



neptronic®

EVCB44N Series

Modbus Communication Module User Guide



EVCB44NIT0S (0 TRIACS / pressure independent)
EVCB44NDT0S (0 TRIACS / pressure dependent)



Introduction

The EVCB44N Series Modbus Communication Module User Guide provides information for using Neptronic[®] communication feature. The controller uses Modbus communication protocol over serial line in the RTU mode and provides a Modbus network interface between client devices and Neptronic EVCB44N Series devices.

The EVCB44N Series Modbus Guide assumes that you are familiar with Modbus terminology.

The following are the requirements for Modbus:

- **Data Model.** The EVCB Modbus server data model uses only the Holding Registers table.
- **Function Codes.** The EVCB Modbus server supports a limited function codes subset comprising:
 - Read Holding Registers (0x03)
 - Write Single Register (0x06)
 - Write Multiple Registers (0x10)
- **Exception Responses.** The EVCB Modbus server supports the following exception codes:
 - Illegal data address
 - Illegal data value
 - Slave device busy
- **Serial Line.** The EVCB Modbus over serial line uses RTU transmission mode over a two-wire configuration RS485 (EIA/TIA-485 standard) physical layer.
 - The physical layer can use fixed baud rate selection or automatic baud rate detection (default) as per the **Modbus Auto Baud Rate** device menu item or holding register index 1.
 - The supported baud rates are 9600, 19200, 38400, and 57600.
 - The physical layer also supports variable parity control and stop bit configuration as per the **Modbus Comport Config** device menu item or holding register index 2.
 - In auto baud rate configuration, if the device detects only consecutive bad frames (2 or more) for one second with any given baud rate, it will reinitialize itself to the next baud rate.
- **Addressing.** The EVCB device only answers at the following address:
 - The device's unique address (1 to 246) that can be set through the device menu or through holding register index 0.

Holding Registers Table

Table Glossary

Name	Description	Name	Description
W	Writable Register	ASCII	For registers containing ASCII (8-bit) characters
RO	Read Only Register	MSB	Most Significant Byte
Unsigned	For range of values from 0 to 65,535, unless otherwise specified	LSB	Least Significant Byte
Signed	For range of values from -32,768 to 32,767, unless otherwise specified	MSW	Most Significant Word
Bit String	For registers with multiple values using bit mask (example, flags)	LSW	Least Significant Word

Holding Register Table

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
0	40001	Modbus Address and Product Type.	Unsigned	MSB = Product type (e.g. 111 for EVCB44) LSB = Modbus Address (e.g. 1-246)	W
1	40002	MSTP Baud Rate.	Unsigned <i>Scale 100</i>	0, 9600, 19200, 38400, or 57600 0 = Auto Baud Rate Detection <i>Value/100 (e.g. 38400 baud = 384)</i>	W
2	40003	Modbus Slave Communication Port Configuration.	Unsigned	1= No parity, 2 Stop bits 2= Even parity, 1 stop bit 3= Odd parity, 1 stop bit	W
3	40004	Product Name (characters 8 & 7).	ASCII	1 to 65,535 char 8: 0x53 = S char 7: 0x00 =	W
4	40005	Product Name (characters 6 & 5).	ASCII	1 to 65,535 char 6: 0x49 = I char 5: 0x34 = 4	W
5	40006	Product Name (characters 4 & 3).	ASCII	1 to 65,535 char 4: 0x42 = B char 3: 0x4E = N	W
6	40007	Product Name (characters 2 & 1).	ASCII	1 to 65,535 char 2: 0x45 = E char 1: 0x56 = V	W
7	40008	Product actual firmware version.	Unsigned	1 to 65,535 (e.g. 410)	RO

Protocol Address	Convention Notation	Description	Data Type	Range	Writable	
8	40009	Product actual EEPROM version.	Unsigned	1 to 65535 (e.g. 203)	RO	
9	40010	System Status 1.	Bit String	B0 – B11: Reserved B12: CO2 alarm <i>0 = Normal; 1 = Alarm</i> B13: Pressure mode (actual status) <i>0 = Independent; 1 = Dependent</i> B14: Air Flow <i>0 = Normal; 1 = Error</i>	RO	
10	40011	System Status 2.	Bit String	[B0-B11, B13-B14]: Reserved B12: Alarm override <i>0 = Normal; 1 = Alarm</i>	RO	
11	40012	Internal Temperature reading from digital room sensor.	Unsigned <i>Scale 100</i>	0 to 5000 <i>Value x 100 (e.g. 23°C = 2300)</i>	RO	
12	40013	External Temperature reading from AI1. See reg 40108.	Signed <i>Scale 100</i>	-4000 to 10000 <i>Value x 100 (e.g. 18°C = 1800)</i>	RO	
13	40014	Change Over Temperature reading from AI1. See reg 40108.	Signed <i>Scale 100</i>	-4000 to 10000 <i>Value x 100 (e.g. 18°C = 1800)</i>	RO	
14	40015	Optional relative humidity reading from digital room sensor on designated models. If not available, the value will be fixed to 0x7FFF (32767)	Unsigned <i>Scale 10</i>	0 to 1000 <i>Value x 10 (e.g. 45%RH = 450)</i>	RO	
15	40016	Integrated pressure sensor reading on EVCB44N models.	Unsigned <i>Scale 10</i>	0 to 2500 <i>Value x 10 (e.g. 10 Pa = 100)</i>	RO	
16	40017	Analog input 1 value.	Unsigned <i>Scale 100</i>	0 to 1000 <i>Value x 100 (e.g. 2 V = 200)</i>	RO	
17	40018	<i>Reserved address space</i>				
18	40019	CO2 reading in ppm, either from digital room sensor on designated models or reading from AI1 as per reg 40159 “System Options 3” bit 3 “CO2 Control Source” value.	Unsigned <i>Scale 100</i>	100 to reg 40099 <i>Value x 100 (e.g. 5 ppm = 500)</i>	RO	

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
19	40020	Air supply temperature reading from AI1. See reg 40108.	Signed Scale 100	-4000 to 10000 Value x 100 (e.g. 5°C = 500)	RO
20	40021	Control temperature.	Signed Scale 100	-4000 to 10000 Value x 100 (e.g. 25°C = 2500)	W
21	40022	Heating demand for heating ramp 1.	Unsigned Scale 10	0 to 1000 Value x 10 (e.g. 25% = 250)	RO
22	40023	Cooling demand for cooling ramp 1.	Unsigned Scale 10	0 to 1000 Value x 10 (e.g. 25% = 250)	RO
23	40024	Temperature offset applied on internal temperature.	Signed Scale 100	-500 to 500 Value x 100 (e.g. 0.5°C = 50)	W
24	40025	Temperature offset applied on external temperature.	Signed Scale 100	-500 to 500 Value x 100 (e.g. 0.5°C = 50)	W
25	40026	Temperature setpoint used during the occupancy period of the day.	Unsigned Scale 10	Range: 40027 to 40028 Value x 10 (e.g. 20°C = 200)	W
26	40027	Minimum temperature setpoint used during the day.	Unsigned Scale 10	Range: 100 to 40028 Value x 10 (e.g. 10°C = 100)	W
27	40028	Maximum temperature setpoint used during the day.	Unsigned Scale 10	Range: 40027 to 400 Value x 10 (e.g. 40°C = 400)	W
28	40029	Cooling setpoint during No Occupancy / Night Set Back	Unsigned Scale 10	Range: 40030 to 400 Value x 10 (e.g. 22°C = 220)	W
29	40030	Heating setpoint during No Occupancy / Night Set Back	Unsigned Scale 10	Range: 100 to 40029 Value x 10 (e.g. 16°C = 160)	W
30	40031	Cooling demand for proportional band 1.	Unsigned Scale 10	5 to 50 Value x 10 (e.g. 0.3°C = 3)	W
31	40032	Heating demand for proportional band 1.	Unsigned Scale 10	5 to 50 Value x 10 (e.g. 0.3°C = 3)	W
32	40033	Cooling dead band for proportional band 1.	Unsigned Scale 10	0 to 50 Value x 10 (e.g. 0.3°C = 3)	W

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
33	40034	Heating dead band for proportional band 1.	Unsigned Scale 10	0 to 50 Value x 10 (e.g. 0.3°C = 3)	W
34	40035	Changeover temperature setpoint.	Unsigned Scale 10	100 to 400 Value x 10 (e.g. 12°C = 120)	W
35	40036	Night setback override delay in minutes.	Unsigned	0 to 180 minutes	W
36	40037	Integral time factor for heating in seconds.	Unsigned	0 to 250 seconds	W
37 to 38	40038 to 40039	<i>Reserved address space</i>			
39	40040	Occupancy Delay Mode in minutes.	Unsigned	0 to 180 minutes	W
40	40041	Cooling demand for cooling ramp 2.	Unsigned Scale 10	0 to 1000% Value x 10 (e.g. 30% = 300)	RO
41	40042	Proportional band for cooling ramp 2.	Unsigned Scale 10	5 to 50 Value x 10 (e.g. 0.2°C = 2)	W
42	40043	Dead band for cooling ramp 2.	Unsigned Scale 10	0 to 50 Value x 10 (e.g. 0.2°C = 2)	W
43	40044	Heating demand for heating ramp 2.	Unsigned Scale 10	0 to 1000% Value x 10 (e.g. 30% = 300)	W
44	40045	Proportional band for heating ramp 2.	Unsigned Scale 10	5 to 50 Value x 10 (e.g. 0.2°C = 2)	W
45	40046	Dead band for heating ramp 2.	Unsigned Scale 10	0 to 50 Value x 10 (e.g. 0.2°C = 2)	W
46	40047	Changeover demand for the VAV box.	Unsigned Scale 10	0 to 1000% Value x 10 (e.g. 30% = 300)	RO
47	40048	Changeover proportional band: the range in which the controller modulates the cooling and heating output from 0 to 100%.	Unsigned Scale 10	5 to 50 Value x 10 (e.g. 0.2°C = 2)	W

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
48	40049	Changeover deadband: the range at which the controller takes no action when the temperature is above or below the setpoint.	Unsigned Scale 10	0 to 50 Value x 10 (e.g. 0.2°C = 2)	W
49	40050	AO1 min Vdc: minimum voltage of analog output 1.	Unsigned Scale 10	Range: 0 to reg. 40052 Value x 10 (e.g. 2 Volts = 20)	W
50	40051	<i>Reserved address space</i>			
51	40052	AO1 max Vdc: maximum voltage of analog output 1.	Unsigned Scale 10	Range: reg. 40050 to 100 Value x 10 (e.g. 10 Volts = 100)	W
52	40053	<i>Reserved address space</i>			
* = The minimum and maximum voltages correspond to 0 to 100% demand. The minimum voltage is always applied to the output. The maximum voltage is applied when the demand reaches 100%. For reheat applications, we recommend leaving the minimum voltage at 0Vdc to avoid heating when the demand is 0%.					
53	40054	Time of numerical filter of delta pressure in seconds.	Unsigned	1 to 10 seconds	W
54	40055	Factor of $V=K*\sqrt{dP}$, where $dP = 1$. Only available on pressure independent model EVCB44NIT0S.	Unsigned	Range: 100 to 9995 CFM	W
55	40056	Minimum air flow for cooling. Only available on pressure independent model EVCB44NIT0S.	Unsigned	Range: 0 or (12.7%) Kfac to reg 40057 CFM	W
56	40057	Maximum air flow for cooling. Only available on pressure independent model EVCB44NIT0S.	Unsigned	Range: reg 40056 to reg 40055 CFM	W
57	40058	Minimum air flow for heating. Only available on pressure independent model EVCB44NIT0S.	Unsigned	Range: 0 or (12.7%) Kfac to reg 40059 CFM	W
58	40059	Maximum air flow for heating. Only available on pressure independent model EVCB44NIT0S.	Unsigned	Range: reg 40058 to reg 40055 CFM	W
59	40060	Integral time factor of air flow in minutes. Only available on pressure independent model EVCB44NIT0S.	Unsigned	0 to 60 minutes	W
60	40061	Actual air flow converted from delta pressure sensor. Only available on pressure independent model EVCB44NIT0S.	Unsigned	Range: 0 to reg 40055 CFM	RO
61	40062	Air flow calculated from system demand. Only available on pressure independent model EVCB44NIT0S.	Unsigned	Range: 0 to 9999 CFM	RO

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
62	40063	Configuration value for Air Flow Max used during airflow balancing sequence. Refer to EVCB-Airflow Balance Instructions. Only available on pressure independent model EVCB44NIT0S.	Unsigned	Range: 0 to 9999 CFM	W
63	40064	Analog output 1 value.	Unsigned Scale 10	Unit: Volt, Range: reg 40050 to reg 40052 Value x 10 (e.g. 5 Volts = 50)	W
64 to 72	40065 to 40073	<i>Reserved address space</i>			
73	40074	Integral time factor for cooling in seconds.	Unsigned	0 to 250 seconds	W
74	40075	Motor position.	Unsigned	0 to 100%	RO
75 to 80	40076 to 40081	<i>Reserved address space</i>			
81	40082	Air flow offset calibration. Refer to EVCB-Airflow Balance Instructions. Only available on pressure independent model EVCB44NIT0S.	Signed	500 to 500 CFM	W
82 to 83	40083 to 40084	<i>Reserved address space</i>			
84	40085	Configuration value for Air Flow Min used during airflow balancing sequence. Refer to EVCB-Airflow Balance Instructions. Only available on pressure independent model EVCB44NIT0S.	Unsigned	Range: 0 to 9999 CFM	W
85 to 95	40086 to 40096	<i>Reserved address space</i>			
96	40097	Network fallback timeout Present Value in minutes.	Unsigned	0 to 60 minutes	W
97	40098	<i>Reserved address space</i>			
98	40099	Maximum range of the CO2 sensor connected to AI1.	Unsigned	100 to 5000 PPM	W
99	40100	Maximum concentration of CO2 before the EVC activates an alarm.	Unsigned	Range: 100 to the greater ppm value between 2000 and reg 40099.	W

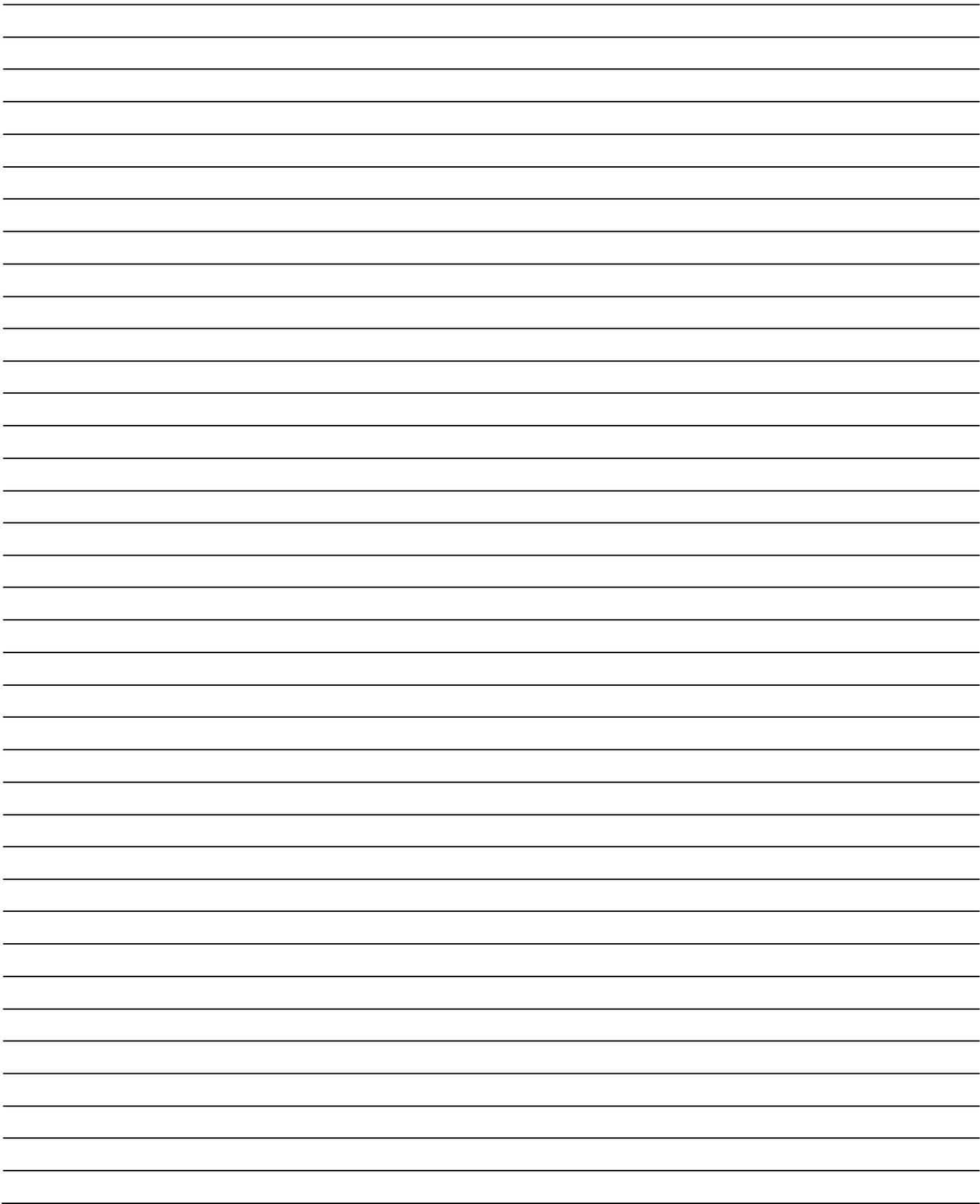
Protocol Address	Convention Notation	Description	Data Type	Range	Writable	
100	40101	System Option 1.	Bit String	B3-B6, B13-B14: Reserved B0: Tstat temperature units 0 = Celsius; 1 = Fahrenheit B1: Modbus temperature units 0 = Celsius; 1 = Fahrenheit B2: Temperature setpoint lock 0 = Unlocked; 1 = Locked B7: Freeze protection 0 = Disabled; 1 = Enabled B8: User system off mode 0 = User can set Tstat to OFF 1 = User cannot set Tstat OFF B9: Keypad bottom left lock 0 = Unlocked; 1 = Locked B10: Keypad upper left lock 0 = Unlocked; 1 = Locked B11: Keypad arrows lock 0 = Unlocked; 1 = Locked B12: Program lock 0 = Unlocked; 1 = Locked B15: Schedule 0 = Disabled; 1 = Enabled	W	
101	40102	System Option 2. B15: Configuration value of the fan operation when an output ramp is configured with the option "Fan On". When set to (0) On, the fan is continuously in operation even when EVC is off. When set to (1) Off, the fan turns off during the following conditions: <ul style="list-style-type: none"> User System Mode is set to OFF, when in night setback mode, scheduler forces the EVC OFF ^Φ Only available on pressure independent model EVCB44NIT0S.	Bit String	B0-B1, B5-B9, B13-B14: Reserved B2: Auto baud rate detection 0 = Enabled; 1 = Disabled B3: Night setback mode 0 = Tstat ON; 1 = Tstat OFF B4: AO1 direction 0 = Direct; 1 = Reverse B10: Display RH^Φ 0 = No; 1 = Yes B11: Pressure mode select^Φ 0 = independent; 1 = dependent B12: Auto pressure mode^Φ change 0 = Enabled; 1 = Disabled B15: Fan always "on" mode 0 = Always on; 1 = Follow NSB/NoOcc	W	
102	40103	Status value of the actual changeover control mode.	Unsigned	0 = Cooling 1 = Heating	RO	
103	40104	System command status.	Unsigned	0 = No Command 1 = AirFlow 1 Balancing 4 = AirFlow 2 Balancing	W	
104	40105	<i>Reserved address space</i>				
105	40106	Occupancy or night setback mode commands.	Unsigned	1 = Reserved 2 = Off 3 = Occupancy 4 = NoOccupancy 5 = Day 6 = Night	W	

Protocol Address	Convention Notation	Description	Data Type	Range	Writable	
106	40107	<i>Reserved address space</i>				
107	40108	Analog input 1 signal. * STFL is available only on pressure independent model EVCB44NIT0S.	Unsigned	1 = OFF 2 = ETS (external temp) 3 = SENS (changeover sensor) 4 = NoCL (normally cool) 5 = NoHT (normally heat) 6 = STFL* (setpnt airflow 0-10Vdc) 7 = CO2 (carbon dioxide) 8 = AST (air supply temp sensor) 9 = mor (motor position) 10 = EXT50K (external 50KΩ sensor) 11 = TSTAT temp sensor (thermostat temperature sensor) 12 = TSTAT Setpoint(thermostat setpoint 0-10Vdc) 13 = TSTAT Setpoint 2-10V (thermostat setpoint 2-10Vdc)	W	
108	40109	User System Control Mode.	Unsigned	1 = AUTO 2 = HEAT 3 = COOL 4 = OFF	W	
109	40110	Sets the permissions or restrictions to change the system control mode by the user.	Unsigned	1 = AUTO 2 = HEAT 3 = COOL 4 = COOL-HEAT 5 = AUTO-LOCK	W	
110	40111	Indicates the status of the Night Setback mode.	Unsigned	1 = Day 2 = Night 3 = Derogation	RO	
111 to 112	40112 to 40113	<i>Reserved address space</i>				
113	40114	Occupancy status of the zone.	Unsigned	1 = No Occupancy 2 = Occupancy 3 = Derogation	RO	
114	40115	AO1: Analog output 1 control ramp For pressure independent model EVCB44NIT0S, the default value is Hr1. *STFL is available only on pressure independent model EVCB44NIT0S.	Unsigned	1 = OFF 2 = CR1 (cooling ramp 1) 3 = CR2 (cooling ramp 2) 4 = HR1 (heating ramp 1) 5 = HR2 (heating ramp 2) 6 = ArFL (airflow reading) 7 = CO2 (carbon dioxide) 8 = STFL* (setpnt airflow 0-10Vdc) 9 – 11 = reserved 12 = Fan Auto (follow demand) 13 = Fan On (always on)	W	
115 to 124	40116 to 40125	<i>Reserved address space</i>				

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
125	40126	Motor ramp: Configuration of the ramp used to modulate the actuator based on demand. *STFL is available only on pressure independent model EVCB44NIT0S.	Unsigned	1 = reserved 2 = CR1 (cooling ramp 1) 3 = CR2 (cooling ramp 2) 4 = HR1 (heating ramp 1) 5 = HR2 (heating ramp 2) 6 – 7 = reserved 8 = STFL* (setpnt airflow 0-10Vdc) 9 = COR (changeover ramp) 10 = CH1 (cool/heat 1) 11 = ANLG (analog 0-10Vdc) 12 – 13 = reserved	W
126	40127	Changeover control mode status that indicates the source of changeover values.	Unsigned	1 = Local 2 = Cooling 3 = Heating	W
127 to 129	40128 to 40130	<i>Reserved address space</i>			
130	40131	Selected temperature control source (in Programming mode).	Unsigned	1 = Internal Temperature 2 = External Temperature 3 = Remote Temperature 4 = Average Temperature 5 = Maximum Temperature	W
131	40132	Airflow balance mode enter the balancing mode to adjust air flow factor.	Unsigned	1 = Close 2 = Minimum Flow 3 = Maximum Flow 4 = Full Open	W
132	40133	<i>Reserved address space</i>			
133	40134	Configuration to set the motor position in night setback mode.	Unsigned	1 = Auto 2 = Open	W
134	40135	<i>Reserved address space</i>			
135	40136	Floating time 2: Time in seconds required by the actuator to complete a 90° run.	Unsigned	15 to 250 seconds	W
136	40137	Minimum motor position in percentage of stroke for cooling.	Unsigned	0 to 100%	W
137	40138	Minimum motor position in percentage of stroke for heating.	Unsigned	0 to 100%	W
138	40139	Airflow Hysteresis Stop in percentage.	Unsigned	1 to 100%	W
139	40140	Airflow Hysteresis Start in percentage.	Unsigned	reg 40139 to 100%	W
140	40141	Airflow scale.	Unsigned	1 = Scale1 2 = Scale10 3 = Scale100	W
141	40142	Airflow fault deadband in percentage	Unsigned	1 to 30%	W

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
142	40143	Airflow fault error in percentage	Unsigned	0 to 100%	W
143	40144	Airflow fault hysteresis in percentage.	Unsigned	1 to 30%	W
144	40145	Airflow fault time.	Unsigned	2 to 59 minutes	W
145	40146	CL_HT SwitchTimer, waiting time before switching between the heating and cooling modes.	Unsigned	0 to 120 minutes	W
146	40147	CL_HT SwitchTimerCount, countdown to indicate the swap between heating and cooling modes.	Unsigned	0 to 4,294,967,295 seconds	RO
147 to 152	40148 to 40153	<i>Reserved address space</i>			
153	40154	Overheat status.	Unsigned	1 = OverHeatNormal 2 = OverHeat1 3 = OverHeat2 4 = OverHeatAll	RO
154	40155	Configuration to override the motor position.	Unsigned	1 = Auto 2 = Open 3 = Close 4 = AirFlowCoolMin 5 = AirFlowCoolMax	W
155	40156	Information displayed on the TRL/TDU.	Unsigned	1 = Temp Demand 2 = Setpoint Demand 3 = Temp 4 = Setpoint 5 = Off	W
156	40157	<i>Reserved address space</i>			
157	40158	<i>Reserved address space</i>			
158	40159	System Options 3	Bit String	B0-B1, B4-B6, B8, B11-B15: Reserved B2: CO₂ Display 0 = No; 1 = Yes B3: CO₂ Control Source 0 = Analog; 1 = TRLG B7: Occupancy Control Source 0 = Reserved; 1 = Intern Sensor B9: Motor Position Control Temperature Fault 0 = Close; 1 = Open B10: CO₂ Control Mode 0 = Open; 1 = Control ramp	W

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
159	40160	System Options 4	Bit String	B0 – B15: Reserved	RO
160	40161	Internal CO2 reading from digital room sensor. If not available, the value will be fixed to 0x7FFF (32767)	Unsigned	0 to 2000 ppm	RO
161	40162	<i>Reserved address space</i>			
162	40163	Internal VOC sensor reading in ppb from the digital room sensor.	Unsigned	1 to 60000 ppb	RO
163	40164	Internal PIR sensor reading from the digital room sensor.	Unsigned	0 = NoOccupancy 1 = Occupancy	RO
164	40165	Occupancy minimum time in minutes.	Unsigned	0 to 240 minutes	W
165	40166	Configuration value of the minimum position in cooling/heating mode in %.	Unsigned	0 to 100 %	W
166	40167	Control SetPoint.	Unsigned Scale 1	10 to 40 Value x 1 (e.g. 30°C = 30)	RO
167	40168	CO2 ramp proportional band	Unsigned Scale 1	50 to 250 ppm Value x 1 (e.g. 50ppm = 50)	W
168	40169	CO2 ramp dead band	Unsigned Scale 1	10 to 50 ppm Value x 1 (e.g. 50ppm = 50)	W
169	40170	Temperature sensor combination	Unsigned	1 = TSTAT+AI1 2 = TSTAT 3 = TSTAT+AI1 4 = AI1	W
170	40171	Average temperature	Signed Scale 100	-4000 to 10000 Value x 100 (e.g. 5°C = 500)	RO
171	40172	Maximum temperature	Signed Scale 100	-4000 to 10000 Value x 100 (e.g. 5°C = 500)	RO
172	40173	<i>Reserved address space</i>			





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