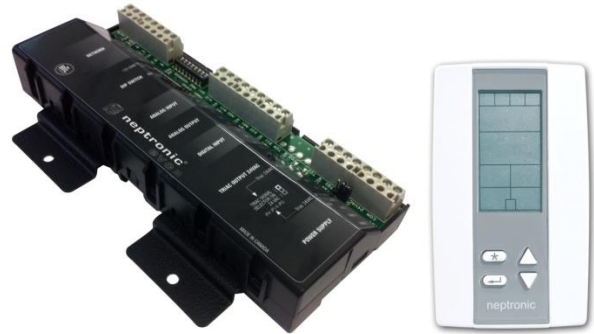




Models

EVCB14NIT4X (4 TRIACS / independent / external motor)
**For use with external floating or modulating actuators*

- TRL24** (Thermostat 2x4)
- TRLH24** (Thermostat 2x4 with Humidity)
- TRLG24** (Thermostat 2x4 with CO2)
- TRLGH24** (Thermostat 2x4 with CO2 and Humidity)



EVCB14NIT4X / TRL24 Series

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 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.

Features

- Field configured VAV algorithms, inputs and outputs
- Control external actuators using analog (0-10Vdc, adjustable) or floating signals with feedback
- 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
- Activate output with CO₂ sensor from TRL or external input
- Selectable internal or external temperature sensor (10KΩ)
- Changeover by contact or external temperature sensor
- 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

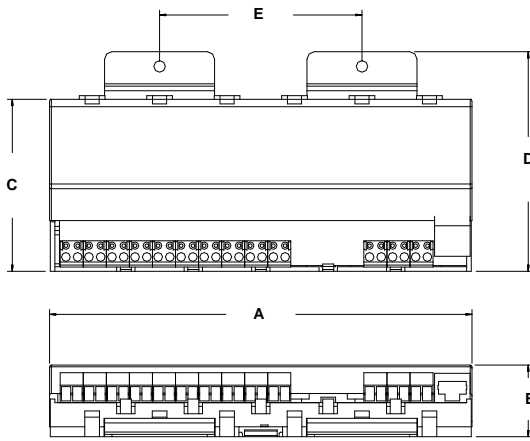
- Modbus @ 9600, 19200, 38400 or 57600 bps
- RTU Slave, 8 bits (configurable parity and stop bits)
- Connects to any Modbus master

Controller Specifications

Description	EVCB14NIT4X
Power consumption	10 VA max
Power supply	22 to 26 Vac 50/60 Hz
Inputs	2 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	2 analog outputs (0-10 Vdc or 2-10Vdc; selectable) 4 TRIAC outputs 24 Vac, 500mA max thermal fuse in series with each TRIAC output (on/off, pulse, or 2 floating outputs)
Real Time Clock	Real-time clock (RTC) with super capacitor backup (approximately 3 days)
BACnet	BACnet® MS/TP @ 9600, 19200, 38400 or 76800 bps (BAS-C)
Modbus	Modbus RTU slave @ 9600, 19200, 38400 or 57600. Selectable parity and stop bit 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). Max 0ft (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

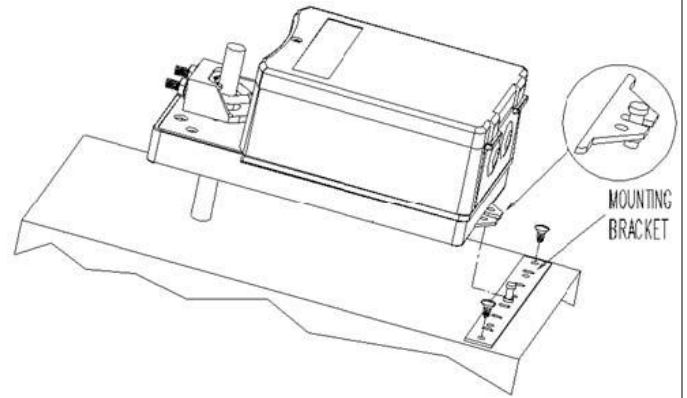


A = 7.20" | 182.9mm
B = 1.22" | 31.0mm
C = 2.93" | 74.3mm
D = 3.74" | 94.9mm
E = 3.45" | 87.6mm

Mechanical Installation

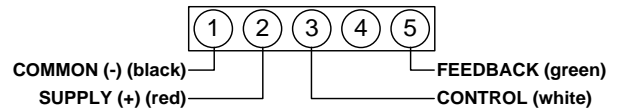
1. Manually close the damper blades and position the actuator to 0° or 90°.
2. Slide the actuator onto the shaft.
3. Tighten the nuts on the "U" bolt to the shaft with an 8mm wrench to a torque of 150 in.lb. [17 Nm].
4. Slide the mounting bracket under the actuator. Ensure free movement of the slot at the base of the actuator. Place the bracket pin at mid distance of the slot.
5. Affix the bracket to the ductwork with #8 self-tapping screws.
6. Connect the cable from the EVC to the terminal in the actuator as shown.

External 180 in. lb. Actuator



 **Do not press the clutch when the actuator is powered.**

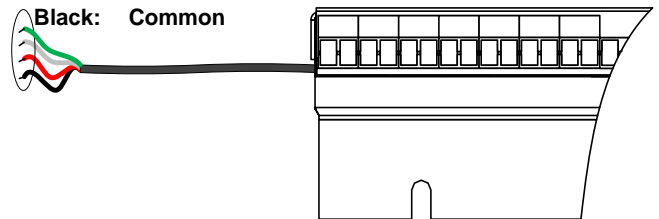
Terminals on the Actuator



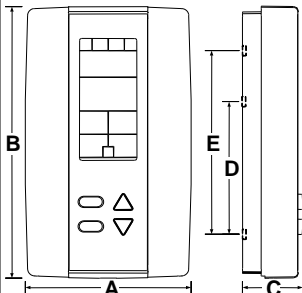
Signal cable from EVC controller

Use to connect the external motor on EVCB14NIT4X.

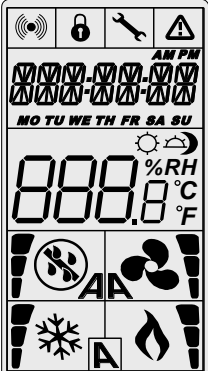
- Green: Feedback
- White: Control
- Red: 24Vac
- Black: Common













Thermostat Specifications

Description	TRL24 / TR LH24 / TR LG24 / TR LGH24
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]
Humidity Sensor (TR LH24 and TR LGH24 only)	
Sensor range	5 to 95%RH
Display resolution	0.1%
CO2 Sensor (TR LG24 and TR LGH24 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
Electrical connection	3 wires to VAV 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	 <p> A = 2.85" 73mm B = 4.85" 123mm C = 1.00" 24mm D = 2.36" 60mm E = 3.27" 83mm </p>

TRL24 Interface

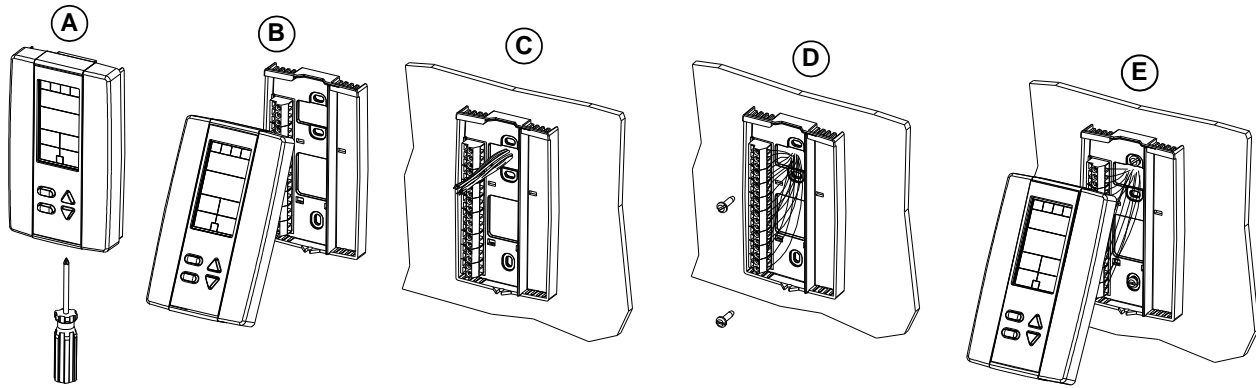


	Cooling ON A: Automatic		Communication Status		Alarm status
	Heating ON A: Automatic		Menu Locked		Energy saving mode (NSB or Occupancy)
	Fan ON A: Automatic		Programming mode (Technician setting)		Percentage of humidity
					°C: Celsius scale °F: Fahrenheit scale

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.



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.

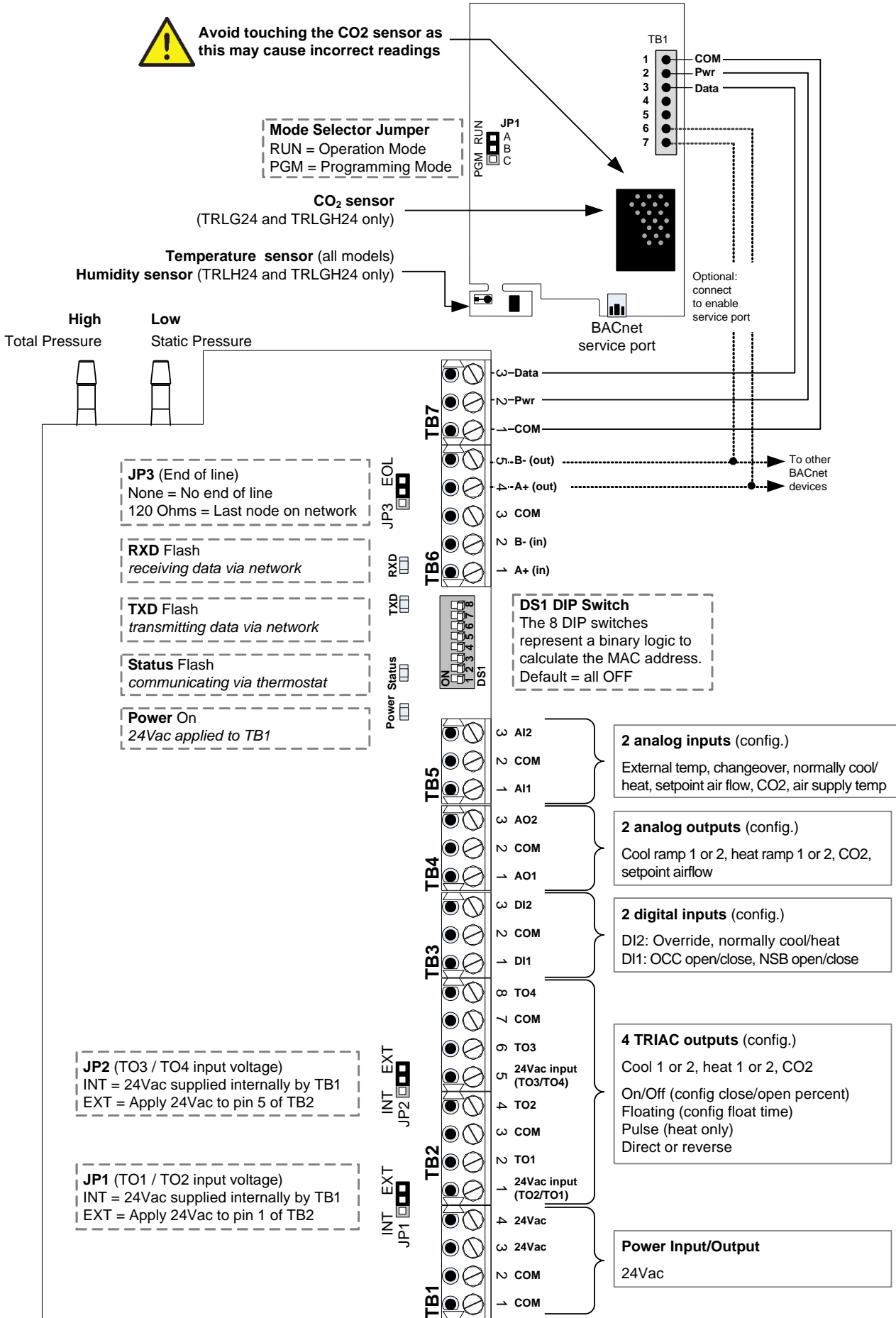
MAC Address	DS.1 = 1	DS.2 = 2	DS.3 = 4	DS.4 = 8	DS.5 = 16	DS.6 = 32	DS.7 = 64	DS.8 = 128	Default Device Instance
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	153000
1	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	153001
2	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	153002
3	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	153003
4	OFF	OFF	ON	OFF	OFF	OFF	OFF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



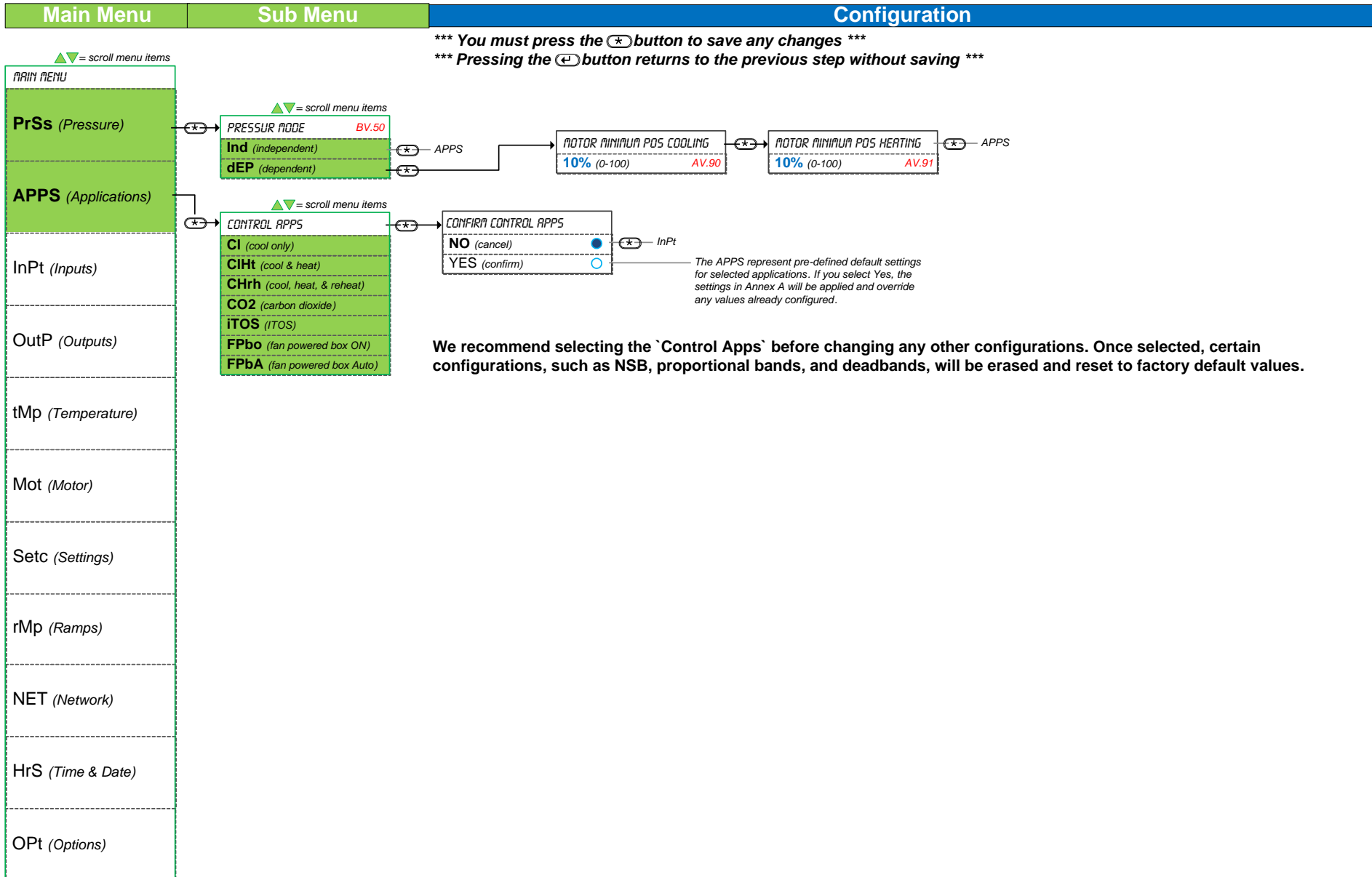
Wiring

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.



Pressure & Applications – Menu (1 of 7)

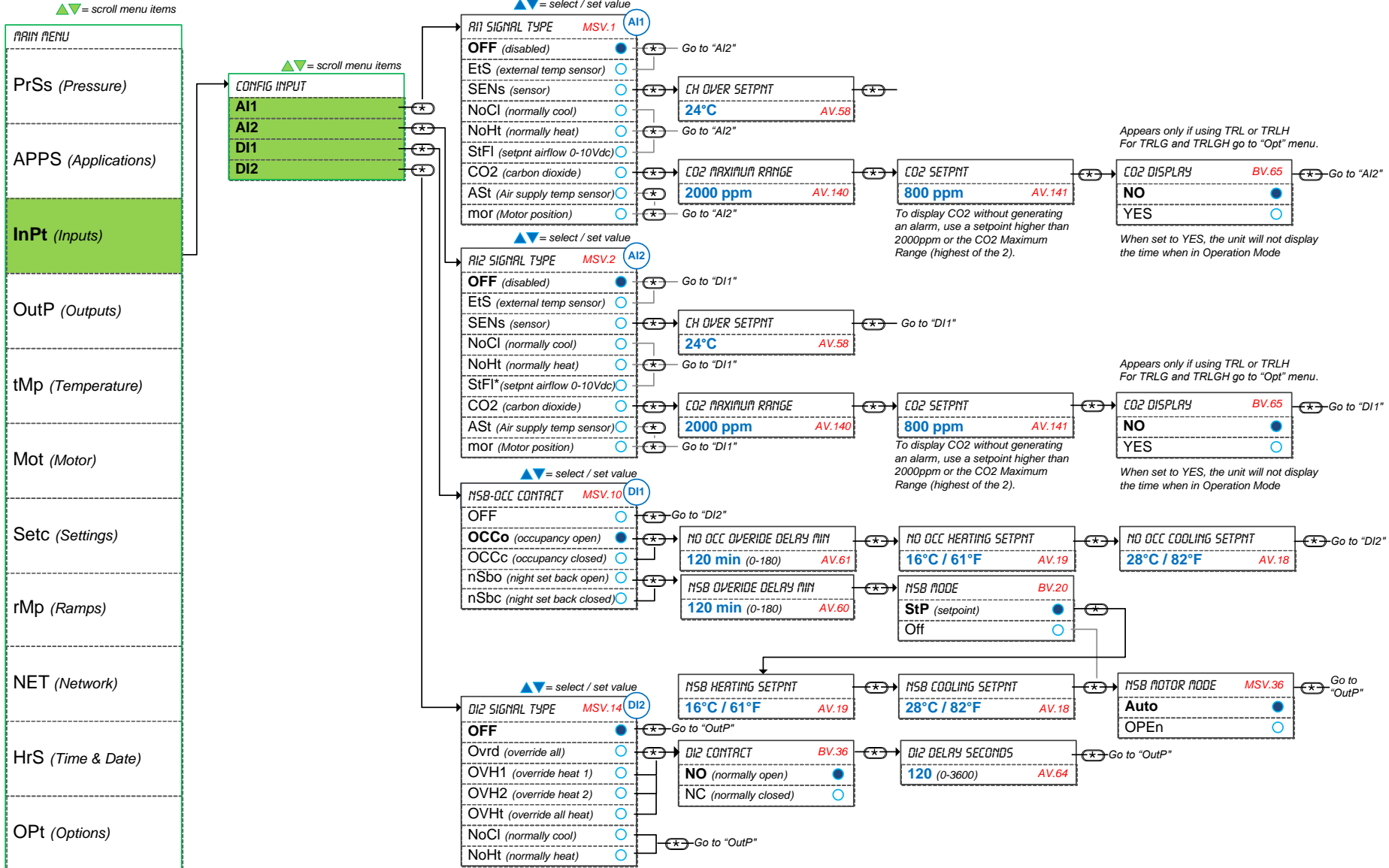
For a description of the default settings for each application refer to Annex A: Control Apps on page 17.



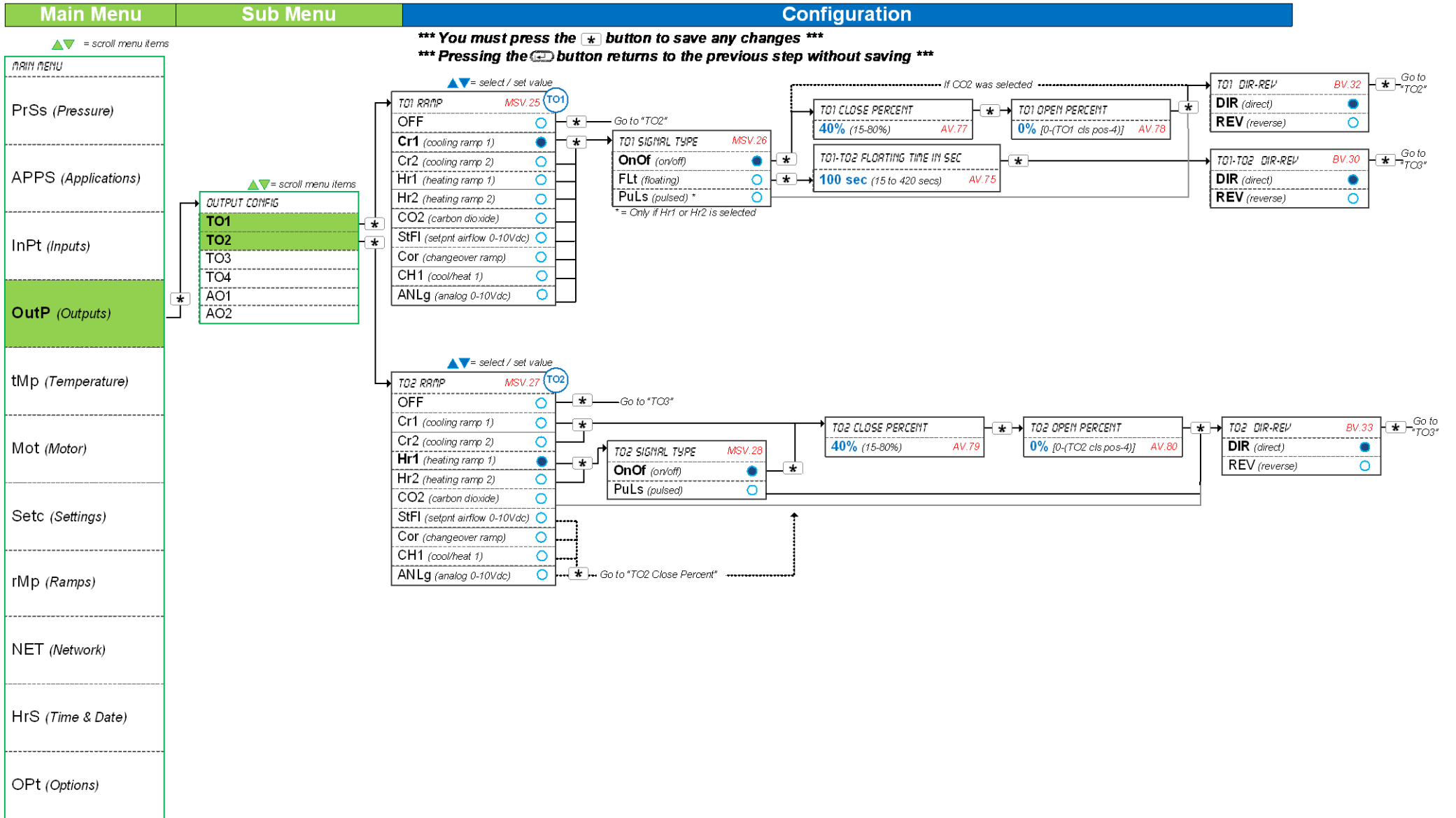
Inputs – Menu (2 of 7) | AI1, AI2, DI1 and DI2

Main Menu	Sub Menu	Configuration
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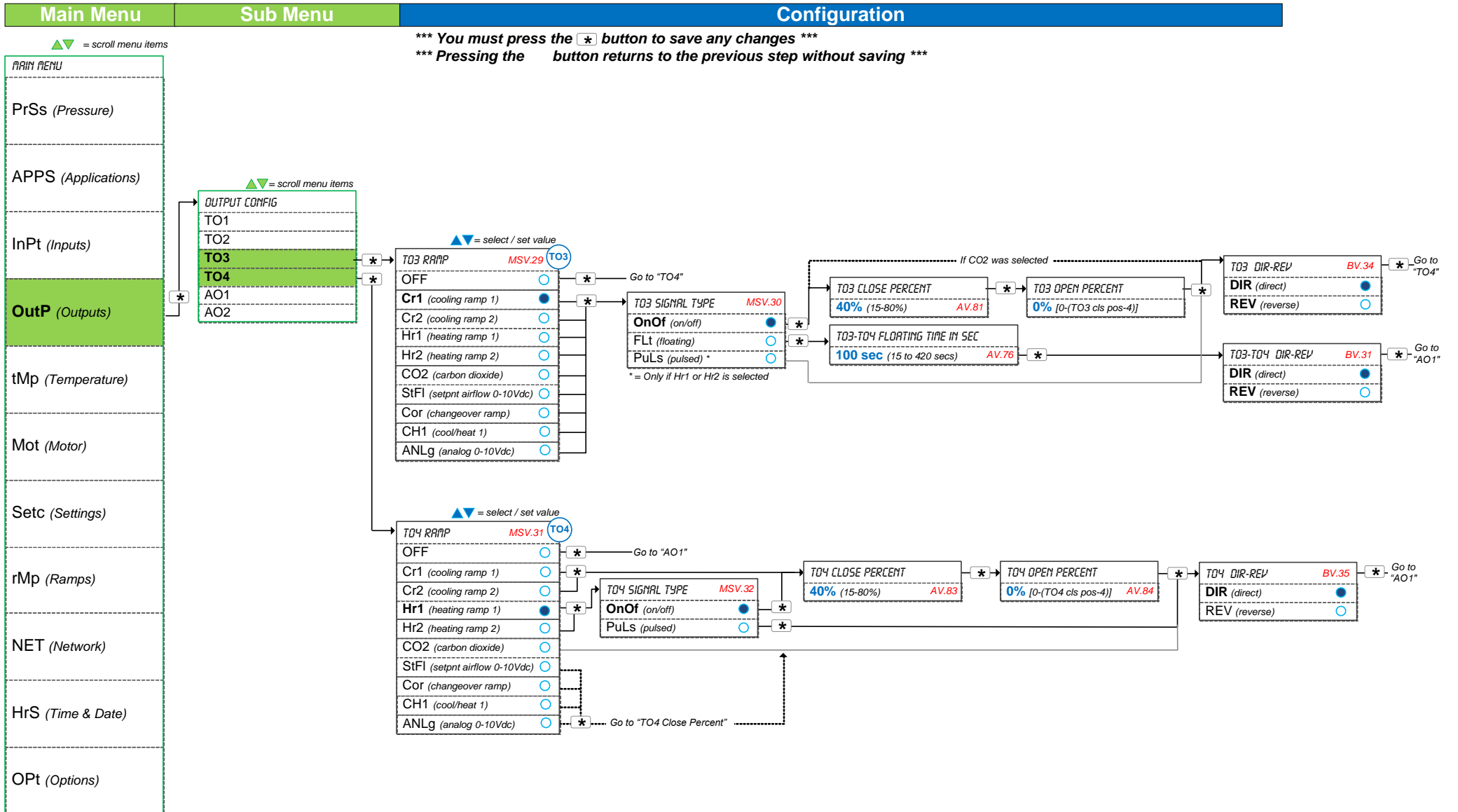
*** You must press the **(*)** button to save any changes ***
 *** Pressing the **(↶)** button returns to the previous step without saving ***



TRIAC Outputs – Menu (3 of 7) | TO1 and TO2



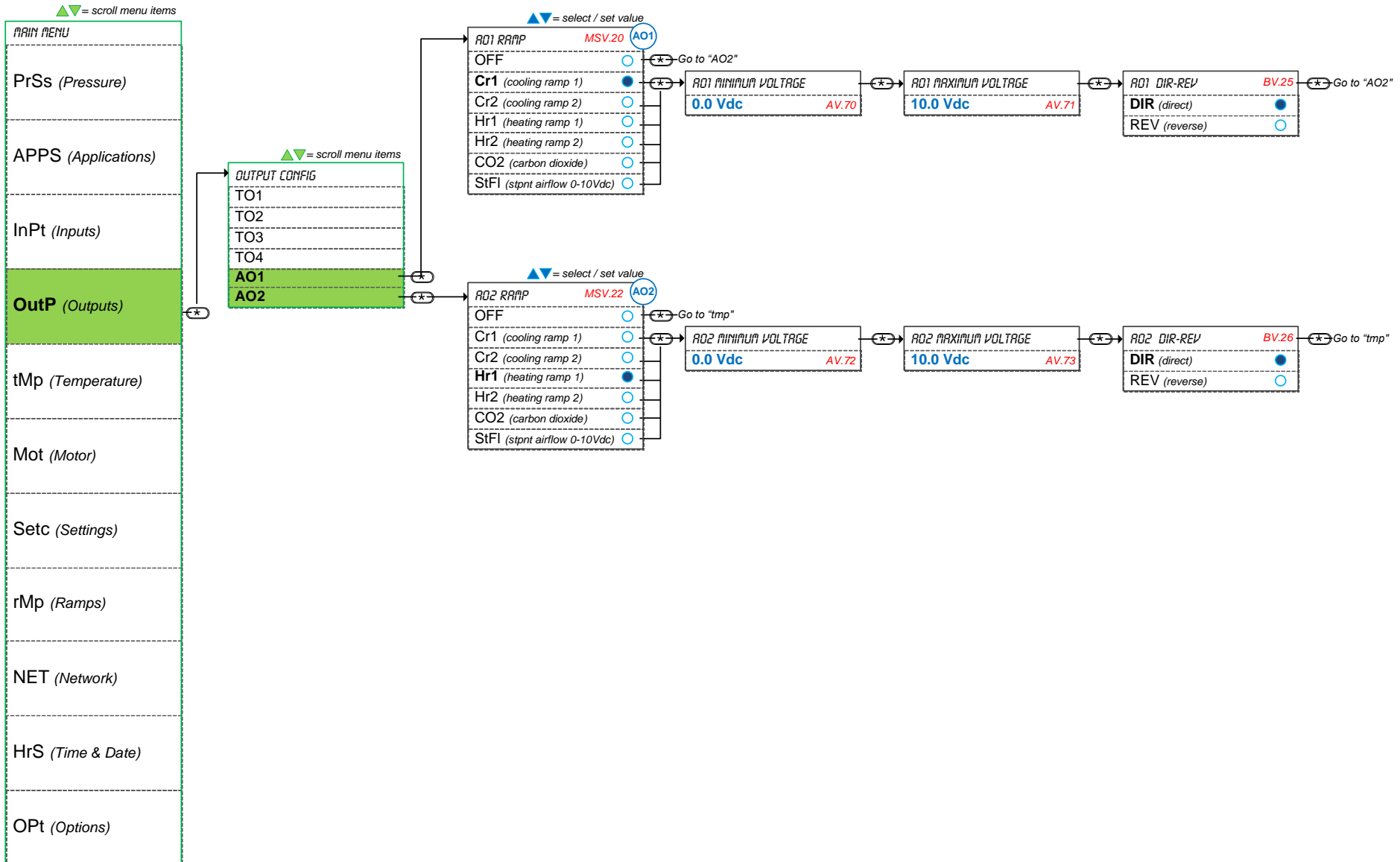
TRIAC Outputs – Menu (4 of 7) | TO3 and TO4



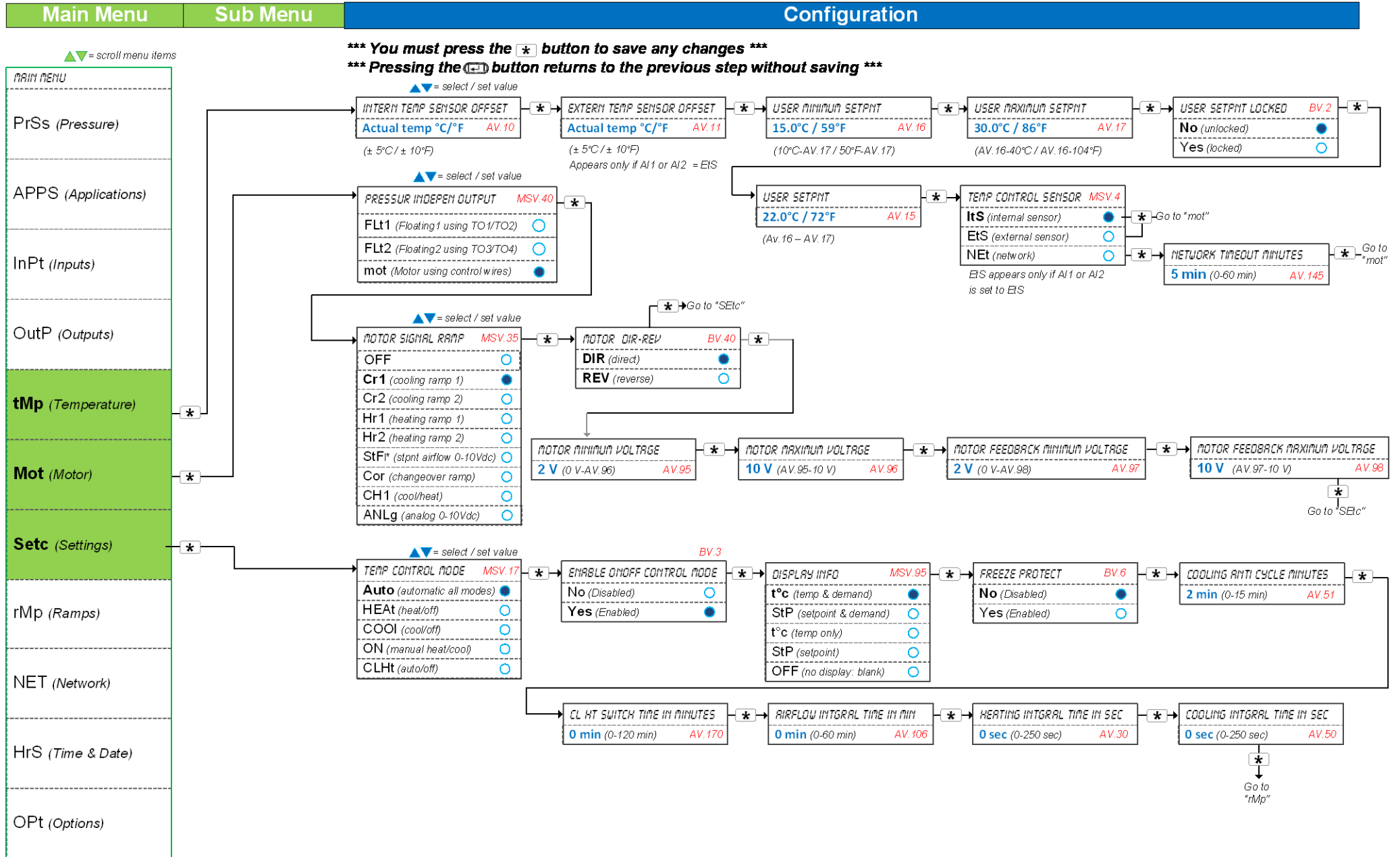
Analog Outputs – Menu (5 of 7) | AO1 and AO2

Main Menu	Sub Menu	Configuration
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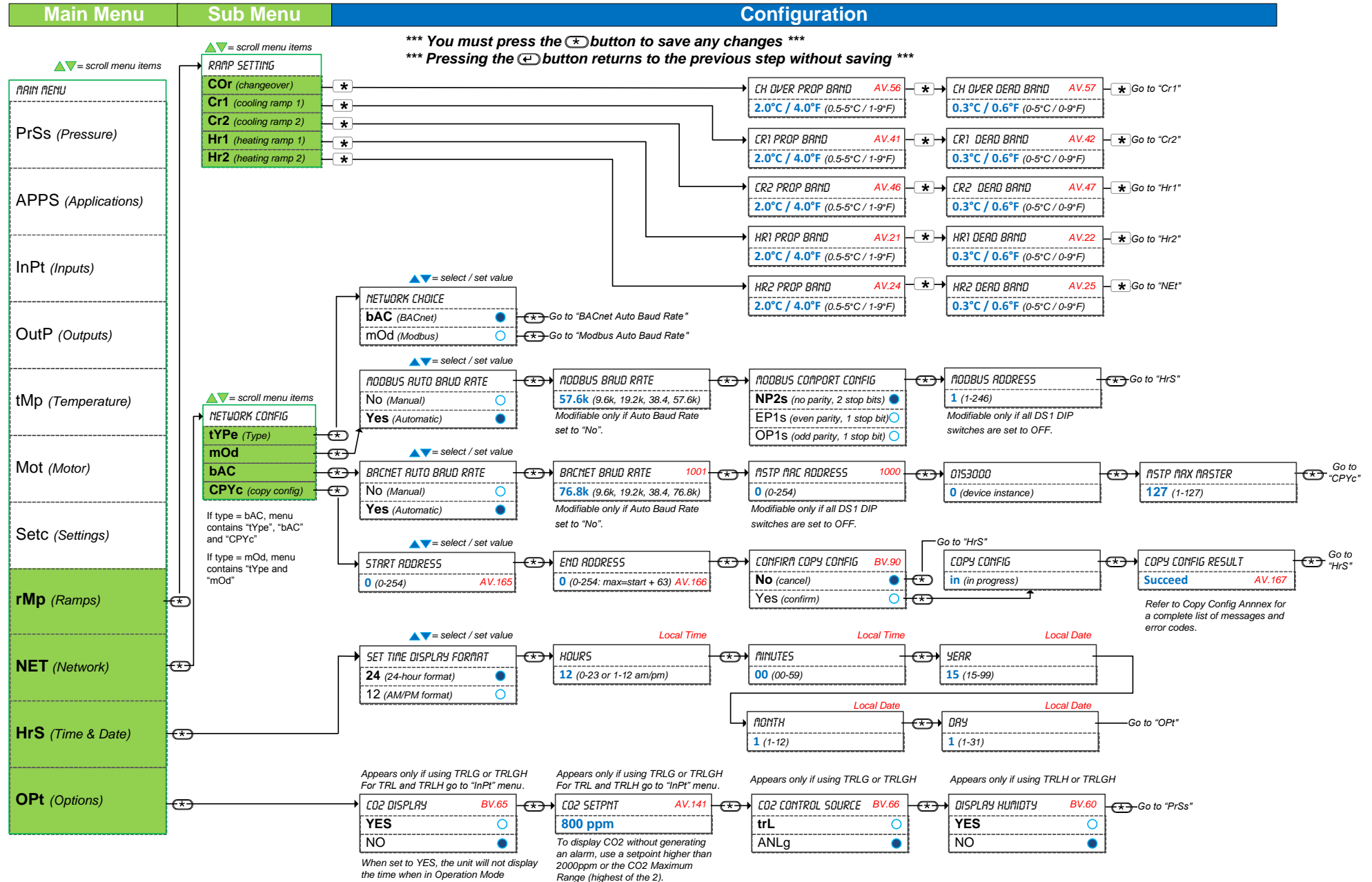
*** You must press the **(*)** button to save any changes ***
 *** Pressing the **(◀)** button returns to the previous step without saving ***



Settings – Menu (6 of 7) | Temp, Motor, and Settings



Settings – Menu (7 of 7) | Ramps, Network, Time, and Options




Operation Menus

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 5.

- Press the [*] and [↵] buttons simultaneously for 5 seconds. The "ENTER PASSWORD" screen appears.
- 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.
 - Password **372** = Temperature Offset Menu
 - Password **637** = Network Settings Menu
 - Password **757** = Airflow Balance Mode
- 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.

Menu 372 – Temperature Offset


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.

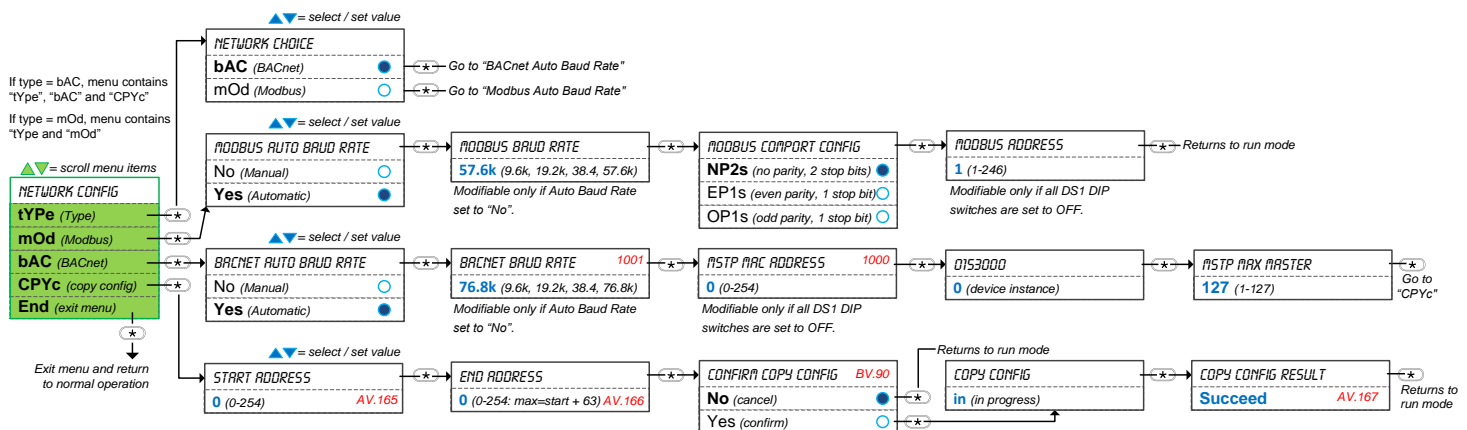
4. "INPUT3 MINIMUM READING"



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.

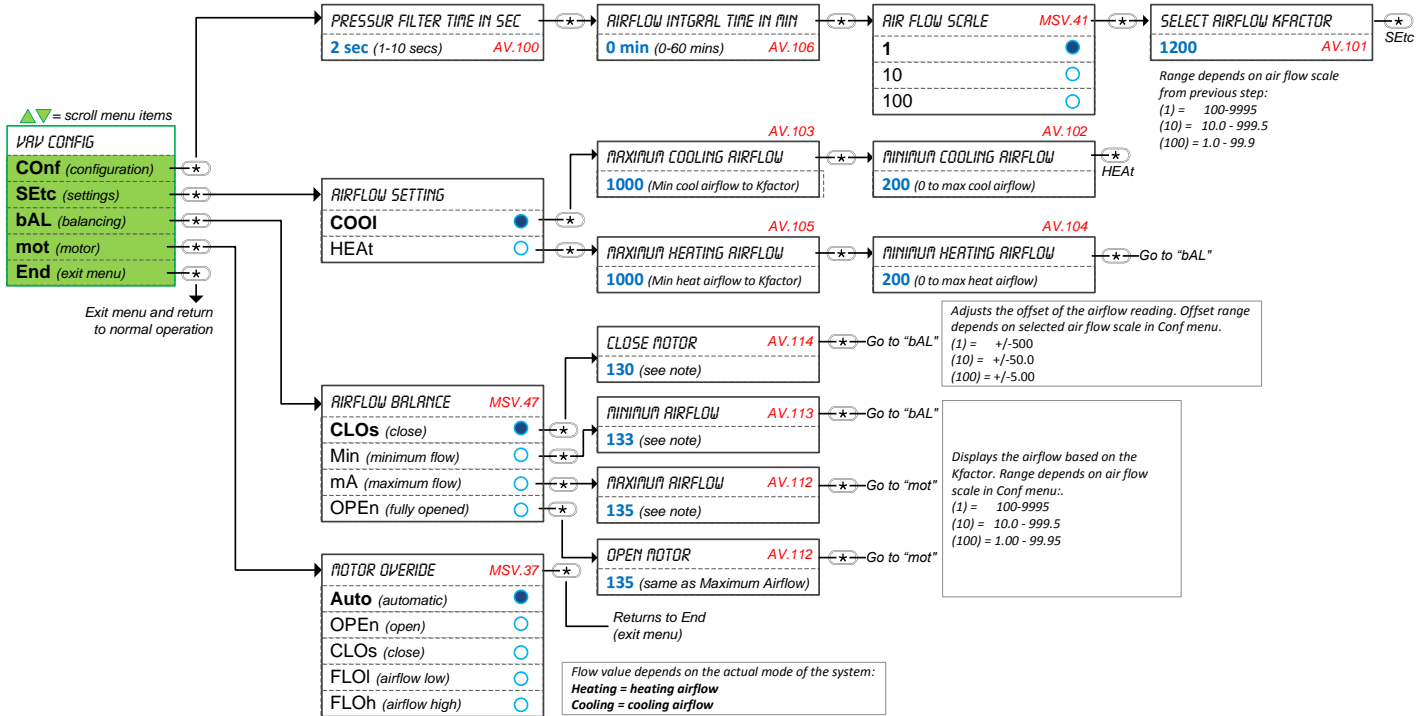
Menu 637 – Network Settings



*** You must press the [*] button to save any changes ***
 *** Pressing the [↵] button returns to the previous step without saving ***



Menu 757 – Airflow Balance Mode



*** You must press the ***** button to save any changes ***
 *** Pressing the **↩** button returns to the previous step without saving ***



Note: Refer to **EVCB-Airflow Balance Instructions** on Neptronic website for further information on airflow balancing function.

Reset to Factory Default Settings

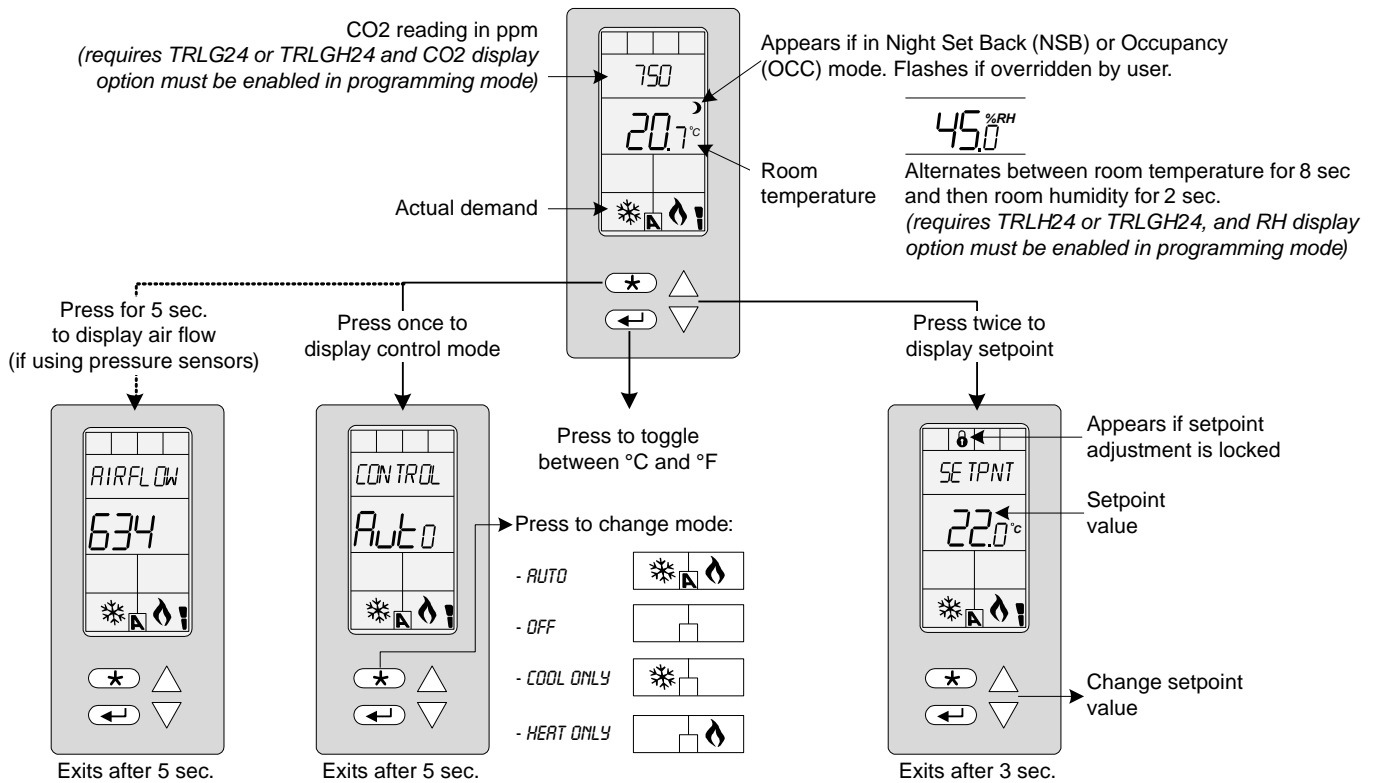


This will erase all actual configurations and replace them with the factory default settings.

1. The Mode Selector jumper (JP1) of the thermostat must be set to the "RUN" position (Operation Mode). Refer to Wiring on page 5.
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 *****.

Operation Mode

The Mode Selector Jumper (JP1) of the thermostat must be set to the "RUN" position (Operation Mode). Refer to Wiring on page 4.




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 (6 of 7) | Temp, Motor, and Settings on page 11), 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 (7 of 7) | Ramps, Network, Time, and Options on page 12), 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", "AIRFLOW SETPNT", 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)

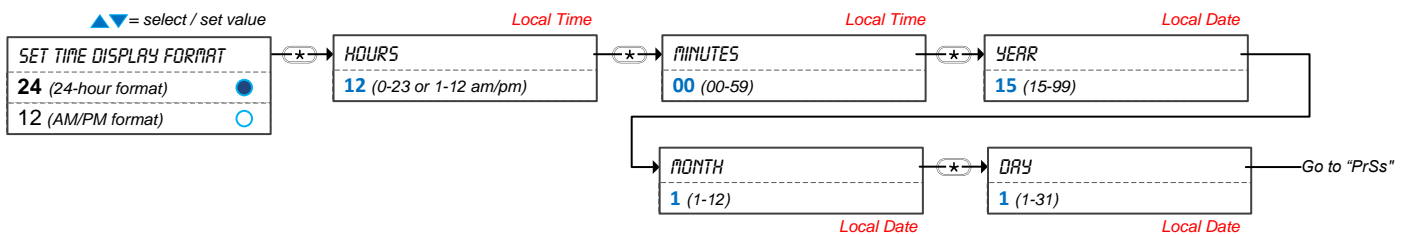
Night Set Back (NSB) or Occupancy Mode

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 got to the next step. Press the  button to go to the previous step without saving.



Annex A: Control Apps

Refer to *Pressure & Applications – Menu (1 of 7)* on page 6 for more information. The available **Control Apps** vary according to the model.

Description	CL (cool only)	CLHt (cool/heat)	CHrH (cool/heat/reheat)	CO2 (CO2)	ITOS (ITOS)	FPbo (fan powered ON)	FPbA (fan powered Auto)
Min. Setpoint	20°C (68°F)	20°C (68°F)	20°C (68°F)	20°C (68°F)	15°C (59°F)	15°C (59°F)	15°C (59°F)
Max. Setpoint	28°C (82°F)	28°C (82°F)	28°C (82°F)	28°C (82°F)	30°C (86°F)	30°C (86°F)	30°C (86°F)
Changeover Setpnt	24°C (75°F)	20°C (68°F)	20°C (68°F)	20°C (68°F)	24°C (75°F)	24°C (75°F)	24°C (75°F)
TO1 Ramp	HR1	CR1	HR1	CR1	OFF	HR1	HR1
TO1 Signal Type	On/Off	On/Off	On/Off	On/Off	On/Off	On/Off	On/Off
TO1 Close Pos.	40%	40%	40%	40%	40%	35%	35%
TO1 Open Pos.	0%	0%	0%	0%	0%	0%	0%
TO2 Ramp	HR1	HR1	HR1	CO2	OFF	HR1	HR1
TO2 Signal Type	Pulse	On/Off	Pulse	On/Off	On/Off	On/Off	On/Off
TO2 Close Pos.	40%	40%	40%	40%	40%	70%	70%
TO2 Open Pos.	0%	0%	0%	0%	0%	35%	35%
TO3 Ramp	HR2	CR2	HR2	HR1	OFF	Fan ON	Fan Auto
TO3 Signal Type	On/Off	On/Off	On/Off	On/Off	On/Off	On/Off	On/Off
TO3 Close Pos.	40%	40%	40%	40%	40%	40%	40%
TO3 Open Pos.	0%	0%	0%	0%	0%	0%	0%
TO4 Ramp	HR2	HR2	HR2	HR1	OFF	HR1	HR1
TO4 Signal Type	Pulse	On/Off	Pulse	On/Off	On/Off	On/Off	On/Off
TO4 Close Pos.	40%	40%	40%	40%	40%	40%	40%
TO4 Open Pos.	0%	0%	0%	0%	0%	0%	0%
Motor Ramp	CR1	COr	COr	COr	CR1	CR1	COr
AO1 ramp	HR1	CR1	HR1	CR1	HR1	HR1	HR1
AO2 Ramp	HR2	HR1	HR2	HR1	OFF	HR2	Fan Auto
AI1 Input	OFF	SENS	SENS	SENS	OFF	OFF	SENS
AI2 Input	OFF	OFF	OFF	CO2	OFF	OFF	OFF
DI1 Input	nSb.o	nSb.o	nSb.o	Occ.o	Occ.o	nSb.o	nSb.o
Heat Prop Band 2	2°C (4°F)	2°C (4°F)	2°C (4°F)	2°C (4°F)	2°C (4°F)	1°C (2°F)	1°C (2°F)
Heat Deadband 2	1.3°C (2.6°F)	1.3°C (2.6°F)	1.3°C (2.6°F)	1.3°C (2.6°F)	0.3°C (0.6°F)	1.3°C (2.6°F)	1.3°C (2.6°F)
Cool Deadband 2	1.3°C (2.6°F)	1.3°C (2.6°F)	1.3°C (2.6°F)	1.3°C (2.6°F)	0.3°C (0.6°F)	0.3°C (0.6°F)	0.3°C (0.6°F)

Legend

Grey Text = Standard default value

Bold Text = Special default value for selected application

- HR = Heating ramp
- CR = Cooling ramp
- COr = Changeover ramp
- SENS = Changeover temperature sensor
- Fan ON = Fan powered box in continuous mode
- Fan Auto = Fan powered box in automatic mode (follows demand)
- nSb.o = Night Set Back (normally open)
- Occ.o = Occupancy mode (normally open)

- TO = TRIAC output
- AO = Analog output
- AI = Analog input
- DI = Digital input



Recycling at end of life: please return this product to your Nepronic local distributor for recycling. If you need to find the nearest Nepronic authorized distributor, please consult www.neptronic.com.



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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)