


Features:

- ModBus or BACnet, user selectable
- Auto baud rate detection
- “Traffic light” LED for CO₂
- Dew point & Enthalpy outputs (with RH&T elements)
- User adjustable set point offset high & low limits
- User adjustable Temp. & RH offsets
- User configurable temperature units (°C or °F)
- Multiple measurements over a simple 2-wire data bus in a single sensor
- Cost effective control measurements

Technical data

Output	BACnet MS/TP or ModBus RTU over RS-485
Baud rates:	
- BACnet MS/TP	9k6, 19k2, 38k4, 76k8 or auto baud detection
- ModBus RTU:	9k6, 19k2, 38k4 or 57k6 or auto baud detection
- Data bits	8
- Parity	None, odd or even
- Stop bits	1 or 2
Supply voltage	24Vac/dc ±10%
Supply current	Dependent on the sensor elements fitted.
Measurement ranges:	
- Temperature	-10 to +110 units user conf (°C or °F)
- RH	0 to 100% RH
- CO ₂	0 to 2000ppm, or 0 to 5000ppm
- IAQ	Simple 0 to 10 indices value
- CO	Simple 0 to 100ppm
- Set point	User conf (°C or °F)
- Fan speed	Off, Lo, Med, Hi, Auto
Other Options:	Light Level ¹ PIR occupancy detection ¹
Measurement accuracies:	
- Temperature	±0.4°C
- RH	±2% RH
- CO ₂	±70ppm, or as dictated by the selected CO ₂ element
Auxiliary inputs:	1 x 0-10Vdc linear 1 x VFC digital
Display	Optional LCD, to show all fitted measured values
CO ₂ LED ¹	“Traffic light” LED for CO ₂ levels LED colour change levels user conf.

Ordering Codes, BACnet Smart Sensor

SB-1001	Temp & RH
SB-1002	Temp, RH, CO ₂ & 3-colour LED
SB-1003	Temp, CO ₂ & 3-colour LED
SB-1004	Temp, LCD, Fan Speed & Set Point
SB-1005	Temp, RH, CO ₂ , LL, OC, SP & 3-Colour LED
SB-1006	Temp, CO ₂ , LL, OC, SP & 3-Colour LED
SB-1007	Temp, CO ₂ , RH, AQ, CO, LCD, SP, FS & MS

Ordering Codes, ModBus Smart Sensor

SM-1001	Temp & RH
SM-1002	Temp, RH, CO ₂ & 3-colour LED
SM-1003	Temp, CO ₂ & 3-colour LED
SM-1004	Temp, LCD, Fan Speed & Set Point
SM-1005	Temp, RH, CO ₂ , LL, OC, SP & 3-Colour LED
SM-1006	Temp, CO ₂ , LL, OC, SP & 3-Colour LED
SM-1007	Temp, CO ₂ , RH, AQ, CO, LCD, SP, FS & MS



EMC Compliance:

- Emissions EN 61000-6-3:2007+A1:2011
- Immunity EN 61000-6-2:2005

Ambient:

- Temperature 0 to +50°C
- RH 0 to 95% non-condensing

Housing:

- Material ABS (flame retardant)
- Colour Polished white finish
- Dimensions 115 x 85 x 28mm

Protection IP30

Country of origin UK

Technical Overview

This is a new concept for total environmental sensing in a single space housing. Each sensor can be individually tailored to specific requirements, with a wide range of options. All option outputs are available via BACnet MS/TP or ModBus RTU. The data bus type is user-selectable.

The options include

Outputs

- Temperature
- RH
- CO₂
- CO
- IAQ
- Set point
- Override switch
- Fan Speed Switch (3, 4 or 5-position)
- Light Level
- PIR Occupancy Detector
- Dew point & Enthalpy (only if RH&T are fitted)

Inputs

- 1 x 0-10Vdc Analogue
- 1 x VFC Digital Binary
- LCD Display, use configurable

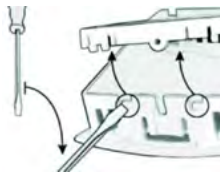
¹ The LCD option will not be able to be offered if the following options are fitted;

- CO₂ LED
- Light level
- PIR



Antistatic precautions must be observed when handling these sensors. The PCB contains circuitry that can be damaged by static discharge.

1. Select a location on a wall of the controlled space which will give a representative sample of the prevailing room condition. Avoid sitting the sensor in direct sunlight, on an outside wall or near heat sources. An idea mounting height is 1.5m from the floor.
2. Undo the tamperproof screw at the bottom of the housing, to remove the front panel from the base, twist a screwdriver as below and pull gently the front panel from the base.



3. Using the base as a template mark the hole centres and fix to the wall with suitable screws. Alternatively the base plate can be mounted on to a conduit box or standard recessed back box. The base plate is suitable for EU & North America fixings.
4. Feed cable through the hole in the base plate of the housing and terminate the cores at the terminal block as required. Leaving some slack inside the unit.
5. Set DS1 & DS2 dip-switches for address, baud rate, communication type and parity & stops bits (Modbus only).
6. Replace the housing to the base plate and tighten the tamperproof screw (if required) through the lug at the bottom of the base plate.
7. Before powering the sensor, ensure that the supply voltage is within the specified tolerances.
8. Allow 3 minutes before checking functionality, and at least 30 minutes before carrying out pre-commissioning checks. This will allow the electronics time to stabilise.

To perform an accurate comparison between a transmitter output and a portable reference, it is essential that the two probes are held adjacent for a minimum of 30 minutes in a stable RH environment. Only in this way can speed of response and temperature factors be eliminated. It is not uncommon for test instruments and transmitters to disagree by 10% RH or more when site measurements are taken incorrectly. 'Slings' or other mechanical hygrometer should not be used as a reference.

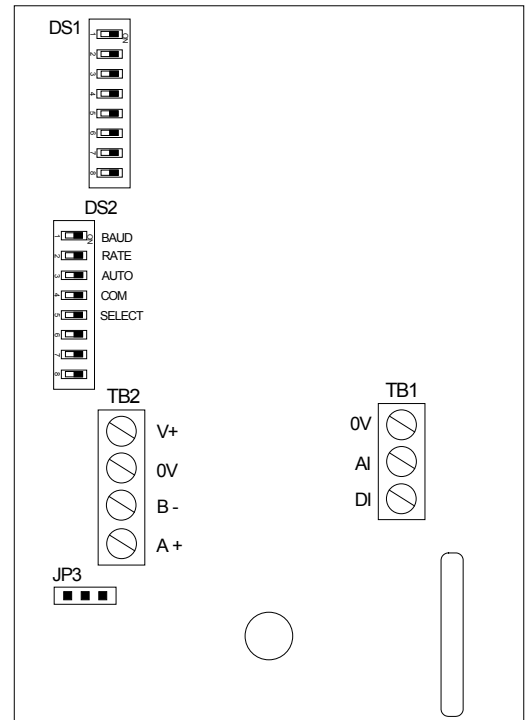


Connections & PCB Layout:

Left Hand terminal Block:		Right Hand Terminal Block:	
TB2		TB1	
+V	Supply + 24Vac/dc	0V	0V
0V	Supply 0V	AI	0-10Vdc Override Input
B-	RS-485 -	DI	VFC Override Input
A+	RS-485 +		

RS-485 Termination

JP3 jumper can be fitted to the left 2 pins for no end-of-line (EOL) termination, or to the right 2 pins for an on-PCB 120Ω terminating resistor. Only position in the EOL setting if the sensor is the last on the RS-485 bus, and farthest away from the bus master.



DIP-switch Settings:

DS2-1 to DS2-3

Baud Rate:

	DS2-1	DS2-2	DS2-3
9600	OFF	OFF	OFF
19200	ON	OFF	OFF
38400	OFF	ON	OFF
BACnet=76800 ModBus=57600	ON	ON	OFF
Auto			ON

DS2-4

Communications:

	DS2-4
BACnet	OFF
ModBus	ON

DS2-5 to DS2-6

Parity and Stop Bits (ModBus only):

	DS2-5	DS2-6
No parity, 2 Stop bits	OFF	OFF
Odd parity, 1 stop bit	ON	OFF
Even parity, 1 stop bit	OFF	ON
No parity, 2 stop bits	ON	ON



Address	DS1.1	DS1.2	DS1.3	DS1.4	DS1.5	DS1.6	DS1.7	DS1.8
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
3	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
4	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
5	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
6	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF
7	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
8	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
9	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
10	OFF	ON	OFF	ON	OFF	OFF	OFF	OFF
11	ON	ON	OFF	ON	OFF	OFF	OFF	OFF
12	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
13	ON	OFF	ON	ON	OFF	OFF	OFF	OFF
14	OFF	ON	ON	ON	OFF	OFF	OFF	OFF
15	ON	ON	ON	ON	OFF	OFF	OFF	OFF
16	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
17	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
18	OFF	ON	OFF	OFF	ON	OFF	OFF	OFF
19	ON	ON	OFF	OFF	ON	OFF	OFF	OFF
20	OFF	OFF	ON	OFF	ON	OFF	OFF	OFF
21	ON	OFF	ON	OFF	ON	OFF	OFF	OFF
22	OFF	ON	ON	OFF	ON	OFF	OFF	OFF
23	ON	ON	ON	OFF	ON	OFF	OFF	OFF
24	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF
25	ON	OFF	OFF	ON	ON	OFF	OFF	OFF
26	OFF	ON	OFF	ON	ON	OFF	OFF	OFF
27	ON	ON	OFF	ON	ON	OFF	OFF	OFF
28	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
29	ON	OFF	ON	ON	ON	OFF	OFF	OFF
30	OFF	ON	ON	ON	ON	OFF	OFF	OFF
31	ON	ON	ON	ON	ON	OFF	OFF	OFF
32	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
33	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF
34	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
35	ON	ON	OFF	OFF	OFF	ON	OFF	OFF
36	OFF	OFF	ON	OFF	OFF	ON	OFF	OFF
37	ON	OFF	ON	OFF	OFF	ON	OFF	OFF
38	OFF	ON	ON	OFF	OFF	ON	OFF	OFF
39	ON	ON	ON	OFF	OFF	ON	OFF	OFF
40	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF
41	ON	OFF	OFF	ON	OFF	ON	OFF	OFF
42	OFF	ON	OFF	ON	OFF	ON	OFF	OFF
43	ON	ON	OFF	ON	OFF	ON	OFF	OFF
44	OFF	OFF	ON	ON	OFF	ON	OFF	OFF
45	ON	OFF	ON	ON	OFF	ON	OFF	OFF

Address	DS1.1	DS1.2	DS1.3	DS1.4	DS1.5	DS1.6	DS1.7	DS1.8
128	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
129	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON
130	OFF	ON	OFF	OFF	OFF	OFF	OFF	ON
131	ON	ON	OFF	OFF	OFF	OFF	OFF	ON
132	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON
133	ON	OFF	ON	OFF	OFF	OFF	OFF	ON
134	OFF	ON	ON	OFF	OFF	OFF	OFF	ON
135	ON	ON	ON	OFF	OFF	OFF	OFF	ON
136	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
137	ON	OFF	OFF	ON	OFF	OFF	OFF	ON
138	OFF	ON	OFF	ON	OFF	OFF	OFF	ON
139	ON	ON	OFF	ON	OFF	OFF	OFF	ON
140	OFF	OFF	ON	ON	OFF	OFF	OFF	ON
141	ON	OFF	ON	ON	OFF	OFF	OFF	ON
142	OFF	ON	ON	ON	OFF	OFF	OFF	ON
143	ON	ON	ON	ON	OFF	OFF	OFF	ON
144	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON
145	ON	OFF	OFF	OFF	ON	OFF	OFF	ON
146	OFF	ON	OFF	OFF	ON	OFF	OFF	ON
147	ON	ON	OFF	OFF	ON	OFF	OFF	ON
148	OFF	OFF	ON	OFF	ON	OFF	OFF	ON
149	ON	OFF	ON	OFF	ON	OFF	OFF	ON
150	OFF	ON	ON	OFF	ON	OFF	OFF	ON
151	ON	ON	ON	OFF	ON	OFF	OFF	ON
152	OFF	OFF	OFF	ON	ON	OFF	OFF	ON
153	ON	OFF	OFF	ON	ON	OFF	OFF	ON
154	OFF	ON	OFF	ON	ON	OFF	OFF	ON
155	ON	ON	OFF	ON	ON	OFF	OFF	ON
156	OFF	OFF	ON	ON	ON	OFF	OFF	ON
157	ON	OFF	ON	ON	ON	OFF	OFF	ON
158	OFF	ON	ON	ON	ON	OFF	OFF	ON
159	ON	ON	ON	ON	ON	OFF	OFF	ON
160	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON
161	ON	OFF	OFF	OFF	OFF	ON	OFF	ON
162	OFF	ON	OFF	OFF	OFF	ON	OFF	ON
163	ON	ON	OFF	OFF	OFF	ON	OFF	ON
164	OFF	OFF	ON	OFF	OFF	ON	OFF	ON
165	ON	OFF	ON	OFF	OFF	ON	OFF	ON
166	OFF	ON	ON	OFF	OFF	ON	OFF	ON
167	ON	ON	ON	OFF	OFF	ON	OFF	ON
168	OFF	OFF	OFF	ON	OFF	ON	OFF	ON
169	ON	OFF	OFF	ON	OFF	ON	OFF	ON
170	OFF	ON	OFF	ON	OFF	ON	OFF	ON
171	ON	ON	OFF	ON	OFF	ON	OFF	ON
172	OFF	OFF	ON	ON	OFF	ON	OFF	ON
173	ON	OFF	ON	ON	OFF	ON	OFF	ON



Address	DS1.1	DS1.2	DS1.3	DS1.4	DS1.5	DS1.6	DS1.7	DS1.8
46	OFF	ON	ON	ON	OFF	ON	OFF	OFF
47	ON	ON	ON	ON	OFF	ON	OFF	OFF
48	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF
49	ON	OFF	OFF	OFF	ON	ON	OFF	OFF
50	OFF	ON	OFF	OFF	ON	ON	OFF	OFF
51	ON	ON	OFF	OFF	ON	ON	OFF	OFF
52	OFF	OFF	ON	OFF	ON	ON	OFF	OFF
53	ON	OFF	ON	OFF	ON	ON	OFF	OFF
54	OFF	ON	ON	OFF	ON	ON	OFF	OFF
55	ON	ON	ON	OFF	ON	ON	OFF	OFF
56	OFF	OFF	OFF	ON	ON	ON	OFF	OFF
57	ON	OFF	OFF	ON	ON	ON	OFF	OFF
58	OFF	ON	OFF	ON	ON	ON	OFF	OFF
59	ON	ON	OFF	ON	ON	ON	OFF	OFF
60	OFF	OFF	ON	ON	ON	ON	OFF	OFF
61	ON	OFF	ON	ON	ON	ON	OFF	OFF
62	OFF	ON	ON	ON	ON	ON	OFF	OFF
63	ON	ON	ON	ON	ON	ON	OFF	OFF
64	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
65	ON	OFF	OFF	OFF	OFF	OFF	ON	OFF
66	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF
67	ON	ON	OFF	OFF	OFF	OFF	ON	OFF
68	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
69	ON	OFF	ON	OFF	OFF	OFF	ON	OFF
70	OFF	ON	ON	OFF	OFF	OFF	ON	OFF
71	ON	ON	ON	OFF	OFF	OFF	ON	OFF
72	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF
73	ON	OFF	OFF	ON	OFF	OFF	ON	OFF
74	OFF	ON	OFF	ON	OFF	OFF	ON	OFF
75	ON	ON	OFF	ON	OFF	OFF	ON	OFF
76	OFF	OFF	ON	ON	OFF	OFF	ON	OFF
77	ON	OFF	ON	ON	OFF	OFF	ON	OFF
78	OFF	ON	ON	ON	OFF	OFF	ON	OFF
79	ON	ON	ON	ON	OFF	OFF	ON	OFF
80	OFF	OFF	OFF	OFF	ON	OFF	ON	OFF
81	ON	OFF	OFF	OFF	ON	OFF	ON	OFF
82	OFF	ON	OFF	OFF	ON	OFF	ON	OFF
83	ON	ON	OFF	OFF	ON	OFF	ON	OFF
84	OFF	OFF	ON	OFF	ON	OFF	ON	OFF
85	ON	OFF	ON	OFF	ON	OFF	ON	OFF
86	OFF	ON	ON	OFF	ON	OFF	ON	OFF
87	ON	ON	ON	OFF	ON	OFF	ON	OFF
88	OFF	OFF	OFF	ON	ON	OFF	ON	OFF
89	ON	OFF	OFF	ON	ON	OFF	ON	OFF
90	OFF	ON	OFF	ON	ON	OFF	ON	OFF

Address	DS1.1	DS1.2	DS1.3	DS1.4	DS1.5	DS1.6	DS1.7	DS1.8
174	OFF	ON	ON	ON	OFF	ON	OFF	ON
175	ON	ON	ON	ON	OFF	ON	OFF	ON
176	OFF	OFF	OFF	OFF	ON	ON	OFF	ON
177	ON	OFF	OFF	OFF	ON	ON	OFF	ON
178	OFF	ON	OFF	OFF	ON	ON	OFF	ON
179	ON	ON	OFF	OFF	ON	ON	OFF	ON
180	OFF	OFF	ON	OFF	ON	ON	OFF	ON
181	ON	OFF	ON	OFF	ON	ON	OFF	ON
182	OFF	ON	ON	OFF	ON	ON	OFF	ON
183	ON	ON	ON	OFF	ON	ON	OFF	ON
184	OFF	OFF	OFF	ON	ON	ON	OFF	ON
185	ON	OFF	OFF	ON	ON	ON	OFF	ON
186	OFF	ON	OFF	ON	ON	ON	OFF	ON
187	ON	ON	OFF	ON	ON	ON	OFF	ON
188	OFF	OFF	ON	ON	ON	ON	OFF	ON
189	ON	OFF	ON	ON	ON	ON	OFF	ON
190	OFF	ON	ON	ON	ON	ON	OFF	ON
191	ON	ON	ON	ON	ON	ON	OFF	ON
192	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON
193	ON	OFF	OFF	OFF	OFF	OFF	ON	ON
194	OFF	ON	OFF	OFF	OFF	OFF	ON	ON
195	ON	ON	OFF	OFF	OFF	OFF	ON	ON
196	OFF	OFF	ON	OFF	OFF	OFF	ON	ON
197	ON	OFF	ON	OFF	OFF	OFF	ON	ON
198	OFF	ON	ON	OFF	OFF	OFF	ON	ON
199	ON	ON	ON	OFF	OFF	OFF	ON	ON
200	OFF	OFF	OFF	ON	OFF	OFF	ON	ON
201	ON	OFF	OFF	ON	OFF	OFF	ON	ON
202	OFF	ON	OFF	ON	OFF	OFF	ON	ON
203	ON	ON	OFF	ON	OFF	OFF	ON	ON
204	OFF	OFF	ON	ON	OFF	OFF	ON	ON
205	ON	OFF	ON	ON	OFF	OFF	ON	ON
206	OFF	ON	ON	ON	OFF	OFF	ON	ON
207	ON	ON	ON	ON	OFF	OFF	ON	ON
208	OFF	OFF	OFF	OFF	ON	OFF	ON	ON
209	ON	OFF	OFF	OFF	ON	OFF	ON	ON
210	OFF	ON	OFF	OFF	ON	OFF	ON	ON
211	ON	ON	OFF	OFF	ON	OFF	ON	ON
212	OFF	OFF	ON	OFF	ON	OFF	ON	ON
213	ON	OFF	ON	OFF	ON	OFF	ON	ON
214	OFF	ON	ON	OFF	ON	OFF	ON	ON
215	ON	ON	ON	OFF	ON	OFF	ON	ON
216	OFF	OFF	OFF	ON	ON	OFF	ON	ON
217	ON	OFF	OFF	ON	ON	OFF	ON	ON
218	OFF	ON	OFF	ON	ON	OFF	ON	ON



Address	DS1.1	DS1.2	DS1.3	DS1.4	DS1.5	DS1.6	DS1.7	DS1.8
91	ON	ON	OFF	ON	ON	OFF	ON	OFF
92	OFF	OFF	ON	ON	ON	OFF	ON	OFF
93	ON	OFF	ON	ON	ON	OFF	ON	OFF
94	OFF	ON	ON	ON	ON	OFF	ON	OFF
95	ON	ON	ON	ON	ON	OFF	ON	OFF
96	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF
97	ON	OFF	OFF	OFF	OFF	ON	ON	OFF
98	OFF	ON	OFF	OFF	OFF	ON	ON	OFF
99	ON	ON	OFF	OFF	OFF	ON	ON	OFF
100	OFF	OFF	ON	OFF	OFF	ON	ON	OFF
101	ON	OFF	ON	OFF	OFF	ON	ON	OFF
102	OFF	ON	ON	OFF	OFF	ON	ON	OFF
103	ON	ON	ON	OFF	OFF	ON	ON	OFF
104	OFF	OFF	OFF	ON	OFF	ON	ON	OFF
105	ON	OFF	OFF	ON	OFF	ON	ON	OFF
106	OFF	ON	OFF	ON	OFF	ON	ON	OFF
107	ON	ON	OFF	ON	OFF	ON	ON	OFF
108	OFF	OFF	ON	ON	OFF	ON	ON	OFF
109	ON	OFF	ON	ON	OFF	ON	ON	OFF
110	OFF	ON	ON	ON	OFF	ON	ON	OFF
111	ON	ON	ON	ON	OFF	ON	ON	OFF
112	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
113	ON	OFF	OFF	OFF	ON	ON	ON	OFF
114	OFF	ON	OFF	OFF	ON	ON	ON	OFF
115	ON	ON	OFF	OFF	ON	ON	ON	OFF
116	OFF	OFF	ON	OFF	ON	ON	ON	OFF
117	ON	OFF	ON	OFF	ON	ON	ON	OFF
118	OFF	ON	ON	OFF	ON	ON	ON	OFF
119	ON	ON	ON	OFF	ON	ON	ON	OFF
120	OFF	OFF	OFF	ON	ON	ON	ON	OFF
121	ON	OFF	OFF	ON	ON	ON	ON	OFF
122	OFF	ON	OFF	ON	ON	ON	ON	OFF
123	ON	ON	OFF	ON	ON	ON	ON	OFF
124	OFF	OFF	ON	ON	ON	ON	ON	OFF
125	ON	OFF	ON	ON	ON	ON	ON	OFF
126	OFF	ON	ON	ON	ON	ON	ON	OFF
127	ON	ON	ON	ON	ON	ON	ON	OFF

Address	DS1.1	DS1.2	DS1.3	DS1.4	DS1.5	DS1.6	DS1.7	DS1.8
219	ON	ON	OFF	ON	ON	OFF	ON	ON
220	OFF	OFF	ON	ON	ON	OFF	ON	ON
221	ON	OFF	ON	ON	ON	OFF	ON	ON
222	OFF	ON	ON	ON	ON	OFF	ON	ON
223	ON	ON	ON	ON	ON	OFF	ON	ON
224	OFF	OFF	OFF	OFF	OFF	ON	ON	ON
225	ON	OFF	OFF	OFF	OFF	ON	ON	ON
226	OFF	ON	OFF	OFF	OFF	ON	ON	ON
227	ON	ON	OFF	OFF	OFF	ON	ON	ON
228	OFF	OFF	ON	OFF	OFF	ON	ON	ON
229	ON	OFF	ON	OFF	OFF	ON	ON	ON
230	OFF	ON	ON	OFF	OFF	ON	ON	ON
231	ON	ON	ON	OFF	OFF	ON	ON	ON
232	OFF	OFF	OFF	ON	OFF	ON	ON	ON
233	ON	OFF	OFF	ON	OFF	ON	ON	ON
234	OFF	ON	OFF	ON	OFF	ON	ON	ON
235	ON	ON	OFF	ON	OFF	ON	ON	ON
236	OFF	OFF	ON	ON	OFF	ON	ON	ON
237	ON	OFF	ON	ON	OFF	ON	ON	ON
238	OFF	ON	ON	ON	OFF	ON	ON	ON
239	ON	ON	ON	ON	OFF	ON	ON	ON
240	OFF	OFF	OFF	OFF	ON	ON	ON	ON
241	ON	OFF	OFF	OFF	ON	ON	ON	ON
242	OFF	ON	OFF	OFF	ON	ON	ON	ON
243	ON	ON	OFF	OFF	ON	ON	ON	ON
244	OFF	OFF	ON	OFF	ON	ON	ON	ON
245	ON	OFF	ON	OFF	ON	ON	ON	ON
246	OFF	ON	ON	OFF	ON	ON	ON	ON
247	ON	ON	ON	OFF	ON	ON	ON	ON
248	OFF	OFF	OFF	ON	ON	ON	ON	ON
249	ON	OFF	OFF	ON	ON	ON	ON	ON
250	OFF	ON	OFF	ON	ON	ON	ON	ON
251	ON	ON	OFF	ON	ON	ON	ON	ON
252	OFF	OFF	ON	ON	ON	ON	ON	ON
253	ON	OFF	ON	ON	ON	ON	ON	ON
254	OFF	ON	ON	ON	ON	ON	ON	ON
255	ON	ON	ON	ON	ON	ON	ON	ON



ModBus Registers		
Register Number	Description	Notes
0	MobBus Address	MB=21 (15h); LB=1=247 (1h-F7h)
1	Modbus Bauld Rate	Type: uINT, Factor: 0.01, No units, 9600, 19200, 38400 (default), 57600
2	ProdName_12	ASCI characters: MB Name (0); LB Name (1), Valid ASCII char: 32 (29h) - 122 (7Ah), Empty = 0
3	ProdName_34	ASCI characters: MB Name (2); LB Name (3), Valid ASCII char: 32 (29h) - 122 (7Ah), Empty = 1
4	ProdName_56	ASCI characters: MB Name (4); LB Name (5), Valid ASCII char: 32 (29h) - 122 (7Ah), Empty = 2
5	ProdName_78	ASCI characters: MB Name (6); LB Name (7), Valid ASCII char: 32 (29h) - 122 (7Ah), Empty = 3
8	System Status	Type: Bit String, Factor: 1, No units
9	System Status 2	Type: Bit String, Factor: 1, No units
11	CO ₂	Type: uINT, Factor 1, Units : PPM, Range : See register 30, Resolution : 1
12	CO	Type: uINT, Factor 1, Units : PPM, Range : 0 - 100PPM, Resolution : 1
13	Set Point	Type: uINT, Factor 1, Units : °C/°F, Range : See register 27 & 28, Resolution : 1
14	IAQ	Type: uINT, Factor 10, Units : No Units, Range : 0 - 99, Resolution : 0.1
15	RH	Type: uINT, Factor 10, Units : %RH, Range : 5.0 - 100 %RH, Resolution : 0.1
16	Temperature	Type: uINT, Factor 100, Units : °C/°F, Range : -10 - 100.00°C, Resolution : 0.01
17	Thermistor	Type: uINT, Factor 100, Units : °C/°F, Range : -10 - 100.00°C, Resolution : 0.01
18	Analogue Input	Type: uINT, Factor 10, Units : No Units, Range : 5 - 100, Resolution : 0.1
19	Light	Type: uINT, Factor 1, Units : No Units, Range : 0 - 1000, Resolution : 1
20	Dew Point	Type: uINT, Factor 100, Units : °C/°F, Range : -10 - 100.00°C, Resolution : 0.01
21	Enthalpy	Type: uINT, Factor 1, Units : No Units, Range : -32768 - 32767, Resolution : 1
22	Digital Input	Type: Bit String, Factor 1, No Units, 0: Inactive 1: Active
23	Fan Speed	Type: uINT, Factor 1, Units : No Units, Range: 1 - 5, Resolution : 1
24	Occupancy Status	Type: uINT, Factor 1, Units : No Units, Range: 1 - 2, Resolution : 1
25	Temp Offset	Type: sINT, Factor 100, Units : °C/°F, Range: +5,00, Resolution : 0.10
26	RH Offset	Type: sINT, Factor 100, Units : %RH, Range: +5,00, Resolution : 0.10
27	Setpoint Lo Limit	Type: sINT, Factor 1, Units : °C/°F, Range : -100.00°C/°F, Resolution : 1
28	Setpoint Hi Limit	Type: sINT, Factor 1, Units : °C/°F, Range : 27 - 100.00°C/°F, Resolution : 1
30	CO ₂ Range	Type: uINT, Factor 1, Units : PPM, Range : 0 - 5000 ppm, Resolution : 1
31	PIR Off Delay	Type: uINT, Factor 1, Units : Seconds, Range : 10 - 900 seconds, Resolution : 1
38	Display Mode	Type: uINT, Factor 1, Units : No Units, Range : 1 - 12, Resolution : 1
39	Display Intensity	Type: uINT, Factor 1, Units : %, Range : 1 - 100, Resolution : 1
40	Display Contrast	Type: uINT, Factor 1, Units : %, Range : 1 - 100, Resolution : 1
41	IAQ Good Level	Type: uINT, Factor 1, Units : No Units, Range : 0 - 10, Resolution : 1
42	IAQ Fair Level	Type: uINT, Factor 1, Units : No Units, Range : 0 - 10, Resolution : 1
43	IAQ Sensitivity	Type: uINT, Factor 1, Units : No Units, Range : 0 - 100, Resolution : 1
44	IAQ Response	Type: uINT, Factor 1, Units : No Units, Range : 0 - 10, Resolution : 1
45	CO Sensitivity	Type: uINT, Factor 1, Units : No Units, Range : 0-100, Resolution : 1
46	CO Response	Type: uINT, Factor 1, Units : No Units, Range : 0 - 10, Resolution : 1
47	CO ₂ Good Level	Type: uINT, Factor 1, Units : No Units, Range : 0 - 50000, Resolution : 1
48	CO ₂ Fair Level	Type: uINT, Factor 1, Units : No Units, Range : 0 - 50000, Resolution : 1
49	CO ₂ Bad Level	Type: uINT, Factor 1, Units : No Units, Range : 0 - 50000, Resolution : 1



BACnet:

B-ASC requirement as per standard

L.4 BACnet Application Specific Controller (B-ASC)

A B-ASC is a controller with limited resources relative to a B-AAC. It is intended for use in a specific application and supports limited programmability. It enables specification of the following:

Data Sharing

- Ability to provide the values of any of its BACnet objects
- Ability to allow modification of some or all of its BACnet objects by another device

Alarm and Event Management

- No requirement

Scheduling

- No requirement

Trending

- No requirement

Device and Network Management

- Ability to respond to queries about its status
- Ability to respond to requests for information about any of its objects
- Ability to respond to communication control messages

BACnet INTEROPERABILITY BUILDING BLOCKS (BIBBs)

Data Sharing

- DS-RP-B
- DS-RPM-B
- DS-WP-B
- DS-WPM-B
- DS-COV-B
- DS-COVP-B

Device management

- DM-DCC-B
- DM-DDB-B
- DM-DOB-B

ANNEX A - PROTOCOL IMPLEMENTATION

CONFORMANCE STATEMENT (NORMATIVE)

BACnet Standardized Device Profile (Annex L):

- _ BACnet Operator Workstation (B-OWS)
- _ BACnet Building Controller (B-BC)
- _ BACnet Advanced Application Controller (B-AAC)
- X 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):

Segmentation Capability:

- _ Able to transmit segmented messages Window Size
- _ Able to receive segmented messages Window Size

Standard Object Types Supported: See list below

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, EIA-485 ARCNET (Clause 8), baud rate(s)
- X MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800
- X MS/TP slave (Clause 9), baud rate(s): 9600, 19200, 38400, 76800
- _ 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 X 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 X No

Character Sets Supported:

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

- X ANSI X3.4 _ IBM_/Microsoft_ DBCS _ ISO 8859-1 _ ISO 10646 (UCS-2) _ ISO 10646 (UCS-4)
- _ JIS C 6226



BACnet (continued):

```

Device Object
object-identifier:      Device-662001(0x020A19F1 (type=8,instance=662001)) Writable
object-name:           TBA, 1 Writable
object-type:           Device (8)
system-status:         OPERATIONAL (0)
vendor-name :          Sontay Ltd.
vendor-identifier:     662
model-name:            Sontay Environmental Sensor
firmware-revision:    1.00
application-software-version: 001, Oct 10 2014
protocol-version:      1
protocol-revision:     12
protocol-services-supported: confirmedCOVNotification,subscribeCOV, readPropertyreadPropertyMultiple, writeProperty, write
PropertyMultiple, deviceCommunicationControl, reinitializeDevice, i-Am, i-Have, unconfirmedCOVNo
tification, who-Has, who-Is, bscribeCOVProperty
protocol-object-types-supported: Analogue-input, Analogue-value, binary-input, binary-value, device, multi-state-input
object-list:           Device-662001 (0x020A19F1)
                        Analogue Input-1 (0x00000001)
                        Analogue Input-2 (0x00000002)
                        Analogue Input-3 (0x00000003)
                        Analogue Input-4 (0x00000004)
                        Analogue Input-5 (0x00000005)
                        Analogue Input-6 (0x00000006)
                        Analogue Input-7 (0x00000007)
                        Analogue Input-8 (0x00000008)
                        Analogue Input-9 (0x00000009)
                        Analogue Value-1 (0x00800001)
                        Analogue Value-2 (0x00800002)
                        Analogue Value-3 (0x00800003)
                        Analogue Value-4 (0x00800004)
                        Analogue Value-6 (0x00800006)
                        Analogue Value-7 (0x00800007)
                        Binary Value-1 (0x01400001)
                        Binary Input-1 (0x00C00001)
                        Binary Input-2 (0x00C00002)
                        Binary Input-3 (0x00C00003)
                        Multistate Input-1 (0x03400001)
                        Multistate Input-2 (0x03400002)
max-apdu-length-accepted: 480
segmentation-supported: NO_SEGMENTATION (3)
apdu-timeout:          3000 Writable
number-of-apdu-retries: 3
device-address-binding: { }
database-revision:     1
description:           Sontay Environ. Sensor Writable
max-master             127 Writable
max-info-frames        1
location               Default Location Writable
active-cov-subscriptions { }

```

BACnet (continued):

Device Object - Proprietary Properties

proprietary property (1000)	{usign=1} MSTP MAC address Writable
proprietary property (1001)	{usign=76800} MSTP BaudRate Writable
proprietary property (1002)	{usign=0} Out of Service Time Out Writable
proprietary property (1003)	{usign=12287} System configuration Writable
proprietary property (1004)	{usign=8} Display Mode Writable
proprietary property (1005)	{usign=35} Display Intensity Writable
proprietary property (1006)	{usign=5000} CO ₂ Range Writable
proprietary property (100)	{usign=65} Display Contrast Writable

AI.1

object-identifier	Analogue Input-1 (0x00000001 (type=0, instance=1))
object-name	AI-1
object-type	Analogue Input (0)
present-value	601.000000 Writable if out of service is TRUE
status-flags	in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state	NORMAL (0)
out-of-service	FALSE Writable
units	PARTS_PER_MILLION (96)
description	CO ₂
reliability	NO_FAULT_DETECTED (0)
min-pres-value	0.000000
max-pres-value	5000.000000
resolution	1.000000
cov-increment	1.000000

AI.2

object-identifier	Analogue Input-2 (0x00000002 (type=0, instance=2))
object-name	AI-2
object-type	Analogue Input (0)
present-value	0.000000 Writable if out of service is TRUE
status-flags	in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state	NORMAL (0)
out-of-service	FALSE Writable
units	PARTS_PER_MILLION (96)
description	CO
reliability	NO_FAULT_DETECTED (0)
min-pres-value	0.000000
max-pres-value	100.000000
resolution	1.000000
cov-increment	1.000000

AI.3

object-identifier	Analogue Input-3 (0x00000003 (type=0, instance=3))
object-name	AI-3
object-type	Analogue Input (0)
present-value	0.000000 Writable if out of service is TRUE
status-flags	in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state	NORMAL (0)
out-of-service	FALSE Writable
units	DEGREES_CELSIUS (62)
description	Setpoint

BACnet (continued):

(AI.3)	
min-pres-value	-10.000000
max-pres-value	10.000000
resolution	1.000000
cov-increment	1.000000
AI.4	
object-identifier	Analogue Input-4 (0x00000004 (type=0, instance=4))
object-name	AI-4
object-type	Analogue Input (0)
present-value	1.000000 Writable if out of service is TRUE
status-flags	in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state	NORMAL (0)
out-of-service	FALSE Writable
units	NO_UNITS (95)
description	IAQ
reliability	NO_FAULT_DETECTED (0)
min-pres-value	0.000000
max-pres-value	9.900000
resolution	0.10000
cov-increment	0.10000
AI.5	
object-identifier	Analogue Input-5 (0x00000005 (type=0, instance=5))
object-name	AI-5
object-type	Analogue Input (0)
present-value	58.099998 Writable if out of service is TRUE
status-flags	in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state	NORMAL (0)
out-of-service	FALSE Writable
units	PERCENT_RELATIVE_HUMIDITY (29)
description	Relative Humidity
reliability	NO_FAULT_DETECTED (0)
min-pres-value	5.000000
max-pres-value	100.000000
resolution	0.100000
cov-increment	0.100000
AI.6	
object-identifier	Analogue Input-6 (0x00000006 (type=0, instance=6))
object-name	AI-6
object-type	Analogue Input (0)
present-value	27.299999 Writable if out of service is TRUE
status-flags	in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state	NORMAL (0)
out-of-service	FALSE Writable
units	DEGREES_CELSIUS (62)
description	Temperature
reliability	NO_FAULT_DETECTED (0)
min-pres-value	-10.000000
max-pres-value	100.000000
resolution	0.010000

BACnet (continued):

AI.7	
object-identifier	Analogue Input-7 (0x00000007 (type=0, instance=7))
object-name	AI-7
object-type	Analogue Input (0)
present-value	27.740000 Writable if out of service is TRUE
status-flags	in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state	NORMAL (0)
out-of-service	FALSE Writable
units	DEGREES_CELSIUS (62)
description	Thermistor Temperature
reliability	NO_FAULT_DETECTED (0)
min-pres-value	-10.000000
max-pres-value	100.000000
resolution	0.010000
cov-increment	0.100000
AI.8	
object-identifier	Analogue Input-8 (0x00000008 (type=0, instance=8))
object-name	AI-8
object-type	Analogue Input (0)
present-value	0.000000 Writable if out of service is TRUE
status-flags	in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state	NORMAL (0)
out-of-service	FALSE Writable
units	PERCENT (98)
description	Override Input
reliability	NO_FAULT_DETECTED (0)
min-pres-value	0.000000
max-pres-value	100.000000
resolution	0.100000
cov-increment	0.100000
AI.9	
object-identifier	Analogue Input-9 (0x00000009 (type=0, instance=9))
object-name	AI-9
object-type	Analogue Input (0)
present-value	0.000000 Writable if out of service is TRUE
status-flags	in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state	NORMAL (0)
out-of-service	FALSE Writable
units	LUX (37)
description	Light Level
reliability	NO_FAULT_DETECTED (0)
min-pres-value	0.000000
max-pres-value	10000.000000
resolution	1.00000
cov-increment	1.00000



BACnet (continued):

AV.1

object-identifier Analogue Value-1 (0x00800001 (type=2, instance=1))
object-name AV-1
object-type Analogue Value (2)
present-value 2.000000 Writable
status-flags in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state NORMAL (0)
out-of-service FALSE
units DEGREES_CELSIUS (62)
description Temperature offset
reliability NO_FAULT_DETECTED (0)
cov-increment 0.100000

AV.2

object-identifier Analogue Value-2 (0x00800002 (type=2, instance=2))
object-name AV-2
object-type Analogue Value (2)
present-value 0.000000 Writable
status-flags in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state NORMAL (0)
out-of-service FALSE
units PERCENT_RELATIVE_HUMIDITY (29)
description RH offset
reliability NO_FAULT_DETECTED (0)
cov-increment 1.000000

AV.3

object-identifier Analogue Value-3 (0x00800003 (type=2, instance=3))
object-name AV-3
object-type Analogue Value (2)
present-value -10.000000 Writable
status-flags in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state NORMAL (0)
out-of-service FALSE
units DEGREES_CELSIUS (62)
description Setpoint Lower Limit
reliability NO_FAULT_DETECTED (0)
cov-increment 1.000000

AV.4

object-identifier Analogue Value-4 (0x00800004 (type=2, instance=4))
object-name AV-4
object-type Analogue Value (2)
present-value 10.000000 Writable
status-flags in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state NORMAL (0)
out-of-service FALSE
units DEGREES_CELSIUS (62)
description Setpoint Upper Limit
reliability NO_FAULT_DETECTED (0)
cov-increment 1.000000



BACnet (continued):

AV.5
object-identifier Analogue Value-5 (0x00800005 (type=2, instance=5))
object-name AV-5
object-type Analogue Value (2)
present-value 76800.000000
status-flags in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state NORMAL (0)
out-of-service FALSE
units NO_UNITS (95)
description Baud Rate
reliability NO_FAULT_DETECTED (0)

AV.6
object-identifier Analogue Value-6 (0x00800006 (type=2, instance=6))
object-name AV-6
object-type Analogue Value (2)
present-value 1.000000 Writable
status-flags in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state NORMAL (0)
out-of-service FALSE
units NO_UNITS (95)
description MAC Address
reliability NO_FAULT_DETECTED (0)

AV.7
object-identifier Analogue Value-7 (0x00800006 (type=2, instance=7))
object-name AV-7
object-type Analogue Value (2)
present-value 50.000000 Writable
status-flags in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state NORMAL (0)
out-of-service FALSE
units KILOJOULES_PER_KILOGRAM_DRY_AIR (149)
description Enthalpy
reliability NO_FAULT_DETECTED (0)
cov-increment 1.000000

AV.8
object-identifier Analogue Value-8 (0x00800006 (type=2, instance=8))
object-name AV-8
object-type Analogue Value (2)
present-value 13.540000 Writable
status-flags in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state NORMAL (0)
out-of-service FALSE
units DEGREES_CELSIUS (62)
description Dewpoint
reliability NO_FAULT_DETECTED (0)
cov-increment 0.100000

BACnet (continued):

AV.9

object-identifier Analogue Value-8 (0x00800006 (type=2, instance=9))
object-name AV-9
object-type Analogue Value (2)
present-value 10.000000 Writable
status-flags in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state NORMAL (0)
out-of-service FALSE
units Seconds (73)
description PIR Off Delay
reliability NO_FAULT_DETECTED (0)
cov-increment 1.000000

BI.1

object-identifier Binary Input-1 (0x00C00001 (type=3, instance=1))
object-name BI-1
object-type Binary Input (3)
present-value 0 Writable if out of service is TRUE
status-flags in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state NORMAL (0)
out-of-service FALSE Writable
polarity NORMAL (0)
description Override switch
reliability NO_FAULT_DETECTED (0)
inactive-text Inactive
active-text Active

BI.2

object-identifier Binary Input-2 (0x00C00002 (type=3, instance=2))
object-name BI-2
object-type Binary Input (3)
present-value 0 Writable if out of service is TRUE
status-flags in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state NORMAL (0)
out-of-service FALSE Writable
polarity NORMAL (0)
description Optional VFC Input
reliability NO_FAULT_DETECTED (0)
inactive-text Inactive
active-text Active

BI.3

object-identifier Binary Input-3 (0x00C00003 (type=3, instance=3))
object-name BI-3
object-type Binary Input (3)
present-value 0 Writable if out of service is TRUE
status-flags in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state NORMAL (0)
out-of-service FALSE Writable
polarity NORMAL (0)
description PIR
reliability NO_FAULT_DETECTED (0)

BACnet (continued):

BV.1	
object-identifier	Binary Value-1 (0x01400001 (type=5, instance=1))
object-name	BV-1
object-type	Binary Value (5)
present-value	0 Writable
status-flags	in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state	NORMAL (0)
out-of-service	FALSE
description	Temperature Units
reliability	NO_FAULT_DETECTED (0)
inactive-text	Celsius
active-text	Fahrenheit
MI.1	
object-identifier	Multistate Input-1 (0x03400001 (type=13, instance=1))
object-name	MI-1
object-type	Multistate Input (13)
present-value	1 Writable if out of service is TRUE
status-flags	in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state	NORMAL (0)
out-of-service	FALSE Writable
number-of-states	2
description	Occupancy Status Text
reliability	NO_FAULT_DETECTED (0)
state-text	{Unoccupied, Occupied} Writable (20 characters maximum)
MI.2	
object-identifier	Multistate Input-2 (0x03400002 (type=13, instance=2))
object-name	MI-2
object-type	Multistate Input (13)
present-value	4 Writable if out of service is TRUE
status-flags	in-alarm = FALSE, fault = FALSE, overridden = FALSE, out-of-service = FALSE
event-state	NORMAL (0)
out-of-service	FALSE Writable
number-of-states	5
description	Fan Speed Switch
reliability	NO_FAULT_DETECTED (0)
state-text	{Off, Lo, Med, Hi, Auto}

Whilst every effort has been made to ensure the accuracy of this specification, AP cannot accept responsibility for damage, injury, loss or expense from errors or omissions. In the interest of technical improvement, this specification may be altered without notice.