# Unity Lab Services Freezer ULT Peek TC Diagnostics User Guide



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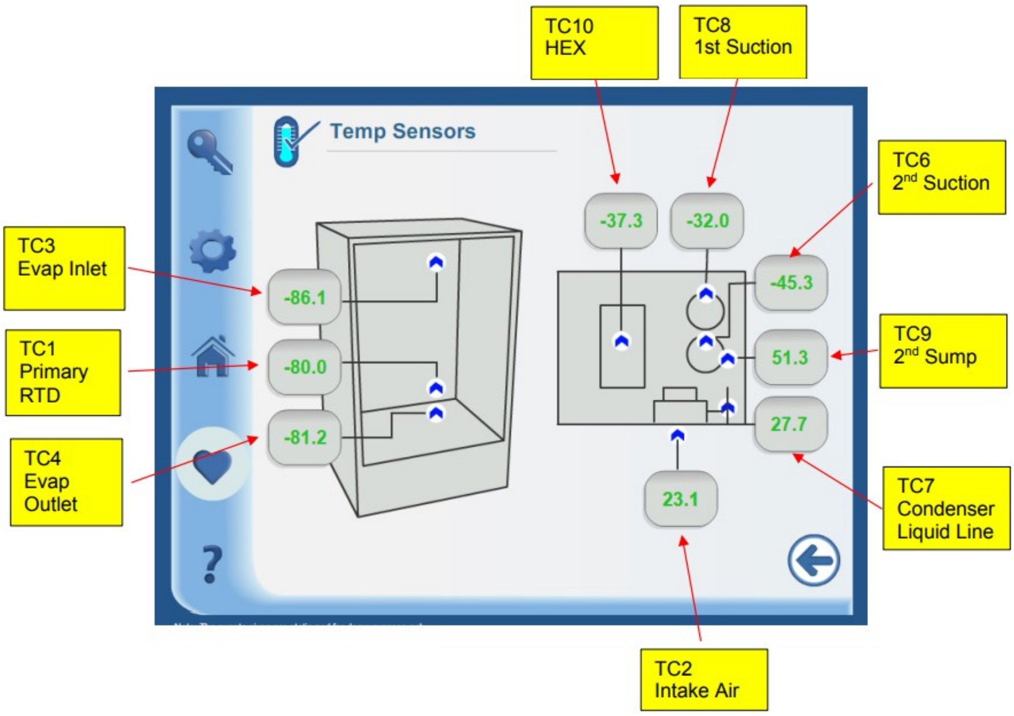
## Product Overview


TC10
HEX
TC8
1st Suction
Temp Sensors
TC6
2nd Suction
-37.3
-32.0
-45.3
TC3
Evap Inlet
-86.1
TC1
Primary
RTD
-80.0
51.3
TC9
2nd Sump
TC4
Evap
Outlet
-81.2
27.7
23.1
TC7
Condenser
Liquid Line
TC2
Intake Air

| T/C | Reading | Indication: No Problem Indicated |
|---|---|---|
| TC #10 | 35 to -45C | The TC is in a normal operating range. TC #10 are warmer than when the first stage is running without the second stage energized, showing that the first st age is receiving a heat load from the second stage, which is how the cascade system is supposed to work. |
| TC #3 | -86 to -95C | TC #3 is cold showing that the interstage condenser (Heat Exchanger) is wor king well. TC #4 is colder than TC #3, reflecting proper operation of the casca de system with a flooded evaporator. |
| TC #4 | -86 to -95C | The delta T between TC #3 and TC #4 is about 5 degrees F. If the door is ope ned, product loaded, or room ambient increases, the TC readings and delta T , along with the cabinet temp, may also increase until the system removes th e added heat load. If the unit is cycling the readings will fluctuate, which is wh y stabilized Bottom Out mode is used for these readings. |
| Display Te mp. | -86 to 95C | Acceptable Bottom Out Temperature. |
| TC #10 | -35 to -50C | First stage appears to be running normally or too cold.<br>• There is little or no heat load coming from the second stage<br>• This is the first indication that second stage is not working properly<br>• TC #3 could be marginal or very cold, depending on how little refrigerant is actually moving through the evaporator TCs #3 and #4. |
| TC #3 | – 86 to -95C | TC #3 shows a large heat load in the second stage, but ifs not getting transfer red to the first stage, indicating a lack of refrigerant flow. Four main reasons: ( 1) Leak, (2) Undercharge, (3) Lack of efficiency, (4) An obstruction to flow. |
| TC #4 | -40 to -75C | Manifold Gauge Diagnostics; second stage flow problems. Hint: If there’s a le ak, you will see temperatures continue to change and warm. If it’s a bad pum p or restriction, it will probably maintain. |
| Display Te mp. | Unable to achiev e set point | A steady or slightly fluctuating cabinet temperature. |

An oil logging problem is a type of restriction, due to too much refrigerant oil getting to the cap tube and evaporator, and then becoming thick, or even solid, at these cold sections of the system. It can be caused by a large load of warm product placed in the cabinet, lack of first stage performance, failed oil separator, contamination build up over time, or failure to defrost the cabinet as needed. It can be constant or varying. This is because the oil logging gets worse as the cabinet cools, which causes the cabinet to warm, which thaws the oil allowing more flow and the cabinet will start to cool again, repeating the cycle. The cabinet temperature will vary around -55°C to -75°C over a period of a day or two, warming then cooling, then warming then cooling, continually. This cycle will not continue if the problem is a leak, as in that case, the cabinet will get continually warmer. Defrosting the cabinet over a period of 48 hours, then restarting it might solve the problem. Back-flushing the system, replacing the oil separator, then recharging is the definite solution. Refer to Manifold Gauge Diagnostic Procedures, Section 6.17 of this manual for further symptoms using gauges.

A continuously increasing restriction can look like a leak, as the restriction gets more severe. Refer to Manifold Gauge Diagnostic Procedures, Section 6.17 of this manual for further instructions before making this determination.

## Onboard Instrumentation

| Sensor | Location | Type | Detail |
|---|---|---|---|
| RTD1 | Cargo Area | RTD, 1000 Ohm | Back wall, center. Near the end of the ev aporator. |
| TC #1 | First Stage Suction | T-type thermocouple | On suction tube at compressor |
| TC #2 | Condenser Air Inlet | TT-type thermocouple | In air stream in front of condenser coil |
| TC #3 | Evaporator In | TT-type thermocouple | Top of cabinet; foamed in place, |
| TC #4 | Evaporator Out | T-type thermocouple | Bottom of cabinet, foamed in place. |
| TC #5 | Blank; Reserved For Futur e Use | | |
| TC #6 | Second Stage Suction | TT-type thermocouple | On suction tube at compressor |
| TC #7 | Condenser Out (Liquid Lin e) | TT-type thermocouple | Immediately downstream from the condenser coil. |
| TC #8 | Blank; Reserved For Futur e Use | T | |
| TC #9 | Stage Sump | IT-type thermocouple | |
| TC #10 | BPHX | Two T-type thermocouples | Installed at the center of the BPHX. Two sensors installed; one for backup. |

| Sensor | Location | Type | Main Board Location | Wire/Band Color | Part **Number** |
|---|---|---|---|---|---|
| RTD I | Back Wall Inside Cabinet | RID, 1000 Ohm Red/Whit e | J18 | Red/White | 315206H01 |
| TC #1 | First Stage Suction | TC, Type T, Stranded | J14 | Brown | 315204H01 |
| TC #2 | Condenser Air Inlet | TC, Type T, Stranded, | J14 | Red | 315204H02 |
| TC #3 | Evaporator Inlet | TC, Type T, Stranded, | J14 | Orange | 315204H03 |
| TC #4 | Evaporator Out #1 | TC, Type T, Stranded, | J14 | Yellow | 315204H04 |
| TC #6 | Second Stage Suction | TC, Type T, Stranded, | J14 | Blue | 315204H06 |
| TC #7 | Condenser Out (Liquid Lin e) | TC, Type T, Stranded, | J14 | Violet | 3152041-107 |
| TC #9 | Second Stage Sump | TC, Type T, Stranded, | J14 | White | 315204H09 |
| Lc #10 | BPHX | TC, Type T, Stranded, | J14 | Black | 315204H10 |

## Documents / Resources

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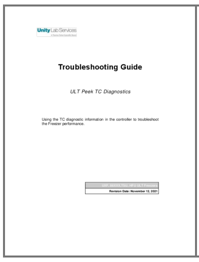
|---|---|
|  Troubleshooting Guide<br>ULT Peek TC Diagnostics<br>Using the TC diagnostic information in the controller to troubleshoot the Freezer performance. | **Unity Lab Services Freezer ULT Peek TC Diagnostics** [pdf] User Guide<br>Freezer ULT Peek TC Diagnostics, ULT Peek TC Diagnostics, Diagnostics |

## References

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