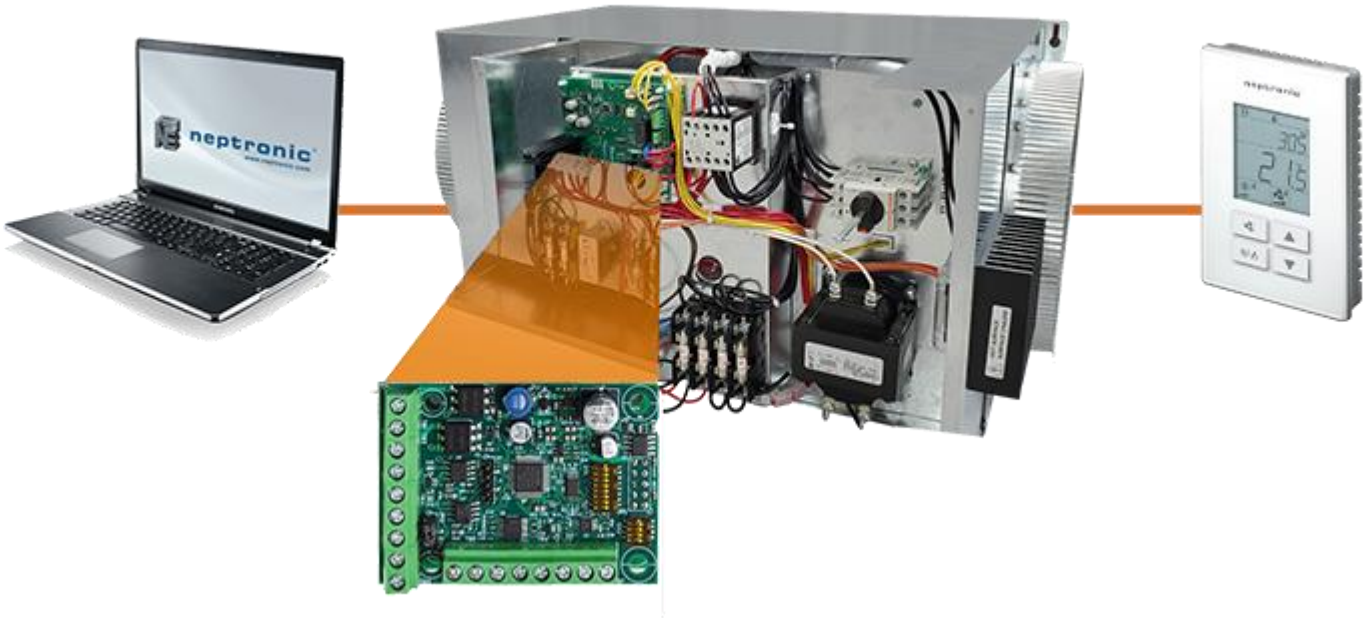
Compact Make-up Air Unit

Modbus Communication Module User Guide



Introduction

The Compact Make-up Air Unit 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 Compact Make-up Air Unit devices.

The Compact Make-up Air Unit Modbus Guide assumes that you are familiar with Modbus terminology.

The following are the requirements for Modbus:

- *Data Model*. The Compact Make-up Air Unit Modbus server data model uses only the Holding Registers table.
- *Register Address*:
    - As per protocol base (base 0); for PLC add 1 to protocol base.
    - As per holding register (base 40001).
- *Function Codes*. The Compact Make-up Air Unit Modbus server supports a limited function codes subset comprising:
    - Read Holding Registers (0x03)
    - Write Single Register (0x06)
    - Write Multiple Registers (0x10)
- *Exception Responses*. The Compact Make-up Air Unit Modbus server supports the following exception codes:
    - Illegal data address
    - Illegal data value
    - Slave device busy
- *Serial Line*. The Compact Make-up Air Unit 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, 57600 and 76800 bps.
    - 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 Compact Make-up Air Unit device only answers at the following address:
    - The device's unique address (1 to 247) 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	Holding Register	Description	Data Type	Range	Writable
0	4000**1**	Modbus product type and address.	Unsigned	MB = Modbus Address (e.g. 110), LB = 1-247	W
1	4000**2**	Analog input 1 voltage.	Unsigned *Scale 1000*	Unit: Volts (V), Range: 0V to 10V *Value x 1000 (e.g. 2V = 2000)*	RO
2	4000**3**	Analog input 2 voltage.	Unsigned *Scale 1000*	Unit: Volts (V), Range: 0V to 10V *Value x 1000 (e.g. 2V = 2000)*	RO
3	4000**4**	Analog input 3 temperature.	Signed *Scale 100*	Units: °C/°F, Range: -40°C to 85°C or -40°F to 185°F *Value x 100 (e.g. 25°C = 2500 or 25°F = 2500)*	RO
4	4000**5**	Analog input 4 temperature.	Signed *Scale 100*	Units: °C/°F, Range: -40°C to 85°C or -40°F to 185°F *Value x 100 (e.g. 25°C = 2500 or 25°F = 2500)*	RO
5	4000**6**	Room air temperature value measured by TDF.	Unsigned *Scale 100*	Units: °C/°F, Range : 0°C to 50°C or 32°F to 122°F *Value x 100 (e.g. 5°C = 500 or 50°F = 5000)*	RO
6	4000**7**	Room air relative humidity value measured by TDF.	Unsigned *Scale 10*	Unit: %RH, Range: 0 to 100%RH *Value x 10 (e.g. 10%RH = 100)*	RO
7	4000**8**	Room CO_2 concentration value measured by TDF.	Unsigned *Scale 1*	Unit: PPM, Range: 0 to 2000 PPM *Value x 1 (e.g. 2 PPM = 2)*	RO
8	4000**9**	Volatile organic compound index measured by TDF.	Unsigned *Scale 1*	Unit: No Unit, Range: 0 to 65535, *Value x 1 (e.g. 100 = 100)*	RO

Protocol Base	Holding Register	Description	Data Type	Range	Writable
9	400**10**	Luminous flux measured by TDF.	Unsigned *Scale 1*	Unit: Lux, Range: 0 to 16000 Lux *Value x 1 (e.g. 2 Lux = 2)*	RO
10	400**11**	CMU on-board potentiometer temperature setpoint.	Unsigned *Scale 100*	Units: °C/°F, Range: 0°C to 35°C or 32°F to 95°F *Value x 100 (e.g. 2°C = 200 or 50°F = 5000)*	RO
11	400**12**	CMU intake temperature.	Signed *Scale 100*	Units: °C/°F, Range: -40ºC to 85ºC or -40°F to 185°F *Value x 100 (e.g. 23°C = 2300 or 23°F = 2300)*	RO
12	400**13**	CMU outtake temperature.	Signed *Scale 100*	Units: °C/°F, Range: -40ºC to 85ºC or -40°F to 185°F *Value x 100 (e.g. 23°C = 2300 or 23°F = 2300)*	RO
13	400**14**	CMU board temperature.	Signed *Scale 100*	Units: °C/°F, Range: -40ºC to 85ºC or -40°F to 185°F *Value x 100 (e.g. 23°C = 2300 or 23°F = 2300)*	RO
14	400**15**	CMU SSR temperature.	Signed *Scale 100*	Units: °C/°F, Range: -40ºC to 85ºC or -40°F to 185°F *Value x 100 (e.g. 23°C = 2300 or 23°F = 2300)*	RO
15	400**16**	AI3/BI3 multi-mode input state.	Unsigned	0 = Open, 1 = Closed	RO
16	400**17**	AI4/BI4 multi-mode input state.	Unsigned	0 = Open, 1 = Closed	RO
17	400**18**	Room movement detection occupancy sensor.	Unsigned	0 = No, 1 = Yes	RO
18	400**19**	CMU On/Off contact input state.	Unsigned	0 = Off, 1 = On	RO
19	400**20**	Analog output 1 voltage.	Unsigned *Scale 100*	Unit: Volts, Range: 0V to 10V *Value x 100 (e.g. 3V = 300)*	RO
20	400**21**	Analog output 2 voltage.	Unsigned *Scale 100*	Unit: Volts, Range: 0V to 10V *Value x 100 (e.g. 3V = 300)*	RO
21	400**22**	Binary output 1 state.	Unsigned	0 = Open, 1 = Closed	RO
22	400**23**	Binary output 1 state.	Unsigned	0 = Open, 1 = Closed	RO
23	400**24**	Supply air temperature.	Unsigned *Scale 100*	Units: °C/°F, Range: 0°C to 100°C or 32°F to 212°F *Value x 100 (e.g. 2°C = 200 or 50°F = 5000)*	RO
24	400**25**	Supply air relative humidity.	Unsigned *Scale 100*	Units: %RH, Range: 0 to 100%RH *Value x 100 (e.g. 23%RH = 2300)*	RO
25	400**26**	Outside air temperature.	Signed *Scale 100*	Units: °C/°F, Range: -40ºC to 50ºC or -40°F to 122°F *Value x 100 (e.g. 23°C = 2300 or 23°F = 2300)*	RO
26	400**27**	Outside air relative humidity.	Unsigned *Scale 100*	Units: %RH, Range: 0 to 100%RH *Value x 100 (e.g. 23%RH = 2300)*	RO
27	400**28**	Duct static pressure.	Unsigned *Scale 10*	Units: Pascal (Pa), Range: 0 to 1250 Pa *Value x 10 (e.g. 50 Pa = 500)*	RO

Protocol Base	Holding Register	Description	Data Type	Range	Writable
28	400**29**	Damper position feedback.	Unsigned *Scale 1*	Unit: %, Range: 0% to 100%, *Value x 1 (e.g. 100% = 100)*	RO
29	400**30**	Current airflow setpoint in percent of maximum capacity.	Unsigned *Scale 1*	Unit: %, Range: 0% to 100%, *Value x 1 (e.g. 100% = 100)*	RO
30	400**31**	CMU ECM fan speed feedback value.	Unsigned *Scale 1*	Unit: RPM, Range: 0 to 10000 RPM, *Value x 1 (e.g. 100 RPM = 100)*	RO
31	400**32**	Heater vernier stage duty cycle.	Unsigned *Scale 10*	Unit: %, Range: 0 to 100%, *Value x 10 (e.g. 100% = 1000)*	RO
32	400**33**	Network temperature setpoint.	Unsigned *Scale 100*	Unit: °C/°F, Range: 0°C to 35°C or 32°F to 95°F, *Value x 1 (e.g. 5°C = 500 or 50°F = 5000)*	W
33	400**34**	TDF temperature setpoint.	Unsigned *Scale 100*	Unit: °C/°F, Range: 0°C to 35°C or 32°F to 95°F, *Value x 1 (e.g. 5°C = 500 or 50°F = 5000)*	W
34	400**35**	CMU anti-freeze setpoint.	Unsigned *Scale 100*	Unit: °C/°F, Range: 0°C to 35°C or 32°F to 95°F, *Value x 1 (e.g. 5°C = 500 or 50°F = 5000)*	W
35	400**36**	Occupied airflow setpoint in percent of maximum capacity.	Unsigned *Scale 1*	Unit: %, Range: 0 to 100%, *Value x 1 (e.g. 100% = 100)*	W
36	400**37**	Unoccupied airflow setpoint in percent of maximum capacity.	Unsigned *Scale 1*	Unit: %, Range: 0 to 100%, *Value x 1 (e.g. 100% = 100)*	W
37	400**38**	Binary input 3 stage weight.	Unsigned *Scale 1*	Unit: %, Range: 0 to 100%, *Value x 1 (e.g. 100% = 100)*	W
38	400**39**	Binary input 4 stage weight.	Unsigned *Scale 1*	Unit: %, Range: 0 to 100%, *Value x 1 (e.g. 100% = 100)*	W
39	400**40**	Exhaust fan start delay.	Unsigned *Scale 1*	Unit: Seconds, Range: 1 to 255 seconds *Value x 1 (e.g. 10 secs = 10)*	W
40	400**41**	Exhaust fan control signal minimum value.	Unsigned *Scale 100*	Unit: Volts (V), Range: 0 to 10V, *Value x 100 (e.g. 3V = 300)*	W
41	400**42**	Exhaust fan control signal maximum value.	Unsigned *Scale 100*	Unit: Volts (V), Range: 0 to 10V, *Value x 100 (e.g. 3V = 300)*	W
42	400**43**	Damper stroke time.	Unsigned *Scale 1*	Unit: Seconds, Range: 1 to 255 seconds, *Value x 1 (e.g. 100 secs = 100)*	W
43	400**44**	Occupancy inputs minimum time.	Unsigned *Scale 1*	Unit: Minutes, Range: 0 to 240 minutes, *Value x 1 (e.g. 10 mins = 10)*	W

Protocol Base	Holding Register	Description	Data Type	Range	Writable
44	400**45**	Temperature setpoint minimum value.	Unsigned *Scale 100*	Unit: °C/°F, Range: 0°C to 35°C or 32°F to 95°F, *Value x 1 (e.g. 5°C = 500 or 50°F = 5000)*	W
45	400**46**	Temperature setpoint maximum value.	Unsigned *Scale 100*	Unit: °C/°F, Range: 0°C to 35°C or 32°F to 95°F, *Value x 1 (e.g. 5°C = 500 or 50°F = 5000)*	W
46	400**47**	Dry mode relative humidity setpoint.	Unsigned *Scale 1*	Unit: %RH, Range: 10 to 90%RH *Value x 1 (e.g. 10%RH = 10)*	W
47	400**48**	Dry mode relative humidity setpoint dead band.	Unsigned *Scale 1*	Unit: %RH, Range: 1 to 10%RH *Value x 1 (e.g. 10%RH = 10)*	W
48	400**49**	Occupied static pressure control loop setpoint.	Unsigned *Scale 10*	Unit: Pascal (Pa), Range: 0 to 1250 Pa *Value x 10 (e.g. 3 Pa = 30)*	W
49	400**50**	Unoccupied static pressure control loop setpoint.	Unsigned *Scale 10*	Unit: Pascal (Pa), Range: 0 to 1250 Pa *Value x 10 (e.g. 3 Pa = 30)*	W
50	400**51**	CO_2 concentration setpoint.	Unsigned *Scale 1*	Unit : PPM, Range : 0 to 1000 PPM *Value x 1 (e.g. 3 PPM = 3)*	W
51	400**52**	CO_2 concentration setpoint dead band.	Unsigned *Scale 1*	Unit : PPM, Range : 0 to 200 PPM *Value x 1 (e.g. 3 PPM = 3)*	W
52	400**53**	Supply air temperature offset.	Signed *Scale 100*	Unit: °C/°F, Range: ± 5ºC or +/-9ºF Value x 100 (e.g. 2ºC = 200 or 3ºF = 300)	W
53	400**54**	Supply air temperature humidity offset.	Signed *Scale 100*	Unit: %RH, Range: ± 5%RH Value x 100 (e.g. 2%RH = 200)	W
54	400**55**	Outside air temperature offset.	Signed *Scale 100*	Unit: °C/°F, Range: ± 5ºC or +/-9ºF Value x 100 (e.g. 2ºC = 200 or 3ºF = 300)	W
55	400**56**	Outside air temperature humidity offset.	Signed *Scale 100*	Unit: %RH, Range: ± 5%RH Value x 100 (e.g. 2%RH = 200)	W
56	400**57**	Room air temperature offset.	Signed *Scale 100*	Unit: °C/°F, Range: ± 10ºC or ± 18ºF Value x 100 (e.g. 2ºC = 200 or 3ºF = 300)	W
57	400**58**	Room air relative humidity offset.	Signed *Scale 100*	Unit: %RH, Range: ± 5%RH Value x 100 (e.g. 2%RH = 200)	W
58	400**59**	Static pressure offset.	Signed *Scale 10*	Unit: Pascal (Pa), Range: ± 125 Pa Value x 10 (e.g. 2 Pa = 200)	W
59	400**60**	Minimum fan speed.	Unsigned *Scale 1*	Unit: %, Range: 0 to 100% *Value x 1 (e.g. 3% = 3)*	W

Protocol Base	Holding Register	Description	Data Type	Range	Writable
60	400**61**	Temperature control proportional band.	Unsigned *Scale 100*	Unit: °C/°F, Range: 0.5°C to 20°C or 33°F to 68°F, *Value x 100 (e.g. 5°C = 500 or 50°F = 5000)*	W
61	400**62**	Temperature control integral time.	Unsigned *Scale 1*	Unit: Seconds, Range: 0 to 255 seconds, *Value x 1 (e.g. 100 secs = 100)*	W
62	400**63**	Temperature control derivate time.	Unsigned *Scale 1*	Unit: Seconds, Range: 0 to 255 seconds, *Value x 1 (e.g. 100 secs = 100)*	W
63	400**64**	Static pressure control proportional band.	Unsigned *Scale 1*	Unit: Pascal (Pa), Range: 0 to 250 Pa *Value x 1 (e.g. 3 Pa = 3)*	W
64	400**65**	Static pressure control integral time.	Unsigned *Scale 1*	Unit: Seconds, Range: 0 to 255 seconds, *Value x 1 (e.g. 100 secs = 100)*	W
65	400**66**	Static pressure control derivate time.	Unsigned *Scale 1*	Unit: Seconds, Range: 0 to 255 seconds, *Value x 1 (e.g. 100 secs = 100)*	W
66	400**67**	Control band.	Unsigned *Scale 100*	Unit: °C/°F, Range: 2°C to 10°C or 36°F to 50°F, *Value x 100 (e.g. 5°C = 500 or 50°F = 5000)*	W
67	400**68**	Modbus timeout.	Unsigned *Scale 1*	Unit: Seconds, Range: 15 to 1800 seconds, *Value x 1 (e.g. 100 secs = 100)*	W
68	400**69**	Number of synchronization timeouts.	Unsigned *Scale 1*	Unit: No Unit, Range: 0 to 65535, *Value x 1 (e.g. 100 = 100)*	W
69	400**70**	No heat detection deadband.	Unsigned *Scale 100*	Unit: °C/°F, Range: 2°C to 8°C or 36°F to 46°F, *Value x 100 (e.g. 5°C = 500 or 5°F = 500)*	W
70	400**71**	No heat detection delay.	Unsigned *Scale 1*	Unit: Seconds, Range: 30 to 240 seconds, *Value x 1 (e.g. 100 secs = 100)*	W
71	400**72**	Exhaust fan state.	Unsigned	0 = Off, 1 = On	RO
72	400**73**	On/Off damper state.	Unsigned	0 = Closed, 1 = Open	RO
73	400**74**	On/Off damper feedback.	Unsigned	0 = Closed, 1 = Open	RO
74	400**75**	CMU fan enable.	Unsigned	0 = No, 1 = Yes	RO
75	400**76**	CMU heater stage 2 state.	Unsigned	0 = Off, 1 = On	RO
76	400**77**	Binary input 3 contact type.	Unsigned	0 = NO, 1 = NC	W
77	400**78**	Binary input 4 contact type.	Unsigned	0 = NO, 1 = NC	W
78	400**79**	Binary output 1 contact type.	Unsigned	0 = NO, 1 = NC	W
79	400**80**	Binary output 2 contact type.	Unsigned	0 = NO, 1 = NC	W

Protocol Base	Holding Register	Description	Data Type	Range	Writable
80	400**81**	Enable occupancy inputs.	Unsigned	0 = No, 1 = Yes	W
81	400**82**	Dry mode.	Unsigned	0 = Disable, 1 = Enable	W
82	400**83**	CO_2 extract.	Unsigned	0 = Disable, 1 = Enable	W
83	400**84**	Static pressure loop.	Unsigned	0 = Disable, 1 = Enable	W
84	400**85**	Occupancy inactive mode.	Unsigned	0 = Unoccupied, 1 = Off	W
85	400**86**	CMU occupancy state.	Unsigned	1 = Occupied | 2 = Unoccupied | 3 = Off	W
86	400**87**	Temperature setpoint source.	Unsigned	1 = On Board | 2 = TSTAT | 3 = Network	W
87	400**88**	AI1 input mode.	Unsigned	1 = Off | 2 = SAT | 3 = SARH | 4 = OAT | 5 = OARH | 6 = Static Pressure | 7 = Fan Setpoint | 8 = Damper Feedback	W
88	400**89**	AI2 input mode.	Unsigned	1 = Off | 2 = SAT | 3 = SARH | 4 = OAT | 5 = OARH | 6 = Static Pressure | 7 = Fan Setpoint | 8 = Damper Feedback	W
89	400**90**	AI3/BI3 input mode.	Unsigned	1 = Off | 2 = SAT | 3 = OAT | 4 = Damper Feedback | 5 = Occupancy | 6 = Fan Speed Stage	W
90	400**91**	AI4/BI4 input mode.	Unsigned	1 = Off | 2 = SAT | 3 = OAT | 4 = Damper Feedback | 5 = Occupancy | 6 = Fan Speed Stage	W
91	400**92**	AO1 output mode.	Unsigned	1 = Off | 2 = Exhaust Fan | 3 = Damper	W
92	400**93**	AO2 output mode.	Unsigned	1 = Off | 2 = Exhaust Fan | 3 = Damper	W
93	400**94**	BO1 output mode.	Unsigned	1 = Off | 2 = Exhaust Fan | 3 = Damper	W
94	400**95**	BO2 output mode.	Unsigned	1 = Off | 2 = Exhaust Fan | 3 = Damper	W
95	400**96**	Static pressure sensor range.	Unsigned	1 = 250 Pa | 2 = 500 Pa | 3 = 1250 Pa	W
96	400**97**	Analog input 1 signal range.	Unsigned	1 = 2-10Vdc | 2 = 0-10Vdc	W
97	400**98**	Analog input 2 signal range.	Unsigned	1 = 2-10Vdc | 2 = 0-10Vdc	W
98	400**99**	Analog output 1 signal range.	Unsigned	1 = 2-10Vdc | 2 = 0-10Vdc	W
99	40**100**	Analog output 2 signal range.	Unsigned	1 = 2-10Vdc | 2 = 0-10Vdc	W
100	40**101**	Control temperature source.	Unsigned	1 = SAT | 2 = RAT	W
101	40**102**	LCD screen top line value.	Unsigned	1 = None | 2 = Time | 3 = CO2 | 4 = SARH | 5 = RARH	W
102	40**103**	LCD screen displayed temperature.	Unsigned	1 = Default | 2 = Alternate | 3 = SAT | 4 = TSTAT	W
103	40**104**	LCD screen last reset reason.	Unsigned	1 = No reason | 2 = Independent Watchdog | 3 = Window Watchdog | 4 = Software Reset | 5 = Power Down	RO

Protocol Base	Holding Register	Description	Data Type	Range	Writable
104	40**105**	Alarm status.	Bit String	B0 = Unblocking Damper Required B1 = SSOR1 Sens Not Detected B2 = SSOR2 Sens Not Required B3 = SAT Not Detected B4 = RAT Not Detected B5 = Timeout Comm B6 = AI1 Reading Error B7 = AI2 Reading Error *B8 to B31 = Reserved*	RO
105	40**106**	System alarm host.	Bit String	B0 = Thermal Cutout B1 = Comm Timeout B3 = Heater Temp Cutout B4 = SSR Temp Cutout B5 = Board Temp Cutout B6 = Duct Temp Cutout B7 = Heater Temp 1 Failure B8 = Heater Temp 2 Failure B9 = Board Temp Failure B10 = SSR Temp Failure B11 = TRL Failure B13 = Invalid Config B14 = Fan Temp Failure B16 = External Temp Failure B17 = Supply Temp Failure B22 = Fan Feedback Error B30 = Air Flow Not Detected B31 = Heat Not Detected *B2, B12, B15, B18 to B21, B23 to B29 = Reserved*	RO

Notes

neptronic®

400 Lebeau blvd, Montreal, Qc, H4N 1R6, Canada
www.neptronic.com
Toll free in North America: 1-800-361-2308
Tel.: (514) 333-1433
Fax: (514) 333-3163
Customer service fax: (514) 333-1091
Monday to Friday: 8:00am to 5:00pm (Eastern time)