

# ExactLogic BACnet Communicating Thermostat

## EXL1590 Sequence Datasheet

Airflow Measuring Station - Average



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## ***Operating Sequence***

This sensor reads 1-4 velocity sensors and calculates The total CFM.

### ***Internal Thermistor Control***

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.

### ***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

**Duct Sensors – 4 included:**

**SPECIFICATIONS**

**Service:** Clean air and compatible, non-combustible gases.

**Accuracy:** ±5% of full scale.

**Response Time (90%):** 5 sec (typical).

**Humidity Limit:** 0-90% RH, non-condensing.

**Power Requirements:** 24 VDC or 24 VAC +10% - 15%.

**Output Signal:** 0-10 VDC.

**Current Consumption:** 60 mA each.

**Electrical Connections:** Screw terminal. Cable gland for 4-8 mm wire (16 gauge wire).

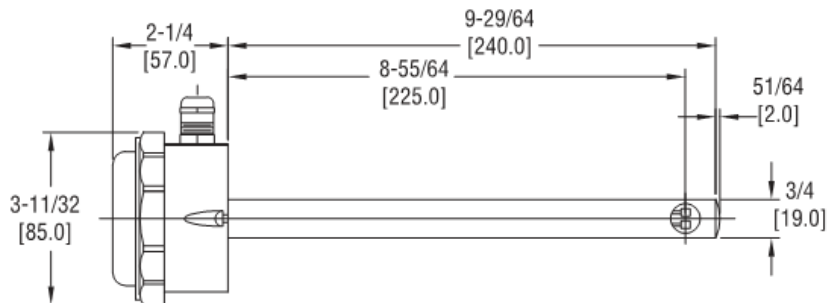
**Enclosure Rating:** NEMA 6 (IP67) except sensing point.

**Probe Dimensions:** 9.45 x .75" (240 x 19 mm).

**Mounting Orientation:** Unit not position sensitive. Probe must be aligned with airflow.

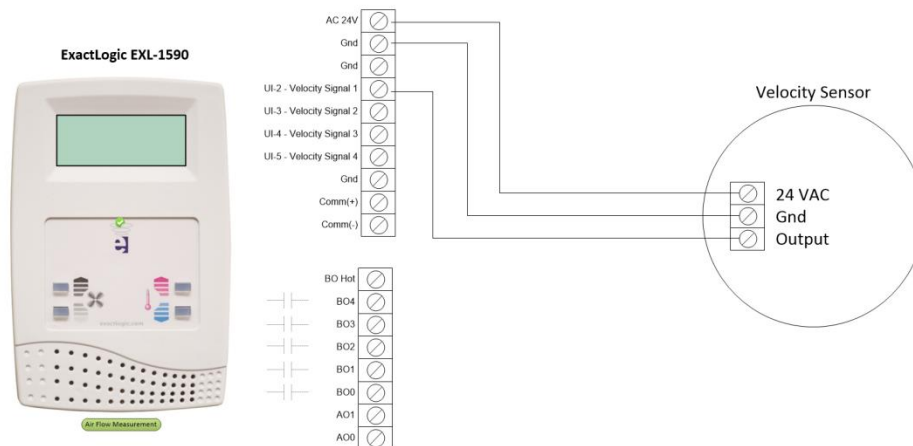
**Weight:** 8.8 oz (250 g) each.

**Agency Approvals:** CE.

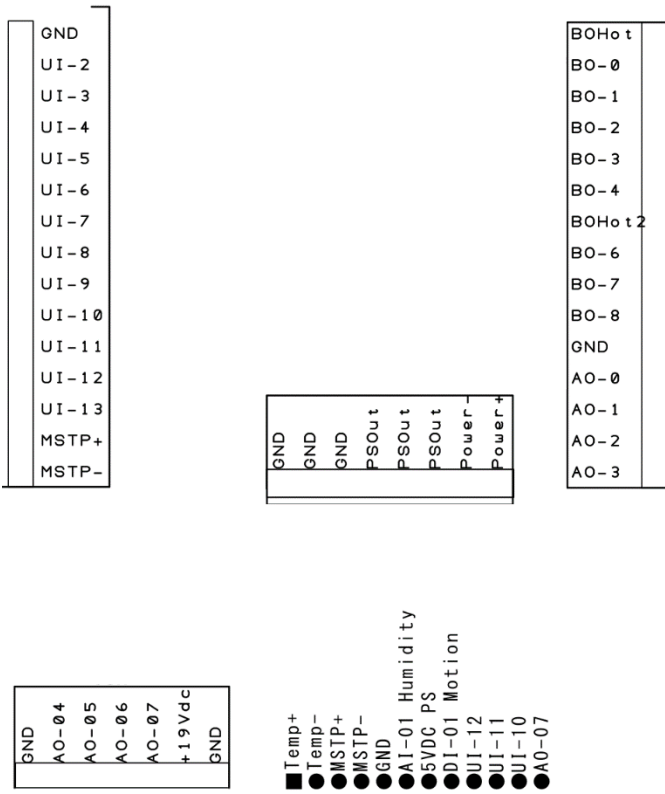


The four transmitters operate by measuring the heat loss from one of two sensing elements per transmitter in the airstream and hence calculating the air velocity. These elements make the transmitter accurate over the whole air velocity range and provides excellent immunity to drift. The sensing elements are clad in metal ensuring a long service life and enabling the sensors to be cleaned easily.

**Sensor Wiring Diagram:**



# Installation



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

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	
BO0	
BO1	Damper Open
BO2	Damper Close
BO3	Damper 2 Open
BO4	Damper 2 Close
AO0	Damper Modulation 0-10Vdc
AO1	Damper Modulation 0-10Vdc

## 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	Velocity Sensor	Input for velocity sensor used in airflow calculation	R	variable
AI-3	Velocity Sensor	Input for velocity sensor used in airflow calculation	R	variable
AI-4	Velocity Sensor	Input for velocity sensor used in airflow calculation	R	variable
AI-5	Velocity Sensor	Input for velocity sensor used in airflow calculation	R	variable

### Analog Outputs

Instance	Object Name	Description	Read/Write	Default
AO-0	Analog Output 00	0-10V output = 0-100% Damper	R/W	0.0
AO-1	Analog Output 01	0-10V output = 0-100% Damper	R/W	0.0
AO-2	Analog Output 02	Variable 0-14VDC, 150mA output	R/W	0.0

### Analog Values

Instance	Object Name	Description	Read/Write	Default
AV-0	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-1				
AV-2				
AV-3				
AV-4				
AV-5				

AV-6				
AV-7				
AV-8				
AV-9				
AV-10				
AV-11	Total Sensor FPM	The total of the sensors FPM readings – for calculating the average	R	
AV-12	Uncalibrated Airflow	Airflow Value before Calibration Factor	R	
AV-13	Duct Size	Duct Size Created from AV-37, Duct Height and AV-38, Duct Width	R	
AV-14				
AV-15				
AV-16	FPM	Feet per Minute	R	
AV-17	CFM	Cubic Feet per Minute	R	0
AV-18	Damper 1 %	The Control Signal for Damper 1		
AV-19	Damper 2 %	The Control Signal for Damper 2		
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	Damper 1 Position	The Damper Position Command BO-1 & BO-2	R	
AV-22	Damper 2 Position	Damper 2 Position Command BO-3 & BO-4	R	
AV-23	CFM Before Average	CFM Before Average	R	
AV-24				
AV-25				
AV-26				
AV-27				
AV-28				
AV-29				
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	4
AV-33	AI-3 Setup	See AV-30	R	4
AV-34	AI-4 Setup	See AV-30	R	4
AV-35	AI-5 Setup	See AV-30	R	4
AV-36	Number of Sensors	Number of Velocity Sensors	R	4
AV-37	Duct Height	Value Used for Duct Height		
AV-38	Duct Width	Value Used for Duct Width		
AV-39	Calibration Factor	Calibration Factor Used to Adjust the Airflow Value		
AV-40	Kp		R/W	.01
AV-41	Ki		R/W	.005
AV-42	I max		R/W	50
AV-43	I Lim		R/W	100

AV-44	StUp		R/W	-50
AV-45	Average Limit%	Average Limit as a portion of the Maximum in AV-60. .01 = 50,000 x .01 = 500	R/W	.01
AV-46	CFM Setpoint	CFM Setpoint for Controlling Damper Outputs	R/W	1000
AV-47	D1 Scaler In 1	Floating Point two Input Scalar Input One	R/W	0
AV-48	D1 Scaler In 2	Floating Point two Input Scalar Input Two	R/W	100
AV-49	D1 Scaler Out 1	Floating Point two Input Scalar Output One	R/W	0
AV-50	D1 Scaler Out 2	Floating Point two Input Scalar Output Two	R/W	100
AV-51	D2 Scaler In 1	Analog two Input Scalar Input One	R/W	0
AV-52	D2 Scaler In 2	Analog two Input Scalar Input Two	R/W	100
AV-53	D2 Scaler Out 1	Analog two Input Scalar Output One	R/W	100
AV-54	D2 Scaler Out 2	Analog two Input Scalar Output Two	R/W	0
AV-55	Damper 1 DB		R/W	5
AV-56	Damper 1 Motor Time	PO/PC motor full travel time	R/W	90
AV -57	Damper 2 DB		R/W	5
AV-58	Correction Factor		R	1.6
AV-59	Damper 2 Motor Time	PO/PC motor full travel time	R/W	90
AV-60	Calibration Offset	Used to Calibrate the Space Temp Sensor	R/W	0
AV-61	Space Alarm Offset		R/W	5
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	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-67	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-68	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-69	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-70	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-71	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-72	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-73	AfterHrs Timer Limit	Maximum After Hours Override	R/W	5
AV-74	AfterHrs Timer	Time Left on the After Hours Timer	R/W	0
AV-75	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	0
AV-76	CFM Maximum	Maximum CFM for Averaging Calculation	R/W	50,000
AV-77	Filter %.001 to 1	Adjustable Filter / Average Setting. Set to .001 would be 1:999, Set to .1 would be 1:9	R/W	.01
AV-78			R	0

AV-79			R	0
AV-80			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	Inc/Dec		R/W	.5
AV-83				
AV-84				
AV-100	Analog Value 100	<b>Internal thermistor display descriptor.</b> The present value is automatically transferred. The AV description holds the descriptor to display.	R	variable
AV-101	Analog Value 101	Total kCFM	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	Humidity 0-100%	R/W	
AV-105	Analog Value 105	Feet Per Minute FPM	R/W	
AV-106	Analog Value 106	Damper AO-0 0-100%	R/W	
AV-107	Analog Value 107	Damper AO-1 0-100%	R/W	
AV-108	Analog Value 108	Damper 1 Position	R/W	
AV-109	Analog Value 109	Damper 2 Position	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	<b>Outside Air Display descriptor.</b> 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	Binary Input 05		R	

## Binary Outputs

Instance	Object Name	Description	Read/Write	Default
BO-0	Binary Output 00		R/W	OFF
BO-1	Binary Output 00	Damper 1 Open	R/W	OFF
BO-2	Binary Output 00	Damper 1 Close	R/W	OFF
BO-3	Binary Output 00	Damper 2 Open	R/W	OFF
BO-4	Binary Output 00	Damper 2 Close	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				
BV-1				
BV-2				
BV-3				
BV-4				
BV-5				
BV-6				
BV-7				
BV-8				
BV-9				
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				
BV-23				
BV-24				

BV-25				
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	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	ON
BV-41				
BV-42				
BV-43	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	ON
BV-44	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	ON
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	Sensor 1 Disable	Disables the velocity sensor for AI-2	R/W	OFF
BV-52	Sensor 2 Disable	Disables the velocity sensor for AI-3	R/W	OFF
BV-53	Sensor 3 Disable	Disables the velocity sensor for AI-4	R/W	OFF
BV-54	Sensor 4 Disable	Disables the velocity sensor for AI-5	R/W	OFF
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				
BV-61				
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				
BV-70	Reserved	This point is reserved for internal thermostat use and its value cannot be changed	R	ON
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	OFF
BV-101	Binary Value 101	Enable descriptor	R/W	ON
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