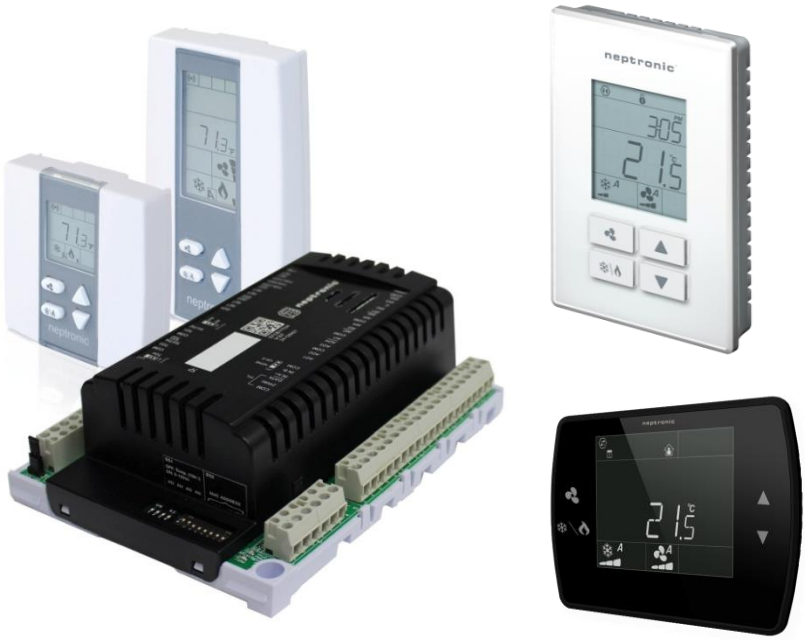
Networkable Fan Coil Controller

EFCB-OE1 Series

Modbus Communication Module User Guide



EFCB10T-OE1 (24Vac / 0 relays)
EFCB12T-OE1 (240Vac / 0 relays)
EFCB10TU2-OE1 (24Vac / 2 relays)
EFCB10TU4-OE1 (24Vac / 4 relays)
EFCB12TU2-OE1 (240Vac / 2 relays)
EFCB12TU4-OE1 (240Vac / 4 relays)

Introduction

The EFCB-OE1 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 EFCB-OE1 Series devices.

The EFCB-OE1 Series Modbus Guide assumes that you are familiar with Modbus terminology.

The following are the requirements for Modbus:

- *Data Model*. The EFCB-OE1 Series Modbus server data model uses only the Holding Registers table.
- *Function Codes*. The EFCB-OE1 Series Modbus server supports a limited function codes subset comprising:
    - Read Holding Registers (0x03)
    - Write Single Register (0x06)
    - Write Multiple Registers (0x10)
- *Exception Responses*. The EFCB-OE1 Series Modbus server supports the following exception codes:
    - Illegal data address
    - Illegal data value
    - Slave device busy
- *Serial Line*. The EFCB-OE1 Series 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.
    - If the device does not detect any activity for one second or more, it will find a silent line to prevent a possible baud rate scan on the next frame it detects.
- *Addressing*. The EFCB-OE1 Series device 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

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 Base	Register Index	Description	Data Type	Range	Writable
0	4000**1**	Address - Neptronic ID and Modbus address of current device.	Unsigned	MB = Modbus Address (e.g. 110), LB = 1-247	W
1	4000**2**	MSTP Baud Rate - BaudRate of device/100.	Unsigned *Scale 100*	0, 9600, 19200, 38400, or 57600, 0 = Auto Baud Rate Detection *Value/100 (e.g. 38400 baud = 384)*	W
2	4000**3**	Communication port configuration.	Unsigned	1= No parity, 2 Stop bits 2= Even parity, 1 Stop bit 3= Odd parity, 1 Stop bit	W
3	4000**4**	ProdName_87, characters 8-7 of 8 name characters.	ASCII	1 to 65,535 char 8: 0x0046 = F char 7: 0x0043 = C	W
4	4000**5**	ProdName_65, characters 6-5 of 8 name characters.	ASCII	1 to 65,535 char 6: 0x0042 = B char 5: 0x0034 = 4	W
5	4000**6**	ProdName_43, characters 4-3 of 8 name characters.	ASCII	1 to 65,535 char 4: 0x004F = O char 3: 0x0045 = E	W

Protocol Base	Register Index	Description	Data Type	Range	Writable
6	4000**7**	ProdName_21, characters 2-1 of 8 name characters.	ASCII	1 to 65,535 char 2: 0x0031 = 1 char 1: 0x0000 =	W
7	4000**8**	Product actual firmware version.	Unsigned	1 to 65,535 (e.g. 205)	RO
8	4000**9**	Product actual EEPROM version.	Unsigned	1 to 65, 535 (e.g. 207)	RO
9	400**10**	System Status 1.	Bit String	**[B1, B5, B7-B11]**: **Reserved** **B0: System operation** *0 = Normal, 1 = Fault* **B2: System override by NSB** *0 = Normal, 1 = OFF* **B3: Change Over Mode** *0 = Cooling, 1 = Heating* **B4: Flow Switch Alarm** *0 = No alarm,1 = Alarm activated* **B6: Dirty Filter Alarm** *0 = No alarm,1 = Alarm activated* **B12: Analog Input 3 Mode** *0 = Temp 10kΩ, 1 = 0-10Vdc* **B13: Analog Input 4 Mode** *0 = Temp 10kΩ, 1 = 0-10Vdc* **B14: Analog Input 5 mode** *0 = Temp 10kΩ, 1 = 0-10Vdc* **B15: Analog Input 6 Mode** *0 = Temp 10kΩ, 1 = 0-10Vdc*	RO
10	400**11**	System Status 2.	Bit String	**[B0-B6, B12-B14]**: **Reserved** **B7: Override Alarm** *0 = Off, 1 = On* **B8: Window Opened Alarm** *0 = Off, 1 = On* **B9: Door Opened Alarm** *0 = Off, 1 = On* **B10: DI1 Alarm** *0 = Off, 1 = On* **B11: DI2 Alarm** *0 = Off, 1 = On* **B13: DI4 Alarm** *0 = Off, 1 = On* **B15: Overheat Alarm** *0 = Off, 1 = On*	RO
11	400**12**	Internal temperature sensor reading.	Unsigned *Scale 100*	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.	Unsigned *Scale 100*	Range: 0ºC to 50ºC or 32ºF to 122ºF *Value x 100 (e.g. 23°C = 2300 or 33ºF = 3300)*	RO
13	400**14**	Changeover temperature sensor reading.	Unsigned *Scale 100*	Range: 0ºC to 50ºC or 32ºF to 122ºF *Value x 100 (e.g. 23°C = 2300 or 33ºF = 3300)*	RO
14	400**15**	Control temperature reading.	Unsigned *Scale 100*	Range: 0ºC to 50ºC or 32ºF to 122ºF *Value x 100 (e.g. 23°C = 2300 or 33ºF = 3300)*	W

Protocol Base	Register Index	Description	Data Type	Range	Writable
15	400**16**	Internal humidity sensor reading. Select models only.	Unsigned *Scale 10*	Unit: % RH, Range: 5%RH to 100%RH *Value x 10 (e.g. 30%RH = 300)*	RO
16	400**17**	External Humidity sensor reading. Select models only.	Unsigned *Scale 10*	Unit: % RH, Range: 5%RH to 100%RH *Value x 10 (e.g. 30%RH = 300)*	RO
17	400**18**	Analog input 3 reading.	Signed *Scale 100*	Unit: Volts or ºC/ºF, Range: 0V to 10V, -40ºC to 100ºC or -40ºF to 212ºF *Value x 100 (e.g. 3 V = 300/18°C = 1800 or 33ºF = 3300)*	RO
18	400**19**	Analog input 4 reading.	Signed *Scale 100*	Unit: Volts or ºC/ºF, Range: 0V to 10V, -40ºC to 100ºC or -40ºF to 212ºF *Value x 100 (e.g. 3 V = 300/18°C = 1800 or 33ºF = 3300)*	RO
19	400**20**	Analog input 5 reading.	Signed *Scale 100*	Unit: Volts or ºC/ºF, Range: 0V to 10V, -40ºC to 100ºC or -40ºF to 212ºF *Value x 100 (e.g. 3 V = 300/18°C = 1800 or 33ºF = 3300)*	RO
20	400**21**	Analog input 6 reading.	Signed *Scale 100*	Unit: Volts or ºC/ºF, Range: 0V to 10V, -40ºC to 100ºC or -40ºF to 212ºF *Value x 100 (e.g. 3 V = 300/18°C = 1800 or 33ºF = 3300)*	RO
21	400**22**	Digital input status of 8 digital inputs.	Bit String	**[B8-B15]**: **Reserved** **B0: Digital input 1** 0 = Open, 1 = Close **B1: Digital input 2** 0 = Open, 1 = Close **B2: Digital input 3** 0 = Open, 1 = Close **B3: Digital input 4** 0 = Open, 1 = Close **B4: AI3 Digital input** 0 = Open, 1 = Close **B5: AI4 Digital input** 0 = Open, 1 = Close **B6: AI5 Digital input** 0 = Open, 1 = Close **B7: AI6 Digital input** 0 = Open, 1 = Close	RO
22	400**23**	Actual system occupancy state.	Unsigned	1= NoOccupancy | 2= Occupancy | 3= Override	RO
23	400**24**	Actual night setback state of the system. Not available on all models.	Unsigned	1= Day | 2= Night | 3= Override	RO
24	400**25**	Actual heating demand.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
25	400**26**	Actual local reheat demand.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
26	400**27**	Actual cooling demand.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
27	400**28**	Actual changeover demand.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO

Protocol Base	Register Index	Description	Data Type	Range	Writable
28	400**29**	Actual fan demand.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
29	400**30**	Actual dehumidification demand. Select models only.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
30	400**31**	Actual humidification demand. Select models only.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
31	400**32**	Switch timer countdown until the system is able to swap the demand.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 120 minutes, *Value x 1 (e.g. 5 mins = 5)*	RO
32	400**33**	Analog output 1 value.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	W
33	400**34**	Analog output 2 value.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	W
34	400**35**	Analog output 3 value.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	W
35	400**36**	Analog output 4 value.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	W
36	400**37**	Floating output 1 value.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
37	400**38**	Floating output 2 value.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
38	400**39**	Pulsing output 1 value.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
39	400**40**	Pulsing output 2 value.	Unsigned *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
40	400**41**	Pulsing output 3 value.	Signed *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
41	400**42**	Pulsing output 4 value.	Signed *Scale 10*	Unit: %, Range: 0% to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
42	400**43**	TRIAC output on-off mode status.	Bit String	**[B4-B15]**: **Reserved** **B0: On Off output 1** *0 = Off, 1 = On* **B1: On Off output 2** *0 = Off, 1 = On* **B2: On Off output 3** *0 = Off, 1 = On* **B3: On Off output 4** *0 = Off, 1 = On*	W

Protocol Base	Register Index	Description	Data Type	Range	Writable
43	400**44**	Digital output - 7 relays output status.	Bit String	**[B7-B15]**: **Reserved** **B0: Digital output 1** *0 = Open, 1 = Close* **B1: Digital output 2** *0 = Open, 1 = Close* **B2: Digital output 3** *0 = Open, 1 = Close* **B3: Digital output 4** *0 = Open, 1 = Close* **B4: FAN Output High** *0 = Open, 1 = Close* **B5: FAN Output Med** *0 = Open, 1 = Close* **B6: FAN Output Low** *0 = Open, 1 = Close*	W
44	400**45**	System command.	Bit String	**[B6, B9-B15]**: **Reserved** **B0: Service Display Address** *0 = Off, 1 = Display address on LCD* **B1: Cooling Ramp Lock** *0 = Off, 1 = On* **B2: Condensation Alarm** *0 = Off, 1 = On* **B3: Heating Ramp Lock** *0 = Off, 1 = On* **B4: Reheat Ramp Lock** *0 = Off, 1 = On* **B5: Changeover Ramp Lock** *0 = Off, 1 = On* **B7: Humidify Ramp Lock** *0 = Off, 1 = On* **B8: Dehumidify Ramp Lock** *0 = Off, 1 = On*	W
45	400**46**	System mode status.	Unsigned	1 = Auto | 2 = Heat | 3 = Cool | 4 = Fan | 5 = Off	W
46	400**47**	Fan speed selection by user.	Unsigned	1 = Auto | 2 = Low | 3 = Med | 4 = High	W
47	400**48**	Temperature setpoint in occupancy or day mode.	Signed *Scale 10*	Unit: Volts or ºC/ºF, Range: min to max setpoint *Value x 10 (e.g. 3 V = 300/18°C = 180 or 60ºF = 600)*	W

Protocol Base	Register Index	Description	Data Type	Range	Writable
48	400**49**	System options 1.	Bit String	**B0: Temp unit displayed on digital room sensor** *0 = ºC, 1 = ºF* **B1: Temp unit displayed in Modbus** *0 = ºC, 1 = ºF* **B2: Temp SetPoint Lock** *0 = Off, 1 = On* **B3: Humidity SetPoint Lock** *0 = Off, 1 = On* **B4: Program Mode Lock** *0 = Off, 1 = On* **B5: Floating TO1/TO2 Direction** *0 = Direct, 1 = Reverse* **B6: Floating TO3/TO4 Direction** *0 = Direct, 1 = Reverse* **B7: Freeze Protection Alarm** *0 = Off, 1 = On* **B8: User System Off Modes** *0 = Enable, 1 = Disable* **B9:** K**eypad Bottom Left Lock** *0 = Off, 1 = On* **B10: Keypad Upper Left Lock** *0 = Off, 1 = On* **B11: Keypad Arrows Lock** *0 = Off, 1 = On* **B12: User Fan Auto Mode** *0 = Enable, 1 = Disable* **B13: Night SetBack Mode*** *0 = Setpoint, 1 = OFF* ** Also applies to No Occupancy Mode* **B14: Humidity Control Source** *0 = Intern Sensor, 1 = Extern Sensor* **B15: Time Mode** *0 = 24h, 1 = 12h*	W

Protocol Base	Register Index	Description	Data Type	Range	Writable
49	400**50**	System options 2.	Bit String	**[B0-B1]**: **Reserved** **B2: Baud Rate** *0 = Auto, 1 = Manual* **B3: Schedule On or Off** *0 = Off, 1 = On* **B4: Analog Output 1 Direction** *0 = Direct, 1 = Reverse* **B5: Analog Output 2 Direction** *0 = Direct, 1 = Reverse* **B6: Analog Output 3 Direction** *0 = Direct, 1 = Reverse* **B7: Analog Output 4 Direction** *0 = Direct, 1 = Reverse* **B8: TO1 Direction** *0 = Direct, 1 = Reverse* **B9: TO2 Direction** *0 = Direct, 1 = Reverse* **B10: TO3 Direction** *0 = Direct, 1 = Reverse* **B11: TO4 Direction** *0 = Direct, 1 = Reverse* **B12: Digital Output 1 Direction** *0 = Direct, 1 = Reverse* **B13: Digital Output 2 Direction** *0 = Direct, 1 = Reverse* **B14: Digital Output 3 Direction** *0 = Direct, 1 = Reverse* **B15: Digital Output 4 Direction** *0 = Direct, 1 = Reverse*	W
50	400**51**	System option 3.	Bit String	**[B0, B2, B5-B6, B8, B11-B15]: Reserved** **B1: ECM Fan Enable** *0 = Off, 1 = On* **B3: Display CO2** *0 = Off, 1 = On* **B4: CO2 Source Select** *0 = TFL, 1 = Analog* **B7: Occupancy Control Source** *0 = DigitalInput3, 1 = InternSensor* **B9: Display RH** *0 = Off, 1 = On* **B10: User system Fan Mode** *0 = Disable, 1 = Enable*	W
51	40052	System option 4.		**[B0-B15]**: **Reserved**	W
52	400**53**	TFL/TDF display information.	Unsigned	1= Temperature and Demand | 2= Setpoint and Demand | 3= Temperature Only 4= Setpoint Only | 5= Off	W
53	400**54**	Temperature control source.	Unsigned	1= Network Temp | 2= Intern Temp | 3= Extern Temp	W

Protocol Base	Register Index	Description	Data Type	Range	Writable
54	400**55**	Network fallback timeout Present Value.	Unsigned	Unit: Minutes, Range: 0 to 60 minutes, *Value x 1 (e.g. 30 mins = 30)*	W
55	400**56**	Minimum occupancy/day setpoint.	Signed *Scale 10*	Unit: Volts or ºC/ºF, Range: 10ºC to max or 50ºF to max *Value x 10 (e.g. 3 V = 30/18°C = 180 or 60ºF = 600)*	W
56	400**57**	Maximum occupancy/day setpoint.	Signed *Scale 10*	Unit: Volts or ºC/ºF, Range: min to 40ºC or min to 104ºF *Value x 10 (e.g. 3 V = 30/18°C = 180 or 60ºF = 600)*	W
57	400**58**	Cooling temperature setpoint in unoccupied or night mode.	Signed *Scale 10*	Unit: Volts or ºC/ºF, Range: 10ºC to 40ºC or 50ºF to 104ºF *Value x 10 (e.g. 3 V = 300/18°C = 180 or 60ºF = 600)*	W
58	400**59**	Heating temperature setpoint in unoccupied or night mode.	Signed *Scale 10*	Unit: Volts or ºC/ºF, Range: 10ºC to 40ºC or 50ºF to 104ºF *Value x 10 (e.g. 3 V = 300/18°C = 180 or 60ºF = 600)*	W
59	400**60**	Heating proportional band.	Unsigned *Scale 10*	Unit: depends on system unit, 0.5ºC to 5ºC or 1ºF to 9º *Value x 10 (e.g. 1°C = 10 or 2ºF = 20)*	W
60	400**61**	Local reheat proportional band.	Unsigned *Scale 10*	Unit: depends on system unit, 0.5ºC to 5ºC or 1ºF to 9ºF *Value x 10 (e.g. 1°C = 10 or 2ºF = 20)*	W
61	400**62**	Cooling proportional band.	Unsigned *Scale 10*	Unit: depends on system unit, 0.5ºC to 5ºC or 1ºF to 9ºF *Value x 10 (e.g. 1°C = 10 or 2ºF = 20)*	W
62	400**63**	Change over proportional band.	Unsigned *Scale 10*	Unit: depends on system unit, 0.5ºC to 5ºC or 1ºF to 9ºF *Value x 10 (e.g. 1°C = 10 or 2ºF = 20)*	W
63	400**64**	Heating dead band.	Unsigned *Scale 10*	Unit: depends on system unit, 0.5ºC to 5ºC or 1ºF to 9ºF *Value x 10 (e.g. 1°C = 10 or 2ºF = 20)*	W
64	400**65**	Local reheat dead band.	Unsigned *Scale 10*	Unit: depends on system unit, 0.5ºC to 5ºC or 1ºF to 9ºF *Value x 10 (e.g. 1°C = 10 or 2ºF = 20)*	W
65	400**66**	Cooling dead band.	Unsigned *Scale 10*	Unit: depends on system unit, 0.5ºC to 5ºC or 1ºF to 9ºF *Value x 10 (e.g. 1°C = 10 or 2ºF = 20)*	W
66	400**67**	Change over dead band.	Unsigned *Scale 10*	Unit: depends on system unit, 0.5ºC to 5ºC or 1ºF to 9ºF *Value x 10 (e.g. 1°C = 10 or 2ºF = 20)*	W
67	400**68**	Change over setpoint.	Signed *Scale 10*	Unit: depends on system unit, 10ºC to 40ºC or 50ºF to 104ºF *Value x 10 (e.g. 12°C = 120 or 60ºF = 600)*	W
68	400**69**	Fan time out in seconds.	Unsigned *Scale 1*	Unit: Seconds, Range: 0 to 255 seconds, *Value x 1 (e.g.100 secs = 100)*	W
69	400**70**	Fan damping factor in seconds.	Unsigned *Scale 1*	Unit: Seconds, Range: 0 to 255 seconds, *Value x 1 (e.g.100 secs = 100)*	W
70	400**71**	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

Protocol Base	Register Index	Description	Data Type	Range	Writable
71	400**72**	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
72	400**73**	Delay between cooling and heating or vice versa.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 120 minutes, *Value x 1 (e.g.10 mins = 10)*	W
73	400**74**	Cooling anticycle delay in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 15 minutes, *Value x 1 (e.g.100 mins = 100)*	W
74	400**75**	NSB override delay in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 180 minutes, *Value x 1 (e.g.100 mins = 100)*	W
75	400**76**	Unoccupied override delay in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 180 minutes, *Value x 1 (e.g.100 mins = 100)*	W
76	400**77**	Occupancy minimum time in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 240 minutes, *Value x 1 (e.g.100 mins = 100)*	W
77	400**78**	Unoccupied override delay count down in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 180 minutes, *Value x 1 (e.g.100 mins = 100)*	W
78	400**79**	Fan mode (speed) in unoccupied or NSB mode.	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**	Digital input 3 mode.	Unsigned	1= Off | 2= Occupancy normally open | 3= Occupancy normally close 4= NSB normally open | 5= NSB normally close	W
81	400**82**	Override system occupancy or NSB mode. Depending on the selected DI3 mode (400**80**), some of these options may not be writable.	Unsigned	1= Locally | 2= OFF | 3= Occupied | 4= Unoccupied | 5= Day | 6= Night	W
82	400**83**	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
83	400**84**	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
84	400**85**	Change over analog input signal.	Unsigned	3= Sensor | 4= Normally Cool | 5= Normally Heat	W
85	400**86**	Change over control mode.	Unsigned	1= Local | 2= Cool | 3= Heat	W
86	400**87**	External temperature 0-10V input on analog input.	Unsigned	1= Off | 2= 2-10V | 3= 0-10V	W
87	400**88**	Minimum analog input 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
88	400**89**	Maximum analog input 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
89	400**90**	Fan output signal.	Unsigned	1= 1 speed | 2= 2 speeds | 3= 3 speeds | 4= Analog	W

Protocol Base	Register Index	Description	Data Type	Range	Writable
90	400**91**	Ramp to control analog output 1.	Unsigned	1= Off | 2= Alarm | 3= Changeover with fan | 4= Cooling with fan | 5= Heating with fan | 6= Local Reheat with fan | 7= Local Reheat | 8= HumidifyWithFan *(with TFLHxx/TDF digital room sensor with humidity only)* | *9= Reserved* | 10= Cooling or Heating	W
91	400**92**	Minimum voltage for analog output 1 (volt).	Unsigned *Scale 10*	Unit: Volt, Range: 0V to 10V, *Value x 10 (e.g. 3 V = 30)*	W
92	400**93**	Maximum voltage for analog output 1 (volt).	Unsigned *Scale 10*	Unit: Volt, Range: 0V to 10V, *Value x 10 (e.g. 3 V = 30)*	W
93	400**94**	Ramp to control analog output 2.	Unsigned	1= Off | 2= Alarm | 3= Change Over with fan | 4= Cooling with fan | 5= Heating with fan | 6= Local Reheat with fan | 7= Local Reheat | 8= HumidifyWithFan *(with TFLHxx/TDF digital room sensor with humidity only)* | *9= Reserved* | 10= Cooling or Heating	W
94	400**95**	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
95	400**96**	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
96	400**97**	Ramp to control analog output 3.	Unsigned	1= Off | 2= Alarm | 3= Change Over with fan | 4= Cooling with fan | 5= Heating with fan | 6= Local Reheat with fan | 7= Local Reheat | 8= HumidifyWithFan *(with TFLHxx/TDF digital room sensor with humidity only)* | *9= Reserved* | 10= Cooling or Heating	W
97	400**98**	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
98	400**99**	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
99	40**100**	Ramp to control analog output 4.	Unsigned	1= Off | 2= Alarm | 3= Change Over with fan | 4= Cooling with fan | 5= Heating with fan | 6= Local Reheat with fan | 7= Local Reheat | 8= HumidifyWithFan *(with TFLHxx/TDF digital room sensor with humidity only)* | 9= Fan | 10= Cooling or Heating	W
100	40**101**	Minimum voltage for analog output 4 (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 4 (volt).	Unsigned *Scale 10*	Unit: Volt, Range: 0V to 10V, *Value x 10 (e.g. 3 V = 30)*	W
102	40**103**	Timing of floating motor TO1-TO2 in seconds.	Unsigned *Scale 1*	Unit: Seconds, Range: 15 to 250 seconds, *Value x 1 (e.g. 20 secs = 20)*	W

Protocol Base	Register Index	Description	Data Type	Range	Writable
103	40**104**	Timing of floating motor TO3-TO4 in seconds.	Unsigned *Scale 1*	Unit: Seconds, Range: 15 to 250 seconds, *Value x 1 (e.g. 20 secs = 20)*	W
104	40**105**	Ramp to control TRIAC output 1.	Unsigned *Scale 1*	1= Off | 2= Alarm | 3= Change Over with fan | 4= Cooling with fan | 5= Heating with fan | 6= Local Reheat with fan | 7= Local Reheat	W
105	40**106**	Signal output configuration for TRIAC output 1.	Unsigned *Scale 1*	1= Pulsing mode | 2= On/Off mode | 3= Floating mode	W
106	40**107**	TRIAC output 1 when set to close.	Unsigned *Scale 1*	Unit: %, Range: 15 to 80%, *Value x 1 (e.g. 20% = 20)*	W
107	40**108**	TRIAC output 1 when set to open.	Unsigned *Scale 1*	Unit: %, Range: 0 to TO1closepos-4%, *Value x 1 (e.g. 20% = 20)*	W
108	40**109**	Ramp to control TRIAC output 2.	Unsigned	1= Off | 2= Alarm | 3= Change Over with fan | 4= Cooling with fan | 5= Heating with fan | 6= Local Reheat with fan | 7= Local Reheat	W
109	40**110**	Signal output configuration for TRIAC output 2.	Unsigned	1= Pulsing mode | 2= On/Off mode | 3= Floating mode	W
110	40**111**	TRIAC output 2 when set to close.	Unsigned *Scale 1*	Unit: %, Range: 15 to 80%, *Value x 1 (e.g. 20% = 20)*	W
111	40**112**	TRIAC output 2 when set to open.	Unsigned *Scale 1*	Unit: %, Range: 0 to TO2closepos-4%, *Value x 1 (e.g. 20% = 20)*	W
112	40**113**	Ramp to control TRIAC output 3.	Unsigned	1= Off | 2= Alarm | 3= Change Over with fan | 4= Cooling with fan | 5= Heating with fan | 6= Local Reheat with fan | 7= Local Reheat	W
113	40**114**	Signal output configuration for TRIAC output 3.	Unsigned	1= Pulsing mode | 2= On/Off mode | 3= Floating mode	W
114	40**115**	TRIAC output 3 when set to close.	Unsigned *Scale 1*	Unit: %, Range: 15 to 80%, *Value x 1 (e.g. 20% = 20)*	W
115	40**116**	TRIAC output 3 when set to open.	Unsigned *Scale 1*	Unit: %, Range: 0 to TO3closepos-4%, *Value x 1 (e.g. 20% = 20)*	W
116	40**117**	Ramp to control TRIAC output 4.	Unsigned	1= Off | 2= Alarm | 3= Change Over with fan | 4= Cooling with fan | 5= Heating with fan | 6= Local Reheat with fan | 7= Local Reheat	W
117	40**118**	Signal output configuration for TRIAC output 4.	Unsigned	1= Pulsing mode | 2= On/Off mode | 3= Floating mode	W
118	40**119**	TRIAC output 4 when set to close.	Unsigned *Scale 1*	Unit: %, Range: 15 to 80%, *Value x 1 (e.g. 20% = 20)*	W
119	40**120**	TRIAC output 4 when set to open.	Unsigned *Scale 1*	Unit: %, Range: 0 to TO4closepos-4%, *Value x 1 (e.g. 20% = 20)*	W

Protocol Base	Register Index	Description	Data Type	Range	Writable
120	40**121**	Configuration of DO1 mode.	Unsigned	1= Off | 2= Alarm | 3= Change Over with fan | 4= Cooling with fan | 5= Heating with fan | 6= Local Reheat with fan | 7= Local Reheat | 8= HumidifyWithFan *(with TFLHxx/TDF digital room sensor with humidity only)*	W
121	40**122**	Delay before activation of DO1 in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 15 minutes, *Value x 1 (e.g. 5 = 5 mins)*	W
122	40**123**	Close position percentage for contact DO1.	Unsigned *Scale 1*	Unit: %, Range: 15% to 80%, *Value x 1 (e.g. 20% = 20)*	W
123	40**124**	Open position percentage for contact DO1.	Unsigned *Scale 1*	Unit: %, Range: 0 to DO1closepos-4%, *Value x 1 (e.g. 20% = 20)*	W
124	40**125**	Configuration of DO2 mode.	Unsigned	1= Off | 2= Alarm | 3= Change Over with fan | 4= Cooling with fan | 5= Heating with fan | 6= Local Reheat with fan | 7= Local Reheat | 8= HumidifyWithFan *(with TFLHxx/TDF digital room sensor with humidity only)*	W
125	40**126**	Activation delay for contact DO2 in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 15 minutes, *Value x 1 (e.g. 5 = 5 mins)*	W
126	40**127**	Close position percentage for contact DO2.	Unsigned *Scale 1*	Unit: %, Range: 15% to 80%, *Value x 1 (e.g. 20% = 20)*	W
127	40**128**	Open position percentage for contact DO2.	Unsigned *Scale 1*	Unit: %, Range: 0 to DO2closepos-4%, *Value x 1 (e.g. 20% = 20)*	W
128	40**129**	Configuration of DO3 mode.	Unsigned	1= Off | 2= Alarm | 3= Change Over with fan | 4= Cooling with fan | 5= Heating with fan | 6= Local Reheat with fan | 7= Local Reheat | 8= HumidifyWithFan *(with TFLHxx/TDF digital room sensor with humidity only)*	W
129	40**130**	Activation delay for contact DO3 in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 15 minutes, *Value x 1 (e.g. 5 = 5 mins)*	W
130	40**131**	Close position percentage for contact DO3.	Unsigned *Scale 1*	Unit: %, Range: 15% to 80%, *Value x 1 (e.g. 20% = 20)*	W
131	40**132**	Open position percentage for contact DO3.	Unsigned *Scale 1*	Unit: %, Range: 0 to DO3closepos-4%, *Value x 1 (e.g. 20% = 20)*	W
132	40**133**	Configuration of DO4 mode.	Unsigned	1= Off | 2= Alarm | 3= Change Over with fan | 4= Cooling with fan | 5= Heating with fan | 6= Local Reheat with fan | 7= Local Reheat | 8= HumidifyWithFan *(with TFLHxx/TDF digital room sensor with humidity only)*	W

Protocol Base	Register Index	Description	Data Type	Range	Writable
133	40**134**	Activation delay for contact DO4 in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 15 minutes, *Value x 1 (e.g. 5 = 5 mins)*	W
134	40**135**	Close position percentage for contact DO4.	Unsigned *Scale 1*	Unit: %, Range: 15% to 80%, *Value x 1 (e.g. 20% = 20)*	W
135	40**136**	Open position percentage for contact DO4.	Unsigned *Scale 1*	Unit: %, Range: 0 to DO4closepos-4%, *Value x 1 (e.g. 20% = 20)*	W
136	40**137**	Digital input contact of DI1 to DI4.	Bit String	**[B3, B5-B15]**: **Reserved** **B0: Digital input 1** *0 = Normally Open, 1 = Normally Close* **B1: Digital input 2** *0 = Normally Open,1 = Normally Close* **B2: Digital input 3** *0 = Normally Open,1 = Normally Close* **B4: Digital input 4** *0 = Normally Open,1 = Normally Close*	W
137	40**138**	Configuration of DI1 mode.	Unsigned	1= OFF | 2= Override | 3= Window | 4= Door | 5= DirtyFilter | 6= FlowSwitch 7= OverHeat | 8= SelectorSwitch* ** Warning, must be used with FlowSwitch, in local mode Fan stay off*	W
138	40**139**	Delay before activation of DI1 in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 65,535 minutes, *Value x 1 (e.g. 5 = 5 mins)*	W
139	40**140**	Configuration of DI2 mode.	Unsigned	1= OFF | 2= Override | 3= Window | 4= Door | 5= DirtyFilter | 6= FlowSwitch 7= OverHeat | 8= SelectorSwitch* ** Warning, must be used with FlowSwitch, in local mode Fan stay off*	W
140	40**141**	Delay before activation of DI2 in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 65,535 minutes, *Value x 1 (e.g. 5 = 5 mins)*	W
141	40**142**	Configuration of DI4 mode.	Unsigned	1= OFF | 2= Override | 3= Window | 4= Door | 5= DirtyFilter | 6= FlowSwitch 7= OverHeat | 8= SelectorSwitch ** Warning, must be used with FlowSwitch, in local mode Fan stay off*	W
142	40**143**	Delay before activation of DI4 in minutes.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 65,535 minutes, *Value x 1 (e.g. 5 = 5 mins)*	W
143	40**144**	Humidity control mode status. Not available on all models.	Unsigned	1= Auto | 2= Dehumidification | 3= Humidification | 4= Off	W
144	40**145**	Humidity setpoint (%RH) in occupancy or day mode. Not available on all models.	Unsigned *Scale 10*	Unit: %RH, Limited by min/max humidity setpoint, *Value x 10 (e.g. 20%RH = 200)*	W

Protocol Base	Register Index	Description	Data Type	Range	Writable
145	40**146**	Dehumidification setpoint (%RH) in unoccupied or night mode. Not available on all models.	Unsigned *Scale 10*	Unit: %RH, Range: 10% to 65%, *Value x 10 (e.g. 20%RH = 200)*	W
146	40**147**	Humidification setpoint (%RH) in unoccupied or night mode. Not available on all models.	Unsigned *Scale 10*	Unit: %RH, Range: 10% to 65%, *Value x 10 (e.g. 20%RH = 200)*	W
147	40**148**	Minimum user setpoint. Not available on all models.	Unsigned *Scale 10*	Unit: %RH, Range: 10% to max, *Value x 10 (e.g. 20%RH = 200)*	W
148	40**149**	Maximum user setpoint. Not available on all models.	Unsigned *Scale 10*	Unit: %RH, Range: min to 65%, *Value x 10 (e.g. 20%RH = 200)*	W
149	40**150**	Humidity proportional band. Not available on all models.	Unsigned *Scale 10*	Unit: %RH, Range: 3%RH to 10%RH, *Value x 10 (e.g. 4%RH = 40)*	W
150	40**151**	Humidity deadband. Not available on all models.	Unsigned *Scale 10*	Unit: %RH, Range: 0% to 5%, *Value x 10 (e.g. 4%RH = 40)*	W
151	40**152**	External humidity sensor input.	Unsigned	1= Off | 2= Analog input 3 | 3= Analog input 4 | 4= Analog input 5 | 5= Analog input 6	W
152	40**153**	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
153	40**154**	External 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
154	40**155**	Internal CO_2 sensor reading. Not available on all models.	Unsigned *Scale 1*	Unit: PPM, Range 0 to 2000 PPM, *Value x 1* (*e.g. 20PPM = 20*)	RO
155	40**156**	Maximum limit of CO_2 concentration. Not available on all models.	Unsigned *Scale 10*	Unit: PPM, Range 100 to CO2rangePPM, *Value x 10* (*e.g. 200PPM = 2000*)	W
156	40**157**	System status 3.	Unsigned	**[B1-B15]**: **Reserved** **B0: CO_2 Alarm** *0 = Off, 1 = On*	RO
157	40**158**	Maximum range for the CO_2 sensor. Not available on all models.	Unsigned *Scale 50*	Unit: PPM, Range 0 to 2000 PPM, *Value x 50* (*e.g. 20PPM = 1000*)	W
158	40**159**	External CO_2 sensor reading. Not available on all models.	Unsigned *Scale 1*	Unit: PPM, Range 1 to CO2rangePPM, *Value x 1* (*e.g. 20PPM = 20*)	RO
159	40**160**	Internal light sensor reading in Luxes. Not available on all models.	Unsigned *Scale 1*	Unit: Luxes, Range 0 to 16000 Luxes, *Value x 1 (e.g. 20Luxes = 20)*	RO

Protocol Base	Register Index	Description	Data Type	Range	Writable
160	40**161**	Internal PIR sensor reading. Not available on all models.	Unsigned	0 = No Occupancy | 1 = Occupancy	RO
161	40**162**	Internal VOC sensor reading in ppb. Not available on all models.	Unsigned *Scale 1*	Unit: ppb, Range 1 to 60000 ppb, *Value x 1 (e.g. 20ppb = 20)*	RO
162	40**163**	Configuration of AI3 mode.	Unsigned	1 = Off | 2 = Temperature | 3 = CO2 | 4 = Humidity	W
163	40**164**	Configuration of AI4 mode.	Unsigned	1 = Off | 2 = Temperature | 3 = CO2 | 4 = Humidity	W
164	40**165**	Configuration of AI5 mode.	Unsigned	1 = Off | 2 = Temperature | 3 = CO2 | 4 = Humidity	W
165	40**166**	Configuration of AI6 mode.	Unsigned	1 = Off | 2 = Temperature | 3 = CO2 | 4 = Humidity	W
166	40**167**	Configuration of TO1 alarm source.	Unsigned	1 = Alarm Override | 2 = Alarm Overheat | 3 = Alarm Door | 4 = Alarm Window Contact | 5 = Alarm FlowSwitch | 6 = Alarm CO2	W
167	40**168**	Configuration of TO2 alarm source.	Unsigned	1 = Alarm Override | 2 = Alarm Overheat | 3 = Alarm Door | 4 = Alarm Window Contact | 5 = Alarm FlowSwitch | 6 = Alarm CO2	W
168	40**169**	Configuration of TO3 alarm source.	Unsigned	1 = Alarm Override | 2 = Alarm Overheat | 3 = Alarm Door | 4 = Alarm Window Contact | 5 = Alarm FlowSwitch | 6 = Alarm CO2	W
169	40**170**	Configuration of TO4 alarm source.	Unsigned	1 = Alarm Override | 2 = Alarm Overheat | 3 = Alarm Door | 4 = Alarm Window Contact | 5 = Alarm FlowSwitch | 6 = Alarm CO2	W
170	40**171**	Configuration of AO1 alarm source.	Unsigned	1 = Alarm Override | 2 = Alarm Overheat | 3 = Alarm Door | 4 = Alarm Window Contact | 5 = Alarm FlowSwitch | 6 = Alarm CO2	W
171	40**172**	Configuration of AO2 alarm source.	Unsigned	1 = Alarm Override | 2 = Alarm Overheat | 3 = Alarm Door | 4 = Alarm Window Contact | 5 = Alarm FlowSwitch | 6 = Alarm CO2	W
172	40**173**	Configuration of AO3 alarm source.	Unsigned	1 = Alarm Override | 2 = Alarm Overheat | 3 = Alarm Door | 4 = Alarm Window Contact | 5 = Alarm FlowSwitch | 6 = Alarm CO2	W
173	40**174**	Configuration of AO4 alarm source.	Unsigned	1 = Alarm Override | 2 = Alarm Overheat | 3 = Alarm Door | 4 = Alarm Window Contact | 5 = Alarm FlowSwitch | 6 = Alarm CO2	W
174	40**175**	Configuration of DO1 alarm source.	Unsigned	1 = Alarm Override | 2 = Alarm Overheat | 3 = Alarm Door | 4 = Alarm Window Contact | 5 = Alarm FlowSwitch | 6 = Alarm CO2	W
175	40**176**	Configuration of DO2 alarm source.	Unsigned	1 = Alarm Override | 2 = Alarm Overheat | 3 = Alarm Door | 4 = Alarm Window Contact | 5 = Alarm FlowSwitch | 6 = Alarm CO2	W
176	40**177**	Configuration of DO3 alarm source.	Unsigned	1 = Alarm Override | 2 = Alarm Overheat | 3 = Alarm Door | 4 = Alarm Window Contact | 5 = Alarm FlowSwitch | 6 = Alarm CO2	W
177	40**178**	Configuration of DO4 alarm source.	Unsigned	1 = Alarm Override | 2 = Alarm Overheat | 3 = Alarm Door | 4 = Alarm Window Contact | 5 = Alarm FlowSwitch | 6 = Alarm CO2	W

Notes

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