PROLON

HARDWARE GUIDE

Digital Thermostat

Specifications and Operational Guide

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REV. 7.3.2
PL-HRDW-T1100-F-EN

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General Information

Description

The T1100 digital thermostats are networkable, microprocessor-based thermostats designed for zoning applications. Proportional and integral (PI) control loops, working in conjunction with fully customizable outputs (1 analog / 1 digital) deliver accurate yet flexible control strategies. An auxiliary analog input is available for zone temperature averaging or as a radiant floor slab temperature input. Configuration, performed via a capacitive circular touch pad, is made easy through an intuitive menu system displayed on a backlit graphic LCD screen.

Part Number Selection

PL-T1100-W GL

Casing Color:
W = White
B = Black

Label Color
GL = Grey Label
WL = White Label

Installation

1. Open casing to remove back cover by pushing on the tab located underneath the thermostat. (Figure 1)
2. Pull wire(s) through central hole of back cover.
3. Screw in the back cover to the wall.
4. Connect wires:
   - Pull out the screw terminal blocks.
   - Remove 1 cm insulation from the end of each wire.
   - Connect the wires to the terminal blocks: see Figure 2 for pin identification. Typical wiring examples can be found below.
   - Reinstall terminal blocks.
5. Reconnect top cover

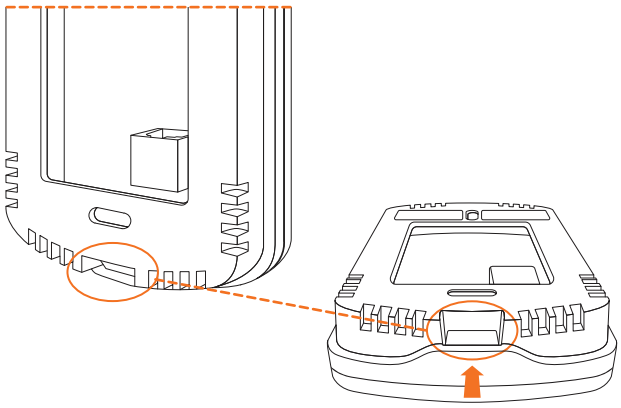


Figure 1 - Opening Tab

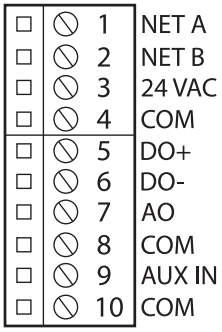


Figure 2 - Terminal Block Pinout

***IMPORTANT*: Do not install the thermostat under the following conditions:**

- Any location exposed to direct sunlight
- On an outside wall
- Near an air discharge grill
- In a location where vertical air circulation is restricted
- Near a dimmer switch

Power Source

The T1100 is powered by a 24 VAC power source connected using the "COM" pin and the "24 VAC" pin. The common for the power source is shared by the auxiliary analog input and the analog output.

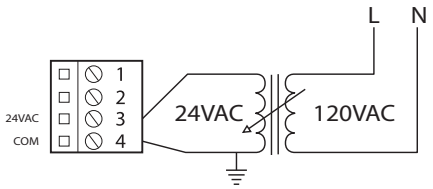


Figure 3 - Power Source

Network Setup

The T1100 can work autonomously or networked. When networked, it will communicate in real-time with other Prolon controllers. The T1100 uses the Modbus RTU protocol over RS485. A unique network address must be assigned to each device on the network. For the T1100, this can be done through the menu system. The network connections are made using the “NET A” and “NET B” pins (Figure 4). Bias and terminating resistors can be activated or deactivated using jumpers on the back of the PCB (Figure 5). Bias and terminating resistors are used to improve signal quality in an RS485 network. For more information regarding application of network resistors or shielding, see the Prolon Network Guide.

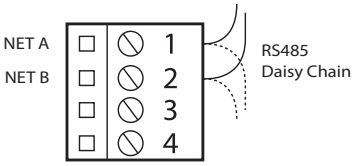


Figure 4 - Network Connection

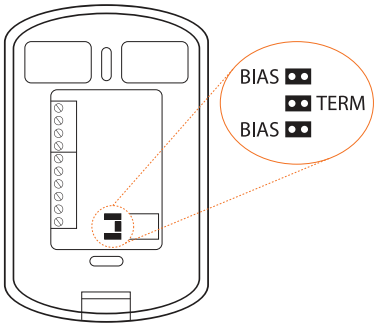


Figure 5 - Network resistor Jumpers

Auxiliary Analog Input

The T1100 has an auxiliary analog input which can be used to connect another thermistor. The T1100 can be configured to use this alternate temperature reading for a variety of functions, including temperature averaging, radiant floor slab temperature or discharge air control. The alternate thermistor (10KΩ type 3) can be connected to the auxiliary input using the “AUX IN” and “COM” pins.

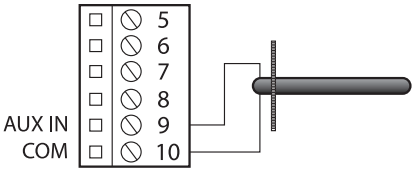


Figure 6 - Remote Temp Sensor

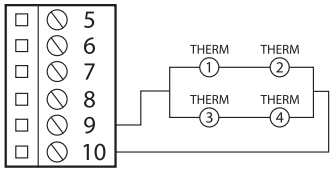


Figure 7 - Averaging multiple remote sensors (Series-Parallel)

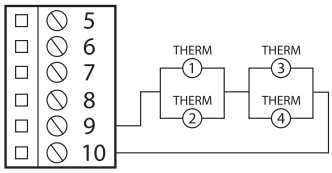


Figure 8 - Averaging multiple remote sensors (Parallel-Series)

Case #1 Remote sensor only
Physical connection: connect remote sensor (10KΩ type 3) into terminals 9 and 10 (see figure 6)
T1100 configuration: set T1100 analog input to "Aux Only"

Case #2 Averaging 2 sensors (1x remote, 1x internal)
Physical connection: connect remote sensor (10KΩ type 3) into terminals 9 and 10 (see figure 6)
T1100 configuration: set T1100 analog input to "Average"

Case #3 Averaging 4 sensors (4x remote)
Physical connection: connect 4 sensors (10KΩ type 3) in Series-Parallel configuration (see figure 7) or in Parallel-Series configuration (see figure 8) to terminals 9 and 10
T1100 configuration: set T1100 analog input to "Aux Only"

Outputs Specifications

The T1100 series thermostats contain a fully customizable Triac output and a 0-10VDC output to drive components. An integrated resettable fuse protects both outputs of the T1100 against current surges and short circuits. This protection will cut the current to the output as soon as an overload condition is detected. The fuse is round and yellow-colored which, upon a short circuit condition, will heat up and change to orange. When the faulty wiring or circuit is fixed, the fuse will automatically reset and allow current to flow through the output again.

Output	Type	Heating	Cooling
Digital	Passive Sink Triac 10-30 VAC (dry contact) On-or-Off Pulsed Max Current: 750 mA	Valve Relay Triac	Valve Relay
Analog	Modulating Output On-or-Off Max Current: 40mA Configurable signal: - 0 to 10 VDC - 2 to 10 VDC - 0 to 5 VDC	Modulating Valve SCR Relay Triac	Modulating Valve Relay

Figure 9 - Output Specifications

Typical Wiring of the Digital Output

The T1100 opens and closes a triac contact to allow an external source to power the load.

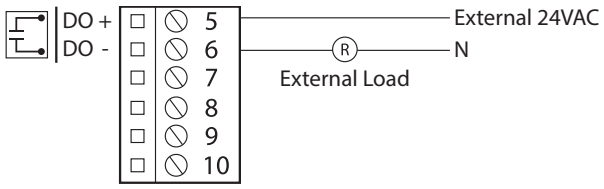


Figure 10 - Typical Wiring of Digital Output

Typical Wiring of the Analog Output

The T1100 provides the control signal to the load, which is powered externally or from the same power source as the T1100.

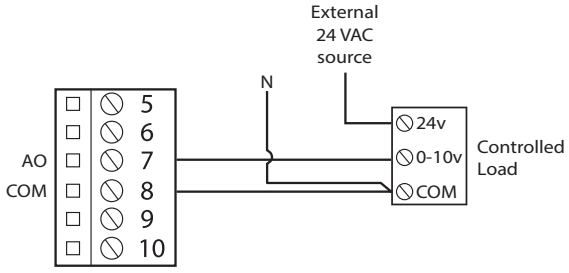


Figure 11 - Typical Wiring of Analog Output

Operation

The T1100 is controlled using the circular touch pad on the bottom half of the thermostat. The touch pad uses capacitive sensing technology to detect finger proximity. There are no moving parts to push or rotate. The T1100 is controlled using simple scrolling, tapping or holding motions, performed around the circle of the touch pad. The center of the circle is unused.

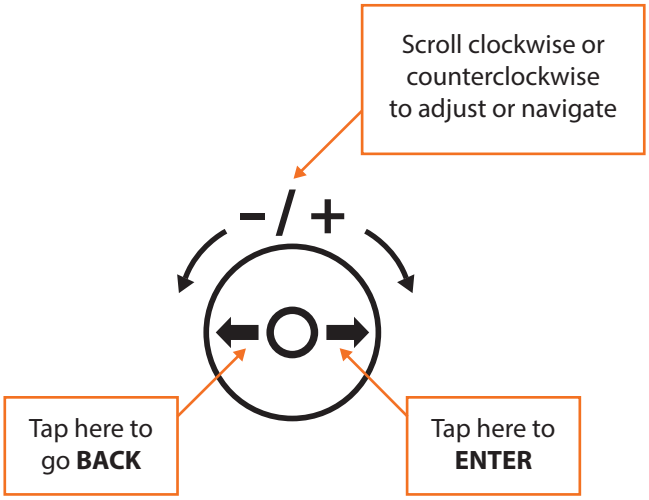


Figure 12 - Touch Pad Controls

Hint Display

At the bottom of the screen, a circle representing the touch pad is displayed, with hints on how to navigate and modify settings, as well as providing feedback as you manipulate the touch pad. Hints are context-sensitive and will only display where logical.

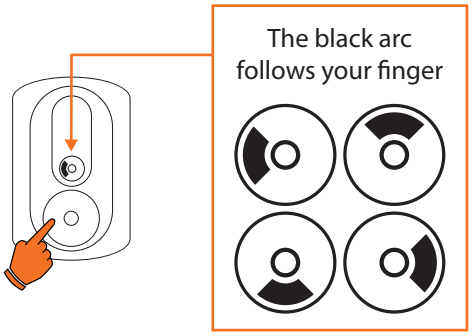
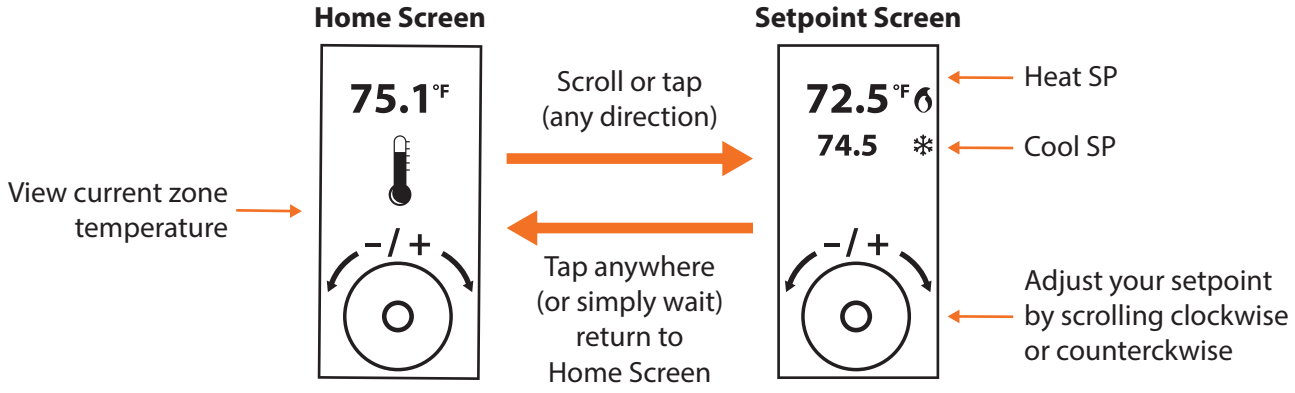


Figure 13 - Touch Pad Feedback

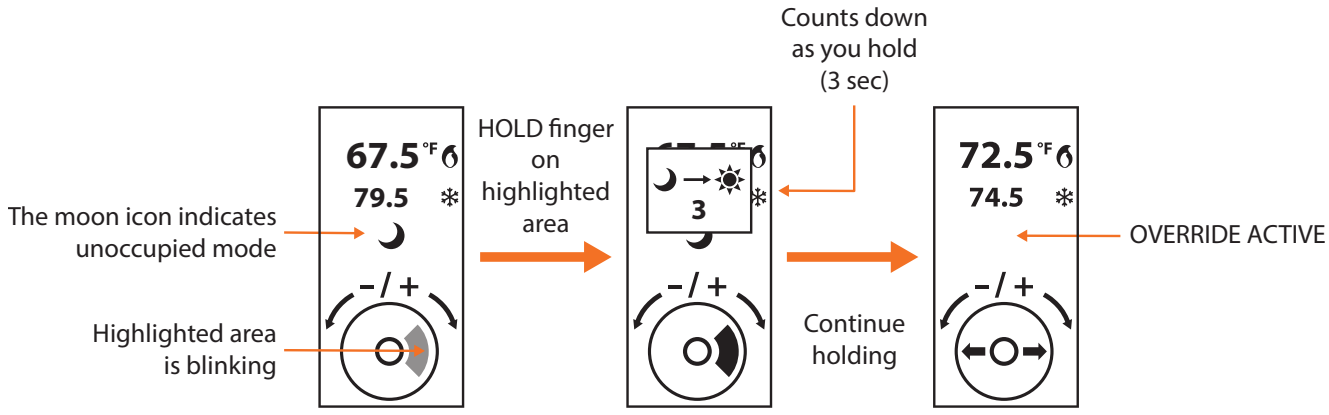
Figure 14 - Touch Pad Hint

Changing the Setpoint



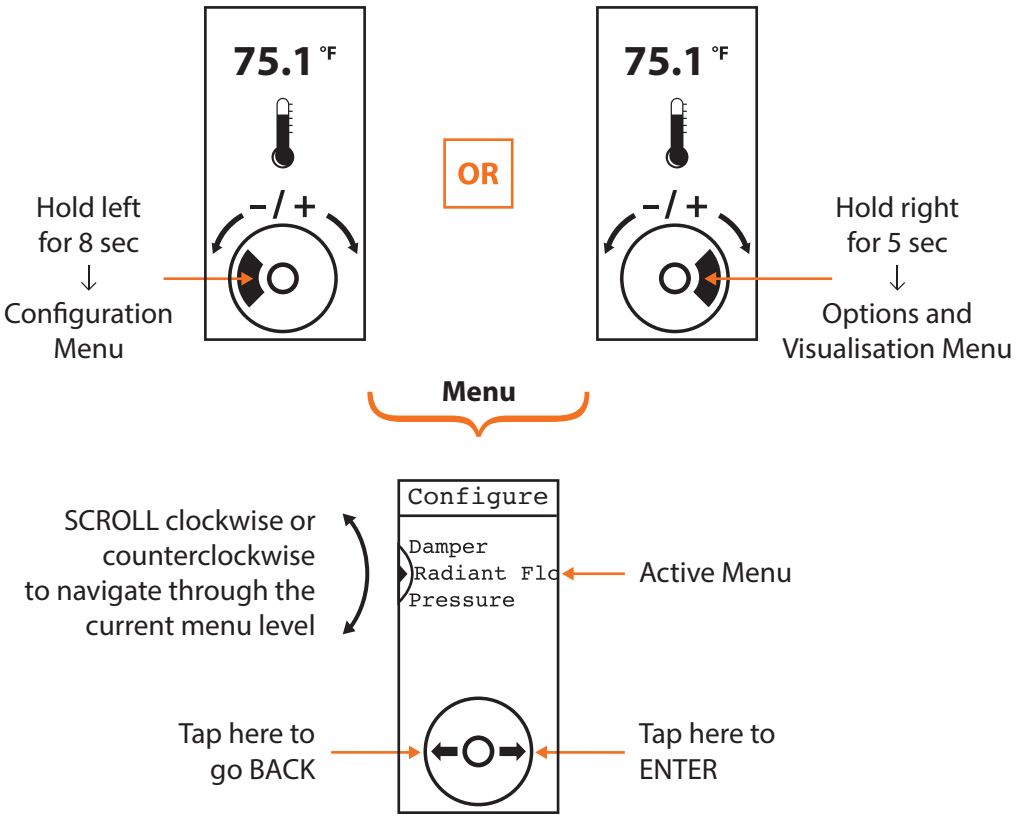
Schedule Override

First, go to the **Setpoint Screen.**



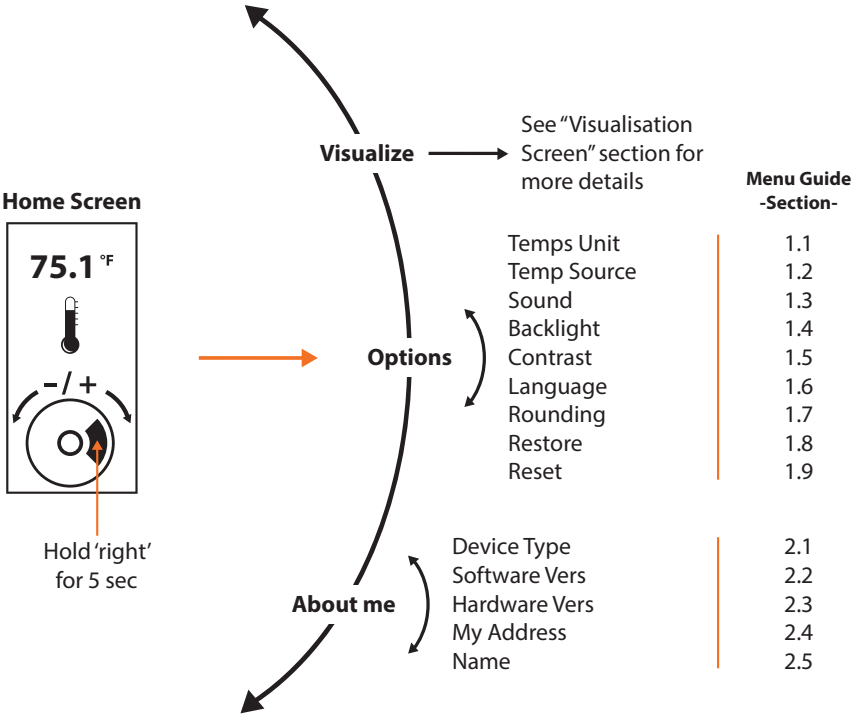
Navigating Menus

From the **Home Screen.**

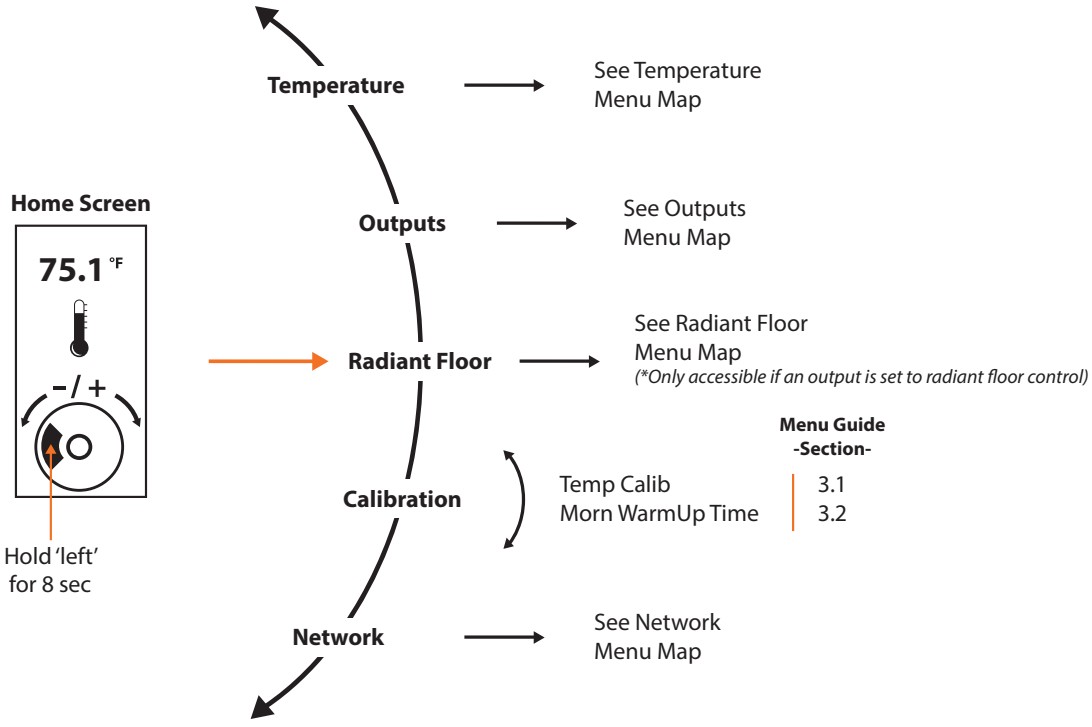


Menu Maps

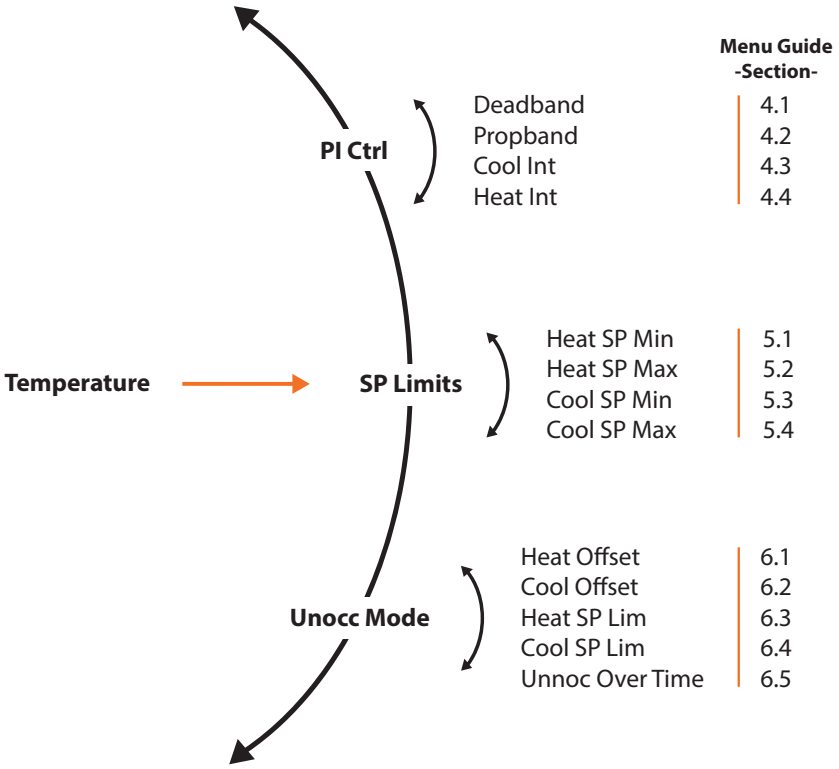
Visualisation and Options Menu Map



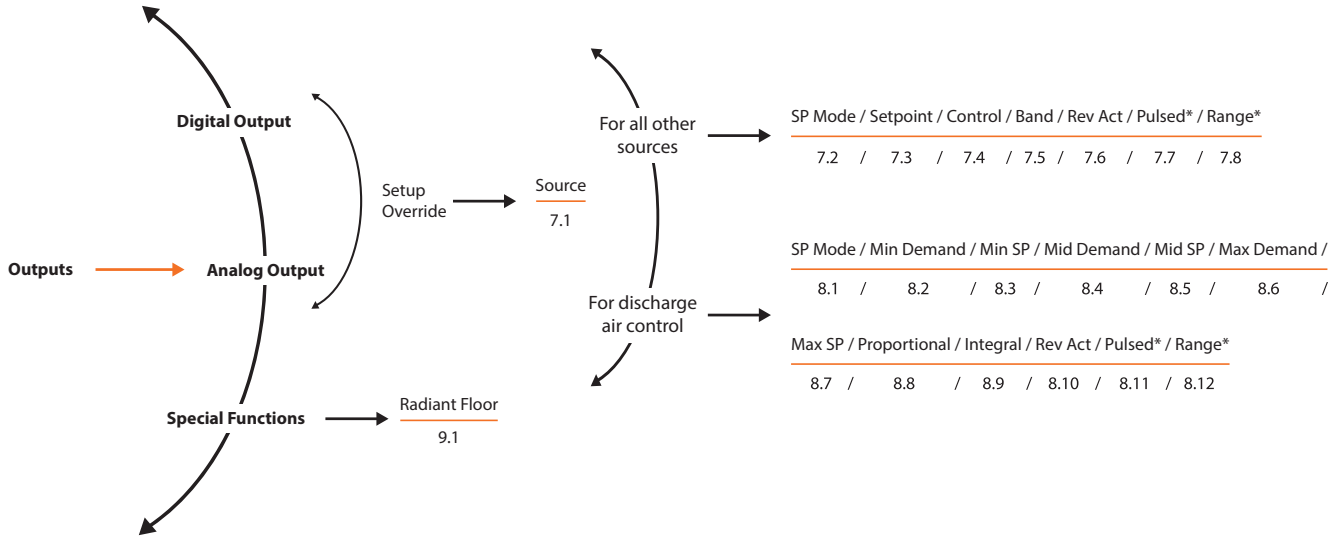
Configuration Menu Map



Temperature Menu Map

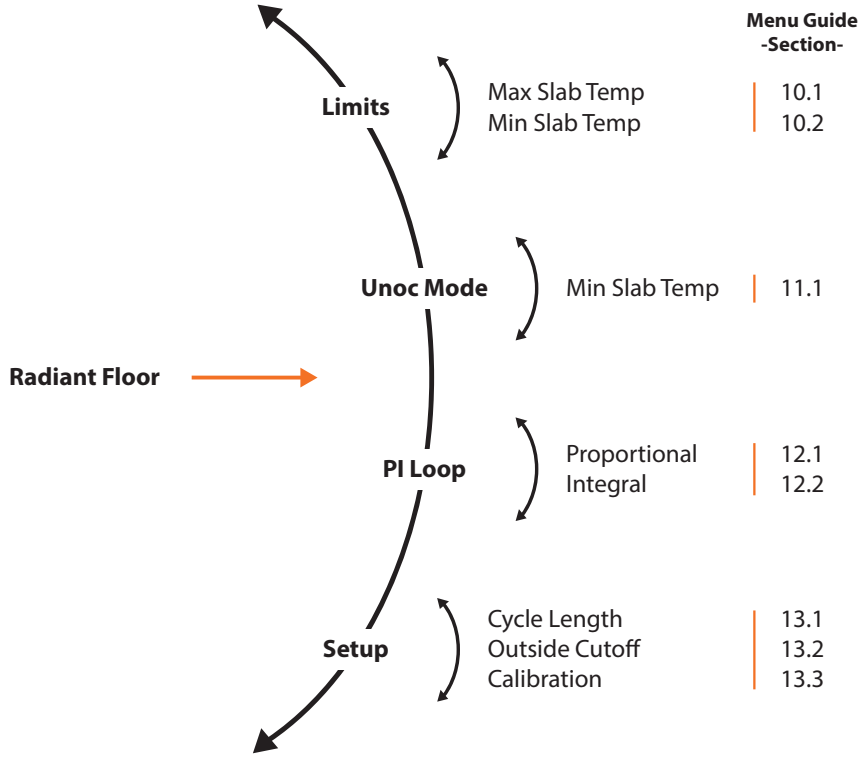


Outputs Menu Map

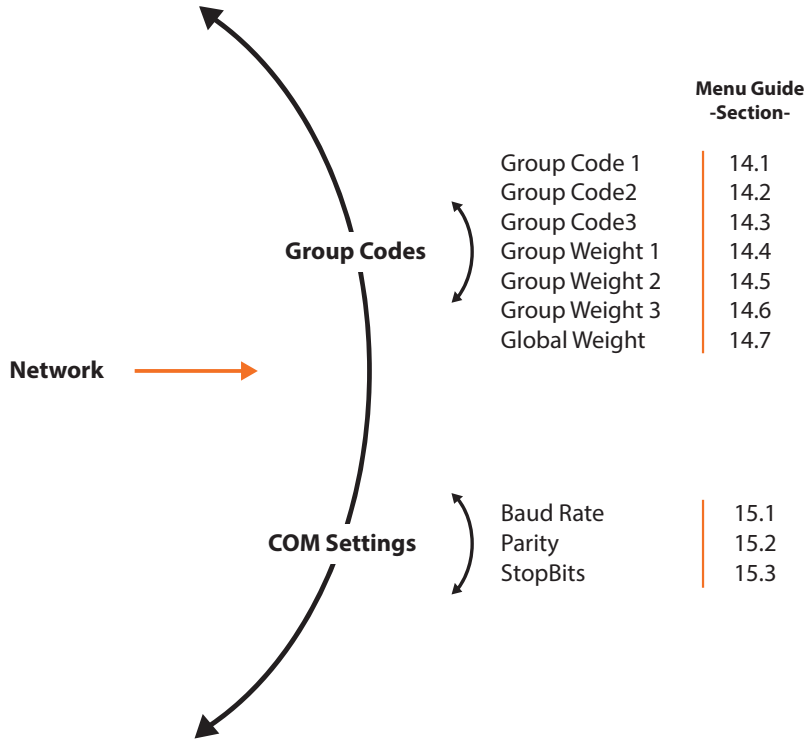


**Not applicable to Digital Output.*

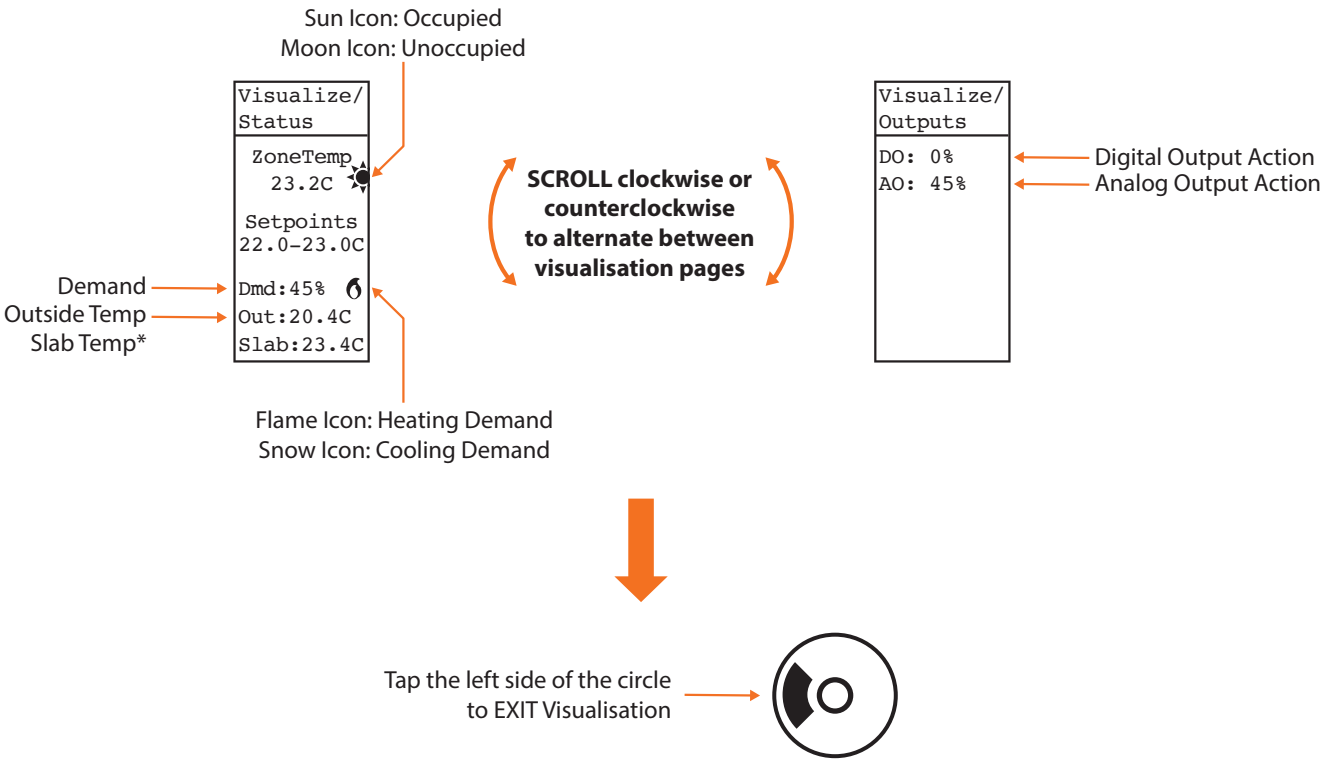
Radiant Floor Menu Map



Network Menu Map



Visualisation Screen



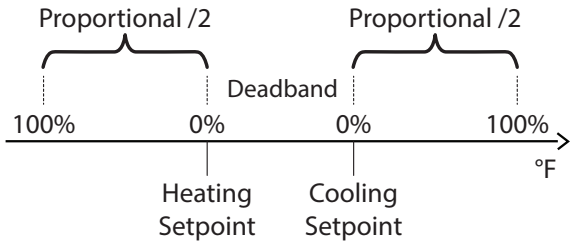
** Displayed only when using radiant floor control.*

Section	Description	Min	Max	Default	Units
1.1) Temp Unit	Lets you select between Celsius or Fahrenheit temperature display.	-	-	Celsius	-
1.2) Temp Source	Lets you decide how the zone temperature is determined: • Internal (Only the onboard thermistor is used to calculate temperature) • External (The temperature reading is obtained from an external thermistor connected to the auxiliary input) • Average (The temperature reading is obtained from an average of both the internal thermistors reading and the reading obtained from the external thermistor connected to the auxiliary input.) ***NOTE***: When an output is set to control a radiant floor, the external input is automatically dedicated to slab temperature sensing.	-	-	Internal	-
1.3) Sound	This option lets you enable or disable audio feedback from touchpad interaction.	-	-	Enabled	-
1.4) Backlight	**Auto**: The backlight activates upon any user interaction with the touchpad, and goes off after 60 seconds of inactivity. **On**: The backlight is permanently on. **Off**: the backlight is permanently off, regardless of user interaction.	-	-	Auto	-
1.5) Contrast	The discrepancy of brightness between text/images and the background.	2	55	20	-
1.6) Language	This option changes the display language	-	-	English	-
1.7) Rounding	The option to alter the value of the ambient temperature to the nearest half or full degree	-	-	None	-
1.8) Restore	Activating this option causes the thermostat to revert all configuration properties back to their factory defaults. ***WARNING***: This cannot be undone.	-	-	-	-
1.9) Reset	Causes the thermostat to perform an electronic reset. All configuration properties remain saved, but any active overrides are lost.	-	-	-	-

Section	Description	Min	Max	Default	Units
2.1) Device Type	The type of thermostat being used.	-	-	-	-
2.2) Software Vers	The current software version of the thermostat device type.	-	-	-	-
2.3) Hardware Vers	Physical version of the thermostat.	-	-	-	-
2.4) My Address	This option lets you set the address of the thermostat on the network. Each device on a network must have a different address.	1	127	101	-
2.5) Name	The name given to this zone. Can only be changed using Focus software.	-	-	-	-

Section	Description	Min	Max	Default	Units
3.1) Temp Calib	This value will be added to the room temperature reading (regardless of source).	-15	15	0	°C
		-27	27	0	°F
3.2) Morn Warmup Time	The duration that the outputs will be disabled after receiving a morning warm up command from the network master, unless the network master is using a longer period.	0	250	0	Min

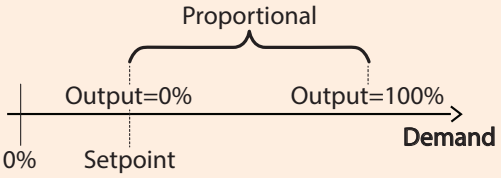
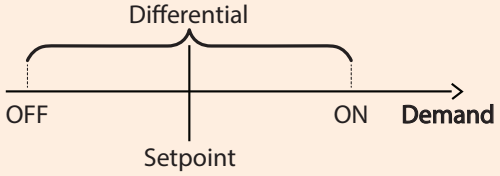
Section	Description	Min	Max	Default	Units
4.1) Deadband	The deadband between the occupied heating set-point and the occupied cooling setpoint.	0.5	15	1	°C
		0.9	27	1.8	°F
4.2) Prop Band	Defines the proportional band used to calculate the proportional component of the demand. Please refer to the following image.	0	10	3	°C
		0	18	5.4	°F

4.3) Cool Int	Defines the amount of time required for the cooling integral component of the demand to equalize the proportional component. Setting this value to zero removes the cooling integral component of the demand. 	0	120	12	Min
4.4) Heat Int	Defines the amount of time required for the heating integral component of the demand to equalize the proportional component. Setting this value to zero removes the cooling integral component of the demand.	0	120	15	Min

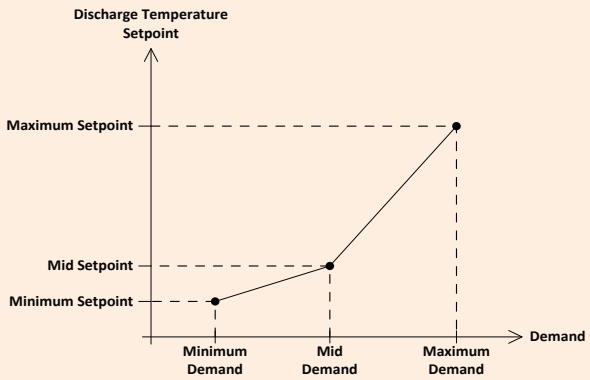
Section	Description	Min	Max	Default	Units
5.1) Heat SP Min	During occupied mode, the thermostat will use this value as a low limit for the heating setpoint.	5	30	19	°C
		41	86	66.2	°F
5.2) Heat SP max	During occupied mode, the thermostat will use this value as a high limit for the heating setpoint.	6	44.5	25	°C
		42.8	112.1	77	°F
5.3) Cool SP Min	During occupied mode, the thermostat will use this value as a low limit for the cooling setpoint.	5.5	44	20	°C
		41.9	111.2	68	°F
5.4) Cool SP Max	During occupied mode, the thermostat will use this value as a high limit for the cooling setpoint.	6.5	45	26	°C
		43.7	113	78.8	°F

Section	Description	Min	Max	Default	Units
6.1) Heat Offset	During unoccupied mode, the active heating setpoint is decreased by this amount.	0	20	3	°C
		0	36	5.4	°F

6.2) Cool Offset	During unoccupied mode, the active cooling setpoint is increased by this amount.	0	20	5	°C
		0	36	9	°F
6.3) Heat SP Lim	During unoccupied mode, the thermostat will use this value as a low limit for the heating setpoint.	5	30	15	°C
		41	86	59	°F
6.4) Cool SP Lim	During unoccupied mode, the thermostat will use this value as a high limit for the cooling setpoint.	5.5	45	30	°C
		41.9	113	86	°F
6.5) Unocc Overr Time	The time spent in occupied mode once the thermostat is manually overridden from unoccupied mode.	0	720	120	Min

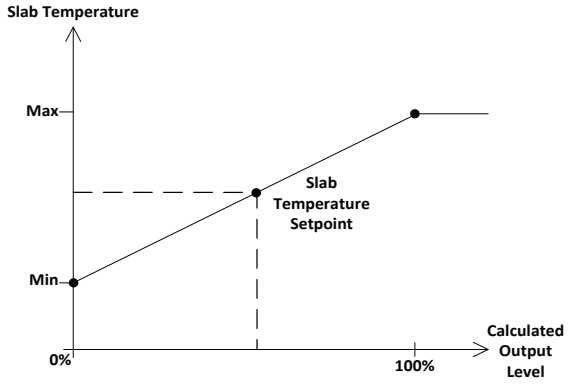
Section	Description	Min	Max	Default	Units
7.1) Source	Establishes the rules behind the outputs operation.	-	-	Demand	-
7.2) SP Mode	Sets the output in heating or cooling mode.	-	-	HEAT	-
7.3) Setpoint	The desired setpoint for the output. Cannot be zero.	1	95	25	%
7.4) Control	Sets the output in proportional or differential mode. • In proportional mode, the output is at 0% when the demand reaches the setpoint, and modulates (or pulses) proportionally as the demand increases, reaching 100% once the demand reaches the sum of the setpoint and the proportional band.  • In differential mode, the output alternates between ON and OFF whenever the demand passes through a differential band centered on the setpoint.  	-	-	PROP	-

7.5) Band	The proportional band used when the output Ctrl Mode is set to Proportional.	5	99	75	%
	The differential band used when the output Ctrl Mode is set to Differential.	8	99	40	%
7.6) Rev Act	When reverse acting is selected, the output voltage will be inversely proportional to the output state.	-	-	OFF	-
7.7) Pulsed ***(not applicable for Digital Output)***	The analog output can be configured to pulse instead of modulate when used in Proportional mode.	-	-	OFF	-
7.8) Range ***(not applicable for Digital Output)***	The analog output can be set to work over different voltage range: • 0-10 VDC • 2-10 VDC • 0-5 VDC	-	-	0-10V	-
Override	This option lets you manually override the digital output or set it back to automatic control.	0	100	AUTO	%

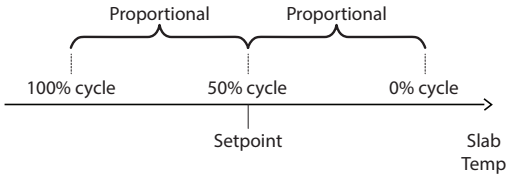
Section	Description	Min	Max	Default	Units
8.1) SP Mode	Sets the analog output in heating or cooling mode or limited heat.	-	-	HEAT	-
8.2) Min Demand	The Discharge Temperature Setpoint is determined using a scale defined by minimum, mid and maximum values of the zone demand and discharge temperature setpoints.  	-100	100	-100	%
8.3) Min SP		-30.0	65.0	13.0	°C
		-22.0	149.0	55.4	°F
8.4) Mid Demand		-100	100	0	%
8.5) Mid SP		-30.0	65.0	21.0	°C
		-22.0	149.0	69.8	°F
8.6) Max Demand		-100	100	100	%
8.7) Max SP		-30.0	65.0	30.0	°C
		-22.0	149.0	86.0	°F

8.8) Proportional	The proportional band used when the output is set to DischCtrl.	0	80	20	°C
		0	144	36	°F
8.9) Integral	Defines the amount of time required for the integral component to equalize the proportional component. Setting this value to zero removes the integral component of the demand.	0	60	15	Min
8.10) Rev Act	When reverse acting is selected, the output action will be inverted versus the output state.	-	-	OFF	-
8.11) Pulsed ***(not applicable for Digital Output)***	The analog output can be configured to pulse instead of modulate when used in proportional mode.	-	-	OFF	-
8.8) Range ***(not applicable for Digital Output)***	The analog output can be set to work over different voltage ranges: • 0-10 VDC • 2-10 VDC • 0-5 VDC	-	-	0-10V	-

Section	Description	Min	Max	Default	Units
9.1) Override	This option lets you assign an output to control the radiant floor system. It also gives access to the radiant floor menu.	-	-	None	-

Section	Description	Min	Max	Default	Units
10.1) Max Slab Temp	The Slab Temperature Setpoint is determined using a scale defined by the minimum and maximum slab temperatures. The Calculated Output Level that determines the Slab Temperature Setpoint is defined by the configuration of the output selected to control the radiant floor. 	5	30	27	°C
		41	86	80.6	°F
10.2) Min Slab Temp		5	30	21	°C
		41	86	69.8	°F

Section	Description	Min	Max	Default	Units
11.1) Min Slab Temp	When in unoccupied mode, the scale defined above is ignored, and the controller maintains this temperature in the slab.	5	30	19	°C
		41	86	66.2	°F

Section	Description	Min	Max	Default	Units
12.1) Proportional	The output pulses at 50% of the cycle length when the slab temperature reaches the setpoint. The proportional band will increase or reduce the length of the pulse depending on the offset from the setpoint. 	0	10	1	°C
		0	18	1.8	°F
12.2) Integral	Defined as the amount of time required to cause the pulse width to vary by 100% to compensate for a continual error of 1 °C.	0	600	60	Min

Section	Description	Min	Max	Default	Units
13.1) Cycle Lenght	The amount of time of a total ON AND OF cycle.	5	250	15	Min
13.2) Outside Cutoff	Above this temperature, the radiant floor output always remains deactivated. (There is a 2°C differential to allow for temperature fluctuations).	5	30	15	°C
		41	86	59	°F
13.3) Calibration	This applies an offset to the slab temperature reading, if required.	-15	15	0	°C
		-27	27	0	°F

Section	Description	Min	Max	Default	Units
14.1) GrpCode1	One of three control groups that this thermostat can belong to. Zero is ignored.	0	250	0	-
14.2) GrpCode2	One of three control groups that this thermostat can belong to. Zero is ignored.	0	250	0	-
14.3) GrpCode3	One of three control groups that this thermostat can belong to. Zero is ignored.	0	250	0	-
14.4) GrpWght1	The weight of the thermostat in the group selected in GrpCode1.	0	15	0	-
14.5) GrpWght2	The weight of the thermostat in the group selected in GrpCode2.	0	15	0	-
14.6) GrpWght3	The weight of the thermostat in the group selected in GrpCode3.	0	15	0	-
14.7) Global Wght	The weight of the thermostat in the global group.	0	60	1	-

Section	Description	Min	Max	Default	Units
15.1) Baud Rate	The baud rate used for serial communication.	9600	115200	57600	Bps
15.2) Parity	The parity used for serial communication. None / Odd / Even	-	-	None	-
15.3) Stop Bits	The number of stop bits used for serial communication.	1	2	1	-

Technical Specifications

Supply: 24 VAC ±10%, 50/60 Hz

Consumption: 5 VA (typ), 13 VA (max)

Inputs: 1 analog input (Thermistor 10K type3), 10 bit resolution

Digital Output: Triac, 10-30 VAC sink, 300 mA max (resettable fuse), ON/OFF or pulsed, heating/cooling

Analog Output: 0-10 VDC, 40 mA max (resettable fuse), modulating, ON/OFF or pulsed, heating/cooling

Screen: LCD 80x130 pixels with back lighting

Interface: Circular capacitive touch pad

Sound: Audible feedback during user interactions

Microprocessor: Atmel 32 bits, 60 MHz, 256K Bytes Flash memory

Communication protocols: Modbus RTU (RS485), up to 127 nodes

Baud rates: 9600, 19200, 38400, 57600, 76800, 115200

Connection: Deatchable screw-type terminal blocks (16 AWG max) and RJ45 modular jack

Dimensions: 3.23" x 4.96" (82 mm x 126 mm)

Weight: 0.22 lb (0.1 kg)

Environment: 32-122 °F (0-50 °C)

Mounting: Standard electrical box 2" x 4"

Certification: FCC Part 15: 2012 class B

The performance specifications are nominal and conform to acceptable industry standards. Prolon Inc. will not be liable for damages resulting from misapplication or misuse of its products.

Compliance

- FCC Compliant to CFR47, Part 15, Subpart B, Class B
- Industry Canada (IC) Compliant to ICES-003, Issue 5: CAN ICES-3 (B)/NMB-3(B)
- RoHS Directive (2002/95/EC)

FCC User Information

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution: Any changes or modifications not approved by Prolon can void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Industry Canada

This Class (B) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment regulations.

Cet appareil numérique de la Classe (B) respecte toutes les exigences du Réglement sur le matériel brouilleur du Canada.

Overall Dimensions

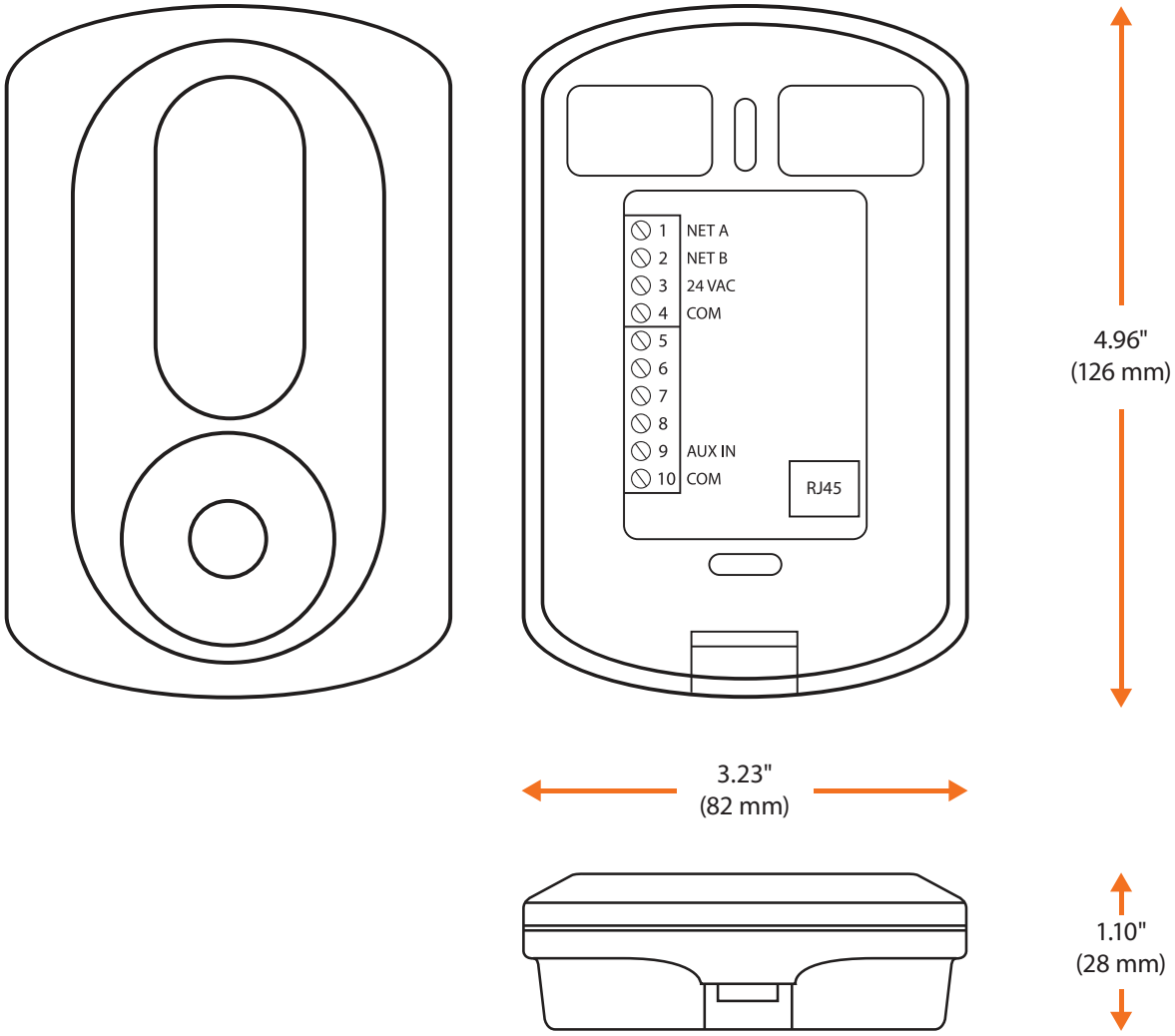


Figure 15 - T1100 Size Diagram

REV. 7.3.2
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