ExactLogic BACnet Communicating VVT Zone Damper with Lighting EXL01712 Sequence Datasheet

DataSheet Rev 1.20.001/4.4
October 9, 2023

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 zone damper keypad will time out after 20 seconds without a key press, and the display will switch back to displaying the room temperature.

Internal/External Thermistor Control

The thermostat control sequence can use the internal thermistor or an external thermistor connected to AI-2. Setting BV-67 to OFF (default) the thermostat will use the internal thermistor. Setting BV-67 to ON the control sequence will use the external thermistor.

The current controlling temperature is located at AV-20. This value will be displayed on the LCD of the thermostat and should be used on any workstation displays.

Control Sequence – Heat / Cool

The occupancy of the thermostat is controlled by BO-5. When active the thermostat will maintain its occupied setpoint. The deadband is controlled by the cooling/heating offset (default 1 degree). The damper control signal is controlled by the heating or cooling signals. The proper signal is selected based on 'Warm Air in Duct' (BV-8) via BACnet or by a Discharge Air Sensor. With an optional Discharge Air Sensor, the 'Warm Air in Duct Status' (BV-18) decision can be made locally. This allows the thermostats to operate on a standalone mode. The 'Local Warm Air in Duct SP' (AV-44) is used to trigger the 'Warm Air in Duct Status' (BV-18) when using a Discharge Air Sensor. The heating and cooling signals can be scaled, allowing for different damper positions in the heating and cooling modes. The heating signal can be scaled using AV 50 and AV-51. The cooling signal can be scaled using AV-52 and AV-53.

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 zone damper 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 zone will be controlled by the unoccupied cooling/heating setpoints. The cooling and heating will operate the same as the occupied control sequence.

Lighting Control Sequence

When in the occupied or the unoccupied mode motion is sensed by the internal sensor at BI-1 or by the external sensor at BI-4 the lights will turn on and remain on for AV-36 minutes (default is 15 minutes). Additional motion will set the ON period to 15 minutes again.

Night Override

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 zone damper 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 zone damper 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 zone damper keypad will time out after 5 seconds without a key press, and the display will switch back to displaying the room temperature.

The zone damper can be set to night override by writing a value to AV-74 though 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 zone is commanded to the occupied mode while in night override, the override timer will be cleared to zero and the zone will enter the occupied mode.

Control Sequence

When the thermostat is in the override mode, the room will be controlled by the occupied cooling and heating setpoints.

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. The Humidity value is shown on AI-1.

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

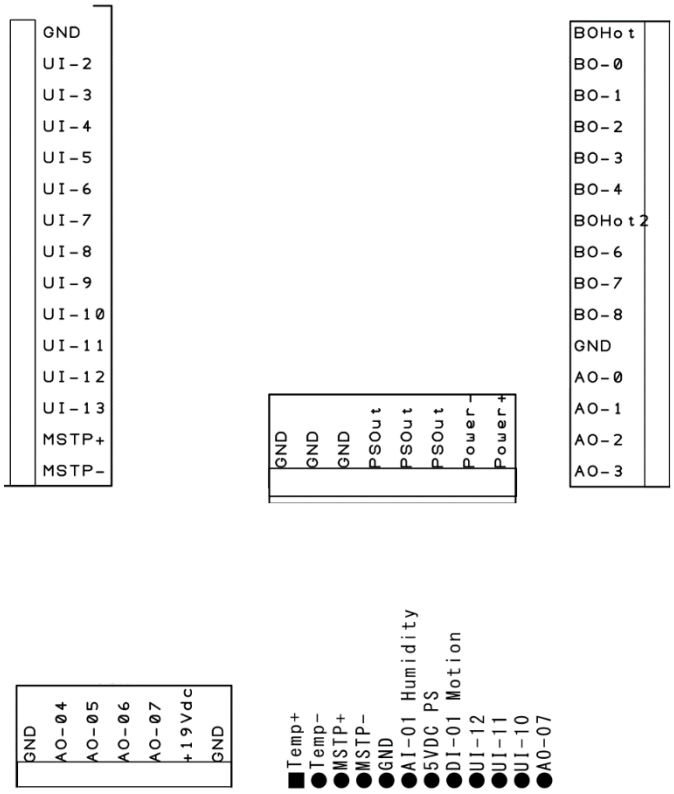

Fig. 4

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

*Note: AI-2 through AI-5 and BI-2 through BI-5 are wired to UI-2 through UI-5. Each universal Input can only be used as an AI or a BI

GND ..... Neutral/Ground
UI-2..... Universal Input 2
UI-3..... Universal Input 3
UI-4..... Universal Input 4
UI-5..... Universal Input 5
UI-6..... Universal Input 6
UI-7..... Universal Input 7
UI-8..... Universal Input 8
UI-9..... Universal Input 9
UI-10 ..... Universal Input 10
UI-11 ..... Universal Input 11
UI-12 ..... Universal Input 12
UI-13 ..... Universal Input 13
MSTP + ... Network Line Positive
MSTP - .....Network Line Negative

BO Hot ..... 24VAC/DC Input for Relays 1-5*
BO-0..... Relay 1 Output, 24VAC/DC
BO-1..... Relay 2 Output, 24VAC/DC
BO-2..... Relay 3 Output, 24VAC/DC
BO-3..... Relay 4 Output, 24VAC/DC
BO-4..... Relay 5 Output, 24VAC/DC
BO Hot 2 ..... 24VAC/DC Input for Relays 7-9*
BO-6..... Relay 7 Output, 24VAC/DC
BO-7..... Relay 8 Output, 24VAC/DC
BO-8..... Relay 9 Output, 24VAC/DC
GND ..... Neutral/Ground
AO-0..... Analog Output 0, 0-10V
AO-1..... Analog Output 1, 0-10V
AO-2..... Analog Output 2, 0-10V
AO-3..... Analog Output 3, 0-10V

GND ..... Neutral/Ground
GND ..... Neutral/Ground
GND ..... Neutral/Ground
PSOut.....24VAC/DC Hot
PSOut.....24VAC/DC Hot
PSOut.....24VAC/DC Hot
Power - ..... Neutral/Ground
Power + ...24VAC/DC Hot

GND ..... Neutral/Ground
AO-04..... Analog Output 4, 0-10V
AO-05..... Analog Output 5, 0-10V
AO-06..... Analog Output 6, 0-10V
AO-07..... Analog Output 7, 0-10V
+19Vdc ..... 19V DC
GND ..... Neutral/Ground

Output Wiring

Output/Label	Function
BO0	
BO1	
BO2	Damper Open
BO3	Damper Close
BO4	Lighting
AO0	Damper Signal 0-10 Vdc 0-100%
AO1	

Reserved BACnet Points

The following are points used by zone damper 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
AI-1	Humidity	Reading from the Humidity sensor add-on card	R	variable
AI-2	Ext. Room Temp	Optional external room temperature input	R	variable
AI-3	Duct Temperature	Reading of the Discharge Air Sensor in counts. 0-1024	R	variable
AI-4	Analog Input 04	Reading of the external input 4 in counts. 0-1024	R	variable
AI-5	Analog Input 05	Reading of the external input 5 in counts. 0-1024	R	variable

Analog Outputs

Instance	Object Name	Description	Read/Write	Default
AO-0	Damper Signal	Damper 0-10V output	R/W	0.0
AO-1			R/W	0.0
AO-2			R/W	0.0

Analog Values

Instance	Object Name	Description	Read/Write	Default
AV-0	Mode of Operation	The mode that the zone damper 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				
AV-2				
AV-3				
AV-4	Current Htg SP	The setpoint that controls heating. If the room temperature goes below this setpoint the zone damper will enter heating mode.	R	72.0°F

AV-5	Current Clg SP	The setpoint that controls cooling. If the room temperature goes above this setpoint the zone damper will enter cooling mode.	R	74.0°F
AV-6	Heating SP	The setpoint used for heating during occupied mode. This setpoint is calculated by AV-90 (Current SP) – AV-94 (Heating Offset)	R	72.0°F
AV-7	Cooling SP	The setpoint used for cooling during occupied mode. This setpoint is calculated by AV-90 (Current SP) + AV-93 (Cooling Offset)	R	74.0°F
AV-8	Heating Signal	Heating signal status before being scaled	R	0%
AV-9	Cooling Signal	Cooling signal status before being scaled	R	0%
AV-10				
AV-11				
AV-12				
AV-13				
AV-14				
AV-15	Htg Damper Signal	The scaled heating signal used for damper control	R	0%
AV-16	Clg Damper Signal	The scaled cooling signal used for damper control	R	0%
AV-17	Damper Control Signal	The heating or cooling signal used to determine the damper position. The point “Warm Air in Duct”, BV-8, determines which signal to use.	R	0%
AV-18				
AV-19				
AV-20	Room Temp for Control	Selected from either AI-0 or AI-2. BV-67 is used for selection. This is the value displayed on the LCD of the thermostat and should be used to display the temperature on any workstation display.	R	73
AV-21				
AV-22				
AV-23				
AV-24				
AV-25	Damper % Open	Percentage that the damper is open, 0-100%	R	50%
AV-26	Cooling Deviation	The difference in the zone temperature from cooling setpoint	R	Varies
AV-27	Heating Deviation	The difference in the zone temperature from heating setpoint	R	Varies
AV-28	Deviation from SP	The difference in the zone temperature from setpoint, determined by whether the zone is heating or cooling	R	Varies
AV-29	Zone Scan	Numerical representation to tell the mode the zone is in. Used for workstation graphics (100 = Full Heat, -100 = Full Cool	R	0%
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	1
AV-31	AI-1 Setup	See AV-30	R	0
AV-32	AI-2 Setup	See AV-30	R	1
AV-33	AI-3 Setup	See AV-30	R	1
AV-34	AI-4 Setup	See AV-30	R	0
AV-35	AI-5 Setup	See AV-30	R	0

AV-36	Lights On Time-Min	This is the time the lights will stay on after either motion sensor senses motion in minutes	R/W	15 min
AV-37				
AV-38				
AV-39				
AV-40	Heating Kp	Proportional constant for Heating PI Loop	R/W	12
AV-41	Heating Ki	Integral Constant for Heating PI Loop	R/W	1
AV-42	Cooling Kp	Proportional constant for Cooling PI Loop	R/W	12
AV-43	Cooling Ki	Integral Constant for Cooling PI Loop	R/W	1
AV-44	WarmDuct SP	Setpoint used to trigger the Warm Air in Duct Signal (BV-18), when using a local DAT Sensor.	R/W	75˚F
AV-45	Output Minimum	Used to scale the analog output. This is the minimum voltage the AO will output. (i.e. 2-10V valve or damper)	R/W	0V
AV-46	Damper Deadband	The deadband used to determine when to open or close the damper	R/W	5%
AV-47	Damper Motor Time	The amount of time to open the damper from 0% open to 100% open	R/W	90 sec
AV-48				
AV-49				
AV-50	Max Heating Signal	Maximum damper position on the heating mode	R/W	100%
AV-51	Min Heating Signal	Minimum damper position on the heating mode	R/W	0%
AV-52	Max Cooling Signal	Maximum damper position on the cooling mode	R/W	100%
AV-53	Min Cooling Signal	Minimum damper position on the cooling mode	R/W	0%
AV-54				
AV-55				
AV-56				
AV -57				
AV-58	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	1.6
AV-59	Ave 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	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R/W	85.0˚F

AV-65	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	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	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	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	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	Discharge Air Temperature 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		R	
BI-4	Binary Input 04		R	
BI-5	Opt. Occupied Relay	Optional occupancy relay input	R	

Binary Outputs

Instance	Object Name	Description	Read/Write	Default
BO-0			R/W	OFF
BO-1			R/W	OFF
BO-2	Damper Open	Digital output to open the zone damper	R/W	OFF
BO-3	Damper Close	Digital output to close the zone damper	R/W	OFF
BO-4	Lighting	Digital output to turn on the Room Lights	R/W	OFF
BO-5	Scheduled Occupied	Logical point only. Used for scheduling purposes. INACTIVE is unoccupied.	R/W	OFF

Binary Values

Instance	Object Name	Description	Read/Write	Default
BV-0	Bad Room Sensor	Alarm for a bad internal thermister	R	OFF
BV-1	H/C Mode	Sequence point to show analog heating or cooling. OFF = Cooling ON = Heat	R	OFF
BV-2				
BV-3				
BV-4				
BV-5				
BV-6				
BV-7				
BV-8	Warm Air in Duct	External Command to indicate heating mode is active	R	OFF
BV-9	Space Alarm Delay	Delay used to prevent a space alarm after receiving an occupied command. The delay is 7200 sec	R	OFF
BV-10	Program Status	Used to determine if the sequence was loaded correctly on a BACnet Restore or power up.	R	ON
BV-11	Duct Sensor Warm	Status of Duct Sensor > AV-44	R	OFF
BV-12				
BV-13				
BV-14				
BV-15				
BV-16				
BV-17				
BV-18	Warm Air in Duct Status	Set ACTIVE by BV-8 when BV-50 is OFF or by the Discharge Air Sensor when BV-50 is ON	R	OFF
BV-19				

BV-20				
BV-21				
BV-22	Too Warm Status	Status of the Too Warm Alarm before checking the Space Alarm Delay	R	OFF
BV-23	Too Cool Status	Status of the Too Warm Alarm before checking the Space Alarm Delay	R	OFF
BV-24	Space To Warm Alarm	The space temperature has been below the Room Set point (AV-90) – Space Alarm Offset (AV-82) for at least 7200 seconds.	R	OFF
BV-25	Space To Cool Alarm	The space temperature has been above the Room Set point (AV-90) + Space Alarm Offset (AV-82) for at least 7200 seconds.	R	OFF
BV-26				
BV-27				
BV-28				
BV-29				
BV-30				
BV-31				
BV-32				
BV-33				
BV-34				
BV-35				
BV-36				
BV-37				
BV-38				
BV-39				
BV-40	Occupied Status	The status of this point switches the zone dampers occupancy settings. ON when the zone damper is in Occupied Setpoint Mode or After Hours Mode.	R	OFF
BV-41	Opt. Start Warmup	A Warmup command has been sent to the zone damper. When ON the zone damper will switch to occupied settings.	R/W	OFF
BV-42	Opt. Start Cooldown	A Cooldown command has been sent to the zone damper. When ON the zone damper will switch to occupied settings.	R/W	OFF
BV-43	Occ Set point Mode	The zone damper has been commanded occupied via BO-5, or a Warmup/Cooldown command has been sent via BV-41/BV-42.	R	OFF
BV-44	After Hours Status	The zone damper has been set to after hours mode. When ON the zone damper will switch to occupied settings.	R	OFF
BV-45	Reserved	This point is reserved for internal zone damper use and its value cannot be changed	R	OFF
BV-46				
BV-47				
BV-48				
BV-49	Update Descriptors	When ON descriptor changes are sent to the thermostats LCD, this point will auto reset to OFF.	R/W	OFF
BV-50	WarmAir Duct or Sen	Follows BV-8 when BV-50 is OFF or the Discharge Air Sensor when BV-50 is ON	R/W	OFF
BV-51				
BV-52				
BV-53				

BV-54				
BV-55				
BV-56				
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	Force Damper Close	When ON the damper will be forced Closed, if BV-60 & BV-61 are on the damper will be forced closed	R/W	OFF
BV-61	Force Damper Open	When ON the damper will be forced Open	R/W	OFF
BV-62				
BV-63				
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				
BV-66				
BV-67	Room Temp Select	When OFF, the internal thermistor is selected for the control sequence. When ON, an external thermistor attached to AI-2 is selected for control of the sequence	R/W	OFF
BV-68	Backlight Off/On	When ON the LCD backlight will remain on	R/W	OFF
BV-69	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	OFF
BV-70	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	OFF
BV-71	C/F	Sets the zone damper to display temperatures in Celsius or Fahrenheit. This point is set through the setup menu. ON = F, OFF = C	R	ON
BV-72				
BV-73				
BV-74	Hotel Mode	This point is reserved for internal zone damper use and its value cannot be changed	R	OFF

BV-100	Binary Value 100	Enable internal thermistor descriptor	R/W	ON
BV-101	Binary Value 101	Enable descriptor	R/W	OFF
BV-102	Binary Value 102	Enable descriptor	R/W	OFF
BV-103	Binary Value 103	Enable Discharge Air Sensor descriptor	R/W	OFF
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-110	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	OFF