Universal Wall-Mount Controller

TSUB Series

Modbus Communication Module User Guide

Introduction

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

The TSUB Modbus Guide assumes that you are familiar with Modbus terminology.

The following are the requirements for Modbus:

- *Data Model*. The TSUB Modbus server data model uses only the Holding Registers table.
- *Function Codes*. The TSUB Modbus server supports a limited function codes subset comprising:
    - Read Holding Registers (0x03)
    - Write Single Register (0x06)
    - Write Multiple Registers (0x10)
- *Exception Responses*. The TSUB Modbus server supports the following exception codes:
    - Illegal data address
    - Illegal data value
    - Slave device busy
- *Serial Line*. The TSUB 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 TSUB 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	Address - Neptronic ID and Modbus address of current device.	Unsigned	MSB = 22, LSB = 1-246	W
1	40002	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
2	40003	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	ProdName_87, characters 8-7 of 8 name characters.	ASCII	MSB = 84 (T), LSB = 85 (U)	W
4	40005	ProdName_65, characters 6-5 of 8 name characters.	ASCII	MSB = 67 (C), LSB = 66 (B)	W
5	40006	ProdName_43, characters 4-3 of 8 name characters.	ASCII	MSB = 50 (2), LSB = 52 (4)	W
6	40007	ProdName_21, characters 2-1 of 8 name characters.	ASCII	MSB = 32 (Space), LSB = 0 (Null)	W
7	40008	Controller Product_Version, actual firmware version.	Unsigned	1 to 65535 (e.g. 115)	RO
8	40009	Controller parameters version.	Unsigned	1 to 65535 (e.g. 102)	RO

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
9	400**10**	System Status 1.	Bit String	**[B1, B5, B7 – B15]**: **Reserved** **B0: System operation** *0 = Normal, 1 = Fault* **B2: System override by NSB or OCC** *0 = Normal, 1 = OFF* **B3: ChangeOverMode** *0 = Cooling, 1 = Heating* **B4: AL_FlowSwitch** *0 = No alarm, 1 = Alarm activated* **B6: AL_DirtyFilter** *0 = No alarm, 1 = Alarm activated*	RO
10	400**11**	System Status 2.	Bit String	**[B1, B3-B6, B12-B14]**: **Reserved** **B0: Selector Switch Status** *0 = Remote Mode, 1 = Local Mode* **B2: CO2 Alarm** *0 = Normal, 1 = Alarm* **B7: AL_Override** *0 = Off, 1 = On* **B8: AL_WindowOpened** *0 = Off, 1 = On* **B9: AL_DoorOpened** *0 = Off, 1 = On* **B10: AL_UI1** *0 = Off, 1 = On* **B11: AL_UI2** *0 = Off, 1 = On* **B15: AL_OverHeat** *0 = Off, 1 = On*	RO
11	400**12**	Internal temperature sensor reading.	Signed *Scale 100*	Unit: ºC/ºF, Range: 0ºC to 50ºC or 32ºF to 122ºF *Value x 100 (e.g. 23°C = 2300 or 33ºF = 3300)*	RO
12	400**13**	External temperature sensor reading.	Signed *Scale 100*	Unit: ºC/ºF, Range: -40ºC to 100ºC or -40ºF to 212ºF *Value x 100 (e.g. 23°C = 2300 or 33ºF = 3300)*	RO
13	400**14**	Changeover temperature sensor reading.	Signed *Scale 100*	Unit: ºC/ºF, Range: -40ºC to 100ºC or -40ºF to 212ºF *Value x 100 (e.g. 23°C = 2300 or 33ºF = 3300)*	RO
14	400**15**	Control temperature reading.	Signed *Scale 100*	Unit: ºC/ºF, Range: -40ºC to 100ºC or -40ºF to 212ºF *Value x 100 (e.g. 23°C = 2300 or 33ºF = 3300)*	W
15	400**16**	Internal humidity sensor reading.* Not available on all models.	Unsigned *Scale 10*	Unit: % RH, Range: 10%RH to 90%RH, *Value x 10 (e.g. 30%RH = 300)*	RO
16	400**17**	External humidity sensor reading.	Unsigned *Scale 10*	Unit: % RH, Range: 10%RH to 90%RH, *Value x 10 (e.g. 30%RH = 300)*	RO

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
17	400**18**	Analog input 1 reading.	Signed *Scale 100*	Unit: Volts or ºC/ºF, Range: 0V to 10V, -40 to 100ºC or -40 to 212ºF, 0 (open), 1 (close). *Value x 100 (e.g. 3 V = 300/18°C = 1800 or 33ºF = 3300)*	RO
18	400**19**	Analog input 2 reading.	Signed *Scale 100*	Unit: Volts or ºC/ºF, Range: 0V to 10V, -40 to 100ºC or -40 to 212ºF, 0 (open), 1 (close). *Value x 100 (e.g. 3 V = 300/18°C = 1800 or 33ºF = 3300)*	RO
19	400**20**	*Reserved*			
20	400**21**	*Reserved*			
21	400**22**	External CO2 sensor value in ppm.	Signed *Scale 1*	Unit: ppm, 0 to Register (CO2 range), *Value x 1 (e.g. 500 ppm = 500)*	RO
22	400**23**	*Reserved*			
23	400**24**	CO2 control value in ppm.	Signed *Scale 1*	Unit: ppm, 0 to Register (CO2 range), *Value x 1 (e.g. 500 ppm = 500)*	RO
24	400**25**	Actual system occupancy state.	Unsigned	1 = NoOccupancy, 2 = Occupancy, 3 = Override	RO
25	400**26**	Actual night setback state of the system.	Unsigned	1 = Day, 2 = Night, 3 = Override	RO
26	400**27**	Actual heating demand of ramp 1.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
27	400**28**	Actual heating demand of ramp 2.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
28	400**29**	Actual cooling demand of ramp 1.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
29	400**30**	Actual cooling demand of ramp 2.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
30	400**31**	Actual changeover demand.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
31	400**32**	Actual fan demand.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
32	400**33**	Actual dehumidification demand.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
33	400**34**	Actual humidification demand.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
34	400**35**	Cooling Heating SwitchTimerCount - countdown until the system is able to swap the demand.	Unsigned *Scale 1*	Unit: Seconds, Range: 0 to 7200 seconds, *Value/1 (e.g. 100 secs = 100)*	RO
35	400**36**	*Reserved*			
36	400**37**	Analog output 2 value.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	W

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
37	400**38**	Analog output 3 value.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	W
38	400**39**	*Reserved*			
39	400**40**	Binary output - 6 relays output status.	Bit String	**[B0-B1, B7-B15]**: **Reserved** **B2: Binary Output 3** *0 = Open, 1 = Close* **B3: Binary Output 4** *0 = Open, 1 = Close* **B4: Binary Output 5** *0 = Open, 1 = Close* **B5: Binary Output 6** *0 = Open, 1 = Close* **B6: Binary Output 7** *0 = Open, 1 =Close*	W
40	400**41**	System command.	Bit String	**[B2, B6, B9-B15]**: **Reserved** **B0: Cfg_ServiceDisplayAddress** *0 = Normal, 1 = Display address on LCD* **B1: Cfg_CoolingRampLock** *0 = Off, 1 = On* **B3: Cfg_HeatingRamp1Lock** *0 = Off, 1 = On* **B4: Cfg_HeatingRamp2Lock** *0 = Off, 1 = On* **B5: Cfg_ChangeOverRampLock** *0 = Off, 1 = On* **B7: Cfg_HumidifyRampLock** *0 = Off, 1 = On* **B8: Cfg_DehumidifyRampLock** *0 = Off, 1 = On*	W
41	400**42**	System mode status.	Unsigned	1 = Auto [Register 400**74** allows Auto Mode (1 or 5)] 2 = Heating [Register 400**74** allows Heating Mode (1, 2 or 4)] 3 = EMH [Register 400**41** Bits 2 and 1 = On and Enable (1) and Register 400**74** allows Heating Mode (1, 2 or 4)] 4 = Cooling [Register 400**74** allows Cooling Mode (1, 3 or 4)] 5 = Fan [Register 400**40** Bit 12 = Advanced (1) and Bit 13 = Enable] 6 = Off [Register 400**44** Bit 6 = Enable (0)]	W
42	400**43**	Fan speed selection by user.	Unsigned	1 = Auto, 2 = Low, 3 = Med, 4 = High	W
43	400**44**	Temperature setpoint in occupancy or day mode.	Signed *Scale 10*	Unit: ºC/ºF, Range: min to max setpoint, *Value x 10 (e.g. 18°C = 180)*	W

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
44	400**45**	System option1.	Bit String	**B0: Cfg_TempUnitTstat** *0 = ºC, 1 = ºF* **B1: Cfg_TempUnitModbus** *0 = ºC, 1 = ºF* **B2: Cfg_TempSetPointLock** *0 = Off, 1 = On* **B3: Cfg_HumSetPointLock** *0 = Off, 1 = On* **B4: Cfg_ProgramModeLock** *0 = Off, 1 = On* **B5: AL_FreezeProtection** *0 = Off, 1 = On* **B6: Cfg_UserSysOffModes** *0 = Enable, 1 = Disable* **B7: Cfg_KeyPadBottomLeftLock** *0 = Off, 1 = On* **B8: Cfg_KeyPadUpperLeftLock** *0 = Off, 1 = On* **B9: Cfg_KeyPadArrowsLock** *0 = Off, 1 = On* **B10: Cfg_UserFanAutoMode** *0 = Enable, 1 = Disable* **B11: Cfg_ NightOrNoOccMode** *0 = Setpoint, 1 = OFF* **B12: Cfg_HumControlSource*** *0 = Intern Sensor, 1 = Extern Sensor* Not available on all models. **B13: Time Mode** *0 = 24h, 1 = 12h* **B14: Cfg_WindowOpenedMode** 0 = Setpoint, 1 = OFF **B15: Cfg_DoorOpenedMode** 0 = Setpoint, 1 = OFF	W

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
45	400**46**	System option2.	Bit String	**[B2, B5-B7]**: **Reserved** **B0: Baud Rate** *0 = Auto, 1 = Manual* **B1: Cfg_ActivateSchedule** *0 = Off, 1 = On* **B3: Cfg_AnalogOutput2Direction** *0 = Direct, 1 = Reverse* **B4: Cfg_AnalogOutput3Direction** *0 = Direct, 1 = Reverse* **B8: Cfg_BinaryOutput3Direction** *0 = Direct, 1 = Reverse* **B9: Cfg_BinaryOutput4Direction** *0 = Direct, 1 = Reverse* **B10: Cfg_BinaryOutput5Direction** *0 = Direct, 1 = Reverse* **B11: Cfg_BinaryOutput6Direction** *0 = Direct, 1 = Reverse* **B12: Cfg_BinaryOutput7Direction** *0 = Direct, 1 = Reverse* **B12: Cfg_ FanSpeedOption** *0 = Standard, 1 = Advanced (OE1)* **B13: Cfg_UserSysFanMode** *0 = Disable, 1 = Enable* **B14: Cfg_HideFanDisplay** *0 = No, 1 = Yes*	W
46	400**47**	System option3.	Bit String	**[B1-B5, B8-B9, B10-B12, B14]**: **Reserved** **B0: DAYLIGHT_SAVINGS_STATUS** *0 = Normal, 1 = Summer* **B6: Cfg_AnalogInput1MinVolt** *0 = 0.0 Volt, 1 = 2.0 Volt* **B7: Cfg_AnalogInput2MinVolt** *0 = 0.0 Volt, 1 = 2.0 Volt* **B13: Cfg_FloatingBO3/BO7Direction** *0 = Direct, 1 = Reverse* **B15: Cfg_DeltaTempLogic** *0 = Off, 1 = On*	W

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
47	400**48**	System option4.	Bit String	**[B3-B5, B7, B10-B15]**: **Reserved** **B0: Cfg_CO2ControlSource** *0 = Internal Sensor, 1 = External Sensor* **B1: Cfg_DisplayHumidity** *0 = Display the temperature only, 1 = Display the temperature and humidity* **B2: Cfg_DisplayCO2** *0 = Don't display CO2 control value, 1 = Display CO2 control value* **B6: Cfg_VFDTempSetpointSource** *0 = VFDTempSetpoint, 1 = TempSetpoint* **B8: Cfg_AnalogOutput2OffVoltage** *0 = Off, 1 = Minimum* **B9: Cfg_AnalogOutput3OffVoltage** *0 = Off, 1 = Minimum*	W
48	400**49**	Display information.	Unsigned	1 = Temperature and Demand, 2 = Setpoint and Demand, 3 = Temperature Only, 4 = Setpoint Only, 5 = Off	W
49	400**50**	Temperature control source.	Unsigned	1 = Network Temp, 2 = Intern Temp, 3 = Extern Temp	W
50	400**51**	Network fallback timeout.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 60, *Value/1 (e.g. 30 mins = 30)*	W
51	400**52**	Minimum occupancy/day setpoint.	Signed *Scale 10*	Unit: ºC/ºF, Range: 10ºC to max or 50ºF to max *Value x 10 (e.g. 18°C = 180 or 60ºF = 600)*	W
52	400**53**	Maximum occupancy/day setpoint.	Signed *Scale 10*	Unit: ºC/ºF, Range: min to 40ºC or min to 104ºF *Value x 10 (e.g. 18°C = 180 or 60ºF = 600)*	W
53	400**54**	Cooling temperature setpoint in unoccupied or night mode.	Signed *Scale 10*	Unit: ºC/ºF, Range: 10ºC to 40ºC or 50ºF to 104ºF *Value x 10 (e.g.18°C = 180 or 60ºF = 600)*	W
54	400**55**	Heating temperature setpoint in unoccupied or night mode.	Signed *Scale 10*	Unit: ºC/ºF, Range: 10ºC to 40ºC or 50ºF to 104ºF *Value x 10 (e.g. 18°C = 180 or 60ºF = 600)*	W
55	400**56**	Heating proportional band for ramp 1.	Unsigned *Scale 10*	Unit: ºC/ºF, 0.5ºC to 5ºC or 1ºF to 9ºF *Value x 10 (e.g. 1ºC = 10 or 2ºF = 20)*	W
56	400**57**	Heating proportional band for ramp 2.	Unsigned *Scale 10*	Unit: ºC/ºF, 0.5ºC to 5ºC or 1ºF to 9ºF *Value x 10 (e.g. 1ºC = 10 or 2ºF = 20)*	W

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
57	400**58**	Cooling proportional band for ramp 1.	Unsigned *Scale 10*	Unit: ºC/ºF, 0.5ºC to 5ºC or 1ºF to 9ºF *Value x 10 (e.g. 1ºC = 10 or 2ºF = 20)*	W
58	400**59**	Cooling proportional band for ramp 2.	Unsigned *Scale 10*	Unit: ºC/ºF, 0.5ºC to 5ºC or 1ºF to 9ºF *Value x 10 (e.g. 1ºC = 10 or 2ºF = 20)*	W
59	400**60**	Changeover proportional band.	Unsigned *Scale 10*	Unit: ºC/ºF, 0.5ºC to 5ºC or 1ºF to 9ºF *Value x 10 (e.g. 1ºC = 10 or 2ºF = 20)*	W
60	400**61**	Heating deadband for ramp 1.	Unsigned *Scale 10*	Unit: ºC/ºF, 0ºC to 5ºC or 0ºF to 9ºF *Value x 10 (e.g. 1ºC = 10 or 2ºF = 20)*	W
61	400**62**	Heating deadband for ramp 2.	Unsigned *Scale 10*	Unit: ºC/ºF, 0ºC to 5ºC or 0ºF to 9ºF *Value x 10 (e.g. 1ºC = 10 or 2ºF = 20)*	W
62	400**63**	Cooling deadband for ramp 1.	Unsigned *Scale 10*	Unit: ºC/ºF, 0ºC to 5ºC or 0ºF to 9ºF *Value x 10 (e.g. 1ºC = 10 or 2ºF = 20)*	W
63	400**64**	Cooling deadband for ramp 2.	Unsigned *Scale 10*	Unit: ºC/ºF, 0ºC to 5ºC or 0ºF to 9ºF *Value x 10 (e.g. 1ºC = 10 or 2ºF = 20)*	W
64	400**65**	Changeover deadband.	Unsigned *Scale 10*	Unit: ºC/ºF, 0ºC to 5ºC or 0ºF to 9ºF *Value x 10 (e.g. 1ºC = 10 or 2ºF = 20)*	W
65	400**66**	Changeover setpoint.	Signed *Scale 10*	Unit: ºC/ºF, 10ºC to 40ºC or 50ºF to 104ºF *Value x 10 (e.g. 12ºC = 120 or 60ºF = 600)*	W
66	400**67**	Fan time out in seconds.	Unsigned *Scale 1*	Unit: Seconds, Range: 0 to 255 seconds, *Value x 1 (e.g.100 secs = 100)*	W
67	400**68**	Fan damping factor in seconds.	Unsigned *Scale 1*	Unit: Seconds, Range: 0 to 255 seconds, *Value x 1 (e.g.100 secs = 100)*	W
68	400**69**	Heating integral time factor in seconds.	Unsigned *Scale 1*	Unit: Seconds, Range: 0 to 250 seconds, *Value x 1 (e.g.100 secs = 100)*	W
69	400**70**	Cooling integral time factor in seconds.	Unsigned *Scale 1*	Unit: Seconds, Range: 0 to 250 seconds, *Value x 1 (e.g.100 secs = 100)*	W
70	400**71**	Cooling Heating SwitchTimer - Delay between cool and heat or vice versa.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 120 minutes, *Value x 1 (e.g.100 mins = 100)*	W
71	400**72**	Cooling anticycle delay in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 15 minutes, *Value x 1 (e.g.10 mins = 10)*	W
72	400**73**	NSB override delay in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 180 minutes, *Value x 1 (e.g.100 mins = 100)*	W
73	400**74**	Unoccupied override delay in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 180 minutes, *Value x 1 (e.g.100 mins = 100)*	W

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
74	400**75**	Occupancy minimum time in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 720 minutes, *Value x 1 (e.g.100 mins = 100)*	W
75	400**76**	Unoccupied override delay countdown in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 180 minutes, *Value x 1 (e.g.100 mins = 100)*	W
76	400**77**	Fan mode (speed) in unoccupied or NSB mode.	Unsigned	1 = Low, 2 = Med, 3 = High, 4 = Auto	W
77	400**78**	Fan mode (speed) when window is opened (alarm).	Unsigned	1 = Low, 2 = Med, 3 = High, 4 = Auto	W
78	400**79**	Fan mode (speed) when door is opened (alarm).	Unsigned	1 = Low, 2 = Med, 3 = High, 4 = Auto	W
79	400**80**	System control mode.	Unsigned	1 = Auto, 2 = Heat, 3 = Cool, 4 = Heat or Cool, 5 = Auto Lock	W
80	400**81**	Override System occupancy/NSB mode.	Unsigned	1 = Locally, 2 = OFF, 3 = Occupied, 4 = Unoccupied, 5 = Day, 6 = Night	W
81	400**82**	Internal temperature sensor offset correction.	Signed *Scale 100*	Unit: depends on system unit, Range: ± 5ºC or +/-9ºF *Value x 100 (e.g.2ºC = 200 or 3ºF = 300)*	W
82	400**83**	Universal Input 1 signal.	Unsigned	1 = OFF 2 = Extern sensor 10K 3 = Change over sensor 4 = Change over normally cool 5 = Change over normally heat 6 = Outside air sensor 7 = Extern sensor 0-10V 8 = CO2 sensor 0-10V 9 = Occupancy binary input 10 = NSB binary input 11 = Override binary input 12 = Window binary input 13 = Door binary input 14 = Dirty Filter binary input 15 = Flow switch binary input 16 = OverHeat binary input 17 = Selector switch binary input 18 = Fan Feedback 19 = Humidity sensor 0-10V 20 = Pressure sensor 0-10V 21 = Extern sensor TT-012 22 = Delta T Inlet 10K 23 = Delta T Inlet 0-10V 24 = Delta T Outlet 10K 25 = Delta T Outlet 0-10V	W
83	400**84**	Universal Input 2 signal.	Unsigned	1 = OFF 2 = Extern sensor 10K 3 = Change over sensor 4 = Change over normally cool 5 = Change over normally heat 6 = Outside air sensor 7 = Extern sensor 0-10V 8 = CO2 sensor 0-10V 9 = Occupancy binary input 10 = NSB binary input 11 = Override binary input 12 = Window binary input 13 = Door binary input 14 = Dirty Filter binary input 15 = Flow switch binary input 16 = OverHeat binary input 17 = Selector switch binary input 18 = Fan Feedback 19 = Humidity sensor 0-10V 20 = Pressure sensor 0-10V 21 = Extern sensor TT-012 22 = Delta T Inlet 10K 23 = Delta T Inlet 0-10V 24 = Delta T Outlet 10K 25 = Delta T Outlet 0-10V	W
84	400**85**	*Reserved*			

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
85	400**86**	*Reserved*			
86	400**87**	External temperature sensor offset correction.	Signed *Scale 100*	Unit: depends on system unit, Range: ± 5ºC or +/-9ºF *Value x 100 (e.g.2ºC = 200 or 3ºF = 300)*	W
87	400**88**	Changeover control mode.	Unsigned	1 = Local, 2 = Cool, 3 = Heat	W
88	400**89**	Minimum external temperature reading.	Signed *Scale 10*	Unit: depends on system unit, Range: -40ºC to 0ºC or -40ºF to 32ºF *Value x 10 (e.g.-20°C = -200 or -20°F = 200)*	W
89	400**90**	Maximum external temperature reading.	Signed *Scale 10*	Unit: depends on system unit, Range: 50ºC to 100ºC or 122ºF to 212ºF *Value x 10 (e.g.60°C = 600 or 140°F = 1400)*	W
90	400**91**	Maximum CO2 reading.	Signed *Scale 1*	Unit: PPM, Range: 1000 to 5000, *Value x 1 (e.g.2000 = 2000)*	W
91	400**92**	Alarm level of CO2.	Signed *Scale 1*	Unit: PPM, Range: 1000 to CO2 range, *Value x 1 (e.g.1000 = 1000)*	W
92	400**93**	Fan output signal.	Unsigned	1 = 1 speed, 2 = 2 speeds, 3 = 3 speeds, 4 = Analog	W
93	400**94**	*Reserved*			
94	400**95**	*Reserved*			
95	400**96**	*Reserved*			
96	400**97**	Ramp to control analog output 2.	Unsigned	1 = Off 2 = Changeover with fan 3 = Cooling 1 with fan 4 = Cooling 2 with fan 5 = Heating 1 with fan 6 = Heating 2 with fan 7 = Heating 2 8 = Cooling 1 Heating 1 With Fan 9 = HumidifyWithFan 10 = CO2 alarm 11 = 6 Way Valve 12 = Delta temperature 13 = VFD/ECMTempLoopEnable 14 = VFD Pressure Loop 15 = FAN	W
97	400**98**	Minimum voltage for analog output 2 (volt).	Unsigned *Scale 10*	Unit: Volt, Range: 0V to 10V, *Value x 10 (e.g. 3 V = 30)*	W
98	400**99**	Maximum voltage for analog output 2 (volt).	Unsigned *Scale 10*	Unit: Volt, Range: 0V to 10V, *Value x 10 (e.g. 3 V = 30)*	W
99	40**100**	Ramp to control analog output 3.	Unsigned *Scale 10*	1= Off 2 = Change Over with fan 3 = Cooling 1 with fan 4 = Cooling 2 with fan 5 = Heating 1 with fan 6 = Heating 2 with fan 7 = Heating 2 8 = Cooling 1 Heating 1 With Fan 9 = HumidifyWithFan 10 = CO2 alarm 11 = 6 Way valve 12 = Delta temperature	W

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
100	40**101**	Minimum voltage for analog output 3 (volt).	Unsigned *Scale 10*	Unit: Volt, Range: 0V to 10V, Value x 10 *(e.g. 3 V = 30)*	W
101	40**102**	Maximum voltage for analog output 3 (volt).	Unsigned *Scale 10*	Unit: Volt, Range: 0V to 10V, Value x 10 *(e.g. 3 V = 30)*	W
102	40**103**	*Reserved*			
103	40**104**	*Reserved*			
104	40**105**	*Reserved*			
105	40**106**	Position of CH1 AO output while heating (%).	Unsigned *Scale 1*	Unit: %, Range: 0% to 100%, *Value x 1 (e.g. 10% = 10)*	W
106 to 113	40**107** to 40**114**	*Reserved*			
114	40**115**	Ramp to control binary output 3.	Unsigned	1 = Off 2 = Changeover with fan 3 = Cooling 1 with fan 4 = Cooling 2 with fan 5 = Heating 1 with fan 6 = Heating 2 with fan 7 = Heating 2 8 = Cooling 1 Heating 1 With Fan 9 = HumidifyWithFan 10 = CO2 alarm	W
115	40**116**	Delay before activation of BO3 in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 15 Minutes, *Value x 1 (e.g. 5 mins = 5)*	W
116	40**117**	Close position percentage for contact BO3.	Unsigned *Scale 1*	Unit: %, Range: 15% to 80%, *Value x 1 (e.g. 20% = 20)*	W
117	40**118**	Open position percentage for contact BO3.	Unsigned *Scale 1*	Unit: %, Range: 0% to BO3closepos-4%, *Value x 1 (e.g. 20% = 20)*	W
118	40**119**	Ramp to control binary output 4.	Unsigned	1 = Off 2 = Changeover with fan 3 = Cooling 1 with fan 4 = Cooling 2 with fan 5 = Heating 1 with fan 6 = Heating 2 with fan 7 = Heating 2 8 = Cooling 1 Heating 1 With Fan 9 = HumidifyWithFan 10 = CO2 alarm 11 = FAN	W
119	40**120**	Delay before activation of BO4 in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 15 Minutes, *Value x 1 (e.g. 5 mins = 5)*	W
120	40**121**	Close position percentage for contact BO4.	Unsigned *Scale 1*	Unit: %, Range: 15% to 80%, *Value x 1 (e.g. 20% = 20)*	W
121	40**122**	Open position percentage for contact BO4.	Unsigned *Scale 1*	Unit: %, Range: 0% to BO4closepos-4%, *Value x 1 (e.g. 20% = 20)*	W

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
122	40**123**	Ramp to control binary output 5.	Unsigned	1 = Off 2 = Changeover with fan 3 = Cooling 1 with fan 4 = Cooling 2 with fan 5 = Heating 1 with fan 6 = Heating 2 with fan 7 = Heating 2 8 = Cooling 1 Heating 1 With Fan 9 = HumidifyWithFan 10 = CO2 alarm 11 = FAN	W
123	40**124**	Delay before activation of BO5 in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 15 Minutes, *Value x 1 (e.g. 5 mins = 5)*	W
124	40**125**	Close position percentage for contact BO5.	Unsigned *Scale 1*	Unit: %, Range: 15% to 80%, *Value/1 (e.g. 20% = 20)*	W
125	40**126**	Open position percentage for contact BO5.	Unsigned *Scale 1*	Unit: %, Range: 0% to BO5closepos-4%, *Value/1 (e.g. 20% = 20)*	W
126	40**127**	Ramp to control binary output 6.	Unsigned	1 = Off 2 = Changeover with fan 3 = Cooling 1 with fan 4 = Cooling 2 with fan 5 = Heating 1 with fan 6 = Heating 2 with fan 7 = Heating 2 8 = Cooling 1 Heating 1 With Fan 9 = HumidifyWithFan 10 = CO2 alarm 11 = 6 Way valve 12 = Delta temperature 13 = FAN (available only if fan type is 1-2-3 speeds) 14 = VFD/ECMTempLoopEnable 15 = VFD Pressure Loop	W
127	40**128**	Delay before activation of BO6 in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 15 Minutes, *Value x 1 (e.g. 5 = 5 mins)*	W
128	40**129**	Close position percentage for contact BO6.	Unsigned *Scale 1*	Unit: %, Range: 15% to 80%, *Value x 1 (e.g. 20% = 20)*	W
129	40**130**	Open position percentage for contact BO6.	Unsigned *Scale 1*	Unit: %, Range: 0% to BO6closepos-4%, *Value x 1 (e.g. 20% = 20)*	W
130	40**131**	Ramp to control binary output 7.	Unsigned	1 = Off 2 = Change Over with fan 3 = Cooling 1 with fan 4 = Cooling 2 with fan 5 = Heating 1 with fan 6 = Heating 2 with fan 7 = Heating 2 8 = Cooling 1 Heating 1 With Fan 9 = HumidifyWithFan 10 = CO2 alarm	W
131	40**132**	Delay before activation of BO7 in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 15 Minutes, Value x 1 (e.g. 5 = 5 mins)	W

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
132	40**133**	Close position percentage for contact BO7.	Unsigned *Scale 1*	Unit: %, Range: 15% to 80%, Value x 1 (e.g. 20% = 20)	W
133	40**134**	Open position percentage for contact BO7.	Unsigned *Scale 1*	Unit: %, Range: 0% to BO7closepos-4%, Value x 1 (e.g. 20% = 20)	W
134	40**135**	Input contact of analog input 1 and 2.	Bit String	**[B2-B15]**: **Reserved** **B0: Analog input 1** *0 = Normally Open, 1 = Normally Close* **B1: Analog input 2** *0 = Normally Open, 1 = Normally Close*	W
135	40**136**	Delay before activation of UI1 in seconds.	Unsigned *Scale 1*	Unit: Seconds, Range: 0 to 3600 seconds, *Value/1 (e.g. 20 secs = 20)*	W
136	40**137**	Delay before activation of UI2 in seconds.	Unsigned *Scale 1*	Unit: Seconds, Range: 0 to 3600 seconds, *Value/1 (e.g. 20 secs = 20)*	W
137	40**138**	*Reserved*			
138	40**139**	*Reserved*			
139	40**140**	Humidity control mode status.	Unsigned	1 = Auto, 2 = Dehumidification, 3 = Humidification, 4 = Off	W
140	40**141**	Humidity setpoint (%RH) in occupancy or day mode.	Unsigned *Scale 10*	Unit: %RH, Limited by min/max humidity setpoint, *Value x 10 (e.g. 20%RH = 200)*	W
141	40**142**	Dehumidification setpoint (%RH) in unoccupied or night mode.	Unsigned *Scale 10*	Unit: %RH, Range: 10%RH to 65%RH, *Value x 10 (e.g. 20%RH = 200)*	W
142	40**143**	Humidification setpoint (%RH) in unoccupied or night mode.	Unsigned *Scale 10*	Unit: %RH, Range: 10%RH to 65%RH, *Value x 10 (e.g. 20%RH = 200)*	W
143	40**144**	Minimum user setpoint.	Unsigned *Scale 10*	Unit: %RH, Range: 10%RH to max, *Value x 10 (e.g. 20%RH = 200)*	W
144	40**145**	Maximum user setpoint.	Unsigned *Scale 10*	Unit: %RH, Range: min to 65%RH, *Value x 10 (e.g. 20%RH = 200)*	W
145	40**146**	Humidity proportional band.	Unsigned *Scale 10*	Unit: %RH, Range: 3%RH to 10%RH, *Value x 10 (e.g. 4%RH = 40)*	W
146	40**147**	Humidity deadband.	Unsigned *Scale 10*	Unit: %RH, Range: 0%RH to 5%RH, *Value x 10 (e.g. 4%RH = 40)*	W
147	40**148**	Internal humidity sensor offset correction. * Not available on all models.	Signed *Scale 10*	Unit: %RH, Range: ± 5%RH, *Value x 10 (e.g. 2%RH = 20)*	W
148	40**149**	External humidity sensor offset correction.	Signed *Scale 10*	Unit: %RH, Range: ± 5%RH, *Value x 10 (e.g. 2%RH = 20)*	W

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
149	40**150**	Pressure sensor value in Pascals.	Unsigned *Scale 1*	Unit: Pascals, Range: 100 to Register Maximum pressure value range [40**135**], *Value/1 (e.g. 200Pa = 200)*	RO
150	40**151**	Maximum pressure value range.	Unsigned *Scale 1*	Unit: Pascals, Range: 200 to 20000, *Value/1 (e.g. 200Pa = 200)*	W
151	40**152**	Actual VFD pressure loop x 10 (%).	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 2% = 20)*	RO
152	40**153**	VFD pressure loop setpoint.	Unsigned *Scale 1*	Unit: Pascals, Range: 100 to Register Maximum pressure value range [40**135**], *Value/1 (e.g. 200Pa = 200)*	W
153	40**154**	VFD pressure loop deadband.	Unsigned *Scale 1*	Unit: Pascals, Range: 0 to 100, *Value x 1 (e.g. 20Pa = 20)*	W
154	40**155**	VFD pressure loop proportional band.	Unsigned *Scale 1*	Unit: Pascals, Range: 100 to 500, *Value x 1 (e.g. 250Pa = 250)*	W
155	40**156**	VFD pressure loop integral time.	Unsigned *Scale 1*	Unit: Seconds, Range: 0 to 250 seconds, *Value x 1 (e.g. 50 secs = 50)*	W
156	40**157**	Actual VFD temperature loop while cooling x 10 (%).	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 2% = 20)*	RO
157	40**158**	Actual VFD temperature loop while heating x 10 (%).	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 2% = 20)*	RO
158	40**159**	VFD temperature loop setpoint x 10 (ºC or ºF).	Signed *Scale 10*	Unit: ºC/ºF, Range: 10ºC to 40ºC or 50ºF to 104ºF, *Value x 10 (e.g. 30°C = 300 or 60ºF = 600)*	W
159	40**160**	VFD temperature loop deadband x 10 (ºC or ºF).	Unsigned *Scale 10*	Unit: ºC/ºF, Range: 0ºC to 5ºC or 0ºF to 9ºF, *Value x 10 (e.g. 2°C = 20 or 4ºF = 40)*	W
160	40**161**	VFD temperature loop proportional band x 10 (ºC or ºF).	Unsigned *Scale 10*	Unit: ºC/ºF, Range: 0.5ºC to 5ºC or 1ºF to 9ºF, *Value x 10 (e.g. 2°C= 20 or 4ºF = 40)*	W
161	40**162**	VFD temperature loop integral time.	Unsigned *Scale 1*	Unit: Seconds, Range: 0 to 250 seconds, *Value x 1 (e.g. 50 secs = 50)*	W
162	40**163**	Voltage required for closing the 6-way valve.	Unsigned *Scale 100*	Unit: V, Range: 0 to 11 V, *Value x 100 (e.g. 2V = 200)*	W
163	40**164**	Minimum output voltage required for cooling for the 6-way valve.	Unsigned *Scale 100*	Unit: V, Range: 0 to 11 V, *Value x 100 (e.g. 2V = 200)*	W
164	40**165**	Minimum output voltage required for heating for the 6-way valve.	Unsigned *Scale 100*	Unit: V, Range: 0 to 11 V, *Value x 100 (e.g. 2V = 200)*	W
165	40**166**	6-way valve size selection in inches.	Unsigned	1 = 1/2, 2 = 3/4, 3 = 1	W
166	40**167**	*Reserved*			

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
167	40**168**	Signal type for Analog output 2.	Unsigned	1 = Analog, 2 = On-Off, 3 = Pulsing	W
168	40**169**	Signal type for Analog output 3.	Unsigned	1 = Analog, 2 = On-Off, 3 = Pulsing	W
169	40**170**	*Reserved*			
170	40**171**	*Reserved*			
171	40**172**	*Reserved*			
172	40**173**	Signal type for Binary output 3.	Unsigned	1 = Pulsing, 2 = On-Off, 3 = Floating	W
173	40**174**	Signal type for Binary output 4.	Unsigned	1 = Pulsing, 2 = On-Off	W
174	40**175**	Signal type for Binary output 5.	Unsigned	1 = Pulsing, 2 = On-Off	W
175	40**176**	Signal type for Binary output 6.	Unsigned	1 = Pulsing, 2 = On-Off	W
176	40**177**	Signal type for Binary output 7.	Unsigned	1 = Pulsing, 2 = On-Off	W
177	40**178**	PIR Relay sensor.	Unsigned	0 = Relay was not activated, 1 = Relay was activated	W
178	40**179**	*Reserved*			
179	40**180**	Floating output motor timing for BO3/BO7.	Unsigned *Scale 1*	Unit: Seconds, Range: 15 to 250 seconds, Value x 1 *(e.g. 20 secs = 20)*	W
180	40**181**	*Reserved*			
181	40**182**	*Reserved*			
182	40**183**	Floating output value for BO3/BO7.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, Value x 1 *(e.g. 2% = 20)*	W
183	40**184**	*Reserved*			
184	40**185**	*Reserved*			
185	40**186**	*Reserved*			
186	40**187**	Value for Pulse output 3.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, Value x 10 *(e.g. 2% = 20)*	W
187	40**188**	Value for Pulse output 4.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, Value x 10 *(e.g. 2% = 20)*	W
188	40**189**	Value for Pulse output 5.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, Value x 10 *(e.g. 2% = 20)*	W
189	40**190**	Value for Pulse output 6.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, Value x 10 *(e.g. 2% = 20)*	W
190	40**191**	Value for Pulse output 7.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, Value x 10 *(e.g. 2% = 20)*	W
191	40**192**	Delta temperature between inlet and outlet.	Signed *Scale 100*	Unit: depends on system unit, Range: -12°C to 12°C or 10.4°F to 53.6°F *Value x 100 (e.g. 8°C = 800 or 6ºF = 600)*	W

Protocol Address	Convention Notation	Description	Data Type	Range	Writable
192	40**193**	Delta temperature set point.	Signed *Scale 100*	Unit: depends on system unit, Range: -12°C to 12°C or 10.4°F to 53.6°F *Value x 100 (e.g. 8°C = 800 or 6ºF = 600)*	W
193 to 198	40**194** to 40**199**	*Reserved*			
199	40**200**	User backlight or contrast intensity.	Unsigned *Scale 1*	Unit: %, Range: 0% to 100%, Value x 1 (e.g. 30% = 30)	W
200	40**201**	Occupancy backlight or contrast intensity.	Unsigned *Scale 1*	Unit: %, Range: 0% to 100%, Value x 1 (e.g. 30% = 30)	W
201	40**202**	Unoccupancy backlight or contrast intensity.	Unsigned *Scale 1*	Unit: %, Range: 0% to 100%, Value x 1 (e.g. 30% = 30)	W
202	40**203**	Configuration value to select the source for VFD temperature control.	Unsigned	1 = InternSensor, 2 = ExternSensor, 3 = ExternSensor2	W
203	40**204**	External Temperature sensor 2 reading.	Signed *Scale 100*	Unit: depends on system unit, Range: -40.00ºC to 100.00ºC or -40.00ºF to 212.00ºF *Value x 100 (e.g.6°C = 600 or 140°F = 1400)*	RO
204	40**205**	Configuration value used to calibrate External Temp Sensor 2 offset.	Signed *Scale 100*	Unit: depends on system unit, Range: ± 5.00ºC or +/-9.00ºF *Value x 100 (e.g.2ºC = 200 or 3ºF = 300)*	W
205	40**206**	External Temp 2 reading minimum value for voltage sensor.	Signed *Scale 10*	Unit: depends on system unit, Range: -40.0ºC to 0.0ºC or -40.0ºF to 32.0ºF *Value x 10 (e.g.-20°C = -200 or -20°F = -200)*	W
206	40**207**	External Temp 2 reading maximum value for voltage sensor.	Signed *Scale 10*	Unit: depends on system unit, Range: 50.0ºC to 100.0ºC or 122.0ºF to 212.0ºF *Value x 10 (e.g.60°C = 600 or 140°F = 1400)*	W
207	40**208**	*Reserved*			
208	40**209**	AO2 voltage present value.	Signed *Scale 100*	Unit: Volts, Range: 0.00V to 10.50V, *Value x 100 (e.g. 3 V = 300)*	RO
209	40**210**	AO3 voltage present value.	Signed *Scale 100*	Unit: Volts, Range: 0.00V to 10.50V, *Value x 100 (e.g. 3 V = 300)*	RO
210	40**211**	*Reserved*			

Notes

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