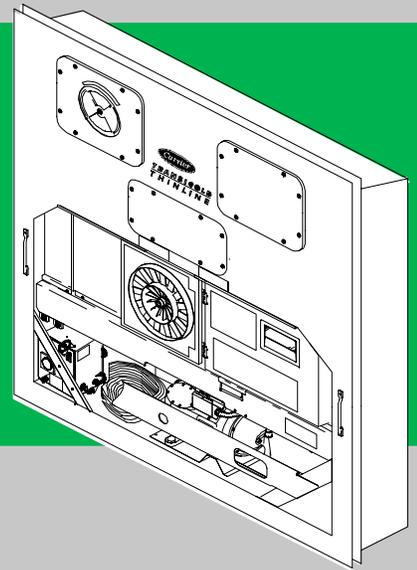
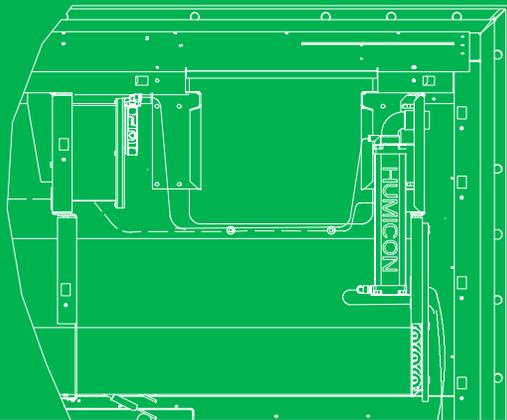




Container Refrigeration



TECHNICAL SUPPLEMENT
For
Container Refrigeration Units
with
NATUREFRESH
Humidity Management System
Models 69NT541-001 to 199



TRANSICOLD

TECHNICAL SUPPLEMENT CONTAINER REFRIGERATION UNIT

NATUREFRESH
Humidity Management System
Models 69NT541-001 to 199

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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 CO₂ (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

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

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

CAUTION

DO NOT allow oil to contaminate the humidity system. Oil residue will clog the Humicon and cause failure.

CAUTION

Humidity system performance and life may be reduced with use of a liquid other than fresh, clean water.

SECTION 1

INTRODUCTION

1.1 INTRODUCTION

This Technical Supplement contains operation/service and parts listing information specific to the NatureFresh Humidity Management System, and is to be used in conjunction with the separately bound Operation and Service Manual and Service Parts List 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 69NT40-	TYPE OF MANUAL
T-316	Refrigeration Unit	541-001 to 199	Operation and Service
T-316PL	Refrigeration Unit	541-001 to 199	Service Parts List

SECTION 2

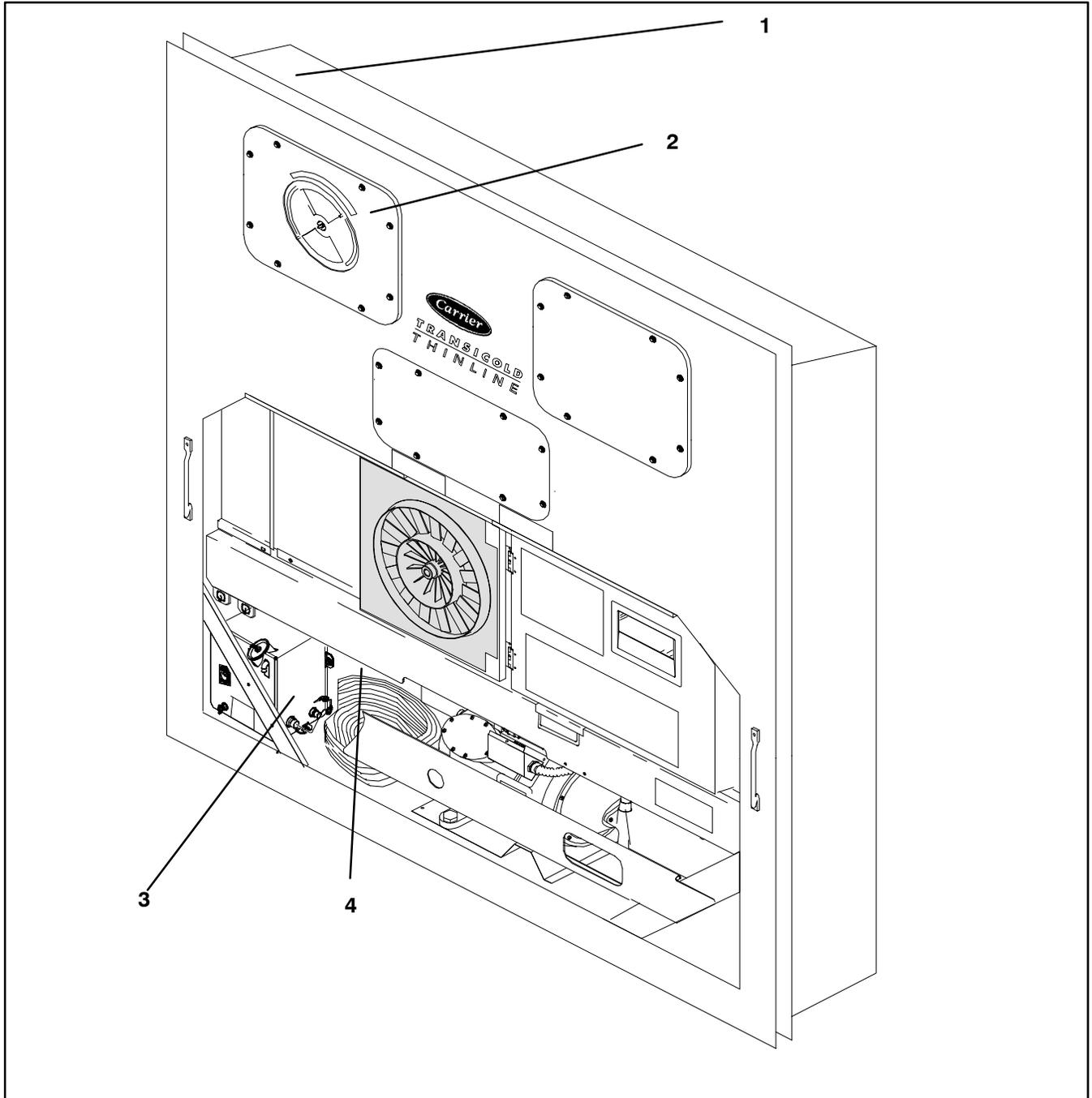
DESCRIPTION

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 upper rear panel allows access to the Humicon.



- | | |
|--------------------------------------------------------------------|------------------------|
| 1. Evaporator Coil Support (LH) - Humicon Location | 3. Humidity Water Tank |
| 2. Evaporator Section Access Panel - Humidity Sensor (HS) Location | 4. Humidity Water Pump |

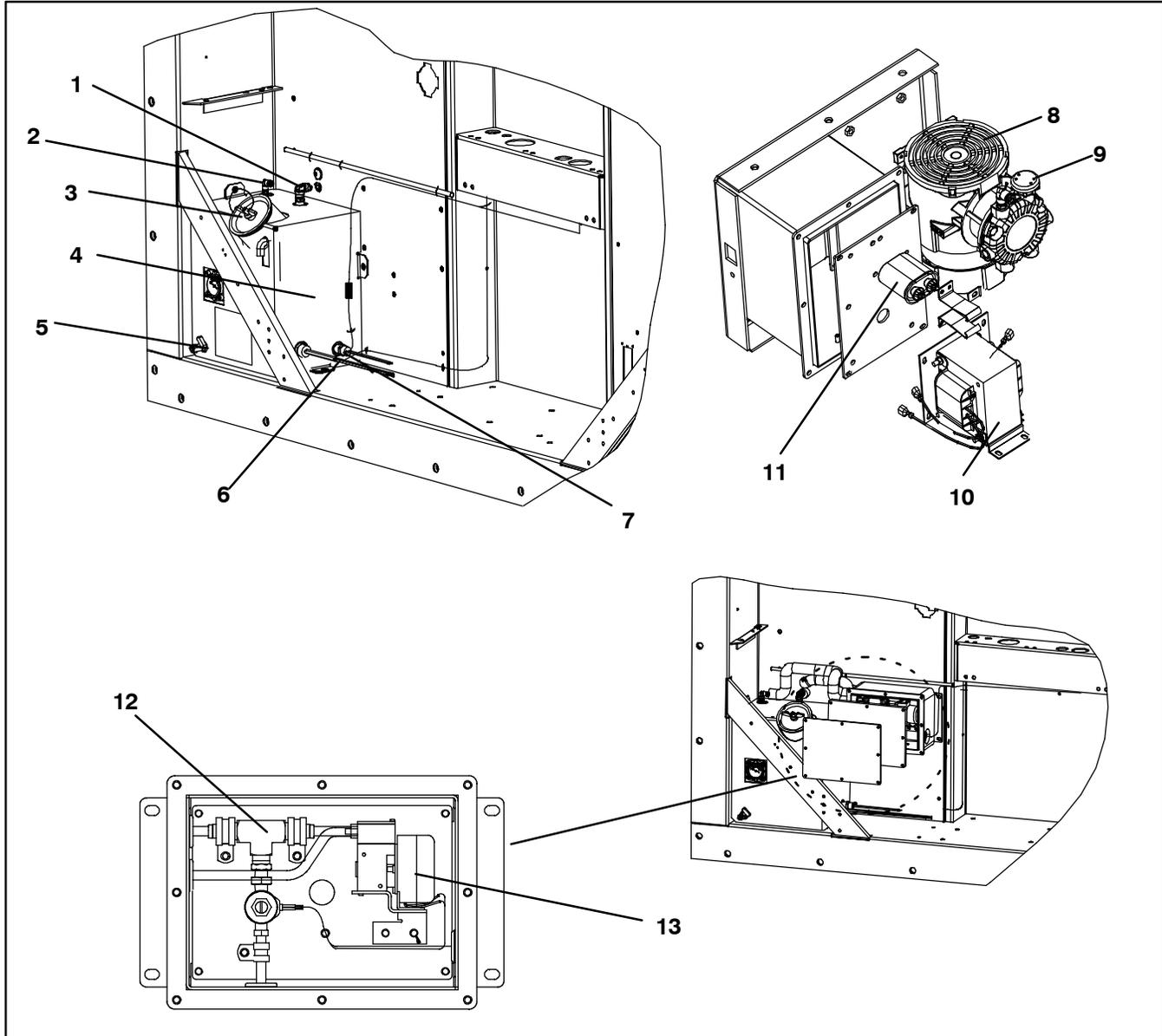
Figure 2-1. Refrigeration Unit - Front

2.1.2 Humidity Water Pump (HWP), Humidity Air Pump (HAP) and Humidity Water Tank (HWT)

The humidity water pump (HWP) is a sealed, diaphragm type pump that contains a single direction, brushless DC motor that is enclosed to protect it from harsh environments. The pump is located in the front of the unit, next to the humidity water tank.

The humidity Air Pump (HAP) is an oil-less 120 VAC piston style air pump, mounted in a protective enclosure to the center coil support. Power is supplied by a 460v/120v stepdown humidity transformer mounted in the enclosure.

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 Tank Return Line | 8. Humidity Air Pump (HAP) |
| 2. Humidity Water Supply Line | 9. Humidity Air Pump Intake Filter |
| 3. Humidity Water Tank Fill Cap | 10. Humidity Air Pump Transformer |
| 4. Humidity Water Tank | 11. Humidity Air Pump Capacitor |
| 5. Drain Valve | 12. Bypass Valve |
| 6. Humidity Water Heater (HWH) | 13. Humidity Water Pump (HWP) |
| 7. Water Heater Termination Thermostat (WHTT) | |

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

2.1.3 Humicon

The Humicon uses air supplied by the humidity air pump (HAP) and water supplied by the humidity water pump

(HWP) through the disposable water filter (refer to Figure 2-3). The humidifying mist is produced when the humidity air pump pushes air/water through the Humicon.

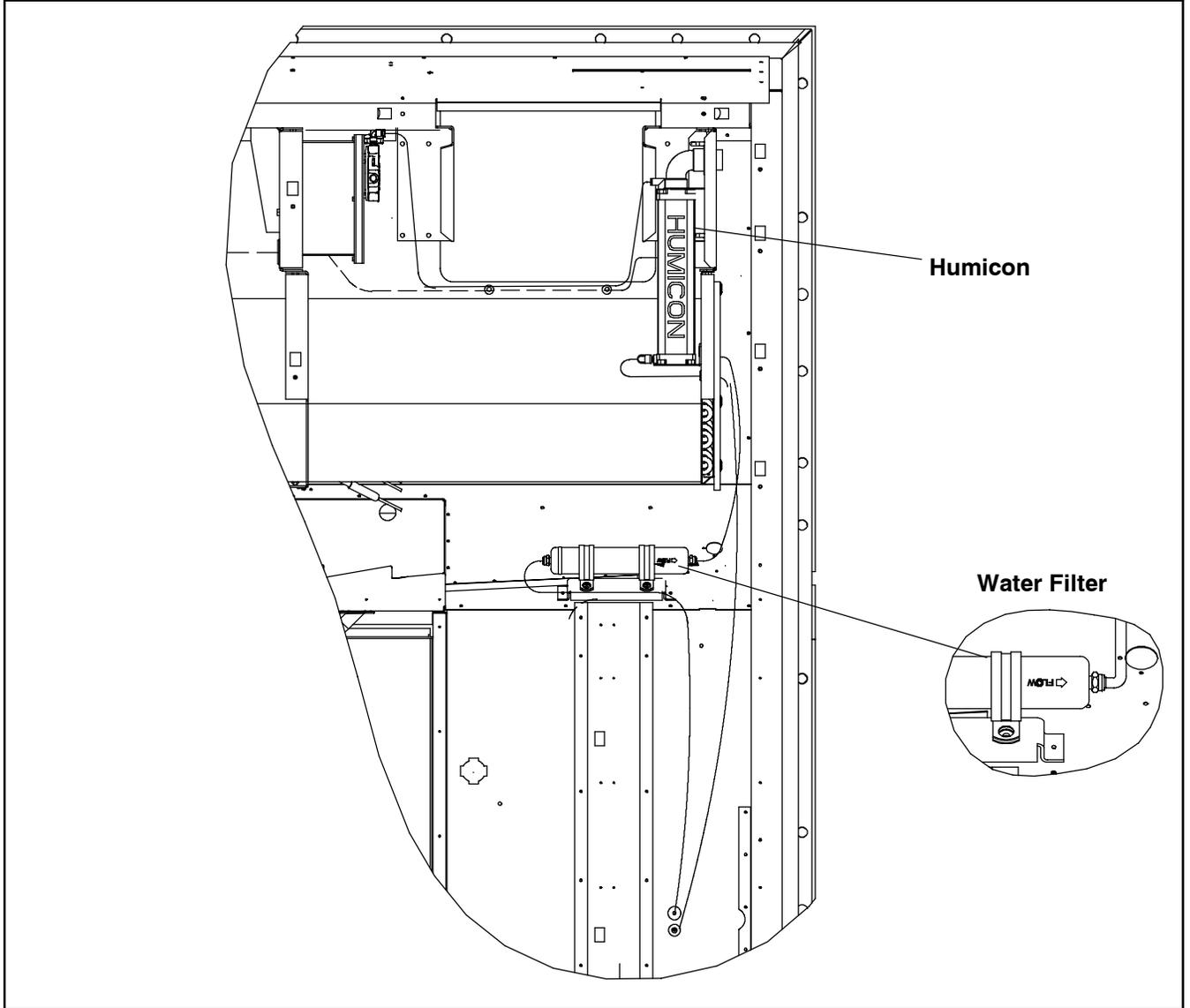
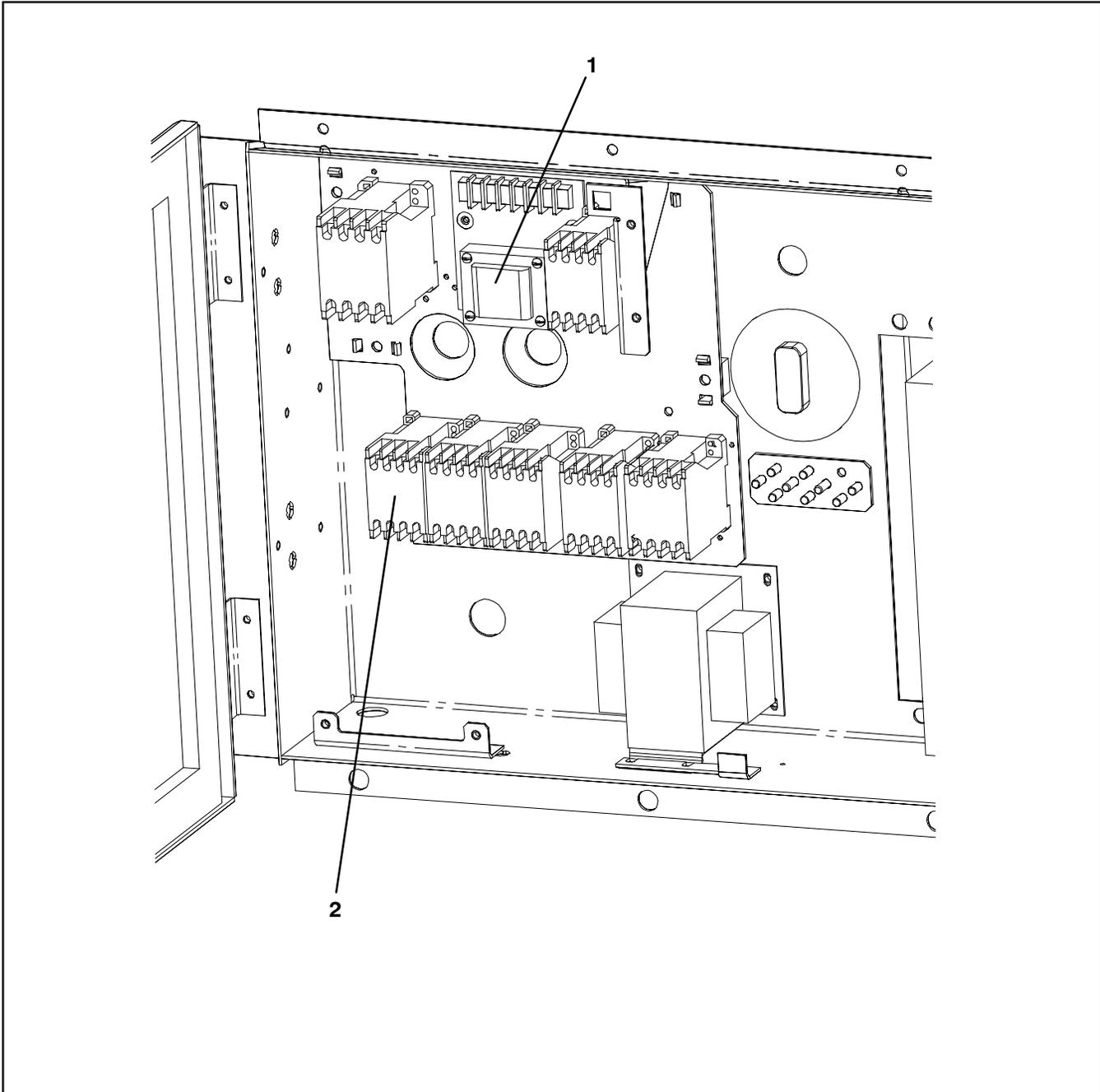


Figure 2-3 Humicon

2.1.4 Control Box with added Humidity Components

The control box with the additional Humidity Management System option includes; a power supply (HPT) with fuse (FH), and contactors refer to Figure 2-4.

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) for Humidity Water Pump (HWP)

2. Humidity Water Heater Contactor (WH)

Figure 2-4 Control Box with added Humidity Components

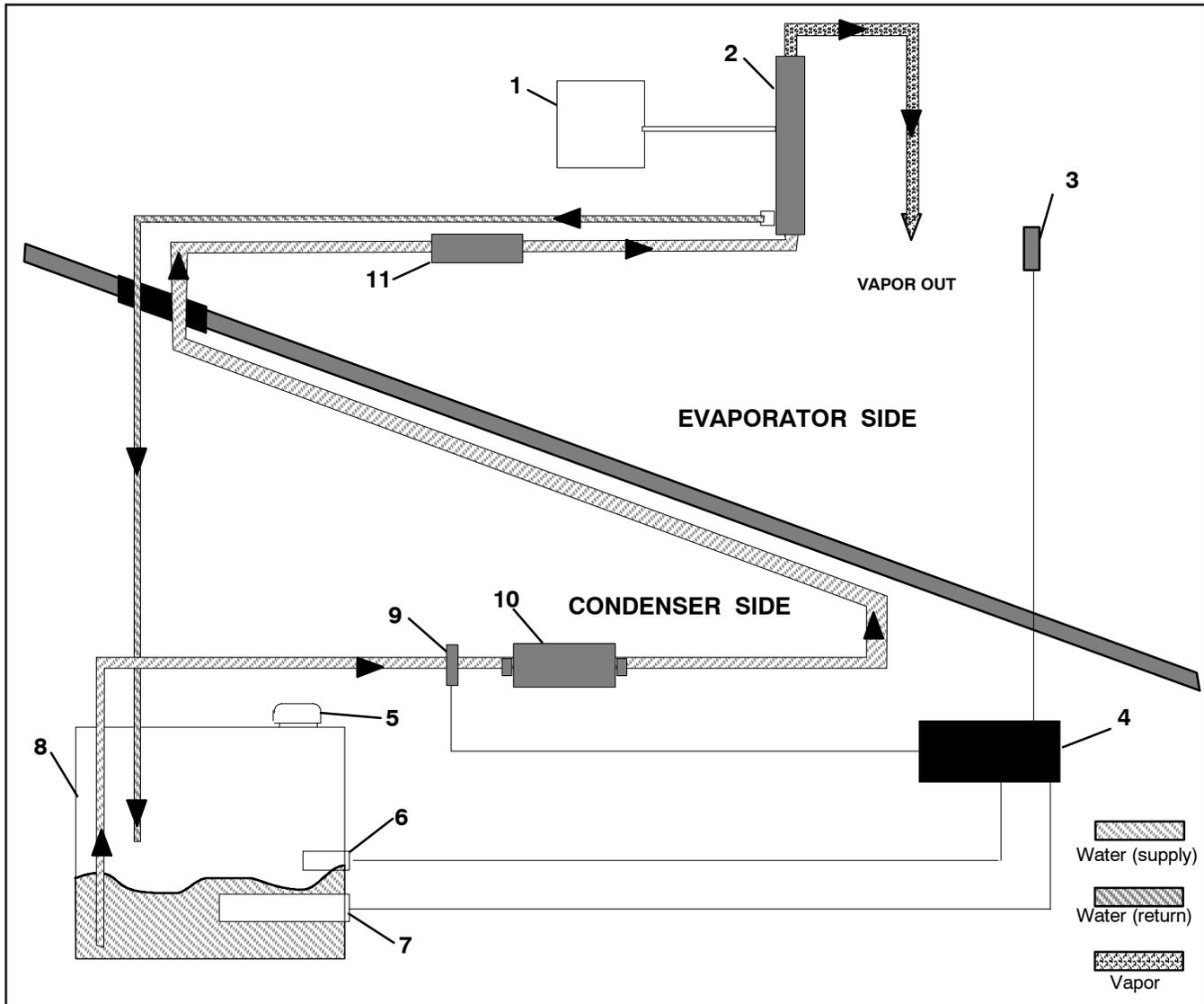
2.2 ELECTRICAL DATA

a. 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		
b. Humidity Water Pump (HWP)	Voltage Input	12 VDC \pm 10%		
	Wires	24 AWG, 2 Conductor Cable, Multistranded insulated wire (one blue, one red)		
	Water Connections	Two push on barb type fittings		
	Single Direction, Brushless, 12 VDC motor, Diaphragm pump			
c. 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		
d. Water Heater Termination Thermostat (WHTT)	Voltage Input	24 VAC Nominal		
	Closes:	130°F \pm 5°F		
	Open	150°F \pm 5°F		
	Wires	Two 18 AWG, Multistranded insulated wire		
e. Fuse (FH)	Humidity Power Transformer (HPT)	5 amps (FH)		

2.2.1 Humidity Management System Operation

Initiation of the humidification mode will result in the energizing of the water and air pumps. The water pump circulates water from the storage tank to the Humicon unit, while excess water is returned to the water tank.

The air pump pushes air and water through the Humicon creating mist to humidify the container. When demand for humidification ends, a bypass solenoid valve opens and allows the water pump to draw air through the water lines to clear the lines of any residual water to prevent freeze-up and contamination.



- | | |
|----------------------------------------|--------------------------|
| 1. Air Pump | 7. Humidity Water Heater |
| 2. Humicon | 8. Humidity Water Tank |
| 3. Humidity Sensor (HS) | 9. Bypass Solenoid Valve |
| 4. Control Box | 10. Humidity Water Pump |
| 5. Water Tank Cap | 11. Water Filter |
| 6. Water Heater Termination Thermostat | |

Figure 2-5 Humidity Flow Diagram

SECTION 3

MICROPROCESSER

3.1 GENERAL LAYOUT OF THE CONTROLLER

The key pad (Figure 3-6) is mounted on the right-hand side of the control box. The key pad consists of eleven push button switches that act as the user's interface with the controller. Descriptions of the switch functions are provided in Table 3-1.

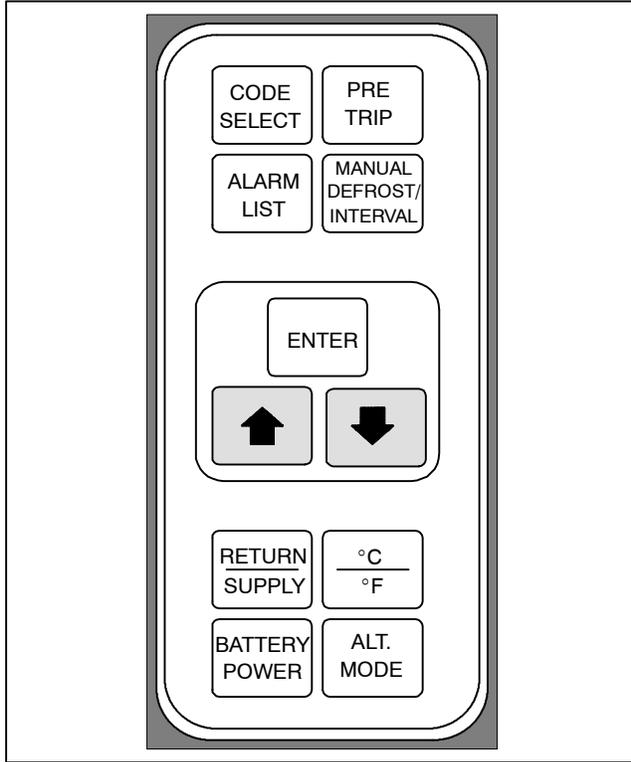


Figure 3-6 Key Pad

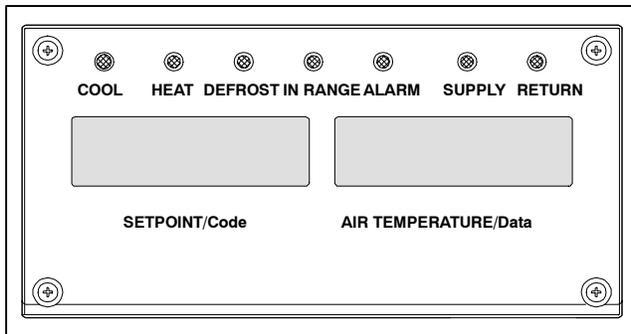


Figure 3-7 Display Module

3.1.1 Display Module

The display module (Figure 3-7) consists of five digit displays and seven indicator lights. The indicator lights include:

1. Cool - White LED: Energized when the refrigerant compressor is energized.
2. Heat - Orange LED: Energized to indicate heater operation in the heat or defrost mode.
3. Defrost - Orange LED: Energized when the unit is in the defrost mode.

4. In-Range - Green LED: Energized when the controlled temperature probe is within specified tolerance of set point.

Table 3-1 Key Pad Function

KEY	FUNCTION
Code Select	Accesses function codes.
Pre-Trip	Displays the pre-trip selection menu. Discontinues pre-trip in progress.
Alarm List	Displays alarm list and clears the alarm queue .
Manual Defrost/Interval	Displays selected defrost mode. Depressing and holding the Defrost interval key for five (5) seconds will initiate defrost using the same logic as if the optional manual defrost switch was toggled on.
Enter	Confirms a selection or saves a selection to the controller
Arrow Up	Change or scroll a selection upward. Pre-trip advance or test interruption.
Arrow Down	Change or scroll a selection downward. Pre-trip repeat backward
Return/Supply	Displays non-controlling probe temperature (momentary display).
°C/°F	Displays alternate English/Metric scale (momentary display). When set to °F, pressure is displayed in psig and vacuum in "/hg. "P" appears after the value to indicate psig and "i" appears for inches of mercury. When set to °C, pressure readings are in bars. "b" appears after the value to indicate bars.
Battery Power	Initiate battery backup mode to allow set point and function code selection if AC power is not connected.
ALT. Mode	This key is pressed to switch the functions from the temperature software to the DataCORDER Software. The remaining keys function the same as described above except the readings or changes are made to the DataCORDER programming.

NOTE

The controlling probe in the perishable range will be the SUPPLY air probe and the controlling probe in the frozen range will be the RETURN air probe.

5. Supply - Yellow LED: Energized when the supply air probe is used for control. When this LED is illuminated, the temperature displayed in the AIR TEMPERATURE display is the reading at the supply air probe. This LED will flash if dehumidification or humidification is enabled.
6. Return - Yellow LED: Energized when the return air probe is used for control. When this LED is illuminated,

the temperature displayed in the AIR TEMPERATURE display is the reading at the return air probe. This LED will flash if dehumidification or humidification is enabled.

7. Alarm - Red LED: Energized when there is an active or an inactive shutdown alarm in the alarm queue.

3.2 CONFIGURATION VARIABLES

NOTE

In order to enable the correct configuration variables the controller must be reconfigured for the correct unit model number (i.e., 69NT40-541-009) using the multi-configuration flash memory card.

Configuration variable CnF35 must be turned "ON" to allow the humidification mode and a humidity setting must be entered in its associated controller function code Cd33 to operate. Configuration variable CnF35 will activate dehumidification and humidification.

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

When configuration variable CnF35 is set to "OFF:"

- The humidification operating mode is deactivated.
- The dehumidification operating mode reverts to configuration variable configuration CnF04 for operating requirements.
- If configuration CnF04 is "OFF," then function code Cd33 will display "-----."
- If configuration CnF04 is "ON," then function code Cd33 will allow a dehumidification set point to be chosen. (Refer to Table 3-3)

3.3 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 Cd33 is explained as follows:

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 74%, the controller will activate dehumidification, and from the set point range of 75% 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) opens. 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
- 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 default settings for configuration variables listed below reflect a Service Parts **unconfigured** Controller module, and NOT a **configured** Controller module specific to models with the EverFresh Humidity Management System.

Table 3-2 Controller Humidification Configuration Variables			
Configuration	TITLE	Default	Option
CnF04	Dehumidification Mode	On	OFF
CnF28	Bulb Mode	NOr	bulb
CnF35	Humidification Mode	OFF	On

Table 3-3 Controller Code Assignments				
Configuration Code	Setting	Cd33 Function Code Set Point Range		Mode of Operation
CnF04 CnF 28 CnF35	ON, NOr & OFF	65%	95%	Dehumidification (only)
	ON, bULb & OFF	60%	95%	Dehumidification (only)
	ON, NOr & OFF	65%	74%	Dehumidification (only)
	ON, bULb & OFF	60%	74%	Dehumidification (only)
	ON, NOr & OFF or ON, bULb & OFF	75%	95%	Humidification (only)

SECTION 4

OPERATION

4.1. INTRODUCTION

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

NOTE

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

4.2. PRE-TRIP INSPECTION

- 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").
- Inspect water lines for cracks or damage. Effect permanent or temporary repairs.
- Flush water tank with fresh, clean water.
- Close the drain valve.
- Ensure fresh air vent is closed.

4.3. HUMIDITY SYSTEM PREPARATION

- Fill water tank to overflowing with fresh, clean water. DO NOT use deionized water, it will cause the humidity system to function poorly.



CAUTION

DO NOT allow oil to contaminate the humidity system. Oil residue will clog the Humicon and cause failure.



CAUTION

Humidity system performance and life may be reduced with use of a liquid other than fresh, clean water.

- Input desired relative humidity set point by using the key pad.

4.4. HUMIDITY SYSTEM CONDITIONS FOR OPERATION

The Humidification mode is initiated and the humidity system turned "ON", relay HC 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.
- Configuration variable CnF35 (Humidification Mode) is selected "ON."
- The system is not in Pre-Trip mode.
- Function code Cd33 (Dehumidification Control) has a set point greater than or equal to 75% RH.
- The control temperature is greater than or equal to -0.6_C (31_F).
- 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 CnF12 (TXV/Solenoid Quench Valve) is selected "OUT."

4.5. HUMIDITY SYSTEM OPERATION

- The humidity power transformer (water pump) (HT), and humidity water pump (HWP) and humidity air pump (HAP) are energized by the humidity contactor (HC). The contactor is normally OPEN. If the ambient temperature is above freezing, the humidity contactor (HC) is energized. This will energize the humidity water pump (HWP) and the humidity air pump (HAP).
- When demand for humidification ends, the bypass solenoid valve will open, allowing the humidity water pump (HWP) to draw air into the system. The pump will run this way for 3 minutes, purging the lines of water. At the end of the 3 minute period, the humidity contactor (HC) will open and stop the humidity air pump (HAP) and the the humidity water pump (HWP). The bypass solenoid valve will de-energize and close.
- 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 (HWH) "ON" (to raise the water temperature) for four hours. This is to prevent water lines and the water tank from freezing.

4.5.1. Humidity Water Heater Operation

The humidity water heater contactor (WH) 460VAC, is being energized when the controller calls for humidity. This contactor 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 energized if ALL of the following conditions are satisfied.:

- Configuration CnF35 (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.
- Unit is not in Pre-Trip.
- 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.

4.6. HUMIDITY SYSTEM SHUTOFF

Humidification mode is terminated, the humidity system is turned “OFF,” and controller relay HC de-energizes, if ANY of the following occurs:

- The relative humidity (%RH) reading rises to the set point.
- Pulldown mode is activated.
- The controller temperature set point is changed to 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.
- Configuration CnF35 (Humidification Mode) selection is changed to “OFF.”
- The refrigeration system enters Pre-Trip mode.
- Function code Cd33 (Dehumidification Control) selection is changed to “OFF.”
- “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.
- Ambient temperature becomes less than -17.8_C (0_F).

4.7. HUMIDITY WATER HEATER SHUTDOWN

The humidity water heater contactor (WH) is de-energized (opened) to de-energize the humidity water heater (HWH) when ANY of the following conditions are satisfied:

- Configuration CnF35 (Humidification Mode) selection is “OFF”.
- Function code Cd33 (Dehumidification Control) is changed to a setpoint lower than 75%RH or “OFF”.
- 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).
- 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) is out of setpoint range.
- The water heater termination thermostat (WHTT) temperature is reading out of range (refer to section 2.2).
- Function code Cd33 (Dehumidification Control) selection is “OFF.”

4.8. HUMIDITY SYSTEM SHUTDOWN PROCEDURE

Shutdown Procedure:

- a. Press the “CODE SELECT” key (see Figure 3-6).
- 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).

4.9. AFTER HUMIDITY SYSTEM SHUTDOWN

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



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

SECTION 5
TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY/REFERENCE SECTION
5.1 HUMIDITY SYSTEM NOT OPERATING		
Humidity level will not increase	Container (box) leakage may be excessive	6.2.1
	Fresh air make-up vent is open	Check
	Unit not configured for Humidification Mode	6.2.4
	Water pump is defective	6.2.5
	Water line is blocked	6.2.2
	Power supply is defective	2.2
	No water in tank	Check
	Set Point is not in the Humidification Range	Table 3-3
	Humidity sensor is defective	6.2.7
	Refrigeration system temperature is not in range	Check
	Water line connections are faulty	6.2.3
	Incorrect wiring	7.1
5.2 HUMIDITY WATER PUMP DOES NOT OPERATE		
Water pump does not operate	Unit not configured for Humidification Mode	6.2.4
	Water pump is defective	6.2.5
	Unit may be in an "Off Cycle"	Check
	Control relay HC did not energize	Check
	Power supply is defective	6.2.6
	Incorrect wiring	7.1
5.3 POWER SUPPLY DOES NOT OPERATE		
Power supply does not operate	No 24 VAC input	6.2.6
	No ground connection	6.2.6
	Control relay HC did not energize	Check
	Fuse (FH) is blown	6.2.6
	Incorrect wiring	7.1
5.4 HUMIDITY WATER HEATER DOES NOT OPERATE		
Water heater does not operate	Thermostat (WHTT) is defective or open	6.2.9
	Heater contactor (WH) did not energize	Check
	No controller relay (TQ) output	Check
	Incorrect wiring	7.1

SECTION 6

SERVICE

6.1 HUMIDITY SYSTEM FLUSHING

- Inspect and flush tank after every trip.
- Drain the humidity water tank and leave drain valve (see Figure 2-2) open.

6.2 DIAGNOSIS

6.2.1 Container Air Leakage

- Verify the container leakage against ISO specification 1496.

6.2.2 Humidity Water Line Inspection

- Inspect for signs of water leakage during the humidity water pump (HWP) ON cycle.
- Replace any cracked, worn or damaged water lines.

6.2.3 Humidity Water Line Connection Inspection

- Ensure water lines are fully connected and not leaking. See Figure 6-1.

6.2.4 Humidification Configuration Variable /Function Code Verification

- See Table 3-2 and Table 3-3.
- Check controller function code Cd20 (Config/Model #) for the correct unit model number, and refer to the e manual listed in Table 1-1, then verify the humidification option is valid.

6.2.5 Humidity Water Pump (HWP) Inspection

- Ensure that the humidity water pump (HWP) is powered (12V DC nominal).
- Ensure that the water lines are connected to proper inlet and outlet fittings. See Figure 6-1.
- Disconnect the outlet water line and ensure that the pump delivers water.

6.2.6 Power Supply Inspection

- Ensure that the power supply input is 24V AC nominal.
- Ensure that the power supply output is 12V DC nominal.
- Ensure that the power supply fuse (FH) is intact.

6.2.7 Humidity Sensor (HS) Inspection

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

6.2.8 Humidity Water Heater (HWH) Inspection

- Ensure the heater resistance is within the specified range, refer to section 2.2.
- Ensure the heater is supplied with 460V AC nominal.

6.2.9 Water Heater Termination Thermostat (WHTT)

- Ensure the continuity of the water heater termination thermostat (WHTT) by first filling the tank with ice water and measuring the resistance.
- Ensure the water heater termination thermostat (WHTT) is supplied with 24V AC nominal.

6.2.10 Humidity Air Pump (HAP)

NOTE

The humidity air pump (HAP) is an OIL-LESS PUMP and does not require lubrication.

- Inspect, clean/replace the intake filter every 500 hours of use, or more frequently as conditions require.
- Ensure that all electrical connections to the humidity air pump (HAP) are secure.
- Inspect the humidity air pump (HAP) air line connections. See Figure 6-1.

6.2.11 Humicon



DO NOT allow oil to contaminate the humidity system. Oil residue will clog the Humicon and cause failure.

The Humicon has no moving parts and requires no service under normal conditions. The most common reason for humicon failure is oil contamination.

Symptoms of oil contamination include:

- Unit unable to reach humidity setpoint
- Low water usage
- Low vapor output
- Oil residue in water supply tank.

If Oil contamination is confirmed, clean and flush the system and replace the humicon.

6.3 VISUAL INSPECTION

- Inspect the water lines and connections for signs of leaks. See Figure 6-1.
- Inspect the water pickup tube on top of the water tank and ensure that it is properly connected.
- Inspect the Humicon and humidity water pump (HWP) connections.
- Ensure that all electrical connections to the humidity power transformer (HPT), and humidity power and air /water pumps (HAP and HWP) are secure.

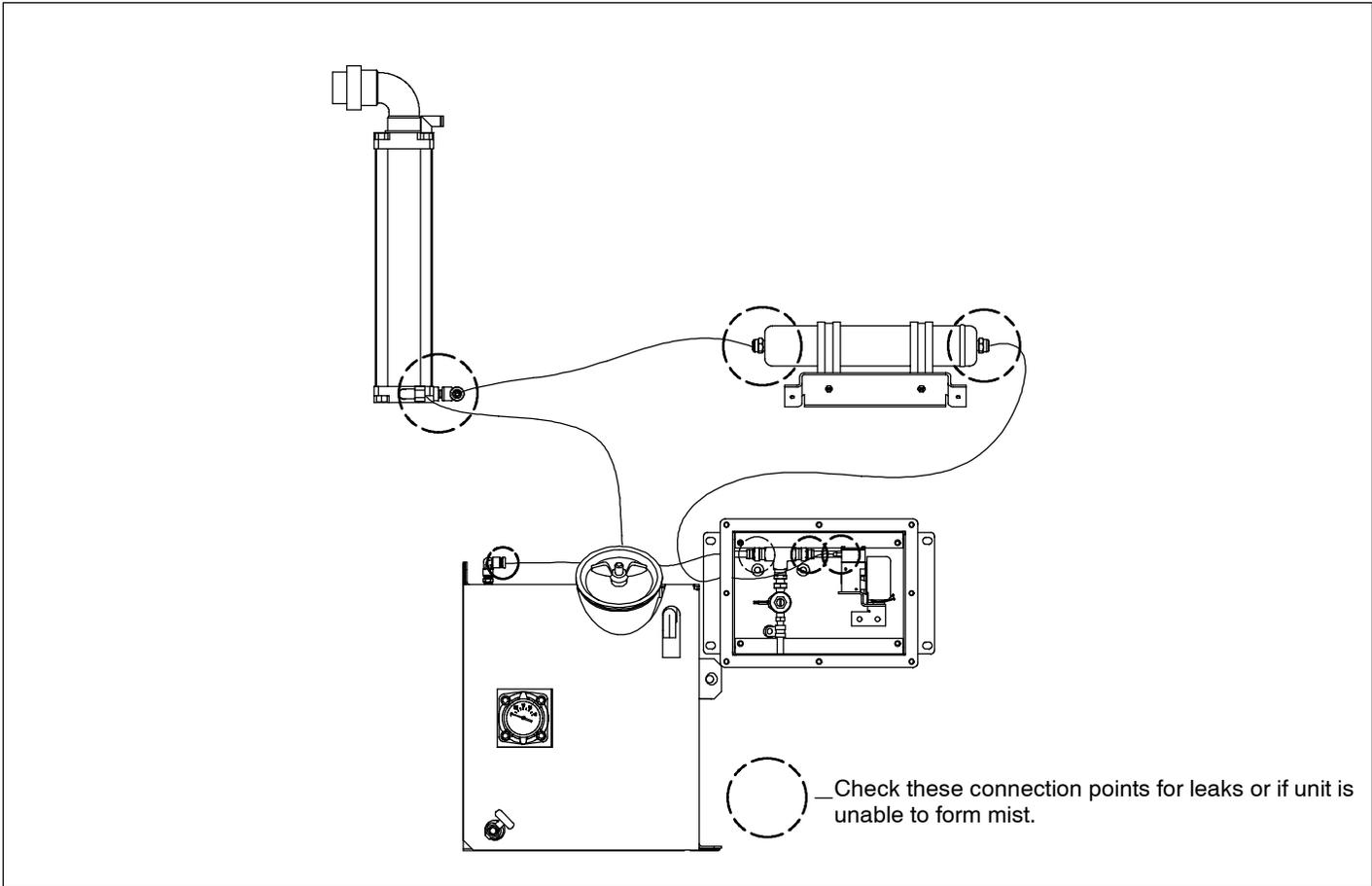


Figure 6-1 Humidity System Connection Points

SECTION 7

ELECTRICAL WIRING SCHEMATIC AND DIAGRAMS

7.1 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 7-1 Provides the legend for use with all figures.

Figure 7-2 Provides the schematic diagram.

Figure 7-3 Provides the wiring diagrams.

LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
AMBS	AMBIENT SENSOR	IC	INTERROGATOR CONNECTOR [FRONT/REAR]
BPV	BYPASS VALVE	IP	INTERNAL PROTECTOR
CB1	CIRCUIT BREAKER - 460 VOLT	K13	CONTROLLER RELAY (HUMIDITY)
CF	CONDENSER FAN CONTACTOR	K15	CONTROLLER RELAY (BYPASS VALVE)
CH	COMPRESSOR CONTACTOR	PR	PROBE RECEPTACLE [USDA]
CI	COMMUNICATIONS INTERFACE MODULE	RRS	RETURN RECORDER SENSOR
CM	CONDENSER FAN MOTOR	RTS	RETURN TEMPERATURE SENSOR
CP	COMPRESSOR MOTOR	SMV	SUCTION MODULATING VALVE
CPT	CONDENSER PRESSURE TRANSDUCER	SPT	SUCTION PRESSURE TRANSDUCER
CPDS	COMPRESSOR DISCHARGE SENSOR	SRS	SUPPLY RECORDER SENSOR
CPSS	COMPRESSOR SUCTION SENSOR	ST	START - STOP SWITCH
CR	CHART RECORDER [TEMPERATURE RECORDER]	STS	SUPPLY TEMPERATURE SENSOR
CS	CURRENT SENSOR	TC	CONTROLLER RELAY - COOLING
DHBL	DEFROST HEATER - BOTTOM LEFT	TE	CONTROLLER RELAY - HIGH SPEED EVAPORATOR FANS
DHBR	DEFROST HEATER - BOTTOM RIGHT	TH	CONTROLLER RELAY - HEATING
DHTL	DEFROST HEATER - TOP LEFT	TN	CONTROLLER RELAY - CONDENSER FAN
DHTR	DEFROST HEATER - TOP RIGHT	TP	TEST POINT
DPT	DISCHARGE PRESSURE TRANSDUCER	TQ	CONTROLLER RELAY - WATER TANK HEATER
DTS	DEFROST TEMPERATURE SENSOR	TR	TRANSFORMER
EF	EVAPORATOR FAN CONTACTOR [HIGH]	TRC	TransFRESH REAR CONNECTOR
EM	EVAPORATOR FAN MOTOR	TV	CONTROLLER RELAY - LOW SPEED EVAPORATOR FANS
ES	EVAPORATOR FAN CONTACTOR [LOW]	WCR	WETTING CURRENT RESISTOR
F	FUSE	WH	WATER HEATER CONTACTOR
FLA	FULL LOAD AMPS	WHTT	WATER HEATER TERMINATION THERMOSTAT
HAP	HUMIDITY AIR PUMP	WP	WATER PRESSURE SWITCH
HAPC	HUMIDITY AIR PUMP CONTACTOR	WPR	WATER PUMP RESISTOR
HC	HUMIDITY CONTACTOR		
HPS	HIGH PRESSURE SWITCH		
HPT	HUMIDITY POWER TRANSFORMER		
HR	HEATER CONTACTOR		
HS	HUMIDITY SENSOR		
HTT	HEAT TERMINATION THERMOSTAT		
HWH	HUMIDITY WATER HEATER		
HWP	HUMIDITY WATER PUMP		

Figure 7-1. Legend

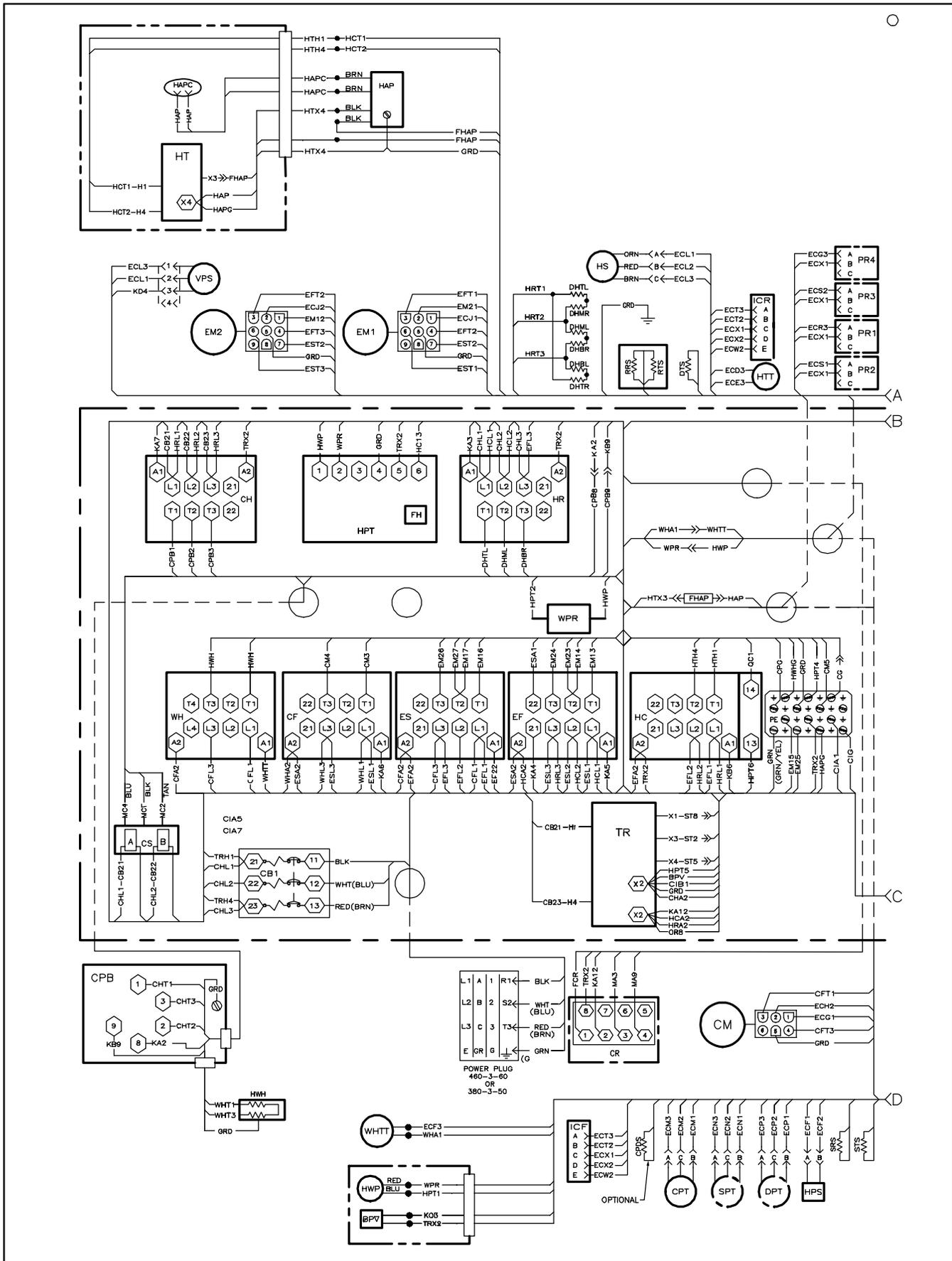


Figure 7-3. Electrical Wiring Diagram

SECTION 8

SERVICE PARTS LIST

8.1 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:

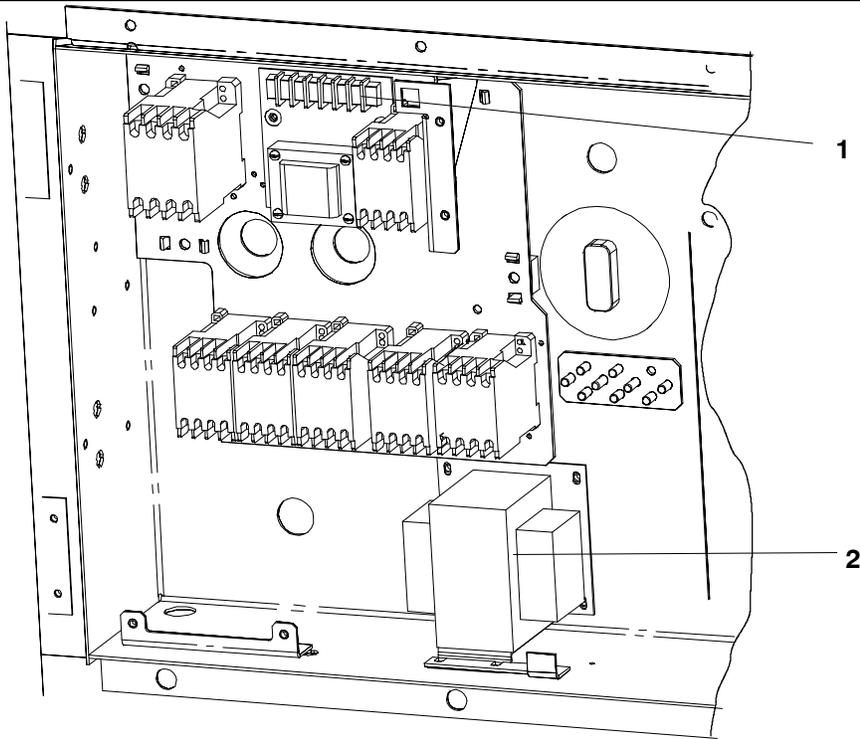
CARRIER TRANSICOLD DIVISION
Replacement Components Group, TR-20
P.O. Box 4805, Syracuse, New York 13221
or FAX to: (315) 432-3778

8.2 LETTER DESIGNATIONS

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

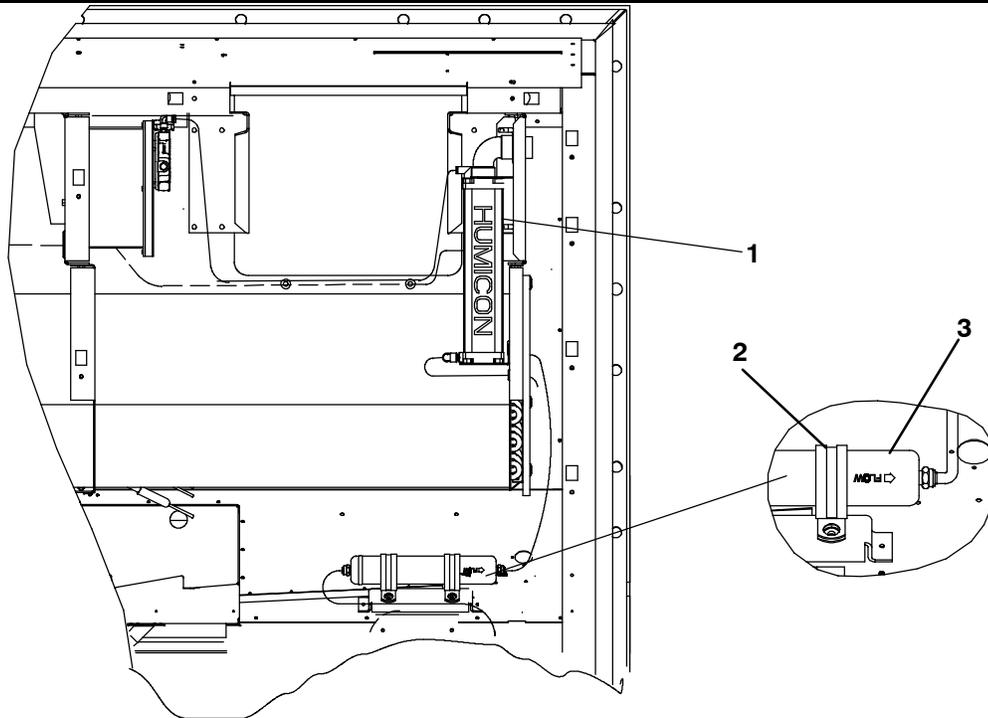
- A/R= *As Required*
- N/A= *Not Available*
- NS = *Not shown in illustration*
- NSS = *Not sold separately* - Order next higher assembly or kit
- PID = *Parts Identification Number* - essential to identify unit configuration.
- PL = *Purchase Locally*
- SST = *Stainless Steel* - 300 Series unless otherwise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

8.3 CONTROL BOX WITH ADDED HUMIDITY COMPONENTS



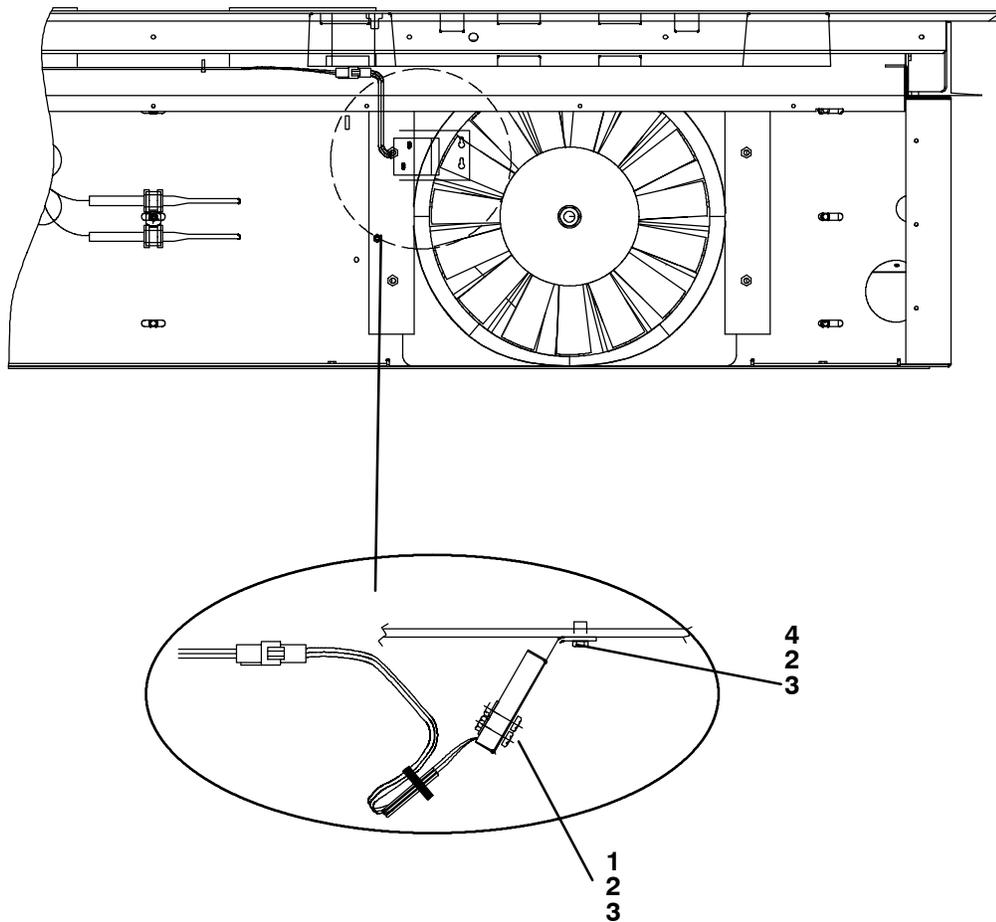
Item	Part Number	Description	Qty
1	10-00380-00	Transformer, Humidity, Power	1
2	10-00439-02	Transformer	1

8.4 HUMICON



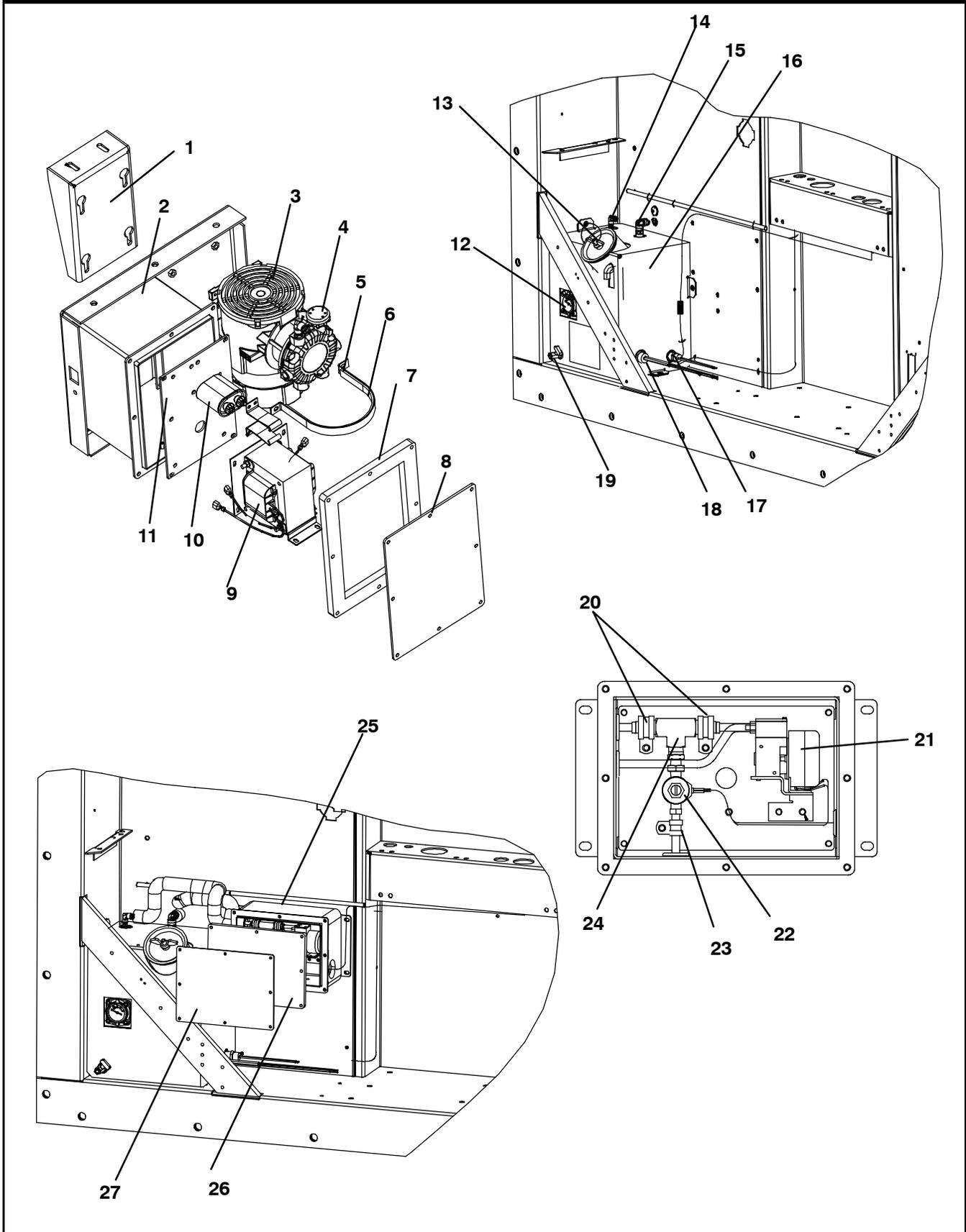
Item	Part Number	Description	Qty
1	65-00189-00	Humicon	1
2	44-00102-63	Clamp, Cushion	2
3	38-00586-00	Filter, Water	1

8.5 HUMIDITY SENSOR



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

8.6 HUMIDITY WATER PUMP AND WATER TANK ASSEMBLIES



8.6 HUMIDITY WATER PUMP , AIR COMPRESSOR AND WATER TANK ASSEMBLIES

Item	Part Number	Description	Qty
1	86-66693-00	Bracket	1
2	86-66692-00	Box assembly	1
3	18-10125-00	Compressor	1
4	18-10125-03	Air filter	1
5	68-66795-00	Strap	1
6	42-00174-39	Gasket	1
7	42-66614-00	Gasket	1
8	68-66786-01	Plate	1
9	10-00462-00	Transformer	1
10	18-10125-01	Capacitor	1
11	68-66791-00	Plate	1
12	12-00441-00	Gauge	1
13	65-00183-01	Cap	1
14	40-00617-05	Elbow, male 3/8 tube X 3/8 tube	1
15	40-00617-01	Elbow, male 1/4 tube X 1/4 npt	1
16	65-00183-02	Tank	1
17	12--00424-02	Temperature switch	1
18	24-02006-00	Heater	1
19	40-00572-00	Drain cock	1
20	34-00373-01	Clamp	1
21	52-00028-00	Pump	1
22	14-00260-00	Solenoid valve	1
23	34-00373-51	Clamp	1
24	40-00107-02	Tee	1
25	86-66690-00	Box assembly	1
26	42-66614-01	Clamp	1
27	68-66786-00	Cover	1



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A United Technologies Company
Carrier Transicold Division,
Carrier Corporation
Container Products Group
P.O. Box 4805
Syracuse, N.Y. 13221 U.S.A

www.carrier.transicold.com