

ExactLogic BACnet Communicating Thermostat

EXL01716 Sequence Datasheet

Duel Deck VAV



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Operating Sequence

Standard Occupied

Thermostat occupancy can be set from a number of different sources. The Occupied Schedule Command at BO-5, a Warmup Command at BV-41, a Cooldown Command at BV-42, an External Occupancy Sensor at BI-5, the Optional Internal Occupancy Sensor at BI-1, or from the Field Service Mode. The External Occupancy Sensor is enabled with BV-51, and the Internal Occupancy Sensor is enabled at BV-64. See the separate Installation documentation to set the occupancy from the Field Service Mode.

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.

Thermostat Temperature Control

The thermostat control sequence can use the internal thermistor, an external thermistor connected to AI-2, or an external network temperature written to AV-10, the average temperature of connected thermistors on AI-2 through AI-5, or a Hi/Lo Temperature Selection as the controlling temperature for the thermostat. Each mode is described below and listed in Table 1 showing which points to set to enable the desired temperature. The 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. If there is no valve in the table for a given point, the value of that point is considered a DON'T CARE in determining the valve of AV-20.

The default mode of the thermostat uses the internal thermistor.

Internal/External Thermistor

This mode is used to select the internal thermistor on AI-0 or the external thermistor on AI-2. The control decision is made by BV-67. BV-63 must be OFF for this mode.

Network Temperature

This mode is used to transfer a temperature from one BACnet device to AV-10 on the thermostat. This mode is intended for occasions where an external thermistor or average temperature can not be wired to the thermostat. The decision for this mode uses BV-62 and BV-63.

Average Temperature

This mode uses the internal thermistor and up to 4 external thermistors wire to UI-2 through 5 to be averaged together. AV-36 is used to configure the number is external thermistors used in the average calculation. The decision for this mode uses BV-61, BV-62, and BV-63.

Hi/Lo Temperature Select

This mode will allow the highest or lowest temperature, selected from the internal, external, or network temperature to be used as the control temperature. The Hi/Lo decision is made using BV-60. BV-56 is used to select the external thermistor on AI-2 or a network temperature on AV-10 to be used for the Hi/Lo Selection. The internal thermistor on AI-0 is always used in the Hi/Lo Selection.

AV-20 Control Temp	BV-56	BV-67	BV-60	BV-61	BV-62	BV-63
Internal Thermistor (default)		OFF				OFF
External Thermistor		ON				OFF
Network Temperature					OFF	ON
Average Temperature				ON	ON	ON
Hi Temperature Select			ON	OFF	ON	ON
Low Temperature Select			OFF	OFF	ON	ON
Use Network Temp for Hi/Lo	ON					
Use External Thermistor for Hi/Lo	OFF					

Table 1

Control Sequence – Heat / Cool

When the room temperature drops below the heating setpoint the heating damper modulates open. When the room temperature rises above the cooling setpoint the cooling damper modulates open.

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 AI-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

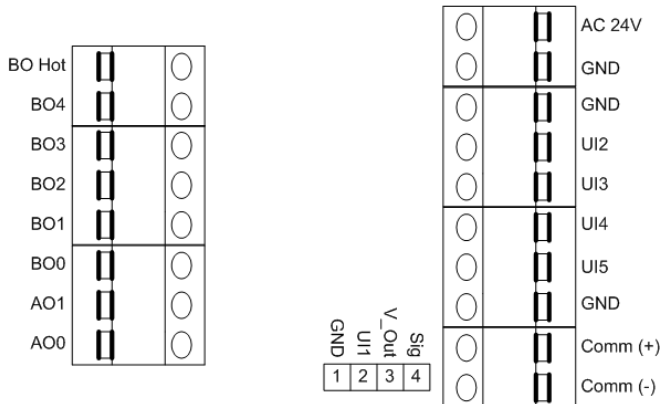
Night Override

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 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.

Installation



AC 24V 24VAC/DC Hot
 GND Neutral/Ground
 GND Neutral/Ground
 UI2 Universal Input 2
 UI3 Universal Input 3
 UI4 Universal Input 4
 UI5 Universal Input 5
 GND Neutral/Ground
 Comm (+) Network Positive Line
 Comm (-) Network Negative Line
 BO Hot Com, 24VAC Hot for relays*
 BO4 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
 AO1 Analog Output 1, 0-10V
 AO0 Analog Output 0, 0-10V

1 Neutral/Ground
 2 Universal Input 1
 3 Analog Output 2
 4 Reserved

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

Output Wiring

Output/Label	Heat / Cool Mode
BO0	
BO1	
BO2	
BO3	
BO4	
AO0	Cooling/Mixing Damper Command
AO1	Heating Damper Command

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
AI-1	Humidity	Reading from the Humidity sensor add-on card	R	variable
AI-2	Ext. Room Temp 1	Optional external room temperature input	R	variable
AI-3	Ext. Room Temp 2	Optional external room temperature input	R	variable
AI-4	Ext. Room Temp 3	Optional external room temperature input	R	variable
AI-5	Ext. Room Temp 4	Optional external room temperature input	R	variable

Analog Outputs

Instance	Object Name	Description	Read/Write	Default
AO-0	Cooling Damper	0-10V output for control of cooling	R/W	variable
AO-1	Heating Damper	0-10V output for control of heating	R/W	variable
AO-2				

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				
AV-2				
AV-3				
AV-4	Current Htg SP	The setpoint that controls heating. If the room temperature goes below this setpoint the thermostat will enter heating mode.	R	80.0°F
AV-5	Current Clg SP	The setpoint that controls cooling. If the room temperature goes above this setpoint the thermostat will enter cooling mode.	R	60.0°F
AV-6	Heating SP	The setpoint used for heating during occupied mode. This setpoint is calculated by AV-66 (Current SP) – AV-70 (Heating Offset)	R	72.0°F
AV-7	Cooling SP	The setpoint used for cooling during occupied mode. This setpoint is calculated by AV-66 (Current SP) + AV-69 (Cooling Offset)	R	70.0°F

AV-8	Heating Signal	Space Temp Heating Signal	R	0-100
AV-9	Cooling Signal	Space Temp Cooling Signal	R	0-100
AV-10	Network Temperature	Temperature used for control that is written from a different network device	R/W	0°F
AV-11				
AV-12				
AV-13				
AV-14				
AV-15				
AV-16				
AV-17	Hi Sensor Temp	The highest temperature determined from AI-0 and AI-2 or AV-10. Use BV-56 to select the between AI-2 and AV-10.	R	variable
AV-18	Lo Sensor Temp	The lowest temperature determined from AI-0 and AI-2 or AV-10. Use BV-56 to select the between AI-2 and AV-10.	R	variable
AV-19	Average Temperature	The average temperature calculated using AI-0 and AI-2 through AI-5. Use AV-36 to configure the number of external sensors used in the average.	R	variable
AV-20	Room Temp	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	variable
AV-21				
AV-22				
AV-23				
AV-24				
AV-25				
AV-26	Cooling Deviation	Number of degrees that the room temperature is away from the cooling setpoint	R	variable
AV-27	Heating Deviation	Number of degrees that the room temperature is away from the heating setpoint	R	variable
AV-28	Deviation from SP	Number of degrees that the room temperature is away from the room setpoint	R	variable
AV-29	Zone Scan	Numerical representation of the thermostats mode. 100 = full heat, -100 = full cool	R	variable
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	AI-1 Setup	See AV-30	R/W	0
AV-32	AI-2 Setup	See AV-30	R/W	1
AV-33	AI-3 Setup	See AV-30	R/W	1
AV-34	AI-4 Setup	See AV-30	R/W	1
AV-35	AI-5 Setup	See AV-30	R/W	1
AV-36	Ext Sensors to Avg	The number of external sensors connected to AI-2 to AI-5, used for the average temp calculation	R/W	0
AV-37	Cooling Damper	Numerical representation of the Cooling mode. -100 = full heat, 100 = full cool	R	variable

AV-39	Heating Damper	Numerical representation of the Heating mode. 100 = full heat, -100 = full cool	R	variable
AV-40				
AV-41				
AV-42				
AV-43				
AV-44				
AV-45				
AV-46				
AV-47				
AV-48				
AV-49				
AV-50				
AV-51				
AV-52				
AV-53				
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	0
AV-59	Average 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	0
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°F
AV-62	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-63	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-64	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-65	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-66	Room Setpoint	The occupied room setpoint	R/W	73°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 hrs
AV-75	Descriptors Enabled	Descriptors enabled	R	1
AV-76				
AV-77				
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	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-83	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-84				
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	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				
BI-1	Motion	Motion sensor status from the add-on card	R	OFF
BI-2				
BI-3				
BI-4				
BI-5				

Binary Outputs

Instance	Object Name	Description	Read/Write	Default
BO-0				
BO-1				
BO-2				
BO-3				
BO-4				
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 Sensor Alarm	Alarm for a bad internal thermistor	R	OFF
BV-1	H/C Mode	Room temp mode for heating or cooling	R	OFF
BV-2				
BV-3				
BV-4				
BV-5				
BV-6				
BV-7				
BV-8				
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	OFF
BV-11				
BV-12				
BV-13				

BV-14				
BV-15				
BV-16				
BV-17				
BV-18				
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 Cool Alarm before checking the Space Alarm Delay	R	OFF
BV-24	Space Too Warm Alarm	The space temperature has been below the Room Set point (AV-66) – Space Alarm Offset (AV-61) for at least 7200 seconds.	R	OFF
BV-25	Space Too Cool Alarm	The space temperature has been above the Room Set point (AV-66) + Space Alarm Offset (AV-61) 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 thermostats occupancy settings. When ON, the thermostat is in Occupied Setpoint Mode or After Hours Mode.	R	ON
BV-41	Opt. Start Warmup	A Warmup command has been sent to the thermostat. When ON the thermostat will switch to occupied settings.	R/W	OFF
BV-42	Opt. Start Cooldown	A Cooldown command has been sent to the thermostat. When ON the thermostat will switch to occupied settings.	R/W	OFF
BV-43	Occ Setpoint Mode	The thermostat has been commanded occupied via BO-5, or a Warmup/Cooldown command has been sent via BV-41/BV-42.	R	ON
BV-44	After Hours Mode	The thermostat has been set to afterhours mode. When ON the thermostat will switch to occupied settings.	R	OFF
BV-45				
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				
BV-51	BI for Occupancy	ON = BI-5 will be used to indicate occupancy OFF = BI-5 is not used for occupancy	R/W	OFF
BV-52	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	OFF
BV-53				
BV-54				
BV-55				
BV-56	Ex Temp Local/Remote	OFF = External Temperature is from AI-2 ON = External Temperature is from AV-10	R/W	OFF
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	Hi/Lo Temp Select	ON = Select the Network Temp, AV-10, for Hi/Lo Mode OFF = Select the External Sensor, AI-2, for HI/Lo Mode	R/W	OFF
BV-61	Temp Select Mode 1	ON = Select the Average Temp, AV-19, for control OFF = Select the Hi/Lo Mode for control	R/W	OFF
BV-62	Temp Select Mode 2	ON = Select Average or Hi/Lo Mode OFF = Select Network Temp for control	R/W	OFF
BV-63	Temp Select Mode 3	ON = Select Average, Hi/Lo, or Average Mode OFF = Selects Internal (AI-0) or External Temp (AI-2) for control	R/W	OFF
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-1 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				
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				
BV-73				
BV-74	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	ON
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 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