



Controller Models

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

TRL Series Thermostat

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

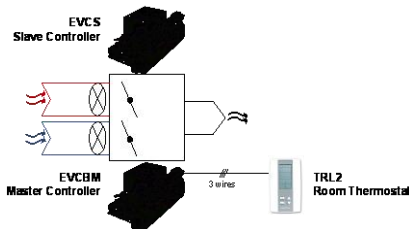
TDU Series Thermostat

TDU10 (Grey LCD, white enclosure)
TDU40 (Black LCD, black enclosure)
TDU70 (Black LCD, white enclosure)

Description

The EVCB Series is a combination controller and thermostat with support for networked communications via the BACnet MS/TP or Modbus protocol. The EVCB Series controller is compatible with both TRL24 and TDU series thermostats. 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.

Typical Application



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/TDU 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 setback or no occupancy override
- Multi level lockable access menu and setpoint
- Selectable Fahrenheit or Celsius scale
- 3-wire connection to controller and 4 push keys



EVCB Series



TRL24 Series



TDU10 / TDU40 / TDU70 Series

Applications

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

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

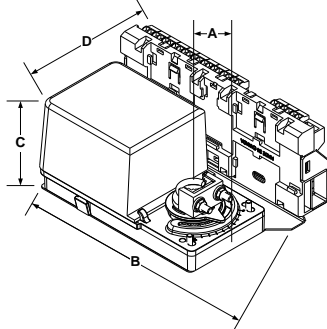


Controller Specifications

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	-
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]	

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

EVC with a built-in 70 in. lb. Actuator



Dimensions

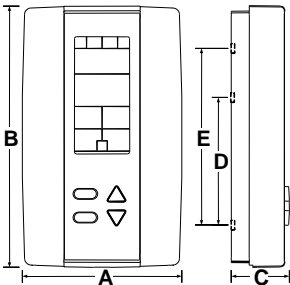
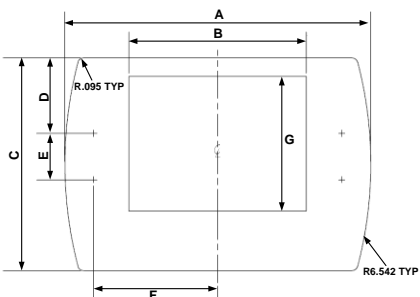
A = 2.85" | 73mm
B = 4.85" | 123mm
C = 1.00" | 24mm
D = 2.36" | 60mm
E = 3.27" | 83mm



Thermostat Specifications

Description	TRL24 and TDU Series
Temperature Sensor (TRL24 and TDU)	
<i>Setpoint range</i>	10°C to 40°C [50°F to 104°F]
<i>Control accuracy</i>	Temperature: ±0.4°C [0.8°F]
<i>Display resolution</i>	±0.1°C [0.2°F]
Humidity Sensor (TRLH24, TRLGH24 and TDU models with Humidity Sensors)	
<i>Sensor range</i>	5 to 95%RH
<i>Display resolution</i>	0.1%
CO₂ Sensor (TRLG24, TRLGH24 and TDU models with CO₂ Sensors)	
<i>Operating principle</i>	Self-calibrating, Non-Dispersive Infrared (NDIR)
<i>Sensor Range</i>	0 to 2000 ppm
<i>Setpoint range</i>	100 to 2000 ppm
<i>Accuracy</i>	±30 ppm ±3% of reading
<i>Response time</i>	2 minutes by 90%
<i>Display resolution</i>	1 ppm
Other	
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
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]

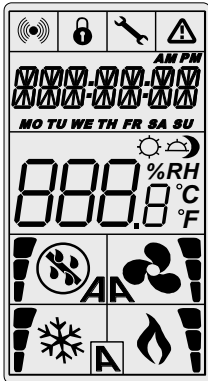
Dimensions

<p>TRL24</p> <p>A = 2.85" 73mm B = 4.85" 123mm C = 1.00" 24mm D = 2.36" 60mm E = 3.27" 83mm</p> 		<p>TDU</p> <p>A = 4.94" 125mm B = 2.87" 72.8mm C = 3.44" 87mm D = 1.22" 31mm E = 0.75" 19 mm F = 2.00" 51mm G = 2.18" 55mm</p> 	
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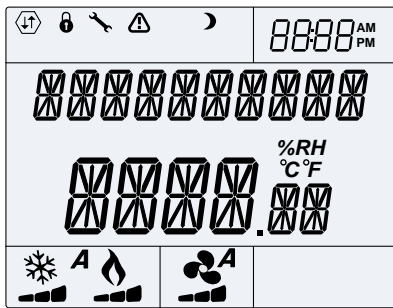
Interface

TRL24



	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

TDU



	Network Communication		User Lock		Programming Mode (Technician Setting)
	Alarm Status		Energy Saving Mode (NSB/OCC)		Schedule
	Time		ppm Parts Per Million		°C: Celsius Scale °F: Fahrenheit Scale %RH: Humidity
	Automatic Mode		Cooling		Heating
			Fan		

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



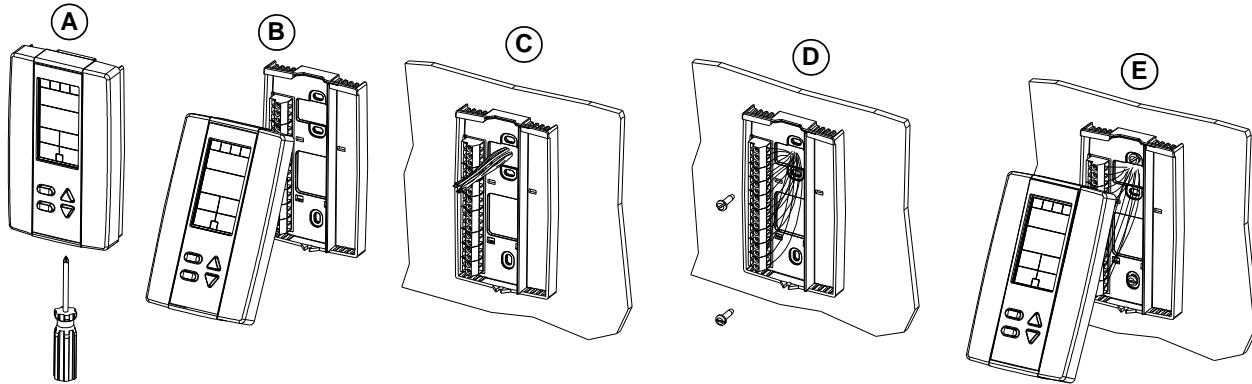
Mounting Instructions

TRL24



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.

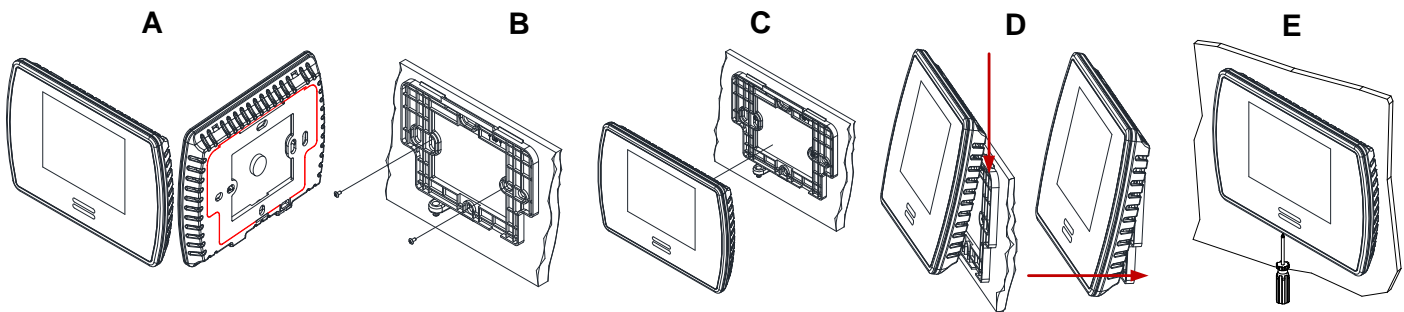


TDU



CAUTION: Remove power to avoid a risk of malfunction.

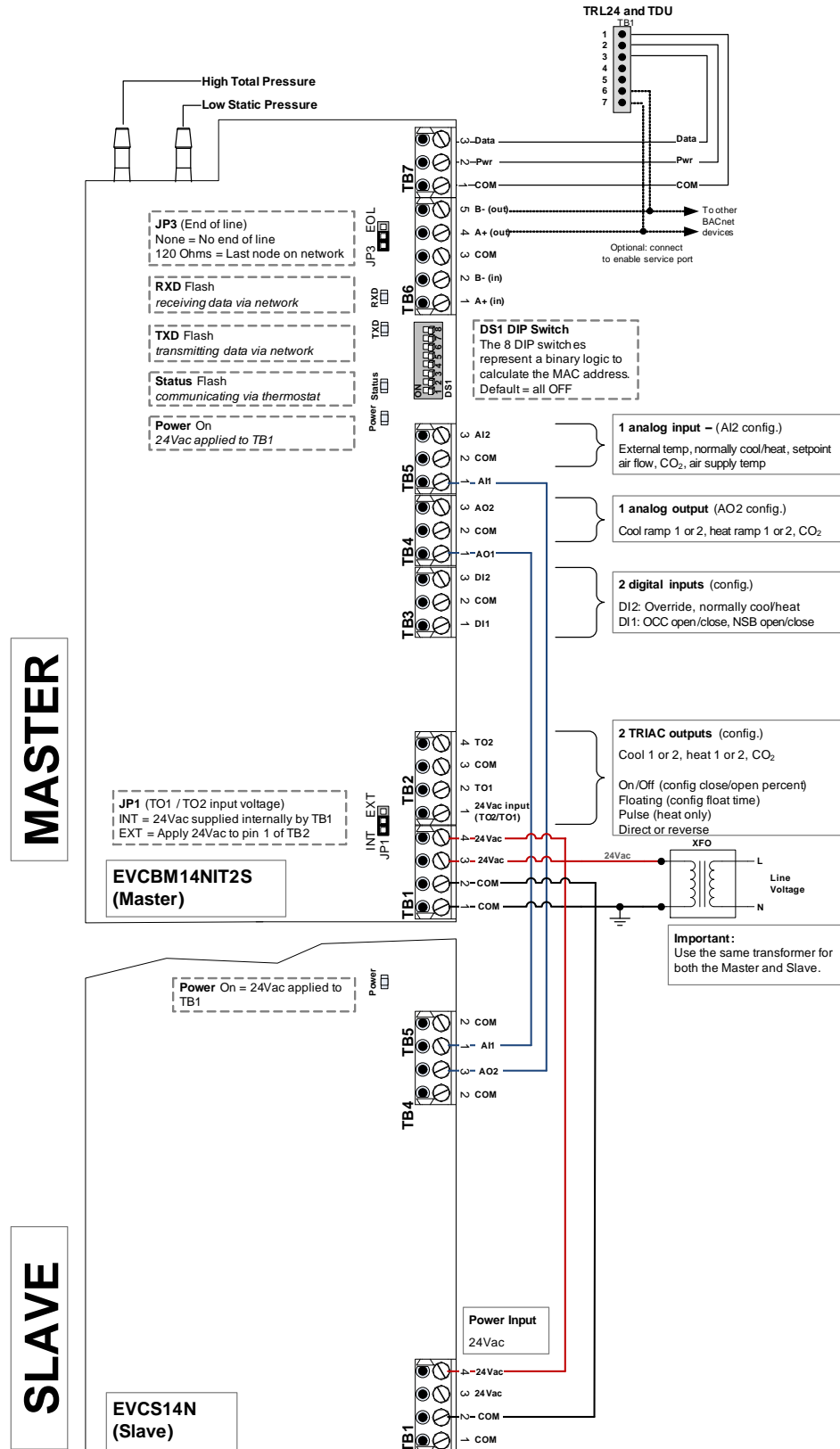
- Remove the wall mounting plate (highlighted) from the back of the thermostat.
- Install the mounting plate on the gang box.
- Pull the wires through the base hole and make the appropriate connections.
- Mount the thermostat onto the wall plate. To mount the thermostat correctly, place the top of the thermostat on the mounting plate first and push it into the grooves to snap it into place.
- Secure the thermostat using the screw (supplied).





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.



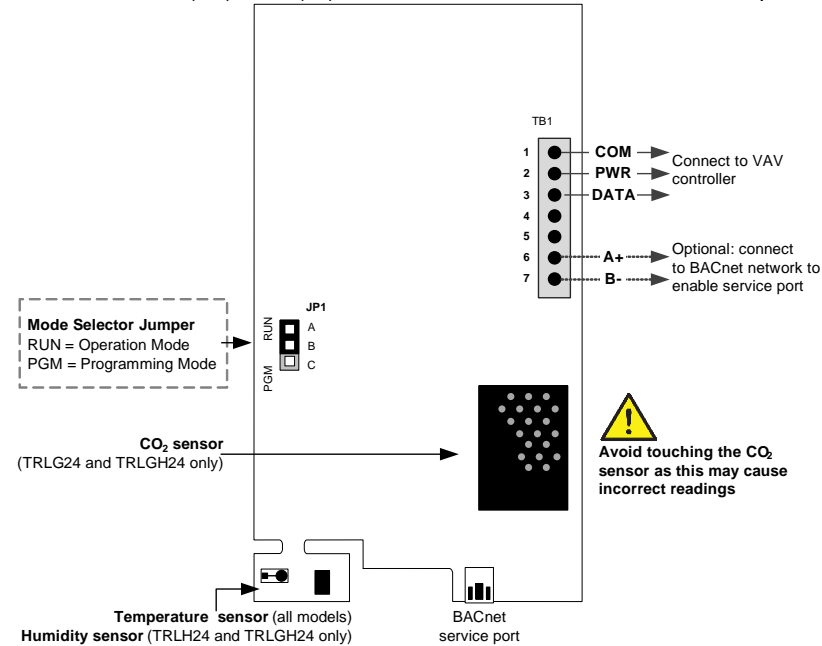


PCB Drawings



TRL24 Thermostat

3 wire cable (TB1 #1, 2 & 3)

Connect TB1 #6 (A+) & #7 (B-) to EVCB to enable the BACnet service port.



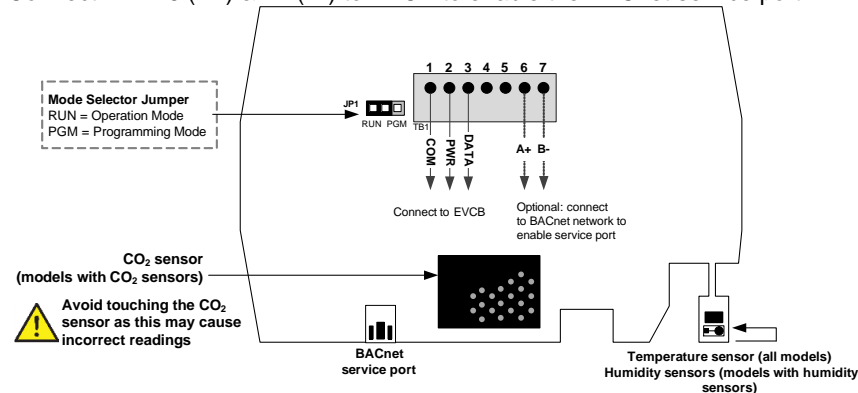
Mode Selection (JP1)

	RUN: Thermostat is in Operation Mode . Thermostat must be set in this mode for normal system operation. If not locked, setpoint and control mode can be changed by the end user.
	PGM: Thermostat is set in Programming Mode . Refer to the following sections for more details.



TDU Thermostat

3 wire cable (TB1 #1, 2 & 3)

Connect TB1 #6 (A+) & #7 (B-) to EVCB to enable the BACnet service port.






Mode Selection (JP1)

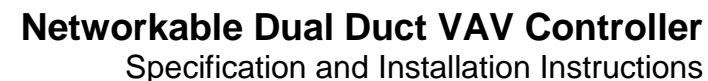
	RUN: Thermostat is in Operation Mode . Thermostat must be set in this mode for normal system operation. If not locked, setpoint and control mode can be changed by the end user.
	PGM: Thermostat is set in Programming Mode . Refer to the following sections for more details.

Access to Menus

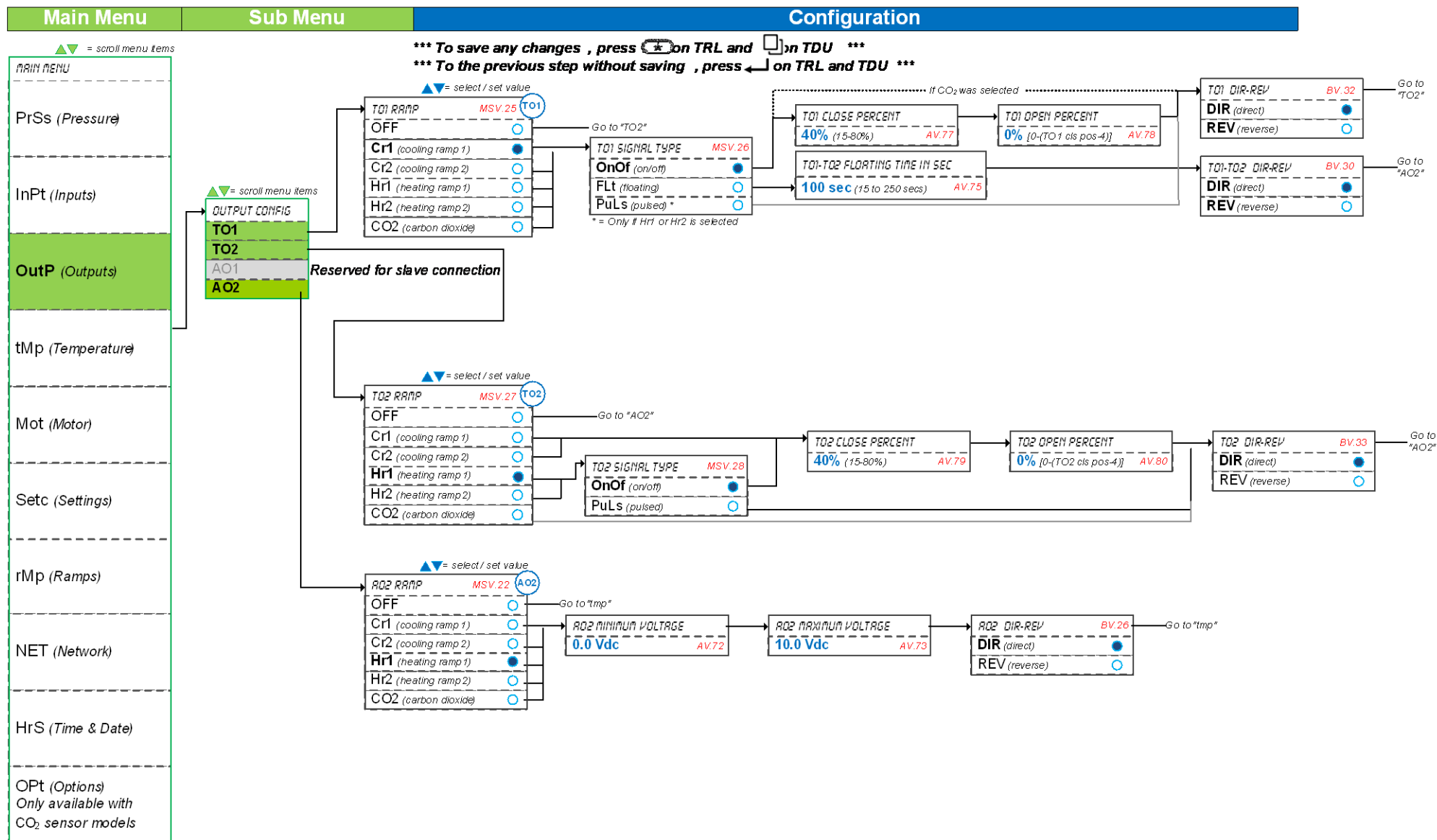
The menu overviews and options are the same for both TRL24 and TDU thermostats. However, the action key or the key used to access the menus and save changes is different in the thermostats. Use the following menu overviews with the appropriate action key as per your thermostat.

Action Keys on Thermostat

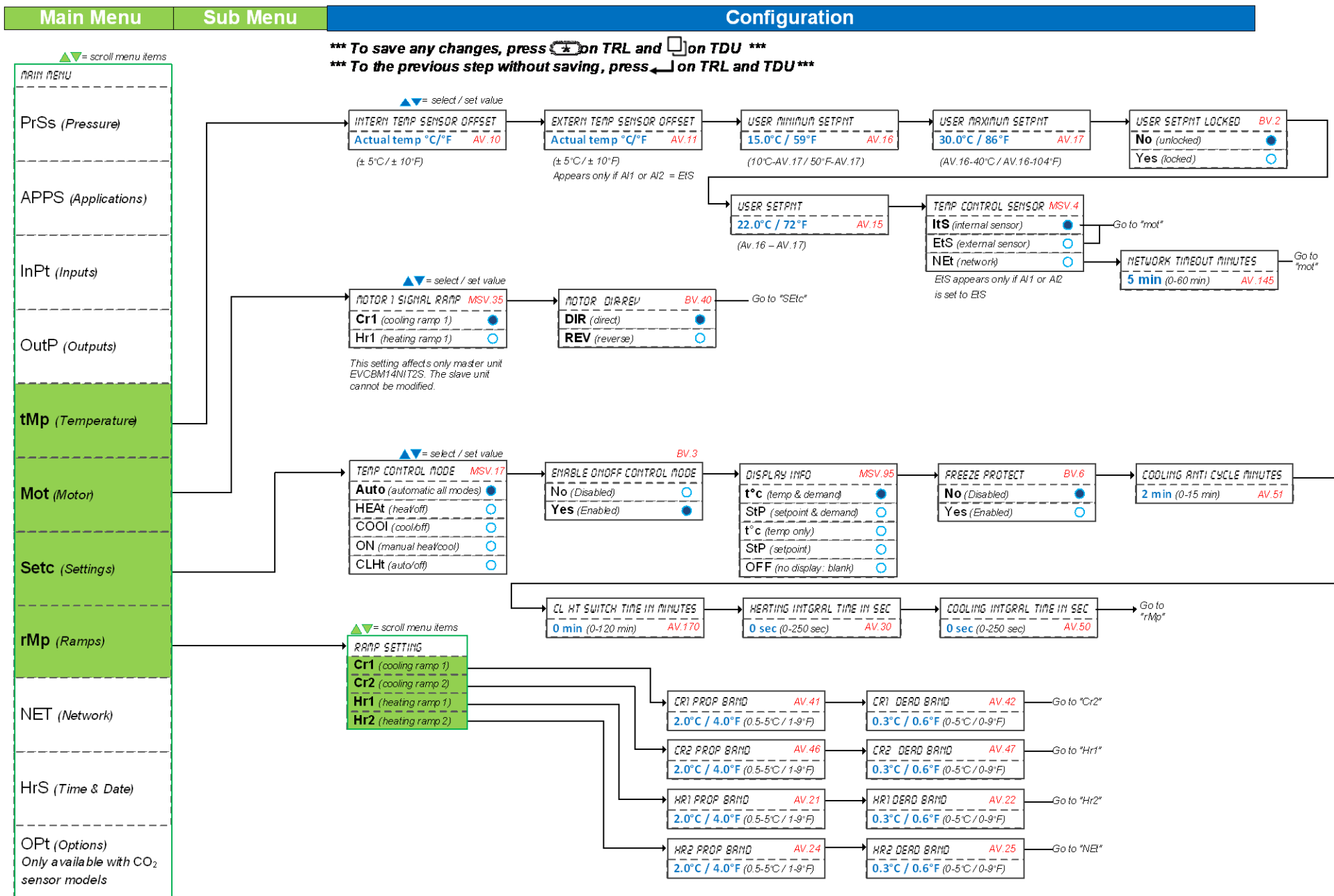
Action Key		Task
TRL24	TDU	
		Press to access the programming menus and save any changes.
		Press to return to the previous step without saving.



Outputs – Menu (2 of 4) | TO1, TO2, AO1, AO2



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







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 6.
2. During the power up sequence of the controller and thermostat (when the firmware versions are displayed), press and hold both the and keys.
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 keys to toggle between the digits.
4. Use the arrow keys to select YES and then press [/].

Menu 372 – Temperature Offset

1. 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 6.
2. Press the [/] and keys simultaneously for 5 seconds. The "ENTER PASSWORD" screen appears.
3. Enter the password within 1 minute by using the arrow keys to increase or decrease the value and the [/] and keys to toggle between the digits.
 - a. Password **372** = Temperature Offset Menu
4. 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

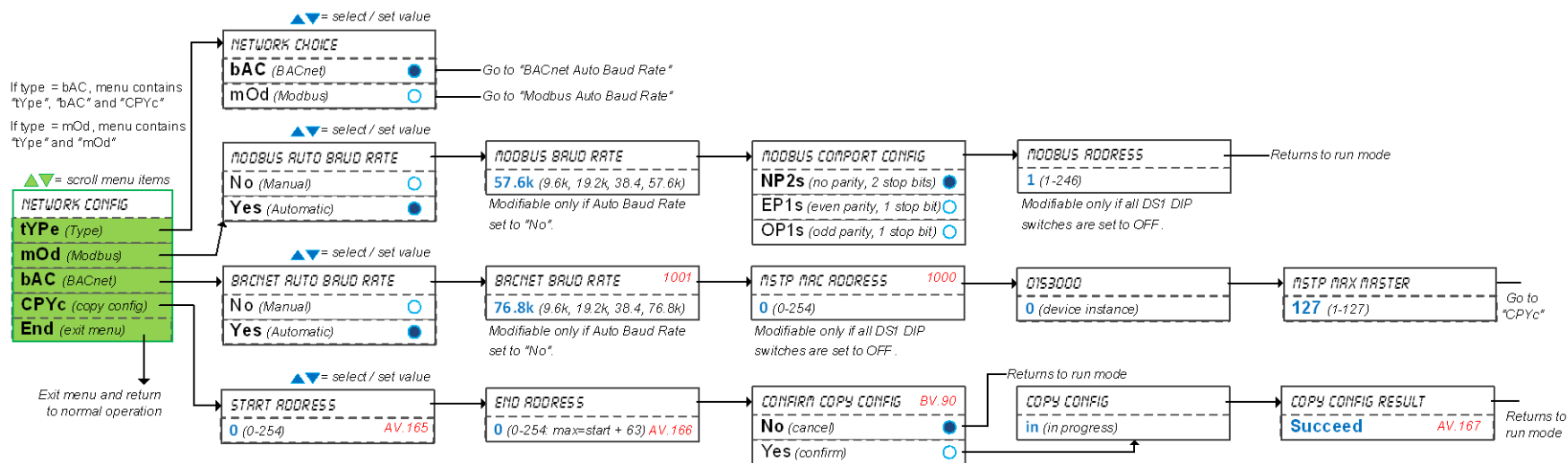
This setting represents the deadband of the pressure sensor in mV. For advanced users or special applications only. We recommend that you use the default setting of 60mV.

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 6.

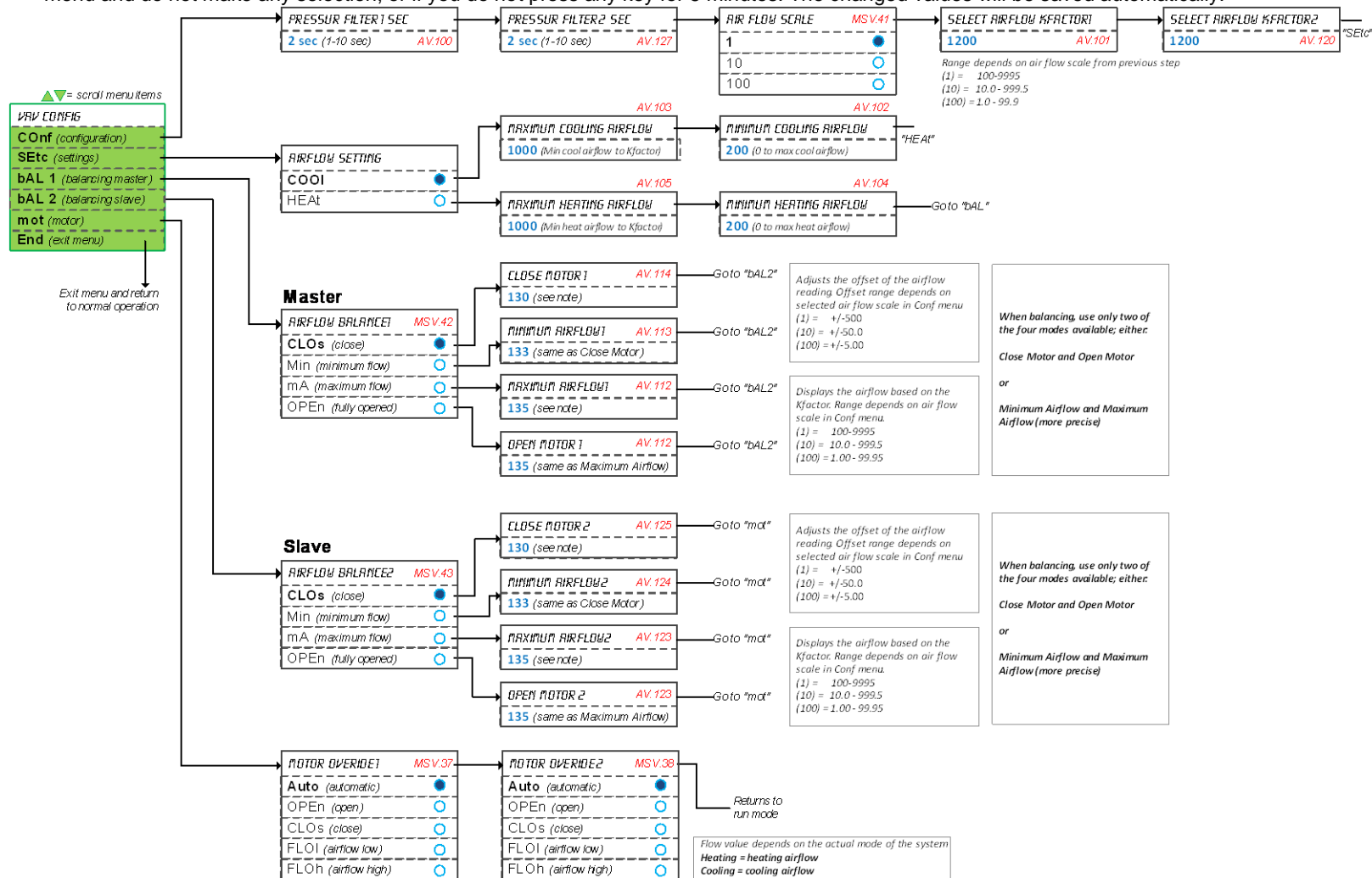
Note: Since the action keys are different on TRL and TDU thermostat series, both keys have been included in the instructions. Refer to the Action Keys on Thermostat section to know and use the key as available on your thermostat.

- Press the [ / ] and  keys 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 [ / ] and  keys to toggle between the digits.
 - Password **637** = Network Settings Menu
- 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 757 – Airflow Balance Mode

- This menu is accessible through normal operation mode. Set the thermostat Mode Selector jumper (JP1) to the "RUN" position (Operation Mode). Refer to Wiring on page 6.
- Press the [/] and keys simultaneously for 5 seconds. The "ENTER PASSWORD" screen appears.
- Enter the password (**757**) within 1 minute by using the arrow keys to increase or decrease the value and the [/] and keys to toggle between the digits.
- 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.



*** To save any changes press on TRL and on TDU**

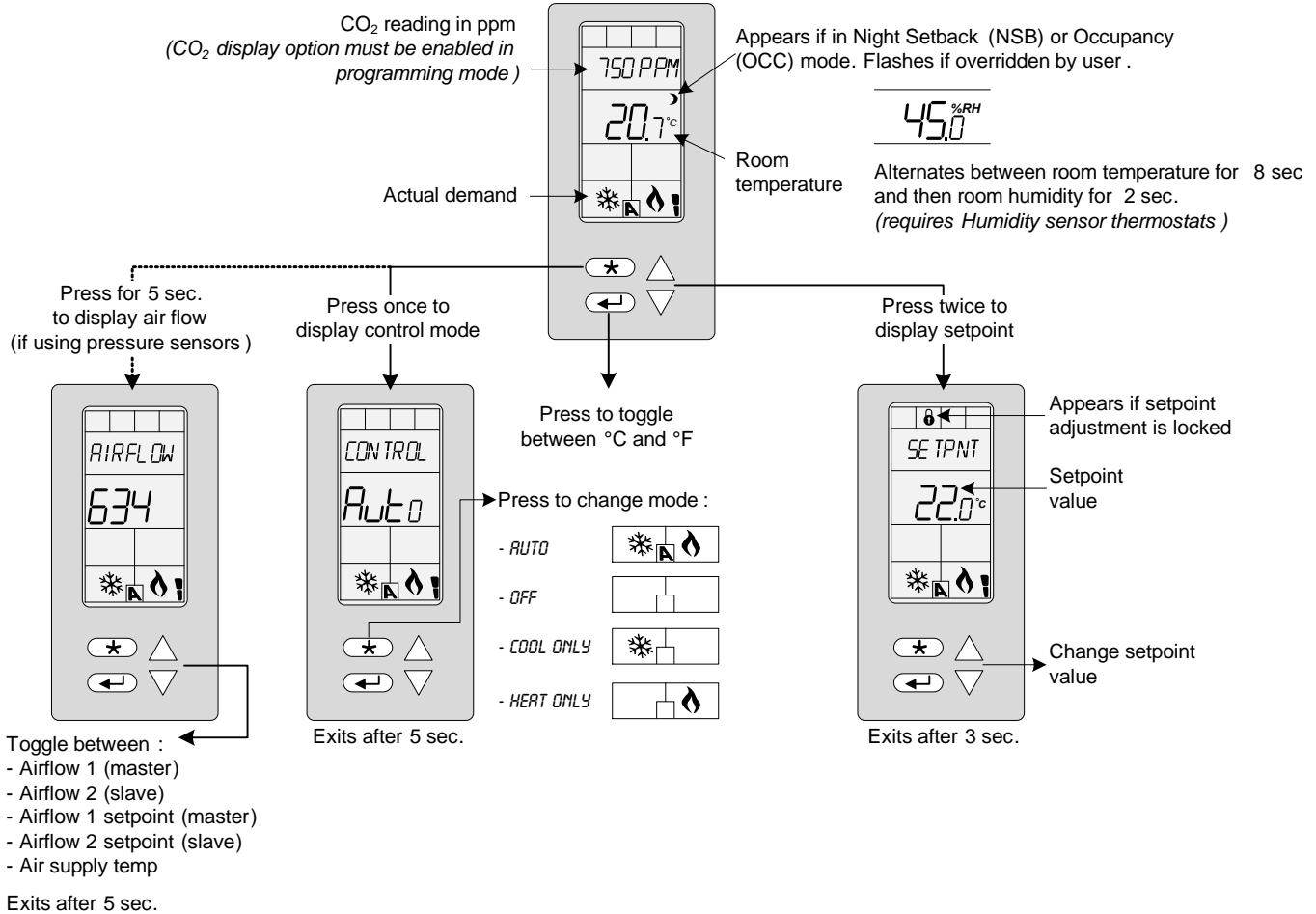
*** To the previous step without saving press on TRL and TDU***



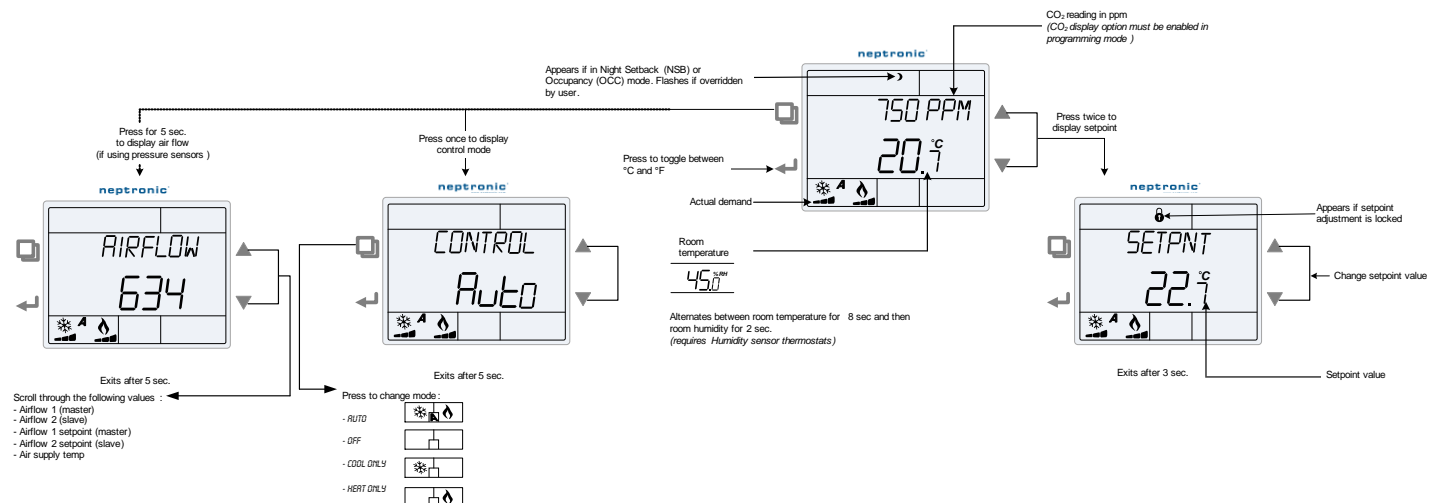
Operation Mode

The Mode Selector Jumper (JP1) of the thermostat must be set to the “RUN” position (Operation Mode). Refer to Wiring on page 6.

TRL24



TDU





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 (Thermostats with CO₂ Sensors)

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 Display and Setpoint

If enabled in the "Display Info" menu (see Settings – Menu (3 of 4) | *Temp, Motor, Settings and Ramps* on page 10), 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 ◀ key. To display the setpoint, press the ▲ or ▼ key twice. The setpoint 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 (4 of 4) | *Network, Time and Options* on page 11), 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 [Ⓢ / Ⓜ] key 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 [Ⓢ / Ⓜ] key. The Control Mode appears for 5 seconds. Press the [Ⓢ / Ⓜ] key 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)
- OFF (if it is not disabled in Programming Mode)
- Cooling only (on, with cooling symbol)
- Heating only (on, with heating symbol)

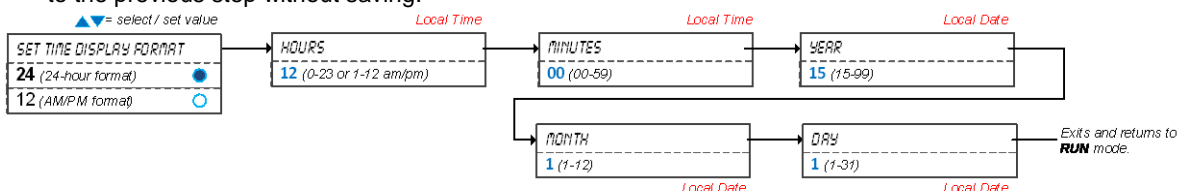
Night Setback (NSB) or Occupancy Mode

This function is only available if you set DI1 to **nSb** (Night setback 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 setback or no occupancy mode for a predetermined period by pressing any of the 4 keys. During the override period the ⤴ symbol will flash. If the ⤴ symbol does not flash, the override period is finished or the night setback 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 ◀ key for 5 seconds
3. Use the arrow keys to set the desired value. Press the [Ⓢ / Ⓜ] key to save and got to the next step. Press the ◀ key to go to the previous step without saving.

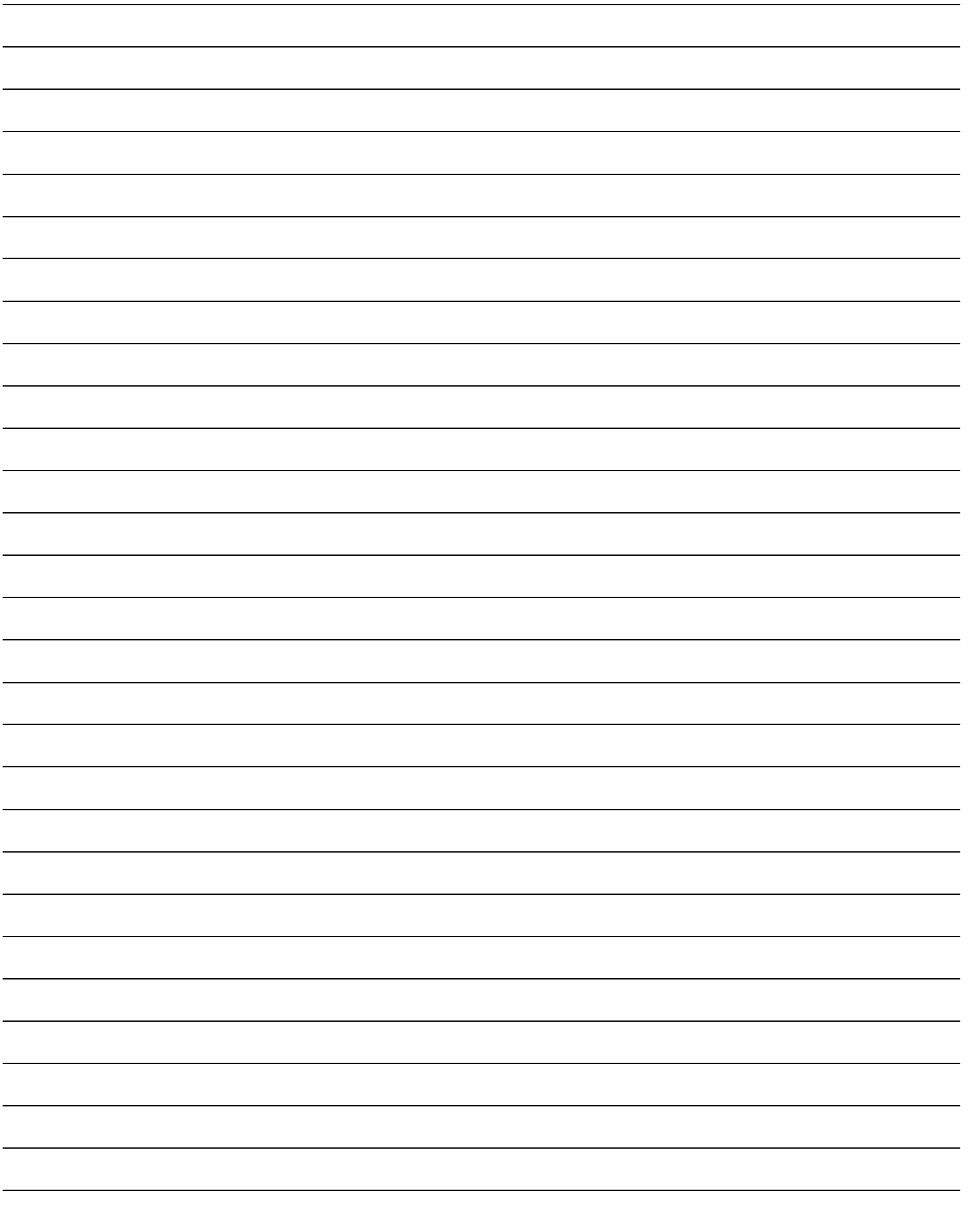


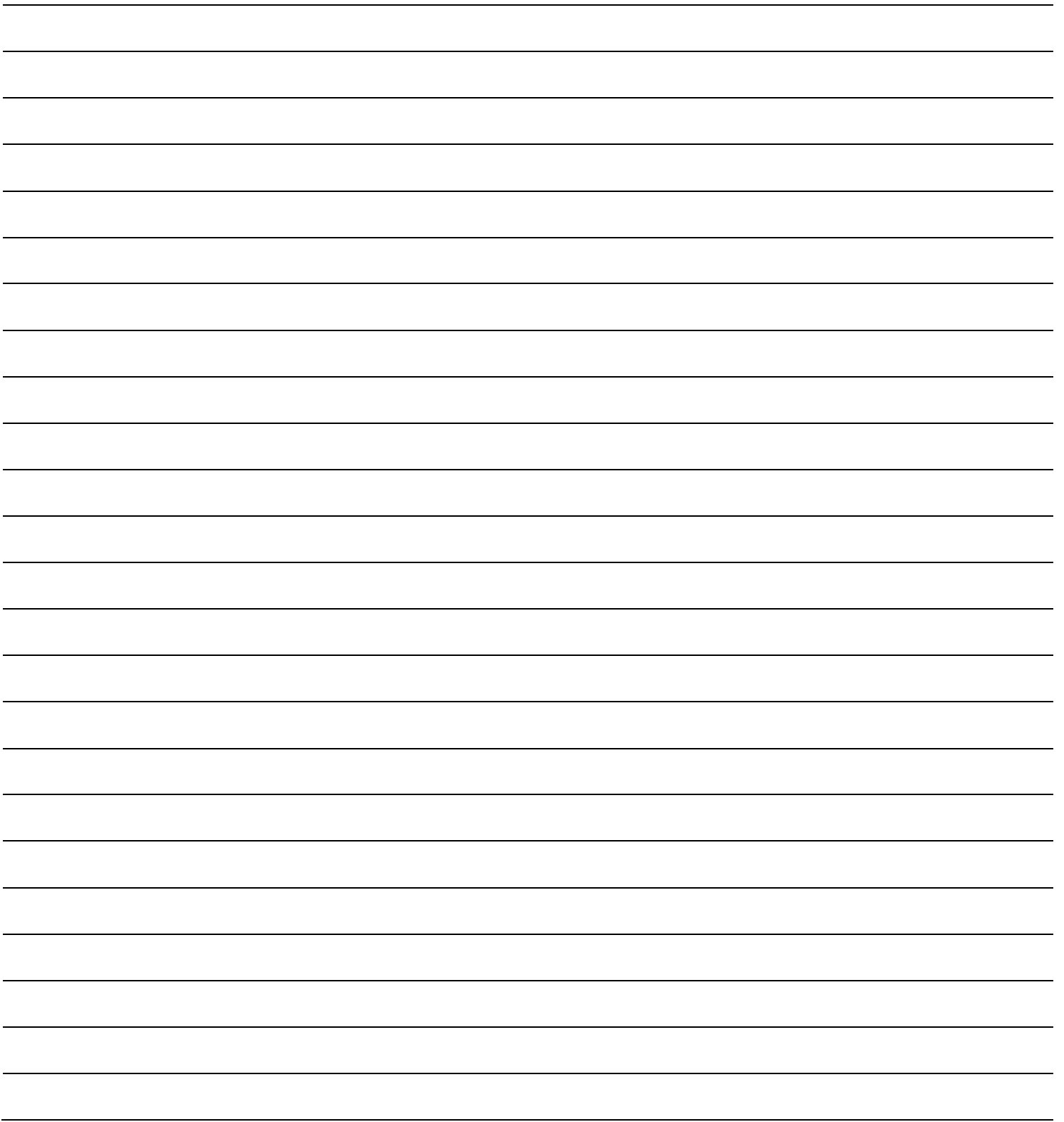
*** To save any changes, press Ⓢ on TRL and Ⓜ on TDU ***

*** To the previous step without saving press ◀ on TRL and TDU ***

Notes

[illegible]







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



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)