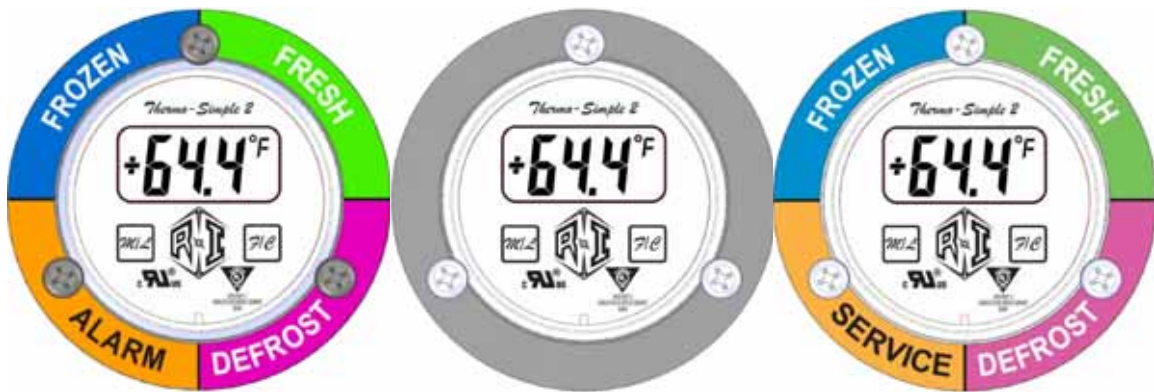


Refrigeration Innovation

# Thermo-Simple 2

# Manual

(Non-Wireless System)



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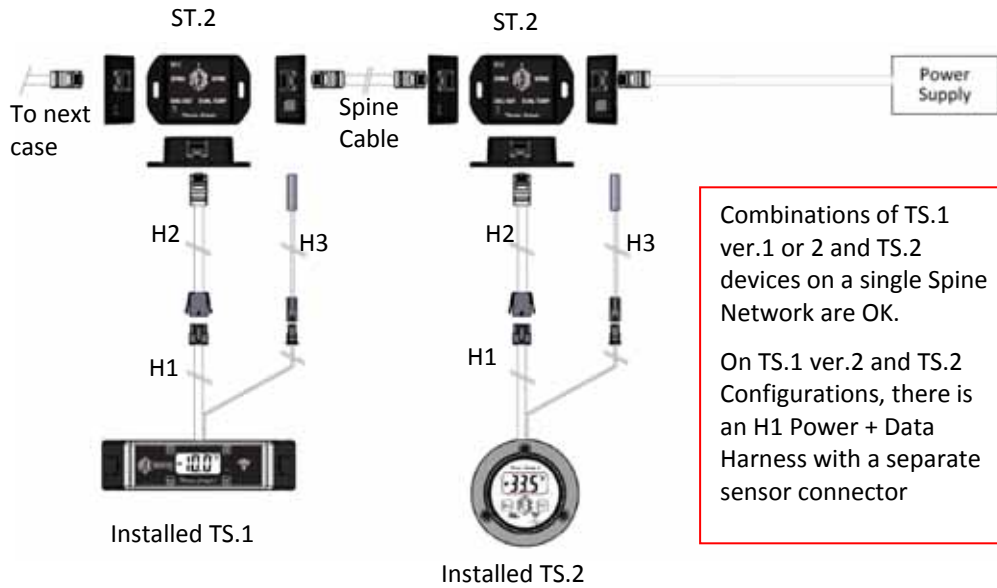
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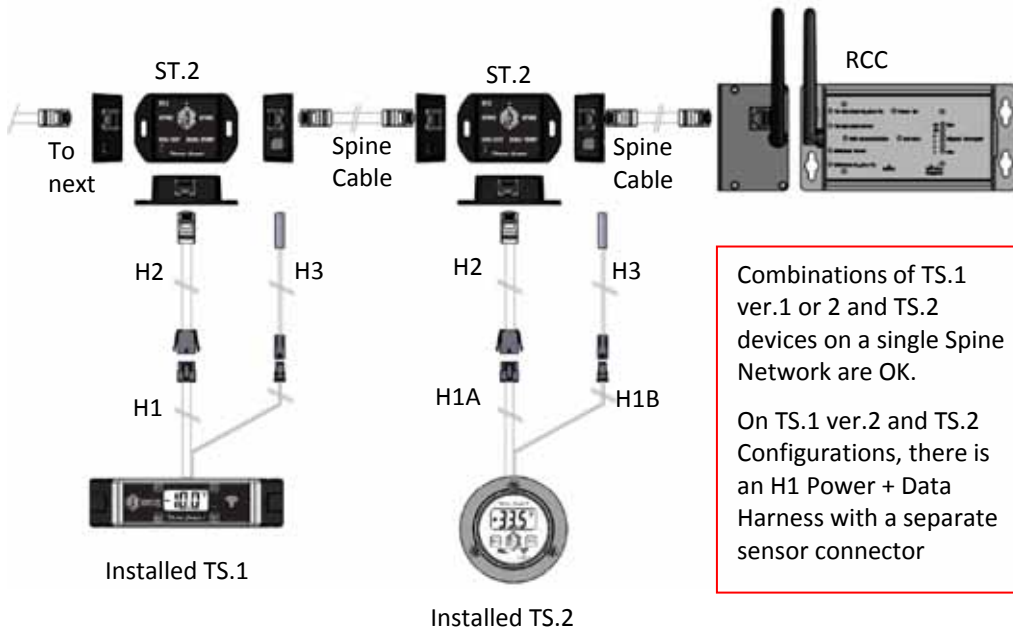
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**INTRODUCTION**

***Spine Network Hardware Configuration (Non-Wireless)***



***Spine Network Hardware Configuration (Wireless)***

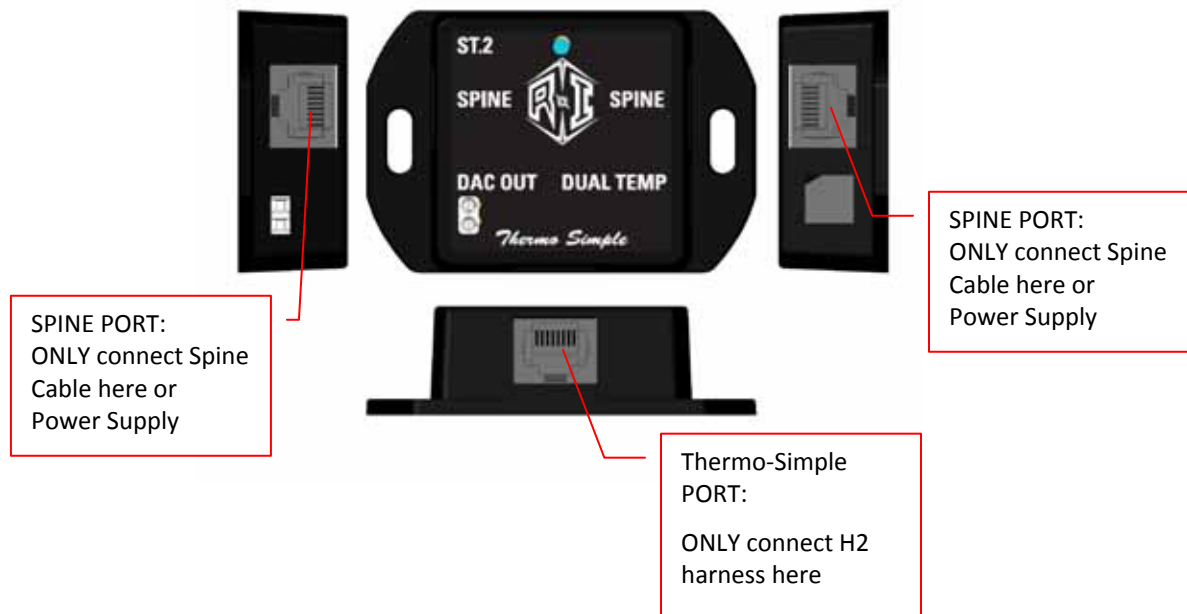


**Power Supply**



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

**Spinal Tap 2 (ST.2)**



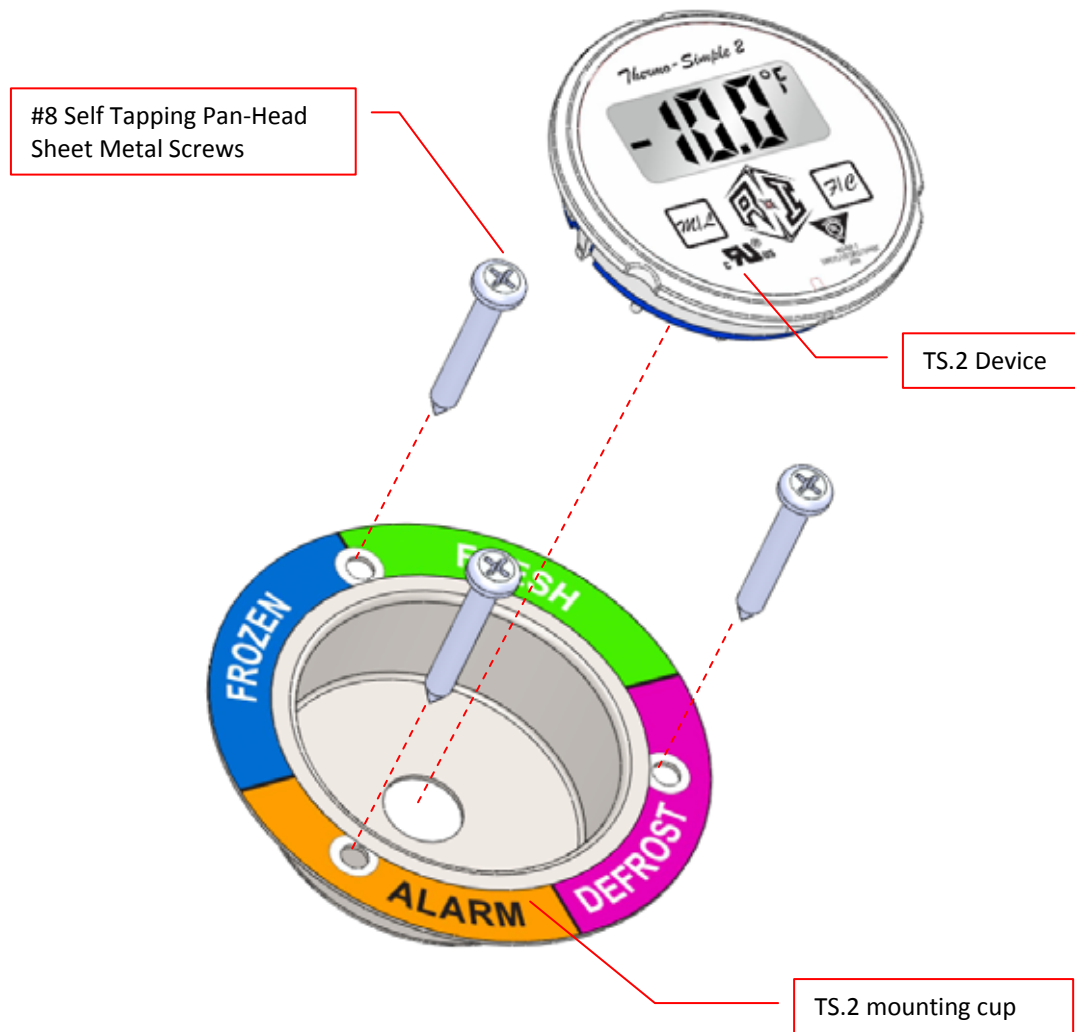
The Spinal-Tap 2, (ST.2), is a three-way junction in the Spinal Network between the Spine Cable and each Thermo-Simple device, (TS.1 or TS.2).

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 harness. Replacements must be ordered separately.

### Thermo-Simple 2 (TS.2)

The Thermo-Simple 2 (TS.2) is an advanced communicating digital thermometer alarm with preprogrammed settings for many low, medium and hot temperature applications. Alert functionality can be as simple as “no light, no problem” to full color display effects for conditions such as defrost, frozen, fresh, normal operation, high temperature alarm, freeze warning and hot food case alarms.

This manual covers Thermo-Simple installations in a non-communicating application (Thermo-Simple 2 devices operating as stand-alone units, not connected to a WiDAQ wireless data acquisition system). For more information regarding communicating and data acquisition applications please consult the WiDAQ Wireless Data Acquisition Manual.



### Mounting Cup Installation

**STEP 1:**

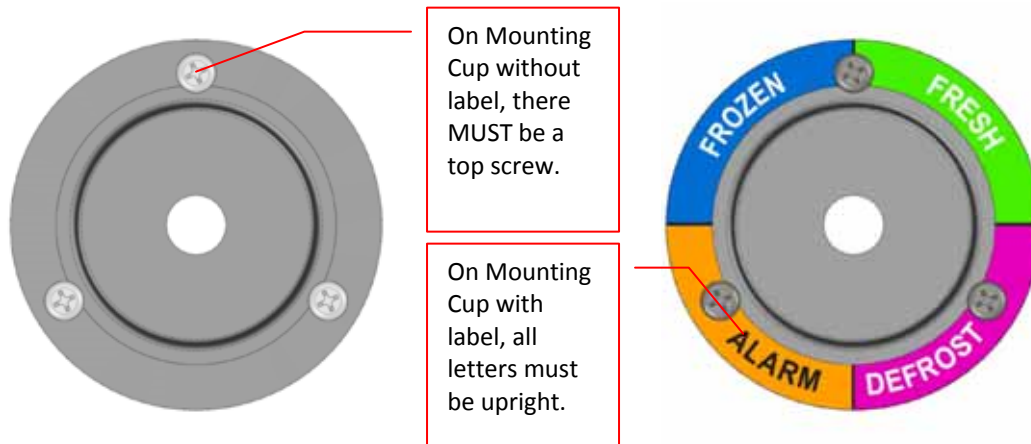
Install the TS.2 Mounting Cup in a safe clean environment suitable for electronic devices. Safe environment requirements are the following:

- Dry, low humidity, non-condensing.
- No direct wash-down. If installed where splash can occur the harnesses require sealing where the wire

- exits the back of the can. Inline harness connectors must not be exposed to water.
- Low static charge.
- Operating temperature range: -20°C to +85°C.
- The entire flange of the Mounting Cup (TS.2.MC) must have contact with a flat hard surface. Mounting on a curved surface may compromise the device functionality.
- Using mounting screws larger than #8 Pan Head screw will cause device malfunction.
- A hole on the case or bracket, located at the center point of the MC must be large enough to allow the TS.2 H1 Harness connectors to pass easily through. The H1 wiring hole must not have sharp edges.

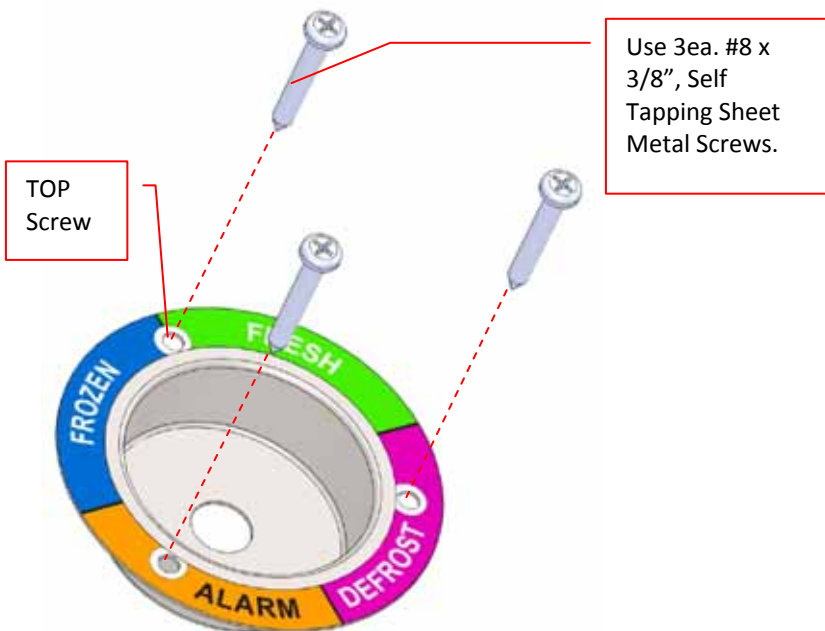
**STEP 2:**

Make sure that the Mounting Cup is oriented properly; the top screw must be at the 12:00 position.



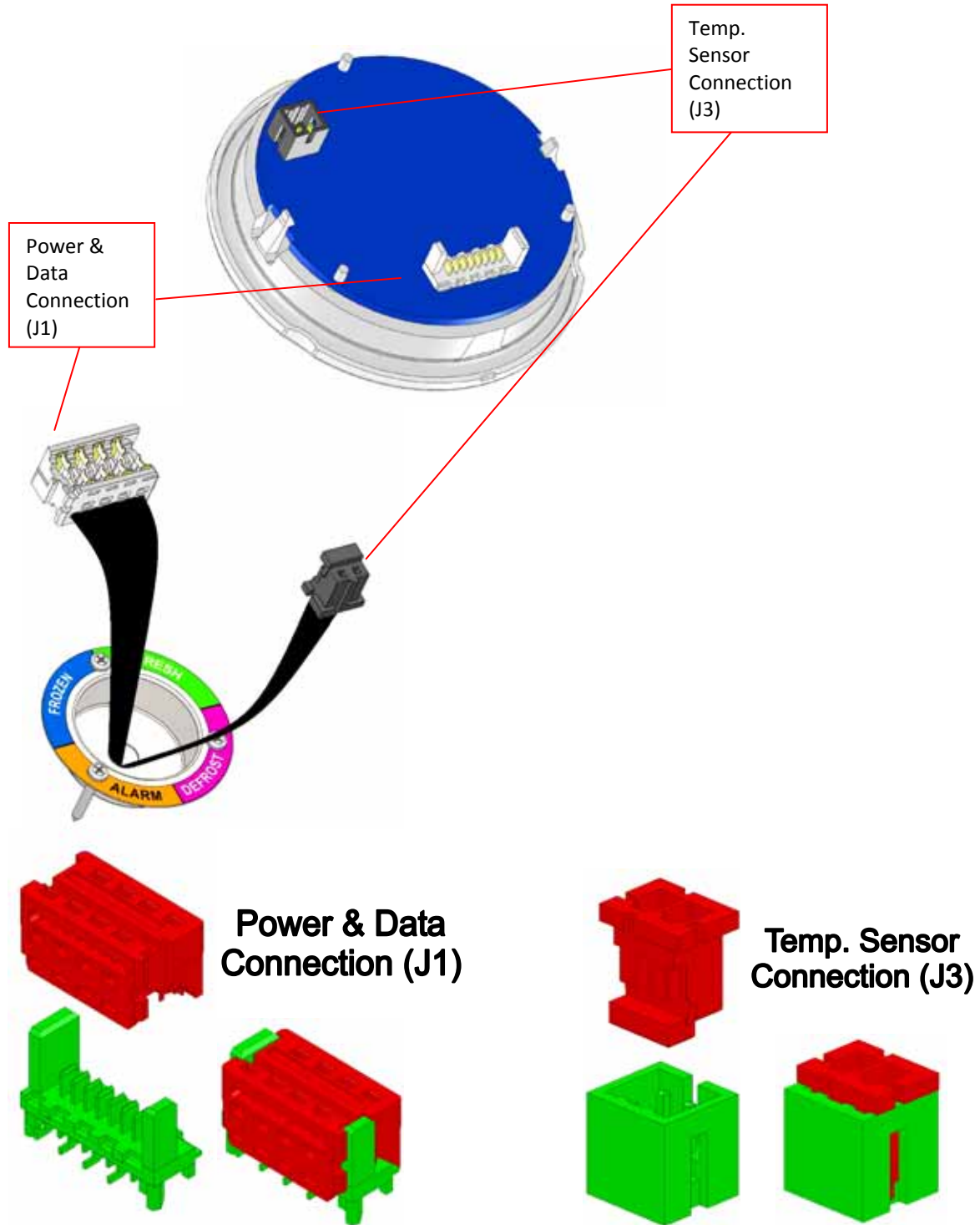
**STEP 3:**

Fasten Mounting Cup using three #8 x 3/8" Self Tapping Sheet Metal Pan Head screws.



### Wire Harness Installation

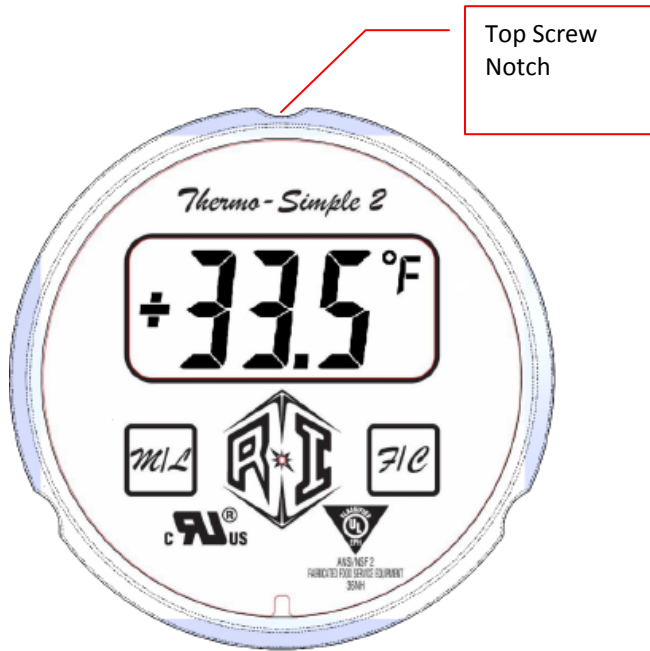
There are 2 inputs to TS.2 device from the mounting cup. First is the power plus data connection. Second is the sensor connection. Note: The connectors are polarized and only plug in one way, do not force.



## Device Installation

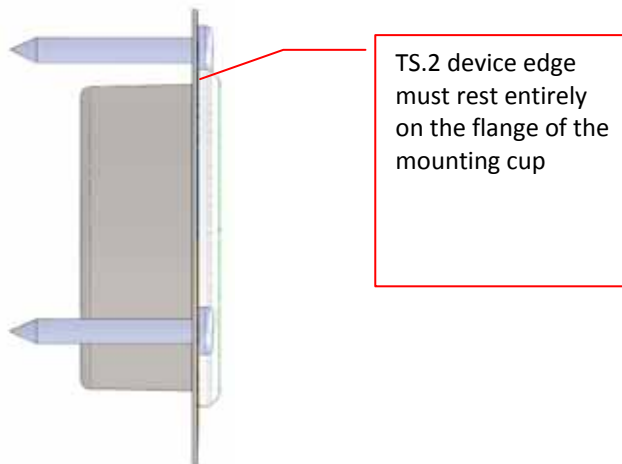
### STEP 1:

Check device orientation and align all screw notches accordingly. Note: Only leave a short (1") wire inside the cup, push the excess harness through the grommet in the center of the cup.

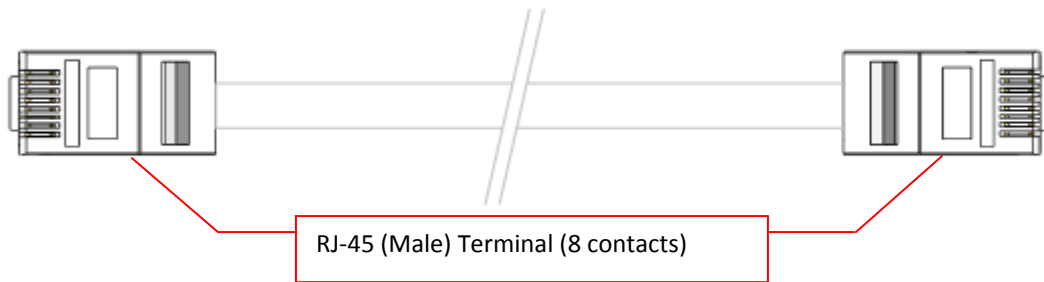


### STEP 2:

Press the TS.2 device into the mounting cup until the edge of the device rests entirely on the mounting cup flange.



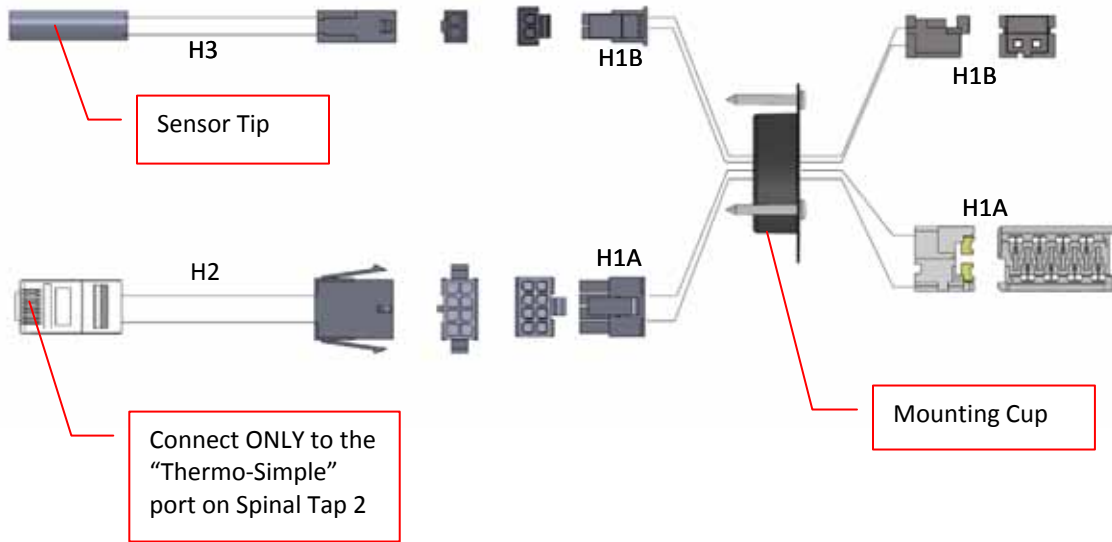
## Spine Cable



The Spine cable follows the EIA/TIA 568 B Ethernet wiring standard. A Spine to Spine Communication Cable contains four twisted pairs of 26AWG 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**

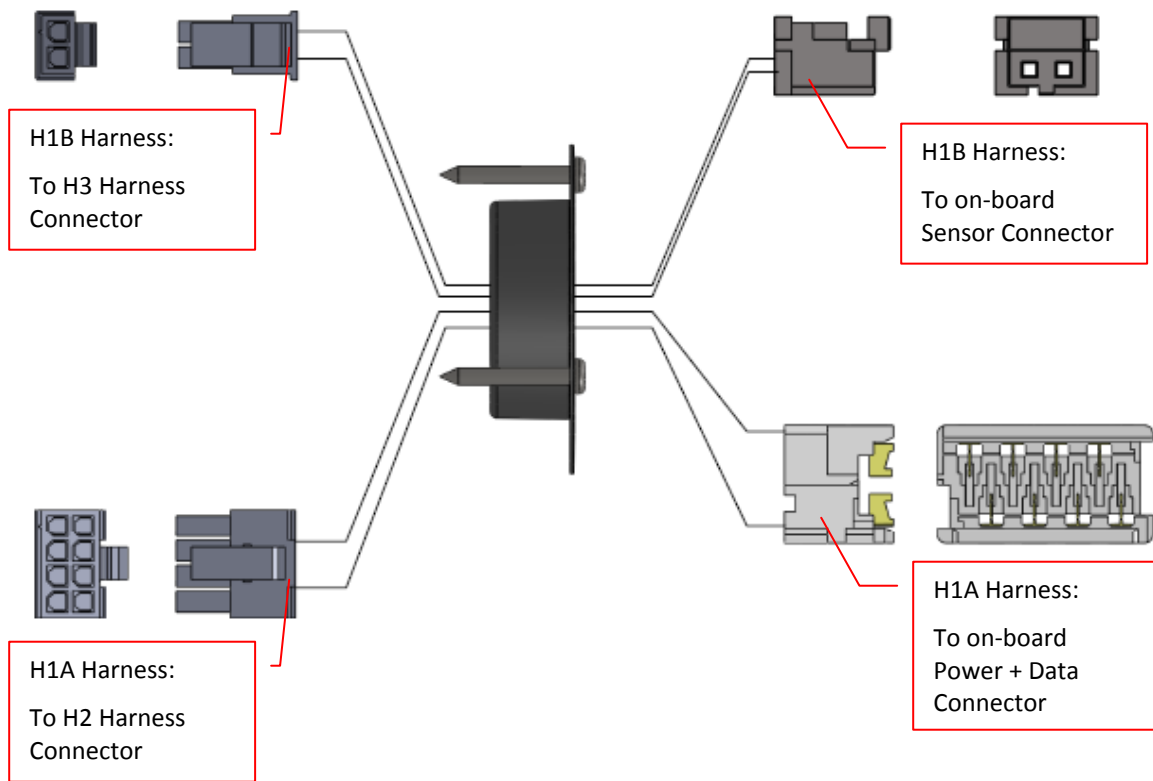
***Mounting Cup and Wiring Harnesses***



The TS.2.MC has 3 harnesses. Typically these harnesses including the mounting cup and the device 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.

## H1A and H1B Harness

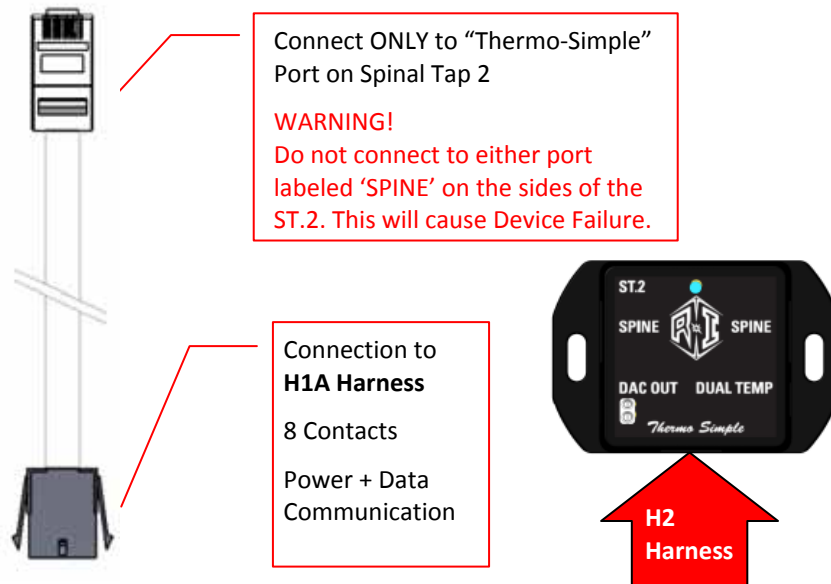


The H1A harness on the TS.2 routes Power and Data from the (H2) Harness to the device.

The H1B harness on the TS.2 routes Sensor input from the (H3) Sensor Harness.

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

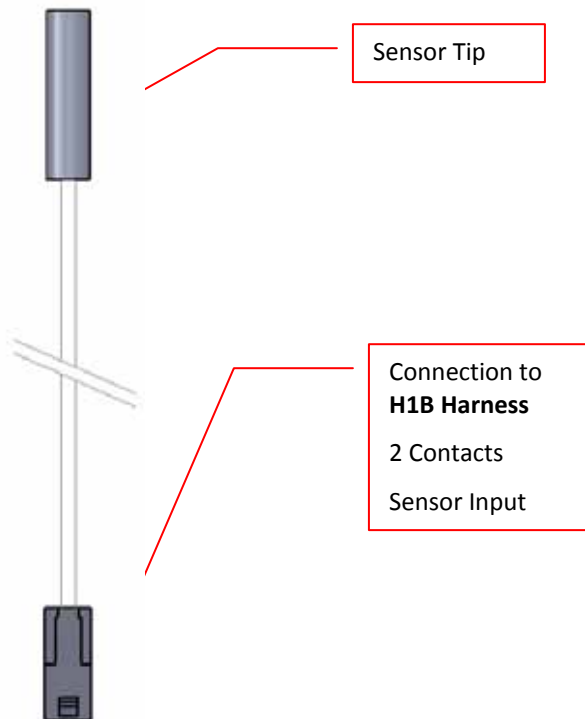
## H2 Harness



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

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

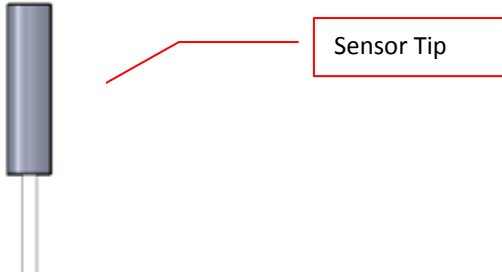
## H3 Harness



The H3 harness on the TS.2 provides the unit with device Sensor Input. The H3 harness usually comes installed and connected to H1B harness by the 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.

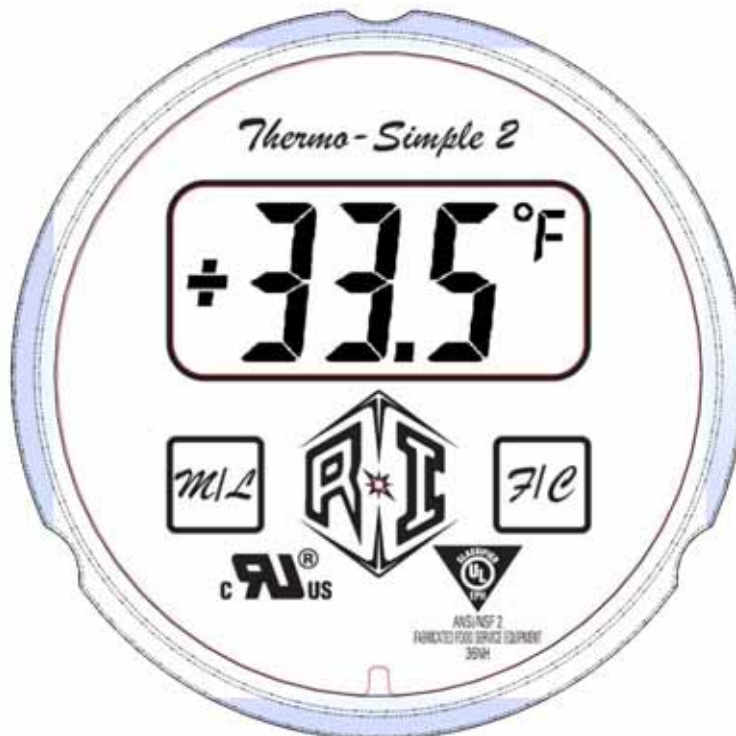
### Sensor



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.2 Device



LEDs



Solid Blue – Frozen Status



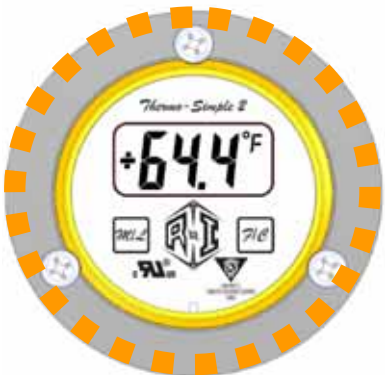
Flashing Blue – Freeze Alarm



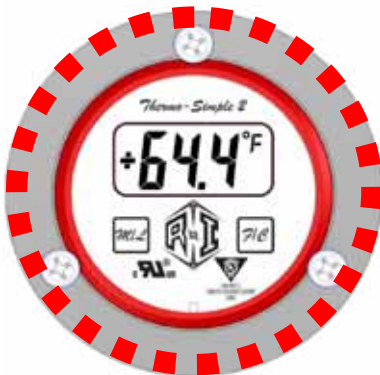
Solid Green – Fresh Status



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)

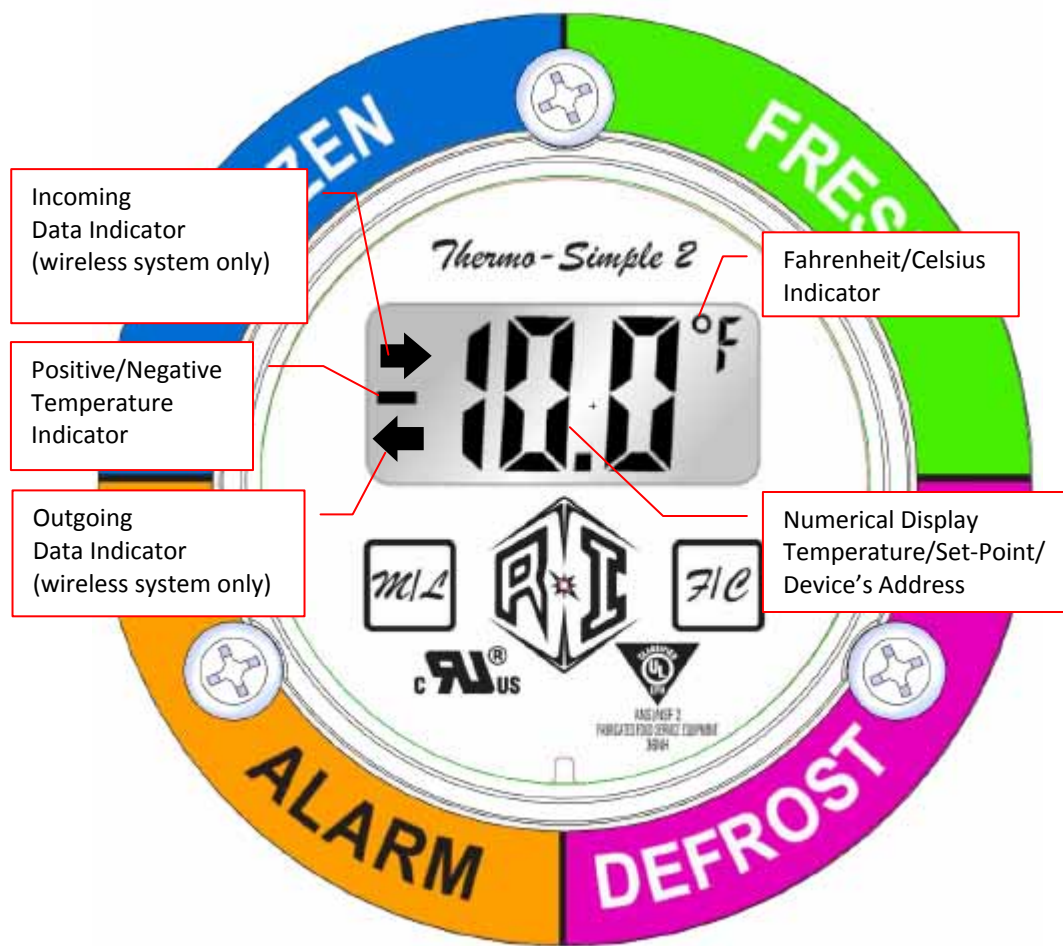
The general LED states are solid and flashing colors. Please note that there are slight differences in LED color schemes at different set-points. For more detail refer to the Set-points section.

**Solid color states mean good 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. case in 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 above set point temperature for at least 60 minutes (70 minutes for walk-in cooler set-points). Flashing red signifies that the case has been above set point temperature for at least 120 minutes (140 minutes on walk-in cooler set-points).

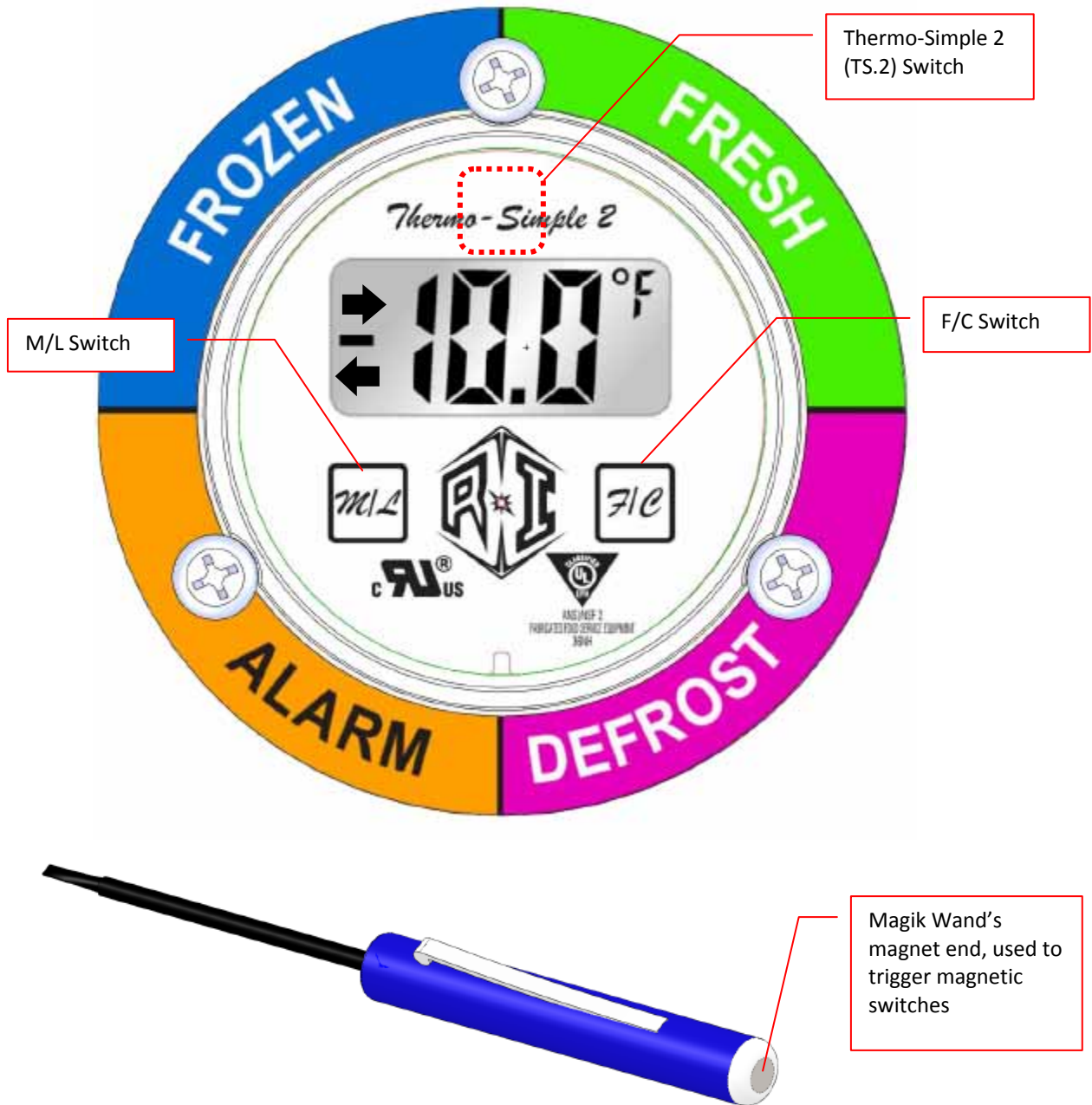
Note: Walk-in cooler set-points have the defrost status LEDs disabled and DEF will not display.

**Display**



TS.2 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**



To trigger a magnetic switch on the TS.2 device, a Refrigeration Innovation Magik Wand is needed. The Magik Wand can be purchased from RI to ensure that the switches are triggered properly.

In absence of a Magik Wand, the magnetic switches on a TS.2 device can be triggered by any strong magnet (Neodymium rare-earth type. A typical refrigerator door magnet or whiteboard magnet are NOT strong enough).

**SOFTWARE OVERVIEW**

***TS.2 Device Settings***

The basic switch functions 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 Units	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. Note: This will not clear an active Alarm.
M/L	Display active set-point	Turn on green LED, display current alarm set point temperature.
Thermo-Simple 2 (TS.2)	Function/Service Request trigger	Turn on blue LED. TS.2 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**

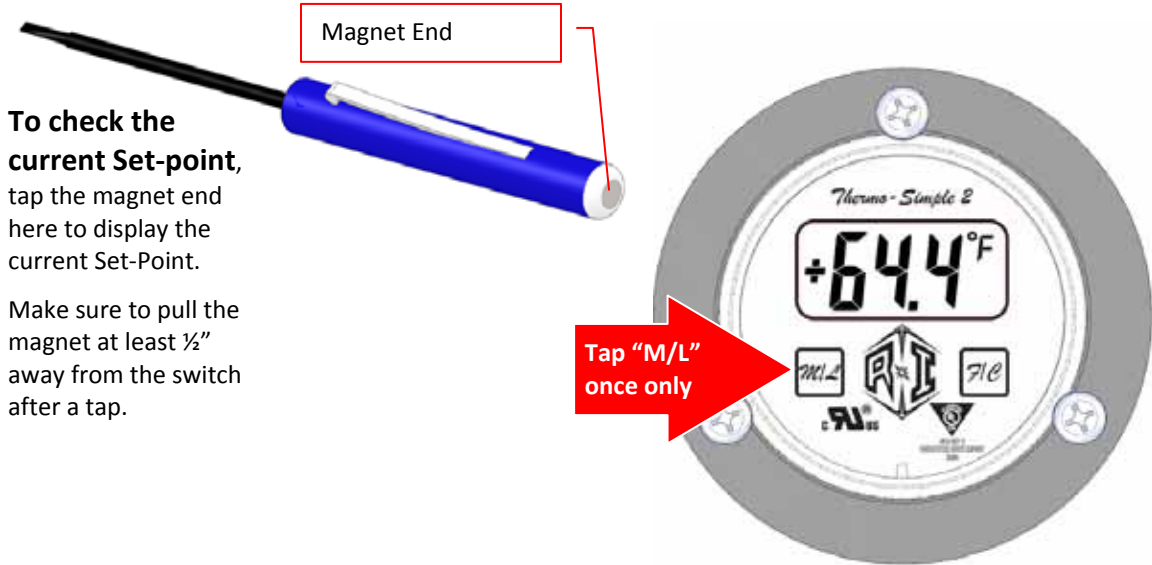
Switch Sequence	Assignments	Descriptions
TS.2   F/C	Set the default temperature display to the opposite of what is currently displayed	<p>From the factory, the default temperature display is Degrees Fahrenheit. Triggering this function will set the default to Degrees Centigrade.</p> <p>If triggered during 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.</p>
TS.2   M/L	Select/Change alarm set-point	<p>While the set-point is flashing on the display, triggering of the M/L switch will successively change the set point to the next pre-programmed set point.</p> <p>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.</p> <p>Note: Setting the "dt" mode for Dual temp cases allows the set-point to be automatically modified with the case switch between 5°F and 40°F for low and medium temperatures respectively.</p>
TS.2   TS.2	<p>Auto-assign the device address to the next available address.</p> <p>WiDAQ (wireless) system only</p>	<p>TS.2 + TS.2, triggers the Function switch once to light the Blue LED then triggers 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.</p> <p>The newly assigned network address should show up on the display.</p> <p>If an address has been previously assigned to the unit then it will display the address that has been assigned.</p>
TS.2   TS.2   M/L	<p>Clear an assigned address and stop device communication</p> <p>WiDAQ (wireless) system only</p>	<p>TS.2 + TS.2 + M/L switches will clear any assigned address and cause the unit to stop responding to commands from the WiDAQ wireless network.</p> <p>After the Unit's address has been cleared, the F/C switch can be triggered to clear the flashing LED and display.</p>

<p>TS.2   TS.2   [TS.2 &amp; HOLD]</p>	<p>Manually assign the device address.</p> <p>Thermo-Simple unit <b>MUST NOT</b> have previously assigned address.</p> <p>Previous address number must be cleared first</p> <p>WiDAQ (wireless) system only</p>	<p>TS.2 + TS.2 + [TS.2 &amp; 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.</p> <p>The Blue LED will flash briefly and allow the unit to start communicating to the WiDAQ wireless network using the manually assigned network address.</p> <p>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.</p>
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**Setting the Device Alarm Set-Point**

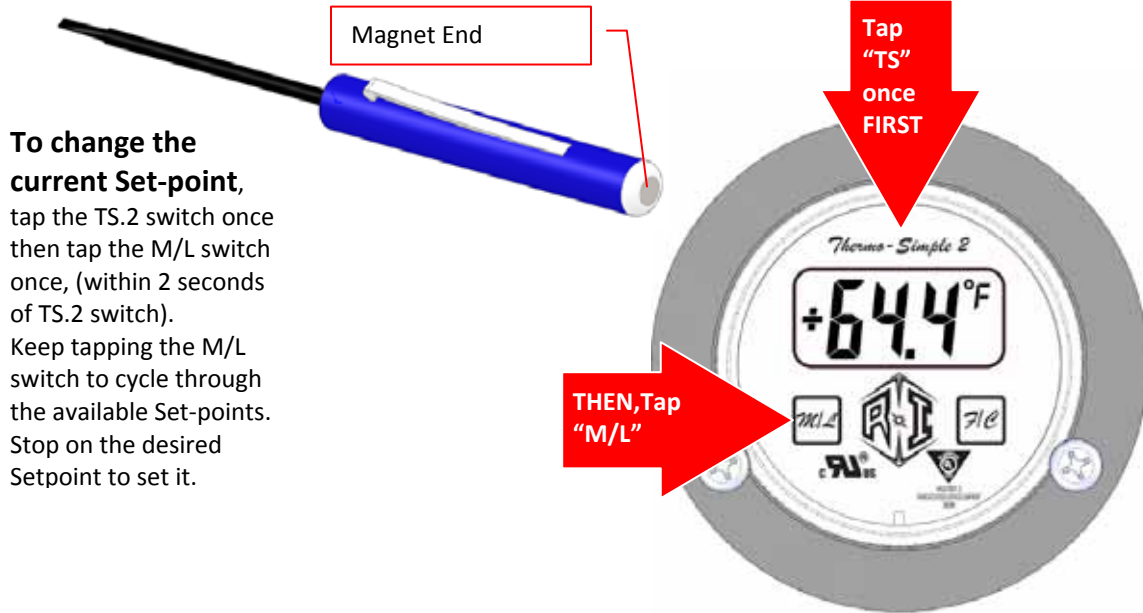
The set-point configures the device to operate in the range of temperature for that particular case. The set-point determines whether the case temperature is within range or not and determines when the unit goes into alarm.

To View the current Set-point of a device tap the M/L switch.  
 Hint: Once a switch is tapped pull the magnet at least 1/2" away from the switch to allow it to turn off.



**To check the current Set-point,** tap the magnet end here to display the current Set-Point.

Make sure to pull the magnet at least 1/2" away from the switch after a tap.



### 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.

**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 after 2 hours.**




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. The dt set-point toggles between 5.0°F set-point for low setting and 40.0°F set-point for medium setting.

### [0.0] 0.0 Fahrenheit


LED COLOR and STATE	DESCRIPTIONS
<p><b>SOLID BLUE</b></p>	Below set-point. (-2 degree Fahrenheit)
<p><b>SOLID BLUE</b></p>	At set-point. (0 degree Fahrenheit)

	<p><b>SOLID PURPLE &amp; dEF</b></p>	<p>Above set-point for the first time. Device assumes case is in Defrost for the first 60 minutes.</p>
	<p><b>FLASHING AMBER</b></p>	<p>Above set-point for more than 60 minutes.</p>
	<p><b>FLASHING RED (optional)</b></p>	<p>Optional Above set-point for more than 120 minutes. (Second Alarm after Amber Alarm)</p>

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
 <p><b>SOLID BLUE</b></p>	<p>Below set-point. (0 degree Fahrenheit)</p>
 <p><b>SOLID BLUE</b></p>	<p>At or below set-point. (5 degree Fahrenheit)</p>
 <p><b>SOLID PURPLE &amp; DEF</b></p>	<p>Above set-point for the first time. Device assumes case is in Defrost for the first 60 minutes.</p>
 <p><b>FLASHING AMBER</b></p>	<p>Above set-point for more than 60 minutes.</p>
 <p><b>FLASHING RED (optional)</b></p>	<p>Optional Above set-point for more than 120 minutes. (Second Alarm after Amber Alarm)</p>

Suggested Product for this Set-point:

- Ice Cream
- Frozen Food

**[36.0] 36.0 Fahrenheit**

LED COLOR and STATE	DESCRIPTIONS
 <p><b>SOLID GREEN</b></p>	<p>Below set-point. (34.4 degree Fahrenheit)</p>
 <p><b>SOLID GREEN</b></p>	<p>At or below set-point. (36 degree Fahrenheit)</p>
 <p><b>SOLID PURPLE &amp; DEF</b></p>	<p>Above set-point for the first time. Device assumes case is in Defrost for the first 60 minutes.</p>
 <p><b>FLASHING AMBER</b></p>	<p>Above set-point for more than 60 minutes.</p>
 <p><b>FLASHING RED (optional)</b></p>	<p>Optional Above set-point for more than 120 minutes. (Second Alarm after Amber Alarm)</p>

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
 <p><b>SOLID GREEN</b></p>	<p>Below set-point. (34.4 degree Fahrenheit)</p>
 <p><b>SOLID GREEN</b></p>	<p>At or below set-point. (40 degree Fahrenheit)</p>
 <p><b>SOLID PURPLE &amp; DEF</b></p>	<p>Above set-point for the first time. Device assumes case is in Defrost for the first 60 minutes.</p>
 <p><b>FLASHING AMBER</b></p>	<p>Above set-point for more than 60 minutes.</p>
 <p><b>FLASHING RED (optional)</b></p>	<p>Optional Above set-point for more than 120 minutes. (Second Alarm after Amber Alarm)</p>

Suggested Product for this Set-point:

- Fresh Meat
- Fresh Fish



**[43F] 43.0 Fahrenheit with Freeze Alarm**

LED COLOR and STATE	DESCRIPTIONS
 <p><b>FLASHING BLUE</b></p>	<p>Below freezing point. (Freeze Alarm starts at 33.5 degree Fahrenheit)</p>
 <p><b>SOLID GREEN</b></p>	<p>At or below set-point. (43 degree Fahrenheit)</p>
 <p><b>SOLID PURPLE &amp; DEF</b></p>	<p>Above set-point for the first time. Device assumes case is in Defrost for the first 60 minutes.</p>
 <p><b>FLASHING AMBER</b></p>	<p>Above set-point for more than 60 minutes.</p>
 <p><b>FLASHING RED (optional)</b></p>	<p>Optional Above set-point for more than 120 minutes. (Second Alarm after Amber Alarm)</p>

Suggested Product for this Set-point:

- Fresh Produce
- Fresh Fruits

[52.0] 52.0 Fahrenheit

LED COLOR and STATE	DESCRIPTIONS
 <p style="text-align: center;"><b>SOLID GREEN</b></p>	<p>Below set-point. (40 degree Fahrenheit)</p>
 <p style="text-align: center;"><b>SOLID GREEN</b></p>	<p>At or below set-point. (52 degree Fahrenheit)</p>
 <p style="text-align: center;"><b>SOLID PURPLE &amp; dEF</b></p>	<p>Above set-point for the first time. Device assumes case is in Defrost for the first 60 minutes.</p>
 <p style="text-align: center;"><b>FLASHING AMBER</b></p>	<p>Above set-point for more than 60 minutes.</p>
 <p style="text-align: center;"><b>FLASHING RED (optional)</b></p>	<p>Optional Above set-point for more than 120 minutes. (Second Alarm after Amber Alarm)</p>

Suggested Product for this Set-point:

- Cheese
- Delicatessens





**[57F] 57.0 Fahrenheit with Freeze Alarm**

LED COLOR and STATE	DESCRIPTIONS
 <p><b>FLASHING BLUE</b></p>	<p>Below freezing point. (Freeze Alarm starts at 33.5 degree Fahrenheit)</p>
 <p><b>SOLID GREEN</b></p>	<p>At or below set-point. (57 degree Fahrenheit)</p>
 <p><b>SOLID PURPLE &amp; def</b></p>	<p>Above set-point for the first time. Device assumes case is in Defrost for the first 60 minutes.</p>
 <p><b>FLASHING AMBER</b></p>	<p>Above set-point for more than 60 minutes.</p>
 <p><b>FLASHING RED (optional)</b></p>	<p>Optional Above set-point for more than 120 minutes. (Second Alarm after Amber Alarm)</p>

Suggested Product for this Set-point:

- Fresh Milk
- Dairy Products

**[142] 142 Fahrenheit for Hot Foods**

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

Suggested Product for this Set-point:

- Hot Foods
- Prepared Foods

### Enabling/Disabling Defrost (dEF)

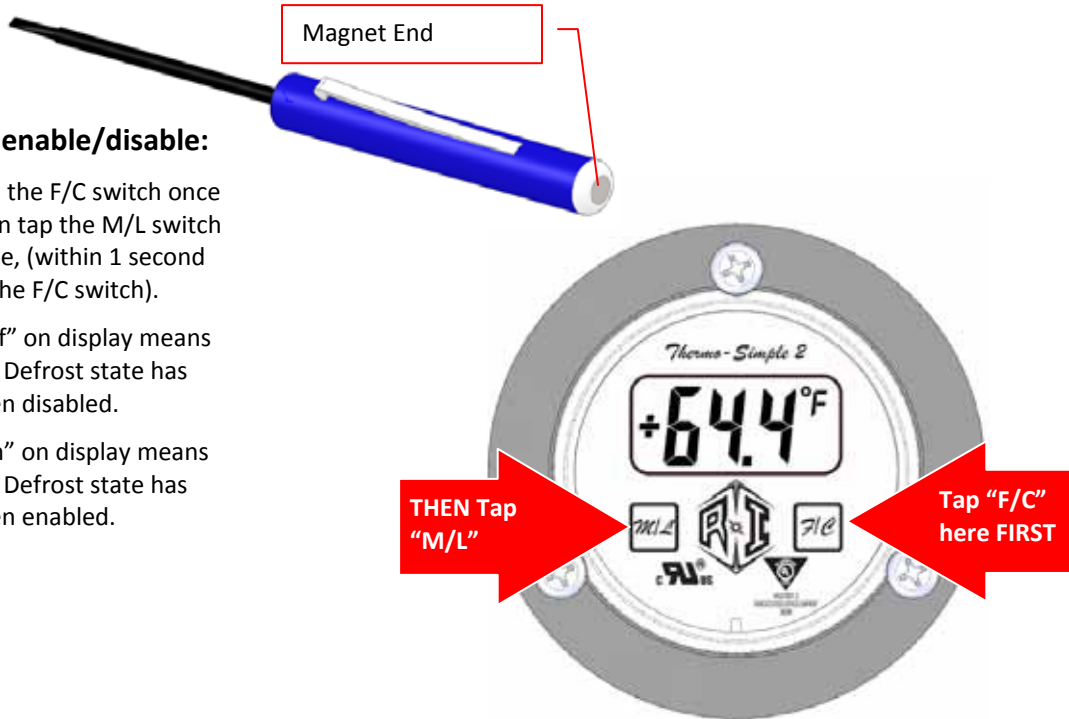
In some applications, there is a need to disable the Solid Purple Defrost state. This may happen in a walk-in case where the door is opened and closed often. Disabling Defrost will cause the device to continue displaying temperatures even when the temperature is above the set-point. An over Temp condition will still go into Alarm if the temperature stays above the set-point for more than 60 minutes.

#### To enable/disable:

Tap the F/C switch once then tap the M/L 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 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.