

ExactLogic BACnet Communicating Thermostat MUA analog cooling only with Outside Air Reset for discharge air temperature Control EXL01815 Sequence Datasheet



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Operating Sequence

Standard Occupied

During normal occupied operation the display will show the current room temperature. The first press of either right pair of keys will show the current room setpoint. Additional presses will adjust the setpoint up or down by 0.5 degrees. The thermostat keypad will time out after 5 seconds without a key press, and the display will switch back to displaying the room temperature.

The left pair of keys allows for the adjustment of the fan speed. The current mode is shown with the first key press; additional key presses will show the adjustment to the mode. AV-62 is used to select the number of fan speeds, and AV-63 will show what speed the fan is currently set to. Refer to the table below for the values of AV-62 (Fan Mode Status) and AV-63 (Fan Speed Status)

AV-62	Mode
0	AUTO Only
1	AUTO-ON
2	OFF-AUTO-ON
3	OFF-1-2-AUTO
4	OFF-1-2-3-AUTO

AV-63	Fan Speed
0	OFF
1	Fan Speed 1
2	Fan Speed 2
3	Fan Speed 3
4	AUTO
5	ON

Control Sequence - Fan

The fan is commanded ON when occupied, in cooldown or warmup. The fan will be overridden off by a Unit Disable command at BV-66.

Control Sequence – Supply Temperature Reset

There are multiple modes that the Supply Temperature can command to.

Warmup Mode

If the unit is commanded to be in a Warmup Mode (BV-41 = ACTIVE), The Supply Air Temperature SP (AV-3) will be set to the Warmup Setpoint (AV-52).

Manual Mode

The Supply Air Temperature SP can be set to a manual setpoint. By setting BV-50 = INACTIVE, AV-3 will be set to the value of AV-51. AV-3 will not be able to change values until BV-50 is set to ACTIVE (Auto Mode).

Auto Mode

Auto Mode is set by commanding BV-50 to ACTIVE. When in this mode there is always a 5 minute Startup delay. The Supply Air Temperature SP (AV-3) will be commanded to the value of AV-51 whenever the Supply Fan Command (BO-0) changes from an INACTIVE state to ACTIVE for 5 minutes. After the 5 minutes, AV-3 will be set to the calculated setpoint determined by the outside air temperature (AI-5). The supply temperature setpoint will reset between the valves of AV-47/48 with the outside air temperature reset setpoints at AV-45/46.

Control Sequence – Cooling

The cooling valve is commanded by a 0-10VDC modulating signal at AO-0. The maximum and minimum output voltage can be scaled by using AV42/43. The cooling valve modulating signal is controlled by a 0-100% PI calculated feedback





signal shown at AV-15. The control signal is calculated using the discharge air temperature (Al-4) and discharge air setpoint (AV-3).

The cooling valve command can be locked out by outside air setpoint (AV-41), a low limit alarm (BV-21), or by a warmup command (BV-41).

Standard Unoccupied

During unoccupied operation the thermostat will continue to display the room temperature. When in an unoccupied state pressing one of the right pair of keys will display a message indicating the thermostat is in night mode, preventing the setpoint from being adjusted. To adjust the room setpoint when unoccupied the thermostat must be set to night override.

Control Sequence

When in the unoccupied mode, the room will be controlled by the unoccupied cooling/heating setpoints. The fan and cooling/heating stages will operate the same as the occupied control sequence.

Vacancy

If a room is known to be vacant, vacant setpoints can be used to override the unoccupied setpoints. By setting BV-70, a room will be controlled by the vacant cooling/heating setpoints (AV-64/65).

Night Overrride

Set the night override by pressing one of the left pair of keys. The display will switch to allow the user to set the night override time. Additional presses of the keys will adjust the time up or down by 0.5 hour increments. The night override can be increased up to the override limit set at AV-73, the default is 5 hours. When the thermostat is in night override, the first press of one of the left pair of keys will display the override time remaining. Additional key presses will add/subtract 0.5 hours to the time that was remaining. When the timer reaches zero the thermostat will return to the unoccupied mode.

In the night override mode, the right pair of keys can be used to adjust the room setpoint. The thermostat keypad will time out after 5 seconds without a key press, and the display will switch back to displaying the room temperature.

The thermostat can be set to a night override by writing a value to AV-74 through BACnet. The value can not exceed the night override limit set at AV-73. If the night override time is set higher than the limit, the night override timer will be set to the limit. The night override limit default is 5 hours.

If the thermostat is commanded to the occupied mode while in night override, the override timer will be cleared to zero and the thermostat will enter the occupied mode.

Control Sequence

When the thermostat is in the override mode, the room will be controlled by the occupied cooling/heating setpoints. The fan and cooling/heating stages will operate the same as the occupied control sequence.

Note: There is no fan control in the override mode. The fan will run in the AUTO mode.

Vacancy

If a room is known to be vacant, vacant setpoints can be used to override the unoccupied setpoints. By setting BV-70 to active, a room will be controlled by the vacant cooling/heating setpoints (AV-64/65).





Motion/Humidity Option Card

The Motion/Humidity Option Card can be used for Motion Only, Humidity Only, or Motion/Humidity together. In order to use the Motion Sensor (either stand alone or with Humidity), BV-64 must be set to ACTIVE. The Humidity Sensor can be enabled by setting AV-31 to 4. These settings will automatically provide the required voltage to power the sensors. The motion sensor status will show on BI-1.

When the motion sensor, senses motion, it puts the unit in occupied "Active" Mode by writing to the Scheduled Occupied Command BO-5 at priority array entry 11, this will remain active until it does not see any motion for the entire duration of the time delay (AV-81 Units=seconds), it will then return to an inactive state.

When the internal occupancy sensor is enabled by setting BV-64 to ACTIVE, the occupied mode is controlled only by the occupancy sensor. The optimum start warmup point, BV-41, and optimum start cooldown point, BV-42, will set the unit to the occupied mode and then return to the unoccupied mode until motion is sensed.

The Humidity value is shown on Al-1. The Humidity Sensor will automatically be scaled by setting AV-31 to 4.

Disabling of the Splash, Setup Menu, or Field Service Mode

When the thermostat is installed in a public location there may be times when the setup of the thermostat will need to be disabled to prevent tenants from changing the configuration while still giving them access to change the setpoints and control after hours modes. The following points have been added to allow this:

BV-57 = Setting ACTIVE will disable the "EXACTLOGIC" splash display after key presses

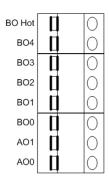
BV-58 = Setting ACTIVE will disable access to the Setup Menu where the Network/MAC/Baud Rate/etc are set

BV-59 = Setting ACTIVE will disable access to the Field Service Mode where Time/Schedule/Setpoints/etc are set





Installation



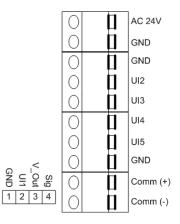


Fig. 4

*Note: Thermostat Common Relay point (BO Hot) usually 24VAC/DC or R

AC 24V	24VAC/DC Hot
GND	Neutral/Ground
GND	Neutral/Ground
	Universal Input 2
UI3	Universal Input 3
UI4	Universal Input 4
	Universal Input 5
	Neutral/Ground
	Network Positive Line
	Network Negative Line
	Com, 24VAC Hot for relays*
	Relay 5 Output, 24VAC/DC
BO3	Relay 4 Output, 24VAC/DC
BO2	Relay 3 Output, 24VAC/DC
BO1	Relay 2 Output, 24VAC/DC
BO0	Relay 1 Output, 24VAC/DC
	Analog Output 1, 0-10V
AO0	Analog Output 0, 0-10V
	Neutral/Ground
2	Universal Input 1
3	Analog Output 2
4	Reserved

Output Wiring

Output/Label

BO0	Fan
BO1	
BO2	
BO3	
BO4	
AO0	Cooling 0-10 Vdc 0-100%
AO1	





Reserved BACnet Points

The following are points reserved by the thermostat for operation.

Analog Inputs

Instance	Object Name	Description	Read/Write	Default
AI-0	Room Temp	Reading of the internal thermistor in counts. 0-1024	R	variable
Al-1	Humidity	Reading from the Humidity sensor add-on card	R	variable
Al-2	Analog Input 02	Reading of the external input 2 in counts. 0-1024	R	variable
Al-3	Analog Input 03	Reading of the external input 3 in counts. 0-1024	R	variable
Al-4	Supply Air Temp	Supply Air Temperature sensor input	R	variable
AI-5	Outside Air Temp	Outside Air Temperature sensor input	R	variable

Analog Outputs

Instance	Object Name	Description	Read/Write	Default
AO-0	Cooling Valve	0-10V output for control of the cooling valve	R/W	0.0
AO-1	Analog Output 1		R/W	0.0
AO-2	Analog Output 2	Variable 0-14VDC, 150mA output	R/W	0.0

Analog Values

Instance	Object Name	Description	Read/Write	Default
AV-0	Mode of Operation	The mode that the thermostat is currently in. 0 = Heat Mode 1 = Cool Mode 2 = Idle 3 = Afterhours 4 = Unoccupied Idle 5 = Unoccupied Heat Mode 6 = Unoccupied Cool Mode	R	4
AV-1	Analog Value 001			
AV-2	Analog Value 002			
AV-3	Current Supply Air Temp SP	Current Supply Air Temperature Setpoint based from the reset schedule (AV47/48)	R	varies
AV-4	Analog Value 004			
AV-5	Analog Value 005			
AV-6	Analog Value 006			
AV-7	Analog Value 007			
AV-8	Analog Value 008			
AV-9	Analog Value 009			
AV-10	Analog Value 010			
AV-11	Analog Value 011			
AV-12	Analog Value 012			
AV-13	Analog Value 013			
AV-14	Analog Value 014			





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AV-15	Supply Temp Control Signal	0-100 feedback control signal used to control the cooling valve	R	0%
AV-16	Analog Value 016			
AV-17	Cooling Valve Position	Estimated position of the cooling valve	R	0%
AV-18	Analog Value 018			
AV-19	Analog Value 019			
AV-20	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-21	Analog Value 021			
AV-22	Analog Value 022			
AV-23	Analog Value 023			
AV-24	Analog Value 024			
AV-25	Analog Value 025			
AV-26	Analog Value 026			
AV-27	Analog Value 026			
AV-28	Analog Value 028			
AV-29	Analog Value 029			
AV-30	AI-0 Setup	Parameter used to set the input type. 0 = counts 1 = temperature 2 = 4-20mA 3 = 0-5V 4 = 0-10V 5 = pulse	R/W	1
AV-31	Al-1 Setup	See AV-30	R/W	0
AV-32	Al-2 Setup	See AV-30	R/W	0
AV-33	Al-3 Setup	See AV-30	R/W	0
AV-34	Al-4 Setup	See AV-30	R/W	0
AV-35	Al-5 Setup	See AV-30	R/W	0
AV-36	Supply Air Low Limit SP	The lowest Supply Air Temperature allowed before triggering and alarm (BV-21)	R/W	45°F
AV-37	Analog Value 037	, ,		
AV-38	Analog Value 038			
AV-39	Analog Value 039			
AV-40	Analog Value 040			
AV-41	Cooling Lockout SP	When the Outside Air Temperature is below this setpoint, cooling is locked out	R/W	55 [°] F
AV-42	Cooling Valve Min Output	The minimum output voltage used to command the cooling valve (x10)	R/W	0
AV-43	Cooling Valve Max Output	The maximum output voltage used to command the cooling valve (x10)	R/W	100
AV-44	Supply Air Deviation DB	Amount the Supply Air Temperature is allowed to be from SP (+/-) before triggering an alarm (BV-23)	R/W	10°F
AV-45	Outside Air Low SP	The low setpoint for the Outside Air Temperature SP reset schedule	R/W	60°F
AV-46	Outside Air High SP	The high setpoint for the Outside Air Temperature SP reset schedule	R/W	80°F
AV-47	Supply Air Low SP	The low setpoint for the Supply Air Temperature SP reset schedule	R/W	55 [°] F
AV-48	Supply Air High SP	The high setpoint for the Supply Air Temperature SP reset schedule	R/W	70 [°] F





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AV-49	Analog Value 049			
AV-50	Analog Value 050			
AV-51	Supply Air SP Manual/Startup	The Supply Air Temperature SP when the unit is in Startup or the reset schedule is in Manual (BV-50)	R/W	75 [°] F
AV-52	Supply Air SP Warmup	The Supply Air Temperature when the unit is in Warmup Mode	R/W	85 [°] F
AV-53	Analog Value 053			
AV-54	Analog Value 054			
AV-55	Filter Alarm SP	Maximum runtime for the filter before triggering an alarm (BV-25).	R/W	3000 hrs
AV-56	Filter Runtime	The number of runtime hours on the filter. Set to zero (0) after changing filter.	R/W	0 hrs
AV -57	Supply Fan Runtime	The number of runtime hours on the fan.	R/W	0 hrs
AV-58	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	1.6
AV-59	Avg Time Base	Factor used to average the room temperature. A small number will allow the room temperature to change faster over time. A large number will cause the room temperature to change slower over time.	R	100
AV-60	Calibration Offset	The calibration offset for the internal thermistor.	R	variable
AV-61	Space Alarm Offset	This offset +/- the Current Cooling/Heating SP is used to determine if the space is too warm/cold, and set an alarm if necessary.	R/W	5.0°F
AV-62	# of Fan Speeds	Select the number of fan speeds for a multispeed fan. 0 = Auto Only 1 = AUTO - ON 2 = Off - AUTO - ON 3 = Off-1-2-AUTO 4 = Off-1-2-3-AUTO	R/W	0
AV-63	Current Fan Speed	The fan speed the thermostat is currently running. 0 = OFF 1 = Fan Speed 1 2 = Fan Speed 2 3 = Fan Speed 3 4 = AUTO 5 = ON	R	4
AV-64	Vacant Clg SP	Used in Hotel Mode. When a room is known vacant, the setpoint can be set below the unoccupied setpoint.	R/W	85.0°F
AV-65	Vacant Htg SP	Used in Hotel Mode. When a room is known vacant, the setpoint can be set below the unoccupied setpoint.	R/W	55.0°F
AV-66	Room Setpoint	The occupied room setpoint	R/W	73.0 F
AV-67	Occupied SP Hi Limit	The maximum occupied room setpoint allowed.	R/W	85.0°F
AV-68	Occupied SP Lo Limit	The minimum occupied room setpoint allowed	R/W	55.0°F
AV-69	Clg Offset	The offset from Room Setpoint used to calculate the Occupied Cooling SP	R/W	1.0°F





AV-70	Htg Offset	The offset from Room Setpoint used to calculate the Occupied Heating SP	R/W	1.0°F
AV-71	Unoccupied Clg SP	The cooling setpoint used when the thermostat is unoccupied.	R/W	80.0°F
AV-72	Unoccupied Htg SP	The heating setpoint used when the thermostat is unoccupied.	R/W	60.0°F
AV-73	After Hours Limit	The maximum hours the thermostat is allowed to run during afterhours time. Setting this will set the thermostat to occupied operation. (0-99.9 hrs)	R/W	5.0 hrs
AV-74	After Hours Timer	The current amount of afterhours time left.	R	0.0 hrs
AV-75	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-76	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-77	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-78	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-79	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-80	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-81	Motion OFF Delay	The amount of time to delay the ON->OFF transition of the motion sensor occupied command after no motion is detected	R/W	900 sec
AV-82	Analog Value 082			
AV-83	Analog Value 083			
AV-84	Analog Value 084			
AV-100	Analog Value 100	Internal thermistor display descriptor. The present value is automatically transferred. The AV description holds the descriptor to display.	R	variable
AV-101	Analog Value 101	Display descriptor. Transfer the value to display to the present value. The AV description holds the descriptor to display.	R/W	
AV-102	Analog Value 102	Discharge Air display descriptor. Transfer the value to display to the present value. The AV description holds the descriptor to display	R/W	
AV-103	Analog Value 103	Cooling Valve Position display descriptor. Transfer the value to display to the present value. The AV description holds the descriptor to display	R/W	
AV-104	Analog Value 104	Display descriptor. Transfer the value to display to the present value. The AV description holds the descriptor to display	R/W	
AV-105	Analog Value 105	Display descriptor. Transfer the value to display to the present value. The AV description holds the descriptor to display	R/W	
AV-106	Analog Value 106	Display descriptor. Transfer the value to display to the present value. The AV description holds the descriptor to display	R/W	
AV-107	Analog Value 107	Display descriptor. Transfer the value to display to the present value. The AV description holds the descriptor to display	R/W	





AV-108	Analog Value 108	Display descriptor. Transfer the value to display to the present value. The AV description holds the descriptor to display	R/W
AV-109	Analog Value 109	Display descriptor. Transfer the value to display to the present value. The AV description holds the descriptor to display	R/W
AV-110	Analog Value 110	Display descriptor. Transfer the value to display to the present value. The AV description holds the descriptor to display	R/W
AV-111	Analog Value 111	Display descriptor. Transfer the value to display to the present value. The AV description holds the descriptor to display	R/W
AV-112	Analog Value 112	Outside Air Display descriptor. Transfer the value to display to the present value. The AV description holds the descriptor to display	R/W



Binary Inputs

Instance	Object Name	Description	Read/Write	Default
BI-0	Binary Input 00		R	
BI-1	Motion	Motion sensor status from the add-on card	R	
BI-2	Binary Input 02		R	
BI-3	Binary Input 03			
BI-4	Binary Input 04		R	
BI-5	Binary Input 05			

Binary Outputs

Instance	Object Name	Description	Read/Write	Default
BO-0	Fan	Output for Fan Control	R/W	OFF
BO-1	Binary Output 01			
BO-2	Binary Output 02			
BO-3	Binary Output 03			
BO-4	Binary Output 04			
BO-5	Scheduled	Logical point only. Used for scheduling	R/W	OFF
	Occupied	purposes. INACTIVE is unoccupied.	1 1/ 7 7	

Binary Values

Instance	Object Name	Description	Read/Write	Default
BV-0	Binary Value 000			
BV-1	Binary Value 001			
BV-2	Binary Value 002			
BV-3	Binary Value 003			
BV-4	Binary Value 004			
BV-5	Binary Value 005			
BV-6	Binary Value 006			
BV-7	Binary Value 007			
BV-8	Binary Value 008			
BV-9	Binary Value 009			
BV-10	Program Status	Used to determine if the sequence was loaded correctly on a BACnet Restore or power up.	R	OFF
BV-11	Binary Value 011			
BV-12	Binary Value 012			
BV-13	Binary Value 013			
BV-14	Binary Value 014			
BV-15	5 Minute Startup Delay	This delay commands the Supply Air SP to the Manual/Startup SP (AV-51) for 5 minutes after the supply fan starts	R	OFF
BV-16	Binary Value 016			
BV-17	Binary Value 017			
BV-18	Binary Value 018			
BV-19	Binary Value 019			
BV-20	Unit Alarm	An alarm on BV-21, 23, or 25 has been triggered	R	OFF





			Managed Fig. 190 September 1990 Green	
BV-21	Low Limit Alarm	The Supply Air Temperature is too low	R	OFF
BV-22	Binary Value 022			
BV-23	Supply Deviation	The Supply Air Temperature (Al-4) is +/- AV-43	R	OFF
	Alarm	degrees from the current Supply Air SP (AV-3)	11	011
BV-24	Binary Value 024			
BV-25	Filter Alarm	The filter runtime is over the setpoint hours	R	OFF
BV-26	Binary Value 026			
BV-27	Binary Value 027			
BV-28	Binary Value 028			
BV-29	Binary Value 029			
BV-30	Unit Alarm Reset	Reset the status of BV-20	R/W	OFF
BV-31	Low Limit Alarm	Reset the low Supply Air Temperature alarm	R/W	OFF
	Reset	status	17/77	Oii
BV-32	Binary Value 032			
BV-33	Binary Value 033			
BV-34	Binary Value 034			
BV-35	Binary Value 035			
BV-36	Binary Value 036			
BV-37	Binary Value 037			
BV-38	Binary Value 038			
	Cooling Enable	Indicated whether cooling has been locked out		ON
BV-39		due to Outside Air Temperate (OFF = Locked Out)	R	
->		The status of this point switches the thermostats	R	OFF
BV-40	Occupied Status	occupancy settings. When ON, the thermostat is in Occupied Setpoint Mode or After Hours Mode.		
		A Warmup command has been sent to the		
BV-41	Opt. Start Warmup	thermostat. When ON the thermostat will switch	R/W	OFF
		to occupied settings.	I	
	Ont Start	A Cooldown command has been sent to the		
BV-42	Opt. Start Cooldown	thermostat. When ON the thermostat will switch	R/W	OFF
	Cooldown	to occupied settings.		
	Occ Set point	The thermostat has been commanded occupied		
BV-43	Mode	via BO-5, or a Warmup/Cooldown command has	R	OFF
	Mode	been sent via BV-41/BV-42.		
		The thermostat has been set to afterhours mode.		
BV-44	After Hours Status	When ON the thermostat will switch to occupied	R	OFF
		settings.		
BV-45	Reserved	This point is reserved for internal thermostat use	R	OFF
		and its value cannot be changed	.,	J
BV-46	Binary Value 046			
BV-47	Binary Value 047			
BV-48	Binary Value 048	-		
BV-49	Update	When ON descriptor changes are sent to the	R/W	OFF
D v = 40	Descriptors	thermostats LCD, this point will auto reset to OFF.	1 3/ V V	0,1
	Supply Air	OFF = Manual Setpoint		_
BV-50	Temperature SP	ON = Auto calculated setpoint	R/W	ON
	Mode	7 Auto salbulated setpolit		
BV-51	Binary Value 051			
BV-52	Binary Value 052			
BV-53	Binary Value 053		1	





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BV-54	Binary Value 054			
BV-55	Binary Value 055			
BV-56	Binary Value 056	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		
BV-57	Disable Splash	When ACTIVE, the "EXACTLOGIC" splash will not show after key presses	R/W	OFF
BV-58	Disable Setup Menu	When ACTIVE, there will be no access to the Setup Menu where the Network/MAC/Baud Rate is set	R/W	OFF
BV-59	Disable FSM Menu	When ACTIVE, there will be not access to the Field Service Mode where the Time/Schedule/Point Access is set	R/W	OFF
BV-60	Binary Value 060			
BV-61	Binary Value 061			
BV-62	Binary Value 062			
BV-63	Binary Value 063			
BV-64	Enable Motion	When ACTIVE, the power to the Motion add-on card is set to the proper voltage	R/W	OFF
BV-65	Binary Value 065			
BV-66	Disable Unit	When ON this point will disable and lockout all analog and binary outputs.	R/W	OFF
BV-67	Binary Value 067			
BV-68	Backlight Off/On	When ON the LCD backlight will remain on	R/W	OFF
BV-69	Binary Value 069	¥		
BV-70	Room Vacant Status	When ON the thermostat will run on Vacant Heating/Cooling setpoints, AV-64/AV-65.	R/W	OFF
BV-71	C/F	Sets the thermostat to display temperatures in Celsius or Fahrenheit. This point is set through the setup menu. ON = F, OFF = C	R	ON
BV-72	Binary Value 072	,		
BV-73	Binary Value 073			
BV-74	Hotel Mode	This point is reserved for internal thermostat use and its value cannot be changed	R/W	OFF
BV-100	Binary Value 100	Enable internal thermistor descriptor	R/W	OFF
BV-101	Binary Value 101	Enable descriptor	R/W	OFF
BV-102	Binary Value 102	Enable discharge air descriptor	R/W	ON
BV-103	Binary Value 103	Enable cooling valve position descriptor	R/W	ON
BV-104	Binary Value 104	Enable descriptor	R/W	OFF
BV-105	Binary Value 105	Enable descriptor	R/W	OFF
BV-106	Binary Value 106	Enable descriptor	R/W	OFF
BV-107	Binary Value 107	Enable descriptor	R/W	OFF
BV-108	Binary Value 108	Enable descriptor	R/W	OFF
BV-109	Binary Value 109	Enable descriptor	R/W	OFF
BV-103	Binary Value 110	Enable descriptor	R/W	OFF
BV-111	Binary Value 111	Enable descriptor	R/W	OFF
BV-112	Binary Value 112	Enable outside air descriptor	R/W	ON
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