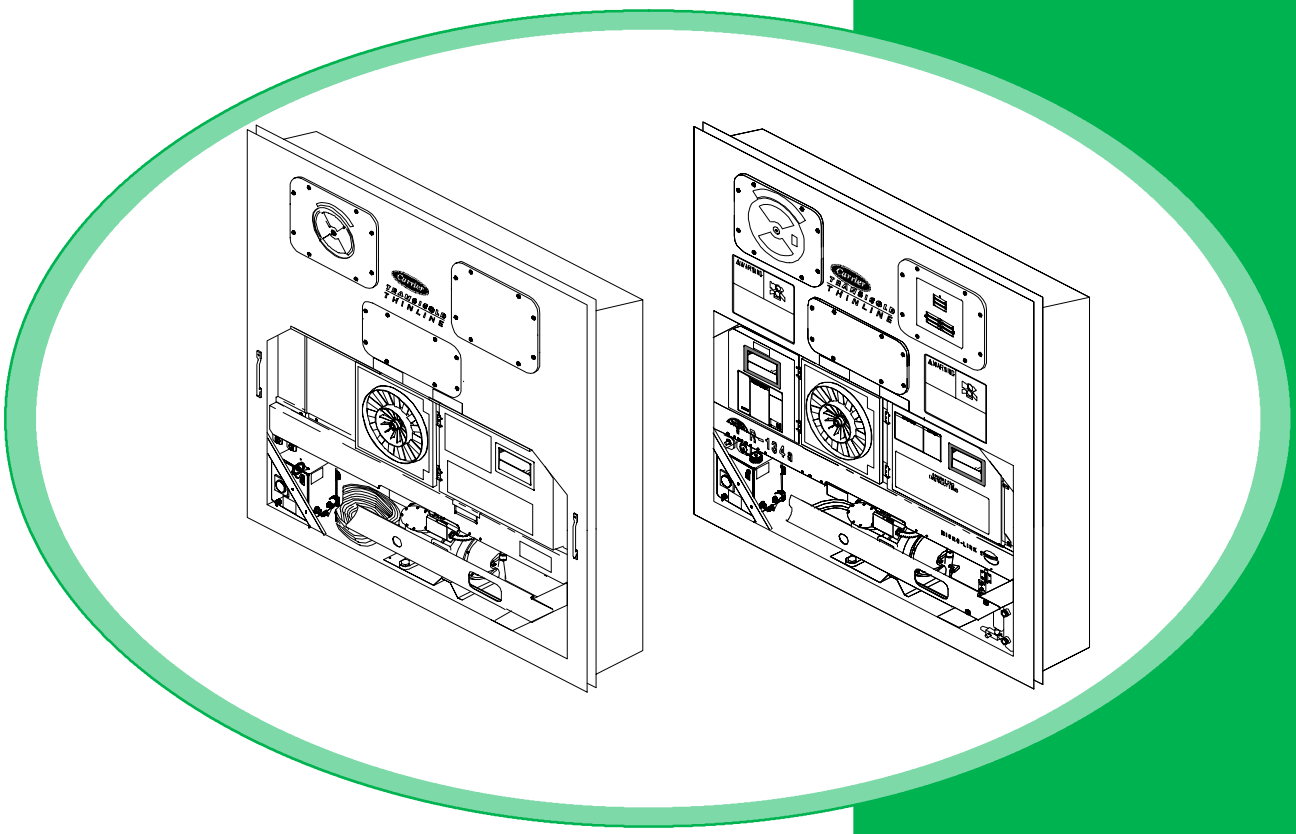
Carrier
Transicold

Container
Refrigeration

# NatureFresh
# Humidity Management System
# Models 69NT40-511-300 Series
# and 69NT40-489-100 Series



Carrier

# Technical Supplement

T-297 Rev A

Carrier

TRANSICOLD

# TECHNICAL SUPPLEMENT
# CONTAINER REFRIGERATION UNIT

## Models
## 69NT40-511-300 Series
## and
## 69NT40-489-100 Series
## with
## NatureFresh
## Humidity
## Management
## System

Carrier Transport Refrigeration and Air Conditioning,
A member of the United Technologies Corporation family. Stock symbol UTX.
Carrier Transicold, Carrier Corporation, P.O. Box 4805, Syracuse, N.Y. 13221 U. S. A.



Carrier
A United Technologies Company

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# SAFETY SUMMARY

## GENERAL SAFETY NOTICES

The following general safety notices supplement the specific warnings and cautions appearing elsewhere in this manual. They are recommended precautions that must be understood and applied during operation and maintenance of the equipment covered herein. The general safety notices are presented in the following three sections labeled: First Aid, Operating Precautions and Maintenance Precautions. A listing of the specific warnings and cautions appearing elsewhere in the manual follows the general safety notices.

## FIRST AID

An injury, no matter how slight, should never go unattended. Always obtain first aid or medical attention immediately.

## OPERATING PRECAUTIONS

Always wear safety glasses.

Keep hands, clothing and tools clear of the evaporator and condenser fans.

No work should be performed on the unit until all circuit breakers, start-stop switches are turned off, and power supply is disconnected.

Always work in pairs. Never work on the equipment alone.

In case of severe vibration or unusual noise, stop the unit and investigate.

## MAINTENANCE PRECAUTIONS

Beware of unannounced starting of the evaporator and condenser fans. Do not open the condenser fan grille or evaporator access panels before turning power off, disconnecting and securing the power plug.

Be sure power is turned off before working on motors, controllers, solenoid valves and electrical control switches. Tag circuit breaker and power supply to prevent accidental energizing of circuit.

Do not bypass any electrical safety devices, e.g. bridging an overload, or using any sort of jumper wires. Problems with the system should be diagnosed, and any necessary repairs performed, by qualified service personnel.

When performing any arc welding on the unit or container, disconnect all wire harness connectors from the modules in both control boxes. Do not remove wire harness from the modules unless you are grounded to the unit frame with a static safe wrist strap.

In case of electrical fire, open circuit switch and extinguish with $CO_2$ (never use water).

## UNIT LABEL IDENTIFICATION

To help identify the label hazards on the unit and explain the level of awareness each one carries, an explanation is given with the appropriate consequences:

DANGER – means an immediate hazard which WILL result in severe personal injury or death.

WARNING – means to warn against hazards or unsafe conditions which COULD result in severe personal injury or death.

CAUTION – means to warn against potential hazard or unsafe practice which could result in minor personal injury, product or property damage.

## SPECIFIC WARNING AND CAUTION STATEMENTS

*The statements listed below are applicable to the refrigeration unit and appear elsewhere in this manual. These recommended precautions must be understood and applied during operation and maintenance of the equipment covered herein.*

**WARNING**

**Beware of unannounced starting of the evaporator and condenser fans. The unit may cycle the fans and compressor unexpectedly as control requirements dictate.**

**WARNING**

**Do not attempt to remove power plug(s) before turning OFF start-stop switch (ST), unit circuit breaker(s) and external power source.**

**WARNING**

**Make sure the power plugs are clean and dry before connecting to any power receptacle.**

**WARNING**

**Make sure that the unit circuit breaker(s) (CB-1 & CB-2) and the START-STOP switch (ST) are in the "O" (OFF) position before connecting to any electrical power source.**

**WARNING**

**Never use air for leak testing. It has been determined that pressurized, mixtures of refrigerant and air can undergo combustion when exposed to an ignition source.**

**WARNING**

**Make sure power to the unit is OFF and power plug disconnected before replacing the compressor.**

**WARNING**

**When servicing the unit, use caution when handling R-134a. The refrigerant when in contact with high temperatures (about 1000°F) will decompose into highly corrosive and toxic compounds.**

**WARNING**

**Be sure to avoid refrigerant coming in contact with the eyes. Should refrigerant come in contact with the eyes, wash eyes for a minimum of 15 minutes with potable water only. THE USE OF MINERAL OIL OR REFRIGERANT OILS IS NOT RECOMMENDED.**

**WARNING**

**Be sure to avoid refrigerant coming in contact with the skin. Should refrigerant come in contact with the skin, it should be treated as if the skin had been frostbitten or frozen.**

**WARNING**

**Be sure ventilation in the workspace is adequate to keep the concentration of refrigerant below 1000 parts per million. If necessary, use portable blowers.**

**WARNING**

**Do not use a nitrogen cylinder without a pressure regulator. Never mix refrigerants with air for leak testing. It has been determined that pressurized, air-rich mixtures of refrigerants and air can undergo combustion when exposed to an ignition source.**

**WARNING**

**Never fill a refrigerant cylinder beyond its rated capacity. Cylinder may rupture due to excessive pressure when exposed to high temperatures.**

**WARNING**

**When starting the unit, be sure that all manual refrigerant valves in the discharge line are open. Severe damage could occur from extremely high refrigerant pressures.**

**WARNING**

**The humidity water heater contactor (WH) may be energized (460 Volts) at ANYTIME when the refrigeration unit power cable is connected to a power source.**

**CAUTION**

**Beware of rotating humidity atomizer disk and unannounced starting of the humidity atomizer (HA).**

**CAUTION**

**The humidity water tank must be drained and the drain valve left open after every use.**

# SECTION 1

# INTRODUCTION

## 1.1 INTRODUCTION

This Technical Supplement contains information specific to the NatureFresh Humidity Management System, and is to be used in conjunction with the separately bound Operation and Service Manuals and Service Parts Lists as described in Table 1-1.

Carrier Transicold's exclusive NatureFresh humidity-control option maintains natural moisture content and prevents dehydration and shrinkage to maximize cargo value.

**Table 1-1. Reference Chart**

| MANUAL NUMBER | EQUIPMENT COVERED | UNITS COVERED | TYPE OF MANUAL |
|---|---|---|---|
| T-285 | Refrigeration Unit | 69NT40-511-300 & UP | Operation and Service |
| T-285PL | Refrigeration Unit | 69NT40-511-300 & UP | Service Parts List |
| T-305 | Refrigeration and EverFresh Controlled Atmosphere Unit | 69NT40-489-100 & UP | Operation and Service |
| T-305PL | Refrigeration and EverFresh Controlled Atmosphere Unit | 69NT40-489-100 & UP | Service Parts List |

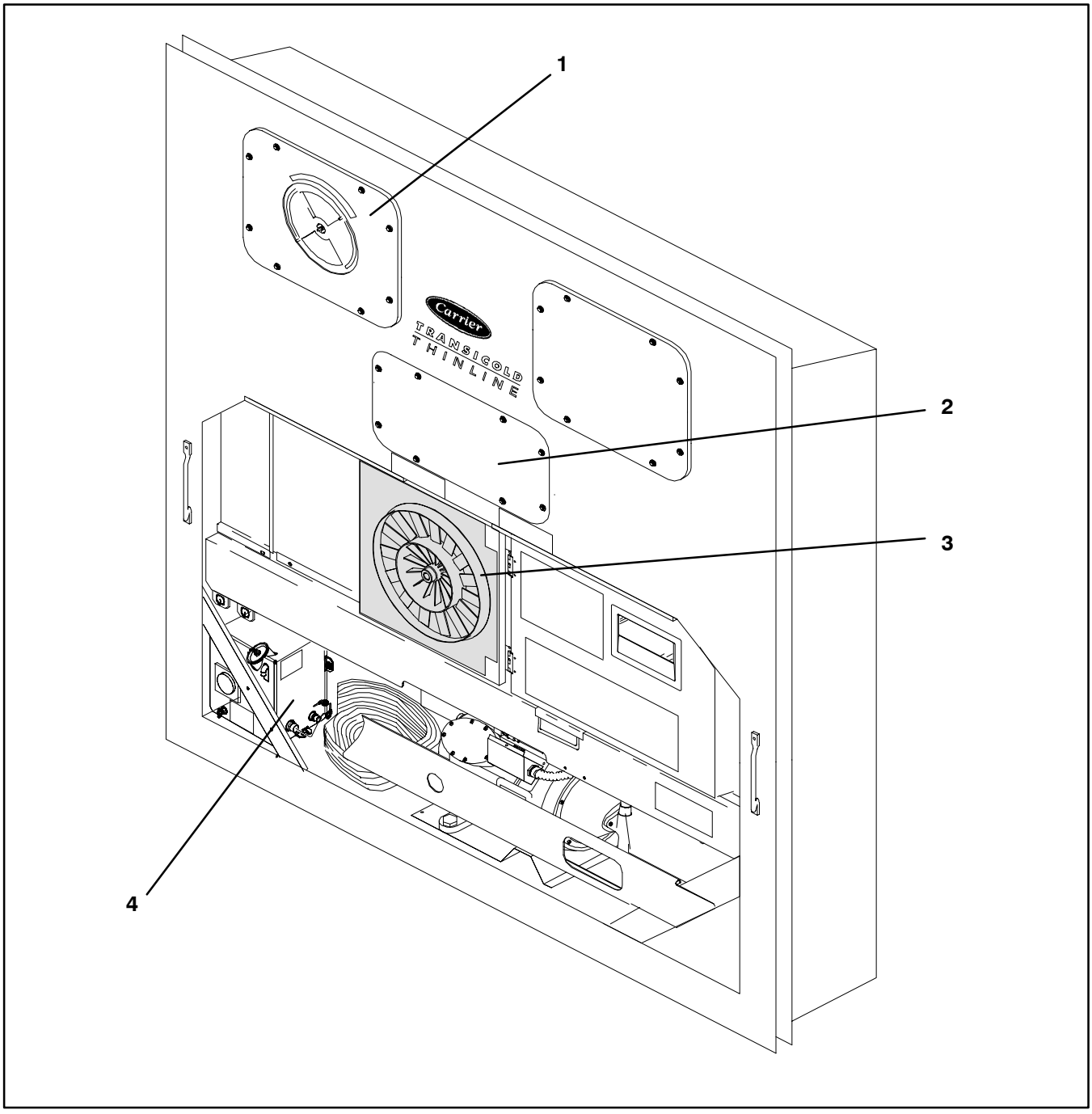
# SECTION 2

# DESCRIPTION

## 2.1 GENERAL DESCRIPTION

### 2.1.1 Refrigeration Unit – Front Section

The unit is designed so that the majority of the components are accessible from the front, see Figure 2-1. The upper left access panel allows for front entry into the evaporator section where the humidity sensor (HS) is located. The center access panel allows access to the humidity atomizer (HA) and the condenser fan grille allows acces to the humidity water pump.



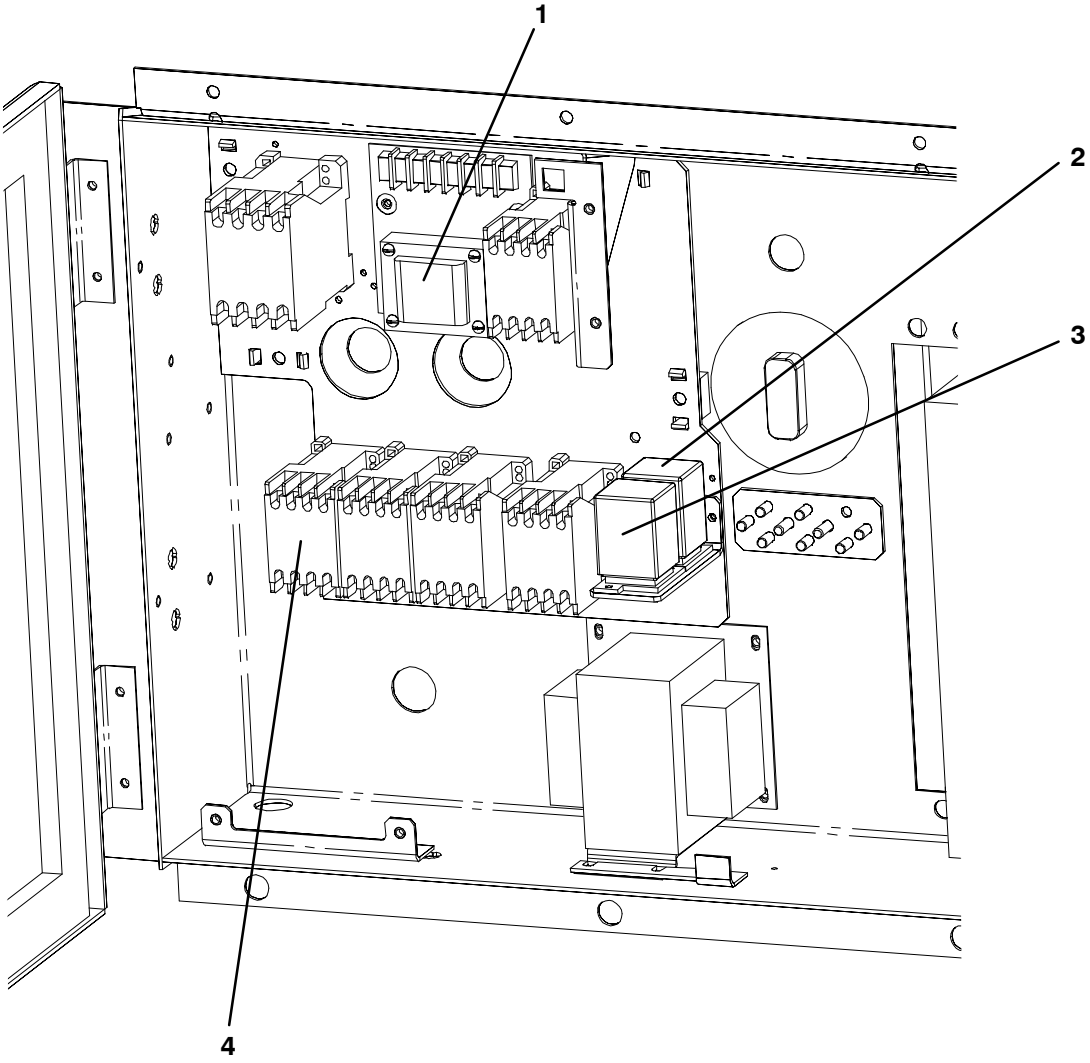

1. Evaporator Section Access Panel – Humidity Sensor (HS) Location
2. Heater Access Panel – Humidity Atomizer (HA) Location
3. Condenser Fan Grille – Humidity Water Pump (HWP) Location
4. Humidity Water Tank

**Figure 2-1. Refrigeration Unit – Front**

### 2.1.2 Control Box with added Humidity Components

The control box with the additional Humidity Management System option includes; a power supply (HPT) with fuse (FH), a contactor (WH) and two relays (HPR and PDR), refer to Figure 2-2.

The refrigeration unit components can be located and ordered from the companion manuals listed in Table 1-1.

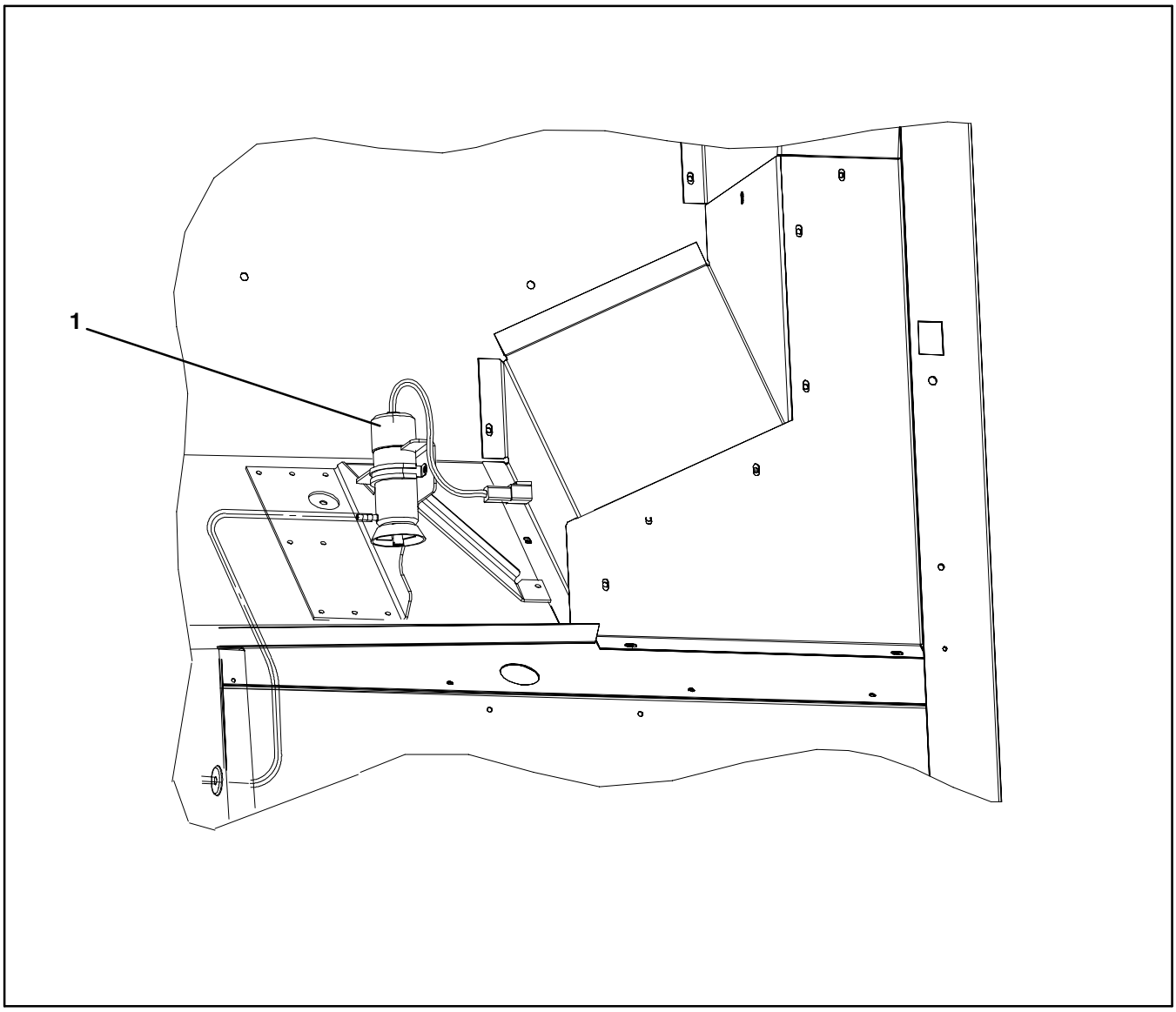



1. Humidity Power Transformer (HPT) with Fuse (FH)
2. Humidity Power Relay (HPR)
3. Pump Direction Relay (PDR)
4. Humidity Water Heater Contactor (WH)

**Figure 2-2 Control Box with added Humidity Components**

### 2.1.3 Humidity Atomizer

The humidity atomizer (HA) contains a DC motor enclosed in a chrome plated brass water-tight housing, which includes a serrated acetal disk that spins at 12,000 RPM @ 12 VDC shearing the water into a mist to be absorbed by the evaporator air stream.




**NOTE**

Location of view for clarification - Middle right side of refrigeration unit as viewed from rear with rear panel removed.

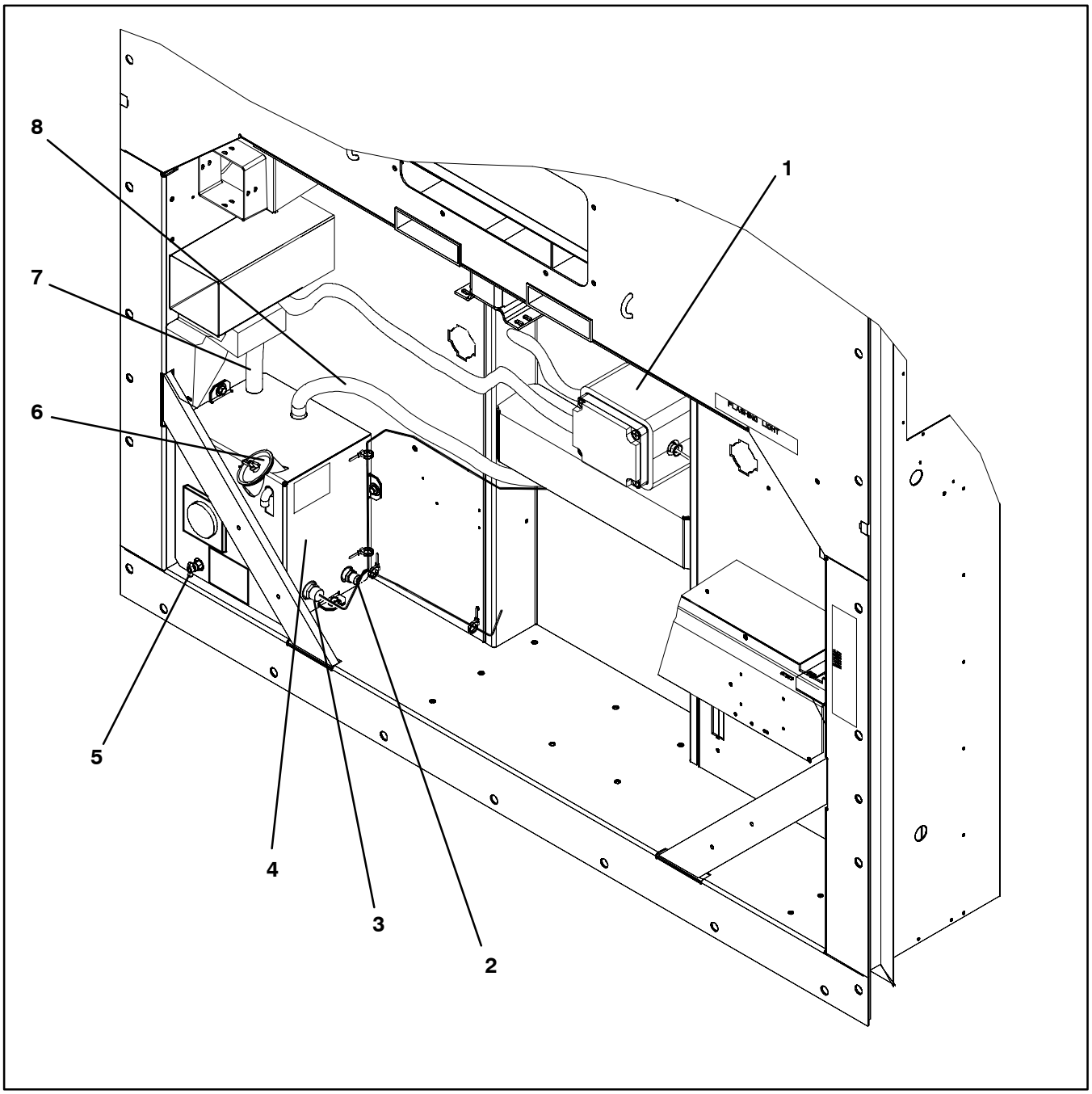
1. Humidity Atomizer (HA)

**Figure 2-3 Humidity Atomizer**

### 2.1.4 Humidity Water Pump (HWP) and Humidity Water Tank

The humidity water pump (HWP) contains a DC motor driven reversible peristaltic pump, and is enclosed in a NEMA 4 enclosure to protect it from harsh environments.

The humidity water tank is stainless steel, with a water level gauge, and uses the humidity water heater (HWH) to prevent water from freezing.The tank is insulated to prolong heater life.




1. Humidity Water Pump (HWP)
2. Water Heater Termination Thermostat (WHTT)
3. Humidity Water Heater (HWH)
4. Humidity Water Tank
5. Drain Valve
6. Humidity Water Tank Fill Cap
7. Humidity Water Tank Pickup Tube
8. Humidity Water Tank Condensate Drain Line

**Figure 2-4 Humidity Water Pump (HWP) and Humidity Water Tank**

### 2.1.5 Humidity Management System Operation

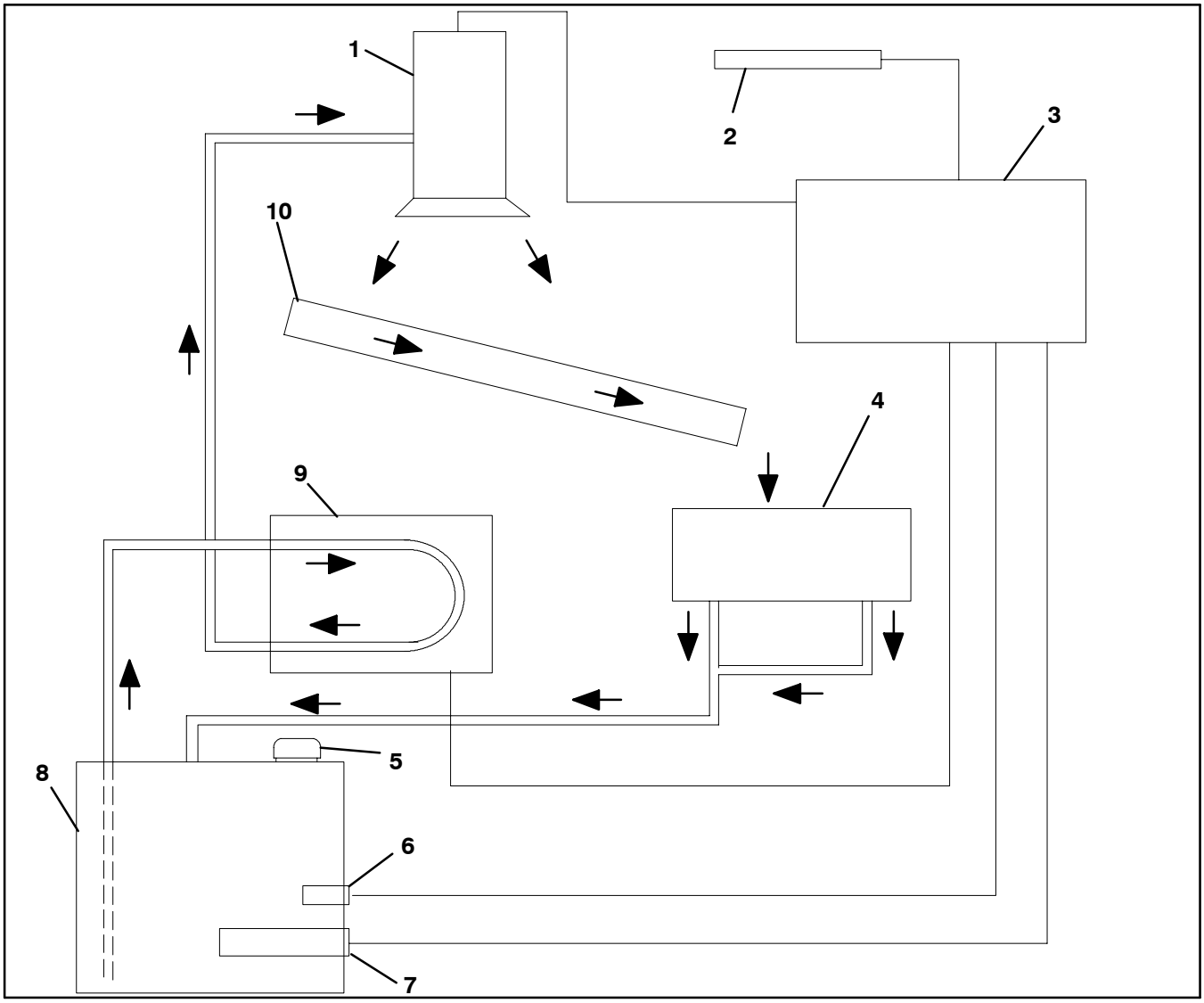
The operation of the Humidification mode will result in an ON/OFF cycling of the humidity water pump (HWP), and humidity atomizer (HA). Cycling continues until the desired set point is reached.

Distilled water is pumped from the humidity water tank to the humidity atomizer. The atomizer creates small water particles (by dropping water on a high speed spinning disk), which is absorbed by the evaporator air stream.

**CAUTION**

**Beware of rotating humidity atomizer disk and unannounced starting of the humidity atomizer (HA).**

Water particles enter the air stream below the evaporator coil. The humidity atomizer is located above the drainpan in the evaporator section, excess condensed water is collected in the drain pan, and returned to the water tank.




1. Humidity Atomizer (HA)
2. Humidity Sensor (HS)
3. Control Box
4. Drain Pan
5. Humidity Water Tank Fill Cap
6. Water Heater Termination Thermostat (WHTT)
7. Humidity Water Heater (HWH)
8. Humidity Water Tank
9. Humidity Water Pump (HWP)
10. Drain Trough

**Figure 2-5 Humidity Flow Diagram**

## 2.2 ELECTRICAL DATA

| | | | | |
|---|---|---|---|---|
| **a.** | **Humidity Atomizer (HA)** | Motor | Brushless 12 VDC reversible | |
| | | Voltage Input | 7 to 18 VDC. 3% Ripple Maximum | |
| | | Current | Start Up | 6.5A Maximum @ 12 VDC |
| | | | Steady State | 0.5A Maximum @ 12 VDC |
| | | Wires | 18 AWG, 2 Conductor Cable, Multistranded insulated wire (one blue, one brown), PVC insulation, with water tight connector | |
| | | Water Connections | 1/8" Barbed Tubing connection | |
| **b.** | **Humidity Sensor (HS)** | Orange wire | Power | |
| | | Red wire | Output | |
| | | Brown wire | Ground | |
| | | Input voltage | 5 vdc | |
| | | Output voltage | 0 to 3.3 vdc | |
| | | **Output voltage readings verses relative humidity (RH) percentage:** | | |
| | | 30% | 0.99 V | |
| | | 50% | 1.65 V | |
| | | 70% | 2.31 V | |
| | | 90% | 2.97 V | |
| **c.** | **Humidity Water Pump (HWP)** | Voltage Input | 6 to 18 VDC | |
| | | Wires | 18 AWG, 2 Conductor Cable, Multistranded insulated wire (one blue, one brown) | |
| | | Water Connections | Two quick disconnect fittings | |
| | | Water Pump On/Off and Direction Relays | Triple Pull Double Throw, 24 VAC | |
| | | Brushed, permanent magnet, 12 VDC motor, Self priming peristaltic pump | | |
| **d.** | **Humidity Water Heater (HWH)** | Material | Sheath | Incoloy 800 |
| | | | Threaded Fitting | 3/4 NPT, 304 Stainless Steel |
| | | Electrical Characteristics | Nominal Power Rating | 300 Watts (+5%/–10%) at 460 Volts nominal |
| | | | Wires | 18 gauge PVC sheathed stranded copper (two blue and one green/yellow chassis ground) |
| | | Full Load Amps (FLA) | 0.7 amps | |
| **e.** | **Water Heater Termination Thermostat (WHTT)** | Voltage Input | 24 VAC Nominal | |
| | | Closes: | 130°F +/–5°F | |
| | | Open | 150°F +/–5°F | |
| | | Wires | Two 18 AWG, Multistranded insulated wire | |
| **f.** | **Power Supply** | 12.00 Volts DC | +/–5% at 24.0 VAC Input | |
| | | 10.97 Volts DC | +/–5% at 20.9 VAC Input | |
| | | 13.65 Volts DC | +/–5% at 26.0 VAC Input | |
| **g.** | **Fuse (FH)** | Humidity Power Transformer (HPT) | 5 amps (FH) | |

## 2.3 GENERAL LAYOUT OF THE CONTROLLER

The Micro-Link 2i Controller/DataCORDER consists of a key pad, display module and Controller module. Connectors are used to attach the wiring of the unit to the Controller module. The Controller module is designed to permit ease of installation and removal.

All Humidification Option control functions are accessed by key pad selections and viewed on the display module which are designed for optimum user friendliness and convenience.

The key pad (see Figure 2-6) is mounted on the right-hand side of the control box. The key pad consists of eleven push-energized membrane switches that act as the user's interface with the Controller and the optional DataCORDER. Refer to Table 2-1.

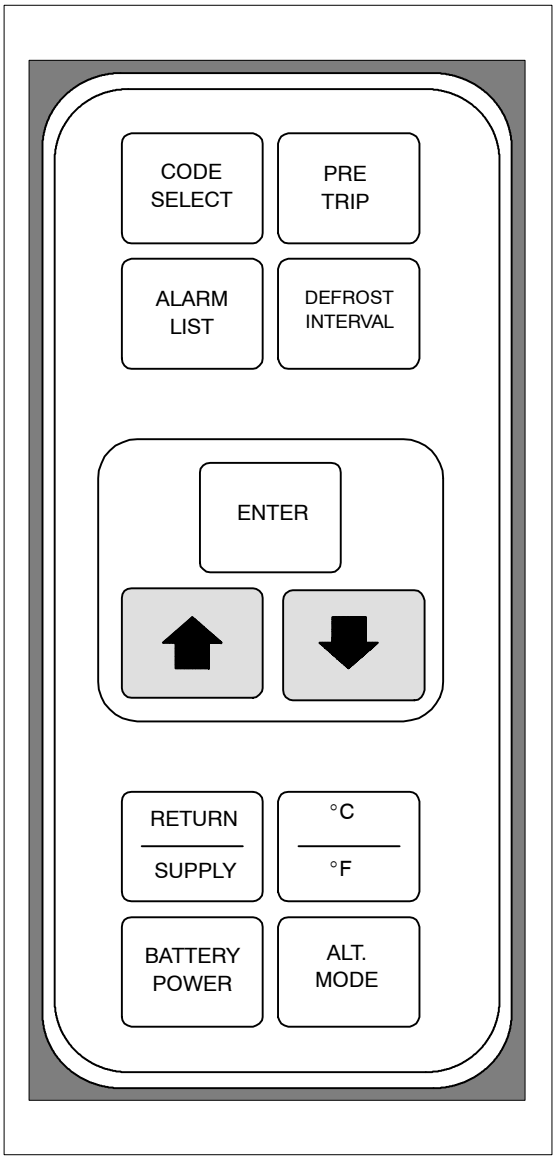



**Figure 2-6 Key Pad**

**Table 2-1. Key Pad Function**

| KEY | FUNCTION |
|---|---|
| Arrow Up | Change set point upward. Change codes upward. Scan alarm list upward. Change user selectable features upward. Pre-trip advance forward. Pre-trip test interruption. DataCORDER Function and Alarm Codes are scrolled upward after the ALT. MODE key is depressed. |
| Arrow Down | Change set point downward. Change codes downward. Scan alarm list downward. Change user selectable features downward. Pre-trip repeat backward. DataCORDER Function and Alarm Codes are scrolled downward after the ALT. MODE key is depressed. |
| Return/ Supply | Displays non-controlling probe temperature (momentary display). |
| °C/°F | Displays alternate temperature scale (momentary display). |
| Alarm List | Displays alarm list and clearing of the alarm queue (when followed by *Enter* key) for the Controller, and also for the DataCORDER after the ALT. MODE key is depressed. |
| Code Select | Access function codes (see arrow up and arrow down) for the Controller, and also for the DataCORDER after the ALT. MODE key is depressed. |
| Defrost Interval | Displays selected defrost interval. |
| Pre-Trip | Displays a pre-trip selection menu. Discontinues pre-trip in progress. |
| Battery Power | If the unit is equipped with the optional battery pack, initiate the battery backup mode to allow set point and function code selection if no mains power is present. |
| Enter | Entering a set point change. Extending to 30 seconds the time a chosen data function code is displayed. Entering the value of a user selectable mode. Clearing the alarm list and initiating pre-trip. Also used for various DataCORDER functions after the ALT. MODE key is depressed. |
| ALT. Mode | Allows access to DataCORDER function codes, alarm codes, DataCORDER configuration and scrollback. |

## 2.4 CONFIGURATION VARIABLES

**NOTE**

In order to enable the correct configuration variables the controller must be reconfigured for the correct unit model number (i.e., 69NT40-511-322) using the multi-configuration flash memory card.

Configuration variable #35 must be turned "ON" to allow the humidification mode and its associated controller function code Cd33 to operate. This configuration variable #35 will activate dehumidification and humidification, depending on the set point.

Dehumidification and humidification operating modes do not operate at the same time. A summary of set point ranges is provided in Table 2-2. Other configuration variables effecting dehumidification/humidification are shown in Table 2-3 and described further in the refrigeration unit manuals.

*When configuration variable #35 is set to"OFF:"*

- The humidification operating mode is deactivated. (Relay K13/TD is OPEN.)
- The dehumidification operating mode reverts to configuration variable configuration #04 for operating requirements.
- If configuration #04 is "OFF," then function code Cd33 will display "-----."
- If configuration #35 is "OFF," and configuration #04 is "OFF," then function code Cd33 will display "-----."
- If configuration #04 is "ON," then function code Cd33 will allow a dehumidification set point to be chosen. (Refer to Table 2-3)

## 2.5 CONTROLLER FUNCTION CODES

The operator may examine the operating status of the unit by accessing function codes. To access these codes perform the following steps: Press the CODE SELECT key, then press an arrow key until the left window displays the desired code number. For the display only function codes, the right window will display the value of this item for five seconds before returning to the normal display mode. If a longer time is desired, pressing the ENTER key will extend the time to 30 seconds after the last pressing of the ENTER key. Function code 33 (Cd33) is explained below:

**Code 21 - Humidity Water Pump (HWP) (Forward-Reverse-Off)**

This code displays the status of the humidity water pump (HWP) (-----, forward, reverse or off). If not configured, the mode is permanently deactivated and Cd21 will display "-----."

**Code 33 - Dehumidification/Humidification Control (% RH)**

This code is only applicable to units with a humidity sensor (HS). Relative humidity set point is available only on units configured for dehumidification or dehumidification and humidification. When the mode is activated, the control probe LED flashes "ON" and "OFF" every second to alert the user. If not configured, the mode is permanently deactivated and function code Cd33 will display "-----." When set point is available and the unit is configured for dehumidification only, it can be set to "OFF," "tESt," or 65 to 95% relative humidity in increments of one percent.

If both dehumidification & humidification are active, the set point can be set to "OFF," "tESt," "htESt" or 65% to 95% relative humidity set points. From a set point range of 65% to 75%, the controller will activate dehumidification, and from the set point range of 76% to 95%, the controller will activate humidification.

If bulb mode is active (function code Cd35) and "Lo" speed evaporator motors are selected (function code Cd36) then set point will range from 60 to 95%. When "tESt" is selected, the heaters should be turned ON, indicating that the dehumidification mode is activated. After a period five minutes has elapsed in this mode, the previously selected mode is reinstated. When "htESt" is selected, the controller uses the ambient temperature to determine how to proceed with humidity water pump and atomizer testing. If the ambient is greater than or equal to 1.1°C (34°F), the controller will suspend the operation of the compressor, high/low speed evaporator fans and the condenser fan. The humidity water pump and humidity atomizer will be activated, while simultaneously displaying "hUM tESt" on the display. This display message will alternate with the controller's default display message. The humidity water pump and humidity atomizer will be activated to deliver water from the tank to the humidity water pump (HWP) for seven minutes. If the ambient is less than 1.1°C (34°F), the humidity water tank heaters will be turned ON for four hours with the water heater termination thermostat (WHTT). During this time, the display will show "hUM tPREP." Upon satisfying these conditions, the controller will display "hUM rEADY" on the display

module. When the user presses "ENTER," the humidity water pump and humidity atomizer will be activated for seven minutes for humidity water pump and humidity atomizer inspection. There may be a slight delay before "htESt" is actually engaged, at this time, the controller will display "hUM tPREP" then display "hUM rEADY" once the initialization sequence is complete. At this time, the user must press "ENTER" on the key pad to transition into the humidification test. Upon completion of the "htESt," the humidity water pump will reverse to clear the water lines. This test will not run if:

- Control temperature is below -0.6°C (31°F)
- Ambient temperature is below -17.8°C (0°F)
- Unit is in defrost
- Unit is in Pre-Trip
- Controlled Atmosphere Pre-Trip is initiated
- Controlled Atmosphere is controlling the container's atmosphere
- Alarm AL67 is active (Humidity Sensor Failure)
- Alarm AL57 is active (Ambient Temperature Sensor Failure)
- Alarm Al26 is active (All Supply and Return Air Control Sensors Failure)

**NOTE**

The configuration variables listed below reflect a Service Parts **unconfigured** Controller module, and NOT the **configured** Controller module specific to models with the EverFresh Humidity Management System.

**Table 2-2 Controller Humidification Configuration Variables**

| Configuration # | TITLE | Default | Option |
|---|---|---|---|
| 4 | Dehumidification Mode | On | OFF |
| 28 | Bulb Mode | NOr | bulb |
| 35 | Humidification Mode | OFF | On |

**Table 2-3 Controller Function Code Cd33 Assignments**

| Configuration | Configuration #'s | Configuration Settings | Set Point Range | |
|---|---|---|---|---|
| Dehumidification | 04 | ON | 65% | 95% |
| Dehumidification/ Bulb Mode | 04 & 28 | ON & bulb | 60% | 95% |
| **Dehumidification/Humidification** | | | | |
| Humidification | 04 & 35 | ON & ON | 76% | 95% |
| Dehumidification | 04 & 35 | ON & ON | 65% | 75% |
| Bulb Mode | 04, 28 & 35 | ON, bulb & ON | 60% | 95% |

# SECTION 3

# OPERATION

## 3.1 INTRODUCTION

This section addresses the additional operating requirements for the Humidity Management System.

**NOTE**

For refrigeration operation information, refer to the separate manuals listed in Table 1-1.

## 3.2 PRE-TRIP INSPECTION

a. The automatic Pre-Trip inspection for the refrigeration unit must be completed prior to the Pre-Trip inspection of the humidification option, (function code Cd33 is set to "OFF").

b. Inspect water lines for cracks or damage. Effect permanent or temporary repairs.

c. Flush water tank with distilled water.

d. Close the drain valve.

## 3.3 HUMIDITY SYSTEM PREPARATION

a. Fill water tank to overflowing with distilled water.

**CAUTION**

**Humidity system performance and life may be reduced with use of a liquid other than distilled water.**

b. Input desired relative humidity set point by using the key pad (Refer to label on front of unit).

**WARNING**

**If the controller temperature set point is set between 0.6°C to 4.5°C (33°F to 40°F), the defrost time cycle must be set at six hours to prevent evaporator coils from being excessively iced-up.**

## 3.4 HUMIDITY SYSTEM CONDITIONS FOR OPERATION

*The Humidification mode is initiated and the humidity system turned "ON", relay TD is CLOSED, if ALL of the following conditions are satisfied:*

- The relative humidity (RH) reading is less than the humidity set point minus two (-2)
- The system is not in a pulldown mode.
- Controller temperature set point is greater than or equal to 0.5°C (33°F).
- The controller temperature is in-range.
- The unit is not in the defrost operating mode.
- The "Humidity Sensor Failure" alarm (AL67) is not active.
- If unit is equipped with CA, and configuration variable #19 ( Controlled Atmosphere), and is selected "In," and the system is not in the "VENT" mode.
- Configuration variable #35 (Humidification Mode) is selected "ON."
- The system is not in Pre-Trip mode.
- Function code #33 (Dehumidification Control) is selected "ON," with a set point greater than 75% RH.
- The control temperature is greater than or equal to -0.6°C (31°F).
- Configuration variable #10 (Compressor Speed) is selected "OUT," for single speed compressor operation.
- The "Ambient Temperature Sensor Failure" alarm (AL57) is not active.
- The "All Supply and Return Air Control Sensors Failure" alarm (AL26) is not active.
- Evaporator fans are energized.
- Configuration variable #12 (TXV/Solenoid Quench Valve) is selected "OUT."
- Ambient temperature is greater than or equal to -17.8°C (0°F).

## 3.5 HUMIDITY SYSTEM OPERATION

a. The humidity atomizer (HA) and humidity water pump (HWP) are turned "ON" via the humidity power relay (HPR). The relay is normally OPEN.

b. If the ambient temperature is above freezing, the operating mode for Humidification will result in a "FORWARD" or "OFF" (FWD/OFF) cycling of the pump. If the ambient temperature is below freezing, the operating mode for Humidification will result in a "FORWARD" or "REVERSE" (FWD/RVS) cycling of the humidity water pumpto reduce the risk of freezing the water lines. Upon reaching set point, the pump direction relay (PDR) reverses the water pump direction to drain the pump and water lines.

c. On initial unit power-up, if the ambient is near freezing, less than or equal to 1.1°C (34°F), the humidification mode will turn the humidity water heater "ON" (to raise the water temperature) for four hours before entering the FWD/RVS cycling of the water pump. This is to prevent water lines and the water tank from freezing.

### 3.5.1 Humidity Water Heater Operation

The humidity water heater contactor (WH) 460VAC, is being controlled when the addition of humidity is being actively controlled. This relay is normally OPEN.

**WARNING**

**The humidity water heater contactor (WH) may be energized (460 Volts) at ANYTIME when the refrigeration unit power cable is connected to a power source.**

*The humidity water heater contactor (WH) is turned "ON," if ALL of the following conditions are satisfied.:*

- Configuration #35 (Humidification Mode) is selected "ON."
- Function code Cd33 (Dehumidification Control) is selected "ON," with a set point greater than 75%RH.
- Controller temperature set point is greater than or equal to 0.5°C (33°F).
- Ambient air temperature is less than or equal to 1.1°C (34°F).
- The humidity water heater (HWH) has been deenergized, and the humidity water heater contactor (WH) is OPEN, for a minimum of 15 minutes.
- Configuration variable #10 (Compressor Speed) is selected "OUT," for single speed compressor operation.
- Configuration variable #12 (TXV/Solenoid Quench Valve) is selected "OUT."
- Automatic Pre-Trip is not active.
- The "Ambient Temperature Sensor Failure" alarm (AL57) is not active.
- The "All Supply and Return Air Control Sensors Failure" alarm (AL26) is not active.
- The water heater termination thermostat (WHTT) temperature is below range (refer to section 2.2) to start and continues until upper temperature limit is reached.

## 3.6 HUMIDITY SYSTEM SHUTOFF

*Humidification mode is terminated, the humidity system is turned "OFF," and controller relay TD becomes OPEN, if ANY of the following conditions are satisfied:*

- The relative humidity (%RH) reading is greater than the humidity set point.
- Pulldown mode is activated.
- The controller temperature set point is changed to be less than 0.5°C (33°F).
- The controller temperature set point is outside the user selected in-range tolerance band, and the five minute out-of-range timer has timed out.
- The refrigeration system enters defrost mode.
- The "Humidity Sensor Failure" alarm (AL67) becomes active.
- If unit is equipped with CA, and configuration variable #19 ( Controlled Atmosphere) is selected "ON," and the system enters the VENT mode.
- Configuration #35 (Humidification Mode) selection is "OFF."
- The refrigeration system enters Pre-Ttrip mode.
- Function code Cd33 (Dehumidification Control) selection is "OFF."
- Function code Cd33 (Dehumidification Control) has the set point changed to be equal or less than 75%RH.
- Configuration variable #10 (Compressor Speed) selection is changed to "IN," for two-speed compressor operation.
- "Ambient Temperature Sensor" alarm (AL57) is active.
- The "All Supply and Return Air Control Sensors Failure" alarm (AL26), is active.
- The evaporator fans are deenergized.
- Configuration variable #12 (TXV/Solenoid Quench Valve) selection is changed to "IN," for solenoid quench valve operation.
- Controller temperature set point becomes less than -0.6°C (31°F).
- Ambient temperature becomes less than -17.8°C (0°F).

*The humidity water heater (HWH) is turned "OFF," and humidity water heater contactor (WH) is OPEN, if ANY of the following conditions are satisfied:*

- Configuration #35 (Humidification Mode) selection is "OFF."
- Function code Cd33 (Dehumidification Control) is selected "ON," with a set point changed to be less than or equal to 75%RH.
- Control temperature set point is less than or equal to 0.5°C (33°F).
- Ambient air temperature is greater than 2.2°C (36°F).
- Function code Cd33 (Dehumidification Control) selection is "OFF."
- Configuration variable #10 (Compressor Speed) selection is changed to "IN," for two-speed compressor operation.
- Configuration variable #12 (TXV/Solenoid Quench Valve) selection is changed to "IN," for solenoid quench valve operation.
- Pre-Trip is initiated.
- "Ambient Temperature Sensor" alarm (AL57) is active.
- The "All Supply and Return Air Control Sensors Failure" alarm (AL26), is active.
- The water heater termination thermostat (WHTT) reaches the upper limit or has not dropped below lower limit.
- The water heater termination thermostat (WHTT) temperature is out of range (refer to section 2.2).

### 3.7 HUMIDITY SYSTEM SHUTDOWN PROCEDURE

**WARNING**

**Operating the Humidity Management System with frozen water lines will damage the humidity water pump (HWP). To prevent damage occurring, the Humidity System must be turned "OFF" prior to every unit power shutdown, if the outside temperature is below freezing. This activates the humidity water pump to reverse and drain the water lines.**

*Shutdown Procedure:*

a. Press the "CODE SELECT" key (see Figure 2-6).

b. Press the "UP or DOWN" arrow key until "CD33" is displayed, then press "ENTER."

c. Press "UP or DOWN" arrow key until "OFF" is displayed, then press "ENTER."

d. Allow the unit to operate for a minimum of three minutes.

e. Turn the start-stop switch (ST) to position "0"("OFF" position).

### 3.8 AFTER HUMIDITY SYSTEM SHUTDOWN

a. Drain the humidity water tank after every use. Leave the drain valve open to prevent water tank damage in low ambient temperatures.

**CAUTION**

**The humidity water tank must be drained and the drain valve left open after every use.**

b. Flush the humidity water tank and system per section 5.1.

# SECTION 4

# TROUBLESHOOTING

| CONDITION | POSSIBLE CAUSE | REMEDY/REFERENCE SECTION |
|---|---|---|
| **4.1 HUMIDITY SYSTEM NOT OPERATING** | | |
| Humidity level will not increase | Container (box) leakage may be excessive | 5.2.1 |
| | Fresh air make-up vent is open | Check |
| | Unit not configured for Humidification Mode | 5.2.4 |
| | Water pump is defective | 5.2.5 |
| | Atomizer is defective | 5.2.6 |
| | Water line is blocked | 5.2.2 |
| | Power supply is defective | 2.2 |
| | No water in tank | Check |
| | Set Point is not in the Humidification Range | Table 2-3 |
| | Atomizer disk is damaged | Replace |
| | Humidity sensor is defective | 5.2.8 |
| | Refrigeration system temperature is not in range | Check |
| | Water line connections are faulty | 5.2.3 |
| | Water line not properly seated in connectors | 5.2.3 |
| | Incorrect wiring | 6.1 |
| **4.2 HUMIDITY ATOMIZER DOES NOT OPERATE** | | |
| Atomizer does not operate | Unit not configured for Humidification Mode | 5.2.4 |
| | Atomizer motor is defective | Replace |
| | Humidification system may be in an “Off Cycle” | 2.1.5 |
| | Control relay HPR did not energize | Check |
| | Power supply is defective | 5.2.7 |
| | Atomizer disk is broken or missing | Check |
| | Incorrect wiring | 6.1 |
| **4.3 HUMIDITY WATER PUMP DOES NOT OPERATE** | | |
| Water pump does not operate | Unit not configured for Humidification Mode | 5.2.4 |
| | Water pump is defective | 5.2.5 |
| | Internal pump tubing is damaged | Replace |
| | Unit may be in an “Off Cycle” | Check |
| | Control relay HPR did not energize | Check |
| | Power supply is defective | 5.2.7 |
| | Incorrect wiring | 6.1 |
| **4.4 POWER SUPPLY DOES NOT OPERATE** | | |
| Power supply does not operate | No 24 VAC input | 5.2.7 |
| | No ground connection | 5.2.7 |
| | Control relay HPR did not energize | Check |
| | Fuse (FH) is blown | 5.2.7 |
| | Incorrect wiring | 6.1 |
| **4.5 HUMIDITY WATER HEATER DOES NOT OPERATE** | | |
| Water heater does not operate | Thermostat (WHTT) is defective or open | 5.2.10 |
| | Heater contactor (WH) did not energize | Check |
| | No controller relay (TQ) output | Check |
| | Incorrect wiring | 6.1 |

# SECTION 5

# SERVICE

## 5.1 HUMIDITY SYSTEM FLUSHING - AFTER EVERY PRE-TRIP

a. Inspect and clean tank and system components as required.

b. Mix a solution of chlorine bleach and distilled water, diluted to one tea-spoon per gallon.

c. Add 1/2 gallon of mixture to the tank.

d. Operate the humidity system (refer to section 3.5) for a period of time necessary to ensure mixture is sprayed from the atomizer. Visually inspect from the heater access panel.

**CAUTION**

**Beware of rotating humidity atomizer disk and unannounced starting of the humidity atomizer (HA).**

e. Drain the humidity water tank and add distilled water.

f. Operate the humidity system for a period of time necessary to purge the water lines of the chlorinated mixture.

g. Drain the humidity water tank and leave drain valve (see Figure 2-4) open.

## 5.2 DIAGNOSIS

### 5.2.1 Container Air Leakage

a. Verify the container leakage against ISO specification 1496.

### 5.2.2 Humidity Water Line Inspection

a. Flush the water lines according to section 5.1.

b. Inspect for signs of water leakage during the humidity water pump (HWP) ON cycle.

c. Replace any cracked, worn or damaged water lines.

### 5.2.3 Humidity Water Line Connection Inspection

a. Ensure tank and pump lines are fully inserted into the plastic fittings by first depressing the fitting ring and removing the water lines, then inserting the water lines fully until the stop is reached (1.75 cm or 0.7 inches of the water line should be inserted into the fitting).

b. Ensure atomizer lines are fully extended over the barbed fitting.

### 5.2.4 Humidification Configuration Variable /Function Code Verification

a. See Table 2-2 and Table 2-3.

b. Check controller function code Cd20 (Config/Model #) for the correct unit model number, and refer to the model chart for the manual listed in Table 1-1, then verify the humidification option is valid.

### 5.2.5 Humidity Water Pump (HWP) Inspection

a. Ensure that the humidity water pump (HWP) is powered (12V DC nominal).

b. Ensure that rotor can rotate in both directions (Clockwise equals forward, Counter-Clockwise equals reverse).

c. Ensure that the water lines are connected to proper inlet and outlet fittings.

d. Disconnect the outlet water line and ensure that the pump delivers water.

e. Remove cover to inspect the internal tubing for damage, splits or cracks and replace as necessary.

### 5.2.6 Humidity Atomizer (HA) Inspection

**CAUTION**

**Beware of rotating humidity atomizer disk and unannounced startup of the humidity atomizer (HA).**

a. Ensure that the atomizer is powered. (12V DC nominal)

b. Ensure that the disk is secured and fully intact.

c. A fine mist should appear when the system is operating.

### 5.2.7 Power Supply Inspection

a. Ensure that the power supply input is 24V AC nominal.

b. Ensure that the power supply output is 12V DC nominal.

c. Ensure that the power supply fuse (FH) is intact.

### 5.2.8 Humidity Sensor (HS) Inspection

a. Ensure that the humidity sensor (HS) input and output voltages are in the valid range, refer to section 2.2.

### 5.2.9 Humidity Water Heater (HWH) Inspection

a. Ensure the heater resistance is within the specified range, refer to section 2.2.

b. Ensure the heater is supplied with 460V AC nominal.

### 5.2.10 Water Heater Termination Thermostat (WHTT)

a. Ensure the continuity of the water heater termination thermostat (WHTT) by first filling the tank with ice water and measuring the resistance.

b. Ensure the water heater termination thermostat (WHTT) is supplied with 24V AC nominal.

## 5.3 VISUAL INSPECTION

a. Inspect the water lines and connections for signs of leaks.

b. Inspect the water pickup tube on top of the water tank and ensure that it is properly connected. Remove and fully insert. (11/16" should be inserted)

c. Remove the heater access panel on the refrigeration unit, and inspect the humidity atomizer disk and body for signs of damage.

**CAUTION**

**Beware of rotating humidity atomizer disk and unannounced starting of the humidity atomizer (HA).**

d. Inspect the humidity atomizer (HA) and humidity water pump (HWP) connections.

e. Ensure that all electrical connections to the humidity power transformer (HPT), and humidity power and pump direction relays (HDR and PDR) are secure.

# SECTION 6

# ELECTRICAL WIRING SCHEMATIC AND DIAGRAMS

## 6.1 INTRODUCTION

This section contains Electrical Schematics and Wiring Diagrams covering the Models listed in Table 1-1 equipped with the NatureFresh humidity management system. The diagrams are presented as follows:

Figure 5-1 Provides the legend for use with all figures.

Figure 5-2 Provides the schematic diagram.

Figure 5-3 Provides the wiring diagrams.

## LEGEND

| SYMBOL | DESCRIPTION (Schematic Location) |
|---|---|
| AMBS | AMBIENT SENSOR (D-19) |
| CB1 | CIRCUIT BREAKER - 460 VOLT (J-1) |
| CF | CONDENSER FAN CONTACTOR (M-11, P-5) |
| CH | COMPRESSOR CONTACTOR (M-10, P-1) |
| CI | COMMUNICATIONS INTERFACE MODULE (A-3) |
| CM | CONDENSER FAN MOTOR (T-4, H-9) |
| CP | COMPRESSOR MOTOR (T-1, E-7) |
| CPT | CONDENSER PRESSURE TRANSDUCER (H-20) |
| CPDS | COMPRESSOR DISCHARGE SENSOR (C-19) |
| CPSS | COMPRESSOR SUCTION SENSOR (E-19) |
| CR | CHART RECORDER [TEMPERATURE RECORDER] (B-16) |
| CS | CURRENT SENSOR (M-1) |
| DHBL | DEFROST HEATER - BOTTOM LEFT (T-3) |
| DHBR | DEFROST HEATER - BOTTOM RIGHT (T-3) |
| DHTL | DEFROST HEATER - TOP LEFT (T-3) |
| DHTR | DEFROST HEATER - TOP RIGHT (R-3) |
| DPH | DRAIN PAN HEATER (R-3) |
| DPT | DISCHARGE PRESSURE TRANSDUCER (K-20) |
| DTS | DEFROST TEMPERATURE SENSOR (D-19) |
| EF | EVAPORATOR FAN CONTACTOR [HIGH] (M-12, P-7, P-9, P-11) |
| EM | EVAPORATOR FAN MOTOR (E-13,H-13,T-8,T-12) |
| ES | EVAPORATOR FAN CONTACTOR [LOW] (M-13, R-7, R-11) |
| F | FUSE (C-6,E-18,F-18,G-5,H-4) |
| FLA | FULL LOAD AMPS |
| HA | HUMIDITY ATOMIZER (M6) |
| HPR | HUMIDITY POWER RELAY (D-5, M-9) |
| HPS | HIGH PRESSURE SWITCH (H-10) |
| HPT | HUMIDITY POWER TRANSFORMER (E-5) |
| HR | HEATER CONTACTOR (M-15, P-2) |
| HS | HUMIDITY SENSOR (G-20) |
| HTT | HEAT TERMINATION THERMOSTAT (H-12) |
| HWH | HUMIDITY WATER HEATER (R-4) |
| HWP | HUMIDITY WATER PUMP (M-5) |

| SYMBOL | DESCRIPTION (Schematic Location) |
|---|---|
| IC | INTERROGATOR CONNECTOR [FRONT/REAR] (T-20) |
| IP | INTERNAL PROTECTOR (E-10,E-13,H-11,H-13) |
| MDS | MANUAL DEFROST SWITCH (G-15) |
| PDR | PUMP DIRECTION RELAY (K-5, L-8) |
| PE | PRIMARY EARTH (J-2) |
| PR | PROBE RECEPTACLE [USDA] (F-20, M-20, N-20, P-20) |
| RRS | RETURN RECORDER SENSOR (C-19) |
| RTS | RETURN TEMPERATURE SENSOR (C-19) |
| SD | STEPPER MOTOR DRIVE (D-20) |
| SMV | SUCTION MODULATING VALVE (B-20) |
| SPT | SUCTION PRESSURE TRANSDUCER (J-20) |
| SRS | SUPPLY RECORDER SENSOR (L-20) |
| ST | START - STOP SWITCH (K-4) |
| STS | SUPPLY TEMPERATURE SENSOR (B-19) |
| TC | CONTROLLER RELAY - COOLING (K-7) |
| TCC | TransFRESH COMMUNICATIONS CONNECTOR (D-5) |
| TD | CONTROLLER RELAY - WATER PUMP/ATOMIZER (K-9) |
| TE | CONTROLLER RELAY - HIGH SPEED EVAPORATOR FANS (K-10) |
| TF | CONTROLLER RELAY - DEFROST (K-13) |
| TFC | TransFRESH CONTROLLER (G-5) |
| TH | CONTROLLER RELAY - HEATING (K-12) |
| TI | CONTROLLER RELAY - IN RANGE (G-8) |
| TN | CONTROLLER RELAY - CONDENSER FAN (K-9) |
| TP | TEST POINT (D7,G-11,J-10,J-11,J-12,J-14,M-16) |
| TQ | CONTROLLER RELAY - WATER TANK HEATER (C-8) |
| TR | TRANSFORMER (M-2) |
| TRC | TransFRESH REAR CONNECTOR (E-5) |
| TV | CONTROLLER RELAY - LOW SPEED EVAPORATOR FANS (F11) |
| WH | WATER HEATER RELAY (M-7, P-4) |
| WHTT | WATER HEATER TERMINATION THERMOSTAT (H-7) |
| WP | WATER PRESSURE SWITCH (E-11) |

**Figure 5-1. Legend**

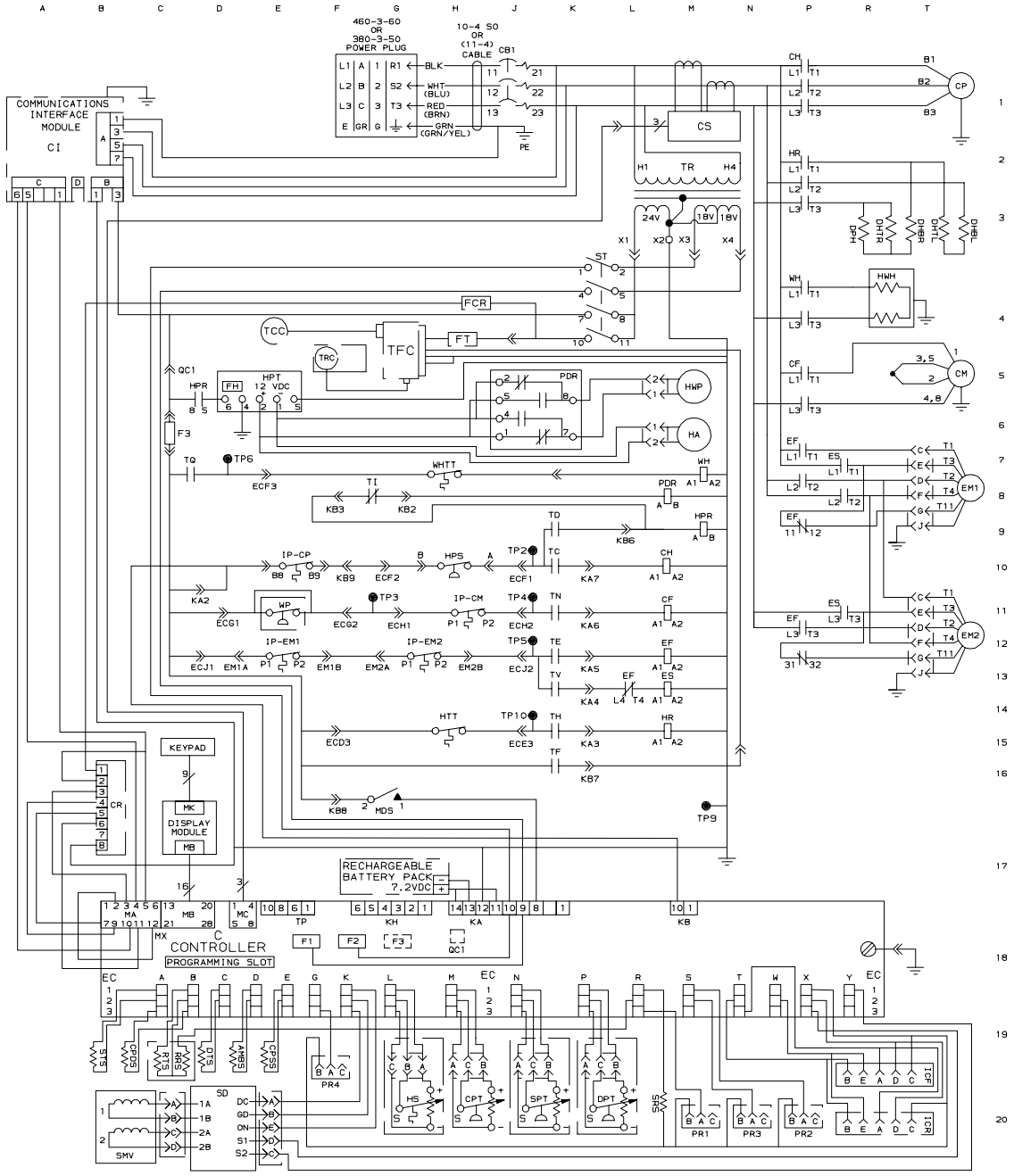



**Figure 5-2. Electrical Schematic**

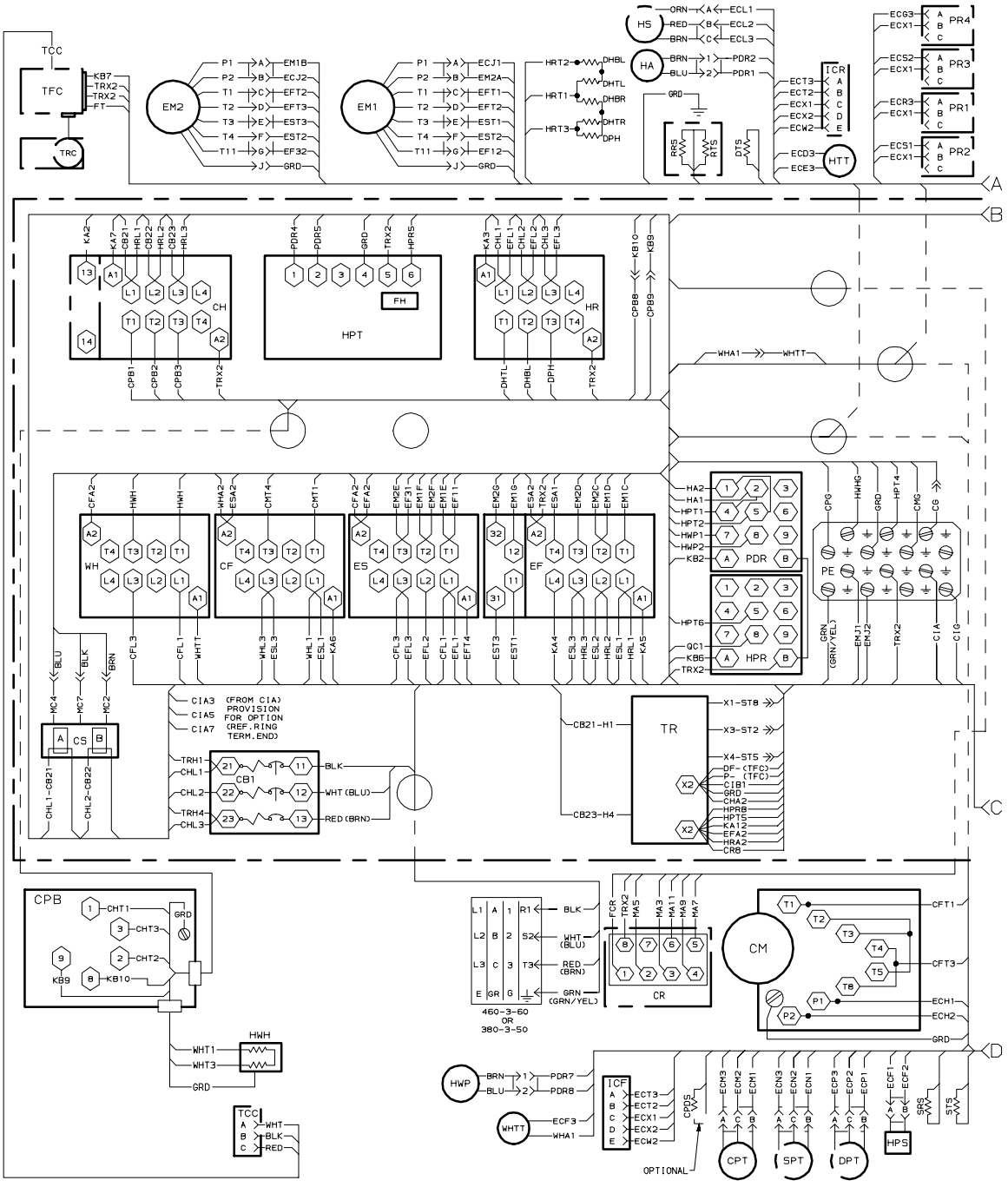



**Figure 5-3. Electrical Wiring Diagram**

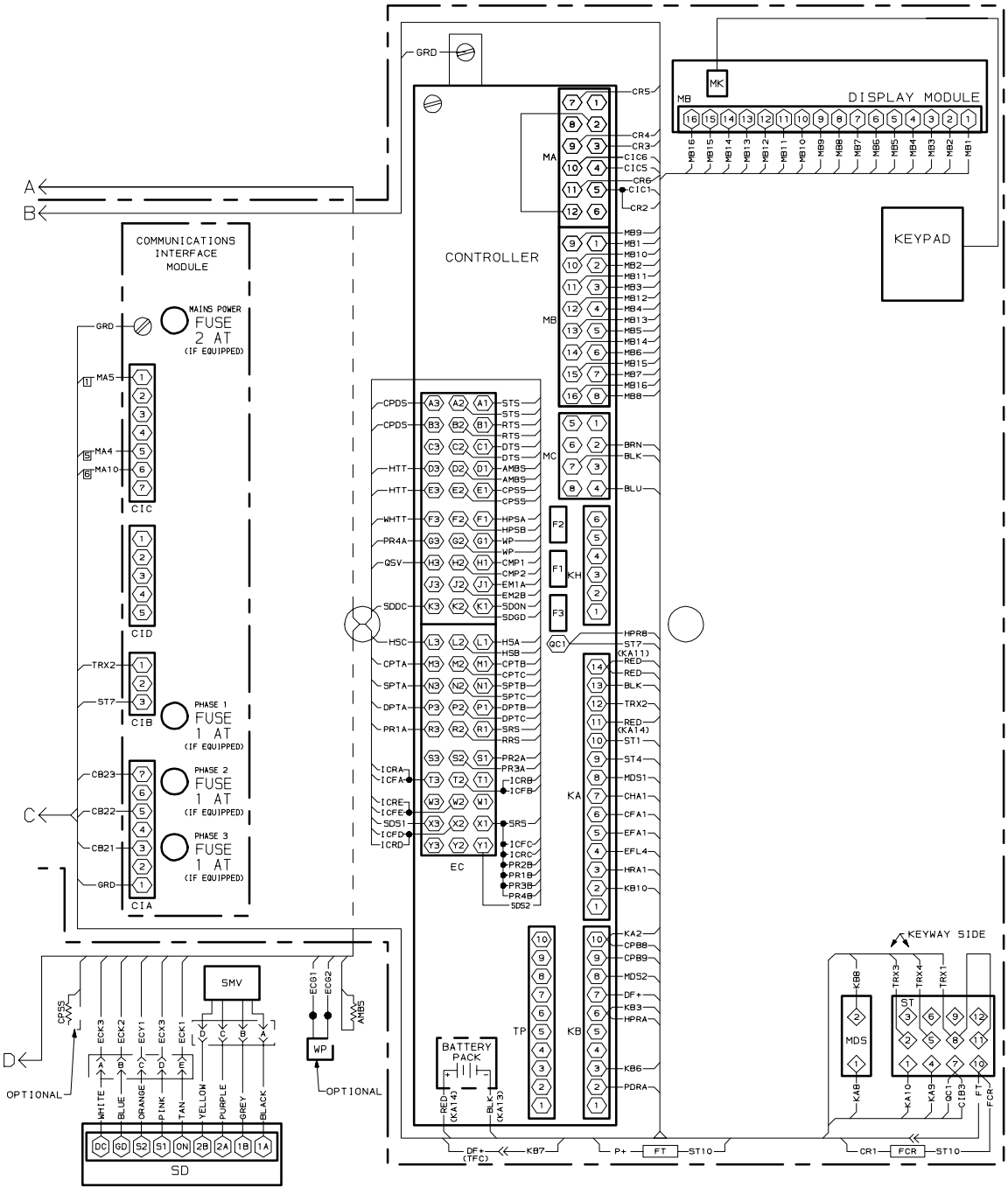



**Figure 5-3. Electrical Wiring Diagram**

# SECTION 7

# SERVICE PARTS LIST

## 7.1 ORDERING INSTRUCTIONS

All orders and inquiries for parts must include: Parts Identification Number **(PID)**, Model Number, Unit Serial Number, Part Number, Description of part as shown on list and Quantity required. Address all correspondence for parts to the following address:

CARRIER TRANSICOLD DIVISION
Replacement Components Group, TR-20
P.O. Box 4805, Syracuse, New York 13221
or FAX to: (315) 432-3778

## 7.2 LETTER DESIGNATIONS

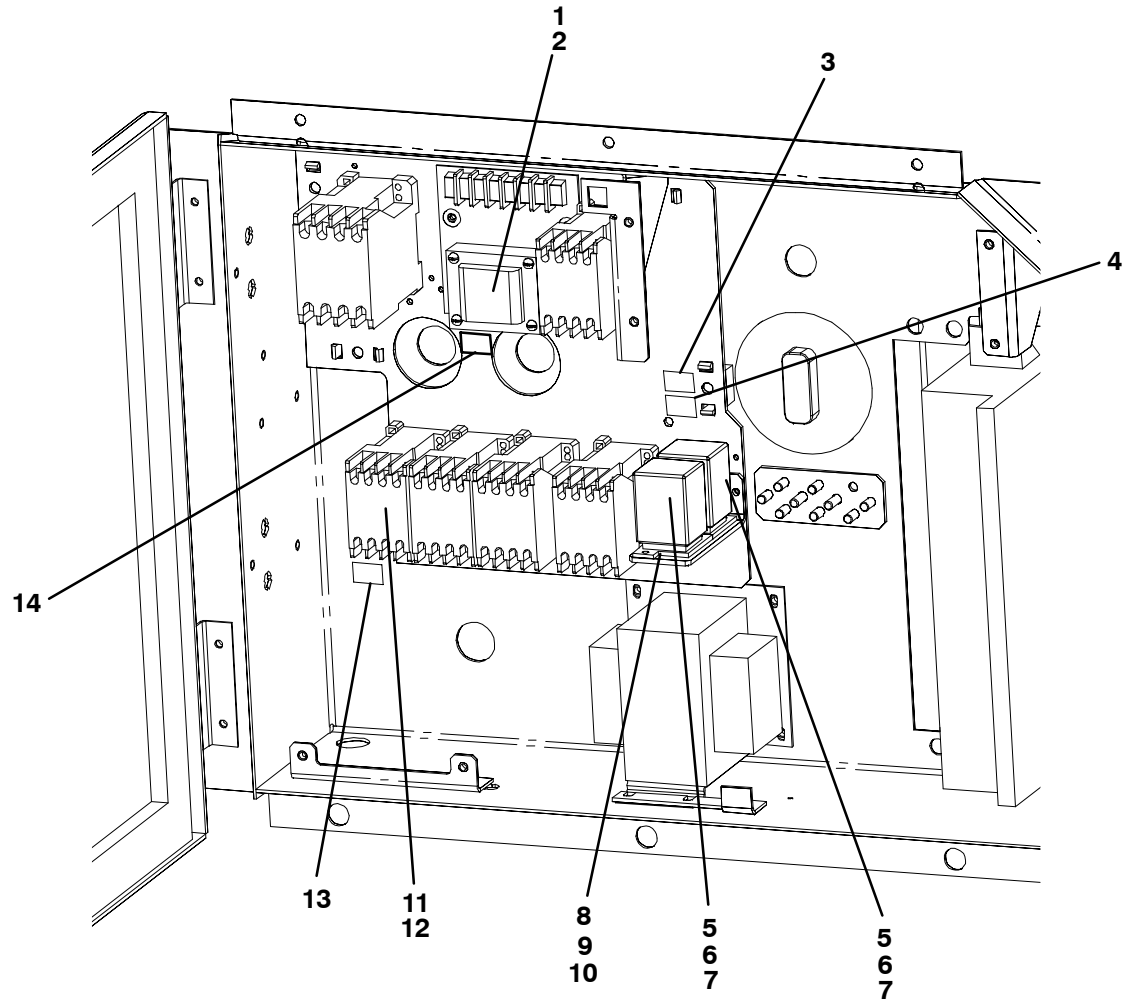
The following letter designations are used to classify parts throughout this list:

| | | |
|---|---|---|
| A/R | = | *As Required* |
| N/A | = | *Not Available* |
| NS | = | *Not shown in illustration* |
| NSS | = | *Not sold separately* – Order next higher assembly or kit |
| PID | = | *Parts Identification Number* – essential to identify unit configuration. |
| PL | = | *Purchase Locally* |
| SST | = | *Stainless Steel* – 300 Series unless otherwise specified. |
| SV | = | *Suffix SV* – added to part number designates service replacement part. |

## 7.3 PROVISION KITS

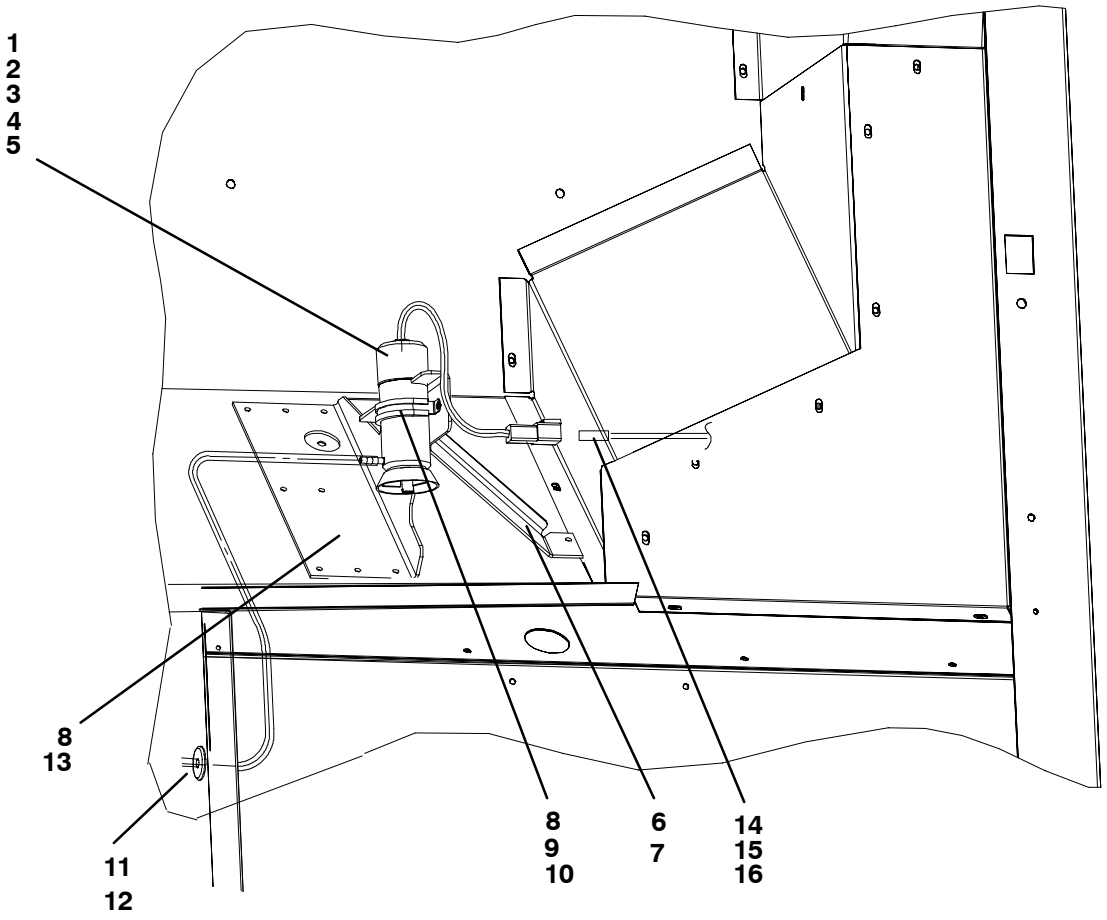
Some Carrier Transicold refrigeration units can be ordered with a “Provisioned For” Humidification option. Retro-fit Kits are available by ordering Carrier Transicold part number 76-00699-00.

## 7.4 CONTROL BOX WITH ADDED HUMIDITY COMPONENTS




| Item | Part Number | Description | Qty |
|---|---|---|---|
| 1 | 10-00380-00 | Transformer, Humidity Power (HPT) | 1 |
| 2 | 66U1-5381 | Screw, Cap Hex Head, #10-24 x 0.50 lg. – SST | 4 |
| 3 | 66CH1-1002-155 | Label, Power Direction Relay | 1 |
| 4 | 66CH1-1002-118 | Label, Humidity Power Relay | 1 |
| 5 | 66U1-5162-1 | Relay, Humidity Power(HPR) and Pump Direction (PDR) | 2 |
| 6 | 10-01153-00 | Socket, Relay | 2 |
| 7 | 73-00130-00 | Clip, Relay | 2 |
| 8 | 68-12500-00 | Bracket, Relay | 1 |
| 9 | 66U1-5391-2 | Screw, Pan Head, #8-32 x 0.50 lg. – SST | 2 |
| 10 | 34-00928-10 | Rivet, Blind 5/32 Diameter, Grip Range – 1/4-3/8 – SST | 4 |
| 11 | 10-00431-00 | Contactor, Humidity Water Heater (12 Amp) (WH) | 1 |
| 12 | 66U1-5391-3 | Screw, Pan Head, #8-32 x 0.75 lg. – SST | 2 |
| 13 | 66CH1-1002-156 | Label, Humidity Water Heater | 1 |
| 14 | 66CH1-1002-154 | Label, Humidity Power Transformer | 1 |

## 7.5 HUMIDITY ATOMIZER

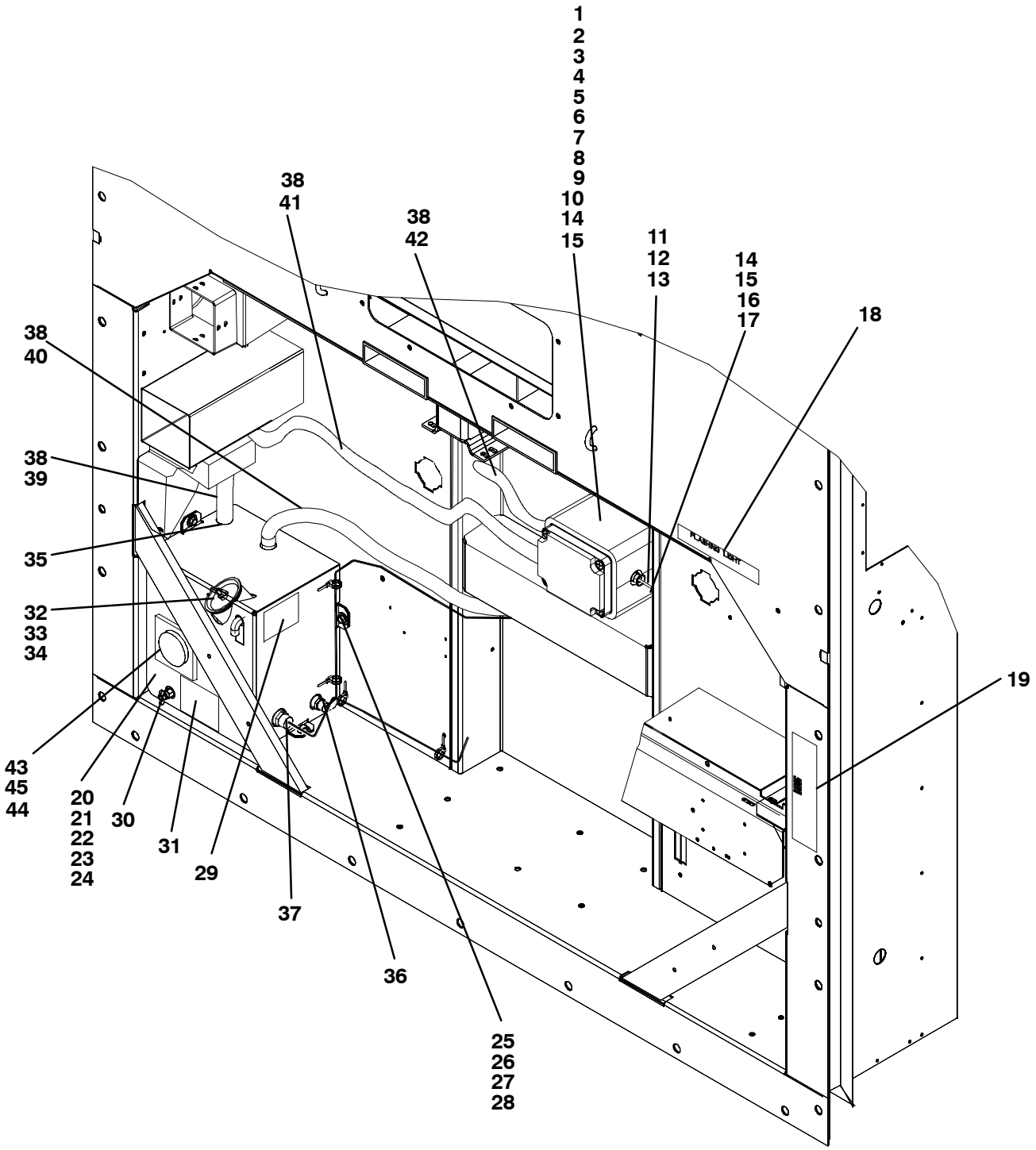



**NOTE**

Location of view for clarification - Middle right side of refrigeration unit as viewed from rear, with rear panel removed.

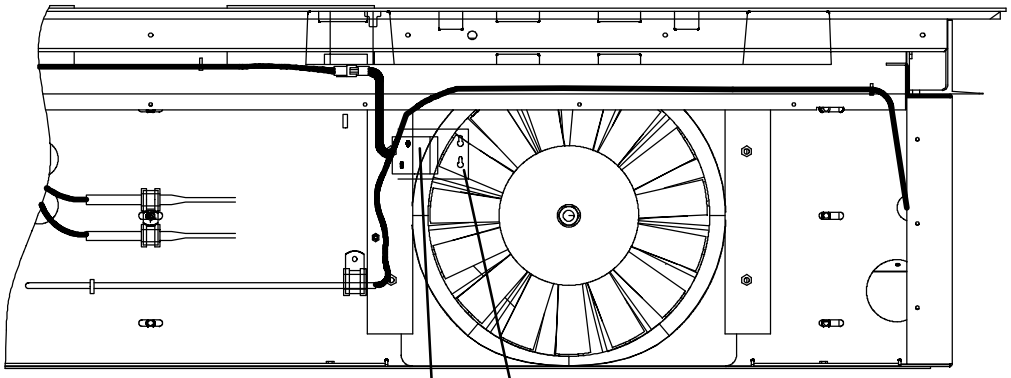
| Item | Part Number | Description | Qty |
|---|---|---|---|
| 1 | 52-00021-00 | Atomizer, Humidity (HA) – Includes: | 1 |
| 2 | 52-00021-01 | Disk, Atomizer | 1 |
| 3 | 22-01613-00 | Connector, 2 Pin | 1 |
| 4 | 22-01613-01 | Lock, Connector | 1 |
| 5 | 22-01613-14 | Contact, Pin #16 | 2 |
| 6 | 68-12552-00 | Brace, Support | 1 |
| 7 | 34-00928-09 | Rivet, Blind, 5/16 Diameter, Grip Range 1/8–1/4 | 9 |
| 8 | 44-00371-00 | Clamp, 1 1/2 Diameter | 1 |
| 9 | 66U1-5361-25 | Screw, Slotted Hex Head, 1/4-20 x 1.00 lg. – SST | 2 |
| 10 | 34-06053-05 | Washer, Mylar, 1/4 I.D. x .800 O.D. | 2 |
| 11 | 58-00065-42 | Grommet, 1/4 I.D. x 1.00 O.D. | 1 |
| 12 | 58-00507-00 | Tube, Black 1/4O.D. x ( 50 feet, Cut to Length) | A/R |
| 13 | 68-12453-00 | Bracket, Atomizer Mounting | 1 |
| 14 | 22-01613-02 | Plug, 2 Pin (Located on Harness) | 1 |
| 15 | 22-01613-03 | Lock, Connector | 1 |
| 16 | 22-01613-15 | Contact, Socket, 2 Pin | 2 |

## 7.6 HUMIDITY WATER PUMP AND WATER TANK ASSEMBLIES

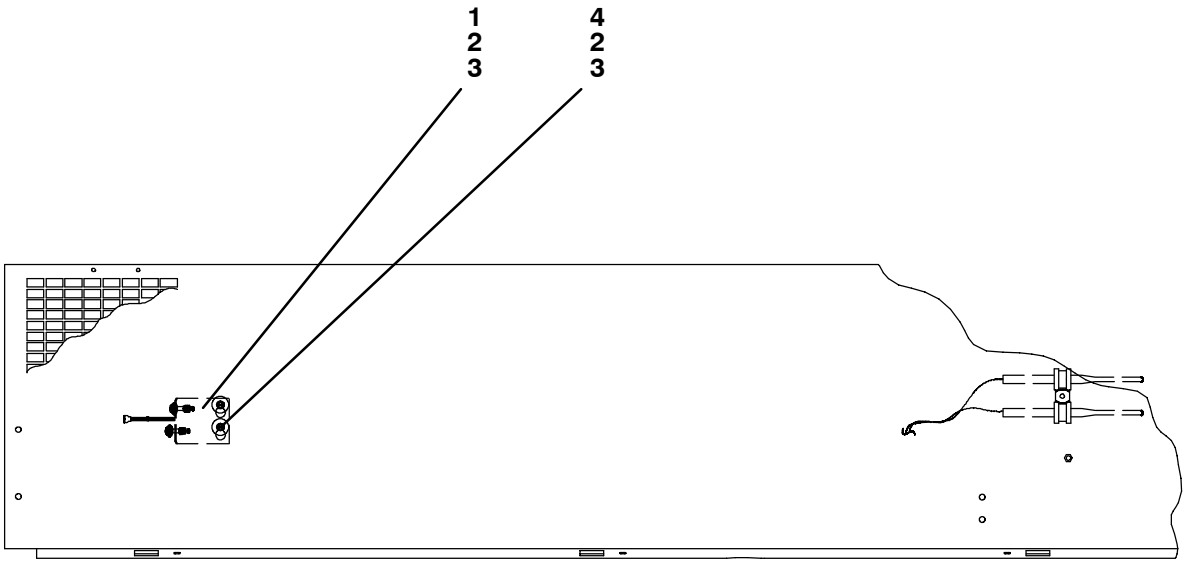


| 7.6 HUMIDITY WATER PUMP AND WATER TANK ASSEMBLIES | | | |
|---|---|---|---|
| **Item** | **Part Number** | **Description** | **Qty** |
| 1 | 79-01681-01 | Pump Assembly, Humidity Water (HWP) – Includes: | 1 |
| 2 | NSS | Pump, Water – Includes: | 1 |
| 3 | 22-01613-00 | Connector, 2 Pin | 1 |
| 4 | 22-01613-01 | Lock, Connector | 1 |
| 5 | 22-01613-14 | Contact, Pin #16 | 2 |
| 6 | 52-00020-23 | Roller Assembly | 1 |
| 7 | 52-00020-21 | Tube, Water | 1 |
| 8 | 52-00020-22 | Fitting | 2 |
| 9 | 42-00387-00 | Insulation, Pump Body | 1 |
| 10 | 42-00388-00 | Insulation, Pump Cover | 1 |
| 11 | 22-01613-02 | Plug, 2 Pin (Located on Harness) | 1 |
| 12 | 22-01613-03 | Lock, Connector | 1 |
| 13 | 22-01613-15 | Contact, Socket, 2 Pin | 1 |
| 14 | 66U1-5361-25 | Screw, Cap Hex Head, 1/4–20 x 0.75 lg. – SST | 1 |
| 15 | 66U1-5321-3 | Washer, Flat 1/4 – SST | 2 |
| 16 | 68-12454-00 | Bracket, Pump Mounting | 8 |
| 17 | 34-06053-00 | Washer, Mylar, .250 I.D. x .800 O.D. | 8 |
| 18 | 62-10111-00 | Label, Flashing Supply Light | 1 |
| 19 | 62-10110-00 | Label, Warning, Humidity Kit | 4 |
| 20 | 79-01678-02SV | Water Tank Assembly, Humidity – Includes: | 1 |
| 21 | 65-00183-00 | Tank, Water | 1 |
| 22 | 42-00374-00 | Insulation (Lower) | 1 |
| 23 | 42-00529-00 | Insulation (Upper) | 1 |
| | 42-00375-01 | Insulation (Upper) **(For Tank 65-00166-02 ONLY)** | 1 |
| 24 | 86-04446-00 | Cover, Tank | 1 |
| | 86-04226-01 | Cover, Tank **(For Tank 65-00166-02 ONLY)** | 1 |
| 25 | 66U1-5361-39 | Screw, Cap Hex Head, 5/16–18 x 1.00 lg. – SST | 3 |
| 26 | 58-50013-02 | Washer, Mylar, .375 I.D. x 1.00 O.D. | 3 |
| 27 | 66U1-5321-4 | Washer, Flat, 5/16 – SST | 3 |
| 28 | 58-04026-28 | Protector, Mylar | 6 |
| 29 | 62-02985-00 | Label, Warning, Water Heater | 1 |
| 30 | 40-00572-00 | Draincock, 1/4 NPT | 1 |
| 31 | 62-02967-00 | Label, Instruction | 1 |
| 32 | 65-00183-01 | Cap Assembly | 1 |
| | 65-00166-02 | Cap Assembly **(For Tank 65-00166-02 ONLY)** | 1 |
| 33 | 34-00928-13 | Rivet, Blind, 3/16 Diameter, Grip Range – 1/8-1/4 – SST | 1 |
| 34 | 58-04026-30 | Washer, Mylar, .205 I.D. x 2.00 O.D. | 1 |
| 35 | 40-00573-00 | Connector, Male, 1/4 NPT x 1/4 Tube – Plastic | 1 |
| 36 | 12-00424-02 | Thermostat, Water Heater Termination (WHTT) | 1 |
| 37 | 24-02006-00 | Heater, Humidity Water (HWH) | 1 |
| 38 | 58-00507-00 | Tube, 1/4 O.D. (50 Feet, Cut to Length) | A/R |
| 39 | 42-01172-03 | Insulation | 1 |
| 40 | 42-01172-02 | Insulation | 1 |
| 41 | 42-01172-13 | Insulation | 1 |
| 42 | 42-01172-14 | Insulation | 1 |
| 43 | 12-00441-00 | Water Level Gauge – Includes: | 1 |
| | 12-00441-11SV | Dial – Includes: | 1 |
| | 12-00441-13 | Gasket, Teflon | 1 |
| | 12-00441-12 | Screw, Dial | 2 |
| 44 | 12-00441-10 | Screw, 5/16–24 x .75 lg. – SST | 4 |
| 45 | 34-06053-06 | Washer, Mylar, .324 I.D. x .566 O.D. | 4 |

## 7.7 HUMIDITY SENSOR



**FOR 511 UNITS**
**Upper right corner**
**of refrigeration unit as viewed from rear.**




**FOR 489 UNITS**
**Upper left corner**
**of refrigeration unit as viewed from rear.**

| Item | Part Number | Description | Qty |
|---|---|---|---|
| 1 | 10-00413-00 | Sensor, Humidity (HS) | 1 |
| 2 | 66U1-5371-10 | Screw, Hex Head, #10-24 x 1.00 lg. – SST | 4 |
| 3 | 66U1-5321-8 | Washer, Flat, #10 – SST | 4 |
| 4 | 62-13181-00 | Bracket, Sensor | 1 |