Refrigeration Innovation

Thermo-Simple 1 version 2

Manual

(Non-Wireless System)

Refrigeration Innovation

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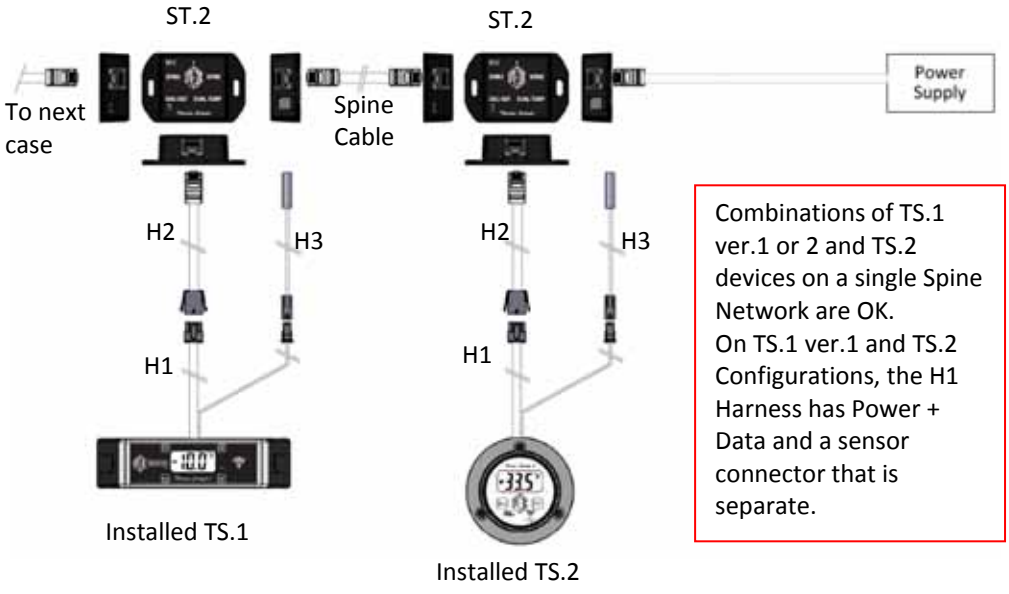
TABLE OF CONTENTS

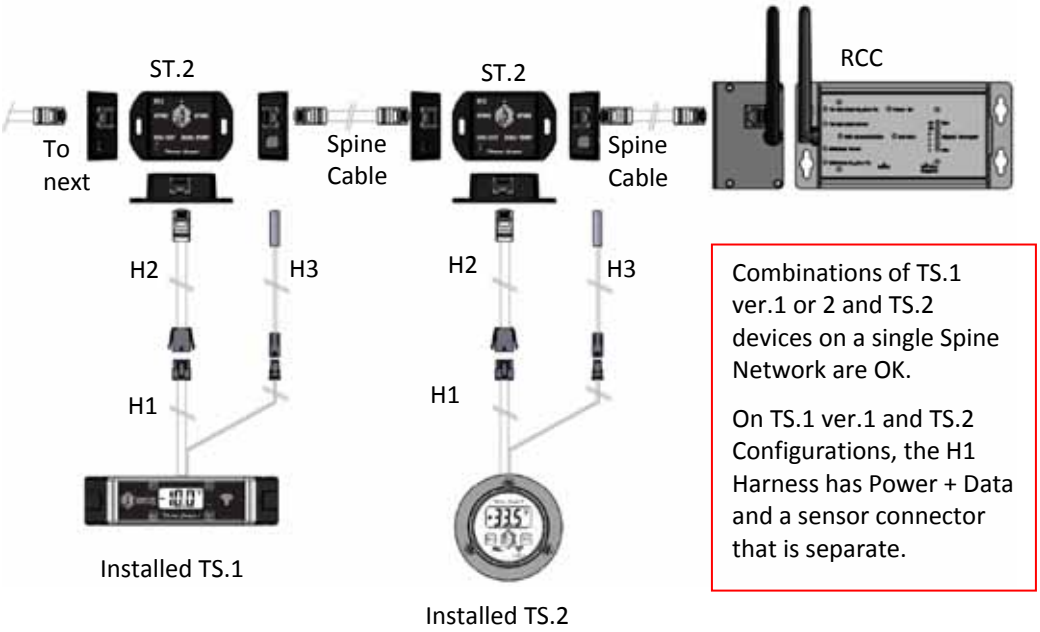
INTRODUCTION

Spine Network Hardware Configuration (Non-Wireless)



Combinations of TS.1 ver.1 or 2 and TS.2 devices on a single Spine Network are OK.
On TS.1 ver.1 and TS.2 Configurations, the H1 Harness has Power + Data and a sensor connector that is separate.

Spine Network Hardware Configuration (Wireless)



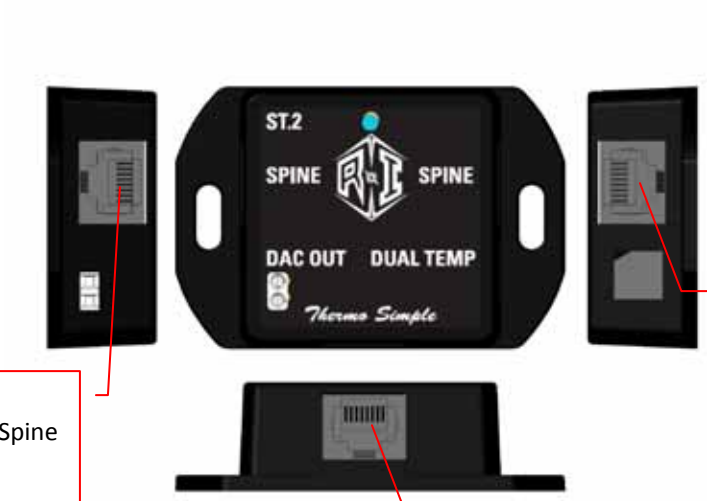
Combinations of TS.1 ver.1 or 2 and TS.2 devices on a single Spine Network are OK.

On TS.1 ver.1 and TS.2 Configurations, the H1 Harness has Power + Data and a sensor connector that is separate.

Power Supply

Standard Power Supply transforms 100-240 Vac to 12 Vdc at maximum 1.5 Amperes.

Spinal Tap 2 (ST.2)



SPINE PORT:
ONLY connect Spine Cable here or Power Supply.

NEVER connect H2 harness here. Warning! THE DEVICE WILL FAIL.

SPINE PORT:
ONLY connect Spine Cable here or Power Supply.

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Thermo-Simple PORT:

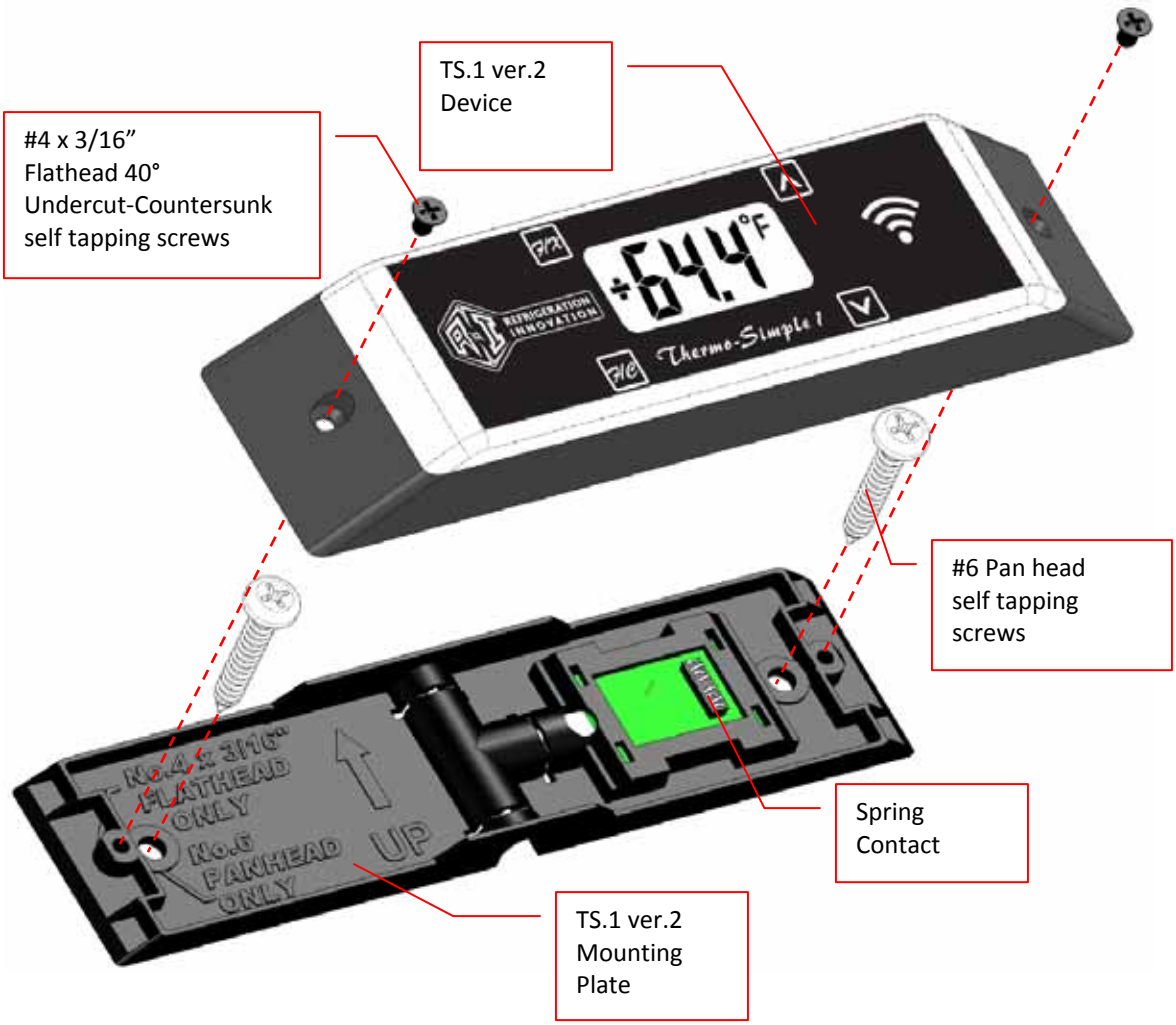
ONLY connect H2 harness here

The Spinal-Tap 2, (ST.2), is a three-way junction in the Spinal Network between the Spine Cable and each Thermo-Simple device, (TS.1 or TS.2).

The number of ST.2 junctions needed in a given Spinal Network depends on the number of Thermo-Simple devices used in the line-up. Each OEM TS device is shipped from the factory with an ST.2 attached to the H2 OEM cable. Replacements must be ordered separately.

Thermo-Simple 1 Version 2 consists of 2 main components. The first part, installed first in a case, is the Mounting Plate. The second part, attached to the Mounting Plate, is the TS.1.v.2 display.

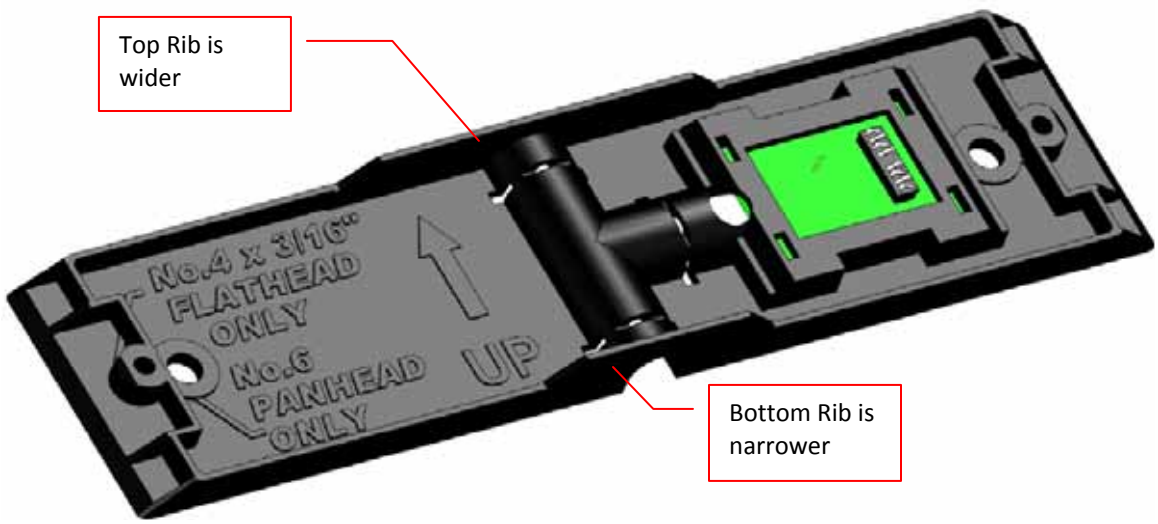
Thermo-Simple 1 version 2



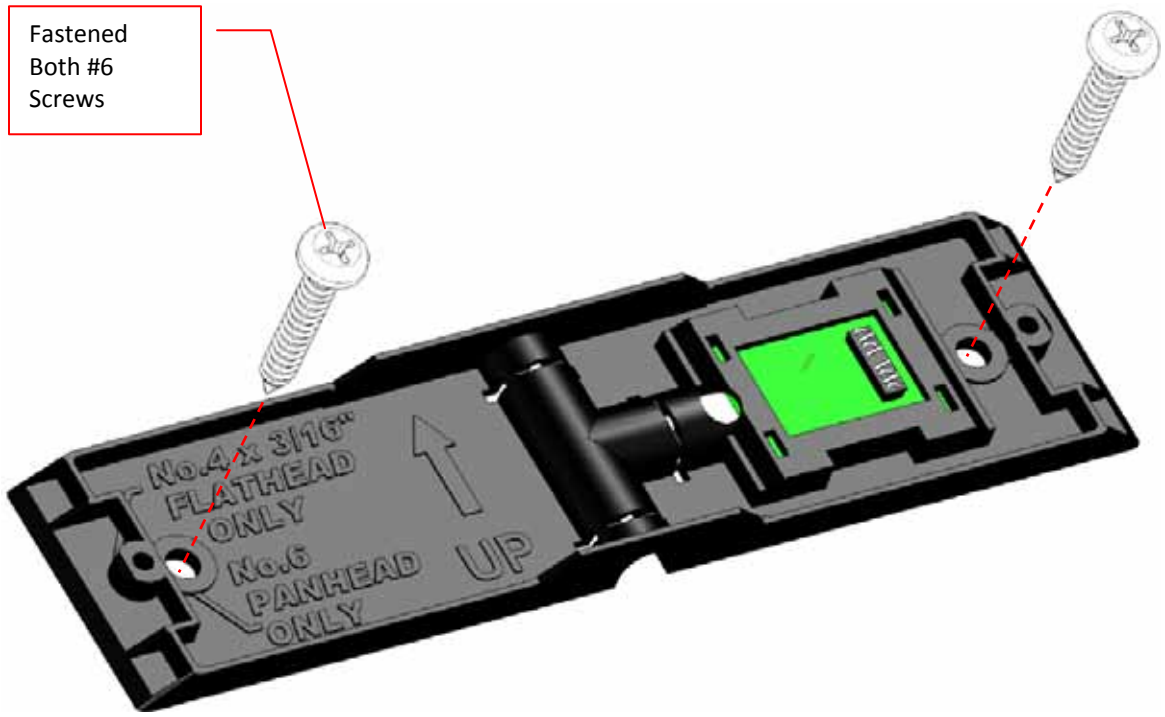
Mounting Plate Installation

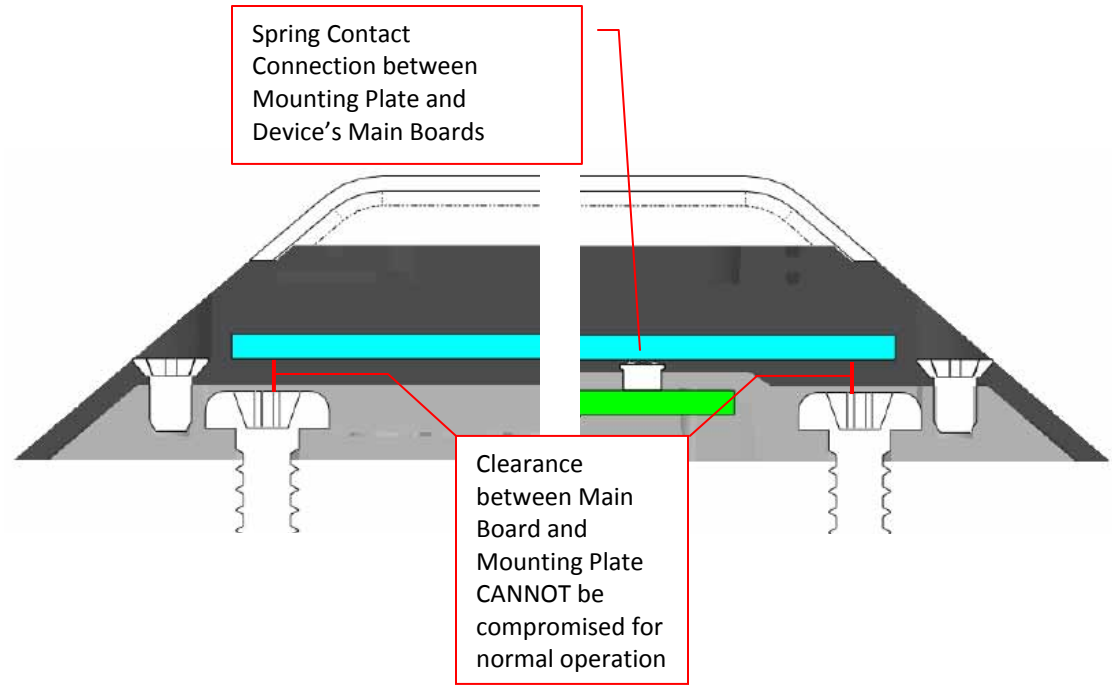
STEP 1:
Install TS.1.MP Mounting Plate in a safe clean environment suitable for electronic devices. Safe environment requirements are the following:
-Dry, low humidity, non-condensing.
-No wash-down.
-Low static charge.
-Operating temperature range: -20°C to +85°C.
-The entire base of the Mounting Plate (TS.1.MP) must have contact with a flat hard surface. Mounting on a curved surface may compromise the device functionality. Allowing the ends of the Mounting Plate to extend over the edge of a bracket may cause the spring connector to malfunction.
-Using mounting screws larger than #6 Pan Head screw can cause device malfunction.
-A hole on the case or bracket, located at the center point of the MP must be large enough to allow the H1 Harness connector to pass easily through. The H1 wiring hole must not have sharp edges.

STEP2:
Make sure that the Mounting Plate is oriented properly.



STEP 3:
Fasten Mounting Plate using two #6 Pan Head screws.

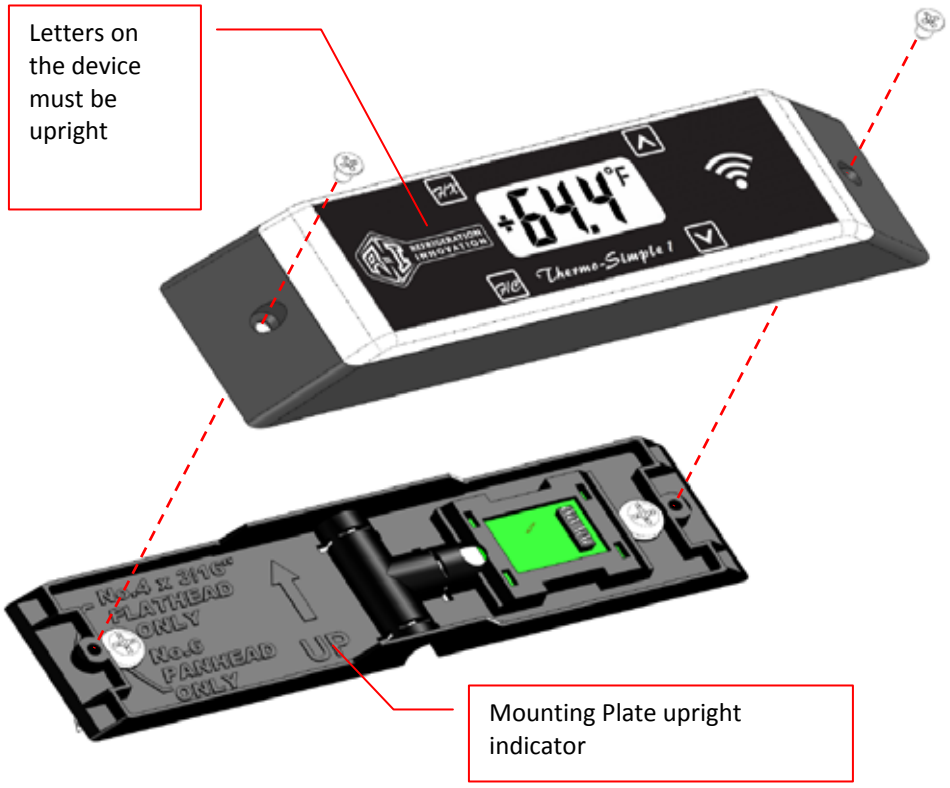




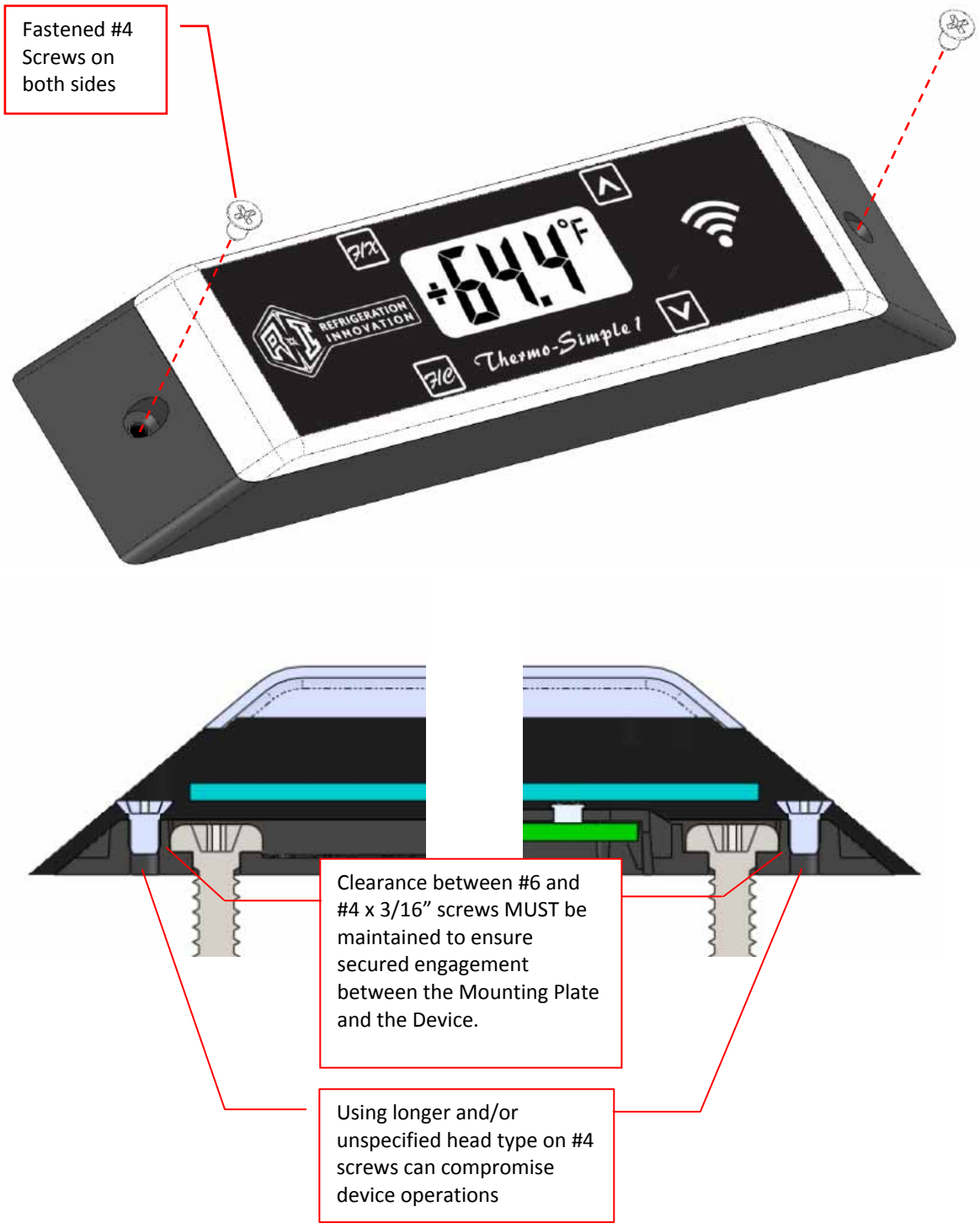
WARNING!!!
It is critical that #6 or #8 Low Profile Pan Head screws are used to ensure proper device operation.

Device Installation

STEP 1:
Check device orientation

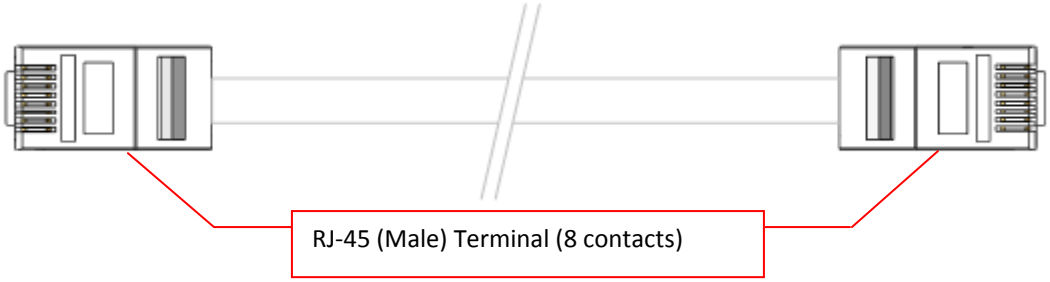


STEP 2:
Engage device to the mounting plate and fastened #4 screws.



WARNING!!!
It is critical that #4 x 3/16" Flathead Undercut Countersunk screws are used to ensure proper engagement between the Mounting Plate spring connector and the Device.

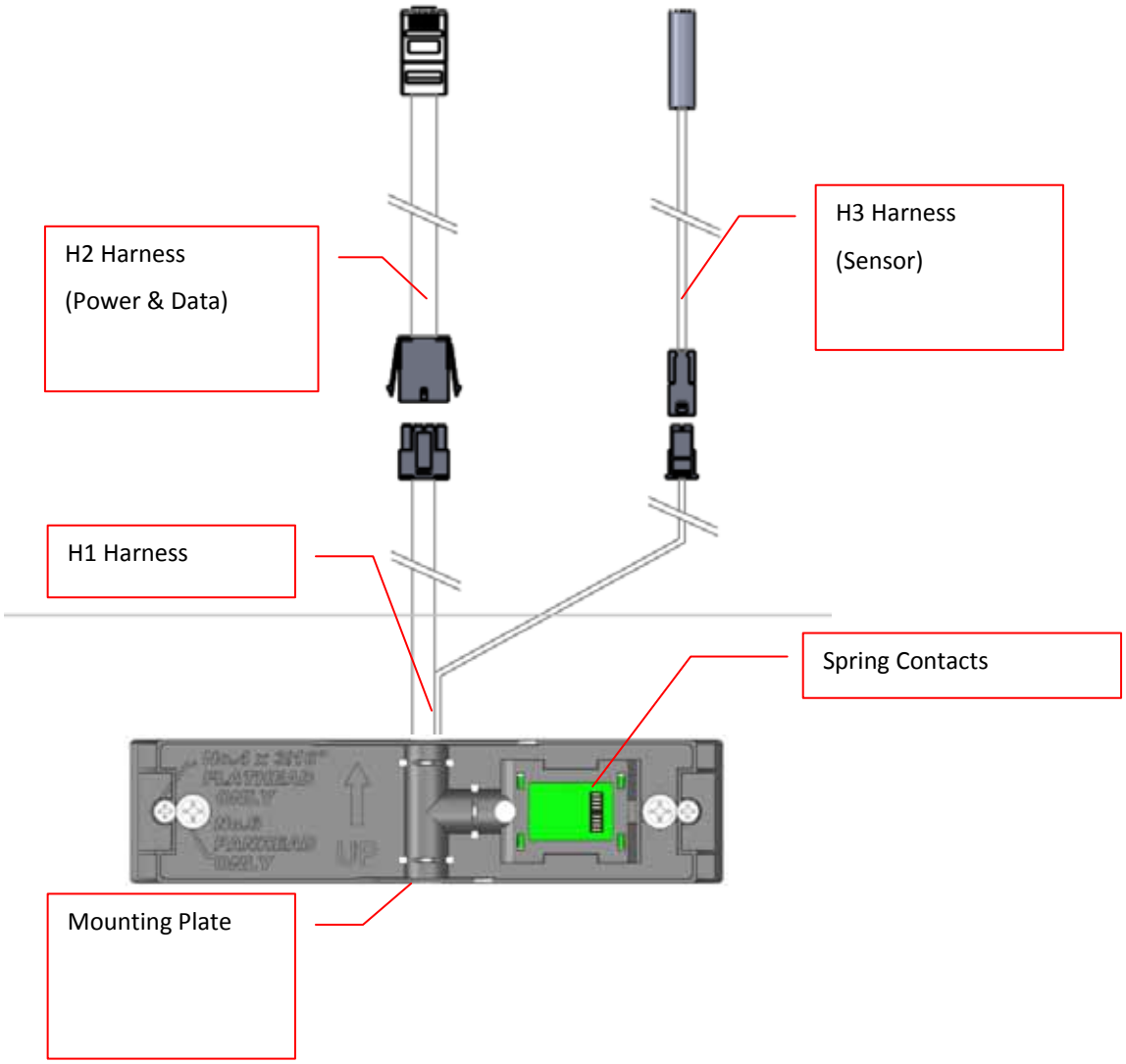
Spine Cable



The Spine cable follows the EIA/TIA 568 B Ethernet wiring standard. A Spine to Spine Communication Cable contains four twisted pairs of 24AWG stranded wire. Industry standard Category 5e stranded network patch cable is used for high quality communication. Both ends of the cable are wired with high quality Cat5e RJ-45 Modular Ethernet connectors. Both connectors in a Spine cable usually come in a transparent clear plastic.

HARDWARE OVERVIEW

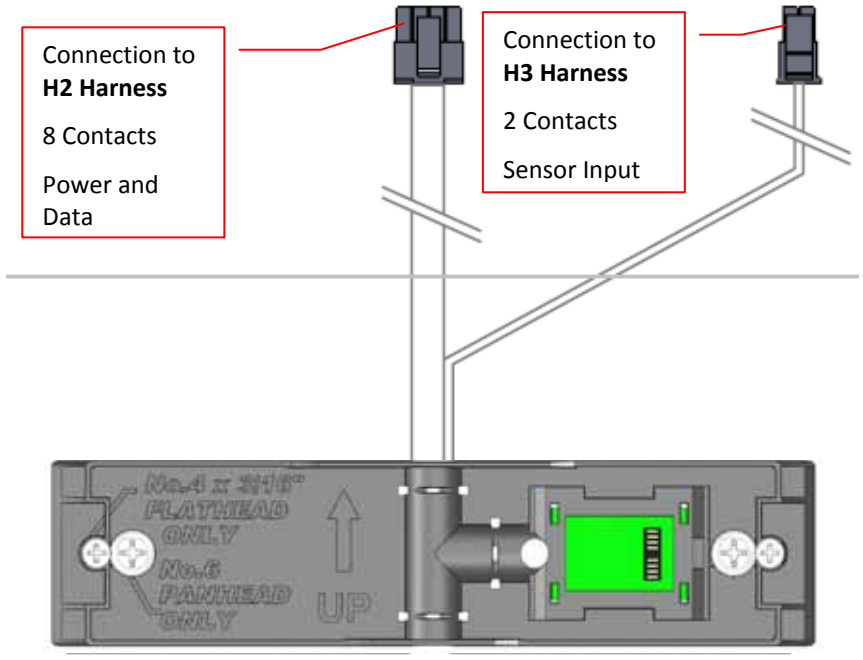
Mounting Plate



The TS.1.MP has several harnesses. Typically these harnesses including the mounting plate will be installed by the case OEM.

In a retrofit the wiring harnesses and sensor(s) will need to be properly routed through the case in a manner appropriate for the application. The H3 sensor harness comes in a standard 6 foot length. A 25 foot H3 sensor harness is available by special order.

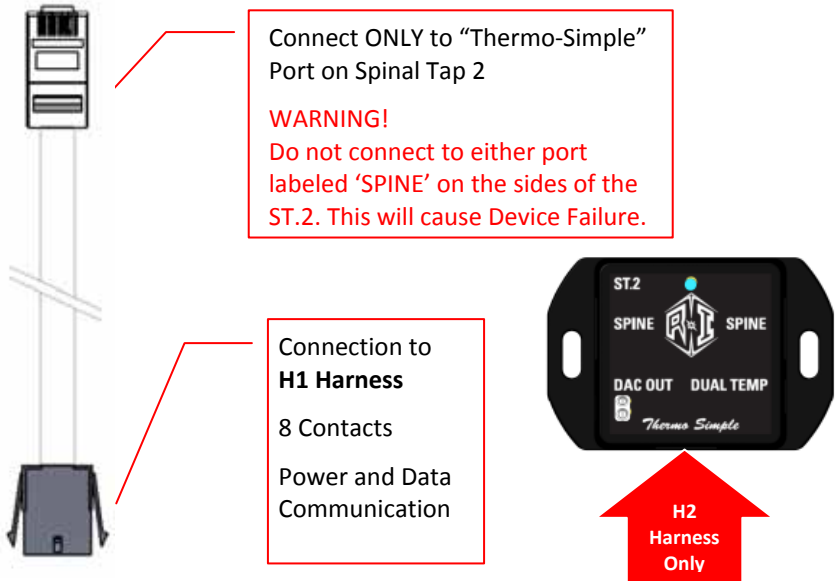
H1 Harness



The H1 harness on the TS.1 splits the wiring for Power and Data (H2) connection and Sensor Input (H3) connection.

The length of the H1 harness is usually very short, (8” long).

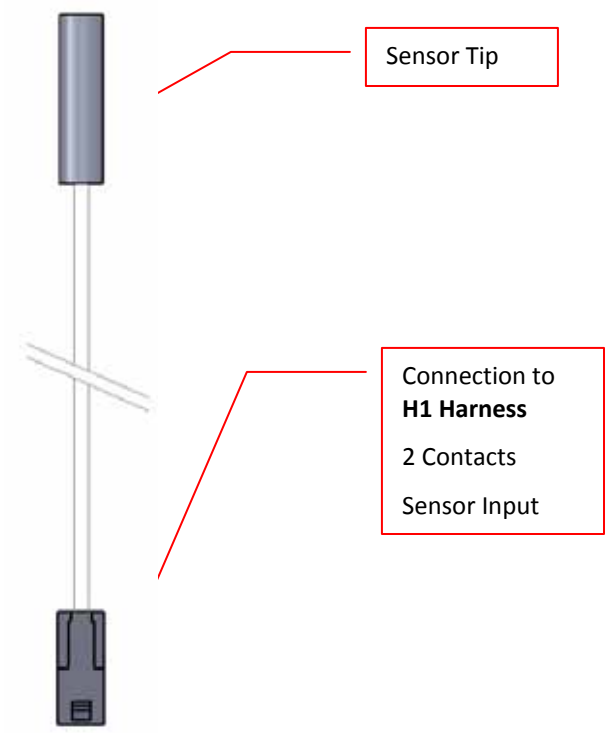
H2 Harness



The H2 harness on TS devices provide the unit with Power and Data connections. The H2 harness usually comes installed and connected to the Spinal Tap 2 (ST.2) by the OEM case manufacturer.

The length of this harness is typically 12 to 20 feet in length, (OEM specified).

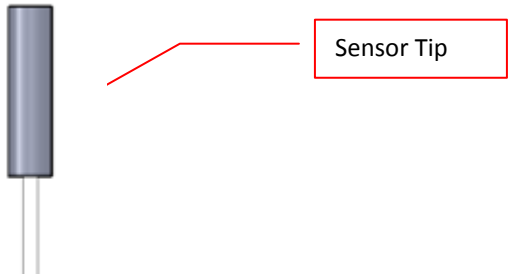
H3 Harness



The H3 harness on the TS.1 provides the unit with a temperature Sensor Input. The H3 harness usually comes installed and connected to H1 harness by the OEM case manufacturer.

The length of this harness is typically 6 feet long. Other sensor harness lengths up to 25 feet are available by special order from the factory.

Sensor



The sensor tip on H3 harness consists of an intelligent digital sensor.

Note: The sensor wires are polarity sensitive. If the wire is cut, wire polarity must be maintained by matching the wire colors.

TS.1 Device

LED

Solid Blue – Frozen Status

Flashing Blue – Freeze Alarm

Solid Green – Fresh Status

Solid Purple – Defrost Status

Flashing Yellow – Over Temp. Alarm
(Or only the first 60 minutes of Alarm with Red Alarm option)

OPTIONAL
Flashing Red – Over Temp. Alarm
(After the first 60 minutes of an Amber alarm)

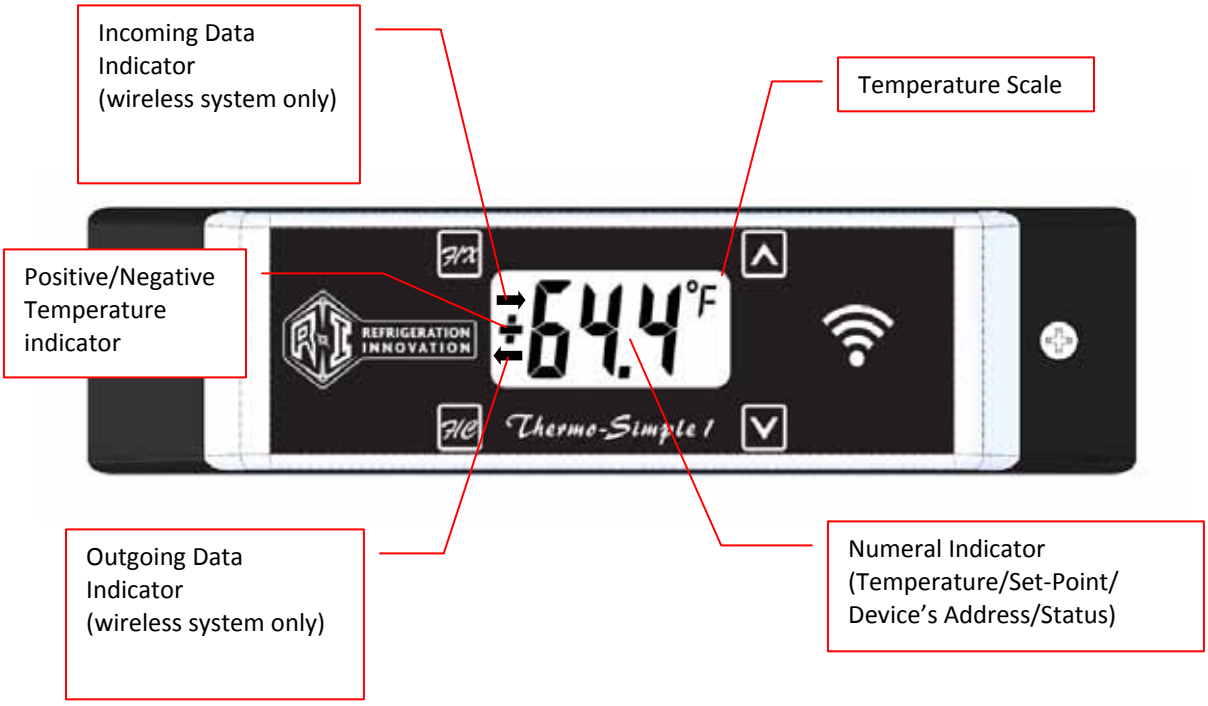
The general LED states are solid and flashing colors. Please note that there are slight differences in LED color schemes at different set-points. For more detail refer to the Set-points section.

Solid color states indicate optimal case status (whether it is for frozen product (Blue) or for fresh product (Green)). Solid color states also indicate the state of the case using various colors (i.e. in a defrost cycle).

Flashing LED states indicate an alarm status, where attention is needed. Flashing blue signifies that the case temperature has dipped below the freezing set point (33.5°F freeze alarm). Flashing amber/yellow signifies that the case has been out of temperature for at least 60 minutes (70 minutes for walk-in cooler set-points). Flashing red signifies that the case has been out of temperature for at least 120 minutes (140 minutes on walk-in cooler set-points). Operational and Alarm colors can be changed by special order.

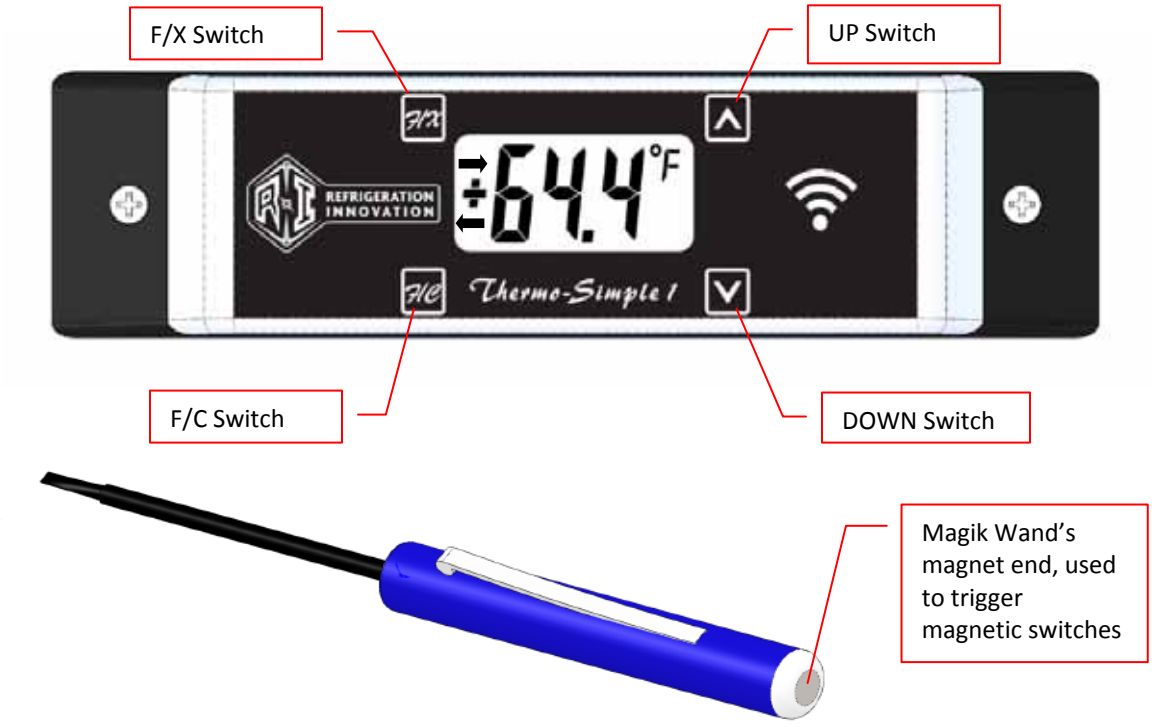
Note: Walk-in cooler set-points have the defrost status LEDs disabled and dEF will not display.

Display



TS.1.v2 displays temperature in its default state. It also displays incoming and outgoing communication between the device and the wireless network a wireless system.

Magnetic Switches



SOFTWARE OVERVIEW

TS.1 Device Settings

The basic switch assignments can be used to temporarily change the temperature scale or display the currently active set-point.

There are also arrays of advanced switch sequences to change the default temperature scale, change active set-points, and obtain or delete the device address in a wireless system.

Basic Switch Assignments

Switch	Assignment	Description
F/C	Temporarily Change Temperature Scale	Turn on red LED, display temperature in Centigrade. Temperature automatically reverts back to Fahrenheit in approximately 10 seconds. If any LEDs are flashing from any previous command, triggering this switch will clear the flashing LEDs and any displayed address on the screen.
UP	Display active set-point	Turn on green LED, display current alarm set point temperature.
DOWN	Turn Cyan LED on	Turn on cyan LED
F/X	Function/Service Request trigger	Turn on blue LED. Function switch, this is a function switch which is enabled for 2-1/2 seconds after triggering. While the Blue LED is lit, triggering other switches will invoke various advanced functions and settings.

Function/Service Request (Advanced) Switch Sequences

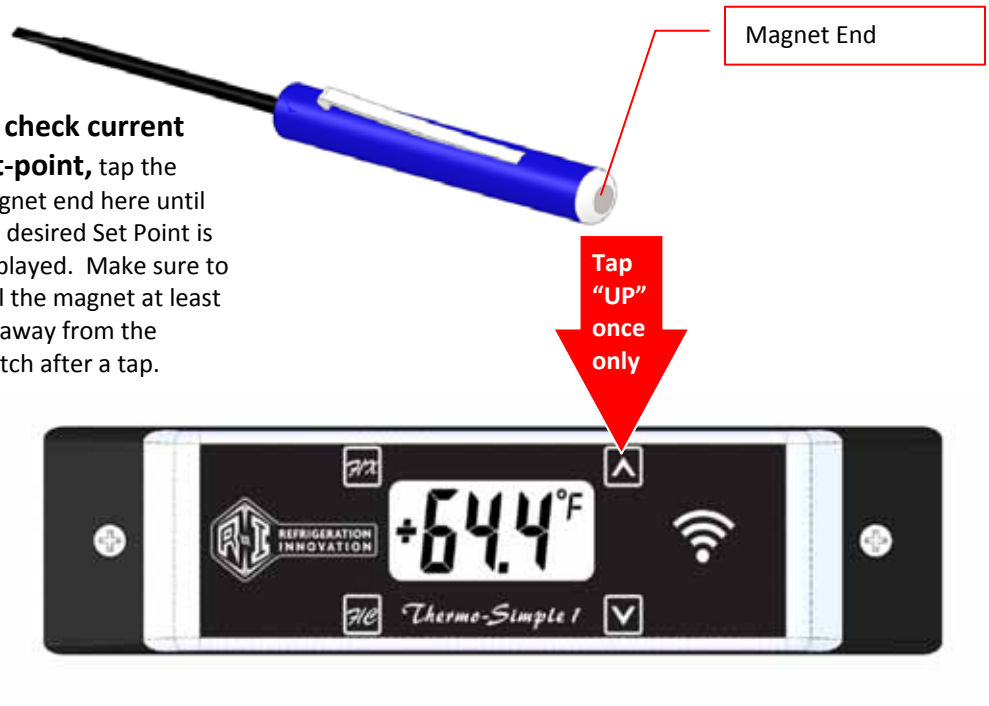
Switch Sequences	Assignments	Descriptions
F/X | F/C	Set the default temperature display to the opposite of what is currently displayed	From the factory, the default temperature display is Degrees Fahrenheit. Triggering this function will set the default to Degrees Centigrade. If triggered during a Defrost cycle, this will override the display of 'dEF' on the Display. This allows reading of the actual temperature during a Defrost cycle. This override will not change the default temperature units and is only in effect for one Defrost cycle. The next Defrost cycle will display 'dEF' as normal.
F/X | UP	Select/change alarm set-point	While the set-point is flashing on the display, triggering of the UP switch will successively change the set point to the next pre-programmed set point. This will cycle through all the set-points as long as the display is flashing. Allowing the display to stop flashing will assign the new set point that is displayed. Note: Setting the "dt" mode for Dual temp units allows the set-point to be automatically modified with the case switch between 5°F and 40°F for low and medium temperatures respectively.
F/X | F/X	Auto-assign the device address to the next available address. WiDAQ (wireless) system only	F/X + F/X, trigger the Function switch once to light the Blue LED then trigger it again within 2-1/2 seconds to light the Green LED. After 2 seconds the Blue LED will start flashing which allows the unit to start communicating to the WiDAQ wireless network and will enable the Thermo-Simple to acquire a network address. The newly assigned network address should show up on the display. If an address has been previously assigned to the unit then it will display the address that has been assigned.
F/X | F/X | UP	Clear an assigned address and stop device communication WiDAQ (wireless) system only	F/X + F/X + UP switches will clear any assigned address and cause the unit to stop responding to commands from the WiDAQ wireless network After the Unit's address has been cleared, the F/C switch can be triggered to clear the flashing LED and display.

F/X | F/X | F/X	Manually assign the device address. Thermo-Simple unit MUST NOT have previously assigned address. Previous address number must be cleared first WiDAQ (wireless) system only	F/X + F/X + [F/X & HOLD], trigger the Function switch once to light the Blue LED. Trigger it again within 2-1/2 seconds to light the Green LED. Trigger and hold for auto-increment, or tap until the desired address number is shown. The Blue LED will flash briefly and allow the unit to start communicating to the WiDAQ wireless network using the manually assigned network address. This is intended to allow replacement of a device that already has an address on the WiDAQ network with a new device using that same address. Note: Use of an address that is already assigned to another device on the network will cause malfunction of both devices.

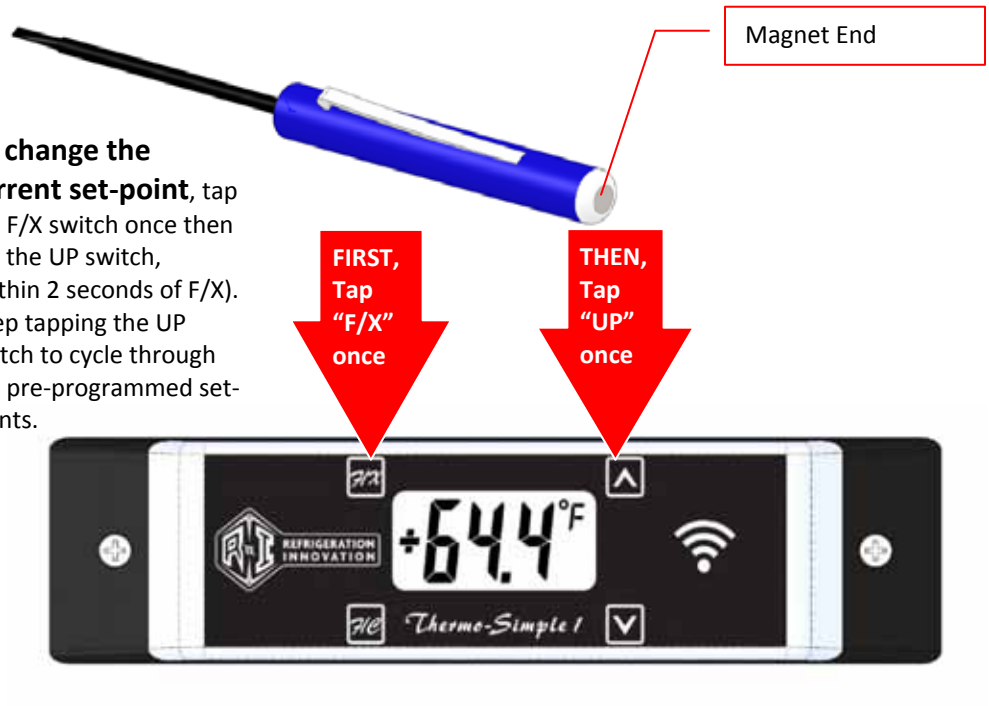
Setting the Device Alarm Set-Point

The set-point configures the device to operate in the range of temperature for that particular case. The set-point determines whether the case temperature is within range or not and determines when the unit goes into alarm.

To View the current Set-point of a device tap the UP switch. **Hint:** Once a switch is tapped pull the magnet at least ½" away from the switch to allow the switch to turn off.



To check current set-point, tap the magnet end here until the desired Set Point is displayed. Make sure to pull the magnet at least ½" away from the switch after a tap.



To change the current set-point, tap the F/X switch once then tap the UP switch, (within 2 seconds of F/X). Keep tapping the UP switch to cycle through the pre-programmed set-points.

Set-Points

There are slight differences between LED color schemes on different set-points. There are also differences in alarm and alarm delay schemes between different set-points.

The Optional Red Alarm is only applicable if it has been enabled from the factory. On most units the Red alarm is NOT enabled. Hence, the Amber Alarm will stay on past 1 hour if out of temp.

For different temperature ranges on different types of cases there are 9 set-points. They are as follows:

[dt] Dual Temperature

The dual temperature set-point is a variable set-point. dt set-point toggles between 5.0°F set-point for low setting and 40.0°F set-point for medium setting when a dual temp case is switched.

[0.0°F] 0.0 Fahrenheit

LED COLOR and STATE		DESCRIPTIONS
	**SOLID BLUE**	Below set-point. (-2 degree Fahrenheit)
	**SOLID BLUE**	At set-point. (0 degrees Fahrenheit)
	**SOLID PURPLE & dEF**	Above set-point for the first time. Device assumes case is in Defrost for the first 60 minutes.
	**FLASHING AMBER**	Above set-point for more than 60 minutes. (First Alarm with optional Red alarm)
	**FLASHING RED (optional)**	Above set-point for more than 120 minutes. (Second Alarm after Amber Alarm)

Suggested Product for this Set-point:
- Ice Cream
- Frozen Food

[5.0]5.0 Fahrenheit and/or Dual Temp Low Setting

LED COLOR and STATE		DESCRIPTIONS
	**SOLID BLUE**	Below set-point. (0 degree Fahrenheit)
	**SOLID BLUE**	At set-point. (5 degrees Fahrenheit)
	**SOLID PURPLE & dEF**	Above set-point for the first time. Device assumes case is in Defrost for the first 60 minutes.
	**FLASHING AMBER**	Above set-point for more than 60 minutes. (First Alarm with optional Red alarm)
	**FLASHING RED (optional)**	Above set-point for more than 120 minutes. (Second Alarm after Amber Alarm)

Suggested Product for this Set-point:
- Ice Cream
- Frozen Food

[36.0] 36.0 Fahrenheit

LED COLOR and STATE		DESCRIPTIONS
	**SOLID GREEN**	Below set-point. (34.4 degree Fahrenheit)
	**SOLID GREEN**	At set-point. (36 degrees Fahrenheit)
	**SOLID PURPLE & dEF**	Above set-point for the first time. Device assumes case is in Defrost for the first 60 minutes.
	**FLASHING AMBER**	Above set-point for more than 60 minutes. (First Alarm with optional Red alarm)
	**FLASHING RED (optional)**	Above set-point for more than 120 minutes. (Second Alarm after Amber Alarm)

Suggested Product for this Set-point:
- Fresh Meat
- Fresh Fish

[40.0] 40.0 Fahrenheit and/or Dual Temp Hi Setting

LED COLOR and STATE		DESCRIPTIONS
	**SOLID GREEN**	Below set-point. (34.4 degree Fahrenheit)
	**SOLID GREEN**	At set-point. (40 degree Fahrenheit)
	**SOLID PURPLE & dEF**	Above set-point for the first time Device assumes case is in Defrost for the first 60 minutes.
	**FLASHING AMBER**	Above set-point for more than 60 minutes. (First Alarm with optional Red alarm)
	**FLASHING RED (optional)**	Above set-point for more than 120 minutes. (Second Alarm after Amber Alarm)

Suggested Product for this Set-point:
- Fresh Meat
- Fresh Fish

[43F] 43.0 Fahrenheit with Freeze Alarm

LED COLOR and STATE		DESCRIPTIONS
	**FLASHING BLUE**	Below freezing point. (Freeze Alarm starts at 33.5 degree Fahrenheit)
	**SOLID GREEN**	At or below set-point. (43 degree Fahrenheit)
	**SOLID PURPLE & dEF**	Above set-point for the first time. Device assumes case is in Defrost for the first 60 minutes.
	**FLASHING AMBER**	Above set-point for more than 60 minutes. (First Alarm with optional Red alarm)
	**FLASHING RED (optional)**	Above set-point for more than 120 minutes. (Second Alarm after Amber Alarm)

Suggested Product for this Set-point:
- Fresh Produce
- Fresh Fruit

[52.0] 52.0 Fahrenheit

LED COLOR and STATE		DESCRIPTIONS
	**SOLID GREEN**	Below set-point. (40 degree Fahrenheit)
	**SOLID GREEN**	At or below set-point. (52 degree Fahrenheit)
	**SOLID PURPLE & dEF**	Above set-point for the first time. Device assumes case is in Defrost for the first 60 minutes.
	**FLASHING AMBER**	Above set-point for more than 60 minutes. (First Alarm with optional Red alarm)
	**FLASHING RED (optional)**	Above set-point for more than 120 minutes. (Second Alarm after Amber Alarm)

Suggested Product for this Set-point:
- Cheese
- Delicatessens

[57F] 57.0 Fahrenheit with Freeze Alarm

LED COLOR and STATE		DESCRIPTIONS
	**FLASHING BLUE**	Below freezing point. (Freeze Alarm starts at 33.5 degree Fahrenheit)
	**SOLID GREEN**	At or below set-point. (57 degree Fahrenheit)
	**SOLID PURPLE & dEF**	Above set-point for the first time Device assumes case is in Defrost for the first 60 minutes.
	**FLASHING AMBER**	Above set-point for more than 60 minutes. (First Alarm with optional Red alarm)
	**FLASHING RED (optional)**	Above set-point for more than 120 minutes. (Second Alarm after Amber Alarm)

Suggested Product for this Set-point:
- Fresh Milk
- Dairy Products

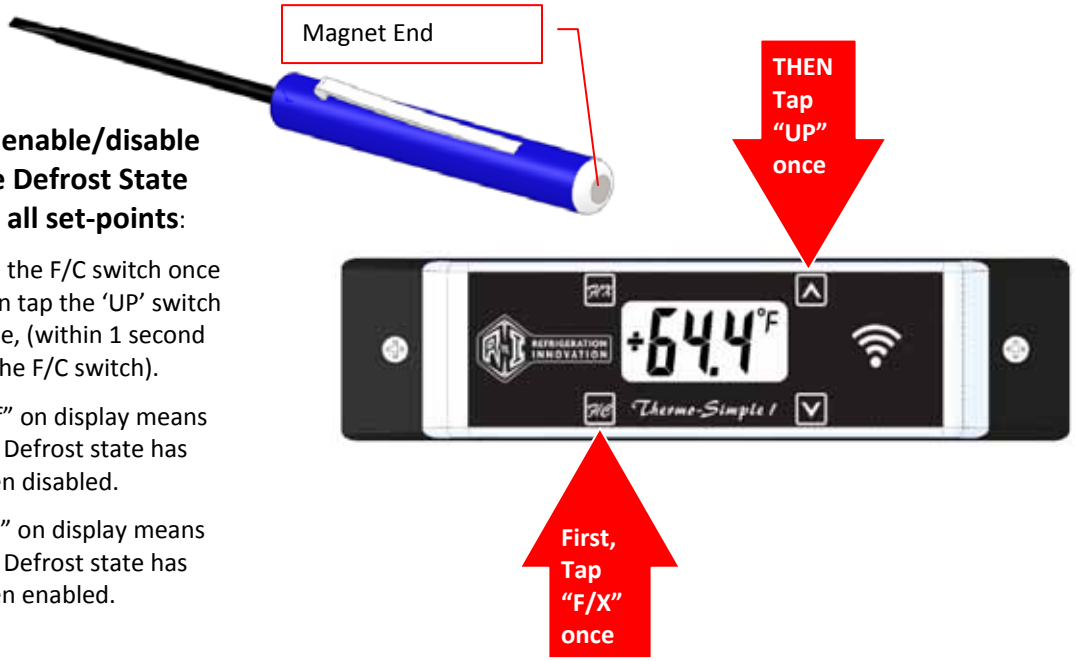
[142] 142 Fahrenheit for Hot Foods

LED COLOR and STATE		DESCRIPTIONS
	**NO COLOR**	Case heaters are off or have been on for less than 60 minutes. Device assumes case is heating up for the first 60 minutes in this set-point
	**SOLID GREEN**	Case has reached or is above set-point. (Above 142 degree Fahrenheit)
	**FLASHING AMBER**	Case has never reached set-point or has been below set-point for more than 60 minutes. Device assumes case failure and triggers the Amber Alarm. Any food should be removed until the case is repaired.
	**FLASHING RED**	Case has been below the set-point for more than 4 hours. If prepared food has been in the case up to a Red Alarm the food should be discarded. (Second Alarm after Amber Alarm)

Suggested Product for this Set-point:
- Hot Foods
- Prepared Foods

Enabling/Disabling Defrost (dEF)

In some applications, there is a need to disable the Solid Purple Defrost state.



To enable/disable the Defrost State for all set-points:

Tap the F/C switch once then tap the 'UP' switch once, (within 1 second of the F/C switch).

"off" on display means the Defrost state has been disabled.

"on" on display means the Defrost state has been enabled.

WARRANTY

2-Year Warranty

Thermo-Simple 1 version 2 from Refrigeration Innovation, (the "Product"), is warranted against defects in materials and workmanship under normal use, for a period of 2-years from the date of purchase. In the event of a product failure due to materials or workmanship, Refrigeration Innovation will repair or replace the defective product. For warranty service, return the defective product to Refrigeration Innovation, shipping prepaid, for prompt repair or replacement.

The foregoing sets forth the full extent of Refrigeration Innovation's warranties regarding the Product. Repair or replacement at Refrigeration Innovation's option is the exclusive remedy. THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, AND REFRIGERATION INNOVATION SPECIFICALLY DISCLAIMS ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL REFRIGERATION INNOVATION, ITS SUPPLIERS OR LICENSORS BE LIABLE FOR DAMAGES IN EXCESS OF THE PURCHASE PRICE OF THE PRODUCT, FOR ANY LOSS OF USE, LOSS OF TIME, INCONVENIENCE, COMMERCIAL LOSS, LOSS OF PRODUCT, LOST PROFITS OR SAVINGS, OR OTHER INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PRODUCT, TO THE FULL EXTENT SUCH MAY BE DISCLAIMED BY LAW. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES. THEREFORE, THE FOREGOING EXCLUSIONS MAY NOT APPLY IN ALL CASES. This warranty provides specific legal rights. Other rights which vary from state to state may also apply.