



neptronic®

Networkable Dual Duct VAV Controller Specification and Installation Instructions

Models

EVCBM14NIT2S (Master controller / 2 TRIACs)
EVCS14N (Slave controller)

TRL24 (Room Sensor: Temp)
TRLH24 (Room Sensor: Temp and %RH)
TRLG24 (Room Sensor: Temp and CO₂)
TRLGH24 (Room Sensor: Temp, %RH and CO₂)

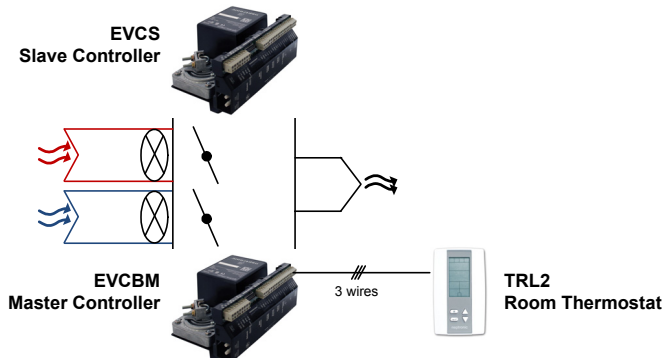
Description

The EVCB Series is a combination controller and thermostat with support for networked communications via the BACnet MS/TP or Modbus protocol. The Networkable Dual Duct VAV Controller is designed for simple and accurate control of any variable air volume box in a number of zone control configurations. Its field configurable algorithms enable versatile implementation of required control sequences.



EVCB Series / TRL24

Typical Application



Applications

- Dual duct
 - Cold and hot duct monitoring
 - Cold and discharge duct monitoring
 - Hot and discharge duct monitoring
 - Pressure independent only

Features

- Field configured VAV algorithms, inputs and outputs
- Built-in actuator, 70 lb-in
- Control external actuators using analog (0-10Vdc, adjustable)
- On board differential pressure sensor
- Select direction on analog outputs
- Simple air balancing and commissioning via thermostat
- Configurable PI (Proportional-Integral) function
- Independent, configurable proportional control band and dead band per ramp
- Selectable internal or external temperature sensor (10KΩ)
- Activate output with CO₂ sensor from TRLG24/TRLGH24 or external sensor input
- Internal and external temperature sensor calibration
- Freeze protection
- Removable, raising clamp, non-strip terminals

Operational Features

- Backlit LCD with simple icon and text driven menus
- Select thermostat's default display
- Network service port via on-board mini USB connector
- Manual night set back or no occupancy override
- Multi level lockable access menu and setpoint
- Selectable Fahrenheit or Celsius scale
- 3-wire connection to controller and 4 push buttons

Network Communication

- BACnet MS/TP or Modbus communication port
- Select MAC address via DIP switch or via network
- Automatic baud rate detection

BACnet MS/TP®

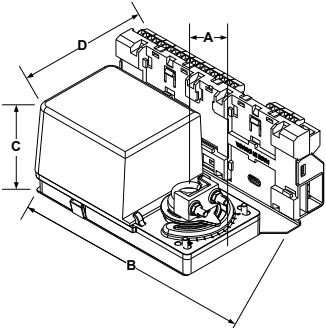
- Automatic device instance configuration
- Copy & broadcast configuration via thermostat menu or via BACnet to other controllers
- BACnet scheduler
- Firmware upgradeable via BACnet
- Support COV (change of value)

Modbus

- Modbus @ 9600, 19200, 38400 or 57600 bps
- RTU Slave, 8 bits (configurable parity and stop bits)
- Connects to any Modbus master



Controller Specifications

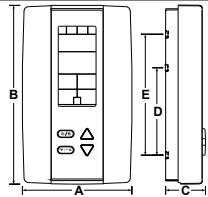
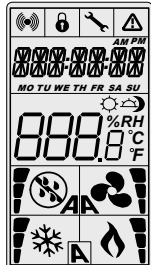
Description	EVCBM14NIT2S Master	EVCS14N Slave
Torque	70 in.lb. [8 Nm] at rated voltage	
Power consumption	10 VA max	
Running time through 90°	90 seconds	
Power supply	22 to 26 Vac 50/60 Hz	
Inputs	1 input for slave connection (0-10Vdc)	1 input for master connection (0-10Vdc)
	1 Universal inputs (Thermistor 10KΩ Type 3, digital 24Vac/dry contact, or 0-10Vdc)	-
	2 digital inputs	-
On-board differential pressure sensor	0-1.0" WC	
Outputs	1 output for slave connection (0-10Vdc)	1 output for master connection (0-10Vdc)
	1 analog outputs (0-10 Vdc or 2-10Vdc; selectable)	-
	2 TRIAC outputs 24 Vac, 500mA max thermal fuse in series with each TRIAC output (on/off, pulse, or 1 floating output)	-
Real Time Clock	Real-time clock (RTC) with super capacitor backup (approximately 3 days)	-
BACnet	BACnet® MS/TP @ 9600, 19200, 38400 or 76800 bps (B-ASC)	-
Modbus	Modbus RTU slave @ 9600, 19200, 38400 or 57600. Selectable configuration: No parity, 2 stop bit Even parity, 1 stop bit Odd parity, 1 stop bit	-
Communication connection	24 AWG twisted-shield cable (Belden 9841 or equivalent). Maximum 50ft (15m) between controller and thermostat	-
Electrical connection	0.8 mm ² [18 AWG] minimum	
Operating temperature	0°C to 50°C [32°F to 122°F]	
Storage temperature	-30°C to 50°C [-22°F to 122°F]	
Relative Humidity	5 to 95% non condensing	
Weight	1.8 kg. [4 lb]	
Dimensions A = 2.85" 73mm B = 4.85" 123mm C = 1.00" 24mm D = 2.36" 60mm E = 3.27" 83mm		



The actuator performs an auto-stroke on power up. When changing the actuator adjustment screws, cycle power to initiate the auto-stroke.

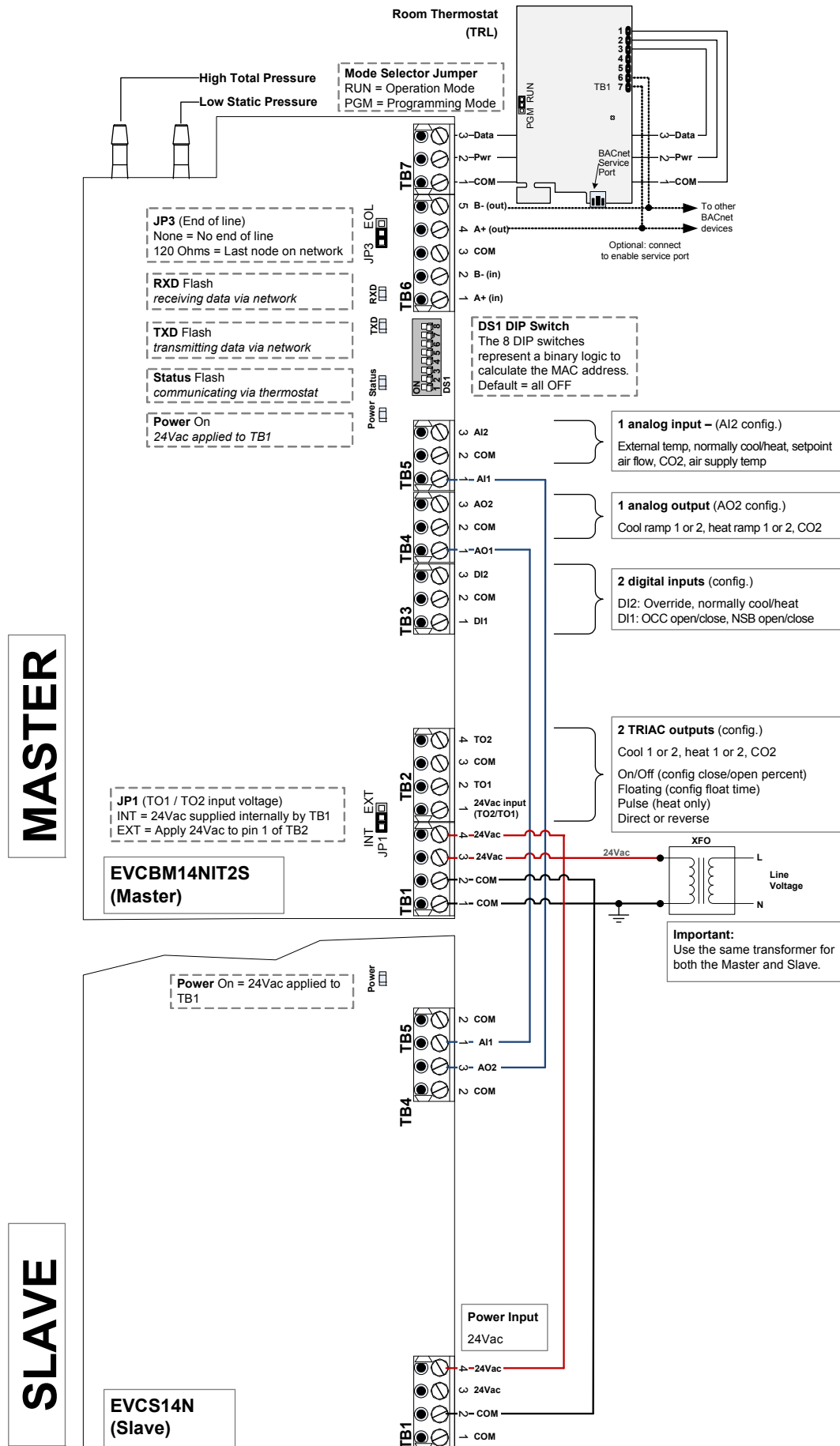


Thermostat Specifications

Description		TRL24 / TRLH24 / TRLG24 / TRLGH24																											
Temperature Sensor																													
Setpoint range	10°C to 40°C [50°F to 104°F]																												
Control accuracy	Temperature: ±0.4°C [0.8°F]																												
Display resolution	±0.1°C [0.2°F]																												
CO2 Sensor (TRLG24 / TRLGH24 only)																													
Operating principle	Self-calibrating, Non-Dispersive Infrared (NDIR)																												
Sensor Range	0 to 2000 ppm																												
Setpoint range	100 to 2000 ppm																												
Accuracy	±30 ppm ±3% of reading																												
Response time	2 minutes by 90%																												
Display resolution	1 ppm																												
Humidity Sensor (TRLH / TRLGH24 only)																													
Sensor range	5 to 100%RH																												
Display resolution	0.1%																												
Electrical connection	3 wires to EVCB controller and 2 wires to BACnet/Modbus network 0.8 mm ² [18 AWG] minimum																												
Network service port	Mini USB connector																												
Power supply	24Vac or 24Vdc																												
Power consumption	1VA																												
Operating temperature	0°C to 50°C [32°F to 122°F]																												
Storage temperature	-30°C to 50°C [-22°F to 122°F]																												
Relative humidity	5 to 95 % non condensing																												
Enclosure protection	IP 30 (EN 60529)																												
Weight	120 g. [0.25 lb]																												
Dimensions	 A = 2.85" 73mm B = 4.85" 123mm C = 1.00" 24mm D = 2.36" 60mm E = 3.27" 83mm																												
LCD Interface	 <table><tr><td></td><td>Cooling ON A: Automatic</td><td></td><td>Communication Status</td><td></td><td>Alarm status</td></tr><tr><td></td><td>Heating ON A: Automatic</td><td></td><td>Menu Locked</td><td></td><td>Energy saving mode (NSB or Occupancy)</td></tr><tr><td></td><td>Fan ON A: Automatic</td><td></td><td>Programming mode (Technician setting)</td><td>%RH</td><td>Percentage of humidity</td></tr><tr><td colspan="3"></td><td></td><td>°C or °F</td><td>°C: Celsius scale °F: Fahrenheit scale</td></tr></table>						Cooling ON A: Automatic		Communication Status		Alarm status		Heating ON A: Automatic		Menu Locked		Energy saving mode (NSB or Occupancy)		Fan ON A: Automatic		Programming mode (Technician setting)	%RH	Percentage of humidity					°C or °F	°C: Celsius scale °F: Fahrenheit scale
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				°C or °F	°C: Celsius scale °F: Fahrenheit scale																								

Wiring

We strongly recommend that all Neptronic products be wired to a separate grounded transformer and that transformer shall service only Neptronic products. This precaution will prevent interference with, and/or possible damage to incompatible equipment.





BACnet or Modbus Address DIP Switch (DS1)

MAC address for communication, are selectable by DIP switch using binary logic. If you do not change device instance in program mode, it will be automatically modified according to the MAC address.



Note: Avoid using addresses above 246 when selecting Modbus MAC address.

MAC Address	DS.1 = 1	DS.2 = 2	DS.3 = 4	DS.4 = 8	DS.5 = 16	DS.6 = 32	DS.7 = 64	DS.8 = 128	Default Device Instance
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	153000
1	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	153001
2	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	153002
3	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	153003
4	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	153004
...	...	...	...	...	...	...	...	...	...
126	OFF	ON	ON	ON	ON	ON	ON	OFF	153126
127	ON	ON	ON	ON	ON	ON	ON	OFF	153127

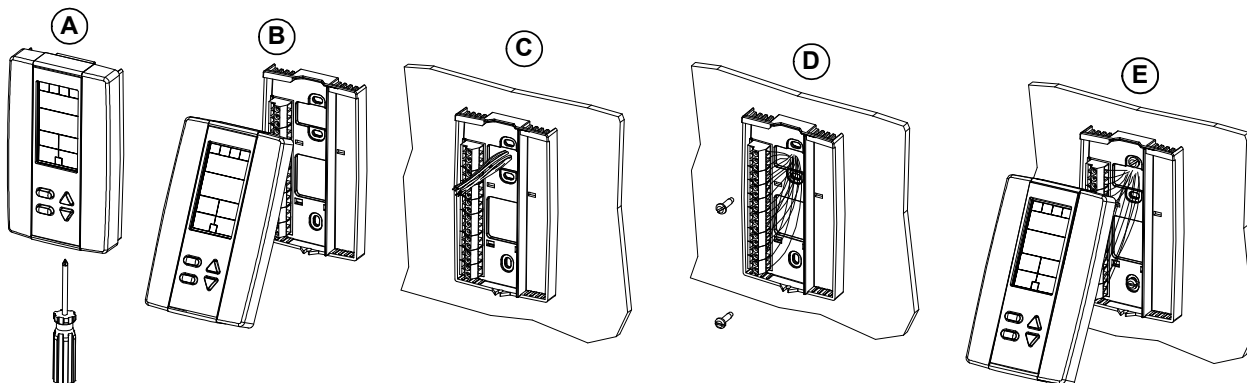
* Slave addresses available by setting DS.8 to ON

Mounting Instructions



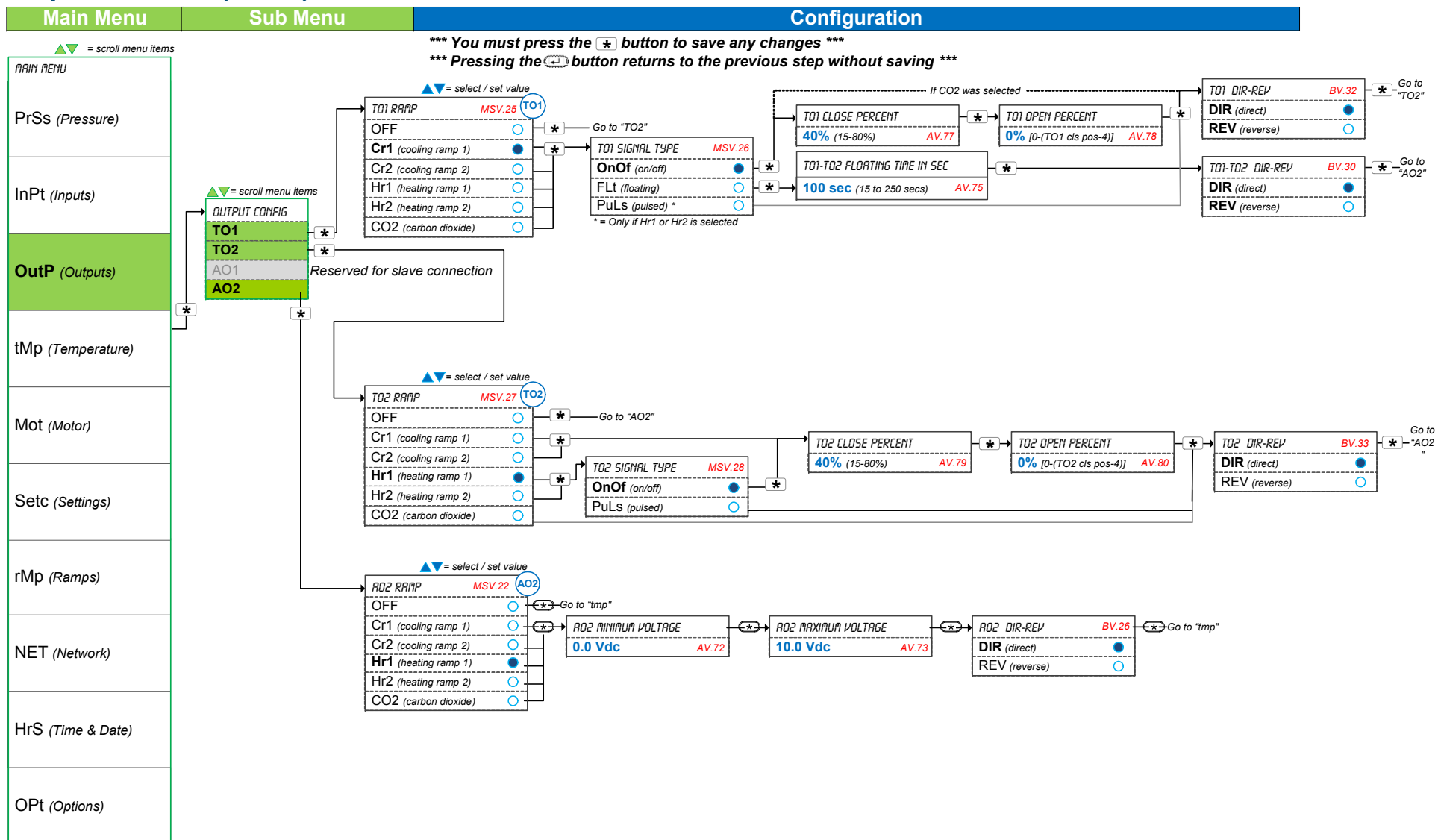
CAUTION: Remove power to avoid a risk of malfunction.

- Remove the captive screw that's holding the base and the front cover of the unit together.
- Lift the front cover of the unit to separate it from the base.
- Pull all wires through the holes in the base.
- Secure the base to the wall using wall anchors and screws (supplied). Make the appropriate connections.
- Mount the control module on the base and secure using the screw.



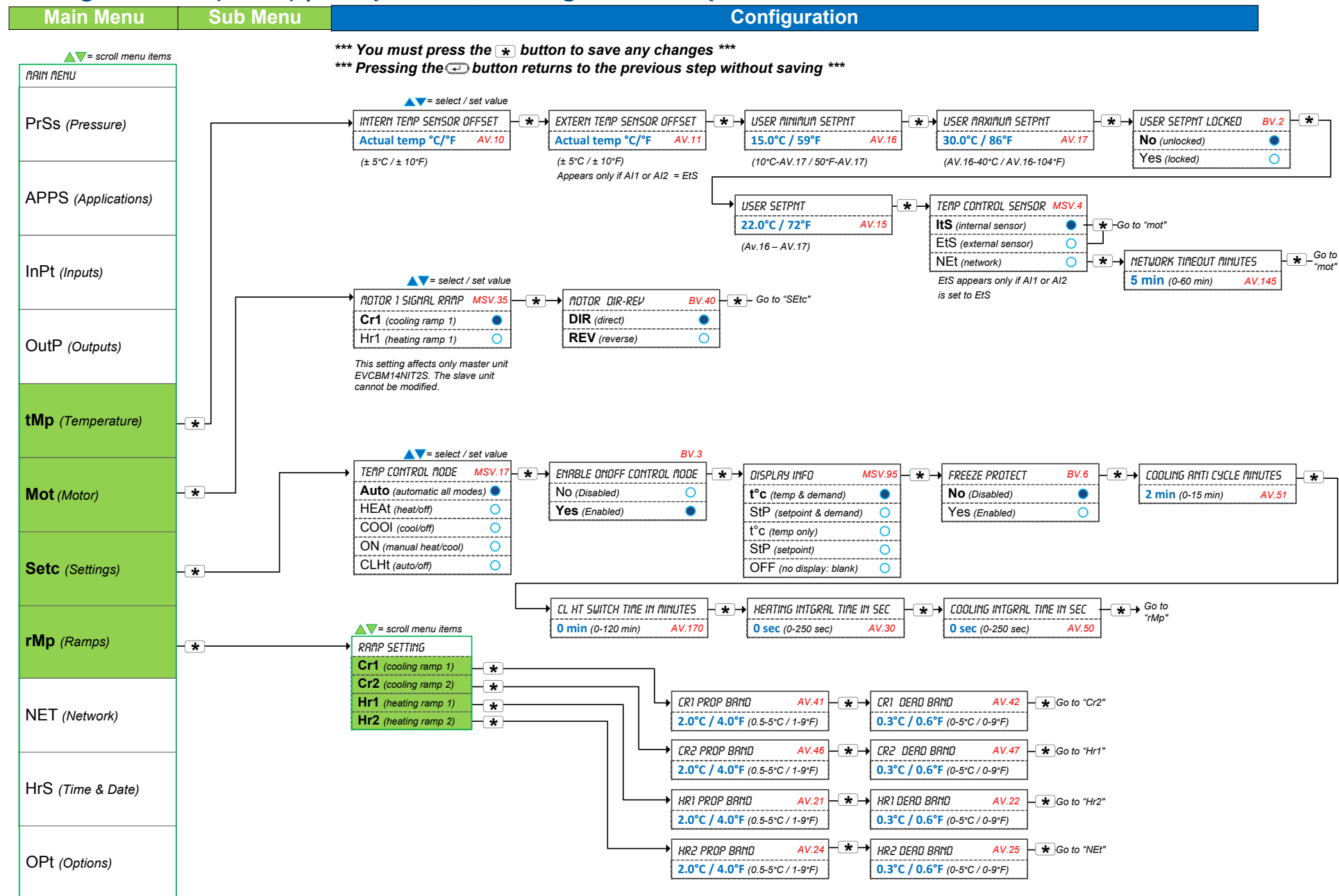


Outputs – Menu (2 of 4)



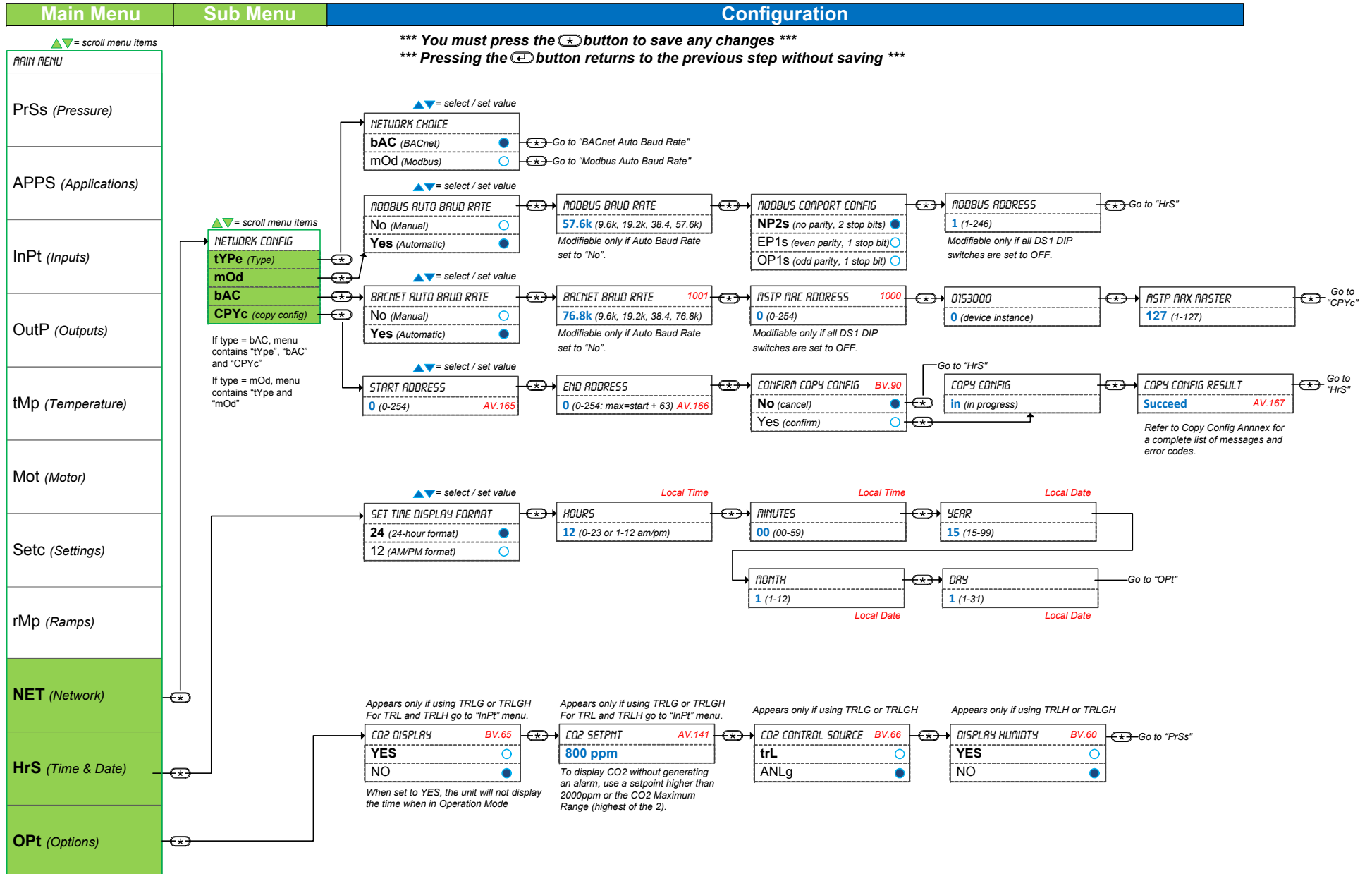


Settings – Menu (3 of 4) | Temp, Motor, Settings and Ramps





Settings – Menu (6 of 6) | Network, Time and Options





Reset to Factory Default Settings



This will erase all actual configurations and replace them with the factory default settings.

1. The Mode Selector jumper (JP1) of the thermostat must be set to the "RUN" position (Operation Mode). Refer to Wiring on page 4.
2. During the power up sequence of the controller and thermostat (when the firmware versions are displayed), press and hold both the  and  buttons.
3. The "ENTER PASSWORD" screen appears. Enter **372** within 1 minute by using the arrow keys to increase or decrease the value and the  and  buttons to toggle between the digits.
4. Use the arrow buttons to select YES and then press .

Menu 372 – Temperature Offset

This menu is accessible through normal operation mode. The Mode Selector jumper (JP1) of the thermostat must be set to the "RUN" position (Operation Mode). Refer to Wiring on page 3.

5. Press the  and  buttons simultaneously for 5 seconds. The "ENTER PASSWORD" screen appears.
6. Enter the password within 1 minute by using the arrow keys to increase or decrease the value and the  and  buttons to toggle between the digits.
 - a. Password **372** = Temperature Offset Menu
7. If you enter the wrong password, the thermostat displays "Error" and returns to Operation Mode. The thermostat will return to normal mode if you navigate through the entire menu and do not make any selection, or if you do not press any key for 5 minutes. The changed values will be saved automatically.

1. "INTERN TEMP SENSOR OFFSET"



Range: 10 to 40°C [50 to 104°F]
Offset: Max ± 5°C
Increment: 0.1°C [0.2°F]

Compare the displayed temperature reading with a known value from a thermometer. To offset or calibrate the sensor, use the arrows key to set the desired temperature reading. This is useful for thermostats installed in areas where the temperature read is slightly different than the room's actual temperature. For example, a thermostat placed right under the air diffuser.

If the thermostat is set to use an external temperature sensor (**EtS**), the thermostat displays "OFF".

2. "EXTERN TEMPER SENSOR OFFSET"



Range: 0 to 50°C [41 to 122°F]
Offset: Max ± 5°C
Increment: 0.1°C [0.2°F]

This option appears if you've set one of the analog inputs to **EtS** (External temperature sensor). When the thermostat is connected to the appropriate analog input, the display shows the temperature read by the external temperature sensor. Adjust the offset by comparing it with a known value (e.g. thermometer). If the sensor is not connected or short circuited, then the unit displays the sensor's limit.

3. "INPUT3 READING"



Range: 250mV (0") to 4000mV (1")

Displays the voltage output value in mV of the pressure sensor.

4. "INPUT3 MINIMUM READING"



Range: 10mV to 180mV
Default: 60mV

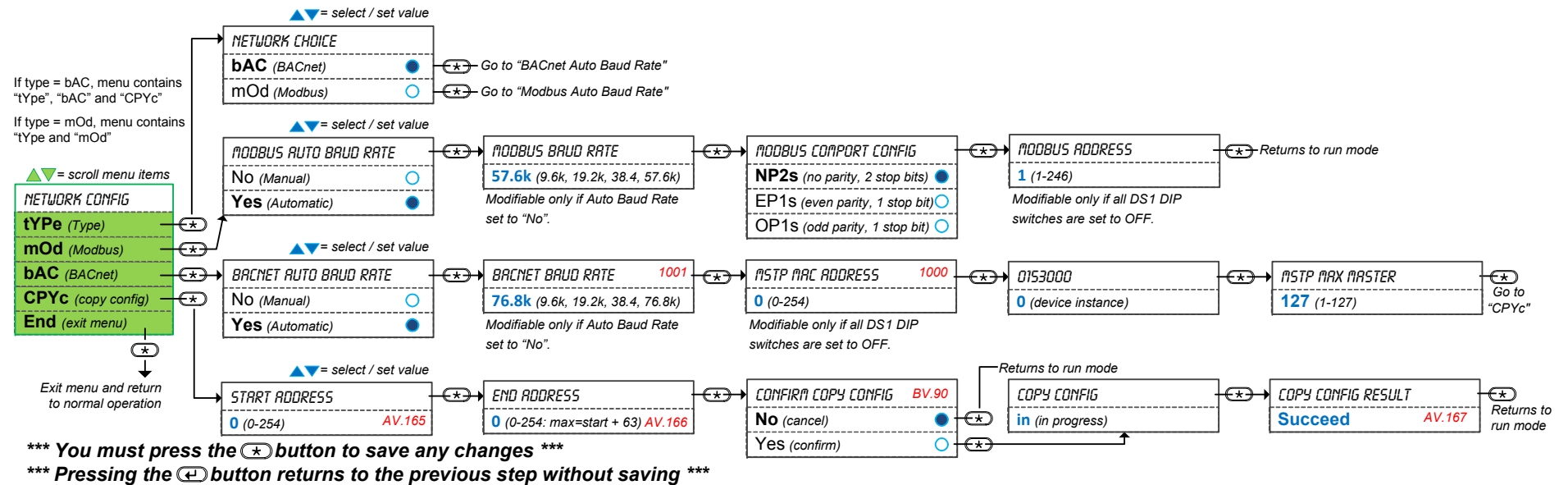
This setting represents the deadband of the pressure sensor in mV. For advanced users or special applications only. We recommend that you use the default setting of 60mV.



Menu 637 – Network Settings

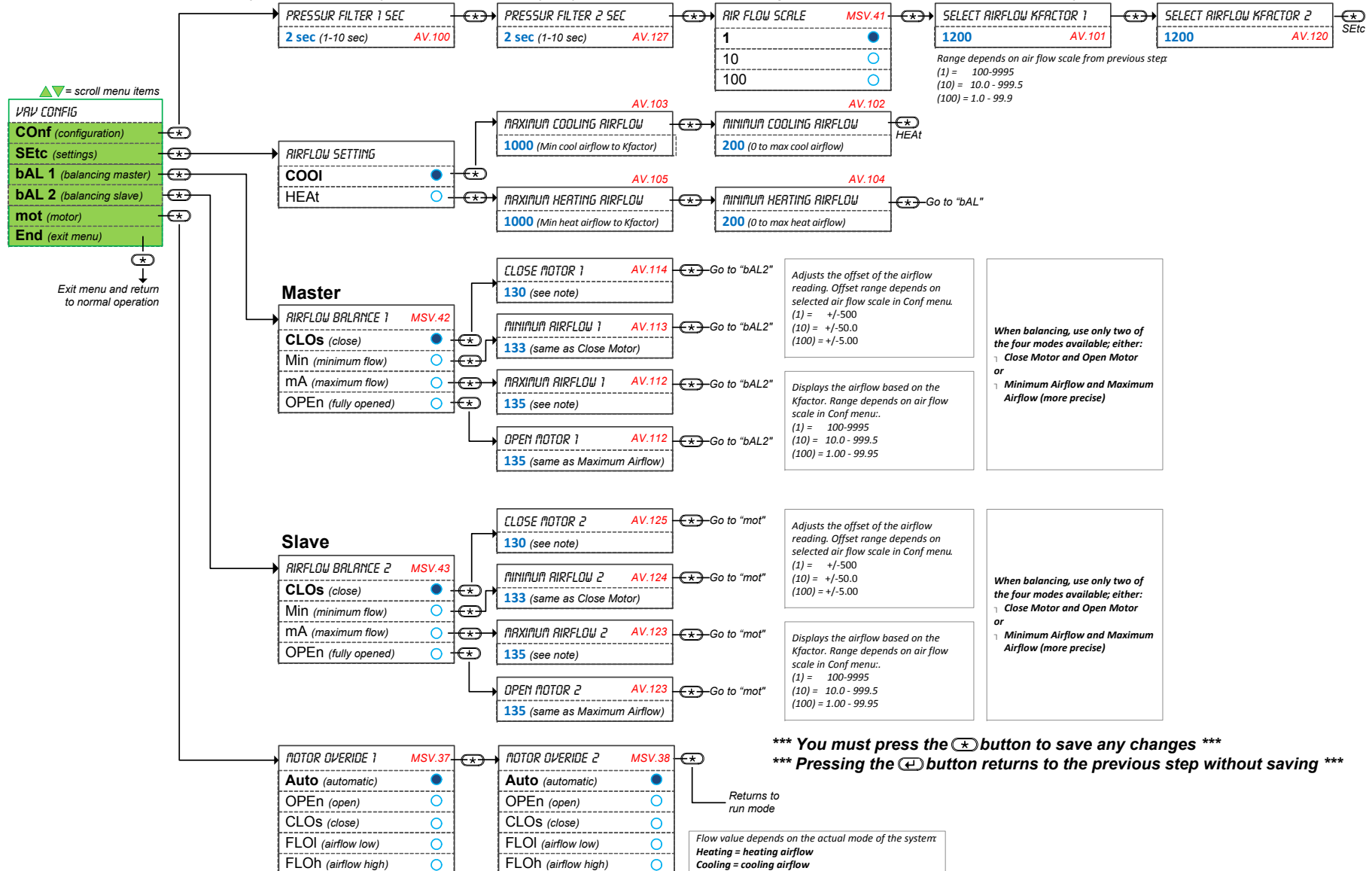
This menu is accessible through normal operation mode. The Mode Selector jumper (JP1) of the thermostat must be set to the “RUN” position (Operation Mode). Refer to Wiring on page 3.

1. Press the **[*]** and **[↵]** buttons simultaneously for 5 seconds. The “ENTER PASSWORD” screen appears.
2. Enter the password within 1 minute by using the arrow keys to increase or decrease the value and the **[*]** and **[↵]** buttons to toggle between the digits.
 - a. Password **637** = Network Settings Menu
3. If you enter the wrong password, the thermostat displays “Error” and returns to Operation Mode. The thermostat will return to normal mode if you navigate through the entire menu and do not make any selection, or if you do not press any key for 5 minutes. The changed values will be saved automatically.





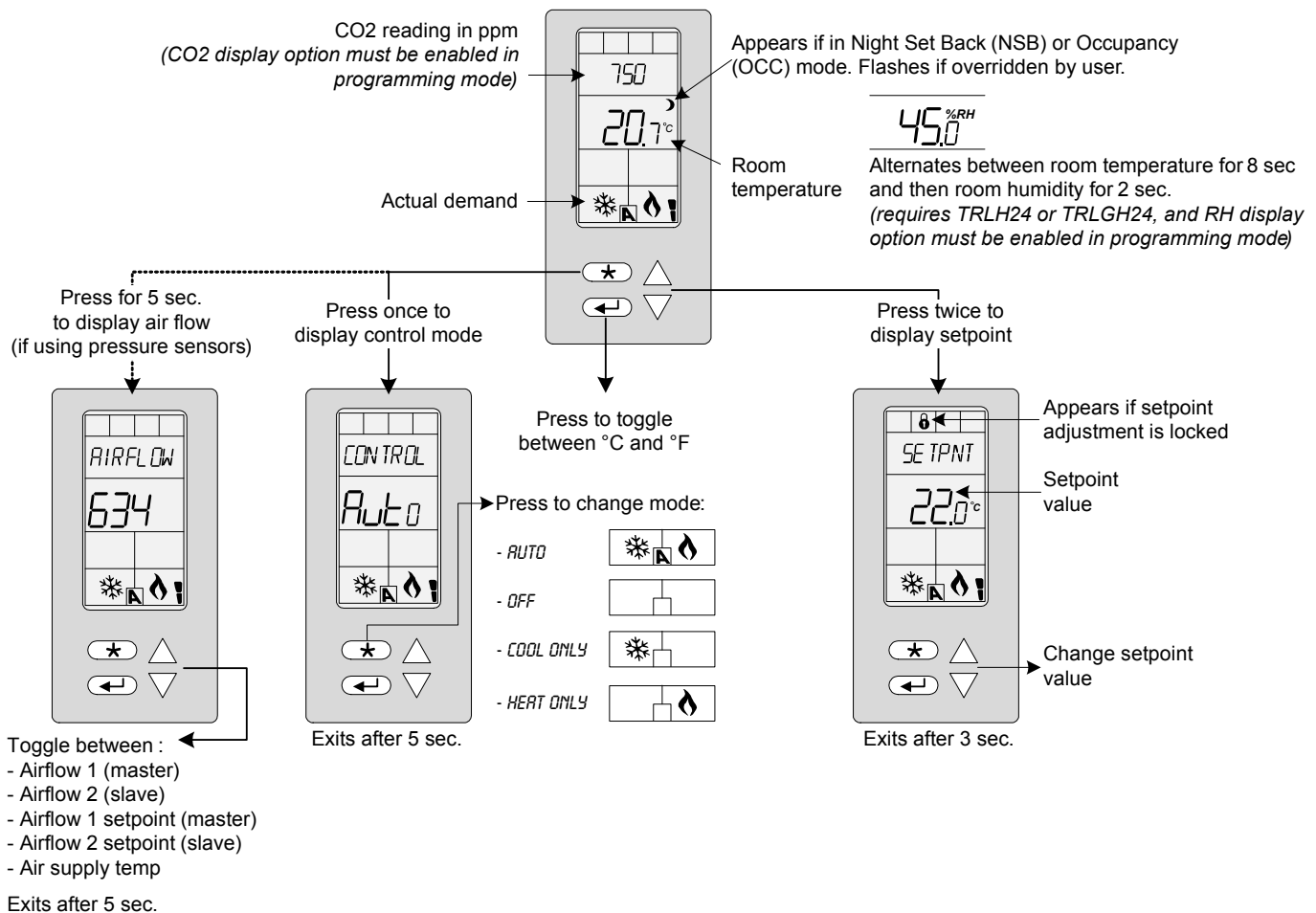
1. Press the **[*]** and **[.]** buttons simultaneously for 5 seconds. The "ENTER PASSWORD" screen appears.
2. Enter the password (**757**) within 1 minute by using the arrow keys to increase or decrease the value and the **[*]** and **[.]** buttons to toggle between the digits.
3. If you enter the wrong password, the thermostat displays "Error" and returns to Operation Mode. The thermostat will return to normal mode if you navigate through the entire menu and do not make any selection, or if you do not press any key for 5 minutes. The changed values will be saved automatically.





Operation Mode

The Mode Selector Jumper (JP1) of the thermostat must be set to the “RUN” position (Operation Mode). Refer to Wiring on page 3.



Power Up

Upon power up, the LCD illuminates and all segments appear for 2 seconds. The thermostat then displays its current version of the thermostat for 2 seconds followed by the current version of the controller for 2 seconds. Pressing any key on the thermostat illuminates the LCD for 4 seconds.

CO₂

If enabled via the configuration menu, the thermostat displays the CO2 reading on the first line above the temperature reading. If CO2 display is enabled, the time will not be displayed.

Temperature

If enabled in the “Display Info” menu (see Settings – Menu (3 of 4) | Temp, Motor, Settings and Ramps on page 8), the thermostat displays the temperature reading. If the sensor is disconnected or short circuited, then the unit displays the sensor’s limit. To toggle the temperature scale between °C and °F, press the button.

Temperature Setpoint

To display the setpoint, press the or key twice. The set point appears for 5 seconds. To adjust the setpoint, press the arrow keys while the temperature is displayed. If the setpoint adjustment has been locked “SETPNT LOCKED”, the lock symbol appears.



Humidity

If enabled in the "Options" menu (see Settings – Menu (6 of 6) | *Network, Time and Options* on page 9), the thermostat displays the temperature reading for 8 seconds and then displays the humidity reading for 2 seconds. If the sensor is disconnected or short circuited, then the unit displays the sensor's limit.

Airflow and Air Supply Temperature

Press and hold the button for 5 seconds and use the arrow keys to view the "AIRFLOW 1" (master), "AIRFLOW 2" (slave), "AIRFLOW SETPNT 1" (master), "AIRFLOW SETPNT 2" (slave), and "AIR SUPPLY TEMP". After 5 seconds without any action, the thermostat returns to operation mode. The air supply temperature appears only if analog input AI1 or AI2 are configured with the AST option.

Control Mode

To access the Control Mode, press the button. The Control Mode appears for 5 seconds. Press the button to scroll through the following control modes. These options can vary depending on the options selected in "Temp Control Mode" and "Enable OnOff Control Mode".

- Auto (Automatic Cooling or Heating)
- Cooling only (on, with cooling symbol)
- Heating only (on, with heating symbol)
- OFF (if it is not disabled in Programming Mode)

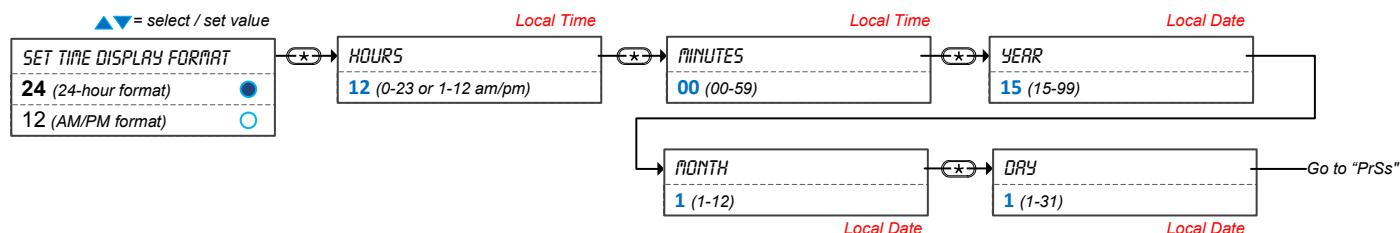
Night Set Back (NSB) or Occupancy Mode

This function is only available if you set DI1 to **nSb** (Night set back contact) or **Occ** (occupancy mode). If the DI1 contact is triggered, the thermostat enters NSB or No Occupancy Mode (the symbol appears) and uses the NSB or OCC heating and cooling setpoints.

If not locked, you can override the night set back or no occupancy mode for a predetermined period by pressing any of the 4 buttons. During the override period the symbol will flash. If the symbol does not flash, the override period is finished or the night set back or no occupancy override has been locked in programming mode.

Set Time and Date

1. Ensure that JP1 on the thermostat is set to run.
2. Press and hold the button for 5 seconds
3. Use the arrow keys to set the desired value. Press the button to save and go to the next step. Press the button to go to the previous step without saving.



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)