



**neptronic®**

# **EVCBM Dual Duct**

## **Modbus Communication Module User Guide**



## Introduction

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The EVCBM Dual Duct Modbus Communication Module User Guide provides information for using Neptronic<sup>®</sup> 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 EVCBM Dual Duct devices.

The EVCBM Dual Duct Modbus Guide assumes that you are familiar with Modbus terminology.

The following are the requirements for Modbus:

- *Data Model.* The EVCBM Modbus server data model uses only the Holding Registers table.
- *Function Codes.* The EVCBM Modbus server supports a limited function codes subset comprising:
  - Read Holding Registers (0x03)
  - Write Single Register (0x06)
  - Write Multiple Registers (0x10)
- *Exception Responses.* The EVCBM Modbus server supports the following exception codes:
  - Illegal data address
  - Illegal data value
  - Slave device busy
- *Serial Line.* The EVCBM 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 EVCBM 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	Values from 0 to 65,535, unless otherwise specified	LSB	Least Significant Byte
Signed	Values from -32,768 to 32,767, unless otherwise specified	MSW	Most Significant Word
Bit String	Registers with multiple values using bit mask (example, flags)	LSW	Least Significant Word

## Holding Register Table

Register Index	Description	Data Type	Range	Writable
40000	Modbus Address and Product Type.	Unsigned	MSB = Product type (e.g. 111 for EVCB) LSB = Modbus Address (e.g. 1-246)	W
40001	MSTP Baud Rate.	Unsigned Scale 100	0, 9600, 19200, 38400, or 57600 0 = Auto Baud Rate Detection Value/100 (e.g. 38400 baud = 384)	W
40002	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
40003	Product Name (characters 8 & 7).	ASCII	1 to 65,535 char8: 0x53 = S char7: 0x00 =	W
40004	Product Name (characters 6 & 5).	ASCII	1 to 65535 char6: 0x49 = I char5: 0x34 = 4	W
40005	Product Name (characters 4 & 3).	ASCII	1 to 65535 char4: 0x42 = B char3: 0x4E = N	W
40006	Product Name (characters 2 & 1).	ASCII	1 to 65535 char2: 0x45 = E char1: 0x56 = V	W
40007	Product actual firmware version.	Unsigned	1 to 65535 (e.g. 409)	RO
40008	Product actual EEPROM version.	Unsigned	1 to 65535 (e.g. 203)	RO
40009	System Status 1.	Bit String	[B0-B11, B13-B14]: Reserved <b>B12: CO2 alarm</b> 0 = Normal; 1 = Alarm	RO
40010	System Status 2.	Bit String	[B0-B11, B13-B14]: Reserved <b>B12: Alarm override</b> 0 = Normal; 1 = Alarm	RO
40011	Internal Temperature.	Unsigned Scale 100	0 to 5000 Value x 100 (e.g. 23°C = 2300)	RO
40012	External Temperature.	Signed Scale 100	-4000 to 10000 Value x 100 (e.g. 18°C = 1800)	RO
40013 - Reserved				



Register Index	Description	Data Type	Range	Writable
40014	Internal Humidity Internal humidity, reading of the integrated humidity sensor of TRLH or TRLGH. If not available the value will be fixed to 0x7FFF (32767)	Signed Scale 10	0 to 1000 Value x 10 (e.g. 45%RH = 450)	RO
40015	Input 3 reading, pressure sensor value	Unsigned	0 to 4000 mV	RO
40016	Pressure input 2 value.	Unsigned	Slave: 0 to 4000 mV	RO
40017	Analog Input 2 value.	Unsigned Scale 100	Slave: 0 to 1000 Value x 100 (e.g. 3 mV = 300)	RO
40018	CO2 value in ppm If using TRLG or TRLG and CO2 is in TRL mode, it is the sensor value in ppm. If using AI1 or AI2 and CO2 is set in Analog mode, the reading is from the external sensor.	Unsigned Scale 100	100 to reg 40098 Value x 100 (e.g. 5 ppm = 500)	RO
40019	Air supply temperature.	Signed Scale 100	-4000 to 10000 Value x 100 (e.g. 5°C = 500)	RO
40020	Control temperature.	Signed Scale 100	-4000 to 10000 Value x 100 (e.g. 25°C = 2500)	W
40021	Heating demand for heating ramp 1.	Unsigned Scale 10	0 to 1000 Value x 10 (e.g. 25% = 250)	RO
40022	Cooling demand for cooling ramp 1.	Unsigned Scale 10	0 to 1000 Value x 10 (e.g. 25% = 250)	RO
40023	Temperature offset applied on internal temperature.	Signed Scale 100	-500 to 500 Value x 100 (e.g. 0.5°C = 50)	W
40024	Temperature offset applied on external temperature.	Signed Scale 100	-500 to 500 Value x 100 (e.g. 0.5°C = 50)	W
40025	Temperature setpoint used during the occupancy period of the day.	Unsigned Scale 10	Range: 40026 to 40027 Value x 10 (e.g. 20°C = 200)	W
40026	Minimum temperature setpoint used during the day.	Unsigned Scale 10	Range: 100 to 40027 Value x 10 (e.g. 10°C = 100)	W
40027	Maximum temperature setpoint used during the day.	Unsigned Scale 10	Range: 40026 to 400 Value x 10 (e.g. 40°C = 400)	W
40028	Cooling setpoint during No Occupancy / Night Set Back	Unsigned Scale 10	Range: 40029 to 400 Value x 10 (e.g. 22°C = 220)	W
40029	Heating setpoint during No Occupancy / Night Set Back	Unsigned Scale 10	Range: 100 to 40028 Value x 10 (e.g. 16°C = 160)	W
40030	Cooling demand for proportional band 1.	Unsigned Scale 10	5 to 50 Value x 10 (e.g. 0.3°C = 3)	W
40031	Heating demand for proportional band 1.	Unsigned Scale 10	5 to 50 Value x 10 (e.g. 0.3°C = 3)	W
40032	Cooling dead band for proportional band 1.	Unsigned Scale 10	0 to 50 Value x 10 (e.g. 0.3°C = 3)	W
40033	Heating dead band for proportional band 1.	Unsigned Scale 10	0 to 50 Value x 10 (e.g. 0.3°C = 3)	W



Register Index	Description	Data Type	Range	Writable
40034 - Reserved				
40035	Night setback override delay in minutes.	Unsigned	0 to 180 minutes	W
40036	Integral time factor for heating in seconds.	Unsigned	0 to 250 seconds	W
40037	Cooling anti-cycle delay: delay in minutes before activating or reactivating the cooling contact.	Unsigned	0 to 15 minutes	W
40038	Floating time 1: Indicates the time in seconds required by the actuator to complete a 90° run.	Unsigned	15 to 250 seconds	W
40039	Occupancy Delay Mode in minutes	Unsigned	0 to 180 minutes	W
40040	Cooling demand for cooling ramp 2.	Unsigned Scale 10	0 to 1000 % Value x 10 (e.g. 30% = 300)	RO
40041	Proportional band for cooling ramp 2	Unsigned Scale 10	5 to 50 Value x 10 (e.g. 0.2°C = 2)	W
40042	Dead band for cooling ramp 2.	Unsigned Scale 10	0 to 50 Value x 10 (e.g. 0.2°C = 2)	W
40043	Heating demand for heating ramp 2.	Unsigned Scale 10	0 to 1000 % Value x 10 (e.g. 30% = 300)	W
40044	Proportional band for heating ramp 2.	Unsigned Scale 10	5 to 50 Value x 10 (e.g. 0.2°C = 2)	W
40045	Dead band for heating ramp 2.	Unsigned Scale 10	0 to 50 Value x 10 (e.g. 0.2°C = 2)	W
40046 to 40049 - Reserved				
40050	AO2 min Vdc: minimum* voltage of analog output 2.	Unsigned Scale 10	Range: 0 to reg. 40052 Value x 10 (e.g. 2 Volts = 20)	W
40051 – Reserved				
40052	AO2 max Vdc: maximum* voltage of analog output 2.	Unsigned Scale 10	Range: reg. 40050 to 100 Value x 10 (e.g. 10 Volts = 100)	W
* = 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 to leave the minimum voltage at 0Vdc to avoid heating when the demand is 0%.				
40053	Cfg_Pressure1NumFilter	Unsigned	Master: 1 to 10 seconds	W
40054	Cfg_AirFlowKFactor1	Unsigned	Master: Range: 100 to 9995 CFM	W
40055	Minimum air flow for cooling.	Unsigned	Range: 0 or (12.7%) Kfac to reg 40056 CFM	W
40056	Maximum air flow for cooling.	Unsigned	Range: reg 40055 to reg 40054 CFM	W
40057	Minimum air flow for heating.	Unsigned	Range: 0 or (12.7%) Kfac to reg 40058 CFM	W
40058	Maximum air flow for heating.	Unsigned	Range: reg 40057 to reg 40054 CFM	W
40059 - Reserved				
40060	Actual air flow 1 converted from delta pressure sensor.	Unsigned	Master: Range: 0 to reg 40054 CFM	RO
40061	Air flow setpoint 1	Unsigned	Master: Range: 0 to 9999 CFM	RO



Register Index	Description	Data Type	Range	Writable
40062	Configuration value for Air Flow 1 Max used during airflow balancing sequence. Use to do Kfactor calculation. Refer to EVCB-Airflow Balance Instructions.	Unsigned	Master: Range: 0 to 9999 CFM AirFlow Bal Mode (Reg. 131) must be >= 3 (Maximum Flow)	W
40063	Motor 2 position	Unsigned	Slave: 0-100%	W
40064	Analog output 2 value.	Unsigned Scale 10	Unit: Volt, Range: reg 40050 to reg 40052 Value x 10 (e.g. 5 Volts = 50)	W
40065	Percentage of demand to close TRIAC output 1.	Unsigned	15 to 80%	W
40066	Percentage of demand to close TRIAC output 2.	Unsigned	15 to 80%	W
40067 to 40067 - Reserved				
40069	Percentage of demand to open TRIAC output 1.	Unsigned	0 to reg 40065-4%	W
40070	Percentage of demand to open TRIAC output 2.	Unsigned	0 to reg 40065-4%	W
40071 to 40072 - Reserved				
40073	Integral time factor for cooling in seconds.	Unsigned	0 to 250 seconds	W
40074	Motor 1 position.	Unsigned	Master: 0 to 100%	RO
40075 to 40080 - Reserved				
40081	Air flow 1 offset calibration. Refer to EVCB-Airflow Balance Instructions.	Signed	Master: -500 to 500 CFM AirFlow Bal Mode (Reg. 131) must be = 1 (Close)	W
40082 to 40083 – Reserved				
40084	Configuration value for Air Flow 1 Min used during airflow balancing sequence. Refer to EVCB-Airflow Balance Instructions.	Unsigned	Master: Range: 0 to 9999 CFM	W
40085 to 40088 - Reserved				
40089	Cfg_AirFlowKFactor2	Unsigned	Slave: Range: 100 to 9995 CFM	W
40090	Actual air flow 2 converted from delta pressure sensor.	Unsigned	Slave: Range: 0 to reg 40089 CFM	RO
40091	Air flow setpoint 2	Unsigned	Slave: Range: 0 to 9999 CFM	RO
40092	Air flow 2 offset calibration. Refer to EVCB-Airflow Balance Instructions.	Signed	Slave: -500 to 500 CFM AirFlow Bal Mode (Reg. 131) must be = 1 (Close)	W
40093	Configuration value for Air Flow 2 Min used during airflow balancing sequence. Use to do minimum flow factor calculation. Refer to EVCB-Airflow Balance Instructions.	Unsigned	Slave: Range: 0 to 9999 CFM AirFlow Bal Mode (Reg. 131) must be = 2 (Minimum Flow)	W
40094	Configuration value for Air Flow 2 Max used during airflow balancing sequence. Use to do Kfactor calculation. Refer to EVCB-Airflow Balance Instructions.	Unsigned	Slave: Range: 0 to 9999 CFM AirFlow Bal Mode (Reg. 131) must be >= 3 (Maximum Flow)	W
40095	Cfg_Pressure2NumFilter	Unsigned	Slave: 1 to 10 seconds	W



Register Index	Description	Data Type	Range	Writable
40096	Network fallback timeout Present Value in minutes.	Unsigned	0 to 60 minutes	W
40097	Reserved			RO
40098	Maximum range of the CO2 sensor connected to AI1 or AI2.	Unsigned	100 to 5000 PPM	W
40099	Maximum concentration of CO2 before the EVC activates an alarm.	Unsigned	Range: 100 to the greater ppm value between 2000 and reg 40098	W
40100	System Option 1.	Bit String	<p>B3, B5, B13-B14: Reserved</p> <p><b>B0: Tstat temperature units</b> 0 = Celsius 1 = Fahrenheit</p> <p><b>B1: Modbus temperature units</b> 0 = Celsius 1 = Fahrenheit</p> <p><b>B2: Temperature setpoint lock</b> 0 = Unlocked 1 = Locked</p> <p><b>B4: TO1/TO2 floating direction</b> 0 = Direct 1 = Reverse</p> <p><b>B6: Onboard motor 1 direction</b> Master 0 = Direct 1 = Reverse</p> <p><b>B7: Freeze protection</b> 0 = Disabled 1 = Enabled</p> <p><b>B8: User system off mode</b> 0 = User can set Tstat to OFF 1 = User cannot set Tstat OFF</p> <p><b>B9: Keypad bottom left lock</b> 0 = Unlocked 1 = Locked</p> <p><b>B10: Keypad upper left lock</b> 0 = Unlocked 1 = Locked</p> <p><b>B11: Keypad arrows lock</b> 0 = Unlocked 1 = Locked</p> <p><b>B12: Program lock</b> 0 = Unlocked 1 = Locked</p> <p><b>B15: Schedule</b> 0 = Disabled 1 = Enabled</p>	W
40101	System Option 2. Notes B14: Applies only if DI2 is in OverHeat or Override.	Bit String	<p>B0, B8-9, B11-13, B15: Reserved</p> <p><b>B1: Cfg_Pressure 2 Option (slave)</b> 0 = Local 1 = Total</p> <p><b>B2: Auto baud rate detection</b> 0 = Enabled 1 = Disabled</p> <p><b>B3: Night setback mode</b> 0 = Tstat ON 1 = Tstat OFF</p> <p><b>B4: Cfg_Motor 2 direction (slave)</b> 0 = Direct; 1 = Reverse</p> <p><b>B5: AO2 direction</b> 0 = Direct; 1 = Reverse</p> <p><b>B6: TO1 direction</b> 0 = Direct; 1 = Reverse</p> <p><b>B7: TO2 direction</b> 0 = Direct; 1 = Reverse</p> <p><b>B10: Display RH</b> 0 = No; 1 = Yes</p> <p><b>B14: DI 2 Contact</b> 0: NO; 1: NC</p>	W



Register Index	Description	Data Type	Range	Writable
<b>40102 - Reserved</b>				
40103	System command status.	Unsigned	0 = No Command 1 = AirFlow Balancing 1 (0=disabled   1=enabled) 4 = AirFlow Balancing 2 (0=disabled   1=enabled) 64 = Cfg_Press1 Calib (0=no   1=yes) 128 = Cfg_Press2 CalibLock (0=lock   1=unlock)	W
40104	TO OnOff.	Unsigned	1 = TO1 OnOff 2 = TO2 OnOff	RO
40105	Occupancy or night setback mode commands.	Unsigned	1 = Locally 2 = Off 3 = Occupancy 4 = NoOccupancy 5 = Day 6 = Night	W
40106	Status of digital input 1.	Unsigned	0 = Open 1 = Close	RO
<b>40107 - Reserved</b>				
40108	User System Control Mode.	Unsigned	1 = AUTO 2 = HEAT 3 = COOL 4 = OFF	W
40109	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
40110	Indicates the status of the Night Setback mode.	Unsigned	1 = Day 2 = Night 3 = Derogation	RO
40111	Configuration of DI1 mode. Night setback or no occupancy status.	Unsigned	1=Off 2= Occupancy NO 3= Occupancy NC 4= Night Set Back NO 5= Night Set Back NC	W
40112	Cfg_Universal Input AI2 Type	Unsigned	1 = OFF 2 = ETS 3 = CO2 4 = AST	W
40113	Occupancy status of the zone.	Unsigned	1 = No Occupancy 2 = Occupancy 3 = Derogation	RO
<b>40114 - Reserved</b>				
40115	AO2: Analog output 2 control ramp	Unsigned	1 = OFF 2 = CR1 (cool ramp 1) 3 = CR2 (cool ramp 2) 4 = HR1 (heat ramp 1) 5 = HR2 (heat ramp 2) 6 = CO2 7 – 12 = reserved	W
40116	TO1: Configuration of the ramp used to modulate (pulse or floating) or activate/deactivate (On/Off) TO1 based on demand.	Unsigned	1 = OFF 2 = CR1 (cool ramp 1) 3 = CR2 (cool ramp 2) 4 = HR1 (heat ramp 1) 5 = HR2 (heat ramp 2) 6 = CO2 7 – 12 = reserved	W
40117	TO2: Configuration of the ramp used to modulate (pulse or floating) or activate/deactivate (On/Off) TO2 based on demand.	Unsigned	1 = OFF 2 = CR1 (cool ramp 1) 3 = CR2 (cool ramp 2) 4 = HR1 (heat ramp 1) 5 = HR2 (heat ramp 2) 6 = CO2 7 – 12 = reserved	W



Register Index	Description	Data Type	Range	Writable
40118 to 40119 - Reserved				
40120	TO1: Signal output type for TRIAC output 1.	Unsigned	3 = Pulsing 4 = On_Off 5 = Floating	W
40121	TO2: Signal output type for TRIAC output 2.	Unsigned	3 = Pulsing 4 = On_Off	W
40122 to 40124 - Reserved				
40125	Motor ramp: Configuration of the ramp used to modulate the actuator based on demand.	Unsigned	2 = CR1 (cooling ramp 1) 4 = HR1 (heating ramp 1)	W
40128 to 40128 - Reserved				
40129	Configuration of DI2 mode.	Unsigned	1=Off 2=Override 3=OverHeat1 4=OverHeat2 5=OverHeatAll	W
40130	Selected temperature control source (in Programming mode).	Unsigned	1 = Internal Temperature 2 = External Temperature 3 = Remote Temperature	W
40131	Airflow 1 balance mode, enter the balancing mode to adjust air flow factor.	Unsigned	Master: 1 = Close 2 = Minimum Flow 3 = Maximum Flow 4 = Full Open	W
40132	Airflow 2 balance mode, enter the balancing mode to adjust air flow factor.	Unsigned	Slave: 1 = Close 2 = Minimum Flow 3 = Maximum Flow 4 = Full Open	W
40133	Configuration to set the motor position in night setback mode.	Unsigned	1 = Auto 2 = Open	W
40134	Digital input 2 delay in seconds.	Unsigned	0 to 3600 seconds	W
40135 to 40135 - Reserved				
40138	Airflow Hysteresis Stop in percentage.	Unsigned	1 to 100%	W
40139	Airflow Hysteresis Start in percentage.	Unsigned	reg 40138 to 100%	W
40140	Airflow scale.	Unsigned	1 = Scale1, 2 = Scale10, 3 = Scale100	W
40141 to 40144 - Reserved				
40145	CL_HT SwitchTimer, waiting time before switching between the heating and cooling modes.	Unsigned	0 to 120 minutes	W
40146	CL_HT SwitchTimerCount, countdown to indicate the swap between heating and cooling modes.	Unsigned	0 to 4,294,967,295 seconds	RO
40147	FloatingTO1/TO2, TRIAC output 1 or 2 when set to floating, indicates the floating signal demand.	Unsigned <i>Scale 10</i>	0 to 1000% <i>Value x 10 (e.g. 15% =150)</i>	RO
40148 - Reserved				
40149	TO1 Pulsing, TRIAC output 1 when set to Pulsed, indicates the pulse signal demand.	Unsigned <i>Scale 10</i>	0 to 1000% <i>Value x 10 (e.g. 15% =150)</i>	RO



Register Index	Description	Data Type	Range	Writable
40150	TO2 Pulsing, TRIAC output 2 when set to Pulsed, indicates the pulse signal demand.	Unsigned <i>Scale 10</i>	0 to 1000% <i>Value x 10 (e.g. 15% =150)</i>	RO
40151 to 40152 - Reserved				
40153	Over heat status.	Unsigned	1 = OverHeatNormal 2 = OverHeat1 3 = OverHeat2 4 = OverHeatAll	RO
40154	Configuration to override the motor 1 position.	Unsigned	Master: 1 = Auto 2 = Open 3 = Close 4 = AirFlowCoolMin 5 = AirFlowCoolMax	W
40155	Information displayed on the TRL.	Unsigned	1 = Temp Demand 2 = Setpoint Demand 3 = Temp 4 = Setpoint 5 = Off	W
40156	Status of digital input 2.	Unsigned	0 = Open 1 = Close	RO
40157	Cfg_Input3 Minimum Reading, this setting represents the deadband of the pressure sensor in mV.	Unsigned	10 to 180 mV	W
40158	System Options 3	Bit String	[B0 – B1], [B4, B6 – B15]: Reserved  <b>B2: CO<sub>2</sub> Display</b> <i>0 = No; 1 = Yes</i>  <b>B3: CO<sub>2</sub> Control Source</b> <i>0 = Analog; 1 = TRLG</i>  <b>B5: Constant Flow Options</b> <i>0 = No; 1 = Yes</i>	W
40159	System Options 4	Bit String	[B0 – B15]: Reserved	RO
40160	Internal CO <sub>2</sub> , reading of the integrated CO <sub>2</sub> sensor of TRLG or TRLGH. If not available the value will be fixed to 0x7FFF (32767)	Unsigned	Range: 0 to 2000 ppm	RO
40161	Motor 2 Position Override	Unsigned	Slave: 1 = Auto 2 = Open 3 = Close 4 = AirFlowCoolMin 5 = AirFlowCoolMax	W



Register Index	Description	Data Type	Range	Writable
40162	Cfg_MixAirDeadBand	Unsigned	Range: 0 - dB Cool 1 or dB Heat 1 (the lower one)	W
40163	Occupancy minimum time in minutes.	Unsigned	0 to 240 minutes	W

