eco-Air Series

EVAPCO Controller User's Manual – Addendum
Communications Guide EC Motor Edition

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Connecting to the Controller

CONTROLLER LAYOUT:

The eco-Air PLC controller is equipped with the means for communicating to building management systems. The default forms of communication are Modbus RTU, Modbus TCP/IP, BACnet MS/TP, & BACnet IP. The serial connection for Modbus RTU and BACnet MS/TP is shown in Detail A. The two connections will allow for easier termination of a daisy-chain network. The serial network will only be able to communicate with either Modbus RTU or BACnet MS/TP. Both means of communication cannot function at the same time. The selection for which form of serial communication is enabled will be made on the control panel HMI screen. Connections for Modbus TCP/IP or BACnet IP will be made to the Ethernet port shown in Detail B. Both forms of communication are active on the Ethernet network.

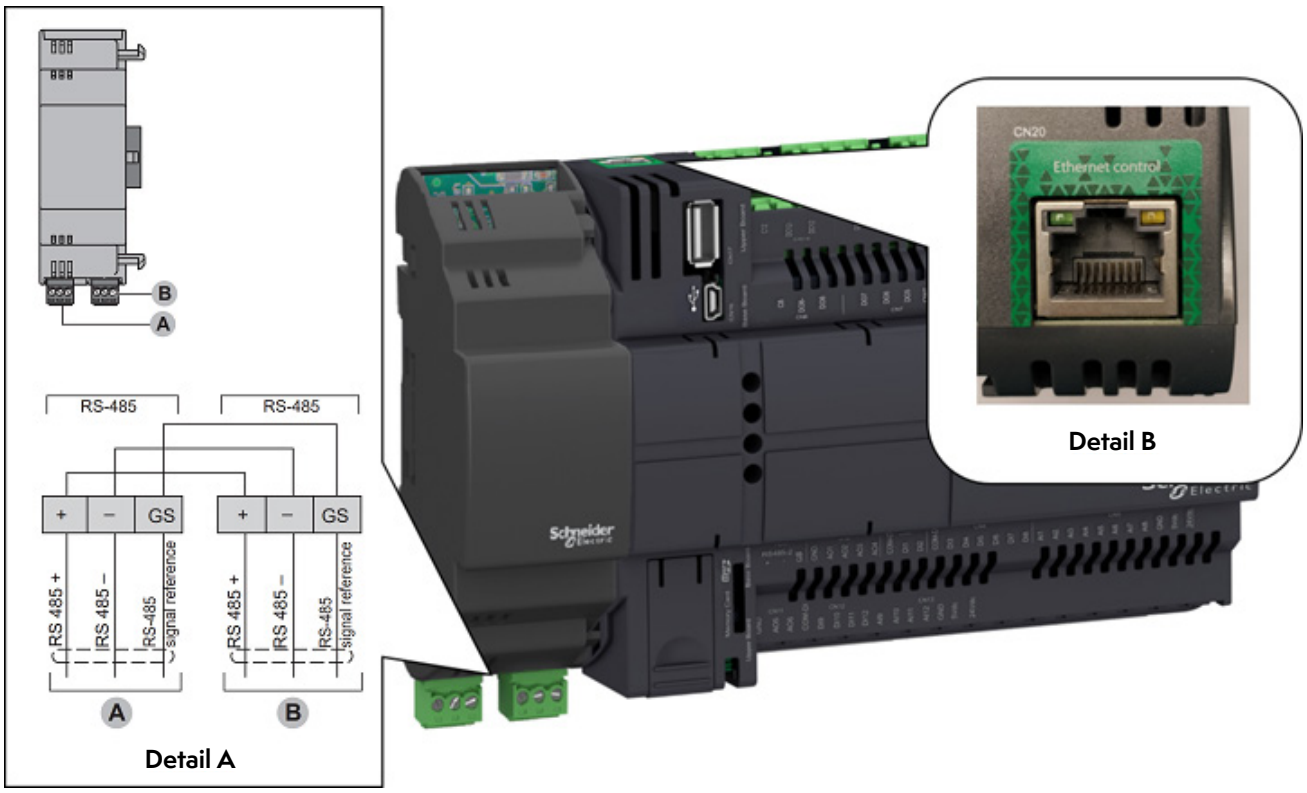

Figure 1 - Controller Layout with Communication Details

MODBUS RTU OR BACNET MS/TP:

Serial connections for either Modbus RTU or BACnet MS/TP are made directly to the set of terminals on the PLC. It is recommended to use RS485 approved twisted pair, shielded cable. The cable shielding should be terminated at only one end of the cable run. Only one protocol can be active at a time on the serial network. This selection is made within the Service menu of the HMI.

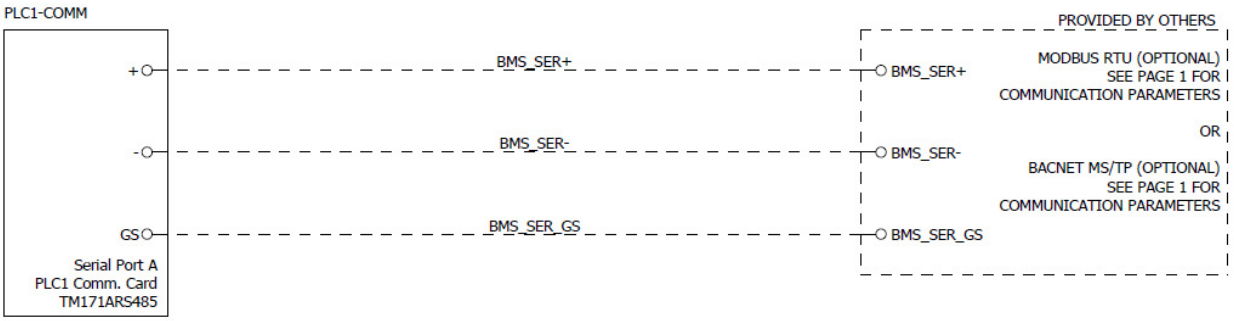

Figure 2 - Modbus RTU or BACnet MS/TP Wiring Diagram

MODBUS TCP/IP & BACNET IP:

Connections for either Modbus TCP/IP or BACnet IP will be made directly to the RJ45 port of the PLC (see Figure 1 Detail B).

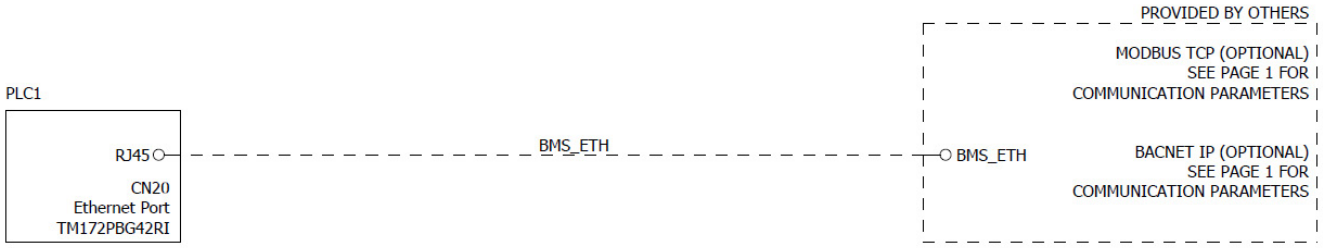

Figure 3 - Ethernet Wiring Diagram

Communication Parameters

DEFAULT COMMUNICATION PARAMETERS:

The controller is setup with default communication parameters detailed on the first page of the control panel wiring diagram.

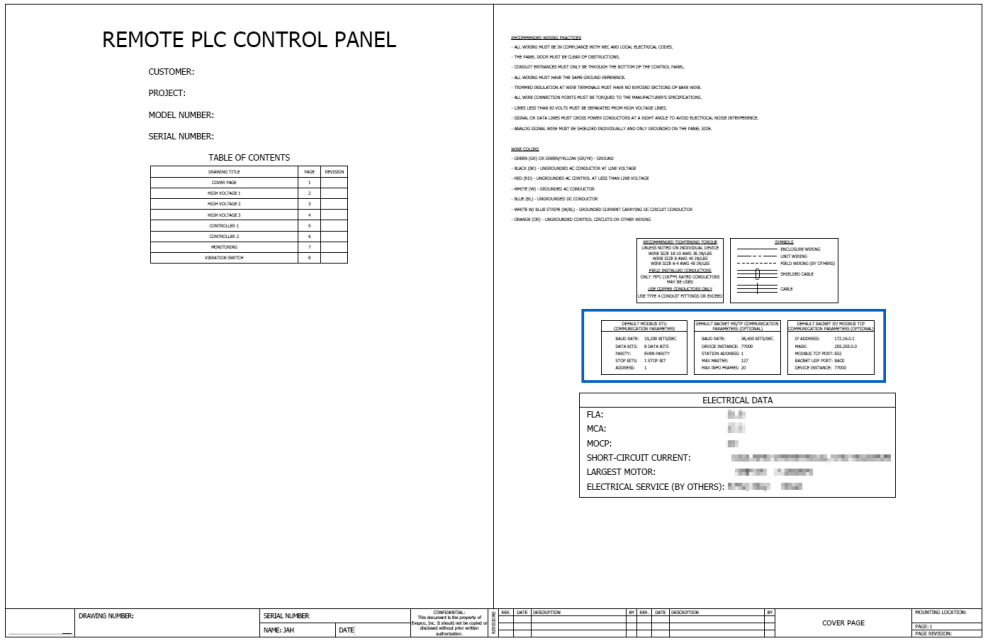

Figure 4 - Communication Parameters

HOW TO CHANGE THE COMMUNICATION PARAMETERS:

Note: the unit must be turned off before changes can be made to the communication parameters. This is easily achieved via the On/Off Control section of the main menu. From the main menu, log in at the Service level (password: 1234) and enter the Service submenu. Select the BMS & Network button menu (Figure 6). After changing any parameter, the Update button must be pressed and held for three seconds to set the value. **This will cause the HMI and PLC to restart.**

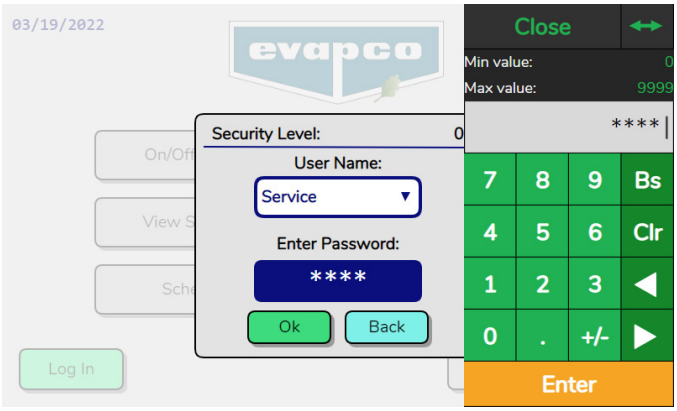

Figure 5 – Service Level Log In

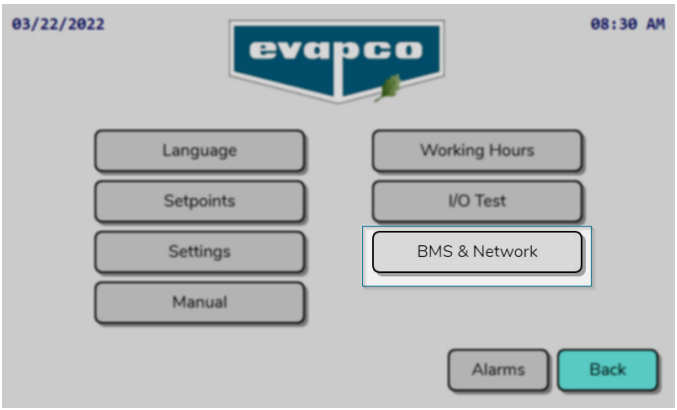

Figure 6 - Service Menu, BMS & Network

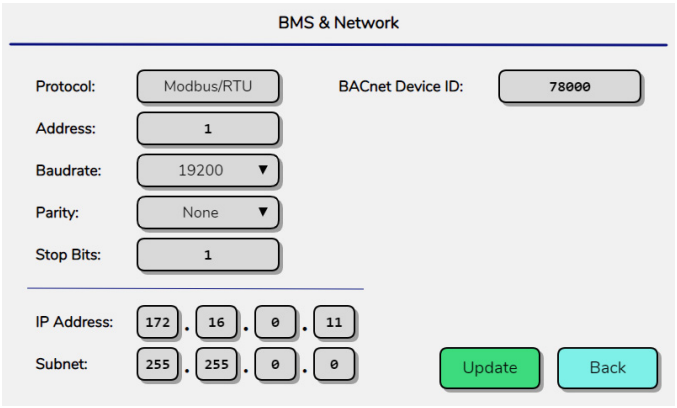

Figure 7 – BMS & Network Parameter Options

MODBUS Communication Points

In the tables below, the adiabatic application column indicates addresses that only apply to units with adiabatic controls e.g., holding register 416595,00 can be referenced to determine whether the adiabatic system has been enabled for the unit. The data points, indicated with the check mark, can be ignored if the unit is not equipped with the adiabatic water valves.

The Holding Registers are separated into two sections. The non-volatile memory section contains equipment parameters that are retained, in the event of a power cycling of the PLC. The volatile memory consists of status variables for PLC IO, calculations, or alarm conditions that are not retained with a loss of power to the PLC.

The non-volatile memory is specified for a life cycle of 100,000 writes (minimum).

Using the non-volatile memory for a cyclic write operation may result in quickly exceeding its life cycle limits resulting in an inoperative memory.

NOTICE

Do not use non-volatile memory registers for cyclic write operations.

Failure to follow these instructions can result in equipment damage.

DANGER

Holding Registers that are not published below are factory reserved.

Modification of any register not listed below can result in rendering the unit non-operational, equipment damage, and possible severe personal injury and or death.

Register	Name	Units	Type	Access	Range	Description	Adiabatic Application
NON-VOLATILE MEMORY							
416384	Setpoint #1 Temperature	0°	REAL	RW	-999.9 to 999.9	The primary process temperature setpoint used when all other alternate setpoints are not active.	
416386	Setpoint #2 Temperature	0°	REAL	RW	-999.9 to 999.9	An alternate process temperature setpoint that may be activated via the scheduler, ambient temperature, or digital input.	
416388	Maximum Allowed Fan Speed	0%	INT	RW	0 to 100	The maximum allowable fan speed.	
416389	Quiet Operation Maximum Fan Speed	0%	INT	RW	0 to 100	The maximum allowable fan speed in quiet operation.	
416390	Energy Savings Fan Speed	0%	INT	RW	0 to 100	The fan speed, above which the precooling system will activate.	✓
416391	Minimum Allowed Fan Speed	0%	INT	RW	0 to 100	The minimum allowable fan speed.	
416392,00	PID vs P Fan Speed Regulation	-	BOOL	RW	BINARY 0 to 1	Determines whether fan speed control is based on a PID controller or a Proportional calculation.	
416393	Proportional Temperature Regulation Band	0°	REAL	RW	0.0 to 30.0	The temperature band between the minimum and maximum fan speed for P fan speed control.	
416395	PID Controller Gain	0g	REAL	RW	0.0 to 10.0	The proportional gain constant used for PID Controller.	
416397	PID Controller Ti Term	0 sec	INT	RW	0 to 999	PID integral term.	
416398	PID Controller Td Term	0 sec	INT	RW	0 to 999	PID derivative term.	
416399	Setpoint #2 Ambient Temperature Trigger	0°	REAL	RW	-100.0 to 200.0	The setpoint that when the ambient temperature falls below, will switch the control to setpoint 2. (Feature must be enabled in the service setpoints section).	
416401	Setpoint #2 Ambient Temperature Trigger Differential	0°	REAL	RW	0.0 to 20.0	The temperature differential added to the ambient temperature setpoint 2 trigger. This will switch the control setpoint back to setpoint 1.	
416403,00	Manual Force Fan Run At Max Speed	-	BOOL	RW	BINARY 0 to 1	0 = Not enabled 1 = Forces fans to run at 100 percent fan speed	
416404	Total Fan Runtime Hours	0 hours	UDINT	RW	0 to 4,294,967,295	The number of hours the fans have been operational.	
416406	Valve #1 Total Runtime Hours	0 hours	UDINT	RW	0 to 4,294,967,295	The number of hours the first valve has been operational.	✓
416408	Valve #2 Total Runtime Hours	0 hours	UDINT	RW	0 to 4,294,967,295	The number of hours the second valve has been operational.	✓
416410	Valve #3 Total Runtime Hours	0 hours	UDINT	RW	0 to 4,294,967,295	The number of hours the third valve has been operational.	✓
416412	Valve #4 Total Runtime Hours	0 hours	UDINT	RW	0 to 4,294,967,295	The number of hours the fourth valve has been operational.	✓
416414,00	Enable Common Alarm Digital Output	-	BOOL	RW	BINARY 0 to 1	Enables the common alarm for the digital output. 0 = Common alarm not enabled 1 = Common alarm enabled	

Register	Name	Units	Type	Access	Range	Description	Adiabatic Application
416415,00	Enable EC Fan Fail-Safe Feature	-	BOOL	RW	BINARY 0 to 1	Enables the fail-safe feature of EC fans. 0 = Feature disabled 1 = Fans operate at fail-safe speed with loss of comms.	
416416	EC Fan Fail-Safe Delay Time	0 sec	INT	RW	0 to 9,999	Length of time that must elapse when communication is lost with the controller before the fans enter fail-safe mode.	
416417	EC Fan Fail-Safe Fan Speed	0%	REAL	RW	0.0 to 100.0	Percentage of fan speed the fans will operate at after fail-safe mode is activated.	
416419	Condenser Refrigerant Type	0	INT	RW	1 to 28	For condenser applications 1=R22, 2=R134a, 3=R404A, 4=R407C, 5=R410A, 6=R407A, 7=R407F, 8=R290, 9=R507A, 10=R717 (NH3), 11=R723, 12=R1234ze, 13=R744 (CO_2), 14=R448A, 15=R427A, 16=R450A (N13), 17=R513A, 18=R449A, 19=R1234yf, 20=R454B, 21=R454C, 22=R455A, 23=434A, 24=R422A, 25=R32, 26=R452B, 27=R452A, 28=Custom	
416420,00	Enable Precooling System To Operate	-	BOOL	RW	BINARY 0 to 1	0 = Precooling system will not function. 1 = Precooling system will function when needed.	✓
416421	Low Temperature Precooling System Lockout	0°	REAL	RW	-9,999.0 to 9,999.0	The minimum ambient temperature at which the precooling system may operate.	✓
416423	Low Temperature Differential For Precooling System Lockout	0°	REAL	RW	0.0 to 20.0	The ambient temperature offset added to the minimum allowable temperature, at which the precooling system becomes activate.	✓
416425	Stage #1 Increase Time Setpoint	0 sec	INT	RW	0 to 32,767	The number of seconds that must pass with the process temperature above setpoint before the stage activates.	✓
416426	Stage #1 Decrease Time Setpoint	0 sec	INT	RW	0 to 32,767	The number of seconds that must pass with the process temperature below setpoint before the stage deactivates.	✓
416427	Stage #2-4 Increase Time Setpoint	0 sec	INT	RW	0 to 32,767	The number of seconds that must pass with the process temperature above setpoint before the stages activate.	✓
416428	Stage #2-4 Decrease Time Setpoint	0 sec	INT	RW	0 to 32,767	The number of seconds that must pass with the process temperature below setpoint before the stages deactivate.	✓
416429	Stage #1 Ambient Temperature Switch Point	0°	REAL	RW	-999.9 to 999.9	The minimum temperature, above which the precooling stage 1 has permission to operate.	✓
416431	Stage #2 Ambient Temperature Switch Point	0°	REAL	RW	-999.9 to 999.9	The minimum temperature, above which the precooling stage 2 has permission to operate.	✓
416433	Stage #3 Ambient Temperature Switch Point	0°	REAL	RW	-999.9 to 999.9	The minimum temperature, above which the precooling stage 3 has permission to operate.	✓
416435	Stage #4 Ambient Temperature Switch Point	0°	REAL	RW	-999.9 to 999.9	The minimum temperature, above which the precooling stage 4 has permission to operate.	✓
416437,00	Enable Stage Minimum Run Time	-	BOOL	RW	BINARY 0 to 1	0 = Not active 1 = Valve must remain on for the minimum run time	✓

Register	Name	Units	Type	Access	Range	Description	Adiabatic Application
416438	Stage #1 Minimum Run Time	0 sec	INT	RW	0 TO 32,767	The minimum amount of time the precooling stage remains active before being allowed to turn off.	✓
416439	Stage #2 Minimum Run Time	0 sec	INT	RW	0 TO 32,767	The minimum amount of time the precooling stage remains active before being allowed to turn off.	✓
416440	Stage #3 Minimum Run Time	0 sec	INT	RW	0 TO 32,767	The minimum amount of time the precooling stage remains active before being allowed to turn off.	✓
416441	Stage #4 Minimum Run Time	0 sec	INT	RW	0 TO 32,767	The minimum amount of time the precooling stage remains active before being allowed to turn off.	✓
416442,00	Manual Force Precooling System Flush Cycle	-	BOOL	RW	BINARY 0 to 1	Manually starts the precooling flushing cycle. 0 = Not active 1 = Start manual flush	✓
416443	Precooling System Water Flush Period of Time	0 min	INT	RW	0 to 9,999	The number of minutes to perform the flushing routine once initiated.	✓
416444	Precooling System Drying Period of Time	0 min	INT	RW	0 to 9,999	The number of minutes to dry the precooling pads after a flushing routine.	✓
416445	Precooling System Flush Fan Speed	0 %	REAL	RW	0.0 to 100.0	The desired fan speed while performing a flushing cycle.	✓
416447	Remote Fan Speed Control Enable	-	BOOL	RW	BINARY 0 to 1	Enables remote fan speed control, overriding the local fan speed calculation.	
416448	Source for Fan Speed Control	-	INT	RW	1 to 2	Source of the reference fan speed: 1 = Analog Input 2 = Communication see 409158	
416449	Signal Failure Ambient Trigger	0°	REAL	RW	-100.0 to 200.0	When the source is set to Analog Input, the ambient trigger will determine whether the fan speed resorts to the high default speed or low default speed.	
416451	Signal Failure High Default Fan Speed	0 %	INT	RW	0 to 100	The fan(s) will operate at the high default fan speed with a loss of the analog input and the ambient temperature is greater than the trigger setpoint.	
416452	Signal Failure Low Default Fan Speed	0 %	INT	RW	0 to 100	The fan(s) will operate at the low default fan speed with a loss of the analog input and the ambient temperature is less than the trigger setpoint.	
VOLATILE MEMORY							
408960,00	Supervisory Unit Enable	-	BOOL	RW	BINARY 0 to 1	Enables the unit if it is configured to be enabled via BMS. 0 = Unit not enabled 1 = Unit enabled	
408961	Actual Unit State	0	INT	R	0 to 32,767	The current state of the EVAPCO Controller. 1 = Unit on and operational 2= Unit is off by an alarm 4 = Unit is off via BMS, Modbus/ BACnet 6 = Unit is off via the digital input 7 = Unit is switched off locally 8 = Manual mode enabled for fan speed control	

Register	Name	Units	Type	Access	Range	Description	Adiabatic Application
408962	Process Temperature	0°	REAL	R	-9999.0 to 9999.0	The outlet temperature of the process fluid. For condenser applications, the process temperature is a saturated calculation based on the condensing pressure.	
408964	Ambient Temperature	0°	REAL	R	-9999.0 to 9999.0	The temperature detected by the ambient temperature sensor.	
408966	Reference Fan Speed	0 %	INT	R	0 to 100	The desired fan speed determined by the controller.	
408967	Current Active Temperature Setpoint	0°	REAL	R	-999.9 to 999.9	The active setpoint that the eco-Air unit will maintain.	
408969	Inlet Pressure	0 Psig/ Bar	REAL	R	-9999.0 to 9999.0	Inlet pressure reading via pressure sensor input.	
408971	Elapsed Stage #1 Increase Timer	0 sec	UDINT	R	0 to 4,294,967,295	The number of seconds with the process temperature above the setpoint while the stage is not active.	✓
408973	Elapsed Stage #1 Decrease Timer	0 sec	UDINT	R	0 to 4,294,967,295	The number of seconds with the process temperature below setpoint while the stage is active.	✓
408975	Elapsed Stage #2-4 Increase Timer	0 sec	UDINT	R	0 to 4,294,967,295	The number of seconds with the process temperature above the setpoint while the stages are not active.	✓
408977	Elapsed Stage #2-4 Decrease Timer	0 sec	UDINT	R	0 to 4,294,967,295	The number of seconds with the process temperature below setpoint while the stages are active.	✓
408979	Elapsed Stage #1 Minimum On Timer	0 sec	UDINT	R	0 to 4,294,967,295	An accumulated number of seconds the stage has been running for the minimum on period of time.	✓
408981	Elapsed Stage #2 Minimum On Timer	0 sec	UDINT	R	0 to 4,294,967,295	An accumulated number of seconds the stage has been running for the minimum on period of time.	✓
408983	Elapsed Stage #3 Minimum On Timer	0 sec	UDINT	R	0 to 4,294,967,295	An accumulated number of seconds the stage has been running for the minimum on period of time.	✓
408985	Elapsed Stage #4 Minimum On Timer	0 sec	UDINT	R	0 to 4,294,967,295	An accumulated number of seconds the stage has been running for the minimum on period of time.	✓
408987	Elapsed Flush Cycle Timer	0 sec	UDINT	R	0 to 4,294,967,295	The number of seconds the flushing routine has been active.	✓
408989	Elapsed Flush Drying Timer	0 sec	UDINT	R	0 to 4,294,967,295	The number of seconds the drying routine has been active.	✓
408991,00	DI – Setpoint #2 Trigger	-	BOOL	R	BINARY 0 to 1	Digital Input for the Setpoint #2 Trigger	
408992,00	DI – Quiet Mode Trigger	-	BOOL	R	BINARY 0 to 1	Digital Input for the Quiet Mode Trigger	
408999,00	DI – Unit On/ Off	-	BOOL	R	BINARY 0 to 1	Digital Input for the Unit On/Off	
409001,00	DI – Valve Fault	-	BOOL	R	BINARY 0 to 1	Digital Input for the Valve Fault	✓
409002,00	DO – Common Alarm	-	BOOL	R	BINARY 0 to 1	Digital Output for Common Alarm	
409003,00	DO – Unit Operation	-	BOOL	R	BINARY 0 to 1	Digital Output for Unit Operation	
409004,00	DO – Valve #1	-	BOOL	R	BINARY 0 to 1	Digital Output for Valve #1	✓

Register	Name	Units	Type	Access	Range	Description	Adiabatic Application
409005,00	DO – Valve #2	-	BOOL	R	BINARY 0 to 1	Digital Output for Valve #2	✓
409006,00	DO – Valve #3	-	BOOL	R	BINARY 0 to 1	Digital Output for Valve #3	✓
409007,00	DO – Valve #4	-	BOOL	R	BINARY 0 to 1	Digital Output for Valve #4	✓
409009,00	Alarm – Valve Fault	-	BOOL	R	BINARY 0 to 1	Active alarm for valve fault	✓
409011,00	Alarm – Vibration Switch Triggered	-	BOOL	R	BINARY 0 to 1	Active alarm for the vibration switch(es)	
409018,00	Alarm – Analog Input #1	-	BOOL	R	BINARY 0 to 1	Active alarm for analog input #1	
409019,00	Alarm – Analog Input #2	-	BOOL	R	BINARY 0 to 1	Active alarm for analog input #2	
409020,00	Alarm – Analog Input #3	-	BOOL	R	BINARY 0 to 1	Active alarm for analog input #3	
409021,00	Alarm – Analog Input #4	-	BOOL	R	BINARY 0 to 1	Active alarm for analog input #4	
409022,00	Alarm – Analog Input #5	-	BOOL	R	BINARY 0 to 1	Active alarm for analog input #5	
409023,00	Alarm – Analog Input #6	-	BOOL	R	BINARY 0 to 1	Active alarm for analog input #6	
409024,00	Alarm – Analog Input #7	-	BOOL	R	BINARY 0 to 1	Active alarm for analog input #7	
409025,00	Alarm – Analog Input #8	-	BOOL	R	BINARY 0 to 1	Active alarm for analog input #8	
409026,00	Alarm – Analog Input #9	-	BOOL	R	BINARY 0 to 1	Active alarm for analog input #9	
409027,00	Alarm – Analog Input #10	-	BOOL	R	BINARY 0 to 1	Active alarm for analog input #10	
409028,00	Alarm – Analog Input #11	-	BOOL	R	BINARY 0 to 1	Active alarm for analog input #11	
409029,00	Alarm – Analog Input #12	-	BOOL	R	BINARY 0 to 1	Active alarm for analog input #12	
409030,00	Alarm – ebm Fan #1 Offline	-	BOOL	R	BINARY 0 to 1	This is the communication link between the Evapco controller and the fan motor only. (Single Stack Units) 0 = Normal 1 = Fan is offline	
409031,00	Alarm – ebm Fan #2 Offline	-	BOOL	R	Typ. BOOL	Typ. Alarm - ebm Fan #1 Offline	
409032,00	Alarm – ebm Fan #3 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	
409033,00	Alarm – ebm Fan #4 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	

Register	Name	Units	Type	Access	Range	Description	Adiabatic Application
409034,00	Alarm – ebm Fan #5 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	
409035,00	Alarm – ebm Fan #6 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	
409036,00	Alarm – ebm Fan #7 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	
409037,00	Alarm – ebm Fan #8 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	
409038,00	Alarm – ebm Fan #9 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	
409039,00	Alarm – ebm Fan #10 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	
409040,00	Alarm – ebm Fan #12 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	
409041,00	Alarm – ebm Fan #12 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	
409042,00	Alarm – ebm Fan #13 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	
409043,00	Alarm – ebm Fan #14 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	
409044,00	Alarm – ebm Fan #15 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	
409045,00	Alarm – ebm Fan #16 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	
409046,00	Alarm – ebm Fan #17 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	
409047,00	Alarm – ebm Fan #18 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	
409048,00	Alarm – ebm Fan #19 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	
409049,00	Alarm – ebm Fan #20 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - ebm Fan #1 Offline	
409050	ebm Fan #1 Motor Status	-	INT	R	0 to 15	Motor status of ebm motors. (Single Stack Units) 0 = Phase Failure Alarm 2 = Output Stage Overheating Alarm 3 = Internal Communication Alarm 5 = Motor Overheating Alarm 6 = Hall Sensor Error 7 = Motor Blocked 8 = Speed Limit Exceeded 10 = Rotor Position Sensor Calibration Error 12 = DC-Link Undervoltage Alarm	
409051	ebm Fan #2 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	

Register	Name	Units	Type	Access	Range	Description	Adiabatic Application
409052	ebm Fan #3 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409053	ebm Fan #4 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409054	ebm Fan #5 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409055	ebm Fan #6 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409056	ebm Fan #7 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409057	ebm Fan #8 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409058	ebm Fan #9 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409059	ebm Fan #10 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409060	ebm Fan #11 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409061	ebm Fan #12 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409062	ebm Fan #13 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409063	ebm Fan #14 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409064	ebm Fan #15 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409065	ebm Fan #16 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409066	ebm Fan #17 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409067	ebm Fan #18 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409068	ebm Fan #19 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409069	ebm Fan #20 Motor Status	-	INT	R	0 to 15	Typ. Ebm Fan #1 Motor Status	
409070	ebm Fan #1 Warning Status	-	INT	R	0 to 15	Warning status of ebm motors. (Single Stack Units) 0 = Current Limitation Engaged 1 = Line Impedance High Warning 2 = Power Limitation Engaged 3 = Output Stage Temperature High Warning 4 = Motor Temperature High Warning 5 = Electronics Temperature High Warning 6 = DC-Link Voltage Low Warning 7 = Brake Operation 9 = Speed Under Limit 10 = Cable Break Warning 12 = DC-Link Voltage High Warning 14 = Line Voltage High Warning 15 = Shedding Active	
409071	ebm Fan #2 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	

Register	Name	Units	Type	Access	Range	Description	Adiabatic Application
409072	ebm Fan #3 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409073	ebm Fan #4 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409074	ebm Fan #5 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409075	ebm Fan #6 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409076	ebm Fan #7 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409077	ebm Fan #8 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409078	ebm Fan #9 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409079	ebm Fan #10 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409080	ebm Fan #11 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409081	ebm Fan #12 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409082	ebm Fan #13 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409083	ebm Fan #14 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409084	ebm Fan #15 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409085	ebm Fan #16 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409086	ebm Fan #17 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409087	ebm Fan #18 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409088	ebm Fan #19 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409089	ebm Fan #20 Warning Status	-	INT	R	0 to 15	Typ. ebm Fan #1 Warning Status	
409090,00	ebm Fan #1 Alarm Present	-	BOOL	R	BINARY 0 to 1	Active alarm for ebm Fan #1 (Single Stack Units) 0 = Normal 1 = Alarm Present	
409091,00	ebm Fan #2 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409092,00	ebm Fan #3 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409093,00	ebm Fan #4 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409094,00	ebm Fan #5 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409095,00	ebm Fan #6 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409096,00	ebm Fan #7 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409097,00	ebm Fan #8 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	

Register	Name	Units	Type	Access	Range	Description	Adiabatic Application
409098,00	ebm Fan #9 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409099,00	ebm Fan #10 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409100,00	ebm Fan #11 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409101,00	ebm Fan #12 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409102,00	ebm Fan #13 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409103,00	ebm Fan #14 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409104,00	ebm Fan #15 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409105,00	ebm Fan #16 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409106,00	ebm Fan #17 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409107,00	ebm Fan #18 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409108,00	ebm Fan #19 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409109,00	ebm Fan #20 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. ebm Fan #1 Alarm Present	
409110,00	Alarm – EFlow Fan #1 Offline	-	BOOL	R	BINARY 0 to 1	This is the communication link between the Evapco controller and the fan motor only. (Double Stack Units) 0 = Normal 1 = Fan is offline	
409111,00	Alarm – EFlow Fan #2 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - EFlow Fan #1 Offline	
409112,00	Alarm – EFlow Fan #3 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - EFlow Fan #1 Offline	
409113,00	Alarm – EFlow Fan #4 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - EFlow Fan #1 Offline	
409114,00	Alarm – EFlow Fan #5 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - EFlow Fan #1 Offline	
409115,00	Alarm – EFlow Fan #6 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - EFlow Fan #1 Offline	
409116,00	Alarm – EFlow Fan #7 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - EFlow Fan #1 Offline	
409117,00	Alarm – EFlow Fan #8 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - EFlow Fan #1 Offline	
409118,00	Alarm – EFlow Fan #9 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - EFlow Fan #1 Offline	

Register	Name	Units	Type	Access	Range	Description	Adiabatic Application
409119,00	Alarm – EFlow Fan #10 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - EFlow Fan #1 Offline	
409120,00	Alarm – EFlow Fan #11 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - EFlow Fan #1 Offline	
409121,00	Alarm – EFlow Fan #12 Offline	-	BOOL	R	BINARY 0 to 1	Typ. Alarm - EFlow Fan #1 Offline	
409122	EFlow Fan #1 Motor Status	-	UDINT	R	0 to 31	Motor status of EFlow motors. (Double Stack Units) 1 = Low Line Voltage Alarm 2 = High Line Voltage Alarm 3 = High Current Motor Short Alarm 4 = High Temperature Warning 5 = Input Phase Error 6 = Rotor Blocked Alarm 7 = Current Limit Warning 8 = Voltage Limit Warning 9 = Rotor Direction Alarm 10 = EEPROM Error 11 = Internal Stop Alarm 12 = Earth Fault Alarm 13 = Brake Chopper Fault 14 = Motor Phase Error 15 = Internal Communication Error 16 = Voltage Ripple Warning 20 = Motor Controller in Bootloader Alarm 25 = Windmilling Warning 27 = IO Configuration Mismatch	
409124	EFlow Fan #2 Motor Status	-	UDINT	R	0 to 31	Typ. EFlow Fan #1 Motor Status	
409126	EFlow Fan #3 Motor Status	-	UDINT	R	0 to 31	Typ. EFlow Fan #1 Motor Status	
409128	EFlow Fan #4 Motor Status	-	UDINT	R	0 to 31	Typ. EFlow Fan #1 Motor Status	
409130	EFlow Fan #5 Motor Status	-	UDINT	R	0 to 31	Typ. EFlow Fan #1 Motor Status	
409132	EFlow Fan #6 Motor Status	-	UDINT	R	0 to 31	Typ. EFlow Fan #1 Motor Status	
409134	EFlow Fan #7 Motor Status	-	UDINT	R	0 to 31	Typ. EFlow Fan #1 Motor Status	
409136	EFlow Fan #8 Motor Status	-	UDINT	R	0 to 31	Typ. EFlow Fan #1 Motor Status	
409138	EFlow Fan #9 Motor Status	-	UDINT	R	0 to 31	Typ. EFlow Fan #1 Motor Status	
409140	EFlow Fan #10 Motor Status	-	UDINT	R	0 to 31	Typ. EFlow Fan #1 Motor Status	
409142	EFlow Fan #11 Motor Status	-	UDINT	R	0 to 31	Typ. EFlow Fan #1 Motor Status	
409144	EFlow Fan #12 Motor Status	-	UDINT	R	0 to 31	Typ. EFlow Fan #1 Motor Status	

Register	Name	Units	Type	Access	Range	Description	Adiabatic Application
409146,00	EFlow Fan #1 Alarm Present	-	BOOL	R	BINARY 0 to 1	Active alarm for EFlow Fan #1 (Double Stack Units) 0 = Normal 1 = Alarm Present	
409147,00	EFlow Fan #2 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. EFlow Fan #1 Alarm Present	
409148,00	EFlow Fan #3 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. EFlow Fan #1 Alarm Present	
409149,00	EFlow Fan #4 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. EFlow Fan #1 Alarm Present	
409150,00	EFlow Fan #5 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. EFlow Fan #1 Alarm Present	
409151,00	EFlow Fan #6 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. EFlow Fan #1 Alarm Present	
409152,00	EFlow Fan #7 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. EFlow Fan #1 Alarm Present	
409153,00	EFlow Fan #8 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. EFlow Fan #1 Alarm Present	
409154,00	EFlow Fan #9 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. EFlow Fan #1 Alarm Present	
409155,00	EFlow Fan #10 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. EFlow Fan #1 Alarm Present	
409156,00	EFlow Fan #11 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. EFlow Fan #1 Alarm Present	
409157,00	EFlow Fan #12 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. EFlow Fan #1 Alarm Present	
409158	Remote Fan Speed Reference Communication	0%	INT	RW	0 to 1000	With remote fan speed enabled and the source set to Communications, the fan(s) will operate based on the value passed to this register. The register is x10, 1000 equal to 100.0%	
409159	Remote Fan Speed Analog Input	0%	REAL	R	0.0 to 100.0	The reference speed for the fan(s) based on the analog input.	

BACNET Communication Points

In the tables below, the adiabatic application column indicates addresses that only apply to units with adiabatic controls e.g., variable BINARY_VALUE:8 can be referenced to determine whether the adiabatic system has been enabled for the unit. The data points, indicated with the check mark, can be ignored if the unit is not equipped with the adiabatic water valves.

The column of the table titled Non-Volatile Memory indicates a data point for equipment parameters that are retained, in the event of a power cycling of the PLC.

The non-volatile memory is specified for a life cycle of 100,000 writes (minimum).

Using the non-volatile memory for a cyclic write operation may result in quickly exceeding its life cycle limits resulting in an inoperative memory.

NOTICE

Do not use non-volatile memory registers for cyclic write operations.

Failure to follow these instructions can result in equipment damage.

Object Identifier	Object Name	Units	Access	Range	Description	Non-Volatile Memory	Adiabatic Application
BINARY_VALUE:0	bnEnableUnit	-	RW	0 to 1	Enables the unit if it is configured to be enabled via BMS. 0 = Unit not enabled 1 = Unit enabled		
BINARY_VALUE: 1	bnRemoteDigital	-	R	0 to 1	The state of the remote digital input. 0 = No voltage present 1 = Voltage present		
BINARY_VALUE:2	bnProcessAlarm	-	R	0 to 1	Fault for either the outlet temperature sensor or the inlet pressure depending on the application. 0 = Normal 1 = Process sensor is not detected		
BINARY_VALUE:3	bnValveStatus1	-	R	0 to 1	The state of the first adiabatic precooling valve. 0 = Valve off (water not flowing) 1 = Valve on (water flowing)		✓
BINARY_VALUE:4	bnValveStatus2	-	R	0 to 1	The state of the second adiabatic precooling valve. 0 = Valve off (water not flowing) 1 = Valve on (water flowing)		✓
BINARY_VALUE:5	bnValveStatus3	-	R	0 to 1	The state of the third adiabatic precooling valve. 0 = Valve off (water not flowing) 1 = Valve on (water flowing)		✓
BINARY_VALUE:6	bnValveStatus4	-	R	0 to 1	The state of the fourth adiabatic precooling valve. 0 = Valve off (water not flowing) 1 = Valve on (water flowing)		✓
BINARY_VALUE:7	bnManualFlush	-	RW	0 to 1	Manually starts the precooling flushing cycle. 0 = Not active 1 = Start manual flush	✓	✓
BINARY_VALUE:8	bnReleasePrecool	-	RW	0 to 1	0 = Precooling system will not function 1 = Precooling system will function when needed	✓	✓

Object Identifier	Object Name	Units	Access	Range	Description	Non-Volatile Memory	Adiabatic Application
BINARY_VALUE:9	bnEnableCommonAlarm	-	RW	0 to 1	Enables the common alarm for the digital output. 0 = Common alarm not enabled 1 = Common alarm enabled	✓	
BINARY_VALUE:10	bnCommonAlarmStatus	-	R	0 to 1	Status of the alarm digital output. 0 = No alarm/not active 1 = Alarm/active		
BINARY_VALUE:11	bnForceFullSpeed	-	RW	0 to 1	0 = Not enabled 1 = Forces fans to run at 100 percent fan speed	✓	
BINARY_VALUE:12	bnEnableStageOntime	-	RW	0 to 1	0 = Not active 1 = Valve must remain on for the minimum run time	✓	✓
BINARY_VALUE:13	bnAlarmPresent_EBM_01	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:14	bnAlarmPresent_EBM_02	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:15	bnAlarmPresent_EBM_03	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:16	bnAlarmPresent_EBM_04	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:17	bnAlarmPresent_EBM_05	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:18	bnAlarmPresent_EBM_06	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:19	bnAlarmPresent_EBM_07	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:20	bnAlarmPresent_EBM_08	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:21	bnAlarmPresent_EBM_09	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:22	bnAlarmPresent_EBM_10	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:23	bnAlarmPresent_EBM_11	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:24	bnAlarmPresent_EBM_12	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:25	bnAlarmPresent_EBM_13	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:26	bnAlarmPresent_EBM_14	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:27	bnAlarmPresent_EBM_15	-	R	0 to 1	0 = Normal 1 = Alarm present		

Object Identifier	Object Name	Units	Access	Range	Description	Non-Volatile Memory	Adiabatic Application
BINARY_VALUE:28	bnAlarmPresent_EBM_16	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:29	bnAlarmPresent_EBM_17	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:30	bnAlarmPresent_EBM_18	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:31	bnAlarmPresent_EBM_19	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:32	bnAlarmPresent_EBM_20	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:33	bnOnline_EBM_01	-	R	0 to 1	This is the communication link between the Evapco controller and the fan motor only. (Single Stage Units) 0 = Fan not online 1 = Fan is online		
BINARY_VALUE:34	bnOnline_EBM_02	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:35	bnOnline_EBM_03	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:36	bnOnline_EBM_04	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:37	bnOnline_EBM_05	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:38	bnOnline_EBM_06	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:39	bnOnline_EBM_07	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:40	bnOnline_EBM_08	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:41	bnOnline_EBM_09	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:42	bnOnline_EBM_10	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:43	bnOnline_EBM_11	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:44	bnOnline_EBM_12	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:45	bnOnline_EBM_13	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:46	bnOnline_EBM_14	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:47	bnOnline_EBM_15	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:48	bnOnline_EBM_16	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:49	bnOnline_EBM_17	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:50	bnOnline_EBM_18	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:51	bnOnline_EBM_19	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:52	bnOnline_EBM_20	-	R	0 to 1	Typ. bnOnline_EBM_01		
BINARY_VALUE:53	bnAlarmPresent_EF_01	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:54	bnAlarmPresent_EF_02	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:55	bnAlarmPresent_EF_03	-	R	0 to 1	0 = Normal 1 = Alarm present		

Object Identifier	Object Name	Units	Access	Range	Description	Non-Volatile Memory	Adiabatic Application
BINARY_VALUE:56	bnAlarmPresent_EF_04	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:57	bnAlarmPresent_EF_05	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:58	bnAlarmPresent_EF_06	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:59	bnAlarmPresent_EF_07	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:60	bnAlarmPresent_EF_08	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:61	bnAlarmPresent_EF_09	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:62	bnAlarmPresent_EF_10	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:63	bnAlarmPresent_EF_11	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:64	bnAlarmPresent_EF_12	-	R	0 to 1	0 = Normal 1 = Alarm present		
BINARY_VALUE:65	bnOnline_EF_01	-	R	0 to 1	This is the communication link between the Evapco controller and the fan motor only. 0 = Fan not online 1 = Fan is online		
BINARY_VALUE:66	bnOnline_EF_02	-	R	0 to 1	Typ. bnOnline_EF_01		
BINARY_VALUE:67	bnOnline_EF_03	-	R	0 to 1	Typ. bnOnline_EF_01		
BINARY_VALUE:68	bnOnline_EF_04	-	R	0 to 1	Typ. bnOnline_EF_01		
BINARY_VALUE:69	bnOnline_EF_05	-	R	0 to 1	Typ. bnOnline_EF_01		
BINARY_VALUE:70	bnOnline_EF_06	-	R	0 to 1	Typ. bnOnline_EF_01		
BINARY_VALUE:71	bnOnline_EF_07	-	R	0 to 1	Typ. bnOnline_EF_01		
BINARY_VALUE:72	bnOnline_EF_08	-	R	0 to 1	Typ. bnOnline_EF_01		
BINARY_VALUE:73	bnOnline_EF_09	-	R	0 to 1	Typ. bnOnline_EF_01		
BINARY_VALUE:74	bnOnline_EF_10	-	R	0 to 1	Typ. bnOnline_EF_01		
BINARY_VALUE:75	bnOnline_EF_11	-	R	0 to 1	Typ. bnOnline_EF_01		
BINARY_VALUE:76	bnOnline_EF_12	-	R	0 to 1	Typ. bnOnline_EF_01		
BINARY_VALUE:77	bnRemoteEnable	-	RW	0 o 1	0 = Not enabled 1 = Fan speed is controlled either by analog input or communication.		
ANALOG_VALUE:0	bnOutletTemp	Deg.	R	-9999.0 to 9999.0	The outlet temperature of the process fluid. For condenser applications, the process temperature is a saturated calculation based on the condensing pressure.		

Object Identifier	Object Name	Units	Access	Range	Description	Non-Volatile Memory	Adiabatic Application
ANALOG_VALUE:1	bnAmbientTemp	Deg.	R	-999.9 to 999.9	The temperature detected by the ambient temperature sensor.		
ANALOG_VALUE:2	bnActiveSetpoint	Deg.	R	-999.9 to 999.9	The active set point that the eco-Air unit will maintain.		
ANALOG_VALUE:3	bnSetpointTemp	Deg.	RW	-999.9 to 999.9	The primary process temperature setpoint used when all other alternate setpoints are not active.	✓	
ANALOG_VALUE:4	bnSetpoint2TempTrig	Deg.	RW	-100.0 to 200.0	The setpoint that when the ambient temperature falls below, will switch the control to setpoint 2. (Feature must be enabled in the service setpoints section).	✓	
ANALOG_VALUE:5	bnTempRegulationBand	Deg.	RW	0.0 to 30.0	The temperature band between the minimum and maximum fan speed for P fan speed control.	✓	
ANALOG_VALUE:6	bnSetpoint2TempTrigDiff	Deg.	RW	0.0 to 20.0	The temperature differential added to the ambient temperature setpoint 2 trigger. This will switch the control setpoint back to setpoint 1.	✓	
ANALOG_VALUE:7	bnPrecoolMinTemp	Deg.	RW	-9,999.0 to 9,999.0	The minimum ambient temperature at which the precooling system may operate.	✓	✓
ANALOG_VALUE:8	bnPrecoolMinTempDiff	Deg.	RW	0.0 to 20.0	The ambient temperature offset added to the minimum allowable temperature, at which the precooling system becomes activate.	✓	✓
ANALOG_VALUE:9	bnProportionalGain	Units	RW	0.0 to 10.0	The proportional gain constant used for the PID controller.	✓	
ANALOG_VALUE:10	bnSwitchTemp1	Deg.	R	-999.9 to 999.9	The minimum temperature, above which the precooling stage 1 has permission to operate.	✓	✓
ANALOG_VALUE:11	bnSwitchTemp2	Deg.	R	-999.9 to 999.9	The minimum temperature, above which the precooling stage 2 has permission to operate.	✓	✓
ANALOG_VALUE:12	bnSwitchTemp3	Deg.	R	-999.9 to 999.9	The minimum temperature, above which the precooling stage 3 has permission to operate.	✓	✓
ANALOG_VALUE:13	bnSwitchTemp4	Deg.	R	-999.9 to 999.9	The minimum temperature, above which the precooling stage 4 has permission to operate.	✓	✓
ANALOG_VALUE:14	bnFlushFanSpeed	%	RW	0 to 100	The desired fan speed while performing a flushing cycle.	✓	✓

Object Identifier	Object Name	Units	Access	Range	Description	Non-Volatile Memory	Adiabatic Application
ANALOG_VALUE:15	bnSetpoint2Temp	Deg.	RW	-999.9 to 999.9	An alternate process temperature set point that may be activated via the scheduler, ambient temperature, or digital input.	✓	
ANALOG_VALUE:16	bnUnitState	-	R	0 to 13	The current state of the EVAPCO Controller. 1 = Unit on and operational 2= Unit is off by an alarm 4 = Unit is off via BMS, Modbus/BACnet 6 = Unit is off via the digital input 7 = Unit is switched off locally 8 = Manual mode enabled for fan speed control		
ANALOG_VALUE:17	bnMinFanSpeed	%	RW	0 to 100	The minimum allowable fan speed.	✓	
ANALOG_VALUE:18	bnMaxFanSpeed	%	RW	0 to 100	The maximum allowable fan speed.	✓	
ANALOG_VALUE:19	bnEnergySaveFanSpeed	%	RW	0 to 100	The fan speed, above which the precooling system will activate.	✓	
ANALOG_VALUE:20	bnQuietMaxFanSpeed	%	RW	0 to 100	The maximum allowable fan speed in quiet operation.	✓	
ANALOG_VALUE:21	bnPID_Integral	Sec.	RW	0 to 999	PID integral term.	✓	
ANALOG_VALUE:22	bnPID_Derivative	Sec.	RW	0 to 999	PID derivative term.	✓	
ANALOG_VALUE:23	bnNumWetStages	Units	R	0 to 4	The number of stages that have been enabled for the adiabatic system. The number of stages is equal to the number of solenoid valves on the unit.	✓	✓
ANALOG_VALUE:24	bnPrecoolStage1_Increase	Sec.	RW	0 to 32,767	The number of seconds that must pass with the process temperature above set point before the stage activates.	✓	✓
ANALOG_VALUE:25	bnPrecoolStage1_Decrease	Sec.	RW	0 to 32,767	The number of seconds that must pass with the process temperature below set point before the stage deactivates.	✓	✓

Register	Name	Units	Type	Access	Range	Description	Adiabatic Application
409157,00	EFlow Fan #12 Alarm Present	-	BOOL	R	BINARY 0 to 1	Typ. EFlow Fan #1 Alarm Present	
409158	Remote Fan Speed Reference Communication	0%	INT	RW	0 to 1000	With remote fan speed enabled and the source set to Communications, the fan(s) will operate based on the value passed to this register. The register is x10, 1000 equal to 100.0%	
409159	Remote Fan Speed Analog Input	0%	REAL	R	0.0 to 100.0	The reference speed for the fan(s) based on the analog input.	

BACNET Communication Points

In the tables below, the adiabatic application column indicates addresses that only apply to units with adiabatic controls e.g., variable BINARY_VALUE:8 can be referenced to determine whether the adiabatic system has been enabled for the unit. The data points, indicated with the check mark, can be ignored if the unit is not equipped with the adiabatic water valves.

The column of the table titled Non-Volatile Memory indicates a data point for equipment parameters that are retained, in the event of a power cycling of the PLC.

The non-volatile memory is specified for a life cycle of 100,000 writes (minimum).

Using the non-volatile memory for a cyclic write operation may result in quickly exceeding its life cycle limits resulting in an inoperative memory.

NOTICE

Do not use non-volatile memory registers for cyclic write operations.

Failure to follow these instructions can result in equipment damage.

Object Identifier	Object Name	Units	Access	Range	Description	Non-Volatile Memory	Adiabatic Application
BINARY_VALUE:0	bnEnableUnit	-	RW	0 to 1	Enables the unit if it is configured to be enabled via BMS. 0 = Unit not enabled 1 = Unit enabled		
BINARY_VALUE: 1	bnRemoteDigital	-	R	0 to 1	The state of the remote digital input. 0 = No voltage present 1 = Voltage present		

Object Identifier	Object Name	Units	Access	Range	Description	Non-Volatile Memory	Adiabatic Application
ANALOG_VALUE:26	bnRefrigerant	-	RW	1 to 28	For condenser applications 1=R22, 2=R134a, 3=R404A, 4=R407C, 5=R410A, 6=R407A, 7=R407F, 8=R290, 9=R507A, 10=R717 (NH3), 11=R723, 12=R1234ze, 13=R744 (CO2), 14=R448A, 15=R427A, 16=R450A (N13), 17=R513A, 18=R449A, 19=R1234yf, 20=R454B, 21=R454C, 22=R455A, 23=434A, 24=R422A, 25=R32, 26=R452B, 27=R452A, 28=Custom	✓	
ANALOG_VALUE:27	bnPrecoolStage1_MinOn	Sec.	RW	0 to 32,767	The minimum amount of time the precooling stage remains active before being allowed to turn off.	✓	✓
ANALOG_VALUE:28	bnPrecoolStage2_MinOn	Sec.	RW	0 to 32,767	The minimum amount of time the precooling stage remains active before being allowed to turn off.	✓	✓
ANALOG_VALUE:29	bnPrecoolStage3_MinOn	Sec.	RW	0 to 32,767	The minimum amount of time the precooling stage remains active before being allowed to turn off.	✓	✓
ANALOG_VALUE:30	bnPrecoolStage4_MinOn	Sec.	RW	0 to 32,767	The minimum amount of time the precooling stage remains active before being allowed to turn off.	✓	✓
ANALOG_VALUE:31	bnFailFanSpeed	%	RW	0 to 100	Percentage of fan speed the fans will operate at after fail-safe mode is activated.	✓	
ANALOG_VALUE:32	bnInletPressure	Press.	R	-32767 to 32767	Inlet pressure reading via pressure sensor input.		
ANALOG_VALUE:33	bnRefFanSpeed	%	R	0 to 100	The desired fan speed determined by the controller.		
ANALOG_VALUE:34	bnFlushingTime	Min.	RW	0 to 9,999	The number of minutes to perform the flushing routine once initiated.	✓	✓
ANALOG_VALUE:35	bnFlushTimeAcc	Sec.	R	0 to 2^{32}	The number of seconds the flushing routine has been active.		✓
ANALOG_VALUE:36	bnDryingTime	Min.	RW	0 to 9,999	The number of minutes to dry the pre-cooling pads after a flushing routine.	✓	✓
ANALOG_VALUE:37	bnDryTimeAcc	Sec.	R	0 to 2^{32}	The number of seconds the drying routine has been active		✓
ANALOG_VALUE:38	bnFan_Hours	Hours	R	0 to 2^{32}	The number of hours the fans have been operational.	✓	
ANALOG_VALUE:39	bnPrecoolStage1_Hours	Hours	R	0 to 2^{32}	The number of hours the first valve has been operational.	✓	✓
ANALOG_VALUE:40	bnPrecoolStage2_Hours	Hours	R	0 to 2^{32}	The number of hours the second valve has been operational.	✓	✓
ANALOG_VALUE:41	bnPrecoolStage3_Hours	Hours	R	0 to 2^{32}	The number of hours the third valve has been operational.	✓	✓

Object Identifier	Object Name	Units	Access	Range	Description	Non-Volatile Memory	Adiabatic Application
ANALOG_VALUE:42	bnPrecoolStage4_Hours	Hours	R	0 to 2^{32}	The number of hours the fourth valve has been operational.	✓	✓
ANALOG_VALUE:43	bnPrecool24_Increase	Sec.	RW	0 to 32,767	The number of seconds that must pass with the process temperature above setpoint before the stages activate.	✓	✓
ANALOG_VALUE:44	bnPrecool24_Decrease	Sec.	RW	0 to 32,767	The number of seconds that must pass with the process temperature below setpoint before the stages deactivate.	✓	✓
ANALOG_VALUE:45	bnPrecool24_DecreaseAcc	Sec.	R	0 to 2^{32}	The number of seconds with the process temperature below setpoint while the stages are active.		✓
ANALOG_VALUE:46	bnPrecool1_DecreaseAcc	Sec.	R	0 to 2^{32}	The number of seconds with the process temperature below setpoint while the stage is active.		✓
ANALOG_VALUE:47	bnPrecool24_IncreaseAcc	Sec.	R	0 to 2^{32}	The number of seconds with the process temperature above the setpoint while the stages are not active.		✓
ANALOG_VALUE:48	bnPrecool1_IncreaseAcc	Sec.	R	0 to 2^{32}	The number of seconds with the process temperature above the setpoint while the stage is not active.		✓
ANALOG_VALUE:49	bnWarnBits_EBM_01	-	R	0 to 15	Warning status of ebm motors. (Single Stack Units) 0 = Current Limitation Engaged 1 = Line Impedance High Warning 2 = Power Limitation Engaged 3 = Output Stage Temperature High Warning 4 = Motor Temperature High Warning 5 = Electronics Temperature High Warning 6 = DC-Link Voltage Low Warning 7 = Brake Operation 9 = Speed Under Limit 10 = Cable Break Warning 12 = DC-Link Voltage High Warning 14 = Line Voltage High Warning 15 = Shedding Active		
ANALOG_VALUE:50	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		

Object Identifier	Object Name	Units	Access	Range	Description	Non-Volatile Memory	Adiabatic Application
ANALOG_VALUE:51	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:52	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:53	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:54	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:55	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:56	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:57	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:58	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:59	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:60	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:61	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:62	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:63	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:64	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:65	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:66	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:67	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:68	bnWarnBits_EBM_01	-	R	0 to 15	Typ. bnWarnBits_ EBM_01		
ANALOG_VALUE:69	bnAlarmBits_EBM_01	-	R	0 to 15	Motor status of ebm motors. (Single Stack Units) 0 = Phase Failure Alarm 2 = Output Stage Overheating Alarm 3 = Internal Communication Alarm 5 = Motor Overheating Alarm 6 = Hall Sensor Error 7 = Motor Blocked 8 = Speed Limit Exceeded 10 = Rotor Position Sensor Calibration Error 12 = DC-Link Undervoltage Alarm		
ANALOG_VALUE:70	bnAlarmBits_EBM_02	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		
ANALOG_VALUE:71	bnAlarmBits_EBM_03	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		

Object Identifier	Object Name	Units	Access	Range	Description	Non-Volatile Memory	Adiabatic Application
ANALOG_VALUE:72	bnAlarmBits_EBM_04	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		
ANALOG_VALUE:73	bnAlarmBits_EBM_05	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		
ANALOG_VALUE:74	bnAlarmBits_EBM_06	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		
ANALOG_VALUE:75	bnAlarmBits_EBM_07	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		
ANALOG_VALUE:76	bnAlarmBits_EBM_08	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		
ANALOG_VALUE:77	bnAlarmBits_EBM_09	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		
ANALOG_VALUE:78	bnAlarmBits_EBM_10	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		
ANALOG_VALUE:79	bnAlarmBits_EBM_11	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		
ANALOG_VALUE:80	bnAlarmBits_EBM_12	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		
ANALOG_VALUE:81	bnAlarmBits_EBM_13	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		
ANALOG_VALUE:82	bnAlarmBits_EBM_14	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		
ANALOG_VALUE:83	bnAlarmBits_EBM_15	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		
ANALOG_VALUE:84	bnAlarmBits_EBM_16	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		
ANALOG_VALUE:85	bnAlarmBits_EBM_17	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		
ANALOG_VALUE:86	bnAlarmBits_EBM_18	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		
ANALOG_VALUE:87	bnAlarmBits_EBM_19	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		
ANALOG_VALUE:88	bnAlarmBits_EBM_20	-	R	0 to 15	Typ. bnAlarmBits_ EBM_01		

Object Identifier	Object Name	Units	Access	Range	Description	Non-Volatile Memory	Adiabatic Application
ANALOG_VALUE:89	bnStatusBits_EF_01	-	R	0 to 31	Motor status of EFlow motors. (Double Stack Units) 1 = Low Line Voltage Alarm 2 = High Line Voltage Alarm 3 = High Current Motor Short Alarm 4 = High Temperature Warning 5 = Input Phase Error 6 = Rotor Blocked Alarm 7 = Current Limit Warning 8 = Voltage Limit Warning 9 = Rotor Direction Alarm 10 = EEPROM Error 11 = Internal Stop Alarm 12 = Earth Fault Alarm 13 = Brake Chopper Fault 14 = Motor Phase Error 15 = Internal Communication Error 16 = Voltage Ripple Warning 20 = Motor Controller in Bootloader Alarm 25 = Windmilling Warning 27 = IO Configuration Mismatch		
ANALOG_VALUE:90	bnStatusBits_EF_02	-	R	0 to 31	Typ. bnStatusBits_EF_01		
ANALOG_VALUE:91	bnStatusBits_EF_03	-	R	0 to 31	Typ. bnStatusBits_EF_01		
ANALOG_VALUE:92	bnStatusBits_EF_04	-	R	0 to 31	Typ. bnStatusBits_EF_01		
ANALOG_VALUE:93	bnStatusBits_EF_05	-	R	0 to 31	Typ. bnStatusBits_EF_01		
ANALOG_VALUE:94	bnStatusBits_EF_06	-	R	0 to 31	Typ. bnStatusBits_EF_01		
ANALOG_VALUE:95	bnStatusBits_EF_07	-	R	0 to 31	Typ. bnStatusBits_EF_01		
ANALOG_VALUE:96	bnStatusBits_EF_08	-	R	0 to 31	Typ. bnStatusBits_EF_01		
ANALOG_VALUE:97	bnStatusBits_EF_09	-	R	0 to 31	Typ. bnStatusBits_EF_01		
ANALOG_VALUE:98	bnStatusBits_EF_10	-	R	0 to 31	Typ. bnStatusBits_EF_01		
ANALOG_VALUE:99	bnStatusBits_EF_11	-	R	0 to 31	Typ. bnStatusBits_EF_01		
ANALOG_VALUE:100	bnStatusBits_EF_12	-	R	0 to 31	Typ. bnStatusBits_EF_01		
ANALOG_VALUE:101	bnRemoteSource	-	RW	1 to 2	Source of the reference fan speed: 1 = Analog Input 2 = Communication see ANALOG_VALUE:105		

Object Identifier	Object Name	Units	Access	Range	Description	Non-Volatile Memory	Adiabatic Application
ANALOG_ VALUE:102	bnRemoteAmbTrig	Deg.	RW	-100.0 to 200.0	When the source is set to Analog Input, the ambient trigger will determine whether the fan speed resorts to the high default speed or low default speed.		
ANALOG_ VALUE:103	bnRemoteHighFanSpeed	%	RW	0 to 100	The fan(s) will operate at the high default fan speed with a loss of the analog input and the ambient temperature is greater than the trigger setpoint.		
ANALOG_ VALUE:104	bnRemoteLowFanSpeed	%	RW	0 to 100	The fan(s) will operate at the low default fan speed with a loss of the analog input and the ambient temperature is less than the trigger setpoint.		
ANALOG_ VALUE:105	bnRemoteFanSpeed	%	RW	0 to 1000	With remote fan speed enabled and the source set to Communications, the fan(s) will operate based on the value set to this object.		
ANALOG_ VALUE:106	bnFanSpeedAI	%	R	-999.9 to 999.9	The reference speed for the fan(s) based on the analog input.		

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