# Diagnostic Troubleshooting Repair

# RTAC

## Control Operation, Setup and Troubleshooting for RTAC Units with Tracer CH530 Controls

Order No: **RTAC-SVD01A-EN** Date: August 2002

Pueblo Built Units Only

## Introduction

The purpose of this bulletin is to provide control operation and general troubleshooting information on the RTAC Air Cooled Chillers with the CH530 control panel. Additional information on the CH530 is located in the RTAC-IOM. It is recommended that the service technician be familiar with the CH530 operation prior to servicing the microprocessor.

## Discussion

This bulletin is intended to serve as a supplement to the RTAC-IOM, the installation, operation and maintenance manuel for all RTAC units. Subjects covered in this bulletin are intended to provide more comprehensive information for the RTAC units.

## Units Affected

This bulletin pertains to any RTAC unit built in Pueblo.

**NOTICE:**

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

⚠ **WARNING** – Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ **CAUTION** – Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

**CAUTION** – Indicates a situation that may result in equipment or property-damage-only accidents.

# Table of Contents

**CH530 Overview ........ 1**
General ........ 1
Main Processor (6U1) ........ 1
Starter Module (1U14, 1U19, 2U14, and 2U19) ........ 1
Power Supply Module (1U2 and 2U2) ........ 1
LLIDs (Low Level Intelligent Devices) ........ 2

**IPC Overview and Troubleshooting ........ 3**
General ........ 3
Installing a LLID ........ 4
Bus connection crimping procedure. ........ 4
Procedure for installing caps. ........ 6
Troubleshooting problems with multiple LLIDS ........ 8

**Power Supply ........ 11**
General ........ 11
Troubleshooting ........ 11

**Temperature Sensor ........ 13**
General ........ 13
Sensor Checkout Procedure ........ 13

**Pressure Transducers ........ 15**
General ........ 15
Transducer Checkout Procedure ........ 15

**Variable Speed/Condenser Fan Control ........ 17**
General ........ 17
Startup and Operation ........ 17
Inverter Fault Input ........ 19
Troubleshooting the Inverter ........ 19

**Current Transformers ........ 23**
General ........ 23
CT and Starter Compressor Current Input Checkout Procedure ........ 24

**Over/Under Voltage ........ 29**
General ........ 29
Under/Over Voltage Transformer Checkout ........ 29

**Compressor Capacity ........ 31**
General ........ 31
Checkout Procedure for the Female Step Load Outputs ........ 32
Checkout Procedure for the Step Load Solenoids Valve and Piston ........ 32
Checkout Procedure for the Male Load-Unload Outputs ........ 33
Checkout procedure for the Slide Valve and Load-Unload Solenoids ........ 34
Setup ........ 34
Load ........ 36

# Table of Contents


Unload ........ 36

**Starter ........ 39**
General ........ 39
X-Line: ........ 39
Y-Delta: ........ 39

**Electronic Expansion Valve ........ 47**
General ........ 47
EXV Checkout Procedure ........ 48

**Liquid Level Sensor ........ 51**
General ........ 51
Liquid Level Sensor Checkout Procedure ........ 52

**TechView Service Tool ........ 55**
General ........ 55
Software Down Load ........ 56
Using TechView ........ 59
Views ........ 61
Unit View ........ 61
Compressor Service View ........ 61
Status View ........ 61
Setpoint View ........ 61
Diagnostics ........ 62
Configuration View ........ 62
Software View ........ 63
Binding View ........ 64
Downloading New Main Processor Software ........ 64
Binding Process ........ 65
Binding Symbols ........ 68
Modify Chiller Configuration ........ 69

**Diagnostic Table ........ 71**
General ........ 71
Legend to Diagnostic Table ........ 71
Diagnostic Table ........ 73
Main Processor Boot Messages and Diagnostics ........ 106

# CH530 Overview

## 1-1. General

CH530 is a distributed architecture that puts communication capability and some limited intelligence down at the sensor level (Low Level Intelligent Devices, or LLIDs). Higher level modules or Super LLIDs (starter) exist only as necessary to support system level control and communications where subsystems require a collection of I/O and intelligence.

The primary benefit of the LLIDs architecture is the low cost of replacement parts. CH530 architecture allows a single point to be replaced with only pigtail wiring and electronics dedicated to a particular point.

## 1-2. Main Processor (6U1)

The main processor is the "master of the chiller" by collecting data, status, and diagnostic information and communicating commands to the other modules (starter) and the LLID bus. The communications bus is called the Intra Processor Communications. The main processor is located in the human interfaces (DynaView, EZView).

## 1-3. Starter Module (1U14, 1U19, 2U14, and 2U19)

The starter module provides control of the contactors when starting, running, and stopping the chiller. Starter types include Across the Line and Y-Delta. The starter module provides protection of the compressor in the form of running overload, phase reversal, phase loss, phase imbalance, and momentary power loss.

## 1-4. Power Supply Module (1U2 and 2U2)

The power supply module provides 24VDC power, to support all of the module and LLIDs functions.

# CH530 Overview

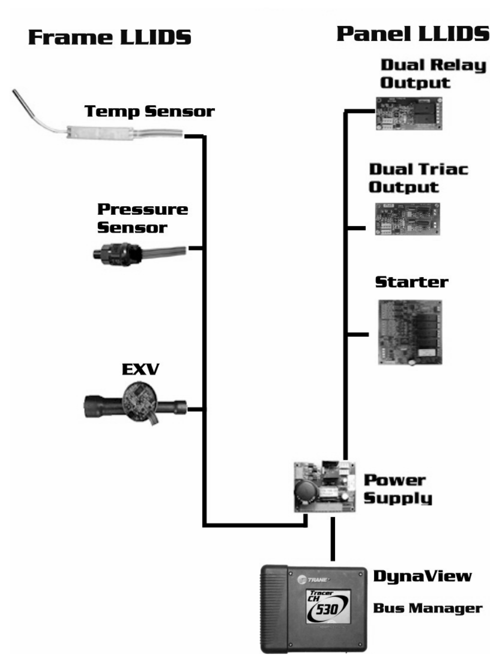
## 1-5. LLIDs (Low Level Intelligent Devices)

The following devices are types of inputs and outputs that exist as LLIDs. Some of the LLIDs are optional. The number and type of LLIDs are dependent on the unit size and configuration.

- temperature sensors
- low voltage binary inputs
- high voltage binary inputs
- analog input/output
- relay output
- triac output
- EXV stepper driver
- liquid level sensor input
- inverter interface
- pressure transducer

The following is a graphic example of the CH530 architecture.

**Figure 1-1 : CH530**



# IPC Overview and Troubleshooting

## 2-1. General

CH530 platform provides a highly modular approach to accommodating the inputs and outputs for control of chiller equipment. The CH530 platform includes discrete devices for each input and output point on the system. For example, the EXV includes the electronics to drive its motor contained within the motor housing. The liquid level sensor includes the electronics necessary to read the float value. Each temperature sensor includes the electronics to read the thermistor value.

The CH530 platform is very generic to varied chiller size or model applications. A four compressor design does not require a different module design than a two compressor design, nor did the two compressor design take on un-used components.

An additional benefit to the LLID (low level intelligent device) approach is that parts stocking is greatly simplified. LLIDs of each point type are not dedicated to a particular chiller design but can be applied individually across all sizes or models.

In the typical installation, there are two sets of devices. One set of devices is installed in a control panel. This first set includes power supplies, devices that require customer wiring, and the main processor. Devices in the second set are installed at points of use around the unit and wired by stubs to a main trunk (IPC bus).

The DynaView or EzView provides the user interface and the system main processor. The main processor is the master of the chiller by collecting data, status, and diagnostic information and communicating commands to the other modules (starter, purge) and the LLID bus. The main processor also serves as the bus manager. Functions of the bus manager include timing out communication failures and recovering from errors on the IPC network.

Out of the box, all EzViews, and DynaViews are generic in that no software is (application code or chiller configuration) installed until programed with tech-view. In the same way that LLIDs are generic until applied, so is the main processor. A service parts desk or technician can stock a main processor and give it an identity at the point in time it is applied to a chiller.

The communications bus is called the Inter Processor Communications (IPC).

There is additional information that each device must be “bound” with that is dependent on its application. This additional data is called “binding information” and is written to each device either by the factory tester or the TechView Service Tool.

LLIDs must communicate with the main processor. In order to be identified, or be recognized, and differentiated from a neighboring device, a “service LED” located on each LLID is used to identify a specific device. On CH530 a

# IPC Overview and Troubleshooting

temperature sensor is bound by being assigned a node number. The binding process requires a LLID be recognized by activating its service pin or green LED.

All LLIDs are constructed with a green LED and associated switch. The switch is a hall-effect sensor, which is activated by a magnetic field of the proper polarity (SOUTH pole). The LED should seem to be brighter when the magnet is in proximity with the hall effect service switch and should stay on, but appear dimmer when the magnet is removed. The LLID is said to be "selected" in this state

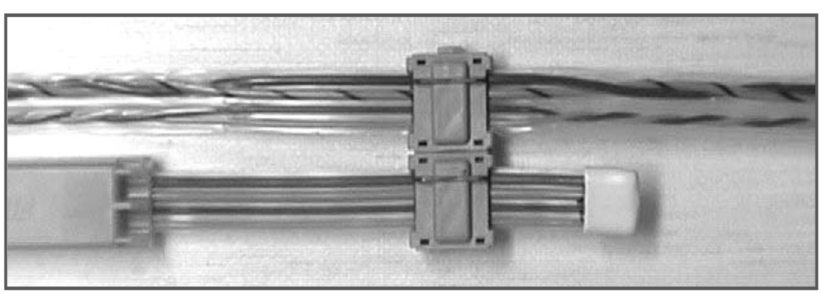
The LLID software is designed to light the LED on reset and turn it off after passing memory tests. If the LED turns on and remains lit after power-up, a failure of the LED circuit or a bad memory test could be the cause. It is normal to notice a short flash of the LED after a reset. The absence of a flash could indicate a failure of the LED circuit or that the device is not programmed.

The LED circuit is designed to light the LED while the switch is active, so the LED can be used to detect that power is supplied. If the LED fails to light when a user attempts to activate the switch, either loss of power or a hardware problem is indicated.

The software is designed to enter a special state, to become selected, when the LED switch is activated. When the LLID becomes selected as a result of the switch activation (by magnet), it automatically turns on the LED state at the same time. Software lights the LED at 50% duty cycle when the state is on, and the user perceives a steady light that is only slightly dimmer than while the switch is activated. If the LED does not remain lit after the switch is activated, one potential cause is a software failure.

## 2-2. Installing a LLID

**Figure 2-1: Installed LLID**



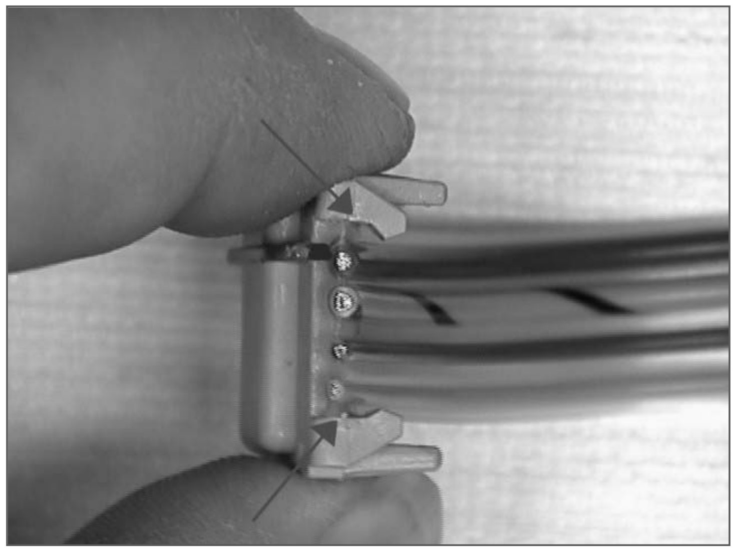
### 2-2 a. Bus connection crimping procedure.

1. The connector must be installed on parallel portion of wire. Care must be taken to ensure no part of connection is on twisted portion of wire.

# IPC Overview and Troubleshooting

2. Insert the cable into the connector. The cable edges must be hooked beneath the four cable retainer tabs. Push the cable into the connector to lock it beneath these tabs.

**Figure 2-2: Cable and Connector**



3. Place the cover and wire over the base and hold in place. Crimp the connector down using the Trane tool or a parallel jaw pliers

   **It is important to apply equal pressure across the jaws of the pliers.**

**Figure 2-3: Pliers**

# IPC Overview and Troubleshooting

4. Inspect finished connector. Make sure the red wire matches up with the red line on the connector. Verify that no wires are twisted in the connector.

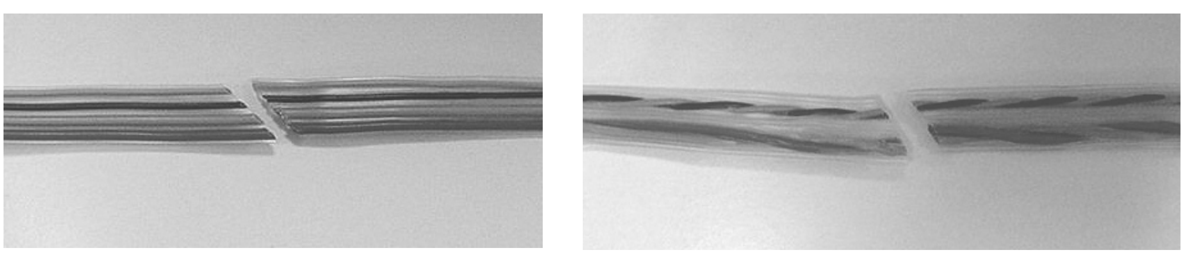
**Figure 2-4: Finished Connector**

## 2-2 b.Procedure for installing caps.

Any time that the bus is cut and/or spliced a cap must be installed on the end.

1. Always cut in parallel section of wire. If cuts are made on twisted wire, shorting of the wire pairs will occur. An angle cut is necessary for the proper installation of the protective cap. Refer to : WireFigure 2-5.

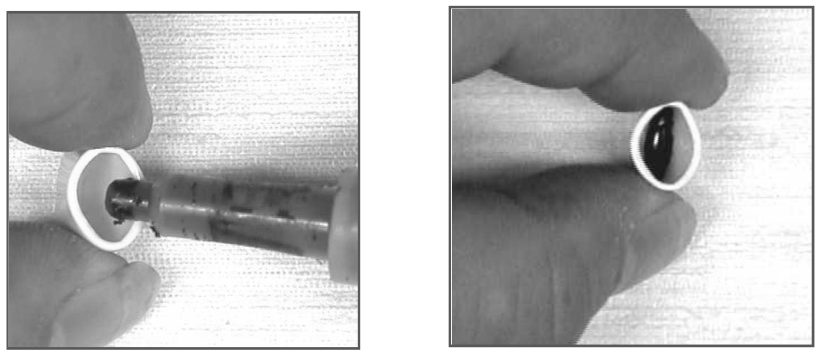
**Figure 2-5: Wire**



**Right** **Wrong**

2. Place a small amount of Locktite 480 in the cap and put the end of the cable in the cap. Refer to : CapFigure 2-6.

**Figure 2-6: Cap**



# IPC Overview and Troubleshooting

## 2-3. Troubleshooting problems with multiple LLIDS

Troubleshooting bus communication problems can be challenging. It is important to remember that all of the LLIDs communicate on the same 2 wire communication bus, and derive their power from the same two wire power bus. Since the LLIDs are effectively in parallel with all other llids, certain llid failures or connector shorts can take down the entire bus, either the power bus, or the comm bus. In the case or shorts, the offending connector cannot usually be automatically identified by the TechView Service Tool using binding view. Most if not all of the LLIDs will show up to be "unverified". Most of these kinds of failures must be tracked down manually.

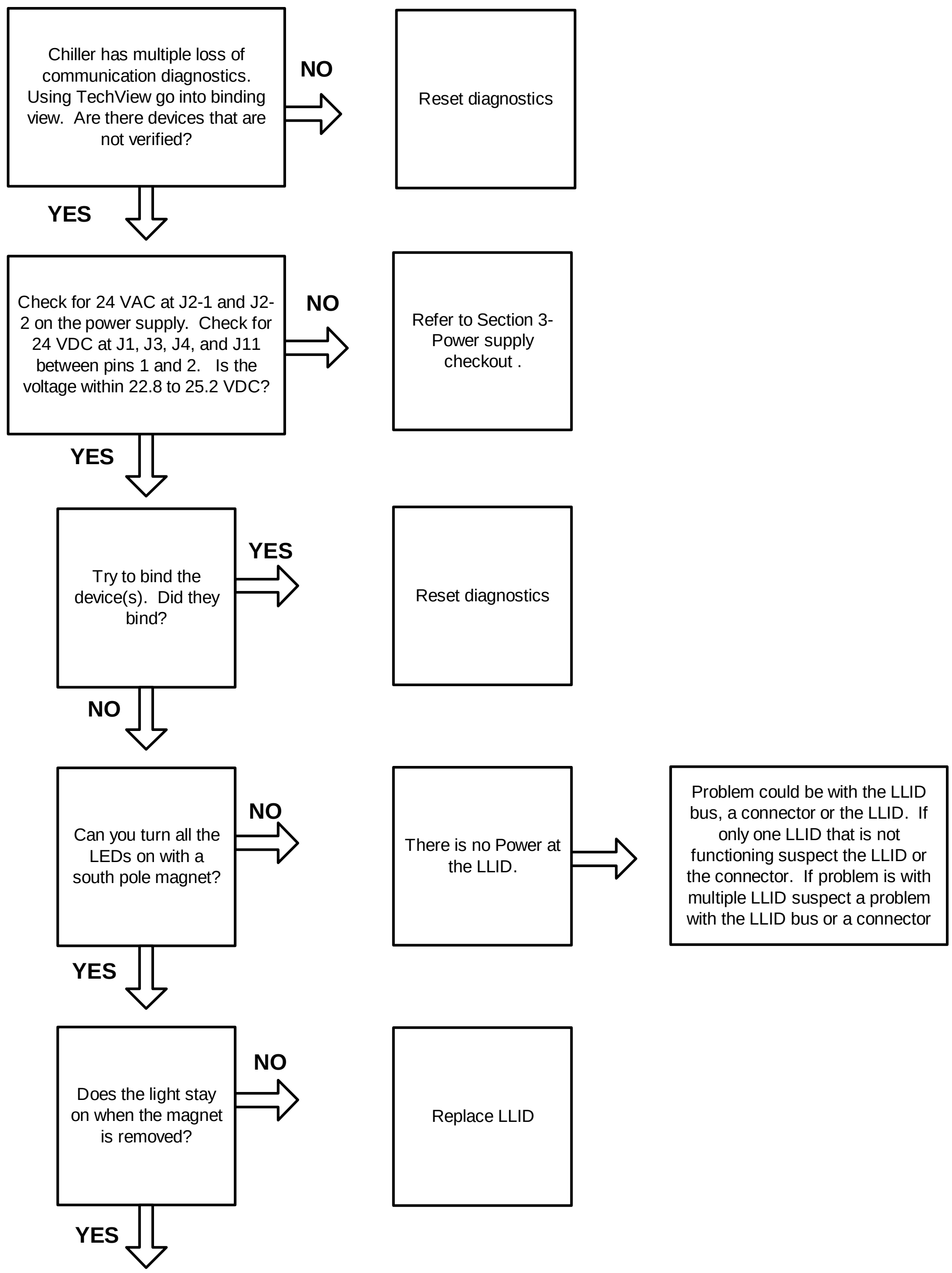
A problem will usually fall in one of four scenarios.

### Connect TechView and go into binding view. One of the following scenarios should be present.

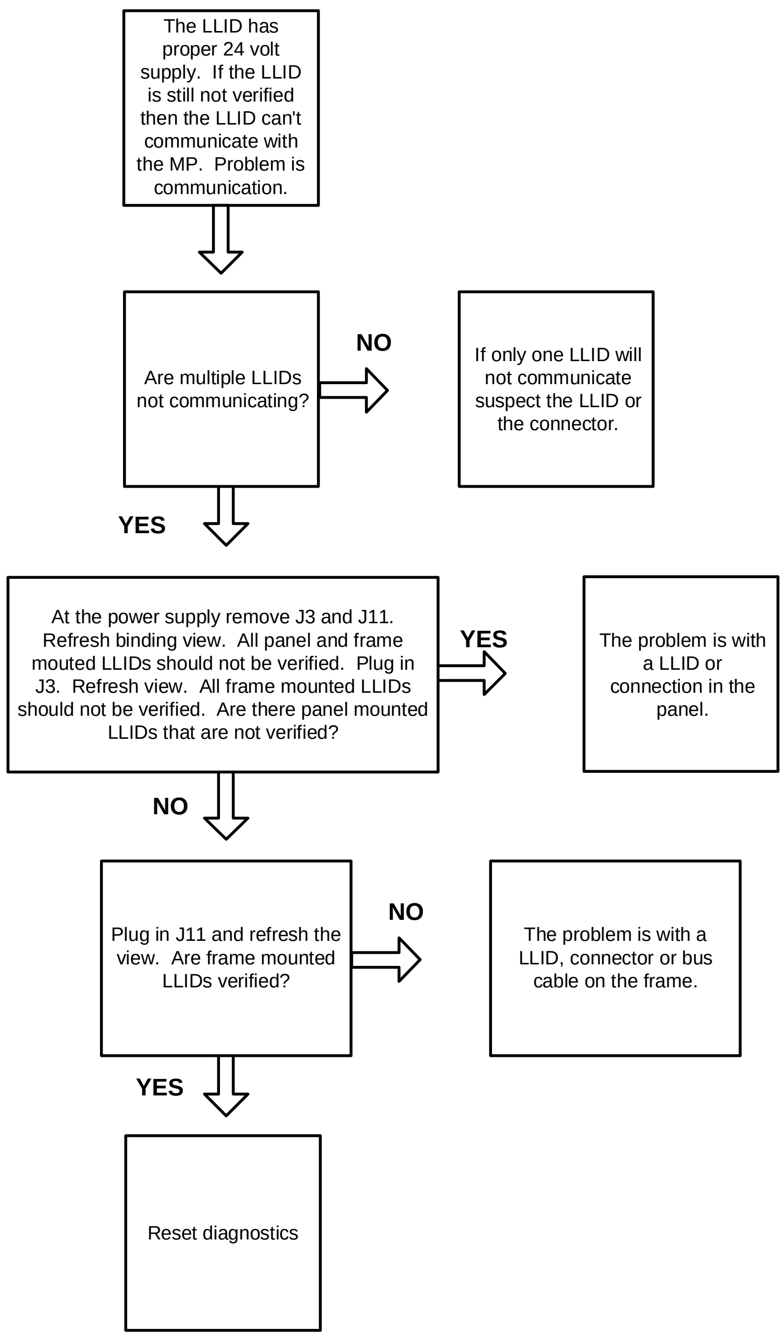
- All LLIDs verified (green smiling face(s)). Suspect a communication problem. It may be necessary to unbind and rebind some or all of the LLIDs.
- All LLIDs not verified (red frowning face(s)). Suspect a short.
- 1/2 of the LLIDs not verified (red frowning face(s)). If all LLIDs that are not verified are on the frame or in the control panel suspect a communication problem. If some of the LLIDs are on the fame and some are in the panel, then suspect a short.
- 1 or 2 of the LLIDs not verified (red frowning face). Suspect LLID or connector.

Use the following flow chart to troubleshoot multiple LLID problems. For this procedure, a south pole magnet and TechView will be required.

# IPC Overview and Troubleshooting



# IPC Overview and Troubleshooting

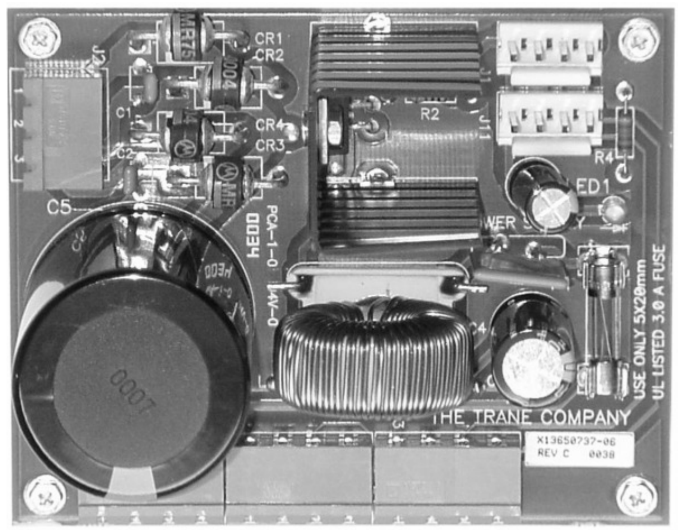


# Power Supply

## 3-1. General

The CH530 power supply has no communication capabilities. It provides 24VDC to the LLIDs and acts as the trunk for the IPC bus. It is also used as a "central hub" to provide a starting point for up to 5 IPC bus cables.

**Figure 3-1**




## 3-2. Troubleshooting

The input voltage on the power supply is 23 to 30 VAC and the output voltage is 22.8 to 25.2 VDC.

The input voltage should fall within the following values.

**Table 3-1: Input Voltage**

| Terminations | Voltage | Min. | Max |
|---|---|---|---|
| J2-1 | 27 VAC | 23 VAC | 30 VAC |
| J2-2 | 27 VAC | 23 VAC | 30 VAC |
| J2-3 | 27 VAC | 23 VAC | 30 VAC |

Table 3-2 list the values for the output voltage on the power supply. If the green LED 1 is lit it implies that there is a good DC output voltage being produced by the board. Output for terminals J1, J3, J4, J5 and J11 are the same. The voltage output should be within ± 5%.

**Table 3-2: Output Voltage**

| Terminations | Voltage |
|---|---|
| J1-1 | +24VDC |
| J1-2 | GND |
| J1-3 | COMM+ |
| J1-4 | COMM- |

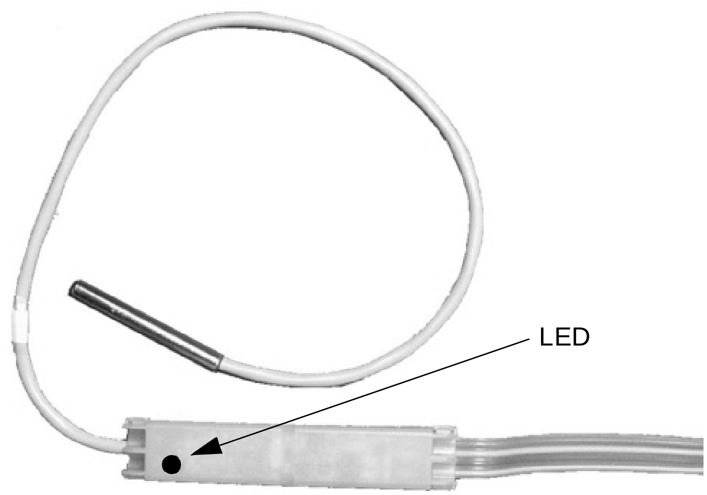
There is a 3.0 amp fuse (X13110456020) on the power supply. If this fuse is open LED 1 will not be on and there will not be any voltage out. This fuse can be replaced. The fuse is a medium time delay 3.0 amp, 5X20mm.

# Temperature Sensor

## 4-1. General

All of the temperature sensors used on CH530 are negative temperature coefficient (NTC) thermistors and located in thermal wells. The thermistors all have a base resistance of 10 kOhms at 77 F (25C). The sensors have a probe range of -40 to 120 F and should have an accuracy of ± 1F.

**Figure 4-1 : Temperature Sensor**




## 4-2. Sensor Checkout Procedure

### Is the sensor bound and communicating?

Connect TechView and get into Binding View. This will shut the chiller down. Once in Binding View, verify that the Temperature Sensor is bound.

*Note: Please refer to Section 13:Service Tool for questions concerning binding LLIDs and getting into Binding View.*

*If there are multiple LLIDs that are not verified go to Section 2:IPC troubleshooting.*

If the sensor is not bound, try to bind it. If the sensor will not bind it could be a problem with the connector or the sensor itself. Take a close look at the connector to make sure that all four wires are securely in place. It may be necessary to remove the cap to check for broken or misplaced wires.

# Temperature Sensor

## CAUTION
## Equipment Damage Possible!

**All unit built before October 1, 2002 (U02#####) used connectors that must be replace if the cap is removed. If the cap is removed on any of these units cut out the old connector and splice in a new section of cable and a new connector. See Section 2-IPC Overview for instruction on installing a new cap.**

If the sensor is bound, try to turn the LED on with a magnet. If the light will not turn on there could be a problem with the sensor. Try to turn the light on in Binding View. With the light on hold the magnet to the LED. The LED should get brighter. If it doesn’t get brighter, this may indicate a problem with the sensor or the connector. Take a close look at the connector to make sure that all four wires are securely in place. It may be necessary to remove the cap to check for broken or misplaced wires.

If there is no problem found with the connector and the sensor will not bind, then replace the sensor.

### Is the sensor reading accurately?

All temperature sensors on RTAC units are in thermal wells. Cycle the chiller off prior to testing the sensor.

1. Remove the sensor of concern from the well.
2. Place the sensor, while still connected to the LLID bus, in an ice bath.
3. Monitor the temperature on DynaView or TechView. The temperature should approach 32 F.
4. If the sensor is bound correctly but doesn’t approach 32 ± 1 F, replace the sensor.

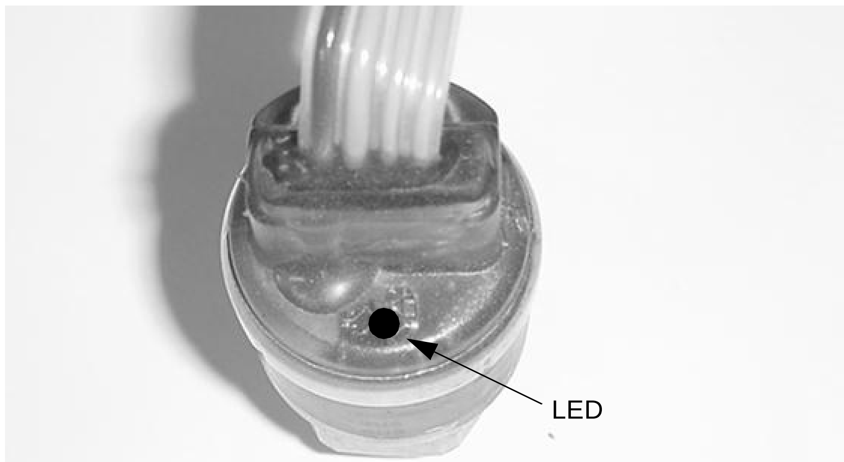
   If the temperature does approach 32 F, then re-install the sensor in the well with suitable heat transfer paste.

# Pressure Transducers

## 5-1. General

All of the Pressure Transducers used on RTAC units are mounted on service valves. Pressure Transducers measure absolute pressure. They have a range of 0 to 365 psia with an accuracy of ± 1.5 psi under steady state conditions.

**Figure 5-1**




## 5-2. Transducer Checkout Procedure

### Is the sensor bound and communicating?

Connect TechView and get into Binding View. This will shut the chiller down. Once in Binding View verify that the Pressure Transducer is bound.

*Note: Please refer to Section 13:Service Tool for questions concerning binding LLIDs and getting into Binding View.*

*If there are multiple LLIDs that are not verified go to Section 2:IPC troubleshooting.*

If the transducer is not bound, try to bind it. If the transducer will not bind, it could be a problem with the connector or the sensor itself. Take a close look at the connector to make sure that all four wires are securely in place. It may be necessary to remove the cap to check for broken or misplaced wires.

# Pressure Transducers

## CAUTION
## Equipment Damage Possible!

**All unit built before October 1, 2002 (U02#####) used connectors that must be replace if the cap is removed. If the cap is removed on any of these units cut out the old connector and splice in a new section of cable and a new connector. See Section 2-IPC Overview for instruction on installing a new cap.**

If the transducer is bound, try to turn the LED on with a magnet. If the light will not turn on there could be a problem with the transducer. Try to turn the light on in Binding View. With the light on hold the magnet to the LED. The LED should get brighter. If it doesn't get brighter, this may indicate a problem with the transducer or the connector. Take a close look at the connector to make sure that all four wires are securely in place. It may be necessary to remove the cap to check for broken or misplaced wires.

If there is no problem found with the connector and the transducer will not bind, then replace the transducer.

### Is the transducer reading accurately?

All transducers are mounted on service valves. Cycle the chiller off prior to testing.

1. Close the valve and remove the transducer.
2. Connect the transducer, while still connected to the LLID bus, to a nitrogen source with a calibrated gauge.

   The pressure that is applied to the transducer must be steady state. If the pressure is changing the test will not be accurate.
3. Increase the pressure on the transducer.
4. Monitor the pressure on DynaView or TechView.

   The transducer measures in absolute pressure and then subtracts the local atmospheric pressure setting to display gauge pressure. If the local atmospheric pressure is set wrong in TechView, the pressure displayed on DynaView or TechView will not match the gauge pressure. This could result in an inaccurate test.
5. If the transducer is not reading accurately it should be replaced.

# Variable Speed/Condenser Fan Control

## 6-1. General

The Main Processor (MP) is be configurable for operation with either 0, 1 or 2 variable speed fans per circuit. Variable speed fans are optional and included on units when the low ambient operation is required. The variable speed fans are standard fans and motors, used with the fixed speed fans, but are driven by the small 1.5 HP inverters that create a variable voltage/frequency, 3 phase output using Pulse With Modulation (PWM) switching.

When either 1 or 2 of the variable speed fans are configured, the MP provides startup and running control of the variable speed fans (as well as the other constant speed fans).

Variable speed condenser fans provide start-up and operation down to an ambient temperature of $0^{o}$ F without fan cycling, without safety trips, or other instabilities that would otherwise occur with fixed speed fans only.

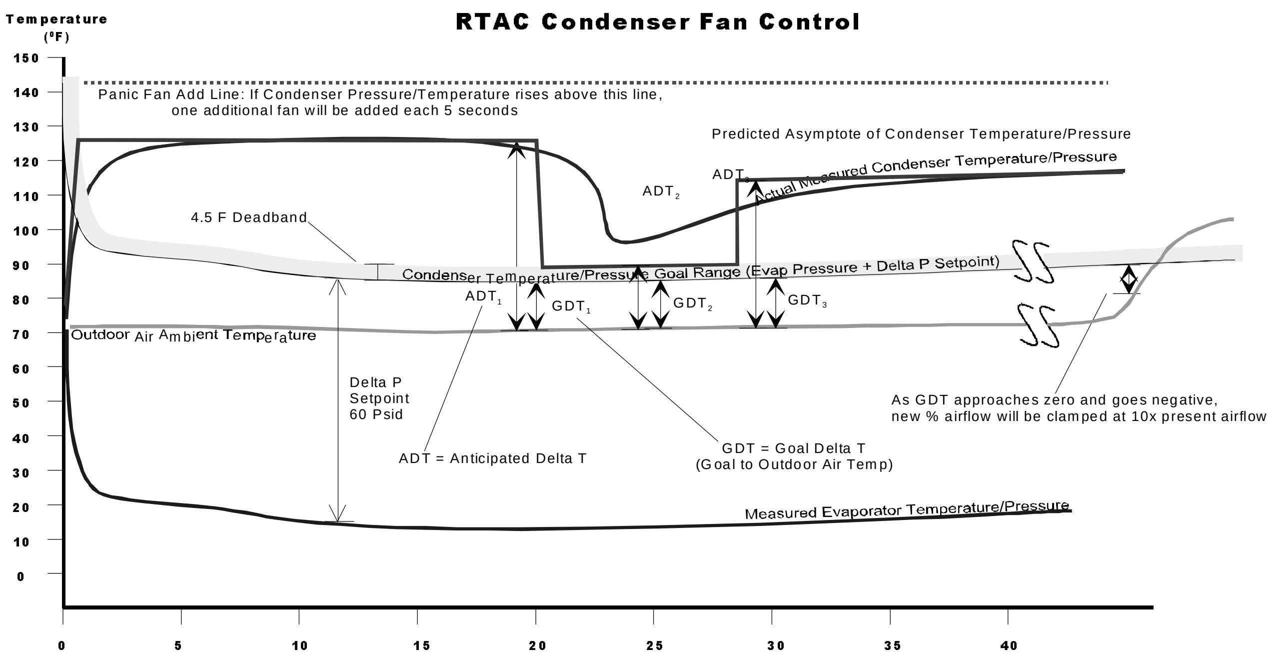
## 6-2. Startup and Operation

The MP provides an output, one per circuit, to control a contactor which delivers 3 phase power to the inverter(s) on that circuit. The output energizes the contactor for the inverter(s) for that circuit at least 5 seconds prior to the first compressor start of that circuit.

Once the compressor(s) on the circuit have started, the inverter(s) will be updated with speed command signals (slaved to run at the same speed if 2 are present), and are continuously monitored for a fault condition. The fan control algorithm outputs a desired % fan capacity for the entire fan deck. This % fan deck capacity is realized by staging on and off constant speed fans in discrete increments of capacity, while the inverter is used to control fan capacity in-between steps.

## Variable Speed/Condenser Fan

**Figure 6-1 : Condenser Fan Control**




The fan state is a function of the ambient temperature as sensed by the ambient temperature sensor at startup, times an additional scaling factor that is a function of the lower of either the leaving water temperature or the outdoor air temperature at startup, divided by how many compressors there are per circuit. The maximum number of fixed speed fans that are started are just equal to or less than the Initial Fan Capacity Function per Figure 6-1. If a variable speed fan is available it will be started along with the necessary number of fixed speed fans to exactly match the requirement.

In normal fan control, a new % fan capacity will be calculated each iteration per the fan control algorithm. The algorithm attempts to control the fans so that the condenser pressure is held to within a 4.5 F deadband above the condenser goal pressure which is set relative to the current Evaporator Pressure (i.e. 60 PSID above it).

If variable speed fans are present, then the air flow is modulated directly on the Desired New % Air Flow calculated every 5 seconds.

When only fixed speed fans are present, additional fans will not be staged on until the new % Air Flow exceeds the next available fan step.

# Variable Speed/Condenser Fan

## 6-3. Inverter Fault Input

The Variable Speed Condenser Fan Inverter provides a fault indication to the MP through an optically isolated darlington transistor circuit. The transistor is off when the inverter is un-powered or in the fault state, and is on at all times during normal operation. A fault signal is sent by the inverter if it has gone through a self shutdown or if the output frequency of the inverter is limited to less than 50% of the signal speed commanded by the MP. Upon receipt of the fault signal (high voltage at fault input terminals), the MP attempts to reset the fault by sending a 0 PWM command to the inverter for a total of 5 seconds. The fault signal again checks and will be repeated if still in fault. If four faults are detected within 1 minute of each other, the power to the inverter cycles off for 30 seconds (through contactor control) and then re-powered. If the fault still remains or occurs again within 1 minute, a diagnostic is called out, the MP status off the Inverter, and attempts to run the remaining constant speed fans using normal constant speed Fan Control Algorithm. When 2 inverters are configured on a circuit, the fault responses are directed to both of the inverters on that circuit. The only exception is that the diagnostic specifies which inverter of the pair reported the fault.

## 6-4. Troubleshooting the Inverter

The purpose of this troubleshooting section is to help technicians determine if the variable speed fan inverter, the compressor module, the fan contactor, the fan motor, or the interconnecting wiring is faulty.

### ⚠ WARNING
### Live Electrical Components!

**During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.**

### ⚠ WARNING
### Hazardous Voltage!

**The VFD's have large capacitors that can store high voltage even when denergized. Once denergized the capacitor may take 1 minute to completely discharge. Always wait for at least 1 minute before servicing the VFD to insure the capacitors are completely discharged. Failure to follow these instructions cold result in death or serious injury.**

# Variable Speed/Condenser Fan

In this troubleshooting procedure, the components will be referred to by the following descriptions

:

**Table 6-1:**

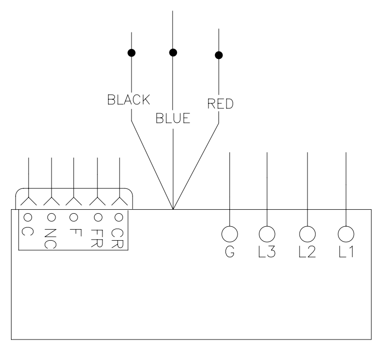
| Description | Circuit 1 | | Circuit 2 | |
|---|---|---|---|---|
| | **1 Comp** | **2 Comp** | **1 Comp** | **2 Comp** |
| Variable Speed Fan Inverter | 3U3 | 3U3, 3U4 | 4U3 | 4U3, 4U4 |
| Dual Inverter Interface LLID | 1U3 | 1U3 | 1U3 or 2U3 | 2U3 |
| Fan Motor | 3B3 | 3B3, 3B13 | 4B3 | 4B3,4B13 |
| Fan Fuses | 1F1, 1F2, 1F3 (All Voltages) | 1F1, 1F2, 1F3 (All Voltages) | 1F2, 1F8, 1F9 (All Voltages) | 2F7, 2F8, 2F9 (All Voltages) |
| | 1F17, 1F18, 119 (380, 400, 460, 575 Volt only) | 1F17, 1F18, 1F9 1F20, 1F21, 1F22 (380, 400, 460, 575 Volt only) | 1F20, 1F21, 1F22 (380, 400, 460, 575 Volt only) | 2F17, 2F18, 2F9 2F20, 2F21, 2F22 (380, 400, 460, 575 Volt only) |

1. Using TechView, go into the Unit Configuration View and verify the Low Ambient Capacity Condenser is selected for Condenser Temperature Range. This will also be reflected as a L in digit 17 of the model number. Go into Binding View and verify that the fan control LLIDs are bound.
2. Verify that all inverter power and control signal wiring is correct for the affected circuit. The wiring diagrams are found in Section 12 of RTAC-SVX01C-EN or on the inside of the unit fan control door.
3. Attempt to start the compressor on the desired circuit. Thirty seconds prior to compressor start, the variable speed fan inverter contactor is energized. Be sure that you can hear the fan contactor pull in. If not, attach an AC voltmeter from FR to ground on the compressor module. Reset the control and look for a 115 volt reading on the voltmeter at FR, 25 to 30 seconds prior to compressor start. If this 115 volts is verified but the contactor does not pull in, check for an open circuit in the contactor coil or an open circuit in the interconnecting wiring to the contactor.
4. Check the fan motor by completely bypassing the inverter. Disconnect power from the unit and remove the three-phase power wiring from the inverter. Connect it to the three-phase power wiring of the fan motor, using splice wires with 1/4 inch male quick connects on both ends. Re-apply power to the unit and reset the circuit being tested. Make sure the phasing is proper when reconnecting the inverter. Twenty-five or thirty seconds before the compressor starts, the contactor that would normally apply power to the inverter should pull in and the fan should run. If the fan does not run, check the line fuses and contactor contacts.

# Variable Speed/Condenser Fan

5. Disconnect power from the unit and reconnect the inverter module. At the same time, check for damaged wiring or loose quick connects on the inverter.
6. Remove connector P1 or P2 (whichever applies) from the inverter and place a jumper wire between terminals F and FR on the female connector. See Figure 6-2. for the location of these wires. This will prevent the control from reporting a fault diagnostic. Restart the unit and carefully measure the DC voltage between wires C (+) and CR (-) on the same female connector. The voltage should be 2 to 10 VDC when the compressor on the affected circuit is running. At compressor start, this voltage will be approximately 2 VDC and gradually ramp up to about 10 VDC. This voltage level is directly proportional to fan speed. At 5 VDC, the fan should be running at 50% of full speed and at 7 VDC the fan should be running at 70% of full speed.

**Figure 6-2 : Variable Speed Fan Inverter**




Note: The output from the compressor LLID is a pulse width modulated signal, 10 volt peak and 10 Hz. fundamental. Its average value can be read with a DC voltmeter.

7. Remove the jumper wire and reconnect connector P1 or P2. While the inverter is still powered, measure the DC voltage between pins F (+) and FR (-) on the Dual Inverter Interface LLID. The connector must be plugged on at both ends while measuring this voltage. If the reading is between 11.5 and 12.5 VDC two problems may exist:

a. The inverter indicates that it has a fault by opening a semiconductor switch within the inverter. The inverter sends a fault signal to the MP when:

It has gone through a self-shutdown. One cause of this could be high line voltage. A 10% high line voltage could cause a diagnostic trip.

The output frequency of the inverter is being internally limited to less than 50% of the signal speed commanded by the MP. Excessive fan

# Variable Speed/Condenser Fan

motor current, high temperature or internal inverter failures could cause this to occur.

b. There is an open circuit in the fault signal wiring, somewhere between the inverter and the compressor module.

If the reading is 2 VDC or less between F and FR, an inverter fault diagnostic for the affected circuit should not be displayed. If the variable speed fan in still not working, check these two interconnecting wires from the compressor module to the inverter, to be sure they are not shorted. The inverter cannot send the Dual Inverter Interface LLID a fault signal if these two wires are shorted together.

8. If all the settings and voltages through step 7 are acceptable and the fan does not operate, replace the variable speed fan inverter.

# Current Transformers

## 7-1. General

Each compressor motor has all three of its line currents monitored by torroid (doughnut) current transformers. These currents are normalized with respect to the Rated Load Amps of the respective compressor and thus are expressed in terms of % RLA and in Amps. The currents are "normalized" through the proper selection of the Current Transformer and the unit configuration. CTs are selected based on the motor RLA. Refer to Table 7-1.

The current transformers provide the input for five basic functions of the starter module:

1. Current overload protection using a programmed % of Rated Load Amps versus time to trip characteristic. The steady state "must trip" value is 140% RLA and the "must hold" value is 125% RLA. The starter Module will trip out the compressor, and the Main Processor (MP) will then shut down the other compressor on the same refrigerant circuit (if applicable). The appropriate diagnostic codes will be displayed.
2. Loss of Phase Current. A phase loss due specifically to lack of Current Transformer inputs is not looked for during transition (which lasts for 3 seconds in software) and is additionally delayed 2.8 seconds. As such, the diagnostic will not be called out any sooner than 5.8 seconds after transition even if it occurs immediately at start. Additional, two of the three current inputs also serve the Phase Rotation circuits. If this circuit (monitored immediately after start), outputs an inconsistent value to the module (due to loss of one or both of its inputs), a diagnostic of either Phase Loss (steady output) or Phase Reversal Protection Lost (varying output) will occur with a maximum delay of 1.2 seconds after start.
3. Phase Rotation. Screw compressors cannot be allowed to run in reverse direction. To protect the compressors, the phase rotation is detected by the current transformers immediately at start up. If improper phasing is detected, within 1 second of startup, the Starter Module will trip out the compressor, and the MP will then shut down the other compressor on the same refrigerant circuit (if applicable). The Phase Rotation diagnostic codes will be displayed.
4. Phase Unbalance. The Starter Module will shut down the compressor if a phase current unbalance is detected by the current transformers while the compressor is running. A 30% unbalance will cause the Starter Module to trip out the compressor, and the MP will then shut down the other compressor on the same refrigeration circuit (if applicable). Phase unbalance is based on the following calculation:

# Current Transformers

$$\% \text{ unbalance} = \frac{(I0x - Iave) \times 100}{Iave}$$

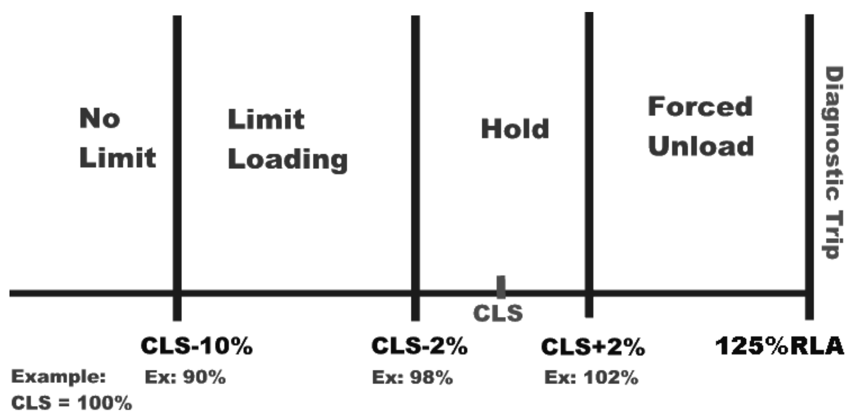
Where:

$$Iave = \frac{I01 + I02 + I03}{3}$$

I0x = the phase with the largest difference from Iave.

5. Current Limit. The current limit range for each compressor is 60-120% RLA. The figure below provides a graphical illustration of the current limit control.

**Figure 7-1 Current Limit Control**




Note: The current transformers are NOT polarity or directionally sensitive.

# 7-2. CT and Starter Compressor Current Input Checkout Procedure

## ⚠ WARNING

### Live Electrical Components!

**During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all**

# Current Transformers

**electrical safety precautions when exposed to live electrical components could result in death or serious injury.**

1. Check incoming 3-phase power for voltage within +/- 10% of nominal per Chiller nameplate. Verify that unit size and voltage are set correctly using TechView.
2. Check for all of the active diagnostic codes or the historic diagnostic codes using TechView under Diagnostic View.

   If there is any question as to which compressor or current transformer is causing a problem, or simply to verify and "witness" the problem, an attempt should be made to start the chiller after resetting all diagnostics.

   It is possible to "force" specific compressors to be the first or next compressor to stage on, using the "Compressor Test" feature of Tech View in Compressor Service View. The Leaving Water Temperature must, however, be above the Chilled Water Setpoint by more than the "differential to start" setting, in order to stage on the first compressor.

   At startup, verify the appropriate contactor(s) pull-in. The starting compressor can be determined in TechView. The mode will change from stopped to starting. This can also been seen on the DynaView under the Modes tab. Note the diagnostic(s) that results, then place the Chiller into the "Stop" mode.
3. For the next portion of the procedure, pull the unit's disconnect and interrupt all high voltage power to the control panel. Locate the torroid (doughnut) current transformers encircling the compressor power wiring and branching to the compressor contactors of the suspect compressor in the control panel. Refer to the Component Location Drawing in the panel to identify the particular current transformer(s) of interest. Locate the part number/UL tag on the transformer leads and note the Trane part number which identifies the transformers.
4. Utilizing the Schematic Wiring Diagram, locate the termination of the transformer's wiring into the Phoenix plug at the appropriate Starter module at pin header J7. Pull off the appropriate Phoenix connector from the pin header on the Starter.

## CAUTION
## Equipment Damage!

**Current Transformers can be damaged and high voltages can result due to running the compressors without a suitable burden load for the CTs. This load is provided by the Starter input. Take care to properly reconnect the CT's Phoenix connector prior to attempted start of the compressors.**

5. Using a digital volt-ohmmeter, measure the resistance of the transformer(s) by probing the appropriate pair(s) of receptacles within the

# Current Transformers

Phoenix connector. The receptacle pairs of the Phoenix connector are most easily measured by using meter leads with pointed probes and contacting the exposed metal of the connector through either the top Phoenix connector.

6. Refer to Table 7-1 which lists the normal resistance range for each extension of current transformer. Check the measured resistance against the value listed per transformer extension. If the resistance is within tolerance, the transformer and Phoenix connector can be considered good. Go on to step 8.

**Table 7-1: Current Transformers Rating and Resistance**

| Unit RLA | Part Number | Rating (amps) | Usable Range (amps) | Resistance Ohms (+10%) |
|---|---|---|---|---|
| 67-100 | X13580853-01 | 100 | 66.67-100 | 23.5 |
| 100-150 | X13580853-02 | 150 | 100-150 | 35.0 |
| 134-200 | X13580853-03 | 200 | 134-200 | 46.0 |
| 184-275 | X13580853-04 | 275 | 184-275 | 67.0 |
| 267-400 | X13580853-05 | 400 | 267-400 | 68.0 |
| 334-500 | X13580853-06 | 500 | 334-500 | 84.0 |
| 467-700 | X13580853-07 | 700 | 467-700 | 128.0 |
| 667-1000 | X13580853-08 | 1000 | 667-1000 | 235.0 |
| 33.4-50 | X13580853-09 | 50 | 33.37-50 | 11.5 |
| 50-75 | X13580853-10 | 75 | 50-75 | 17.0 |

7. If the resistance reading above is out of tolerance, the problem is either with the transformer, its wiring, or the Phoenix connector. First, double check the schematic to be sure you are working the proper lead pair. Then, cut the leads to the particular transformer near the Phoenix connector and repeat the resistance measurement by stripping insulation from the wire's end. Once the fault has been isolated in this manner, reconnect leads or install a new transformer or connector.

   More than one current transformer is terminated to a single Phoenix connector. When replacing, take care to note the proper positions of the respective transformer wire terminations on the Phoenix connector for re-termination. (The current transformers are NOT polarity or directionally sensitive). The transformer lead wiring is #22 AWG, UL 1015 600V and the proper Phoenix connector must be used to ensure a reliable connection. Isolate the problem to the current transformer or its wiring apart from the connector.

# Current Transformers

8. If the transformer/connector resistance proves accurate, recheck the resistance with the connector held at different angles and with a light lead pull (less than 5 lb.) to test for an intermittent condition.
9. To perform the following test, you will need to use a digital voltmeter with a diode test function. With the transformer Phoenix connector disconnected and the power off to the Starter, perform a diode test across the corresponding pair of current transformer input pins on the Starter (header J7). The meter should read from 1.0 to 1.5 volts for each current transformer input. Repeat using the opposite polarity. The same reading should result. Extreme errors suggest a defective Starter module. If the diode voltage drops prove accurate, reconnect the transformers to the Starter and re-power the unit.

### ⚠ WARNING
### Live Electrical Components!

**During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.**

10. With the CTs reconnected to the Starter, attempt a restart of the chiller. As the given compressor is started, and the inrush locked rotor transient has passed, (locked rotor transient should last less than one second) simultaneously monitor the actual compressor phase current(s) (using a clamp- on type ammeter) and the voltage developed at the respective current transformer's termination at the Starter (using a digital volt-meter on a 0-20 VAC scale). Refer to Table 7-1 for the compressor phase current to output voltage relationship for each extension current transformer. Using Table 7-1, look up the current that corresponds to the output voltage read by the voltmeter and compare to ammeter reading. Assuming relatively accurate meters, the values should agree to within ± 5%.
11. If the measured current and the output voltage from the CT agree within the tolerance specified, the CT is good. If diagnostics, overload trips, or other problems potentially involving current sensing continue to occur with all phase currents to the compressors verified to be within their normal range, then the problem is with the Starter Model’s current input. It is advisable to replace the Starter module at this point.

# Current Transformers

# Over/Under Voltage

## 8-1. General

The hardware required for the Under/Over voltage sensing function of the Main Processor is standard on all RTAC units. The feature can be enabled/disabled in TechView under Setpoint View. A custom designed transformer whose primary is connected across the Line voltage A to B, provides a stepped down and isolated voltage to the Starter Module at J5. This secondary voltage is directly proportional to the Line Voltage applied to the primary. The Line Voltage is displayed on the DynaView under the compressor 1A tab or on TechView under Status View - Compressor 1A tab. A non-latching (automatically reset) diagnostic will be generated for a high or low Line Voltage condition.

**Over Voltage:** Trip: 60 seconds at greater than 112.5%, ± 2.5%, Auto Reset at 109% or less.

**Under Voltage:** Trip: 60 seconds at less than 87.5%, ± 2.8% at 200V or ± 1.8% at 575V, Auto Reset at 90% or greater.

### ⚠ WARNING
### Live Electrical Components!

**During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.**

## 8-2. Under/Over Voltage Transformer Checkout

1. Locate the Under/Over Voltage Transformer 1T9 in the panel by referring to the Component Location Drawing. Carefully measure and record the primary voltage across the Transformer (Line Voltage Phase A to B).
2. Next, disconnect the transformer’s secondary from J5 on the Starter module. Using voltmeter probes, measure and note the unloaded secondary voltage (Vac rms).
3. The ratio of the primary or line voltage to the open circuity secondary voltage should be 20 to 1. If the unloaded turns ratio is not within 2% of this value, replace the transformer.
4. Reconnect the secondary back to J5 and re-measure the loaded (connected) secondary voltage. The new loaded ratio should be approximately 20.2 to 1. If not within 2% of this ratio, the transformer's secondary should be disconnected from the Starter module and a 1 kOhm resistor connected across the secondary. Measuring the voltage across the 1

# Over/Under Voltage

kOhm resistor should yield a voltage ratio of 20 to 1. Deviations of more than ±2% suggests a bad transformer. If the 1 kOhm loaded ratio is within tolerance, but the Main Processor connected ratio is out of tolerance, suspect a bad Starter Module. Before replacing the Starter module, double check the Unit Line Voltage programed in the Main Processor. It should match the nameplate unit line voltage.

5. If the Under/Over Voltage Protection continues to call out a diagnostic and all of the above measured ratios are within tolerance, and all Main Processor Under/Over Voltage settings have been verified, replace the Starter module.

# Compressor Capacity

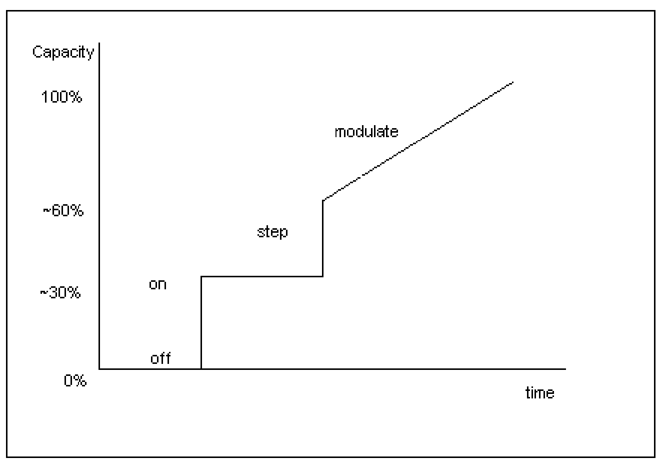
## 9-1. General

The CHHP (GPII) compressor is a “screw” or helical rotor design with two rotors, one directly driven by the motor called the male and the other driven by the lobes of the male called the female.

CHHP compressors have a female step load solenoid valve and male load/unload solenoid valves that are utilized for capacity control. The female step load solenoid is so named because it acts on the female rotor side of the compressor, and its function is to “pilot” a larger valve inside the compressor that opens to bypass compressed vapor back to the suction of the compressor. This bypass action causes a “step” difference in the capacity of the compressor.

On the Male rotor side of the compressor is the male port unloader piston, which can move laterally along the male rotor. Small bypass ports in the rotor housing are covered and uncovered by the unloader piston as it moves. The position of the piston, is controlled by two direct acting solenoid valves called the male load and male unload solenoid valves. These valves add or vent pressure to the cylinder of the movable piston to position and “modulate” the amount of compressed vapor that can be bypassed back to suction.

**Figure 9-1: Compressor Capacity**




With the female solenoid de-energized (internal female bypass valve open), the minimum capacity of the compressor is 30%. With the female solenoid valve energized, (and the male port unloader in the unloaded position) the compressor capacity jumps up to 60%. Through pulsed control of the male load and unload solenoid valves, the piston can be moved to exactly modulate the load of the compressor from 60 to 100% of its capacity. There are no springs acting on the male port unloader piston, and as such, the piston can only be effectively moved while the compressor (or manifolded compressor) is running, creating differential pressure.

## 9-2. Checkout Procedure for the Female Step Load Outputs

A dual triac LLID (1U17, 2U17,) controls the female solenoid valve on the compressor with a 115VAC dry contact relay output. Refer to the wiring diagrams in the control panel for the following procedure.

### ⚠ WARNING
### Live Electrical Components!

**During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.**

With a particular compressor running, the relay may be checked (under load) by measuring the voltage for terminal J2-1 or J3-1 to neutral. The relay operators in the high side and switches power to J2-1 and/or J3-1, to move the female step load valve to the loaded position. When CH530 decides to load the compressor, the female step load is energized continuously. To assure that loading is occurring, it may be necessary to make slight adjustments to the chilled water setpoint to force the action.

## 9-3. Checkout Procedure for the Step Load Solenoids Valve and Piston

1. Connect a manifold gauge set to the schrader valve located at the side of the piston housing. Refer to Figure 9-2. This schrader allows access to the back side of the step load piston and, therefore, will allow direct measurement of the pressure that actuates the step load valve.
2. Observe the pressure during a compressor start. Initially, the pressure should drop to suction pressure. The compressor will run unloaded for at least 45 seconds.
3. When the CH530 begins to load the compressor the solenoid will actuate and supply discharge pressure to the piston.

   If after verifying the 115 VAC has been applied to the step load solenoid, the pressure does not increase to discharge pressure, the step load solenoid coil and/or the valve must be replaced.

   The percent RLA of the compressor should increase. If the percent RLA does not increase, the step load valve is stuck and should be repaired.

**NOTE**: All limits are still active. If the chiller enters into a condenser, current, or evaporator limit. Continuously monitor the operating mode.

## 9-4. Checkout Procedure for the Male Load-Unload Outputs

A dual triac LLID (1U16, 1U21,2U16, 2U21) controls the load and unload solenoid valve on the compressor with a 115VAC triacs (solid state relays). Unlike mechanical relays however, a triac has a rather high leakage current when off, comparatively speaking. While the leakage is not nearly enough to actuate a solenoid valve, it may under a no load condition (as would be experienced when a solenoid coil fails open), look like it was stuck "on" when using a voltmeter to test it. Thus it is important to verify that the solenoid coil is continuous and providing a normal load or to connect a known good load, such as a low wattage 115 Volt lamp, to the terminals when testing the outputs. Refer to the wiring diagrams in the control panel for the following procedure.

### ⚠ WARNING
### Live Electrical Components!

**During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.**

With a particular compressor running, the triacs may be checked by measuring voltage from terminal J3-1(load) and J2-1 (unload) to neutral. The triacs operate in the high side and switch 115 VAC power to J3-1 (load solenoid) or J2-1 (unload solenoid) to move the slide valve in the appropriate direction. Except during compressor starts and stops, in normal operation, the solenoid valves can only be energized for a period of between 40 and 400 milliseconds once every 6 seconds. Often, if the chilled water setpoint is being met under steady state conditions, they may not be energized at all. To assure loading and unloading is occurring it may be necessary to make slight adjustments to the chilled water setpoint to force the action. As the pulsed on-time is potentially short it may be difficult to see, especially if using a meter movement type voltmeter. Use of a low wattage 115 VAC lamp may be of some help for a visual indication of output triac operation.

When a triac is off, about 3 VAC or less should be measured on its terminal with the solenoid load connected. When it is on, the voltage should be close to 115 VAC (the drop across the triac is about 1-2 volts).

The best time to check the unload solenoid is immediately after the compressor starts. For the first 45 seconds (30 seconds in ice making) after the start the unload solenoid should be energized continuously.

# Compressor Capacity

Checking the load solenoid is more difficult. 45 seconds after the start, the compressor will usually start to load until the water temperature is satisfied. Remember however, that certain limit conditions may prevent the compressor form loading even if the chilled water setpoint is not satisfied.

## 9-5. Checkout procedure for the Slide Valve and Load-Unload Solenoids

### 9-5 a. Setup

Make sure unit is off and there is no power in the control panel before beginning this procedure.

### ⚠ WARNING
### Hazardous Voltage!

**Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.**

1. Identify the LLID associated with the compressor to be tested (1U16, 1U21, 2U16, 2U21). Disconnect the wires, take care to identify the wires to prevent cross wiring when reconnecting.
2. Install a toggle switch between the Control power HOT to the load and unload leads (previously connected to J3-1 and J2-1).

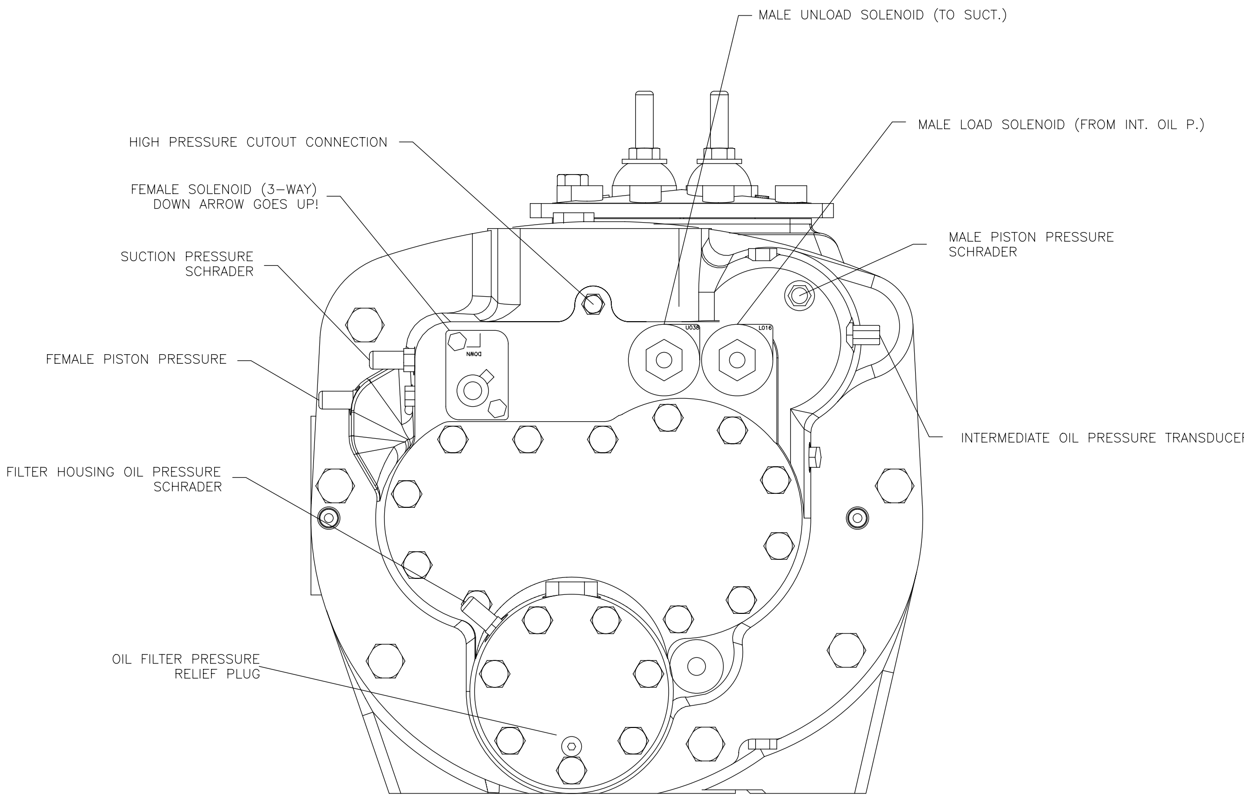
   1TB5-1, 2TB5-1 Hot

   1TB5-16, 2TB5-16 Neutral

   Initially make sure that the Load toggle switch is open and the Unload toggle switch is closed.
3. Connect a manifold gauge set to the schrader valve located at the end of the piston housing. This schrader allows access to the pressure behind the male piston. Refer to Figure 9-2.

# Compressor Capacity

**Figure 9-2: CHHP Compressor**




4. Re-apply power to the unit and place the chiller in the “stop” mode. Using techview lockout all compressors except the compressor to be tested. Place the chiller in”Auto” mode and provide all necessary interlocks and a load to start the chiller

## ⚠ WARNING
## Live Electrical Components!

**During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.**

# Compressor Capacity

5. Allow the compressor to start and monitor the compressor currents with a clamp-on type ammeter.

## 9-5 b.Load

1. Once the compressor has started, allow the Unload solenoid to remain energized for approximately 45 seconds, then open the Unload toggle switch to de-energize the valve. Verify that at least one condenser fan is on before continuing with the checkout, as low differential refrigerant pressure will preclude proper Slide Valve operation. Record the male piston pressure and compressor currents.
2. Manually close and open the Load toggle switch to energize the Load Solenoid in 4 to 5 short "pulses". Each load pulse should be approximately one second in duration, with approximately 10 seconds between pulses.
3. Monitor the male pressure behind the piston and the amp draw of the unit. Both should gradually increase with each pulse of the load solenoid.

**NOTE**: All limits are still active. If the chiller enters into a condenser, current, or evaporator limit. Continuously monitor the operating mode.

## 9-5 c.Unload

1. Manually close the Unload toggle switch to continuously energize the Unload Solenoid valve.
2. The pressure behind the male piston and the RLA of the unit should gradually decrease with each pulse sent to the unload solenoid.

**NOTE:** The pressure behind the piston should be approximately suction pressure when the compressor is fully unloaded. The RLA will be dependent on the application.

With the results from the above checkout procedure use Table 9-4 to determine the possible causes of the loading problem.

# Compressor Capacity

**Table 9-4: Possible Causes to Loading Problem**

| Possible Operation | Recorded Measurement | Load | Unload | Hold |
|---|---|---|---|---|
| Operating properly | Piston Pressure | increase | decrease | remain constant |
| | Amp Draw | increase | decrease | remain constant |
| Stuck piston | Piston Pressure | increase | decrease | remain constant |
| | Amp Draw | remain constant | remain constant | remain constant |
| Leaking load solenoid, internal leak or leaking piston | Piston Pressure | increase | may drop initially but will increase as soon as the unload is de-energized | increase |
| | Amp Draw | increase | may drop initially but will increase as soon as the unload is de energized | increase |
| Leaking unload solenoid | Piston Pressure | remain constant or decrease | decrease | decrease |
| | Amp Draw | remain constant or decrease | decrease | decrease |

# Compressor Capacity

# Starter

## 10-1. General

The CH530 provides compatibility with two types of starters for RTAC:

- X-Line
- Y-Delta

### 10-1 a. X-Line:

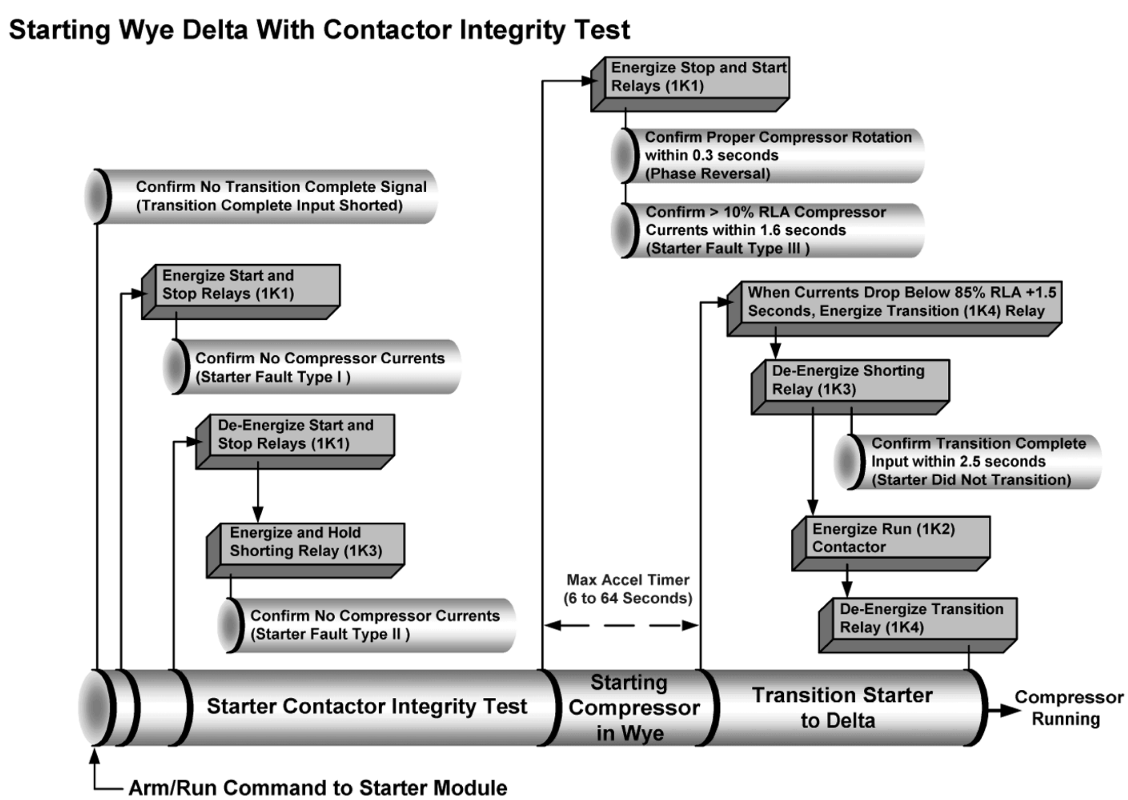
CH530 provides a "Start" contact closure output for across the line starters. To reduce the risk of starter damage due to the wrong starter type being selected, the Transition Complete input is required to be wired at the starter module.

### 10-1 b. Y-Delta:

Individual relays on the CH530 Starter module control the timing sequence for the "Stop", "Start", "Short", "Transition", and "Run" contactor closures. During a motor start. Prior to closing the "Short" contact, the transition complete input is verified to be open, otherwise an MMR diagnostic is generated.

Below is the sequence of a Y-Delta Start. A more elaborate description of the Y-delta starting sequence is shown in Figure 10-2 - Figure 10-15.

**Figure 10-1 RTAC Sequence of Operation**



# Starter

Figure 10-2 : Y-Delta Starter Sequence

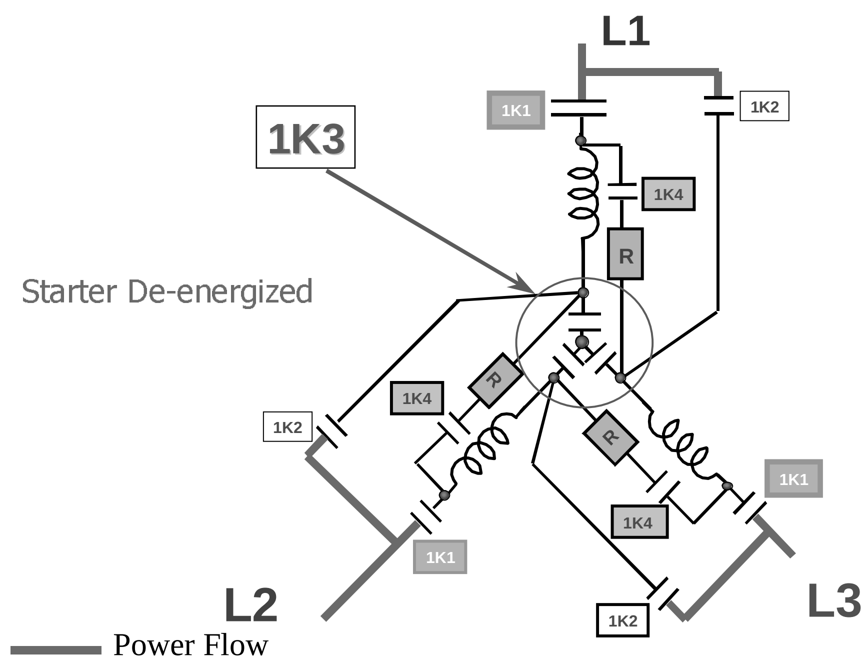
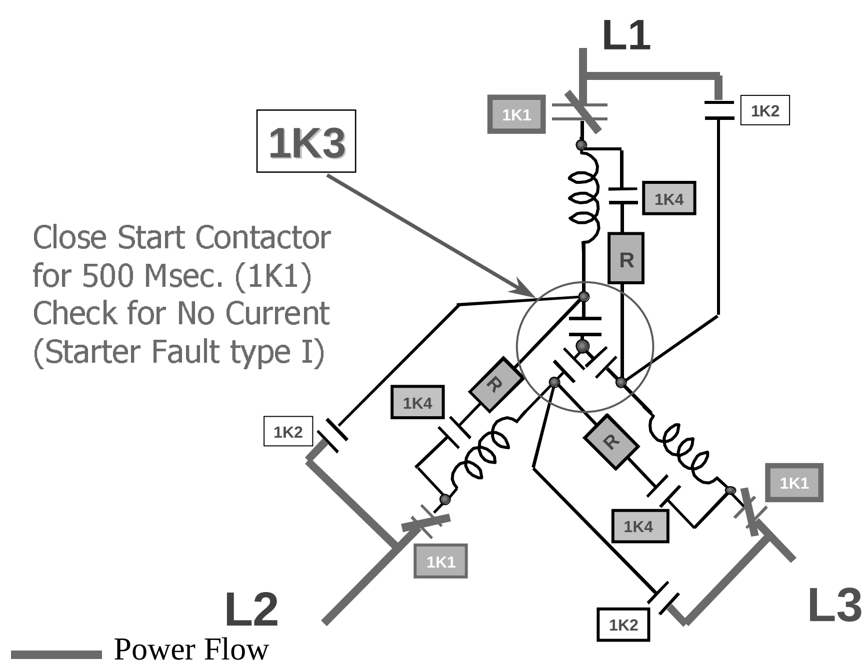



Figure 10-3 : Y-Delta Starter Sequence



# Starter

**Figure 10-4 : Y-Delta Starter Sequence**

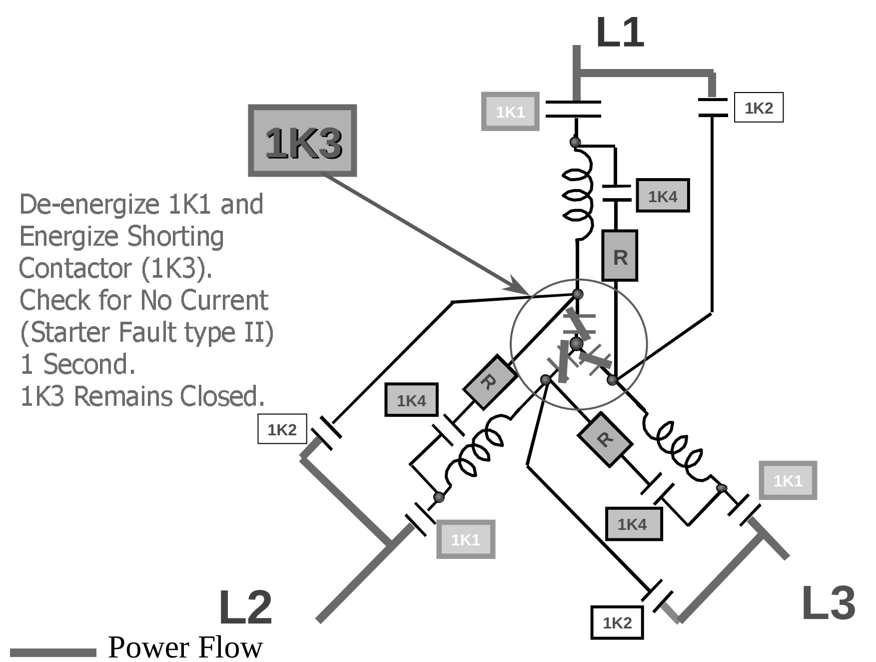
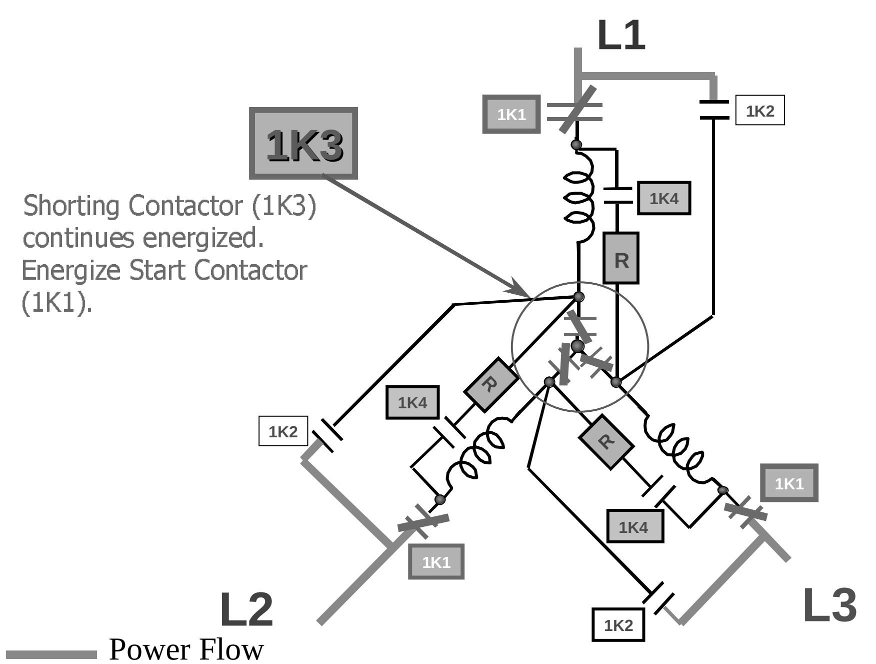



**Figure 10-5 : Y-Delta Starter Sequence**



# Starter

Figure 10-6 : Y-Delta Starter Sequence

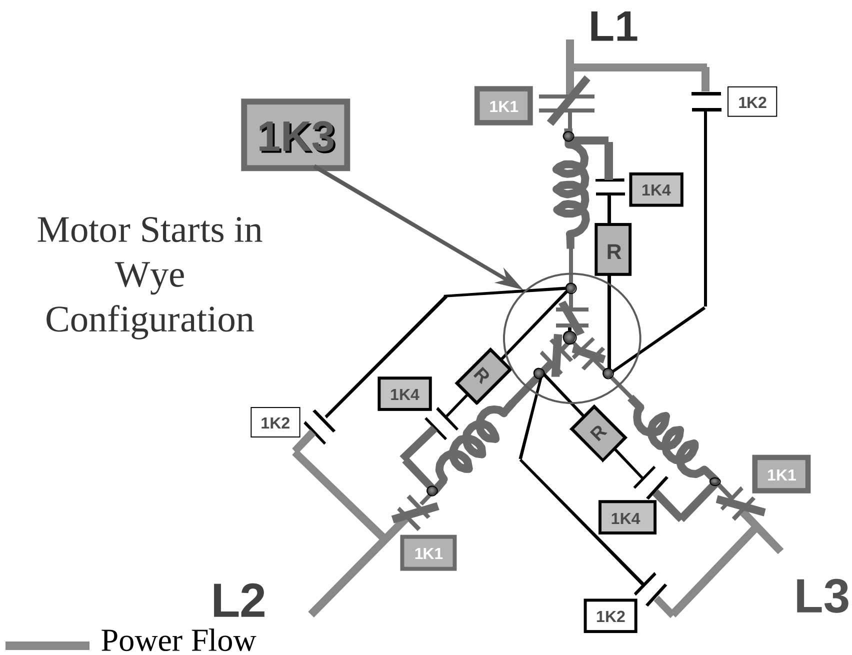



Figure 10-7 : Y-Delta Starter Sequence

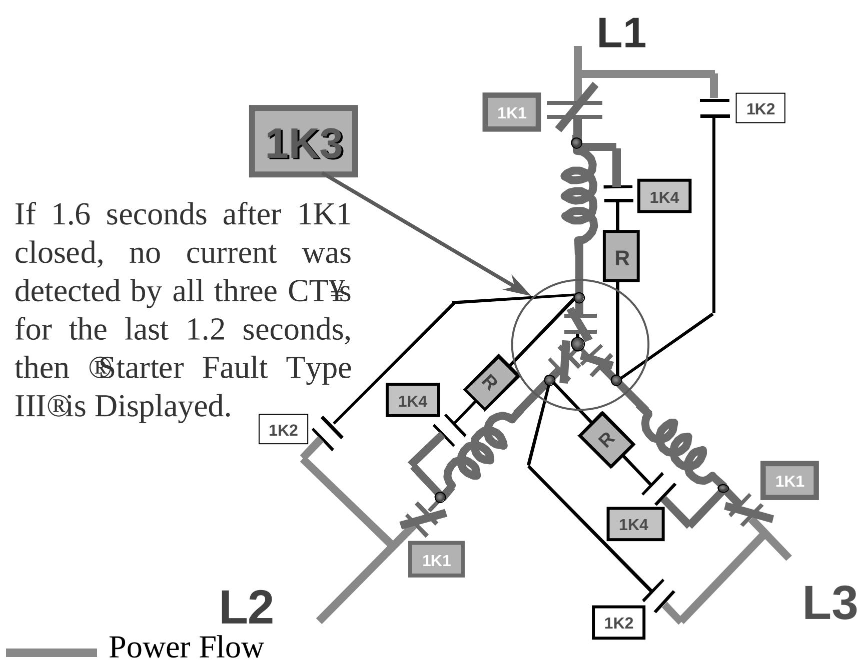


Figure 10-8 : Y-Delta Starter Sequence

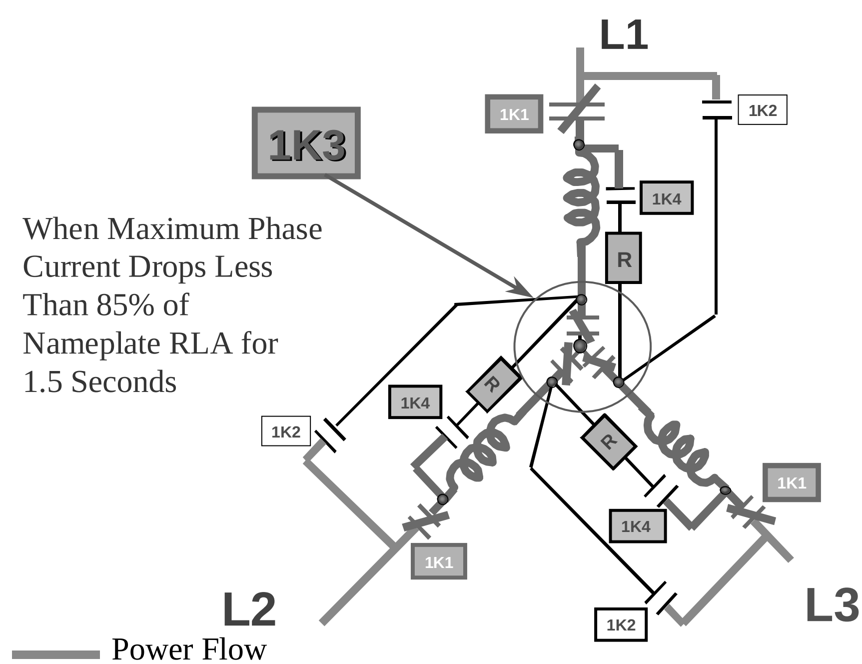
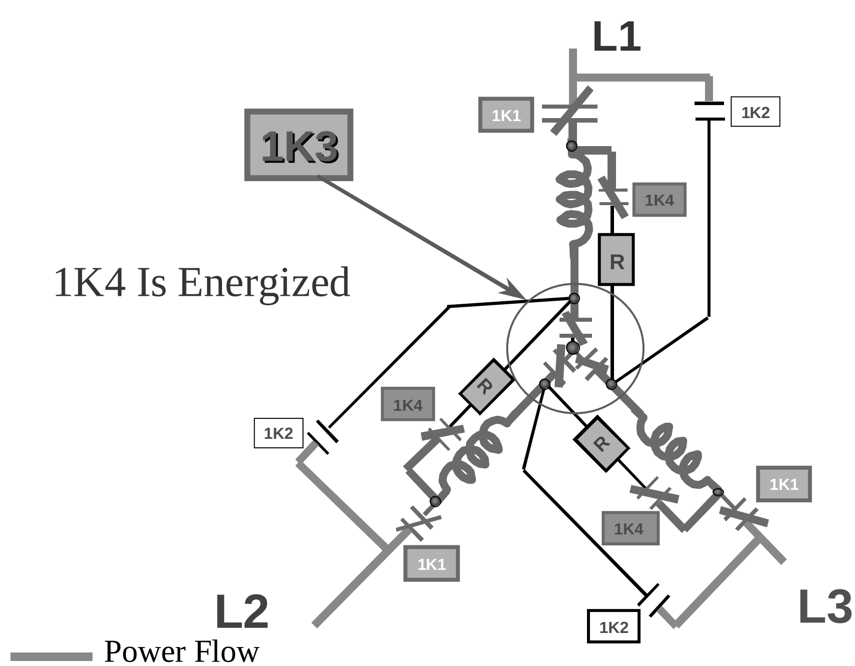



Figure 10-9 : Y-Delta Starter Sequence



# Starter

**Figure 10-10 : Y-Delta Starter Sequence**

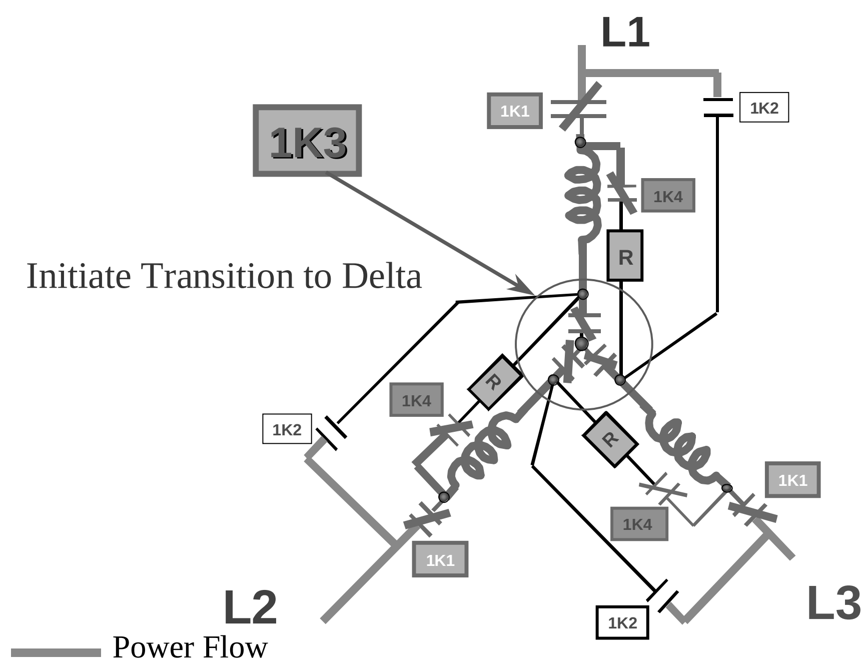



**Figure 10-11 : Y-Delta Starter Sequence**

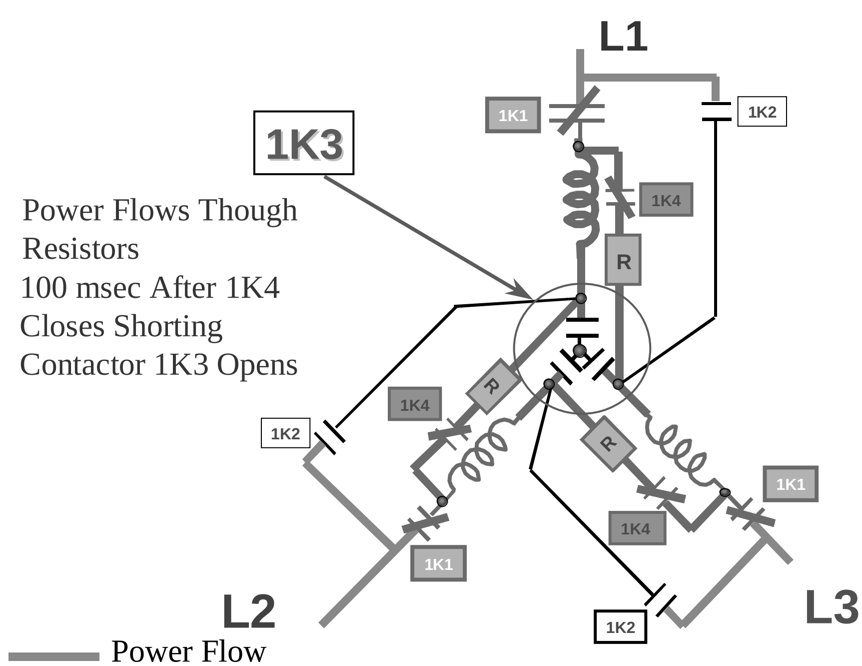


**Figure 10-12 : Y-Delta Starter Sequence**

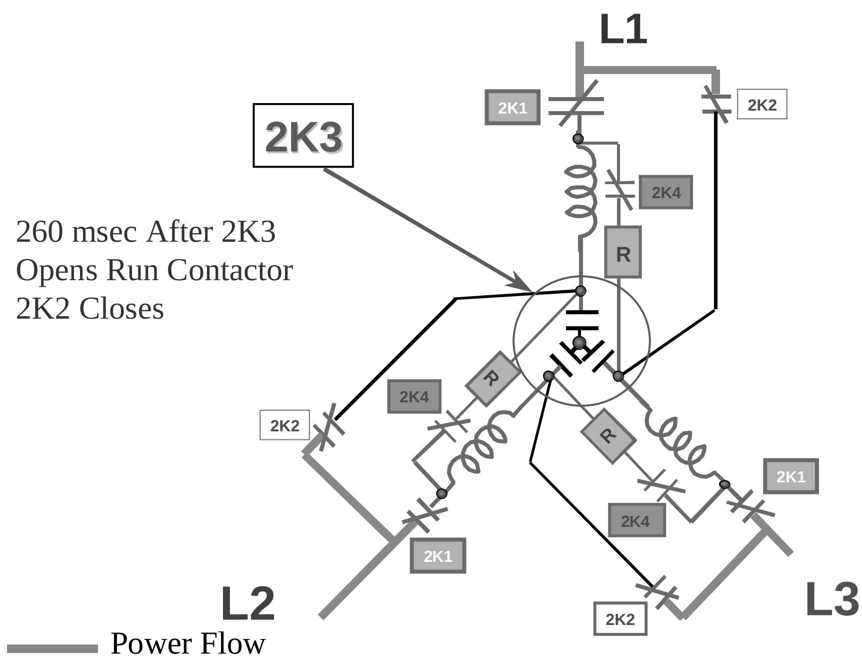
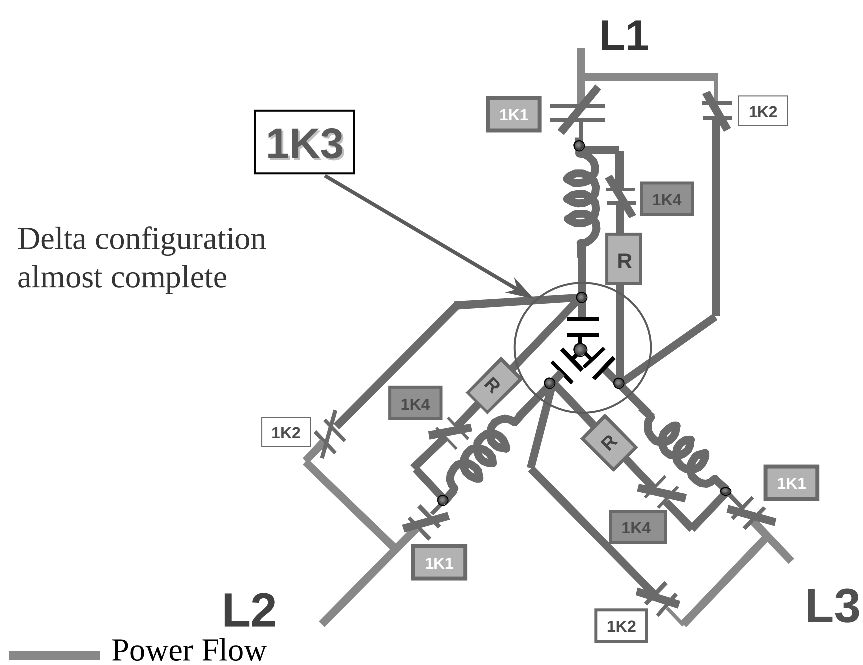



**Figure 10-13 : Y-Delta Starter Sequence**



# Starter

Figure 10-14 : Y-Delta Starter Sequence

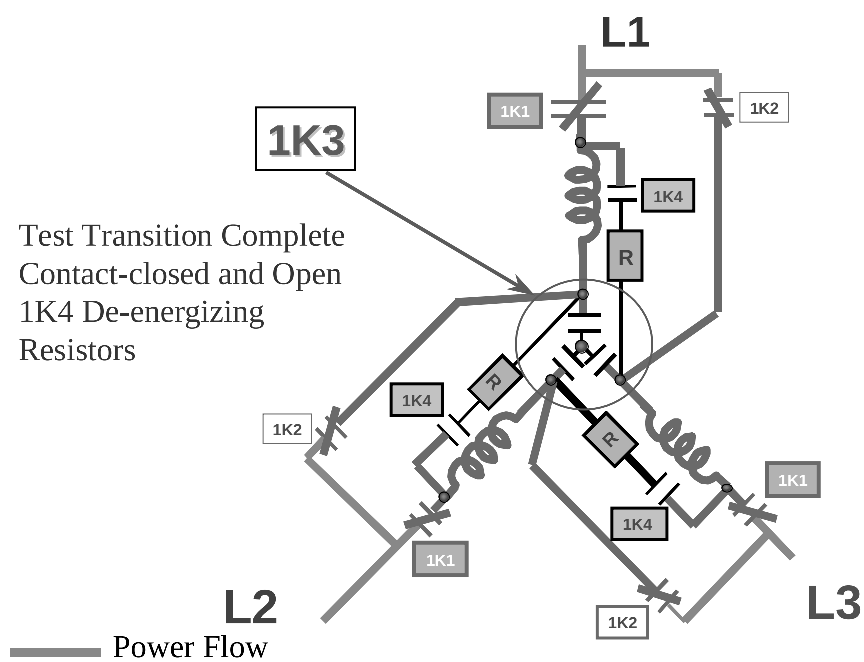
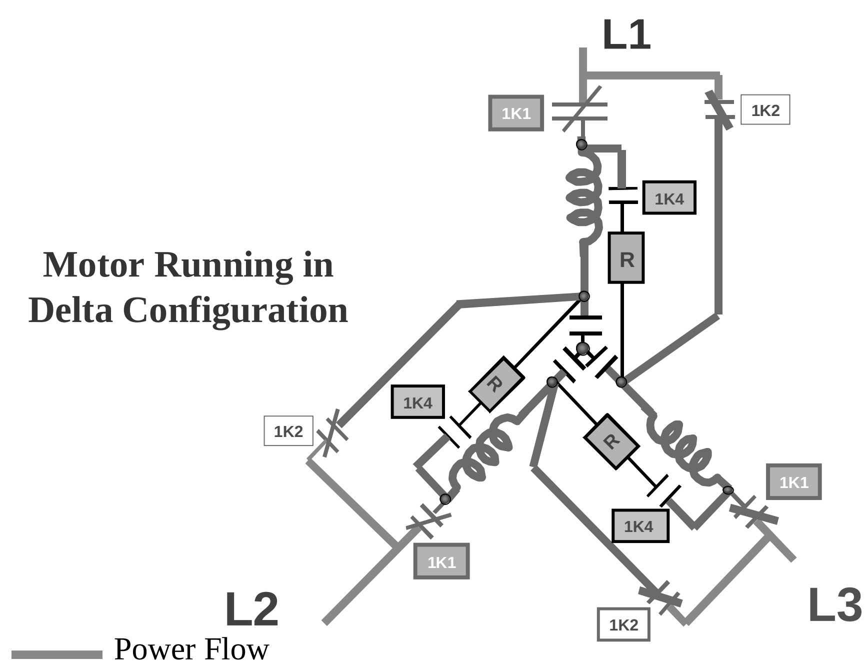



Figure 10-15 : Y-Delta Starter Sequence



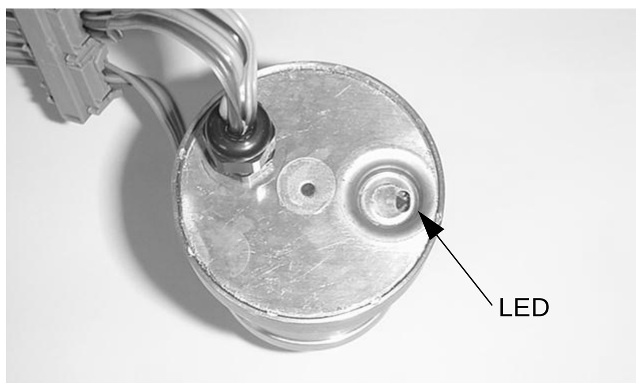
# Electronic Expansion Valve

## 11-1.General

The Electronic Expansion Valve (EXV) is a flow device which regulates the flow of refrigerant to the evaporator in order to match the compressor capacity. This function increases the part load efficiencies.

The EXV is positioned by a 24VDC three phase bipolar stepper motor. The electronics to drive the stepper motor are integral to the motor housing. The position of the valve is determined by main processor calculations based on the liquid level control algorithm. If the liquid level rises above the optimum value of 0.0" as displayed on the MP, the EXV will begin to close. If the liquid level falls below the optimum value, the EXV will begin to open. To adjust the position of the EXV, the main processor communicates a step value (0-6386 steps) command to the EXV via the LLIDs bus cable.

**Figure 11-1 :Top of EXV**



# Electronic Expansion Valve

## 11-2.EXV Checkout Procedure

### Is the EXV bound and communicating?

Connect TechView and get into Binding View. This will shut the chiller down. Once in Binding View, verify that the EXV is bound.

*Note: Please refer to Section 13:Service Tool for questions concerning binding LLIDs and getting into Binding View.*

*If there are multiple LLIDs that are not verified go to Section 2:IPC troubleshooting.*

If the EXV is not bound, try to bind it. If the EXV will not bind, it could be a problem with the connector or the EXV itself. Take a close look at the connector to make sure that all four wires are securely in place. It may be necessary to remove the cap to check for broken or misplaced wires.

### CAUTION
### Equipment Damage Possible!

**All unit built before October 1, 2002 (U02#####) used connectors that must be replace if the cap is removed. If the cap is removed on any of these units cut out the old connector and splice in a new section of cable and a new connector. See Section 2-IPC Overview for instruction on installing a new cap.**

If the EXV is bound, try to turn the LED on with a magnet. If the light will not turn on, there could be a problem with the EXV. Try to turn the light on in Binding View. With the light on, hold the magnet to the LED. The LED should get brighter. If it doesn't get brighter, this may indicate a problem with the EXV or the connector. Take a close look at the connector to make sure that all four wires are securely in place. It may be necessary to remove the cap to check for broken or misplaced wires.

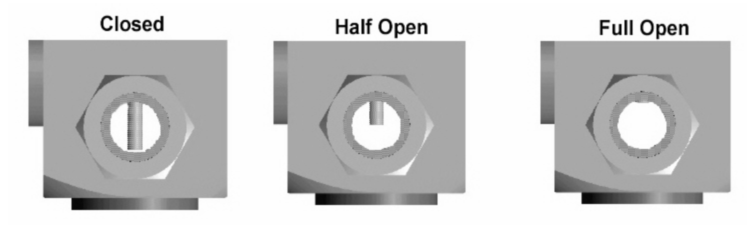
If there is no problem found with the connector and the EXV will not bind, then replace the EXV.

### Is the EXV functioning properly?

The EXV goes to the closed position at a normal shutdown. There is a sight glass in the body of the valve to monitor EXV position. Refer to Figure 11-2.

# Electronic Expansion Valve

**Figure 11-2 : EXV Position**

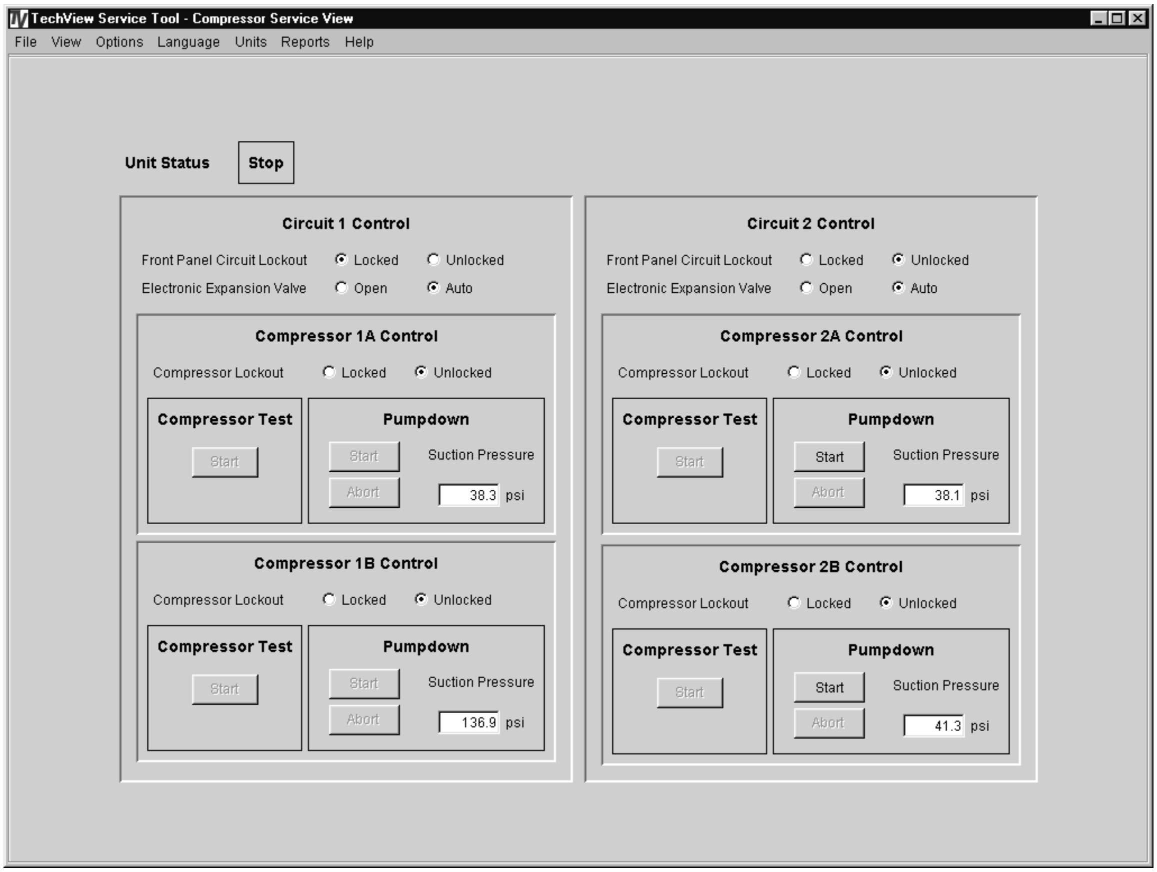



1. Shut the chiller down.
2. Lock out the circuit. This can be done using DynaView under the setpoint tab or in Techview under the Compressor Service View. Refer to Figure 11-3. With the circuit shut down the valve should go to the closed position. Note the EXV position.
3. Using TechView under Compressor Service View, open the EXV. Look at the EXV position. The valve should go to the open position. Refer to Figure 11-3.
4. The valve should go from closed to full open. If the valve does not move or open fully, replace the valve.

   It is very important to confirm that the valve is bound and communicating on the LLID bus before it is replaced.
5. Place the valve back into the auto mode of operation.

# Electronic Expansion Valve

**Figure 11-3 : Compressor Service View**

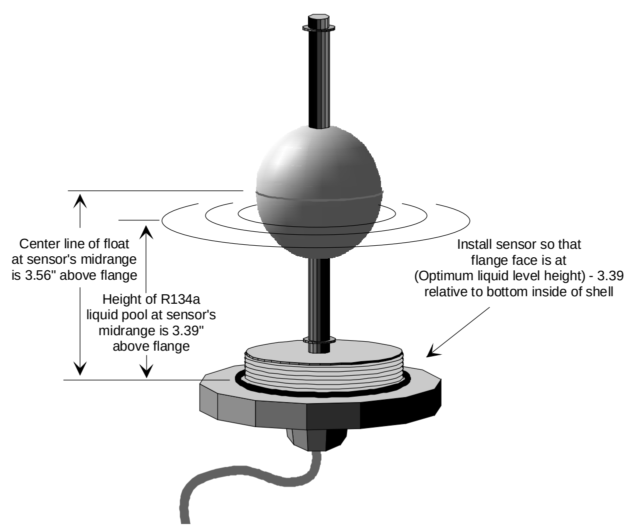


# Liquid Level Sensor

## 12-1.General

The liquid level sensor is mounted in a small tank or canister attached to the outside of the tube sheet. The evaporator's liquid level is transmitted into the tank through a small vapor and liquid line. The sensor consists of a body made from an enclosed tube and fitting, and a magnetic float which slides over the tube. Internal to the tube, and isolated from the refrigerant, is a narrow PC board with a resistor and magnetic reed switch array. The float's magnets close the reed switches pattern as it moves up the tube, creating a changing resistance (and ultimately a direct acting DC output voltage) similar to that of a potentiometer.

**Figure 12-1: Liquid Level Sensor**




The liquid level sensor is required to provide input for control of the EXV, which allows the regulation of refrigerant flow into the evaporator, to match the compressor capacity. This provides for increased part load efficiencies compared to a fixed orifice device.

# Liquid Level Sensor

## 12-2.Liquid Level Sensor Checkout Procedure

### Is the sensor bound and communicating?

Connect TechView and get into Binding View. This will shut the chiller down. Once in Binding View verify that the Liquid Level Senor is bound.

*Note: Please refer to Section 13:Service Tool for questions concerning binding LLIDs and getting into Binding View.*

*If there are multiple LLIDs that are not verified go to Section 2:IPC troubleshooting.*

If the sensor is not bound, try to bind it. If the sensor will not bind, it could be a problem with the connector or the sensor itself. Take a close look at the connector to make sure that all four wires are securely in place. It may be necessary to remove the cap to check for broken or misplaced wires.

**CAUTION**
**Equipment Damage Possible!**

**All unit built before October 1, 2002 (U02#####) used connectors that must be replace if the cap is removed. If the cap is removed on any of these units cut out the old connector and splice in a new section of cable and a new connector. See Section 2-IPC Overview for instruction on installing a new cap.**

If the sensor is bound, try to turn the LED on with a magnet. If the light will not turn on there could be a problem with the sensor. Try to turn the light on in Binding View. With the light on, hold the magnet to the LED. The LED should get brighter. If it doesn't get brighter this may indicate a problem with the sensor, connector, or bus. Take a close look at the connector to make sure that all four wires are securely in place. It may be necessary to remove the cap to check for broken or misplaced wires. If there is no problem found with the connector, and the sensor will not bind, then replace the sensor.

### Is the sensor reading accurately?

In order for this test to work, the condenser pressure must be at least 60 psi greater than the evaporator pressure.

1. Run the circuit to increase differential pressure.
2. Shut the unit down. Close the liquid line service valve. Place a gage on the suction line (the gage is a secondary check to verify that suction transducer is reading correctly). Enable pump down (the unit must be in the stopped mode to enable pump down). This can be done from either

# Liquid Level Sensor

DynaView (Set Points tab) or TechView (Compressor Service View). Pump down will be automatically terminated when the suction pressure reaches 5 psig.

*If the ambient temperature is below 50 deg F the unit will do an operational pumpdown just before shut down. This operational pumpdown is only active on units with software version 18 and later and design sequence B0 and later. If the unit does a pumpdown skip step 2.*

3. During pump down watch the liquid level. This can be done in TechView in Status View under the Circuit tab or no the DynaView (software version 18 and later only) under the refrigerant tab.
4. The liquid level should go to -1.1 or less as the refrigerant is removed from the evaporator.
5. As soon as pump down is complete, open the expansion valve. This can be done from the DynaView under the Set Point tab or in TechView in Compressor Service View.
6. With the valve open, the liquid level should increase. Depending on operating conditions, the level may not go all the way to +1.0 or more, but the level should increase.
7. If there is no change in the liquid level during this test there may be problem with the liquid level sensor, canister, or the lines going to the canister.

# Liquid Level Sensor

# TechView Service Tool

## 13-1.General

TechView is designed to functionally setup, configure, service and trouble-shoot the operation of RTAC Units using PC based software. The unit will arrive from the factory fully configured. TechView is not necessary to perform startup, but it is strongly recommended. It is required to change unit configurations and many setpoints. Not all setting are available using DynaView. Any component failure will require TechView for diagnosing and replacing of the components.

TechView is available for download on Trane.com at no cost. Minimum Laptop requirements are listed below. The version of TechView will be updated periodically and laptop requirements may change. Please refer to Trane.com for the latest information.

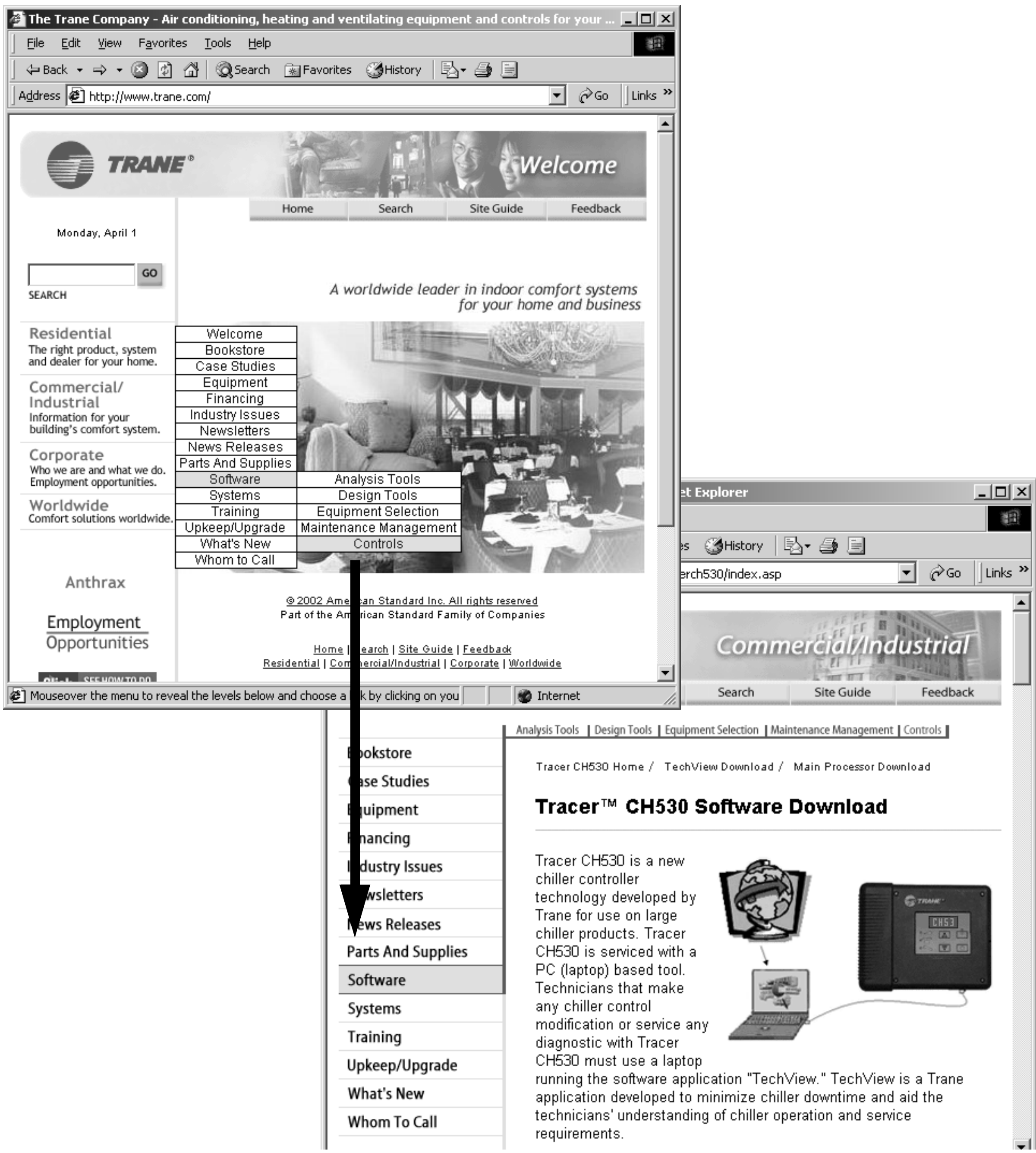
- Pentium II, III, or higher processor
- 128MB RAM
- 1024x768 display resolution
- CD-ROM
- 56K Modem
- 9-pin RS232 serial port connection
- Windows 2000 (TechView is compatible with Windows 95 and 98.)
- Microsoft Office (MS Word, MS Access, MS Excel)
- 25-pin LPT1 parallel port connection

# TechView Service Tool

## 13-2.Software Down Load

1. Create a “CH530” Folder using Explorer.
2. Go to Trane.com via the Internet. Refer to Figure 13-1.

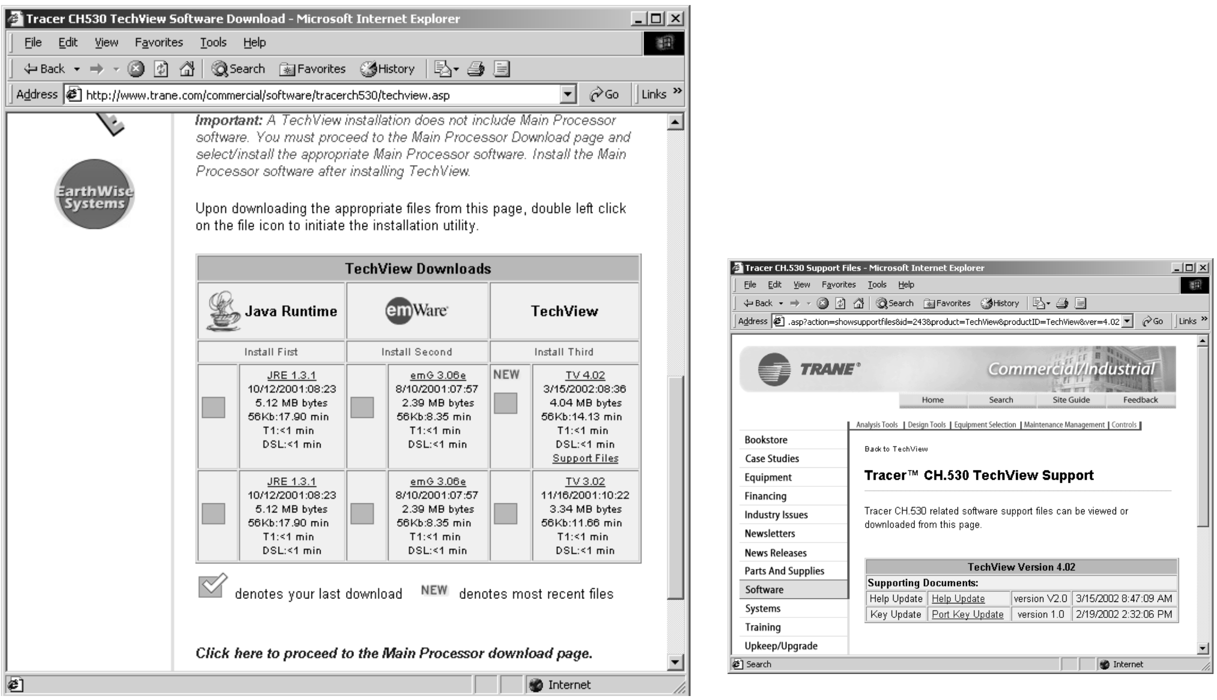
**Figure 13-1 : Trane.com**



# TechView Service Tool

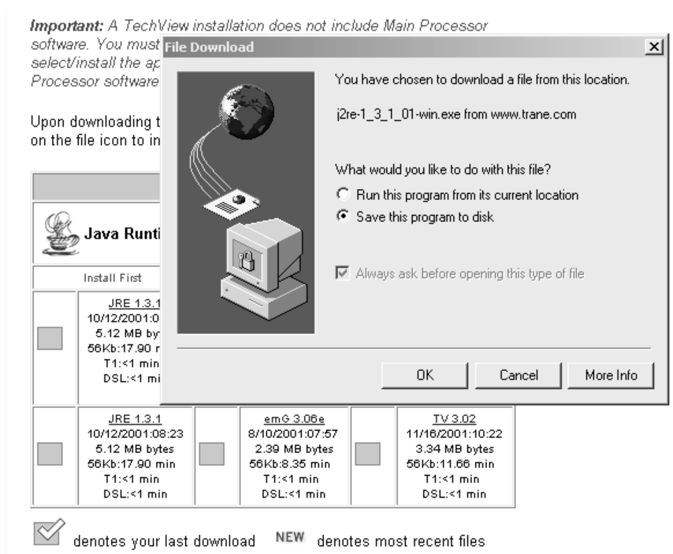
3. Read instruction on the CH530 download page. Download required files.

**Figure 13-2 : TechView Files**




4. Save files on PC. Make sure that the files are saved in the “CH530” folder. Refer to Figure 13-3.

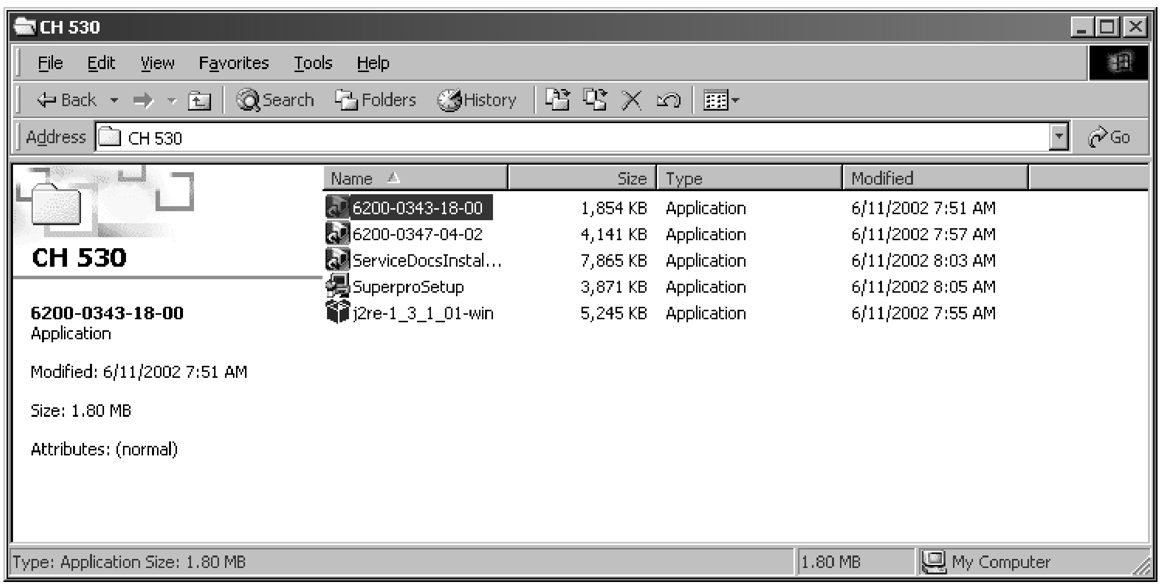
**Figure 13-3 : Saving Files**



5. Locate installed files on PC. They should be in the “CH530” folder.
6. Install applications from the files on PC.

- Install First: Java Runtime Environment
- Install Second: TechView
- Install Third: Main Processor Application File
- Install Fourth: Hardware Key Update
- Install Fifth: Help File Update

**Figure 13-4 : Files**




TechView versions **prior** to version 5.0 require the added installation of an “emGateway” program. TechView users who are upgrading from a prior version should un-install emGateway by using the PC’s remove program utility (select Settings, Control Panel, and Add/Remove Programs).

## 13-3.Using TechView

1. Connect laptop to the Main Processor using a RS232 serial cable. Refer to Figure 13-5.

**Figure 13-5 : TechView Connection**

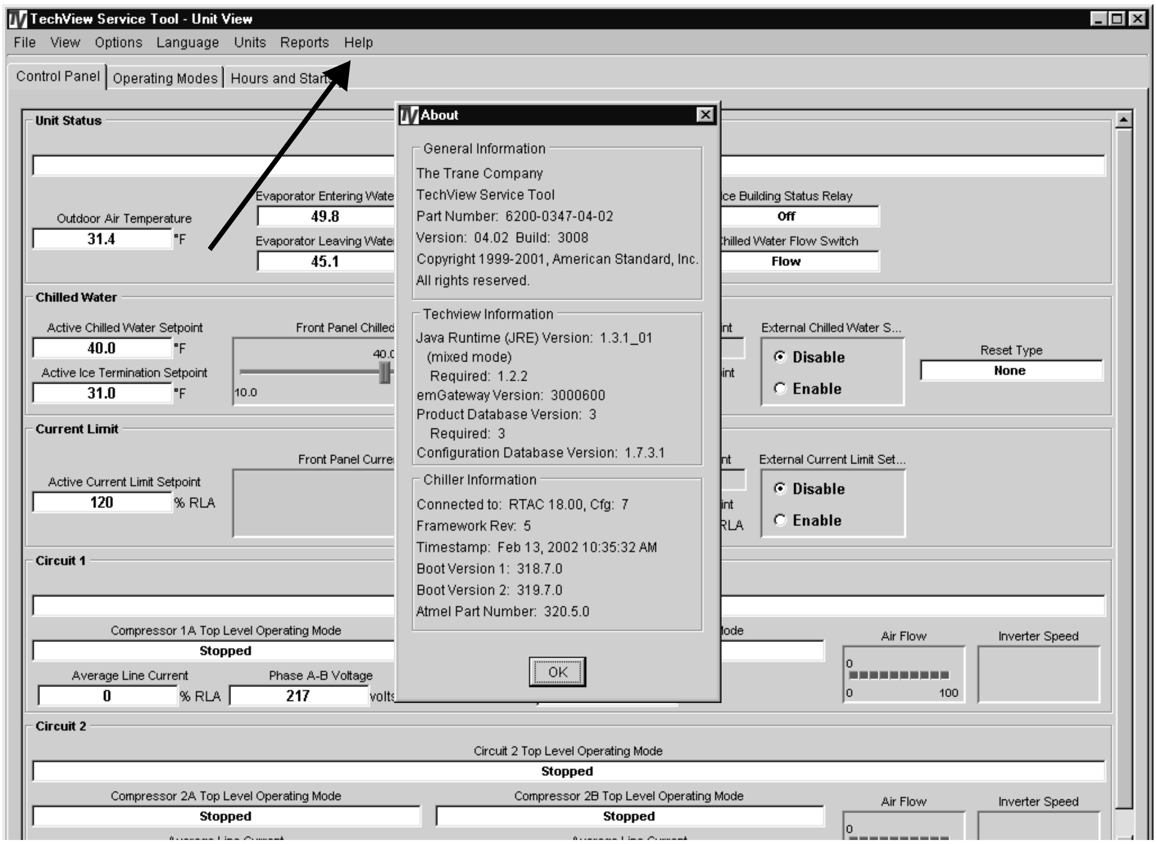

2. A TechView icon has been placed on the computers desktop. Double click on the icon to begin using TechView.

**Figure 13-6 : Connection Screen**

# TechView Service Tool

3. Click on "Help" then "About" to find installed software versions.

**Figure 13-7 : Installed Software**



# TechView Service Tool

## 13-4. Views

### 13-4 a. Unit View

Unit view is a summary for the system organized by chiller subsystem. This provides an overall view of chiller operating parameters and gives you an "at-a-glance" assessment of chiller operation from a Control Panel and an Hours and Starts point of view. This window also allows you to change a small number of key operating parameters.

#### Control Panel Tab

The Control Panel tab displays important operating information for the unit and allows you to change several key operating parameters. The panel is divided into four or more sub-panels.

#### Operating Modes Tab

This tab the current operating modes for chiller and individual compressors.

#### Hours and Starts Tab

This tab displays the number a hours (total) a compressor has run and the number of times the compressor has started. This window plays a key role in evaluating maintenance requirements.

### 13-4 b. Compressor Service View

The Compressor View provides convenient access to service functions for pumping down circuits, test starting compressors and EXV test. Various operational lockouts allow operation of the rest of the chiller while some parts are awaiting repair.

Note: Repairs are to be conducted with power off; the lockouts do not make it safe to repair a part while the rest of the chiller is running.

### 13-4 c. Status View

Status View displays, in real time, all non-setpoint data organized by subsystem tabs. As data changes on the chiller it is automatically updated in Status View.

### 13-4 d. Setpoint View

Setpoint view displays the setpoints and allows you to make changes. The Default button changes the setpoint to the product's factory setting. The text field and slider are updated when the change is complete.

You can change a setpoint with the text field or with the slider. When you select on the entry field, the change setpoint dialog displays to coordinate the setpoint change. If you select on the slider, the entire panel changes to an enlarged slider with an OK and Cancel button. The setpoint changes with the slider and the OK button verifies the change and returns the panel to it's initial state. The Cancel button returns the panel to its initial state without changing the setpoint.

# TechView Service Tool

Note: There is a short delay before the new value displays. TechView sends the new value to the main processor, the main processor validates the new value, and confirmation is returned to TechView. This process should only take a few seconds.

You can change the display units for a setpoint by selecting on the unit label next to the entry field. Only units that have different English and SI values can be modified.

## 13-4 e.Diagnostics

This window lists the active and inactive (history) diagnostics. There can be up to 60 diagnostics, both active and historic. For example, if there were 5 active diagnostics, the possible number of historic diagnostics would be 55. You can also reset active diagnostics here, (i.e., transfer active diagnostics to history and allow the chiller to regenerate any active diagnostics).

**Important:** Resetting the active diagnostics may cause the chiller to resume operation.

Each diagnostic shows:

- Date/Time: The date and time the diagnostic was generated.
- Code: A three-digit, hexadecimal diagnostic code, which identifies the diagnostic description.
- Description: Displays the data or algorithm generating the diagnostic.
- Target: The system or sub-system generating the diagnostic.
- Severity: Describes the action taken by the system (warning, normal shutdown, immediate shutdown, etc.).
- Persistence: Describes whether the diagnostic is self-correcting (non-latching) or whether is requires an active reset (latching).

You can sort the diagnostics by Date/Time, Severity, or Persistence by clicking on the column heading. Selecting again changes the order of sorting (ascending to descending and visa versa).

## 13-4 f.Configuration View

Configuration View allows you to define the chiller's components, ratings, and configuration settings. These are all values that determine the required installed devices, and how the chiller application is run in the main processor. For example, a user may set an option to be installed with Configuration View, which will require devices to be bound using Binding View. And when the main processor runs the chiller application, the appropriate steps are taken to monitor required inputs and control necessary outputs.

Any changes made in the Configuration View, on any of the tabs, will modify the chiller configuration when you select the Load Configuration button (located at the base of the window). The Load Configuration button uploads the new configuration settings into the main processor.

# TechView Service Tool

### Features Tab

For RTA chiller types, a valid nameplate model number and confirmation code must be entered in order to view the Feature tab.

The center portion of the window contains a scrollable list of feature categories (FCATs). Each FCAT is associated with a pull down list of acceptable feature codes (FCODEs).

The configuration field displays an active value. Clicking the spin button to the right of the text field displays a list of valid selections with the active value highlighted. When you select a new value, the Load Configuration button enables, the list closes, and the new value is displays in the text field.

### Custom Tab

The Custom tab is disabled when TechView connects to an EasyView or DynaView that doesn't already contain valid configuration information. It is enabled once the nameplate information is entered. This information is not known from the nameplate model number and must be defined from specific job site criteria or requirements.

### Nameplate tab

The Nameplate tab is the only window enabled when TechView connects to an EasyView or DynaView that does not contain valid configuration information. All information on this window should match the information stamped on the nameplate attached to the chiller. The numbers may be slightly different if features were added or removed subsequent to final delivery. Therefore, it is important to record the chiller model number and confirmation code if any modifications are made to the feature option list. This model number and confirmation code must be know if the main processor requires replacment.

The Model Number field contains the model number stored in the EasyView or DynaView.

The Confirm Code field contains the confirm code stored in the EasyView or DynaView. The confirm code is a four-digit hex value that is a mathematical calculation of the model number. This number has one to one correlation to a specific model number and is used to verify that the model number was entered properly.

## 13-4 g.Software View

Software view allows you to verify the version of chiller software currently running on the EasyView or DynaView and download a new version of chiller software to the EasyView or DynaView.

You can also select up to two available languages to load into the DynaView. Loading an alternate language file allows the DynaView to display its text in the selected alternate language.

# TechView Service Tool

## 13-4 h.Binding View

Binding View allows you to assess the status of the network and all the devices connected as a whole, or the status of individual devices by using status icons and function buttons.

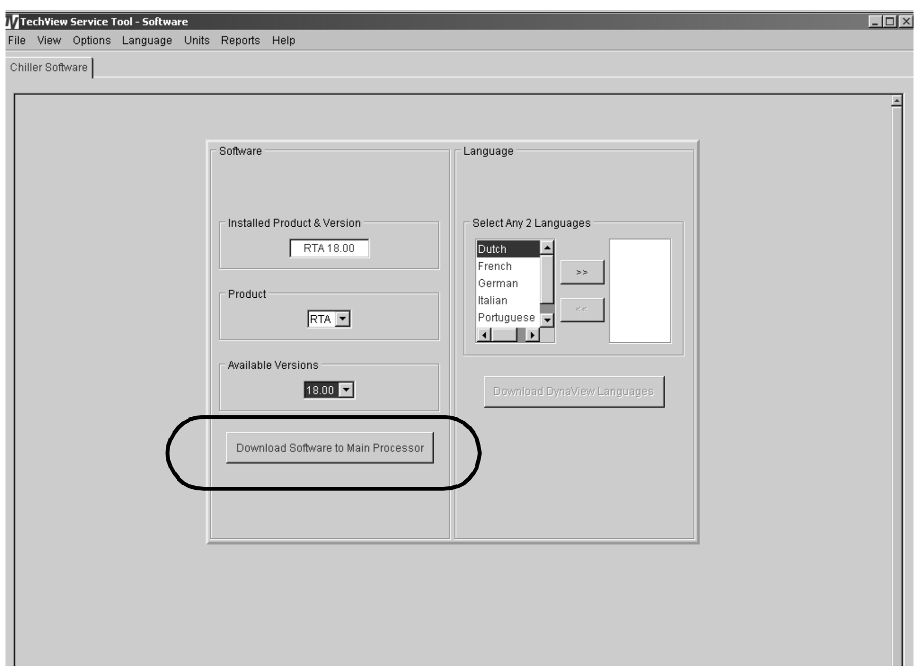
Binding View is essentially a table depicting what devices and options are actually discovered on the network bus (and their communication status) versus what is required to support the configuration defined by the feature codes and categories. Binding View allows you to add, remove, modify, verify, and reassign devices and options in order to match the configuration requirements.

Whenever a device is installed, it must be correctly configured to communicate and to function as intended. This process is called binding. Some features of Binding View are intended to serve a second purpose; that is diagnosing problems with communication among the devices (refer to error messages).

# 13-5.Downloading New Main Processor Software

A new main processor application can be loaded from the Software view.

**Figure 13-8 : Software View**



## 13-6.Binding Process

Binding is required whenever Binding View shows status icons other than the green smiling face icon in the network status area.

If a device is communicating but incorrectly configured, it might not be necessary to replace it. If the problem with the device is related to communication, attempt to rebind it, and if the device becomes correctly configured, it will then communicate properly.

If a device that needs to be replaced is still communicating, it should be unbound. Otherwise, it will be necessary to rebuild the network image for Binding View to discover that it has been removed. An unbound device stops communicating and allows a new device to be bound in its place.

It is good practice to turn the power off while detaching and attaching devices to the network. Be sure to keep power on the service tool computer. After power is restored to the network, the reconnect function in Binding View restores communication with the network. If the service tool computer is turned off, you must restart TechView and Binding View.

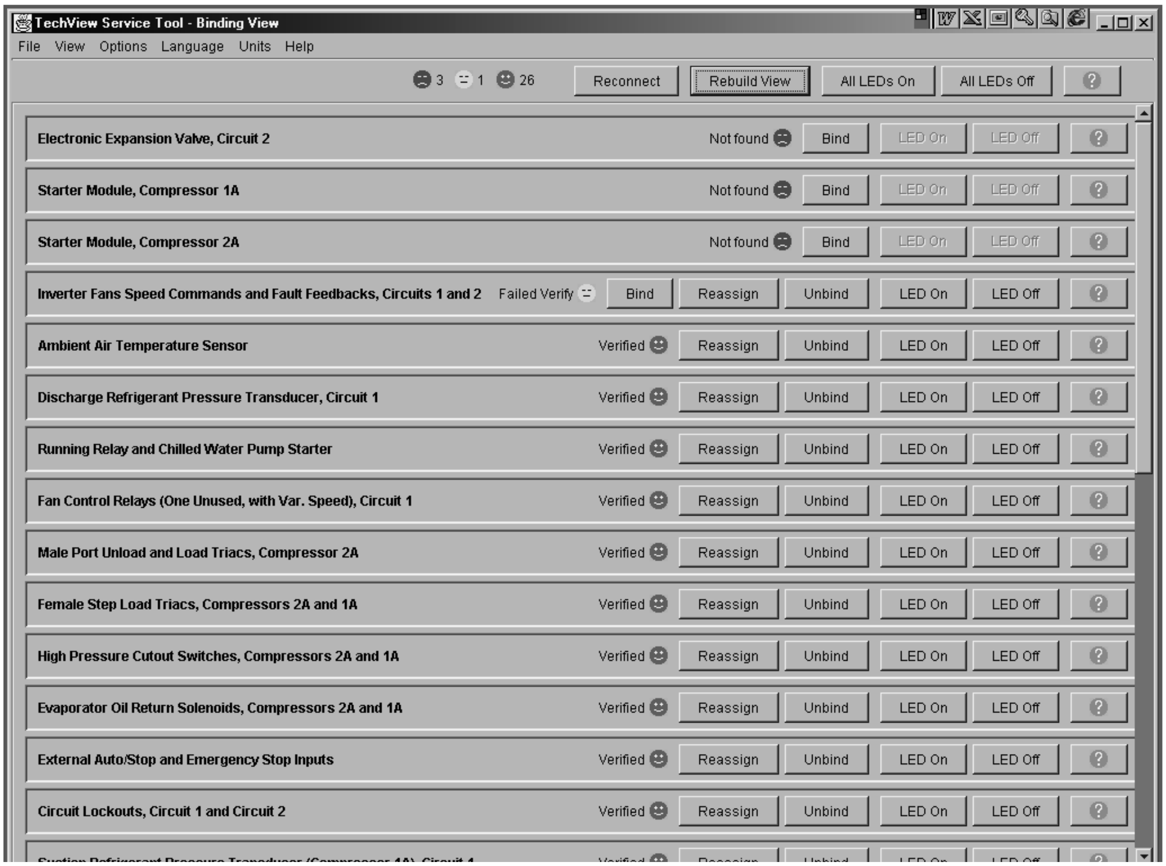
If a device is not communicating, the binding function displays a window to request manual selection of the device to be bound. Previously-selected devices are deselected when the function starts. When manual selection is confirmed, exactly one device must be selected; if it is the correct type, it is bound. If the desired device cannot be selected or if multiple devices are accidentally selected, you can close the manual selection window by clicking on No and repeat the bind function.

The typical binding procedure involves:

# TechView Service Tool

1. Go into Binding View.

**Figure 13-9 : Binding View**

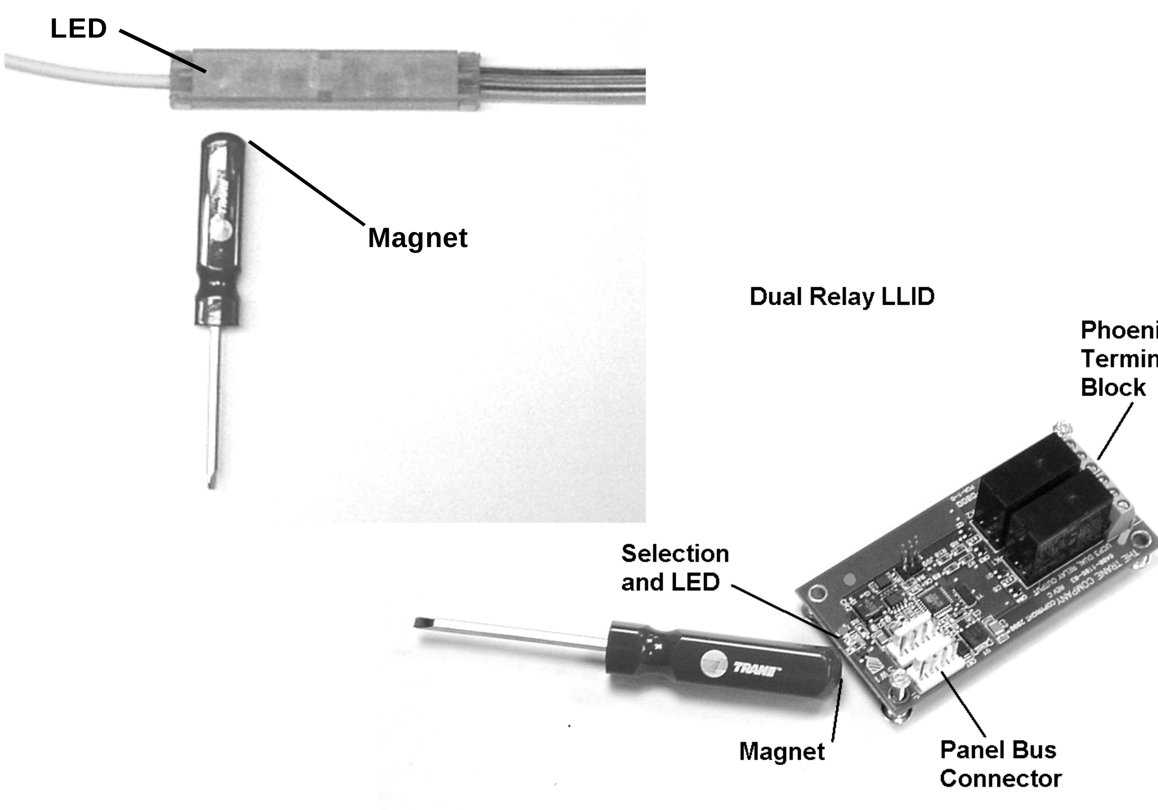



2. Find the appropriate LLID on the frame or in the control panel.
3. Click on bind.
4. Select the desired LLID with the south pole of a magnet.
   On panel mounted LLID this will be at the arrow.
   Temperature sensors and Liquid level sensor will be at the dimple.
   Transducers will be on top of the transducer body.
   EXVs and will be at a recession in the top of the dome.

# TechView Service Tool

Watch for the LED to light. Refer to Figure 13-10.

**Figure 13-10 : Panel and Frame Mounted LLIDs**



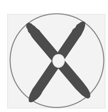

5. When the LED lights, remove the magnet and click on "Yes". Refer to Figure 13-11.

**Figure 13-11 : Selecting a LLID to bind**

6. Confirm that binding took place. The red face should have turned green.

## 13-7.Binding Symbols

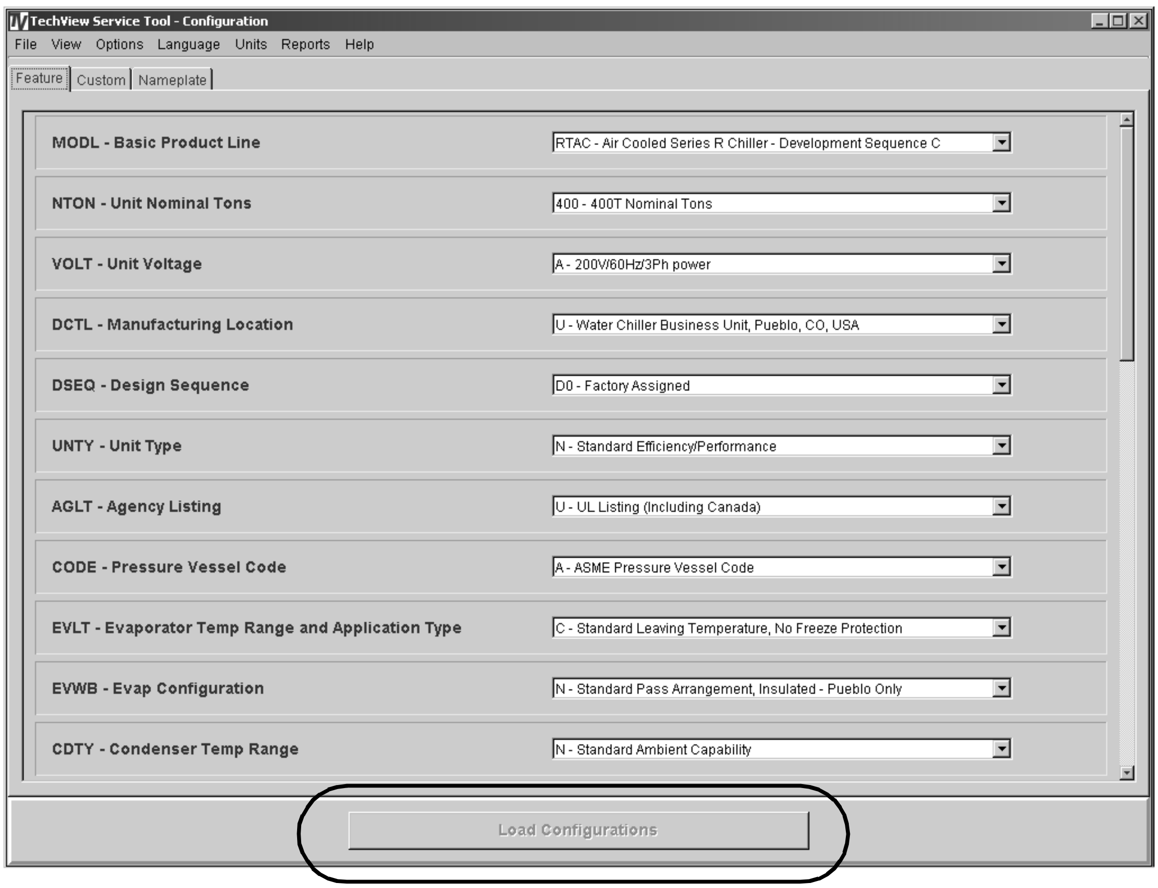
**Table 13-9:**

| | |
|---|---|
|  | The green smiling face marks a device that is communicating and correctly configured-no action is required. |
|  | The yellow face marks a device that is communicating but incorrectly configured or not all of its information has been confirmed. Click on Bind and it should verify the device, and turn the icon into a green smiling face. |
|  | The red frowning face marks a necessary device (as it is set in the Configuration View) that is unconfigured or is not communicating. There are several reasons why a device may not be found:<br>• The device has been added to the network bus, but not yet bound.<br>• The device configuration is not correct.<br>• The device does not have power or communications.<br>• The device has failed. |
|  | The red “X” marks a device that is communicating and configured for a function that either is not required or is duplicated by another device. |
|  | The red “S” symbol marks a device that is past the end of the expected sequence. |
|  | The blue “?” symbol is shown on the information buttons. |

## 13-8.Modify Chiller Configuration

The chiller configuration can be modified in the Configuration View. This will change the model and CRC number. This should only be done after talking with Field Modification in La Crosse or Pueblo Technical Service. Refer to : Unit Configuration View Figure 13-12.

**Figure 13-12 : Unit Configuration View**



# TechView Service Tool

# Diagnostic Table

## 14-1.General

The EasyView panel only display the last active diagnostic that occurred. The DynaView panel displays the last 10 active diagnostics (MP software version 18 and later)

If the chiller has a DynaView panel, diagnostics can be found by pressing the flashing alarm key on the bottom right-hand side of the screen. This will take you directly to the screen that displays the Diagnostics. The diagnostics will appear in plain language and also in its coded (hex) form.

If the chiller has an EasyView panel mounted on it and either the orange or red LED's are flashing, the most recent active diagnostic can viewed by simultaneously pressing the (+) and (-) keys. When the (+) and (-) keys are pressed simultaneously, the most recent active diagnostic will be displayed on the screen as a hexadecimal code. The hex code can be converted to text by looking it up in the CH530 diagnostics list.

There may be other active diagnostics that previously occurred that could help you isolate the problem. See the TechView's Diagnostics View section of this document for the procedure for viewing the entire active diagnostics list.

## 14-2.Legend to Diagnostic Table

**Hex Code**: 3-digit code used to uniquely identify diagnostics. The hex code can be “interpreted by looking it up in the RTAC CH530 diagnostics list that follows. This list is also available in the RTAC Installation and Operation Manual (IOM)

**Diagnostic Name**: Name of Diagnostic as it appears at DynaView and/or TechView displays.

**Target**: Defines whether the entire Chiller, the Circuit or the Compressor is affected by this diagnostic. *None* implies that there is no direct effect to the chiller operation.

**Severity**: Defines the action of the above effect. *Immediate* means an instantaneous shutdown of the affected portion. *Normal* means routine or friendly shutdown of the affected portion. *Special Mode* means a particular mode of operation is invoked, but without shutdown, and *Info* means an Informational Note or Warning is generated.

**Persistence**: Defines whether or not the diagnostic and its effects are to be manually reset (Latched), or can be either manually or automatically reset (Nonlatched).

**Active Modes [Inactive Modes]**: States the modes or periods of operation that the diagnostic is active and, as necessary, those modes or periods that it is specifically not active as an exception to the active modes. The inactive modes are enclosed in brackets [ ].

# Diagnostic Table

**Criteria**: Quantitatively defines the criteria used in generating the diagnostic and, if nonlatching, the criteria for auto reset.

**Reset Level**: Defines the lowest level of manual diagnostic reset command which can clear the diagnostic. The manual diagnostic reset levels in order of priority are: Local, Remote and Info. For example, a diagnostic that has a reset level of Remote, can be reset by either a remote diagnostic reset command or by a local diagnostic reset command, but not by the lower priority Info Reset command.

# 14-3. Diagnostic Table

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 398 | BAS Communication Lost | None | Special | | All | The BAS was setup as “installed” at the MP and the Comm 3 LLID lost communications with the BAS for 15 contiguous minutes after it had been established. Refer to Section on Setpoint Arbitration to determine how setpoints and operating modes may be effected by the comm loss. The chiller follows the value of the Tracer Default Run Command which can be previously written by Tracer and stored nonvolatilely by the MP (either use local or shutdown). | Info |
| 390 | BAS Failed to Establish Communication | None | Special | | At power-up | The BAS was setup as "installed" and the BAS did not communicate with the MP within 15 minutes after power-up. Refer to Section on Setpoint Arbitration to determine how setpoints and operating modes may be effected. Note: The original requirement for this was 2 minutes, but was implemented at 15 minutes for RTAC. | Info |
| 2E6 | Check Clock | Chiller | Info | Latch | All | The real time clock had detected loss of its oscillator at some time in the past. Check / replace battery. This diagnostic can be effectively cleared only by writing a new value to the chiller's time clock using the TechView or DynaView's "set chiller time" functions. | |
| 8A | Chilled Water Flow (Entering Water Temp) | None | Info | NonLatch | Any Ckt(s) Energzd [No Ckt(s) Energzd] | The entering evaporator water temp fell below the leaving evaporator water temp. by more than 2°F for 100 °F-sec. For RTAC this diagnostic cannot reliably indicate loss of flow, but can warn of improper flow direction through the evaporator, misbound temperature sensors, or other system problems | |
| 5EF | Comm Loss: Chilled Water Flow Switch | Chiller | Immediate | Latch | All | Continual loss of communication between the MP and the Chilled Water Flow Switch has occurred for a 30 second period. | Remote |
| 5F2 | Comm Loss: Cond Rfgt Pressure, Circuit #1 | Circuit | Immediate | Latch | All | Continual loss of communication between the MP and the Cond Rfgt Pressure, Circuit #1 has occurred for a 30 second period. | Remote |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 5F3 | Comm Loss: Cond Rfgt Pressure, Circuit #2 | Circuit | Immediate | Latch | All | Continual loss of communication between the MP and the Cond Rfgt Pressure, Circuit #2 has occurred for a 30 second period. | Remote |
| 694 | Comm Loss: Electronic Expansion Valve, Circuit #1 | Circuit | Normal | Latch | All | Continual loss of communication between the MP and the Electronic Expansion Valve, Circuit #1 has occurred for a 30 second period. | Remote |
| 695 | Comm Loss: Electronic Expansion Valve, Circuit #2 | Circuit | Normal | Latch | All | Continual loss of communication between the MP and the Electronic Expansion Valve, Circuit #2 has occurred for a 30 second period. | Remote |
| 5DE | Comm Loss: Emergency Stop | Chiller | Normal | Latch | All | Continual loss of communication between the MP and the Emergency Stop has occurred for a 30 second period. | Remote |
| 68E | Comm Loss: Evap Oil Return Valve, Cprsr 1A | Cprsrt | Normal | Latch | All | Continual loss of communication between the MP and the Evap Oil Return Valve, Cprsr 1A has occurred for a 30 second period. | Remote |
| 69E | Comm Loss: Evap Oil Return Valve, Cprsr 1B | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Evap Oil Return Valve, Cprsr 1A has occurred for a 30 second period. | Remote |
| 68F | Comm Loss: Evap Oil Return Valve, Cprsr 2A | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Evap Oil Return Valve, Cprsr 2A has occurred for a 30 second period. | Remote |
| 69F | Comm Loss: Evap Oil Return Valve, Cprsr 2B | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Evap Oil Return Valve, Cprsr 2B has occurred for a 30 second period. | Remote |
| 5E4 | Comm Loss: Evaporator Entering Water Temperature | Chilled Water Reset | Special Mode | Latch | All | Continual loss of communication between the MP and the Evaporator Entering Water Temperature has occurred for a 30 second period. Chiller shall remove any Return or Constant Return Chilled Water Reset, if it was in effect. Apply slew rates per Chilled Water Reset spec. | Info |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 5E3 | Comm Loss: Evaporator Leaving Water Temperature | Chiller | Normal | Latch | All | Continual loss of communication between the MP and the Evaporator Leaving Water Temperature has occurred for a 30 second period. | Remote |
| 6BB | Comm Loss: Evaporator Rfgt Drain Valve - Ckt 1 | Circuit | Normal | Latch | All | Continual loss of communication between the MP and the Evaporator Rfgt Drain Valve - Ckt 1 has occurred for a 30 second period. | Remote |
| 6BC | Comm Loss: Evaporator Rfgt Drain Valve - Ckt 2 | Circuit | Normal | Latch | All | Continual loss of communication between the MP and the Evaporator Rfgt Drain Valve - Ckt 2 has occurred for a 30 second period. | Remote |
| 688 | Comm Loss: Evaporator Rfgt Liquid Level, Circuit #1 | Circuit | Immediate | Latch | All | Continual loss of communication between the MP and the Evaporator Rfgt Liquid Level, Circuit #1 has occurred for a 30 second period. | Remote |
| 689 | Comm Loss: Evaporator Rfgt Liquid Level, Circuit #2 | Circuit | Immediate | Latch | All | Continual loss of communication between the MP and the Evaporator Rfgt Liquid Level, Circuit #2 has occurred for a 30 second period. | Remote |
| 5F0 | Comm Loss: Evaporator Rfgt Pressure, Circuit #1 | Circuit | Immediate | Latch | All [Ckt/Cprsr lock out] | Continual loss of communication between the MP and the Evaporator Rfgt Pressure, Circuit #1 has occurred for a 30 second period. Note: This diagnostic is replaced by diagnostic 5FB below with Rev 15.0 | Remote |
| 5F1 | Comm Loss: Evaporator Rfgt Pressure, Circuit #2 | Circuit | Immediate | Latch | All [Ckt/Cprsr lock out] | Continual loss of communication between the MP and the Evaporator Rfgt Pressure, Circuit #2 has occurred for a 30 second period. Note: This diagnostic is replaced by diagnostic 5FD below with Rev 15.0 | Remote |
| 5F8 | Comm Loss: Evaporator Water Pump Control | Chiller | Normal | Latch | All | Continual loss of communication between the MP and the Evaporator Water Pump Control has occurred for a 30 second period. | Remote |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 5DD | Comm Loss: External Auto/Stop | Chiller | Normal | Latch | All | Continual loss of communication between the MP and the External Auto/Stop has occurred for a 30 second period. | Remote |
| 5E9 | Comm Loss: External Chilled Water Setpoint | External Chilled Water setpoint | Special Mode | NonLatch | All | Continual loss of communication between the MP and the External Chilled Water Setpoint has occurred for a 30 second period. Chiller shall discontinue use of the External Chilled Water Setpoint source and revert to the next higher priority for setpoint arbitration | Info |
| 5DF | Comm Loss: External Circuit Lockout, Circuit #1 | Circuit | Special Mode | Latch | All | Continual loss of communication between the MP and the External Circuit Lockout, Circuit #1 has occurred for a 30 second period. MP will nonvolatily hold the lockout state (enabled or disabled) that was in effect at the time of comm loss. | Info |
| 5E0 | Comm Loss: External Circuit Lockout, Circuit #2 | Circuit | Special Mode | Latch | All | Continual loss of communication between the MP and the External Circuit Lockout, Circuit #2 has occurred for a 30 second period. MP will nonvolatily hold the lockout state (enabled or disabled) that was in effect at the time of comm loss | Info |
| 5EA | Comm Loss: External Current Limit Setpoint | External Current Limit setpoint | Special Mode | NonLatch | All | Continual loss of communication between the MP and the External Current Limit Setpoint has occurred for a 30 second period. Chiller shall discontinue use of the External Current limit setpoint and revert to the next higher priority for Current Limit setpoint arbitration | Info |
| 680 | Comm Loss: Fan Control Circuit #1, Stage #1 | Circuit | Normal | Latch | All | Continual loss of communication between the MP and the Fan Control Circuit #1, Stage #1 has occurred for a 30 second period. | Remote |
| 681 | Comm Loss: Fan Control Circuit #1, Stage #2 | Circuit | Normal | Latch | All | Continual loss of communication between the MP and the Fan Control Circuit #1, Stage #2 has occurred for a 30 second period. | Remote |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 682 | Comm Loss: Fan Control Circuit #1, Stage #3 | Circuit | Normal | Latch | All | Continual loss of communication between the MP and the Fan Control Circuit #1, Stage #3 has occurred for a 30 second period. | Remote |
| 683 | Comm Loss: Fan Control Circuit #1, Stage #4 | Circuit | Normal | Latch | All | Continual loss of communication between the MP and the Fan Control Circuit #1, Stage #4 has occurred for a 30 second period. | Remote |
| 684 | Comm Loss: Fan Control Circuit #2, Stage #1 | Circuit | Normal | Latch | All | Continual loss of communication between the MP and the Fan Control Circuit #2, Stage #1 has occurred for a 30 second period. | Remote |
| 685 | Comm Loss: Fan Control Circuit #2, Stage #2 | Circuit | Normal | Latch | All | Continual loss of communication between the MP and the Fan Control Circuit #2, Stage #2 has occurred for a 30 second period. | Remote |
| 686 | Comm Loss: Fan Control Circuit #2, Stage #3 | Circuit | Normal | Latch | All | Continual loss of communication between the MP and the Fan Control Circuit #2, Stage #3 has occurred for a 30 second period. | Remote |
| 687 | Comm Loss: Fan Control Circuit #2, Stage #4 | Circuit | Normal | Latch | All | Continual loss of communication between the MP and the Fan Control Circuit #2, Stage #4 has occurred for a 30 second period. | Remote |
| 68C | Comm Loss: Fan Inverter Fault, Circuit #1 or Circuit #1, Drive 1 | Inverter | Special Mode | Latch | All | Continual loss of communication between the MP and the Fan Inverter Fault, Circuit #1 or Circuit #1, Drive 1 has occurred for a 30 second period. Operate the remaining fans as fixed speed fan deck. | Remote |
| 68D | Comm Loss: Fan Inverter Fault, Circuit #1, Drive 2 | Inverter | Special Mode | Latch | All | Continual loss of communication between the MP and the Fan Inverter Fault, Circuit #1, Drive 2 has occurred for a 30 second period. Operate the remaining fans as fixed speed fan deck. | Remote |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 69A | Comm Loss: Fan Inverter Fault, Circuit #2 or Circuit #2, Drive 1 | Inverter | Special Mode | Latch | All | Continual loss of communication between the MP and the Fan Inverter Fault, Circuit #2 or Circuit #2, Drive 1 has occurred for a 30 second period. Operate the remaining fans as fixed speed fan deck. | Remote |
| 69B | Comm Loss: Fan Inverter Fault, Circuit #2, Drive 2 | Inverter | Special Mode | Latch | All | Continual loss of communication between the MP and the Fan Inverter Fault, Circuit #2, Drive 2 has occurred for a 30 second period. Operate the remaining fans as fixed speed fan deck. | Remote |
| 68A | Comm Loss: Fan Inverter Power, Circuit #1 or Circuit #1 Drive 1 and 2 | Circuit | Normal | Latch | All | Continual loss of communication between the MP and the Fan Inverter Power, Circuit #1 or Circuit #1 Drive 1 and 2 has occurred for a 30 second period. | Remote |
| 698 | Comm Loss: Fan Inverter Power, Circuit #2 or Circuit #2 Drive 1 and 2 | Circuit | Normal | Latch | All | Continual loss of communication between the MP and the Fan Inverter Power, Circuit #2 or Circuit #2 Drive 1 and 2 has occurred for a 30 second period. | Remote |
| 68B | Comm Loss: Fan Inverter Speed Command, Circuit #1 or Circuit #1 Drive 1 and 2 | Inverter | Special Mode | Latch | All | Continual loss of communication between the MP and the Fan Inverter Speed Command, Circuit #1 or Circuit #1 Drive 1 and 2 has occurred for a 30 second period. Operate the remaining fans as fixed speed fan deck. | Remote |
| 699 | Comm Loss: Fan Inverter Speed Command, Circuit #2 or Circuit #2 Drive 1 and 2 | Inverter | Special Mode | Latch | All | Continual loss of communication between the MP and the Fan Inverter Speed Command, Circuit #2 or Circuit #2 Drive 1 and 2 has occurred for a 30 second period. Operate the remaining fans as fixed speed fan deck. | Remote |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 5D9 | Comm Loss: Female Step Load Compressor 1A | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Female Step Load Compressor 1A has occurred for a 30 second period. | Remote |
| 5DA | Comm Loss: Female Step Load Compressor 1B | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Female Step Load Compressor 1B has occurred for a 30 second period. | Remote |
| 5DB | Comm Loss: Female Step Load Compressor 2A | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Female Step Load Compressor 2A has occurred for a 30 second period. | Remote |
| 5DC | Comm Loss: Female Step Load Compressor 2B | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Female Step Load Compressor 2B has occurred for a 30 second period. | Remote |
| 5EB | Comm Loss: High Pressure Cutout Switch, Cprsr 1A | Cprsr | Immediate | Latch | All | Continual loss of communication between the MP and the High Pressure Cutout Switch, Cprsr 1A has occurred for a 30 second period. | Remote |
| 5EC | Comm Loss: High Pressure Cutout Switch, Cprsr 1B | Cprsr | Immediate | Latch | All | Continual loss of communication between the MP and the High Pressure Cutout Switch, Cprsr 1B has occurred for a 30 second period. | Remote |
| 5ED | Comm Loss: High Pressure Cutout Switch, Cprsr 2A | Cprsr | Immediate | Latch | All | Continual loss of communication between the MP and the High Pressure Cutout Switch, Cprsr 2A has occurred for a 30 second period. | Remote |
| 5EE | Comm Loss: High Pressure Cutout Switch, Cprsr 2B | Cprsr | Immediate | Latch | All | Continual loss of communication between the MP and the High Pressure Cutout Switch, Cprsr 2B has occurred for a 30 second period. | Remote |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 5E1 | Comm Loss: Ice-Machine Control | Ice Making Mode | Special Mode | Latch | All | Continual loss of communication between the MP and the Ice-Machine Control has occurred for a 30 second period. Chiller shall revert to normal (non-ice building) mode regardless of last state. | Info |
| 5FA | Comm Loss: Ice-Making Status | Ice-Machine | Special Mode | Latch | All | Continual loss of communication between the MP and the Ice-Making Status has occurred for a 30 second period. Chiller shall revert to normal (non-ice building) mode regardless of last state. | Info |
| 5F4 | Comm Loss: Intermediate Oil Pressure, Cprsr 1A | Cprsr | Immediate | Latch | All | Continual loss of communication between the MP and the Intermediate Oil Pressure, Cprsr 1A has occurred for a 30 second period. | Remote |
| 5F5 | Comm Loss: Intermediate Oil Pressure, Cprsr 1B | Cprsr | Immediate | Latch | All | Continual loss of communication between the MP and the Intermediate Oil Pressure, Cprsr 1B has occurred for a 30 second period. | Remote |
| 5F6 | Comm Loss: Intermediate Oil Pressure, Cprsr 2A | Cprsr | Immediate | Latch | All | Continual loss of communication between the MP and the Intermediate Oil Pressure, Cprsr 2A has occurred for a 30 second period. | Remote |
| 5F7 | Comm Loss: Intermediate Oil Pressure, Cprsr 2B | Cprsr | Immediate | Latch | All | Continual loss of communication between the MP and the Intermediate Oil Pressure, Cprsr 2B has occurred for a 30 second period. | Remote |
| 69D | Comm Loss: Local BAS Interface | None | Special Mode | Latch | All | Continual loss of communication between the MP and the Local BAS Interface has occurred for a 30 second period. | Remote |
| 5D2 | Comm Loss: Male Port Load Compressor 1A | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Male Port Load Compressor 1A has occurred for a 30 second period. | Remote |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 5D4 | Comm Loss: Male Port Load Compressor 1B | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Male Port Load Compressor 1B has occurred for a 30 second period. | Remote |
| 5D6 | Comm Loss: Male Port Load Compressor 2A | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Male Port Load Compressor 2A has occurred for a 30 second period. | Remote |
| 5D8 | Comm Loss: Male Port Load Compressor 2B | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Male Port Load Compressor 2B has occurred for a 30 second period. | Remote |
| 5D1 | Comm Loss: Male Port Unload Compressor 1A | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Male Port Unload Compressor 1A has occurred for a 30 second period. | Remote |
| 5D3 | Comm Loss: Male Port Unload Compressor 1B | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Male Port Unload Compressor 1B has occurred for a 30 second period. | Remote |
| 5D5 | Comm Loss: Male Port Unload Compressor 2A | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Male Port Unload Compressor 2A has occurred for a 30 second period. | Remote |
| 5D7 | Comm Loss: Male Port Unload Compressor 2B | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Male Port Unload Compressor 2B has occurred for a 30 second period. | Remote |
| 5E5 | Comm Loss: Oil Temperature, Circuit #1 or Cprsr 1A | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Oil Temperature, Circuit #1 or Cprsr 1A has occurred for a 30 second period. | Remote |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 5E6 | Comm Loss: Oil Temperature, Circuit #2 or Cprsr 2A | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Oil Temperature, Circuit #2 or Cprsr 2A has occurred for a 30 second period. | Remote |
| 696 | Comm Loss: Oil Temperature, Cprsr 1B | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Oil Temperature, Cprsr 1B has occurred for a 30 second period. | Remote |
| 697 | Comm Loss: Oil Temperature, Cprsr 2B | Cprsr | Normal | Latch | All | Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. | Remote |
| 5E2 | Comm Loss: Outdoor Air Temperature | Chiller | Normal | Latch | All | Continual loss of communication between the MP and the Outdoor Air Temperature has occurred for a 30 second period. Note that if this diagnostic occurs, operational pumpdown will be performed regardless of the last valid temperature | Remote |
| 690 | Comm Loss: Starter 1A | Cprsr | Immediate | Latch | All | Continual loss of communication between the MP and the Starter 1A has occurred for a 30 second period. | Local |
| 691 | Comm Loss: Starter 1B | Cprsr | Immediate | Latch | All | Continual loss of communication between the MP and the tarter 1B has occurred for a 30 second period. | Local |
| 692 | Comm Loss: Starter 2A | Cprsr | Immediate | Latch | All | Continual loss of communication between the MP and the Starter 2A has occurred for a 30 second period. | Local |
| 693 | Comm Loss: Starter 2B | Cprsr | Immediate | Latch | All | Continual loss of communication between the MP and the Starter 2B ID has occurred for a 30 second period. | Local |
| 6AB | Comm Loss: Starter Panel High Temperature Limit - Panel 1, Cprsr 2A | None | Info | Latch | All | Continual loss of communication between the MP and the Starter Panel High Temperature Limit - Panel 1, Cprsr 2A has occurred for a 30 second period. | Remote |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 6AC | Comm Loss: Starter Panel High Temperature Limit - Panel 1, Cprsr 1B | None | Info | Latch | All | Continual loss of communication between the MP and the Starter Panel High Temperature Limit - Panel 1, Cprsr 1B has occurred for a 30 second period. | Remote |
| 6AD | Comm Loss: Starter Panel High Temperature Limit - Panel 2, Cprsr 2B | None | Info | Latch | All | Continual loss of communication between the MP and the Starter Panel High Temperature Limit - Panel 2, Cprsr 2B has occurred for a 30 second period. | Remote |
| 6A0 | Comm Loss: Status/ Annunciation Relays | None | Info | Latch | All | Continual loss of communication between the MP and the Status/Annunciation Relays has occurred for a 30 second period. | Remote |
| 5FB | Comm Loss: Suction Pressure Cprsr 1A | Special | Immediate | Latch | All | Continual loss of communication between the MP and the Suction Pressure Cprsr 1A has occurred for a 30 second period. Circuit target if no isolation valves, Compressor target if isolation valves or simplex. Design Note: In the case of manifolded compressors w/o isolation valves, the occurrence of this diagnostic will also generate a comm loss with the nonexistent Suction | Remote |
| 5FC | Comm Loss: Suction Pressure Cprsr 1B | Cprsr | Immediate | Latch | All | See Comm Loss: Suction Pressure Cprsr 1A. | Remote |
| 5FD | Comm Loss: Suction Pressure Cprsr 2A | Special | Immediate | Latch | All | See Comm Loss: Suction Pressure Cprsr 1A. | Remote |

Table 14-1: Diagnostics

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 5FE | Comm Loss: Suction Pressure Cprsr 2B | Cprsr | Immediate | Latch | All | See Comm Loss: Suction Pressure Cprsr 1A. | Remote |
| 2A1 | Condenser Fan Variable Speed Drive Fault - Circuit 1 (Drive 1) | All inverters on this circuit | Special Mode | Latch | Prestart and Running w/ Variable Spd Fan enabled | The MP has received a fault signal from the respective condenser fan Variable Speed Inverter Drive, and unsuccessfully attempted (5 times within 1 minute of each other) to clear the fault. The 4th attempt removes power from the inverter to create a power up reset. If the fault does not clear, the MP will revert to constant speed operation without the use of the inverter's fan. The inverter must be manually bypassed, and fan outputs rebound, for full fixed speed fan operation. | Remote |
| 5B4 | Condenser Fan Variable Speed Drive Fault - Circuit 1 (Drive 2) | All inverters on this circuit | Special Mode | Latch | Prestart and Running w/ Variable Spd Fan enabled | See Condenser Fan Variable Speed Drive Fault - Circuit 1 (Drive 1) | Remote |
| 2A2 | Condenser Fan Variable Speed Drive Fault - Circuit 2 (Drive 1) | All inverters on this circuit | Special Mode | Latch | Prestart and Running w/ Variable Spd Fan enabled | See Condenser Fan Variable Speed Drive Fault - Circuit 1 (Drive 1) | Remote |
| 5B5 | Condenser Fan Variable Speed Drive Fault - Circuit 2 (Drive 2) | All inverters on this circuit | Special Mode | Latch | Prestart and Running w/ Variable Spd Fan enabled | See Condenser Fan Variable Speed Drive Fault - Circuit 1 (Drive 1) | Remote |
| 5B8 | Condenser Refrigerant Pressure Transducer - Circuit 1 | Circuit | Immediate | Latch | All | Bad Sensor or LLID | Remote |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 5B9 | Condenser Refrigerant Pressure Transducer - Circuit 2 | Circuit | Immediate | Latch | All | Bad Sensor or LLID | Remote |
| FD | Emergency Stop | Chiller | Immediate | Latch | All | a. EMERGENCY STOP input is open. An external interlock has tripped. Time to trip from input opening to unit stop shall be 0.1 to 1.0 seconds. | Local |
| 8E | Evaporator Entering Water Temperature Sensor | Chilled Water Reset | Info | Latch | All | Bad Sensor or LLID a. Normal operation, no effects on control. b. Chiller shall remove any Return or Constant Return Chilled Water Reset, if it was in effect. Apply slew rates per Chilled Water Reset spec. | Info |
| AB | Evaporator Leaving Water Temperature Sensor | Chiller | Normal | Latch | All | Bad Sensor or LLID | Remote |
| 27D | Evaporator Liquid Level Sensor - Circuit 1 | Circuit | Immediate | Latch | All | Bad Sensor or LLID | Remote |
| 3F9 | Evaporator Liquid Level Sensor - Circuit 2 | Circuit | Immediate | Latch | All | Bad Sensor or LLID | Remote |
| 6B9 | Evaporator Rfgt Drain - Circuit 1 | Circuit | NA | Latch | Circuit non-running modes [Drain Valve commanded closed] | This diagnostic is effective only with Remote Evap units. The liquid level of the respective evaporator was not seen to be below the level of -21.2 mm within 5 minutes of the commanded opening of its Drain Valve Solenoid. The diagnostic will not be active if the drain valve is commanded closed. | Remote |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 6BA | Evaporator Rfgt Drain - Circuit 2 | Circuit | NA | Latch | Circuit non-running modes [Drain Valve commanded closed | See Evaporator Rfgt Drain - Circuit 1 | Remote |
| ED | Evaporator Water Flow Lost | Chiller | Immediate | NonLatch | [All Stop modes] | a. The chilled water flow switch input was open for more than 6-10 contiguous seconds. b. This diagnostic does not de-energize the evap pump output c. 6-10 seconds of contiguous flow shall clear this diagnostic. d. Even though the pump times out in the STOP modes, this diagnostic shall not be called out in the STOP modes. Note that this diagnostic will not light the red diagnostic light on the EZ View display. | N/A |
| 384 | Evaporator Water Flow Overdue | Chiller | Normal | NonLatch | Estab. Evap. Water Flow on going from STOP to AUTO. | Evaporator water flow was not proven within 4.25 minutes of the Chilled water pump relay being energized. With Software Rev 17.0 and earlier, the diagnostic will de-energize the Chilled Water Pump output. It will be re-energized if the diagnostic clears with the return of flow and the chiller will be allowed to restart normally (to accommodate external control of pump) With Software Rev 18.0 and later, the pump command status will not be effected. Note that this diagnostic will not light the red diagnostic light on the EZ View display. | Remote |
| 5C4 | Excessive Loss of Comm | Chiller | Immediate | Latch | All | Loss of comm with 10% or more of the LLIDs configured for the system has been detected. This diagnostic will suppress the callout of all subsequent comm loss diagnostics. Check power supply(s) and power disconnects - troubleshoot LLIDs buss using TechView | Remote |
| 87 | External Chilled Water Setpoint | None | Info | NonLatch | All | a. Function Not "Enabled": no diagnostics. b. "Enabled ": Out-Of-Range Low or Hi or bad LLID, set diagnostic, default CWS to next level of priority (e.g. Front Panel SetPoint). This Info diagnostic will automatically reset if the input returns to the normal range. | Info |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 89 | External Current Limit Setpoint | None | Info | NonLatch | All | a. Not "Enabled": no diagnostics. b. "Enabled ": Out-Of-Range Low or Hi or bad LLID, set diagnostic, default CLS to next level of priority (e.g. Front Panel SetPoint. This Info diagnostic will automatically reset if the input returns to the normal range. | Info |
| 1C6 | High Differential Refrigerant Pressure - Circuit 1 | Circuit | Normal | Latch | Cprsr Energized | The system differential pressure for the respective circuit was above 275 Psid for 2 consecutive samples or more than 10 seconds. | Remote |
| 1C7 | High Differential Refrigerant Pressure - Circuit 2 | Circuit | Normal | Latch | Cprsr Energized | See High Differential Refrigerant Pressure - Circuit 1 | Remote |
| 584 | High Evaporator Liquid Level - Circuit 1 | Circuit | Normal | Latch | Starter Contactor Energized [all Stop modes] | The liquid level sensor is seen to be at or near its high end of range for 80 contiguous minutes while the compressor is running. (The diagnostic timer will hold, but not clear when the circuit is off). Design: 80% or more of bit count corresponding to +.8 mm or more liquid level for 80 minutes) | Remote |
| 5B7 | High Evaporator Liquid Level - Circuit 2 | Circuit | Normal | Latch | Starter Contactor Energized [all Stop modes] | See High Evaporator Liquid Level - Circuit 1 | . Remote |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 6B8 | High Evaporator Refrigerant Pressure | Chiller | Immediate | NonLatch | All | The evaporator refrigerant pressure of either circuit has risen above 190 psig. The evaporator water pump relay will be de-energized to stop the pump regardless of why the pump is running. The diagnostic will auto reset and the pump will return to normal control when all of the evaporator pressures fall below 185 psig. This diagnostic has severity of Immediate because if an evaporator pressure reads high without being invalid, the pump would be shut off but the chiller could keep running. Evap water flow diagnostics are not active if the pump is commanded off, only if the pump is commanded on but flow does not occur as expected. | Remote |
| 1DD | High Oil Temperature - Compressor 1A | Cprsr 1A | Immediate | Latch | All | The respective oil temperature as supplied to the compressor, exceeded 200°F for 2 consecutive samples or for over 10 seconds. Note: As part of the Compressor High Temperature Limit Mode (aka Minimum Limit), the running compressor's female load step will be forced loaded when its oil temperature exceeds 190F and returned to normal control when the oil temperature falls below 170°F. | |
| 1DF | High Oil Temperature - Compressor 2A | Cprsr 2A | Immediate | Latch | All | See High Oil Temperature -Compressor 1A | |
| 1DE | High Oil Temperature - Compressor 1B | Cprsr 1B | Immediate | Latch | All | See High Oil Temperature -Compressor 1A | |
| 1E0 | High Oil Temperature - Compressor 2B | Cprsr 2B | Immediate | Latch | All | See High Oil Temperature -Compressor 1A | |
| F5 | High Pressure Cutout - Compressor 1A | Circuit | Immediate | Latch | All | A high pressure cutout was detected on Compressor 1A; trip at 315 ± 5 PSIG. Note: Other diagnostics that may occur as an expected consequence of the HPC trip will be suppressed from annunciation. These include Phase Loss, Power Loss, and Transition Complete Input Open. | Local |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| F6 | High Pressure Cutout - Compressor 1B | Circuit | Immediate | Latch | All | See High Pressure Cutout - Compressor 1A | Local |
| BE | High Pressure Cutout - Compressor 2A | Circuit | Immediate | Latch | All | See High Pressure Cutout - Compressor 1A | Local |
| BF | High Pressure Cutout - Compressor 2B | Circuit | Immediate | Latch | All | See High Pressure Cutout - Compressor 1A | Local |
| 5BE | Intermediate Oil Pressure Transducer - Compressor 1A | Cprsr 1A | Immediate | Latch | All | Bad Sensor or LLID | Remote |
| 5BF | Intermediate Oil Pressure Transducer - Compressor 1B | Cprsr 1B | Immediate | Latch | All | Bad Sensor or LLID | Remote |
| 5C0 | Intermediate Oil Pressure Transducer - Compressor 2A | Cprsr 2A | Immediate | Latch | All | Bad Sensor or LLID | Remote |
| 5C1 | Intermediate Oil Pressure Transducer - Compressor 2B | Cprsr 2B | Immediate | Latch | All | Bad Sensor or LLID | Remote |
| C5 | Low Chilled Water Temp: Unit Off | Evap Pump | Special Mode | NonLatch | Unit in Stop Mode, or in Auto Mode and No Ckt(s) Energzd [Any Ckt Energzd] | The leaving chilled water temp. fell below the leaving water temp cutout setting for 30 degree F seconds while the Chiller is in the Stop mode, or in Auto mode with no compressors running. Energize Evap Water pump Relay until diagnostic auto resets, then return to normal evap pump control. Automatic reset occurs when the temp rises 2°F (1.1°C) above the cutout setting for 30 minutes. | Info |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| C6 | Low Chilled Water Temp: Unit On | Chiller | Immediate and Special Mode | NonLatch | Any Ckt[s] Energzd [No Ckt(s) Energzd] | The chilled water temp. fell below the cutout setpoint for 30 degree F Seconds while the compressor was running. Automatic reset occurs when the temperature rises 2 °F (1.1°C) above the cutout setting for 2 minutes. This diagnostic shall not de-energize the Evaporator Water Pump Output. | Remote |
| 1AE | Low Differential Refrigerant Pressure - Circuit 1 | Circuit | Immediate | Latch | Cprsr Energized | The system differential pressure for the respective circuit was below 35 Psid for more than 2000 Psid-sec with either a 1 minute (single cprsr circuit) or 2.5 minute (manifolded cprsr circuit) ignore time from the start of the circuit. | Remote |
| 1AF | Low Differential Refrigerant Pressure - Circuit 2 | Circuit | Immediate | Latch | Cprsr Energized | See Low Differential Refrigerant Pressure - Circuit 1 | Remote |
| 583 | Low Evaporator Liquid Level - Circuit 1 | None | Info | NonLatch | Starter Contactor Energized [all Stop modes] | The liquid level sensor is seen to be at or near its low end of range for 80 contiguous minutes while the compressor is running. Design: 20% or less of bit count corresponding to -.8 in or less liquid level for 80 minutes) | Remote |
| 5B6 | Low Evaporator Liquid Level - Circuit 2 | None | Info | NonLatch | Starter Contactor Energized [all Stop modes] | See Low Evaporator Liquid Level - Circuit 1 | Remote |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 194 or FB | Low Evaporator Refrigerant Temperature - Circuit 1 | Circuit | Immediate | Latch | All Ckt Running Modes | a. The inferred Saturated Evap Refrigerant Temperature (calculated from suction pressure transducer(s)) dropped below the Low Refrigerant Temperature Cutout Setpoint for 120°F-sec (8°F-sec max rate) while the circuit was running after the ignore period had expired. The integral is held at zero for the ignore time (which is a function of outdoor air temp) following the circuit startup and the integral will be limited to never trip in less than 15 seconds, i.e. the error term shall be clamped to 8°F. The minimum LRTC setpoint is -5°F (18.7 Psia) the point at which oil separates from the refrigerant. b. During the timeout of the trip integral, the unload solenoid(s) of the running compressors on the circuit, shall be energized continuously. Normal load/unload operation will be resumed if the trip integral is reset by return to temps above the cutout setpoint. | Remote |
| 195 | Low Evaporator Refrigerant Temperature - Circuit 2 | Circuit | Immediate | Latch | All Ckt Running Modes | See Low Evaporator Refrigerant Temperature - Circuit 1 | Remote |
| 6B3 | Low Evaporator Temp - Ckt 1: Unit Off | Evap Pump | Special Mode | NonLatch | Unit in Stop Mode, or in Auto Mode and No Ckt's Energzd [Any Ckt Energzd] | Any of the evap sat temps fell below the water temp cutout setting while the respective evap liquid level was greater than -21.2mm for 30 degree F seconds while Chiller is in the Stop mode, or in Auto mode with no compressors running. Energize Evap Water pump Relay until diagnostic auto resets, then return to normal evap pump control. Automatic reset occurs when either the evap temp rises 2°F (1.1°C) above the cutout setting or the liquid level falls below -.8 in for 30 minutes | |
| 6B3 | Low Evaporator Temp - Ckt 2: Unit Off | Evap Pump | Special Mode | NonLatch | Unit in Stop Mode, or in Auto Mode and No Ckt's Energzd [Any Ckt Energzd] | See Low Evaporator Temp - Ckt 1: Unit Off | |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 198 | Low Oil Flow - Compressor 1A | Cprsr | Immediate | Latch | Cprsr Energized and Delta P above 35 Psid | The intermediate oil pressure transducer for this compressor was out of the acceptable pressure range for 15 seconds, while the Delta Pressure was greater than 35 Psid.: Acceptable range is 0.50 > (PC-PI) / (PC-PE) for the first 2.5 minutes of operation, and 0.25 > (PC-PI) / (PC-PE) thereafter, | Local |
| 199 | Low Oil Flow - Compressor 1B | Cprsr | Immediate | Latch | Cprsr Energized and Delta P above 35 Psid | See Low Oil Flow - Compressor 1A | Local |
| 19A | Low Oil Flow - Compressor 2A | Cprsr | Immediate | Latch | Cprsr Energized and Delta P above 35 Psid | See Low Oil Flow - Compressor 1A | Local |
| 19B | Low Oil Flow - Compressor 2B | Cprsr | Immediate | Latch | Cprsr Energized and Delta P above 35 Psid | See Low Oil Flow - Compressor 1A | Local |
| B5 | Low Suction Refrigerant Pressure - Circuit 1 | Circuit | Immediate | Latch | Cprsr Prestart and Cprsr Energized | a. The Suction Refrigerant Pressure (or either of the compressor suction pressures) dropped below 10 Psia just prior to compressor start (after EXV preposition). b. The pressure fell below 16 Psia while running after the ignore time had expired, or fell below 5 Psia before the ignore time had expired. The ignore time is function of outdoor air temperature. Note: Part b. is identical to Low Evaporator Refrigerant Temperature diagnostic except for the trip integral and trip point settings. | Local |
| B6 | Low Suction Refrigerant Pressure - Circuit 2 | Circuit | Immediate | Latch | Cprsr Prestart and Cprsr Energized | See Low Suction Refrigerant Pressure - Circuit 1 | Local |
| B7 | Low Suction Refrigerant Pressure - Cprsr 1B | Circuit | Immediate | Latch | Cprsr Prestart and Cprsr Energized | See Low Suction Refrigerant Pressure - Circuit 1 | Local |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| B8 | Low Suction Refrigerant Pressure - Cprsr 2B | Circuit | Immediate | Latch | Cprsr Prestart and Cprsr Energized | See Low Suction Refrigerant Pressure - Circuit 1 | Local |
| 1AD | MP Application Memory CRC Error | Chiller | Immediate | Latch | All Modes | | Remote |
| 6A1 | MP: Could not Store Starts and Hours | None | Info | Latch | All | MP has determined there was an error with the previous power down store. Starts and Hours may have been lost for the last 24 hours. | NA |
| 5FF | MP: Invalid Configuration | None | Immediate | Latch | All | MP has an invalid configuration based on the current software installed | NA |
| 6A2 | MP: Non-Volatile Block Test Error | None | Info | Latch | All | MP has determined there was an error with a block in the Non-Volatile memory. Check settings. | NA |
| 69C | MP: Non-Volatile Memory Reformat | None | Info | Latch | All | MP has determined there was an error in a sector of the Non-Volatile memory and it was reformatted. Check settings. | NA |
| D9 | MP: Reset Has Occurred | None | Info | NonLatch | All | The main processor has successfully come out of a reset and built its application. A reset may have been due to a power up, installing new software or configuration. This diagnostic is immediately and automatically cleared and thus can only be seen in the Historic Diagnostic List in TechView | Remote |
| 1E1 | Oil Flow Protection Fault - Compressor 1A | Circuit | Immediate | Latch | Starter Contactor Energized [all Stop modes] | The Intermediate Oil Pressure Transducer for this cprsr is reading a pressure either above its respective circuit's Condenser Pressure by 15 Psia or more, or below its respective Suction Pressure 10 Psia or more for 30 continuous seconds. | Local |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 1E2 | Oil Flow Protection Fault - Compressor 1B | Circuit | Immediate | Latch | Starter Contactor Energized [all Stop modes] | See Oil Flow Protection Fault - Compressor 1B | Local |
| 5A0 | Oil Flow Protection Fault - Compressor 2A | Circuit | Immediate | Latch | Starter Contactor Energized [all Stop modes] | See Oil Flow Protection Fault - Compressor 1B | Local |
| 5A1 | Oil Flow Protection Fault - Compressor 2B | Circuit | Immediate | Latch | Starter Contactor Energized [all Stop modes] | See Oil Flow Protection Fault - Compressor 1B | Local |
| 1E6 | Oil Temperature Sensor - Cprsr 1B | Circuit | Normal | Latch | All | Bad Sensor or LLID | Remote |
| 1E8 | Oil Temperature Sensor - Cprsr 2B | Circuit | Normal | Latch | All | Bad Sensor or LLID | Remote |
| 1E5 | Oil Temperature Sensor -Cprsr 1A | Circuit | Normal | Latch | All | Bad Sensor or LLID | Remote |
| 1E7 | Oil Temperature Sensor -Cprsr 2A | Circuit | Normal | Latch | All | Bad Sensor or LLID | Remote |
| A1 | Outdoor Air Temperature Sensor | Chiller | Normal | Latch | All | Bad Sensor or LLID. Note that if this diagnostic occurs, operational pumpdown will be performed regardless of the last valid temperature | Remote |
| D7 | Over Voltage | Chiller | Normal | NonLatch | Pre-Start and Any Ckt(s) Energzd | Nom. trip: 60 seconds at greater than 112.5%, + /- 2.5%, Auto Reset at 109% or less. | Remote |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| BA or EC | Overload Trip - Compressor 1A | Circuit | Immediate | Latch | Cprsr Energized | Compressor current exceeded overload time vs. trip characteristic. For A/C products Must trip = 140% RLA, Must hold=125%, nominal trip 132.5% in 30 seconds | Local |
| BB | Overload Trip - Compressor 1B | Circuit | Immediate | Latch | Cprsr Energized | See Overload Trip - Compressor 1A | Local |
| BC | Overload Trip - Compressor 2A | Circuit | Immediate | Latch | Cprsr Energized | See Overload Trip - Compressor 1A | Local |
| BD | Overload Trip - Compressor 2B | Circuit | Immediate | Latch | Cprsr Energized | See Overload Trip - Compressor 1A | Local |
| 19C | Phase Loss - Compressor 1A | Cprsr | Immediate | Latch | Start Sequence and Run modes | a.) No current was sensed on one or two of the current transformer inputs while running or starting (See Nonlatching Power Loss Diagnostic for all three phases lost while running). Must hold = 20% RLA. Must trip = 5% RLA. Time to trip shall be longer than guaranteed reset on Starter Module at a minimum, 3 seconds maximum. Actual design trip point is 10%. The actual design trip time is 2.64 seconds. b.) If Phase reversal protection is enabled and current is not sensed on one or more current Transformer inputs. Logic will detect and trip in a maximum of 0.3 second from compressor start. | Local |
| 19D | Phase Loss - Compressor 1B | Cprsr | Immediate | Latch | Start Sequence and Run modes | See Phase Loss - Compressor 1A | Local |
| 19E | Phase Loss - Compressor 2A | Cprsr | Immediate | Latch | Start Sequence and Run modes | See Phase Loss - Compressor 1A | Local |
| 19F | Phase Loss - Compressor 2B | Cprsr | Immediate | Latch | Start Sequence and Run modes | See Phase Loss - Compressor 1A | Local |
| 184 or E5 | Phase Reversal - Compressor 1A | Cprsr | Immediate | Latch | Compressor energized to transition command [All Other Times] | A phase reversal was detected on the incoming current. On a compressor startup the phase reversal logic must detect and trip in a maximum of 0.3 second from compressor start. | Local |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 185 | Phase Reversal - Compressor 1B | Cprsr | Immediate | Latch | Compressor energized to transition command [All Other Times] | See Phase Reversal - Compressor 1A | Local |
| 186 | Phase Reversal - Compressor 2A | Cprsr | Immediate | Latch | Compressor energized to transition command [All Other Times] | See Phase Reversal - Compressor 1A | Local |
| 187 | Phase Reversal - Compressor 2B | Cprsr | Immediate | Latch | Compressor energized to transition command [All Other Times] | See Phase Reversal - Compressor 1A | Local |
| 1A0 | Power Loss - Compressor 1A | Cprsr | Immediate | NonLatch | All compressor running modes [all compressor starting and non-running modes] | The compressor had previously established currents while running and then all three phases of current were lost. Design: Less than 10% RLA, trip in 2.64 seconds. This diagnostic will preclude the Phase Loss Diagnostic and the Transition Complete Input Opened Diagnostic from being called out. To prevent this diagnostic from occurring with the intended disconnect of main power, the minimum time to trip must be greater than the guaranteed reset time of the Starter module. Note: This diagnostic prevents nuisance latching diagnostics due to a momentary power loss - It does not protect motor/compressor from uncontrolled power reapplication. See Momentary Power Loss Diagnostic for this protection. This diagnostic is not active during the start mode before the transition complete input is proven. Thus a random power loss during a start would result in either a "Starter Fault Type III" or a "Starter Did Not Transition" latching diagnostic. | Remote |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 1A1 | Power Loss - Compressor 1B | Cprsr | Immediate | NonLatch | All compressor running modes [all compressor starting and non-running modes | See Power Loss - Compressor 1A | Remote |
| 1A2 | Power Loss - Compressor 2A | Cprsr | Immediate | NonLatch | All compressor running modes [all compressor starting and non-running modes] | See Power Loss - Compressor 1A | Remote |
| 1A3 | Power Loss - Compressor 2B | Cprsr | Immediate | NonLatch | All compressor running modes [all compressor starting and non-running modes] | See Power Loss - Compressor 1A | Remote |
| 8C | Pumpdown Terminated - Circuit 1 | None | Info | NonLatch | Pumpdown Mode | The pumpdown cycle for this circuit was terminated abnormally due to excessive time or on an immediate shutdown diagnostic | Info |
| 8D | Pumpdown Terminated - Circuit 2 | None | Info | NonLatch | Pumpdown Mode | See Pumpdown Terminated - Circuit 1 | Info |
| 1B2 | Severe Phase Unbalance - Compressor 1A | Circuit | Immediate | Latch | All Running Modes | A 30% Phase Current Unbalance has been detected on one phase relative to the average of all 3 phases for 90 continuous seconds. | Local |
| 1B3 | Severe Phase Unbalance - Compressor 1B | Circuit | Immediate | Latch | All Running Modes | See Severe Phase Unbalance - Compressor 1A | Local |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 1B4 | Severe Phase Unbalance - Compressor 2A | Circuit | Immediate | Latch | All Running Modes | See Severe Phase Unbalance - Compressor 1A | Local |
| 1B5 | Severe Phase Unbalance - Compressor 2B | Circuit | Immediate | Latch | All Running Modes | See Severe Phase Unbalance - Compressor 1A | Local |
| 5CD | Starter 1A Comm Loss: MP | Cprsr | Immediate | Latch | All | Starter has had a loss of communication with the MP for a 15 second period. | Local |
| 6A7 | Starter 1A Dry Run Test | Cprsr | Immediate | Latch | Starter Dry Run Mode | While in the Starter Dry Run Mode either 50 % Line Voltage was sensed at the Potential Transformers or 10 % RLA Current was sensed at the Current Transformers. | Local |
| 5CE | Starter 1B Comm Loss: MP | Cprsr | Immediate | Latch | All | Starter has had a loss of communication with the MP for a 15 second period. | Local |
| 6A8 | Starter 1B Dry Run Test | Cprsr | Immediate | Latch | Starter Dry Run Mode | See Starter 1A Dry Run Test | Local |
| 5CF | Starter 2A Comm Loss: MP | Cprsr | Immediate | Latch | All | Starter has had a loss of communication with the MP for a 15 second period. | Local |
| 6A9 | Starter 2A Dry Run Test | Cprsr | Immediate | Latch | Starter Dry Run Mode | See Starter 1A Dry Run Test | Local |
| 5D0 | Starter 2B Comm Loss: MP | Cprsr | Immediate | Latch | All | Starter has had a loss of communication with the MP for a 15 second period. | Local |
| 6AA | Starter 2B Dry Run Test | Cprsr | Immediate | Latch | Starter Dry Run Mode | See Starter 1A Dry Run Test | Local |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| CC | Starter Contactor Interrupt Failure - Compressor 2A | Chiller | Special Mode | Latch | Starter Contactor not Energized [Starter Contactor Energized] | Detected compressor currents greater than 10% RLA on any or all phases when the compressor was commanded off. Detection time shall be 5 second minimum and 10 seconds maximum. On detection and until the controller is manually reset: generate diagnostic, energize the appropriate alarm relay, continue to energize the Evap Pump Output, continue to command the affected compressor off, fully unload the effected compressor and command a normal stop to all other compressors. For as long as current continues, perform liquid level and fan control on the circuit effected. | Local |
| CA | Starter Contactor Interrupt Failure - Compressor 1A | Chiller | Special Mode | Latch | Starter Contactor not Energized [Starter Contactor Energized] | See Starter Contactor Interrupt Failure - Compressor 2A | Local |
| CB | Starter Contactor Interrupt Failure - Compressor 1B | Chiller | Special Mode | Latch | Starter Contactor not Energized [Starter Contactor Energized] | See Starter Contactor Interrupt Failure - Compressor 2A | Local |
| CD | Starter Contactor Interrupt Failure - Compressor 2B | Chiller | Special Mode | Latch | Starter Contactor not Energized [Starter Contactor Energized] | See Starter Contactor Interrupt Failure - Compressor 2A | Local |
| 180 or F0 | Starter Did Not Transition - Compressor 1A | Cprsr | Immediate | Latch | On the first check after transition. | The Starter Module did not receive a transition complete signal in the designated time from its command to transition. The must hold time from the Starter Module transition command is 1 second. The Must trip time from the transition command is 6 seconds. Actual design is 2.5 seconds. This diagnostic is active only for Y-Delta, X-Line Starters. | Local |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 181 | Starter Did Not Transition - Compressor 1B | Cprsr | Immediate | Latch | On the first check after transition. | See Starter Did Not Transition Compressor 1A | Local |
| 182 | Starter Did Not Transition - Compressor 2A | Cprsr | Immediate | Latch | On the first check after transition. | See Starter Did Not Transition Compressor 1A | Local |
| 183 | Starter Did Not Transition - Compressor 2B | Cprsr | Immediate | Latch | On the first check after transition. | See Starter Did Not Transition Compressor 1A | Local |
| 6A3 | Starter Failed to Arm/Start - Cprsr 1A | Cprsr | Info | Latch | All | Starter failed to arm or start within the allotted time (15 seconds). | NA |
| 6A4 | Starter Failed to Arm/Start - Cprsr 1B | Cprsr | Info | Latch | All | Starter failed to arm or start within the allotted time (15 seconds). | NA |
| 6A5 | Starter Failed to Arm/Start - Cprsr 2A | Cprsr | Info | Latch | All | Starter failed to arm or start within the allotted time (15 seconds). | NA |
| 6A6 | Starter Failed to Arm/Start - Cprsr 2B | Cprsr | Info | Latch | All | Starter failed to arm or start within the allotted time (15 seconds). | NA |
| 1E9 | Starter Fault Type I - Compressor 1A | Cprsr | Immediate | Latch | Starting - Y Delta Starters Only | This is a specific starter test where 1M is closed first and a check is made to ensure that there are no currents detected by the CT's. If currents are detected when only 1M is closed first at start, then one of the other contactors is shorted. | Local |
| 1EA | Starter Fault Type I - Compressor 1B | Cprsr | Immediate | Latch | Starting - Y Delta Starters Only | See Starter Fault Type I - Compressor 1. | Local |
| 1EB | Starter Fault Type I - Compressor 2A | Cprsr | Immediate | Latch | Starting - Y Delta Starters Only | See Starter Fault Type I - Compressor 1. | Local |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 1EC | Starter Fault Type I - Compressor 2B | Cprsr | Immediate | Latch | Starting - Y Delta Starters Only | See Starter Fault Type I - Compressor 1. | Local |
| 1ED | Starter Fault Type II - Compressor 1A | Cprsr | Immediate | Latch | Starting All types of starters | a. This is a specific starter test where the Shorting Contactor is individually energized and a check is made to ensure that there are no currents detected by the CT's. If current is detected when only Shorting is energized at Start, then 1M is shorted. b. This test in a. above applies to all forms of starters | Local |
| 1EE | Starter Fault Type II - Compressor 1B | Cprsr | Immediate | Latch | Starting - All types of starters | See Starter Fault Type II - Compressor 1. | Local |
| 1EF | Starter Fault Type II - Compressor 2A | Cprsr | Immediate | Latch | Starting - All types of starters | See Starter Fault Type II - Compressor 1. | Local |
| 1F0 | Starter Fault Type II - Compressor 2B | Cprsr | Immediate | Latch | Starting - All types of starters | See Starter Fault Type II - Compressor 1. | Local |
| 1F1 | Starter Fault Type III - Compressor 1A | Cprsr | Immediate | Latch | Starting [Adaptive Frequency Starter Type] | As part of the normal start sequence to apply power to the compressor, the Shorting Contactor (S) and then the Main Contactor (1M) were energized. 1.6 seconds later there were no currents detected by the CT's for the last 1.2 Seconds on all three phases. The test above applies to all forms of starters except Adaptive Frequency Drives. | Local |
| 1F2 | Starter Fault Type III - Compressor 1B | Cprsr | Immediate | Latch | Starting [Adaptive Frequency Starter Type] | See Starter Fault Type III - Compressor 1A. | Local |
| 1F3 | Starter Fault Type III - Compressor 2A | Cprsr | Immediate | Latch | Starting [Adaptive Frequency Starter Type] | See Starter Fault Type III - Compressor 1A. | Local |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 1F4 | Starter Fault Type III - Compressor 2B | Cprsr | Immediate | Latch | Starting [Adaptive Frequency Starter Type] | See Starter Fault Type III - Compressor 1A. | Local |
| 5C7 | Starter Module Memory Error Type 1 - Starter 2A | None | Info | Latch | All | Checksum on RAM copy of the Starter LLID configuration failed. Configuration recalled from EPROM. | Local |
| 5C8 | Starter Module Memory Error Type 1 - Starter 2B | None | Info | Latch | All | See Starter Module Memory Error Type 1 - Starter 2A | Local |
| 5C5 | Starter Module Memory Error Type 1Starter 1A | None | Info | Latch | All | See Starter Module Memory Error Type 1 - Starter 2A | Local |
| 5C6 | Starter Module Memory Error Type 1-Starter 1B | None | Info | Latch | All | See Starter Module Memory Error Type 1 - Starter 2A | Local |
| 5C9 | Starter Module Memory Error Type 2 - Starter 1A | Cprsr | Immediate | Latch | All | Checksum on EPROM copy of the Starter LLID configuration failed. Factor default values used. | |
| 5CA | Starter Module Memory Error Type 2 - Starter 1B | Cprsr | Immediate | Latch | All | See Starter Module Memory Error Type 2 - Starter 1A | |
| 5CB | Starter Module Memory Error Type 2 - Starter 2A | Cprsr | Immediate | Latch | All | See Starter Module Memory Error Type 2 - Starter 1A | |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 5CC | Starter Module Memory Error Type 2 - Starter 2B | Cprsr | Immediate | Latch | All | See Starter Module Memory Error Type 2 - Starter 1A | |
| 6B1 | Starter Panel High Temperature Limit - Panel 1, Cprsr 1B | Cprsr 1B | Special Mode | NonLatch | All | Starter Panel High Limit Thermostat (170°F) trip was detected. Note: Other diagnostics that may occur as an expected consequence of the Panel High Temp Limit trip will be suppressed from annunciation. These include Phase Loss, Power Loss, and Transition Complete Input Open for Cprsr 1B | |
| 6B0 | Starter Panel High Temperature Limit - Panel 1, Cprsr 2A | Cprsr 2A | Special Mode | NonLatch | All | See Starter Panel High Temperature Limit - Panel 1, Cprsr 1B | |
| 6B2 | Starter Panel High Temperature Limit - Panel 2, Cprsr 2B | Cprsr 2B | Special Mode | NonLatch | All | See Starter Panel High Temperature Limit - Panel 1, Cprsr 1B | |
| 5BA | Suction Refrigerant Pressure Transducer - Circuit 1, Compressor 1A | Special | Immediate | Latch | All | Bad Sensor or LLID. Design Note: For circuits with manifolded compressors w/o isolation valve option, this diagnostic will occur with the preceeding diagnostic, even though this transducer is not required or installed. | Remote |
| 5BB | Suction Refrigerant Pressure Transducer - Circuit 1, Compressor 1B | Cprsr 1B | Immediate | Latch | All | See Suction Refrigerant Pressure Transducer - Circuit 1, Compressor 1A. | Remote |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 5BC | Suction Refrigerant Pressure Transducer - Circuit 2, Compressor 2A | Special | Immediate | Latch | All | Bad Sensor or LLID Circuit target if no isolation valves, Compressor target if isolation valves. Design Note: In the case of manifolded compressors w/o isolation valves, the occurrence of this diagnostic will also generate a comm loss with the nonexistent Suction Press Cprsr 2B in order to accomplish circuit shutdown. | Remote |
| 5BD | Suction Refrigerant Pressure Transducer - Circuit 2, Compressor 2B | Cprsr 2B | Immediate | Latch | All | See Suction Refrigerant Pressure Transducer - Circuit 1, Compressor 1A. | Remote |
| 5B0 | Transition Complete Input Opened - Compressor 1A | Cprsr | Immediate | Latch | All running modes | The Transition Complete input was found to be opened with the compressor motor running after a successful completion of transition. This is active only for Y-Delta, Auto-Transformer, Primary Reactor, and X-Line Starters. To prevent this diagnostic from occurring as the result of a power loss to the contactors, the minimum time to trip must be greater than the trip time for the power loss diagnostic. | Local |
| 5B1 | Transition Complete Input Opened - Compressor 1B | Cprsr | Immediate | Latch | All running modes | See Transition Complete Input Opened - Compressor 1A. | Local |
| 5B2 | Transition Complete Input Opened - Compressor 2A | Cprsr | Immediate | Latch | All running modes | See Transition Complete Input Opened - Compressor 1A. | Local |
| 5B3 | Transition Complete Input Opened - Compressor 2B | Cprsr | Immediate | Latch | All running modes | See Transition Complete Input Opened - Compressor 1A. | Local |

**Table 14-1: Diagnostics**

| Hex Code | Diagnostic Name and Source | Effects Target | Severity | Persistence | Active Modes [Inactive Modes] | Criteria | Reset Level |
|---|---|---|---|---|---|---|---|
| 5AC | Transition Complete Input Shorted - Compressor 1A | Cprsr | Immediate | Latch | Pre-Start | The Transition Complete input was found to be shorted before the compressor was started. This is active for all electromechanical starters. | Local |
| 5AD | Transition Complete Input Shorted - Compressor 1B | Cprsr | Immediate | Latch | Pre-Start | See Transition Complete Input Shorted - Compressor 1A | Local |
| 5AE | Transition Complete Input Shorted - Compressor 2A | Cprsr | Immediate | Latch | Pre-Start | See Transition Complete Input Shorted - Compressor 1A | Local |
| 5AF | Transition Complete Input Shorted - Compressor 2B | Cprsr | Immediate | Latch | Pre-Start | See Transition Complete Input Shorted - Compressor 1A | Local |
| D8 | Under Voltage | Chiller | Normal | NonLatch | Pre-Start and Any Ckt(s) Energzd | Nom. trip: 60 seconds at less than 87.5%, +/ - 2.8% at 200V or + or - 1.8% at 575V, Auto Reset at 90% or greater. | Remote |
| 771 | Very Low Evaporator Refrigerant Pressure - Circuit 1 | Chiller | Immediate | Latch | All [compressor or circuit in manual lockout | The evaporator pressure dropped below 5 psia regardless of whether or not compressors are running on that circuit. This diagnostic was created to prevent compressor failures due to crossbinding by forcing an entire chiller shutdown. If a given compressor or circuit is locked out, the suction pressure transducer(s) associated with it, will be excluded from causing this diagnostic. | Local |
| 772 | Very Low Evaporator Refrigerant Pressure - Circuit 2 | Chiller | Immediate | Latch | All | See Very Low Evaporator Refrigerant Pressure - Circuit 1. | Local |

TRANE

# Diagnostic Table

## 14-4.Main Processor Boot Messages and Diagnostics

These messages indicate either normal operation during power up of the Main Processor, or callout specific problems or failures with either the configuration data (as written by the Factory or the TechView Service Tool) or problems with the Main Processor itself.

**Table 14-2: Boot messages and Diagnostics**

| DynaView Display Message | **EasyView Display Code** | **Description Troubleshooting** |
|---|---|---|
| Boot Software Part Numbers:<br>LS Flash --> 6200-0318-04<br>MS Flash --> 6200-0319-04 | 04<br>then | The "boot code" is the portion of the code that is resident in all MPs regardless of what application code (if any) is loaded. Its main function is to run power up tests and provide a means for downloading application code via the MP's serial connection. The Part numbers for the code are displayed in the lower left hand corner of the DynaView during the early portion of the power up sequence and during special programming and converter modes. See below. For the EasyView, the extension of the boot code part number is displayed for approximately 3 immediately following power up.<br>// This is normal, but you should provide this information when contacting Technical Service about power up problems. |
| Err2: RAM Pattern 1 Failure | Err2 | There were RAM errors detected in RAM Test Pattern #1.<br>// Recycle power, if the error persists, replace MP. |
| Err2: RAM Pattern 2 Failure | Err2 | There were RAM errors detected in RAM Test Pattern #2.<br>//Recycle power, if the error persists, replace MP. |
| Err2: RAM Addr Test #1 Failure | Err2 | There were RAM errors detected in RAM Address Test #1.<br>// Recycle power, if error persists, replace MP. |
| Err2: RAM Addr Test #2 Failure | Err2 | There were RAM errors detected in RAM Address Test #2.<br>//Recycle power, if the error persists, replace MP. |
| No Application Present<br>Please Load Application... | -APP | No Main Processor Application is present - There are no RAM Test Errors.<br>// Connect a TechView Service Tool to the MP's serial port, provide chiller model number (configuration information) and download the configuration if prompted by TechView. Then proceed to download the most recent RTAC application or specific version as recommended by Technical Service. |

# Diagnostic Table

**Table 14-2: Boot messages and Diagnostics**

| DynaView Display Message | **EasyView Display Code** | **Description Troubleshooting** |
|---|---|---|
| App Present. Running Selftest....<br>Selftest Passed | **APP**<br>then<br>**8888**<br>then<br>**CH.530** | An application has been detected in the Main Processor's nonvolatile memory and the boot code is proceeding to run a check on its entirety. 8 seconds later, the boot code had completed and passed the (CRC) test.<br>// Temporary display of this screen is part of the normal power up sequence. |
| App Present. Running Selftest...<br>Err3: CRC Failure | APP<br>then<br>Err3 | An application has been detected in Main Processor's nonvolatile memory and the boot code is proceeding to run a check on its entirety. A few seconds later, the boot code had completed but failed the (CRC) test.<br>//Connect a TechView Service Tool to the MP's serial port, provide chiller model number (configuration information) and download the configuration if prompted by TechView. Then proceed to download the most recent RTAC application or specific version as recommended by Technical Service. Note that this error display may also occur during the programming process, if the MP never had a valid application any time prior to the download. If the problem persists, replace the MP. |
| A Valid Configuration is Present | | A valid configuration is present in the MP's nonvolatile memory. The configuration is a set of variables and settings that define the physical makeup of this particular chiller. These include: number/airflow,/and type of fans, number/and size of compressors, special features, characteristics, and control options.<br>// Temporary display of this screen is part of the normal power up sequence. |

# Diagnostic Table

**Table 14-2: Boot messages and Diagnostics**

| DynaView Display Message | **EasyView Display Code** | **Description Troubleshooting** |
|---|---|---|
| Err4: UnHandled Interrupt<br>Restart Timer:<br>[30 sec countdown timer] | [30s countdown timer]<br>then<br>Err4 | An unhandled interrupt has occurred while running the application code. This event will normally cause a safe shutdown of the entire chiller. Once the countdown timer reaches 0, the processor will reset, clear diagnostics, and attempt to restart the application and allow a normal restart of chiller as appropriate.<br>// This condition might occur due to a severe electro-magnetic transient such as can be caused by a near lightening strike. Such events should be rare or isolated and if no damage results to the CH.530 control system, the Chiller will experience a shutdown and restart. If this occurs more persistently it may be due to an MP hardware problem. Try replacing the MP. If replacement of the MP proves ineffective, the problem may be a result of extremely high radiated or conducted EMI. Contact Technical Service.<br>If this screen occurs immediately after a software download, attempt to reload both the configuration and the application. Failing this, contact Technical Service. |
| Err5: Operating System Error<br>Restart Timer:<br>[30 sec countdown timer] | [30s countdown timer]<br>then<br>Err5 | An Operating System error has occurred while running the application code. This event will normally cause a safe shutdown of the entire chiller. Once the countdown timer reaches 0, the processor will reset, clear diagnostics, and attempt to restart the application and allow a normal restart of chiller as appropriate.<br>// See Err 4 above |
| Err6: Watch Dog Timer Error<br>Restart Timer:<br>[30 sec countdown timer] | [30s countdown timer]<br>then<br>Err6 | A Watch Dog Timer Error has occurred while running the application code. This event will normally cause a safe shutdown of the entire chiller. Once the countdown timer reaches 0, the processor will reset, clear diagnostics, and attempt to restart the application allowing a normal restart of chiller as appropriate. |
| Err7: Unknown Error<br>Restart Timer:<br>[30 sec countdown timer] | [30s countdown timer]<br>then<br>Err7 | An unknown Error has occurred while running the application code. This event will normally cause a safe shutdown of the entire chiller. Once the countdown timer reaches 0, the processor will reset, clear diagnostics, and attempt to restart the application allowing a normal restart of chiller as appropriate |

# Diagnostic Table

**Table 14-2: Boot messages and Diagnostics**

| DynaView Display Message | **EasyView Display Code** | **Description Troubleshooting** |
|---|---|---|
| Converter Mode | Con | A command was received from the Service Tool (Tech View) to stop the running application and run in the "converter mode". In this mode the MP acts as a simple gateway and allows the TechView service computer to talk to all the LLIDS on the IPC3 bus. |
| Programming Mode | Prog | A command was received by the MP from the Tech View Service Tool and the MP is in the process of first erasing and then writing the program code to its internal Flash (nonvolatile) Memory. Note that if the MP never had a prior application already in memory, the error code “Err3”will be displayed instead of this, during the programming download process. |

# Diagnostic Table

***Trane***
A business of American Standard Companies
www.trane.com

For more information contact your local district
office or e-mail us at comfort@trane.com

| | |
|---|---|
| Literature Order Number | RTAC-SVD01A-EN |
| File Number | SV-RF-RTAC-SVD01A-EN-0802 |
| Supersedes | New |
| Stocking Location | Inland -La Crosse |