								
Maximum Fresh Air	AV 99	Present_Value (R,W)													√	√		
High Temp Reset RH Setpoint	AV 100	Present_Value (R,W)							√	√								
Minimum CO2 Level	AV 100	Present_Value (R,W)													√	√		
Humidifier Output	AV 101	Present_Value (R)							√	√								
Maximum CO2 Level	AV 101	Present_Value (R,W)													√	√		
Local Schedule	SCH 102	Present_Value (R,W)		√		√		√		√		√		√		√		√

**STANDARD OBJECT TYPES SUPPORTED\***

Object Type	Supported Objects	Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Properties
Analog Input	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reliability	Out_of_Service
Analog Value	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reliability	Present_Value <sup>a</sup> Out_of_Service <sup>a</sup> Object_Name <sup>b</sup>
Binary Input	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reliability Active_Text Inactive_Text	Out_of_Service
Binary Value	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reliability Active_Text Inactive_Text	Present_Value Out_of_Service
Device	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Max_Master Max_Info_frames	Object_Identifier Object_name Max_Master
Group	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	N/A	N/A
Multi-state Value	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reliability States_Text	Present_Value <sup>d</sup> Out_of_Service <sup>d</sup>
Schedule	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Weekly_schedule	Present_Value Weekly_Schedule

Notes

a : The following AV's are defined as read only. When Out\_of\_Service properties is set to true, the Present\_Value if written is not derived to the application level of the controller.

- Room Humidity (AV11)
- PI Heating Demand (AV20)
- PI Cooling Demand (AV21)
- Economizer Output (AV22)
- Eff Reset Humidification RH Spt (AV96)
- Humidifier Output (AV101)

b : Object\_Name property is writable for 1 object only :

- Room\_Temperature (AV7)

**PROPRIETARY PROPERTIES**

Property name	ID	BACnet® Data type	Description
Major_Version	1045	CharacterString	The version number of the BACnet® communications module. This is the hardware version number.
MS/TP_Address	1001	Unsigned	Display the MAC layer address of the module.
MS/TP_Baud_Rate	1002	Unsigned	Display the communication baud rate of the module.
Sensor_Offset	1005	REAL	Display the temperature or humidity calibration value. The range is -5.0 deg F to 5.0 deg F for temperature and -15% to 15% for humidity.

\* Note: Please note that some object type and instant numbers have the same object name.

Therefore please make sure to see the table above for more detailed information on each controller model

PROPERTY VALUE RANGE RESTRICTIONS FOR AI AND AV OBJECTS

Object name	Object Type and instance	Under range value	Over range value	Default value
Room Temperature	AV 7	-40°F (-40°C)	122°F (50°C)	N/A
Outdoor Temperature	AV 9	-40°F (-40°C)	122°F (50°C)	N/A
Room Humidity	AV 11	0%	100%	N/A
Supply Temp	AI 16	-40°F (-40°C)	122°F (50°C)	N/A
Supply RH	AV 17	0%	100%	N/A
Water Temperature	AV 17	-40°F (-40°C)	122°F (50°C)	N/A
PI Heating Demand	AV 20	0%	100%	N/A
PI Cooling Demand	AV 21	0%	100%	N/A
Economizer Output	AV 22	0%	100%	N/A
AI1 Value	AI 23	0 VDC	10 VDC	N/A
Analog Heat Output	AV 35	0%	100%	N/A
Occupied Heat Setpoint	AV 42	40°F (4.5°C)	90°F (32°C)	72°F (22°C)
Occupied Cool Setpoint	AV 43	54°F (12°C)	100°F (37.5°C)	75°F (24°C)
Unoccupied Heat Setpoint	AV 44	40°F (4.5°C)	90°F (32°C)	62°F (16.5°C)
Fresh Air Level	AI 46	0 CFM	20000 CFM	N/A
Unoccupied Cool Setpoint	AV 45	54°F (12°C)	100°F (37.5)	80°F (26.5°C)
Heating Setpoint Limit	AV 48	40°F (4.5°C)	90°F (32°C)	90°F (32°C)
Cooling Setpoint Limit	AV 49	54°F (12°C)	100°F (37.5)	54°F (12°C)
Heating Lockout Temperature	AV 50	-15°F (-26°C)	120°F (49°C)	120°F (49°C)
Cooling Lockout Temperature	AV 51	-40°F (-40°C)	95°F (35°C)	-40°F (-40°C)
Deadband	AV 52	2°F (1°C)	4°F (2°C)	2°F (1°C)
Password Value	AV 59	0	1000	0
Power-up Delay	AV 60	10 sec	120 sec	10 sec
Unoccupied Time	AV 68	0.5 hrs	24.0. hrs	0.5 hrs
CO2 Level	AI 69	0 PPM	2000 PPM	N/A
Fresh Air Max Range	AV 76	0 CFM	20000 CFM	N/A
Economizer Changeover Setpoint	AV 77	14°F (-10°C)	70°F (21°C)	55°F (13°C)
Economizer Minimum Position	AV 78	0%	100%	0%
Mixed Air Setpoint	AV 80	50°F (10°C)	90°F (32°C)	55°F (13°C)
Economizer Max Position	AV 81	0%	100%	N/A
High Balance Point	AV 82	34°F (1°C)	90°F (32°C)	90°F (32°C)
Discharge High Limit Setpoint	AV 82	70°F (21°C)	150°F (65°C)	120°F (49°C)
Discharge Low Limit Setpoint	AV 83	35°F (2C)	65°F(19C)	65°F (7°C)
Low Balance Point	AV 83	-40°F (-40°C)	30°F (-1°C)	-12°F (-24°C)
Dehumidification RH Setpoint	AV 89	30%	95%	50%
Dehumidification RH Setpoint	AV 89	20%	100%	50%

**PROPERTY VALUE RANGE RESTRICTIONS FOR AI AND AV OBJECTS (CONT'D)**

Object name	Object Type and instance	Under range value	Over range value	Default value
Dehumidification Hysterisys	AV 90	2%	20%	5%
Dehumidification Low OA Lockout	AV 91	-40°F (-40°C)	122°F (50°C)	32°F (0°C)
Humidification RH Setpoint	AV 95	10%	90%	50%
Minimum Supply Heat Setpoint	AV 95	50°F(10°C)	72°F(20°C)	64°F(18°C)
Eff (Effective) Reset Humidification RH Spt (Setpoint)	AV 96	0%	100%	N/A
Supply Heat Lockout Temperature	AV 96	-15°F(-26°C)	120°F(49°C)	32°F(0°C)
Humidification High Limit Spt (Setpoint)	AV 97	50%	90%	85%
Supply PI Heat Demand	AV 97	0%	100%	N/A
Low RH Setpoint	AV 98	10%	90%	20%
Minimum Fresh Air	AV 98	0 CFM	20000 CFM	N/A
Low Temp Reset RH Setpoint	AV 99	-40°F (-40°C)	15°F (-9.5°C)	-20°F (-29°C)
Maximum Fresh Air	AV 99	0 CFM	20000 CFM	N/A
High Temp Reset RH Setpoint	AV 100	20°F (-6.5°C)	55°F (13°C)	32°F (0.0°C)
Minimum CO2 Level	AV 100	0 PPM	2000 PPM	800 PPM
Humidifier Output	AV 101	0%	100%	N/A
Maximum CO2 Level	AV 101	0 PPM	2000 PPM	1200 PPM

**PROPERTY ENUMERATION SETS FOR BV OBJECTS AND BI OBJECTS**

Object Name	Object Type and instance	Inactive_Text	Active_Text	Default value
Room Temp Override	BV 8	Normal	Override	Normal
Outdoor Temp Override	BV 10	Normal	Override	Normal
Room Humidity Override	BV 13	Normal	Override	Normal
AUX	BI 24	Off	On	Off
	BI 23			
G Fan	BI 25	Off	On	Off
Y1 Cool	BI 26	Off	On	Off
Y2 Cool	BI 27	Off	On	Off
W1 Heat	BI 28	Off	On	Off
W2 Heat	BI 29	Off	On	Off
Reversing Valve	BI 30	Off	On	Off
DI 1 Status	BI 31	Not Activated	Activated	Not Activated
DI 2 Status	BI 32	Not Activated	Activated	Not Activated
Local Motion	BI 33	No Motion	Motion	No Motion
Frost Alarm	BI 36	Off	On	Off
Clock Alarm	BI 37	Off	On	Off

**PROPERTY ENUMERATION SETS FOR BV OBJECTS AND BI OBJECTS (CONT'D)**

Object Name	Object Type and instance	Inactive_Text	Active_Text	Default value
Room Temp Override	BV 8	Normal	Override	Normal
Room Humidity Override	BV 11	Normal	Override	Normal
Dehumidification Lockout	BV 13	Disabled	Enabled	Enabled
AUX Command	BV 14	Off	On	Off
Dehumidification Status	BI 23	Off	On	Off
Aux Status	BI 25	Off	On	Off
BI 1 Status	BI 29	Deactivated	Activated	Deactivated
BI 2 Status	BI 30	Deactivated	Activated	Deactivated
UI 3 Status(*)	BI 31	Deactivated	Activated	Deactivated
Local Motion	BI 32	No Motion	Motion	No Motion
Window Alarm	BI 35	Off	On	Off
Filter Alarm	BI 36	Off	On	Off
Filter Alarm	BI 38	Off	On	Off
Service Alarm	BI 39	Off	On	Off
Fan Lock Alarm	BI 40	Off	On	Off
Temperature Scale	BV 47	°C	°F	°F
Frost Protection	BV 55	Off	On	Off
Aux Contact	BV 56	N.O.	N.C.	N.O.
Menu Scroll	BV 57	No Scroll	Scroll Active	Scroll Active
Supply Heat Lock Status	BI 58	Off	On	Inactive
Fan Control	BV 62	Off	On	On
Fan Purge Delay	BV 64	Off	On	Off
Progressive Recovery	BV 70	Off	Active	Off
Discharge Air Alarm	BI 72	Off	On	Off
Mechanical Cooling Enabled	BV 79	Off	On	Off
Comfort Mode	BV 84	Comfort	Economy	Comfort
High CO2 Alarm	BI 84	Off	On	Off
Reversing Valve Configuration	BV 85	Normally Cool Energized in Heating	Normally Heat Energized in Cooling	Normally Heat Energized in Cooling
Compressor Interlock	BV 86	Off	On	Off
Fresh Air Alarm	BI 86	Off	On	Off
RH Display	BV 88	Disabled	Enabled	Disabled
Dehumidification Lockout Functions	BV 92	Disabled	Enabled	Enabled
Dehumidification Output Status	BI 93	Off	On	N/A
AI1 Configuration	BV 94	None	CO2	None

(\*) This object will be linked to the value of the 'UI 3 Configuration' object. When the 'UI 3 Configuration' object value is 0, 3 or 4, the value will be set to 'Deactivated'

PROPERTY ENUMERATION SETS FOR MV OBJECTS

Object Name	Object Type and Instance	BACnet® Index	Text	Default Value
Occupancy Command	MV 12	1	Local Occupancy	Local Occupancy
		2	Occupied	
		3	Unoccupied	
System Mode HPU	MV 13	1	Off	Auto
		2	Auto	
		3	Cool	
		4	Heat	
		5	Emergency	
System Mode RTU	MV 14	1	Off	Auto
		2	Auto	
		3	Cool	
		4	Heat	
Fan Mode	MV 15	1	On	Smart
		2	Auto	
		3	Smart	
Keypad Lockout	MV 18	1	Level 0	Level 0
		2	Level 1	
		3	Level 2	
Effective Occupancy	MV 34	1	Occupied	Depends on local occupancy
		2	Unoccupied	
		3	Temporary Occupied	
Heating CPH	MV 53	1	3 CPH	4 CPH
		2	4 CPH	
		3	5 CPH	
		4	6 CPH	
		5	7 CPH	
		6	8 CPH	
Cooling CPH	MV 54	1	3 CPH	4 CPH
		2	4 CPH	
Temporary Occupancy Time	MV 16	1	0 hour	3 Hours
		2	1 hour	
		3	2 hours	
		4	3 hours	
		5	4 hours	
		6	5 hours	
		7	6 hours	
		8	7 hours	
		9	8 hours	
		10	9 hours	
		11	10 hours	
		12	11 hours	
		13	12 hours	

PROPERTY ENUMERATION SETS FOR MV OBJECTS

Object Name	Object Type and Instance	BACnet® Index	Text	Default Value
Anticycle	MV 63	1	0 minute	2 minutes
		2	1 minute	
		3	2 minutes	
		4	3 minutes	
		5	4 minutes	
		6	5 minutes	
DI1 Configuration	MV 65	1	None	None
		2	RemNSB	
		3	RemOVR	
		4	Filter	
		5	Service	
		6	Fan lock	
DI2 Configuration	MV 66	1	None	None
		2	RemNSB	
		3	RemOVR	
		4	Filter	
		5	Service	
		6	Fan lock	
Proportional Band	MV 67	1	2    2 F    0.6 C	2
		2	3    3 F    1.2 C	
		3	4    4 F    1.7 C	
		4	5    5 F    2.2 C	
		5	6    6 F    2.8 C	
		6	7    7 F    3.3 C	
		7	8    8 F    3.9 C	
Event Display	MV 71	1	2 Events	2 Event
		2	4 Events	
Heating Stages	MV 73	1	Analog Heat	2 Stages
		2	1 Stage	
		3	2 Stages	
Cooling Stages	MV74	1	1 Stage	2 Stages
		2	2 Stages	
Heat Pump Stages	MV75	1	1 Stage	2 Stages
		2	2 Stages	
Dehumidification Lockout Functions	MV 92	1	Disabled	N/A
		2	Restricted	
			Enabled	

**INTEGRATION – GLOBAL COMMANDS**

The following figure shows which objects from the controller can be monitored and commanded from the BAS front-end.

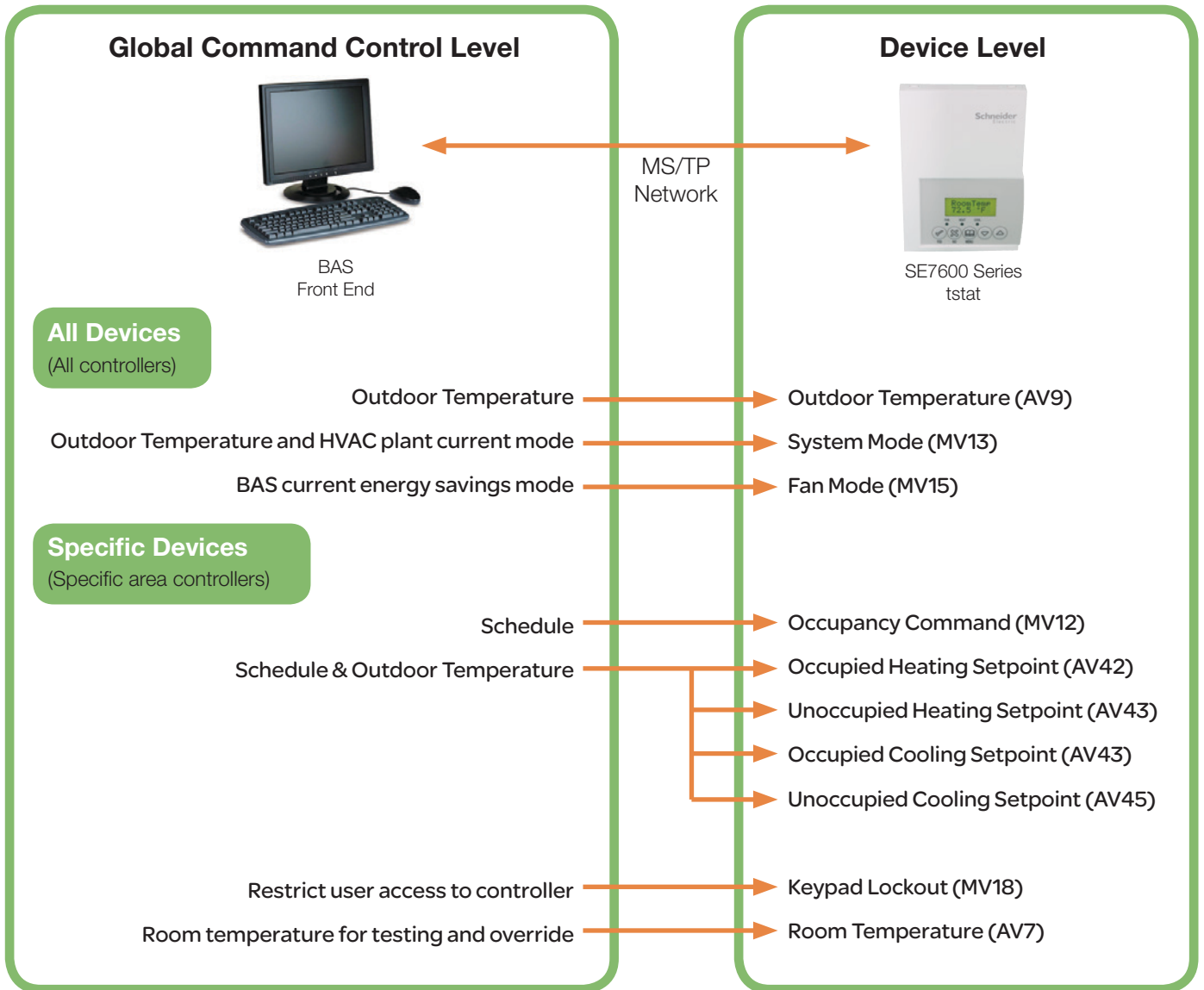


Figure 1: Global commands from a BAS front-end to a typical SE76xx series controller

## SE7600X INTEGRATION – GRAPHICAL USER INTERFACE (GUI) OBJECTS

Objects that should typically be used in a GUI:

- Room Temperature (AV7)
- Occupied and Unoccupied Heat Setpoints (AV 42 and AV44)
- Occupied and Unoccupied Cool Setpoints (AV 43 and AV45)
- Outdoor Temperature (AV9)
- Supply Temperature (AI16) (If available)
- Occupancy Command (MV12)
- Effective Occupancy (MV34)
- System Mode RTU (MV14) or System Mode HPU (MV13)
- G Fan (BI25)
- Y1 Cool (BI26)
- Y2 Cool (BI27)
- W1 Heat (BI28)
- W2 Heat (BI29) or Reversing Valve (BI30);
- Economizer Output (AV22) (if available)
- Aux (BI24)
- DI 1 Status (BI31)
- DI 2 Status (BI 32)
- Frost Alarm (BI36) (if available)
- Filter Alarm (BI38) (if available)
- Service Alarm (BI39) (if available)
- Fan Lock Alarm (BI40) (if available)

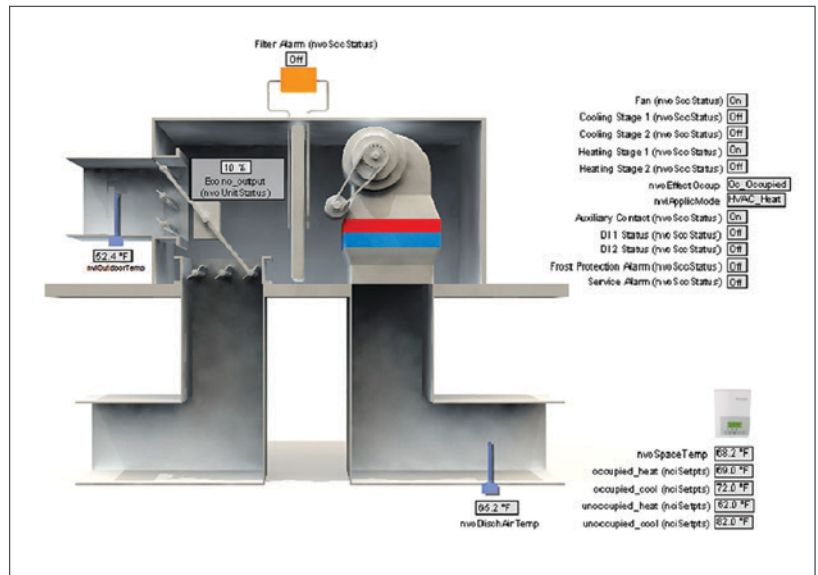


Figure-1 GUI Example - SE7600X

## CONFIGURATION OBJECTS

The following objects and group objects should be typically used for configuration purposes:

- General Options 1 Group GRP 46 and its complete list of objects
- General Options 2 Group GRP 58 and its complete list of objects
- With schedule Model Configuration Options Group GRP 69 and its complete list of objects
- Stages Configuration Options Group GRP 72 and its complete list of objects
- Economizer Model Configuration Option Group GRP 76 and its complete list of objects
- Heatpump Model Configuration Option Group GRP 81 and its complete list of objects
- Dehumidification Model Configuration Option Group GRP 87 and its complete list of objects
- Humidification Model Configuration Option Group GRP 94 and its complete list of objects

If your BAS allows you to remove objects from your database, Schneider Electric recommends removing all configuration objects once your setup is complete. This will prevent unnecessary polling of non used objects and will help speed up the network.

## WIRING GUIDE

### Overview

Schneider Electric uses EIA-485 as the physical layer between their devices and supervisory controllers.

For clarity we will use the term “Device” to represent any product with an active EIA-485 network connection, including Schneider Electric and non-Schneider Electric controllers.

A summary of network specifications are listed below.

### Summary Specifications

Parameter	Details
Media	Twisted pair 22 AWG–24 AWG, shielded recommended
Characteristic Impedance	100-130 ohms
Distributed capacitance	Less than 100 pF per meter (30 pF per foot)
Maximum length per segment	1200 meters (4000 feet) Note: AWG 18 cable
Polarity	Polarity sensitive
Multi-drop	Daisy-chain (no T connections)
Terminations	<ol style="list-style-type: none"> <li>Schneider Electric devices are installed at both ends of the MS/TP network: 120 Ohms resistor should be installed at each end.</li> <li>A Schneider Electric device is installed at one end of the MS/TP network and a third-party device is installed at the other end: Install an End-Of-Line resistor value that matches the third-party device instruction regarding the End-Of-Line resistors.</li> <li>Third-party devices are installed at both ends of the MS/TP network: Follow the third-party device instructions regarding the End-Of-Line resistors.</li> </ol>
Network Bias Resistors	510 ohms per wire (max. of two sets per segment)
Maximum number of nodes per segment	64 (Schneider Electric devices only)
Maximum number of nodes per network	128
Baud rate	9600, 19200, 38400, 76800 (Auto detect)

Table 1: Summary of Specifications for a Schneider Electric EIA-485 Network

### Cable Type

Schneider Electric recommends the use of balanced 22-24 AWG twisted pair with characteristic impedance of 100-130 ohms, capacitance of 30 pF/ft or lower. A braided shield is also recommended.

### Impedance

A value based on the inherent conductance, resistance, capacitance and inductance that represent the impedance of an infinitely long cable. The nominal impedance of the cable should be between 100Ω and 120Ω. However using 120Ω will result in a lighter load on the network.

### Capacitance (pF/ft)

The amount of equivalent capacitive load of the cable, typically listed in a per foot basis. One of the factors limiting total cable length is the capacitive load. Systems with long lengths benefit from using low capacitance cable (i.e. 17pF/ft or lower).

### NETWORK CONFIGURATION

EIA-485 networks use a daisy chain configuration. A daisy chain means that there is only one main cable and every network device is connected directly along its path.

Figure 3 illustrates two improper network configurations and the proper daisy chain configuration.

Other methods of wiring an EIA-485 network may give unreliable and unpredictable results. There are no troubleshooting methods for these types of networks. Therefore, a great deal of site experimentation may have to be done, making this a difficult task with no guarantee of success. Schneider Electric will only support daisy chain configurations.

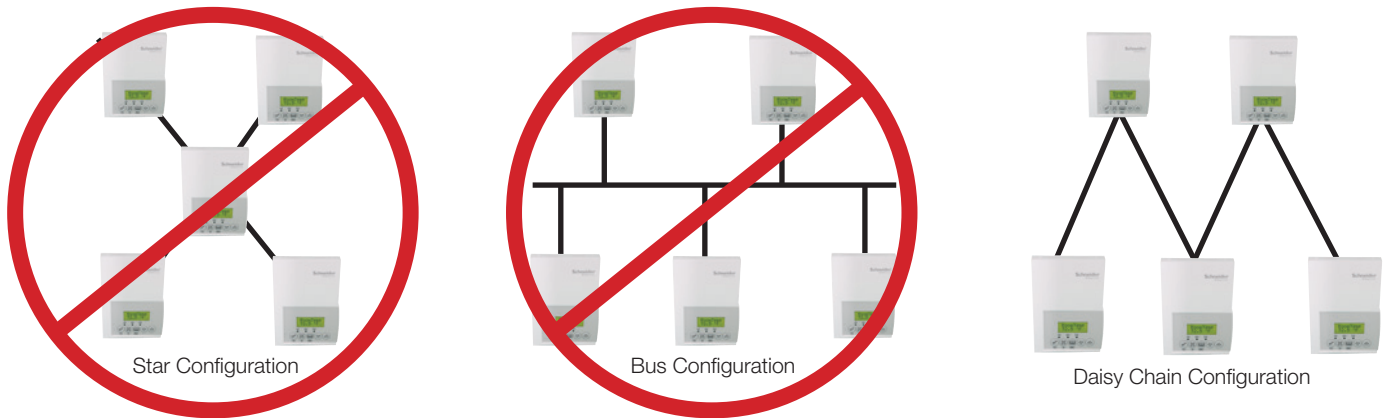


Figure 3: Three different network configurations: star, bus, and daisy chain. Only the daisy chain configuration is correct for an EIA-485 network

### Maximum Number of Devices

A maximum of 64 nodes are allowed on a single daisy-chain segment. A node is defined as any device (Panel, Zone, Repeater, etc.) connected to the RS485 network. Terminators do not count as a node.

To determine the number of nodes on a network, add the following:

- One node for each device, including main panels
- One node for each repeater on the chain

For the example, in Figure 4 there is one node for the main SC panel, plus 4 for the controllers; for a total of 5 nodes.

If there are more than 64 devices, install repeaters to extend the network.

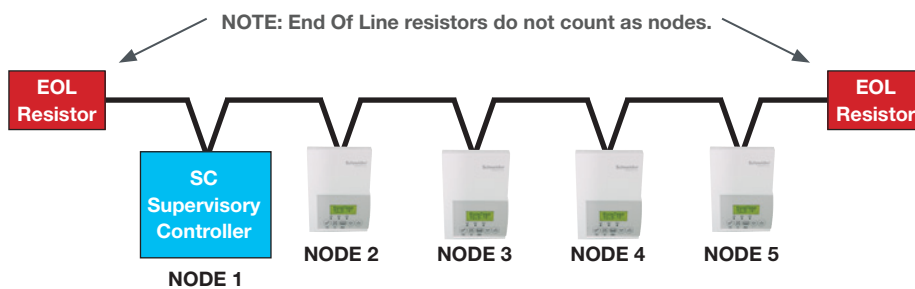


Figure 4: Example Network - 5 Nodes

### Maximum Cable Length

The maximum length of a chain is related to its transmission speed. The longer the chain, the slower the speed. Using proper cable, the maximum length of an EIA-485 daisy chain is 4000-ft (1200 m). This will only work reliably for data rates up to 100,000 bps. Schneider Electric's maximum data rate is 76,800 bps.

If you require a maximum network length of more than 4000 feet, then repeaters are required to extend the network.

### EIA-485 Repeaters

If you have more than 64 devices, or require a maximum network length of more than 4000 feet, then repeaters are required to extend the network. The best configuration is to daisy chain the repeaters to the main panel. From each of these repeaters, a separate daisy chain will branch off. Figure 5 demonstrates a valid use of repeaters in an EIA-485 network.

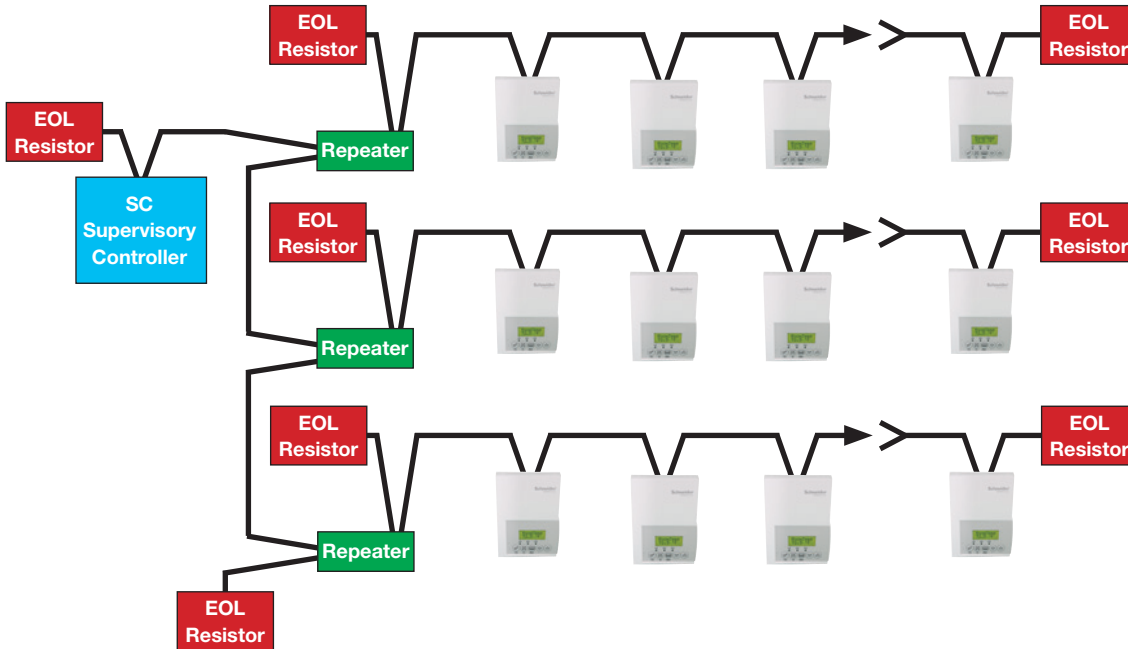


Figure-5 Correct Repeater Use in an EIA-485 Network

Do not install repeaters in series, as this may result in network reliability problems. Incorrect use of a repeater in an EIA-485 network is illustrated below in Figure-6.

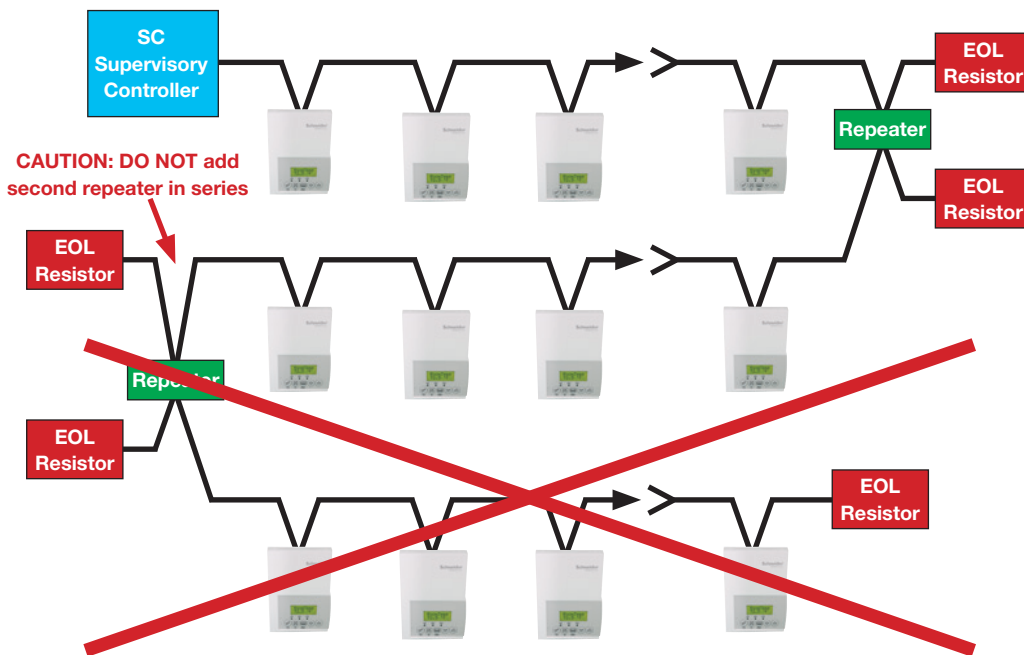


Figure-6 Incorrect Repeater Use in an EIA-485 Network

### End Of Line (EOL) Resistors

MS/TP network must be properly terminated. For daisy chain configurations, you must install an EOL resistor at each end of the daisy chain. Depending on your MS/TP network configuration, the resistance value of the EOL resistor may change:

- Schneider Electric's devices are installed at both ends of the MS/TP network: 120 Ohms resistor should be installed at each end.
- A Schneider Electric device is installed at one end of the MS/TP network and a 3rd party device is installed at the other end:  
Install an End-Of-Line resistor value that matches the 3rd party devices instructions regarding its EOL resistor value;
- 3rd party devices are installed at both ends of the MS/TP network:  
Follow the 3rd party devices instructions regarding its EOL resistor value.

### Network Adapter

The polarity of the connection to the cable is important. From one module to the other it is important that the same coloured wire be connected to “plus” or “+” and the other coloured wire be connected to the “minus” or “-“. Figure 7 shows the proper MS/TP connections and the location of the Status LED. This Status LED may help to troubleshoot network problems.

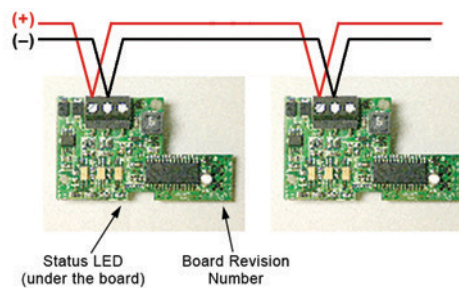


Figure-7 BACnet® Network Module Details

**IMPORTANT NOTE:** The Ref terminal should NEVER be used to wire shields. The 2 shields from each feed of the network connection to a controller should be wired together in the back of the controller and properly protected to prevent any accidental connection to the ground.

The joined shield connection should then be grounded at a SINGLE point on the whole segment. More than one ground connection to a shielded wire may induce ground loop noises and affect communication.

Table 2: Status LED condition and possible solutions

Status LED Action	Possible Cause	Solution
1 short blink	BACnet® communication NOT active at default MAC address = 254	Change MAC address to another value from 0 to 127
	BACnet module is not compatible with the SE7600 controller	Install a SE7600 BACnet® module on the controller
2 short blinks (no wires connected to the module)	The right module has been installed on the right controller model	N/A
2 short blinks (wires connected to the module)	Module is not at the same baud rate as the network	Power off and on the controller
2 short blinks and a longer blink (wires connected to the module)	The module has detected the presence of a network	N/A
Right after power is applied: 2 long blinks and then no blinking	Polarity has been reversed at the module	Reverse polarity at the module

## DEFAULT DEVICE NAME AND ID

Default **Device Name** is set to: Model number – MAC:

- Where MAC is the current MAC address of the device.
- Where Model number is Schneider Electric part number.

The device name will be upgraded as soon as there is a change to the device MAC address.

The Device Name and Device ID properties are writable. Both properties can be renamed from any BACnet® network management tool as long as the tool itself can write to these properties.

## SE76xxX Models

Default **Device ID** is set to: Model number + MAC

- Where MAC is the current MAC address of the device.
- Where model number is the Schneider Electric part number.

The device ID will also be upgraded as soon as there is a change to the device's MAC address.

For example, when a SE7600B5x45B controller with a MAC address of 63 is connected to a network, its default Device Name will be SE7600B5x45B-63 and its default Device ID will be 76063.

Device Name and Device ID properties are writable in Schneider Electric's device object. Both properties can be renamed from any BACnet® network management tool as long as the tool itself can write to these properties.

## INTEGRATING SCHNEIDER ELECTRIC DEVICES ON AN MS/TP NETWORK

Before doing any BACnet® integration, make sure to obtain a Schneider Electric PICS document (Protocol Implementation Conformance Statement).

This PICS document lists all the BACnet® Services and Object types supported by a device and can be found at [www.Schneider-Electric.com](http://www.Schneider-Electric.com).

### Graphical Interfaces

For example, some graphic interface might poll every data linked to the graphic page on a COV basis. If the 3rd party device does not support COV, the graphic interface then relies on a pre-configured polling interval, which is usually in hundredths of milliseconds. Any device containing a monitored object could be subject to network traffic congestion if such a polling interval is used. Schneider Electric strongly recommend a polling interval of 5 seconds minimum for any graphic interface. This becomes even more critical in area graphics where a single representation might poll many devices. If proper poll rate is not respected, devices may be reported offline by certain front end by saturating the traffic handling capacity of BACnet MS/TP without COV subscription.

### Free Programmed Object or Loops

As for the application program, you might want to read and write MS/TP data on an "If Once" basis or a "Do Every Loop" basis instead of reading or writing to a third-party device's object directly in the program. Otherwise, any read or write request will occur at the Supervisory Controller's program scan rate, which might be in hundredths of milliseconds. This can easily bog down a network as single commands can be sent to **all** ASC devices down the MS/TP trunks every hundredths of milliseconds

Programs writing to the devices should have a structure similar to the following:

If Once Schedule = On then		Do Every 5min
MV11 = Occupied		If Schedule = On Then
End If		MV11= Occupied
If Once Schedule = Off Then	OR	Else
MV11 = Unoccupied		MV11 = Unoccupied
End If		End If
		End Do

### Retries and Timeouts

Another thing to look for in BACnet® integration is the device object of the Supervisory Controller (and the Operator's Workstation). This object contains the two following required properties:

- 1) Retry Timeout
- 2) Number of APDU Retries

1) The Retry Timeout property specifies the time between re-transmissions if the acknowledgement has not been received. When you are experiencing problems with controllers dropping off line, increasing this value may help.

2) The Number of APDU Retries property specifies the number of times unsuccessful transmissions will be repeated. If the receiving controller has not received the transmission successfully after this many attempts, no further attempts will be made.

For example, if one of the controllers does not reply to a Supervisory Controller (SC) request, and the SC's Retry Timeout is set to 2000 milliseconds and the Number of APDU Retries is set to 1 (still at the SC level), then the SC will send one other request 2 seconds later. If the MS/TP device does not reply, it will be considered off line by the workstation.

Having a Retry Timeout value of 10450 milliseconds and a Number of APDU Retries property set to 3 at the SC level may prevent the device from dropping off line. These properties should also be changed at the workstation level since the workstation will likely issue requests to any MS/TP devices when the graphics are used.

### TIPS AND THINGS YOU NEED TO KNOW

- Each controller is delivered from the factory with the default MAC address set at 254. At this value, the BACnet® communication is **not** active and the device will not participate in the token pass either. The local LED status for the communication adapter at this point is one short flash only. To enable the BACnet® communication, set the local MAC address configuration property of the controller to any valid value from 0 to 127.
- After the initial configuration of your device and if your BAS allows you to remove objects, we suggest that you remove all the configuration objects to prevent unnecessary polling of unused objects and to help speed up the network.
- Please refer to the appropriate Technical Manual for more details.
  - PIR Ready SE76xxA,B,H Series
  - PIR Ready SE76xxF Series
  - PIR Ready SE76xxE Series
  - PIR Ready SE76xxW Series
  - PIR Ready SE76x7B Series
- In default mode of operation, the device will automatically match its baud rate to the baud rate of the network. Automatic baud rate detection will occur when the MS/TP communication port is initialized (on power up). If the network speed is changed, the device will keep listening at the previously detected speed for 10 minutes before resuming auto-baud. Re-powering the devices will force the auto-baud.

- If the device should go off line, the following binded controller parameters will be released:
  - Room Temperature
  - Outdoor Temperature
  - Occupancy
- The BACnet® Data Link layer has two key parameters: the device object name and the device object ID. The device object name must be unique from any other BACnet® device object name on the BACnet® network (i.e. not just the MS/TP sub-network). The device object ID must be unique from any other BACnet® device object ID on the entire BACnet® network (i.e. not just the MS/TP sub-network).
- Time synchronization can be made through a network even if the controller does not support the full date. Therefore, the device cannot claim conformance to the DeviceManagement – TimeSynchronization - B (DM-TS-B) service. The device object does not have the Local\_Time or Local\_Date properties.
- Device Name and Device ID properties are writable in Schneider Electric device objects. Both properties can be renamed from any BACnet® network management tool as long as the tool itself gives access to write to these properties.

## TROUBLESHOOTING

Table-4 Troubleshooting

Error / Fault	Possible Cause	Solution
Controller does not come online	Two or more controllers have the same MAC address.	Modify each duplicate address to a unique number.
	The MS/TP network has too many devices.	Do not exceed the maximum number of devices and maximum length allowed by the EIA-485 specifications.
	Too many devices were installed without any repeaters.	Repeaters need to be installed as specified in this document.
	The MS/TP cable runs are broken	Locate the break and correct the wiring.
	MS/TP connections at the module are reversed	Respect polarity of the wires on a MS/TP network.
	The controller does not have power	Apply power to the controller