MODEL PFP-572 CE

OPERATION, SERVICE AND PARTS MANUAL

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MANUFACTURED BY KLINGE CORPORATION

REVISION RECORD

Rev	Description	Date	Approved
A	Updated cargo temperature range (pg 5)	3-20-2026	BES

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Service Request

Requests for Service should be directed to the Klinge Service Team. The link below should be used to place all requests for service and will afford the quickest response time.

https://klingecorp.com/request-service/

This form will help us determine model and age of the equipment, location, basic details about the issue, who to contact and how to best handle the issues with the equipment. A service ticket number will be provided in a response email once the form is received and processed. If the equipment is out of warranty, charges may apply for extensive technical support.

Additionally, our Service Department can be reached via email at technical@klingecorp.com.

Spare Parts Request

Requests for Spare Parts should be directed to our Parts Department via email at spares@klingecorp.com. Please have available at the time of the request the Serial Number of the equipment to ensure that the proper part is provided.

Use of this Manual

The use of this manual is intended for the safe operation of the equipment described. It is therefore reasoned that people who have the occasion to use this manual have a knowledge of mechanical and electrical systems and components addressed by its' contents. However, efforts have been made to enable people less familiar with these systems to use this manual.

The equipment may be installed in a number of configurations. Each may have optional items and differing external details provided by third parties. The specific electrical circuit and pipe diagram are posted on the unit as decals.

Most external and internal pipework parts are standard commercially available pipe fittings and not covered here. For external pipe fitting, replace like for like, taking care to replace stainless steel with stainless steel.

Suggestions as to improvement in content and format are welcome and should be addressed to engineering@klingecorp.com. Corrections and improvements will be included on dated revisions – the latest of which will be available upon request.

SECTION ONE - GENERAL DESCRIPTION

The KLINGE PFP-572 Series of refrigeration units are specially designed for the handling of organic goods in ambient temperatures found throughout the world.

These units are designed to maintain temperatures from 2°C (36°F) to 25°C (77°F) automatically, using cooling, heating, and defrost cycles during its operation. Main power is 400/480 volts 3 phase, 50/60 Hz electrical power. Control circuit voltage is reduced to 20/24VAC.

The KLINGE PFP-572 units have two independent systems (left-hand - system 1 and right-hand - system 2). Each system is capable of maintaining temperature. Only one system will operate at any one time, however, both systems need to be switched “ON” to ensure automatic changeover. The first system turned on is considered the Primary system. To ensure runtime is divided across both systems, the primary system will change over to the other system after each defrost cycle. The maximum compressor runtime between defrost cycles is 24 hours.

The electrical section consists of two complete electrical systems for each unit in one central control box.

The electronic microprocessor thermostats control the temperature of the cargo space. Each system has its own thermostat.

Each system also has its own compressor, evaporator motor and condenser motor. Each system operates with 3.6 kg of refrigerant charge.

Alarm signals occur under the following conditions.

1. Compressor failure shutdown.
2. Cargo temperature is more than 2°C above or below set point and the temperature change rate (up or down) is less than 0.14°C (0.25°F) / hour.
3. Cargo temperature is more than 2°C above or below set point for more than 120 minutes.
4. Cargo temperature outside a user selectable HIGH / LOW setting for the data logger probe (T1 or T3).

As the system operates, the controller takes an hourly “snapshot” of the return air probe temperature. This information is used to determine if the system is functioning properly with respect to temperature pull-down rate and set point temperature.

During the initial temperature pull-down, if the difference between two consecutive hourly snapshots does not show the system is lowering the temperature at the rate of at least 0.17°C (0.3°F) per hour, the system will go into an alarm condition.

Once the system has reached a window within 2°C of the set point, the pull-down rate alarm monitoring is no longer active.

Once the system has reached set point and cycles to maintain the set point, if 2 consecutive hourly snapshots show the return air probe temperature is more than 2°C above or below the set point, the system will go into an alarm condition.

If power is removed from the system, and/or after each defrost cycle, the hourly snapshots will again check for the proper temperature pull-down rate until within the 2°C window to the setpoint.

The unit automatically shifts the “Primary Control” from the system generating the alarm to the other system. The alarm light and horn will remain ON in the system that detected the alarm condition until an operator “resets” the thermostat by switching the ON/OFF switch.
For more details look in the alarm code section.

SECTION TWO - OPERATION

2.1 GENERAL INFORMATION

To understand the sequence of operating the dual refrigeration system, there are several things to remember:

1. System 1, or the left-hand system, is on the left side as you face the unit.

2. System 2, or the right-hand system, is on the right side as you face the unit.

3. The Primary system will be the only complete system running.

    a. The secondary system evaporator fan will run until the set point is reached.
    b. The secondary system evaporator fan will restart when the primary system compressor starts again.
    c. If a failure occurs to the primary system, then the other system will take over.

4. Both systems are equipped with an automatic function test. See section 2.5

5. There are two circuit breakers protecting each electric system. One protects the main line 480 volts 3 phase power; the other protects the 24-volt control circuit.

6. High-pressure switches are located on the compressors and reset automatically.

2.2 PRE-STARTING CHECK

The following inspections should be made before the container is loaded or the unit started.

1. Check unit visually for physical damage.

2. Check of major hold-down bolts etc. visual.

3. Check that control boxes are properly secured in their locked positions.

4. Open control box cover and check that all electric components are secured and that the terminal connections are tight.

NOTE: There should be no power to unit for this check.

5. Check the gasket on control box. Be sure the cam latches will hold the cover tightly closed.

6. Check cleanliness of the condenser coils and clean if necessary.

7. Check all refrigerant joints and connections thoroughly for traces of oil, which could be caused by a small refrigerant leak.

2.3 OPERATIONAL CHECK
(check each unit separately)

1. Connect main power to unit.

2. Be sure that the CB1 and CB2 circuit breakers are closed in the ON position in both electric boxes.

3. Hold the "Manual Defrost" switch in the **ON** position until the thermostat LEDs flash, and switch the unit **ON/OFF** switch to the **ON** position. The automatic function test will now begin. (See section 2.5)

4. After completion of function test adjust set point to 4-5°C below container temperature. Allow the unit to go through all cycles. At the same time check that all indicator lights on thermostat work.

5. Check amperage of the compressor motor, the condenser motor, and the evaporator motor.

6. Check the rotation of the fans.

7. Adjust set point to 5°C.

8. After temperature reaches 5°C put unit on manual defrost. (Hold defrost switch in **ON** position for 5 seconds).

NOTE: During the defrost cycle, the compressor will continue to run. Condenser motor and evaporator motor will not be running.

9. When defrost cycle is completed let unit run for approximately 15 minutes. Then check refrigerant level in receiver sight glasses.

10. These checks should be conducted on both systems. Turn off the system that has completed the function test before doing the function test on the other system.

2.4 RUNNING UNIT

1. Turn the **ON/OFF** switch on the system that is to be the secondary **ON**. Set thermostat to the desired setting and then turn this system off.

2. Turn system that is to be the primary **ON**. Set thermostat to the desired setting.

3. Turn the other system (secondary) back **ON**.

PHASE SELECTION
When the unit's **ON/OFF** switch is in the **ON** position, power feeds though the current loops. When the thermostat is energized, it scans the phasing of the input power and will allow either phase changing contactor PC1 or PC2 to become energized to ensure the correct rotation of the fans. (See section 4.5 for more info)

COOLING CYCLE
The return air probe is mounted in the return air vents. With this arrangement the probe will be reading the return air. When the cargo space temperature requires maximum cooling, the compressor, condenser, and evaporator fan motors will operate.

This will allow the liquid from the TX valve to cool down the evaporator coil and the air flow from the evaporator fan will circulate the cold air into the container cargo space.
The cargo space temperature will continue to pull down until it reaches set point, then the compressor motor and condenser fan motor will stop.

HEATING CYCLE
The return air probe is mounted in the return air vents. With this arrangement the probe will be reading the return air. When the cargo space temperature requires maximum heating, the unit heaters will operate.
The cargo space temperature will continue to rise until it reaches set point.

DEFROST CYCLE
The defrost cycle can only be activated by the system which is the **PRIMARY** system.

The defrost cycle is controlled by a defrost probe mounted at the suction pipe, which will activate the defrost cycle automatically.

When the compressor has been **ON** for at least two minutes, and the temperature difference between the return air temperature probe and the defrost probe reaches a predetermined value, the thermostat will automatically initiate a defrost cycle.

Automatic defrost will also activate under the following circumstances:
1. After 6 continuous hours of compressor run time after start-up.
2. If defrost has not occurred within 9 cumulative compressor hours while in chill mode.
3. After 24 hours of run time since last defrost.

When the unit is on defrost, the hot gas solenoid valves activate so that the hot vapor from the high-pressure side of the compressor goes directly to the evaporator coil.

The hot gas solenoid is deactivated when the temperature of the defrost probe rises to a preset temperature of 18°C (64.4°F), plus 5 minutes, or when the defrost probe reads 38°C (100°F).

If the defrost cycle is not finished within 1 hour, the thermostat will stop the defrost cycle and go to normal operation.

NOTES:

When the primary system defrost probe is "out of range" (open or shorted) the system will automatically shut down and the secondary system will become the operating system.

If the defrost probe is "out of range" an alarm code will be shown in the display.

If the system calls for defrost within 30 minutes after a defrost cycle has ended, an alarm code will be shown in the display, and the unit will not go into another defrost cycle.

The defrost cycle can also be manually activated. On the primary system, hold the manual defrost switch **ON** for a minimum of 5 seconds.

UNLOAD SYSTEM
The compressor unload system can be active in different situations.
1. In Chill cool mode, to make a uniform supply air temperature to the container.
2. In Chill heat mode, to make a uniform supply air temperature to the container.
3. To reduce the compressor current use.
4. To lower high pressure at the system, on start-up and in high ambient temperature.

2.5 FUNCTION TEST

The thermostat is provided with an automatic function test, which energizes the compressor motor, condenser motor, evaporator motor, alarm lamp, alarm horn and tests the probes.

NOTE: Steps of the Function Test are listed on the right-side label of the thermostat and are also on the electrical schematic.

To start the Function Test program:

1. Press the MANUAL DEFROST/FUNCTION TEST button.

2. Press the **ON/OFF** button. Display will show the software version and then the current set point.

3. After approximately 10 seconds (all LEDs will flash) release the MANUAL DEFROST/FUNCTION TEST button and the function test will run.

The test **must** only be run on 1 system at a time.

Step 1:

Phase sensing test.
Incoming power routed through the Phase Sensor for each system. The Phase Sensor will monitor both the phase direction and system amperages. If the power is sequenced as phase 1-2-3 the controller will activate Phase Changer (PC1 for system one or PC2 for system 2) to allow power to pass through the system. If the power is sequenced as phase 3-2-1, LED 3 on the controller will flash and the controller will activate Phase Changer (PC3 for system one or PC4 for system 2) to correct the phase direction and allow power to pass through the system. Activating the correct Phase Changer will also turn on the Evaporator Fans. After four seconds the controller will test that there is a minimum of 0.3A at each phase.

If the Phase Sensing procedure is functioning properly the function test will continue to Step 2, and LED 3 will be turned ON.

Note that the Evaporator Fans will remain on due to being directly connected to the Phase Changing contactors.

The display will show the actual amps used.

Step 2:

Evaporator fan on.
LED 4 will flash
Controller checks if amps are within limits.
(If amps are lower than 0.3A or higher than 4.0A, then test failed)
The controller also checks the highest and lowest amps measured, if the highest amps measured is twice the lowest, there will be an alarm.
The display will show the actual amps used by the evaporator fan.

Step 3:

Condenser fan on, Evaporator fan on
LED 5 will flash
Controller checks if amps are within limits.
(If amps are lower than 1.0A or higher than 6.1A, then test failed.)

The controller also checks the highest and lowest amps measured, if the highest amps measured is twice the lowest, there will be an alarm.
The display will show the actual amps used by the condenser fan and evaporator fan.

Step 4:

Compressor on
LED 6 will flash
Controller checks if amps are within limits.
(If amps are lower than 5.0A or higher than 16.0A, then test failed)
The controller also checks the highest and lowest amps measured, if the highest amps measured is twice the lowest, there will be an alarm.
The display will show the actual amps used by the compressor.

Step 5:

Compressor is on and unload is on.
LED 7 will flash
The controller also checks that the ampere use in step 5 is less than the ampere use in step 4, if not then there will be an alarm.
The display will show the actual amps used by the compressor.

Step 6:

Heater is on.
LED 8 will flash
The display will show the actual amps used by the compressor.

Step 7:

Alarm relay is de-energized.
LED 9 will flash
The alarm LED will flash, and the alarm horn will sound.
If the external alarm monitor is connected, it will trigger external alarm monitor.
If the Manual Defrost button is activated, then the horn will stop sounding, and the controller will jump to the next test step.

Step 8:

Temperature sensor test
LED 10 will flash
Display will toggle between defrost probe temperature, supply probe temperature, and return air probe temperature.
If the difference between the probes is less than 5°C the test passes.
If the difference between the three probes is greater than 5°C the evaporator fan will turn on for up to 8 minutes to bring the sensed temperatures to within 5°C.
If after 8 minutes the temperatures are still not inside the 5°C range, the temperature sensor test will fail.

NOTE: If all steps of the function test are passed, all LED´s will be on for 10 seconds and after that the controller will return to normal operation.
If there has been any alarm, the LED for that step will flash for ½ hour and the alarm code is shown in the display and will remain in the display for ½ hour. After this ½ hour delay the controller will return to normal operation.

SECTION THREE - ELECTRICAL AND ELECTRONIC FUNCTIONS

3.1 GENERAL INFORMATION

Both electric systems are identical except System 1 includes the battery and the battery charger.

When high voltage is fed to the unit through the current phase loops, and the circuit breaker CB1 or CB2 (for system 2) is in the **ON** position, power will pass along L1, L2 and L3 to the phase changing contactors and transformers.

Note: Beware of high voltage (400-480 volt) in various parts of the unit, especially when CB1 or CB2 is in the ON position. It is recommended that a thorough study of the wiring diagram be made to determine where high voltage may be encountered when electric power is fed to the unit.

3.2 ELECTRIC BOX

CIRCUIT BREAKERS

A. Circuit Breaker (CB1) & (CB2).
The 20-amp circuit breaker has three poles. It is reset manually and protects the entire unit against overload. CB1 protects system 1 and CB2 protects system 2 It may be used as a switch.

B. Circuit Breaker (CB3) & (CB4).
6-amp circuit breakers (CB3) & (CB4) protect the heaters, in case of possible overload. CB3 for system 1 and CB4 for system 2. The circuit breakers are reset manually

C. Circuit Breaker (CB5) & (CB6)
These are 2-amp circuit breakers with 2 poles and protect the unit's transformers from over current. CB5 protects system 1 and CB6 protects system 2.

D. Circuit Breaker (CB7) & (CB8)
8-amp single pole circuit breakers protect the 24V control circuit and 12V Thermostat circuit in case of possible overload. CB7 protects system 1 and CB8 protects system 2.

E. Circuit Breaker (CB9).
4-amp circuit breaker (CB9) protects the 12 VDC alarm circuit.

CONTACTORS

A. Compressor Motor Contactor (C1) & (C2)
These are 3 pole, 480-volt, contactors with a 24-volt operating coil. They operate the compressor motor, C1 for system 1 and C2 for system 2, and are energized by the thermostat.

B. Condenser fan contactors (CF1) & (CF2)
These are 3 pole, 480-volt, contactors with a 24-volt operating coil. They operate the condenser motor, CF1 for system 1 and CF2 for system 2, and are energized by the thermostat.

C. Evaporator Fan (EF1) & (EF2)
These are 3 pole, 480-volt, contactors with a 24-volt operating coil. It operates the Evaporator motor and is energized by the thermostat. EF1 controls system 1 and EF2 controls system 2.

D. Phase Changing Contactors (PC1 & PC2) (PC3 & PC4)
These are 3 pole, 480-volt contactors with a 24-volt operating coil. The rotation of the evaporator and condenser motors is controlled by these contactors, and they are energized by the MPC4 thermostat (terminals 1 or 2 on the MPC4 thermostat). They have a mechanical interlock to prevent accidental energizing of both at the same time.

E. System Change
The first system turned ON is primary. The MPC4 thermostat CAN bus detects the system that is turned on first and makes that system to be primary. If a problem occurs with the primary system, then the MPC4 thermostat makes the other system primary.

F. Heater Contactor (H1) & (H2)
This is a 3 pole, 480-volt, contactor with a 24-volt operating coil. They operate the unit's heaters and are energized by the thermostat.

MOTOR PROTECTION

The compressor, evaporator and condenser fan motors have an internal thermal switch to protect the motors from single phasing, overheating and overloads. The internal switch will automatically reset after cooling.

Motor protection switches are automatically reset.

The Compressor, condenser fan motor, and evaporator fan motors stop immediately if failure occurs.

Immediately the unit will automatically switch to the other system, if the other system is not in an alarm state.

TRANSFORMERS

Control circuit transformers (T1 and T2) are on the left and right side of the control box.
The primary windings are tied onto the 480 VAC line after the 20A circuit breaker. The secondary windings supply 24 VAC for the control circuit, and the 12 VAC for thermostat logic.

BATTERY CHARGING SYSTEM

This is located in the control box door, wired into System 1. In case of a malfunction in the unit, it is necessary to keep the battery optimally charged. The battery charging system works when the unit is connected to the power supply. The battery charger has an LED to indicate power on.

HIGH PRESSURE SWITCH (HP)

Normally closed when pressure is in range.

Switch is automatically reset.

Compressor stops immediately if failure occurs.

Failure signal to alarm lamp and horn will have 12 minutes delay.

Immediately the unit will automatically switch to the other system, if the other system is not in an alarm state.

SECTION FOUR - THERMOSTAT INSTRUCTIONS AND SEQUENCE

4.1 GENERAL INFORMATION

Several components are used to control the system temperature:

A. Temperature select/display panel
   A display panel is mounted in both control boxes.
B. Temperature probes
   Each system uses 4 probes to monitor temperatures:
   a. Supply air
   b. Return air
   c. Defrost probe, mounted on the suction pipe in the evaporator section
   d. Compressor discharge probe
C. Microprocessor thermostat for each system
D. Phase sensing current loops
E. Pressure transmitter

4.2 TEMPERATURE SELECT/DISPLAY PANEL

4.2.1 General Description

The temperature select/display panel consists of three touch pad switches for operator input and a three-position alpha-numeric display as shown in Figure 1.

Display panel shows:
A. Return air temperature – during normal operation
B. Set point temperature – by momentarily pushing the ^ (up) or v (down) touch pad switch
C. Defrost probe temperature – by momentarily toggling the MANUAL DEFROST switch
D. Alarm code – when system has experienced an alarm fault
   For additional alarm code information see Section 6.5.

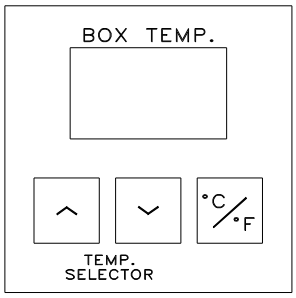


Figure 1

The temperature setting (set point) is stored in a nonvolatile memory and will always be intact even in case of power failure.

In order to prevent false entry or accidental changes of values, both selector buttons (**^** and **v)** must be depressed simultaneously for a new setting to be entered into the memory.

4.2.2 Display Panel Operation

Creating a Temperature Set Point:

1. Pressing the **^** (up) or **v** (down) touch pad switch causes the display to show the current set point.

2. After the current set point is displayed, each pressing of one of these touch pad switches will increment or decrement the display by one whole degree.

3. Holding a touch pad switch pressed will cause the display to change one degree each half second.

4. Simultaneously pressing both touch pad switches causes the current set point to be saved (display will blink once when set point is saved). This set point will be used until another set point is chosen, even if power is removed from the thermostat.

5. The display automatically returns to normal display mode approximately five seconds after the touch pad switch has been released.

NOTE: The equipment can be protected from accidental or unauthorized changing of the set point by using a PIN Code. If a PIN Code is in use, contact the equipment owner for the code, then use the below step by step process for entering the PIN Code to allow you to change the Set Point.

1. When the unit is in operation the current Set Point will be displayed by pressing either the UP or DOWN button. This will display the current Set Point.
2. When you press either the UP or DOWN button again the word “Pin” will be displayed.
3. When the word “Pin” is displayed you then press the C/F Key one time.
4. The display will now show 0 as the first digit, at this time you will need to enter the first digit of the PIN Code.
5. Once the first digit has been entered press the C/F key to move to the second digit.
6. The display will now show 0 as the second digit, at this time you will need to enter the second digit of the PIN Code.
7. Once the second digit has been entered press the C/F key to move to the third digit.
8. The display will now show 0 as the third digit, at this time you will need to enter the third digit of the PIN Code.
9. Once the third digit has been entered press the C/F key to confirm the PIN CODE that you have entered.
10. If the PIN Code that has been entered is not correct the Temperature Display will read “Pin”.
11. If the code that has been entered is correct the Temperature Display will show the Return Air Temperature. At this point the Set Point can be set through the normal process. It should be noted that the Set Point will remain unlocked for 3 minutes after the PIN Code has been entered. After 3 minutes the PIN Code will need to be entered again.

Changing Temperature Mode:

1. The thermostat can operate in either degrees Centigrade (ºC), or Fahrenheit (ºF).

2. Pressing the **C/F** key causes the display to indicate the current mode. This is indicated by a **C** or **F** in the right character of the display. A decimal point is displayed in the right most character when in **F** mode.

3. Each pressing of the **C/F** key causes the mode to change.

4. After selecting ºC or ºF, pressing either the **^** (up) or **v** (down) touch pad switch will cause the currently selected mode to be saved and the display will immediately return to normal mode.

5. The display automatically returns to normal display mode approximately five seconds after the last touch pad switch press.

4.3 TEMPERATURE PROBES

The temperature sensing devices are probes consisting of a thermistor, sealed in an epoxy filled stainless steel tube. These probes are strategically placed on the unit to monitor temperature parameters essential to effective system performance. The probes transmit the desired temperature signal to the thermostat via a two-conductor shielded cable.
This unit requires 8 temperature sensors, 4 for the Left-Hand System and 4 for the Right-Hand System.
Each system has its' own independent return air probe, supply air probe, compressor discharge probe and defrost probe.

A. The compressor discharge probes connect to the thermostats at terminals 37 and 33(common).
B. The supply air probes connect to the thermostats at terminals 36 and 33(common).
C. The return air probes connect to the thermostats at terminals 35 and 33(common).
D. The defrost probes connect to the thermostats at terminals 34 and 33(common).

Accuracy of the probes is:

TEMPERATURE RANGE	TOLERANCE
-40°C to -20°C	+/-0.75°C
-20°C to -10°C	+/-0.4°C
-10°C to 70°C	+/-0.2°C

Checking of temperature should be done with an instrument with equal or better accuracy. The thermostat cannot be calibrated.

An opened or shorted probe will be indicated with an alarm, see alarm codes in Section 6.5 for more information.

If a probe or cable becomes defective, check the probe assembly and the thermostat connection first to confirm a shorted or open circuit. Then disconnect the probe to determine whether the probe or cable is defective.

WARNING
Stop the unit and disconnect the main power to the unit when disconnecting and measuring resistance of a probe.

It is important that the sensor is properly mounted. Use an ohmmeter to check probes. A short circuit indicates 0 ohms resistance. An open circuit indicates infinite ohms resistance. Good readings should agree with the chart below:

PROBE RESISTANCE CHART		
Probe at Ambient Temperature		**K-Ohms** (Approx.)
°C	°F	
+ 25	+77	10.0
+ 20	+68	12.5
+ 15	+59	15.7
+ 10	+50	19.9
+ 5	+41	25.4
0	+32	32.6
- 5	+23	42.3
- 10	+14	55.3
- 15	+5	72.9
- 20	- 4	97.0
- 25	-13	130.2

4.4 MICROPROCESSOR THERMOSTAT

This device contains all circuits necessary to select the required functions to maintain an accurate temperature. The selection is based on signals received from the probes and touch pad/display panel.

NOTE: Being electronic, the thermostat does not react immediately to setting changes.

Several time delays are incorporated in the microprocessor thermostat logic and are not adjustable.

Two kinds of indicator LEDs are provided for determining the correct function and as an aid to servicing the unit:

A. LEDs mounted on the front of the thermostat
   These LEDs will indicate which function is being called for by the thermostat logic.
   These LEDs are visible from the front of the unit.

B. LEDs mounted next to each thermostat relay
   These LEDs show if the associated relay is energized.
   These are small red LEDs and can only be seen from the side of the device.

FRONT EDGE LEDs

10 LEDs are visible at the front of the thermostat and indicate the unit status as follows:

1. ON
Green LED indicates the **ON/OFF** switch is in **ON** position.

2. ALARM ON
Red LED indicates when any alarm occurs.

3. PHASE OK
Clear LED indicates that phase direction is detected.

4. **PRIMARY SYSTEM**
   Clear LED indicates that this is the primary (controlling) system.

5. **COMPRESSOR FAIL**
   Clear LED indicates failure on high-pressure switch or motor protection.

6. **TEMPERATURE FAILURE**
   Clear LED indicates temperature out of range or pull-down rate too slow.

7. **DEFROST**
   Clear LED indicates defrost mode.

8. **COMPRESSOR**
   Clear LED indicates the thermostat logic is calling for cooling.

9. **HEAT**
   Clear LED indicates the thermostat logic is calling for heat.

10. **DEHUMIDIFY**
    Clear LED indicates that thermostat logic is calling for dehumidification.

THERMOSTAT RELAYS

A small red LED is placed adjacent to each of the 8 thermostat relays. An illuminated LED indicates its associated relay is energized.

1. **PHASE RELAY (AR1)**
   De-energize when phase is L1-L2-L3.
   Energize when phase is L3-L2-L1.

2. **ALARM HORN RELAY and ALARM LAMP RELAY (AR2)**
   T6 is common.
   The relay is energized during normal operation (continuity from T5 to T6), and will de-energize, if an alarm occurs (continuity from T6 to T4).
   There will be momentary continuity from T6 toT4 when unit is stopped.

3. **HEATER RELAY (AR3)**
   The relay will be energized when the thermostat is calling for heating.

4. **UNLOAD RELAY (AR4)**
   The relay will be energized when the thermostat logic is calling for unload.

5. **CONDENSER FAN RELAY (AR5)**
   Normally open
   The relay will be energized when the thermostat logic is calling for unload.

6. **COMPRESSOR RELAY (AR6)**
   Normally open
   The relay will be energized when the thermostat logic is calling for cooling, heat and defrost.
   The relay energizes the compressor motor.

7. **EVAPORATOR FAN RELAY (AR7)**
   Normally open.

Primary system: This relay will be energized at all times except during defrost.
Secondary system: This relay will be energized when the primary system is in cool or heat mode.
The relay gives a signal to the AR1. PC1 or PC3 will then energize the evaporator fan motor for System 1, or PC2 or PC4 will then energize the evaporator fan motor for System 2.

8. DEFROST RELAY (AR8)
Normally open
The relay will be energized when the thermostat logic calls for defrost or heat.
This relay energizes the solenoid of the hot gas valves.

4.4.1 THERMOSTAT SEQUENCE

When starting the unit with the temperature selector set at least 1.2ºC below the container temperature the unit will start up with a test of the main components. This test will also be performed after a defrost cycle and at system change.

After the test is preformed the unit returns to normal operation.

START-UP TEST

The test is automatically performed by the controller when the unit **ON/OFF** switch is set to **ON**.

Phase selection
At power **ON**, the evaporator fan is started to detect the phase direction, if there is no power use at the evaporator fan, then the condenser fan is started.
When phase direction is detected, after approximately 5 seconds, LED3 is lit and the evaporator and condenser fans are stopped.
If the phase direction is wrong, then relay 1 on the controller will be activated. This will turn off PS1 and turn on PS2.
If phase direction can't be detected, LED2 and LED3 will flash. After 5 minutes the controller will try to find the phase direction again. This will continue until the phase direction is detected.

Approximately 10 seconds after the controller has found the phase direction, the test will start.

Step 1: Evaporator fan on
Controller checks if amps are within limits.
(If amps are lower than 0.3A or higher than 4.0A, then test failed)
The controller also checks the highest and lowest amps measured, if the highest amps measured is twice the lowest, there will be an alarm.

Step 2: Evaporator fan on and condenser fan on
Controller checks if amps are within limits.
(If amps are lower than 0.5A or higher than 6.1A, then test failed)
The controller also checks the highest and lowest amps measured, if the highest amps measured is twice the lowest, there will be an alarm.

Step 3: Compressor on
Controller checks if amps are within limits.
(If amps are lower than 4A or higher than 17A, then test failed)

Step 4: Heater on
Controller checks if amps are within limits.
(If amps are lower than 2A or higher than 7A, then test failed)

The controller also checks the highest and lowest amps measured, if the highest amps measured is twice the lowest, there will be an alarm.

NOTE: If there has been any alarm, the alarm code is shown on the display panel and will remain displayed until it is reset using the touch pad C/F switch. After the start-up test is complete the controller will return to normal operation.

4.4.2 COOLING and HEATING SEQUENCE

CHILL MODE

Falling temperature at cooling.
Evaporator fan will run continually.
Compressor will run until the return air is at set point.
Condenser fan will run until the return air is at set point.
When the return air is 2°C from set point, the unload valve is active.

Rising temperature at cooling.
Evaporator fan will run continually.
Compressor will start when the return air is 1°C above set point.
Condenser fan will start when the return air is 1°C above set point.
When the return air is 1°C above set point, the unload valve is on until the return air is 4.0°C above the set point.

HEATING MODE

Rising temperature at heating.
Evaporator fan will run continually.
Unit heaters will run until the return air is at set point.

4.5 PHASE SENSING CURRENT LOOPS

The current sensing devices are 3 sensors consisting of a solenoid, sealed in an epoxy shell.
These sensors are placed on a common board and are connected to the MPC4 thermostat with 4 wires.
The 3 main power phase lines are then taken through the solenoids, to read the phase detection, the hertz and the current at the main power line.
With these inputs the MPC4 thermostat can detect the phase direction for correct rotation of the fans and activate PC1 or PC3 for System 1, or PC2 or PC4 for System 2.

If phase detection fails, the MPC4 thermostat will wait until the correct phase direction is found.
If the phase system is not able to detect the correct direction, the system can be disabled at parameter P32 in the Config menu.
If parameter P32 value is 0, then PC1 will always be active. (Important check rotation of fans.)

If a sensor or cable becomes defective, check the sensor assembly and the thermostat connection first to confirm a shorted or open circuit. Then check the sensor to determine whether the sensor or cable is defective.

WARNING
Stop the unit and disconnect the main power to the unit.

It is important that the sensor is properly mounted. Use an ohmmeter to check each solenoid. A short circuit indicates 0 ohms resistance. An open circuit indicates infinite ohms resistance.
Good readings should agree with the data below:

Readings are at +20°C.
Dismount the MPC4 thermostat from the control box.
At terminal 33 to 21 there must be from 40 to 45 ohms.
At terminal 33 to 22 there must be from 40 to 45 ohms.
At terminal 33 to 23 there must be from 40 to 45 ohms.

4.6 PRESSURE TRANSMITTER

The pressure transmitter devices are a transmitter that is placed on the discharge line from the compressor.
The transmitter is connected to the MPC4 thermostat with 2 wires.

The transmitter reads the pressure in the system, and from this the MPC4 thermostat can control the condenser fan, the unload valve and show the pressure in the display.

The transmitter type is a 4 to 20 mA output.

4.7 EMERGENCY SWITCH OPERATION (Optional)

In the event of an emergency, press the red mushroom button inside the container. This will turn off the unit, if desired, and produce a unit alarm.

4.8 DOOR SWITCH OPERATION (Optional)

This unit is installed with a door switch that will turn off all refrigeration operation when the container door is open. When the container door is open DOO will be shown on the display.

If the container door is open for an extended amount of time, the unit will produce an alarm and A44 will be shown on the display.

SECTION FIVE - MAINTENANCE AND SERVICE INSTRUCTIONS

5.1 GENERAL

This section provides procedures for establishing preventative maintenance and systematic servicing schedules, which are the keys to successful operation.
All service and maintenance procedures should be performed in accordance with Section 608 of the Clean Air Act (CAA), prohibiting the venting of refrigerants into the atmosphere and providing for the use of refrigerant recycling and recovering equipment to be used whenever a system is opened.

5.2 SAFETY

A. Safety glasses, approved goggles or eye shields should be worn at all times when operating or servicing the refrigeration unit.

B. When any work is to be done on the components of the refrigeration system, be sure that the unit cannot be started automatically or accidentally. If valves are closed and/or circuits interrupted during service procedures, the control switches should be suitably tagged with such notations.

C. Beware of high voltage in various parts of the unit, especially when main CB1 and/or CB2 is on. It is recommended that a thorough study of the wiring schematic be made to determine where high voltage will be encountered before electric power is applied to the unit.

D. Special attention should be given to the Main Power Plug and Receptacle when disconnecting from each other. When disconnecting these two items ensure that the power circuit breaker has been turned to the off position. Do not pull at the cable but rather with a firm grip on the housing, grab the plug and receptacle and pull apart. If the cable is used rather than the housing the risk exists that the wires within the housing could become dislodged and lead to a future electrical hazard.

E. Do not exert excessive pressure when tightening flare nuts, as it may result in a rupture of the flare or stripped threads.

F. Never, under any circumstances, apply heat to a refrigerant cylinder by using a naked flame. Should it be considered necessary to apply heat to a cylinder to create a refrigerant flow when recharging a system, place the cylinder in a container of hot or warm water to a point about 3/4 of the height of the cylinder.

   Even this method requires that a pressure gauge is in use in the charging line to indicate the pressure in the cylinder at all times.
   Also, never close the shut-off valve in the cylinder while the cylinder is being heated.
   The use of a manifold gauge set will permit compliance with CAA regulations by having a gauge in the line and a shut-off valve on the manifold to stop the flow of refrigerant into the system and allow the gauge to read cylinder pressure.

G. Always replace refrigerant cylinder valve and connection caps after using the cylinder, and do not permit a cylinder to be dropped or hit severely by another object.

H. Container related safety items:

a. Due to the height at which the refrigeration unit is placed in the container, always use safe and secure means to service the unit and to allow a platform for tools and a refrigerant cylinder.

b. The internal space of the container should only be accessed by trained staff. It is suggested that specific company-based SOP's be established to monitor and govern this.

c. The roof of the container should only be accessed by trained staff. It is suggested that specific company-based SOP's be established to monitor and govern this. Also, it is highly recommended that proper fall protection is utilized.

d. Proper securing of internal cargo should be done to company established SOP's based on the type of cargo being stored and transported.

CAUTION:
A gauge manifold should always be used when charging unit with refrigerant.

Refrigerant R-134a is heavier than air. Therefore, it settles in the lowest places and will expel air (oxygen) from a small, confined space, resulting in dizziness or suffocation to an occupant.

5.3 CHECKING REFRIGERANT CHARGE

The receiver sight glasses are equipped with a ball, which floats when the liquid level is in the sight glass, or above.

It should be noted and remembered that the only requirement of liquid level is that a seal be maintained at the outlet of the receiver. At low ambient temperatures, approximately 50ºF and below, the liquid refrigerant may not accumulate in the receiver to a point where a liquid level will show on the sight glass. Many times, the liquid will accumulate in the condenser. Therefore, caution should be taken before adding refrigerant. Air in the receiver may also prevent the level from coming up into the sight glass. This can be rectified by purging the air from the system.

If the ball is not floating, it is recommended that the suction and discharge pressure be checked before determining that the charge is low. It is just as possible to do harm to the system by overcharging as it is to run the system under charged.

It is important to have the correct amount of refrigerant in the system. The charge required is 4.3 kg at each system. If there is too little, the expansion valve will pass vapor and reduce the capacity of the evaporator. Too much refrigerant will result in higher head pressures and reduced capacity.

NOTE: Before adding refrigerant, always determine the reason for the low charge and remedy the cause. Leak test thoroughly with an electronic leak detector and also check for traces of oil.

5.4 PROCEDURE FOR ADDING REFRIGERANT

To add small quantities of refrigerant to the system, it is preferable to add gas to the low or suction side of the system. This will allow the system to operate with little or no disturbance of the refrigeration cycle while the refrigerant is being added.

Care should be taken to ensure that only gas is extracted from the refrigerant cylinder when charging into the low side.

1. Remove the compressor suction service valve cap and back seat the valve. This closes the charging port. Loosely attach the suction gauge line of a manifold set. Connect the center charging line to a refrigerant cylinder and tighten the connection.

2. Crack open the refrigerant cylinder valve and the manifold suction gauge valve and purge the air from the line. Then tighten the connection at the compressor suction service valve.

3. With the system still operating and the suction pressure being 30 psig or below, and the cylinder pressure at 170 psig (dependent upon ambient temperature), open the refrigerant cylinder valve and the manifold suction gauge valve completely. Open the compressor suction service valve 1 to 2 turns.

4. Allow refrigerant into the system and observe the receiver sight glass.

5. If the pressure in the refrigerant cylinder equalizes the suction pressure of the system, charging will cease until the cylinder pressure is raised by heating it. To do this, a container of hot water or an electric blanket (made for this purpose) can safely be used.

6. If the pressures equalize and no heating is available, partially front seat the compressor suction service valve and allow the system to pump down to a pressure slightly below the one of the cylinder pressure. This will create a pressure difference between the system and the cylinder, allowing refrigerant to flow again. However, remember to close the cylinder or manifold valve before opening the compressor service valve, or R-134a will be forced back into the cylinder. Also, the system should be allowed to cycle for at least 5 minutes after each shot of refrigerant to allow it to settle so that an accurate reading can be taken at the receiver sight glass.

7. When it is determined that the system has an adequate refrigerant charge, close the refrigerant cylinder valve (if not already closed), and the manifold suction gauge valve, and back seat the suction service valve, in that order. Remove the manifold lines and replace caps securely.

5.5 NON-CONDENSABLE GASES

Air and non-condensable gases in any system gather in the receiver above the liquid. This will result in above normal discharge pressures. These gases can be removed during operation by purging through the receiver valve. To purge, use recycle equipment and open valve a small amount. Note any significant difference from the initial pressure when the valve is again closed. Repeat the operation until the discharge pressure is normal.

5.6 OPENING THE SYSTEM

Whenever it is necessary to open a charged or functioning system to make repairs or replacements, it is necessary to comply with CAA by using recovery and recycle equipment.

The use of "**EASY FLOW**" silver solder and flux, or equivalent, is recommended in the refrigerant system piping. Do not use soft solder.

Prior to disturbing any connections, the type of solder originally used should first be verified then continue. By taking this precaution, the contamination of the joint will be avoided.

5.7 TESTING FOR LEAKS

The preferred method for finding leaks is by use of an electronic leak detector. There are several different makes available, and they all use the same method of detecting a leak through an exploring tube which will detect from large to extremely small leaks depending on the setting used on the detector.

Leak testing with soapsuds will reveal only the large leaks and is therefore ineffective in determining the tightness of a system.

5.8 EVACUATING THE SYSTEM

CAUTION

Do not use the compressor as a vacuum pump or as an air compressor. It is not designed to handle air and will not pull down to as low a vacuum as a pump designed for that purpose. Similarly, if used to compress air, serious overheating and consequent damage may be the result.

Connect a pump capable of drawing a vacuum of 0.15 mm Hg or greater to that part of the system which has been opened. Continue until all air and moisture has been removed.

The final evacuation may be accelerated, however, by manifolding the connections to the vacuum pump and evacuating simultaneously the high and the low sides of the system; the vacuum should be broken by introducing refrigerant.

Too much emphasis cannot be placed on the importance of keeping the system free of moisture. Slight amounts of water in the system will inevitably lead to trouble in the following forms:

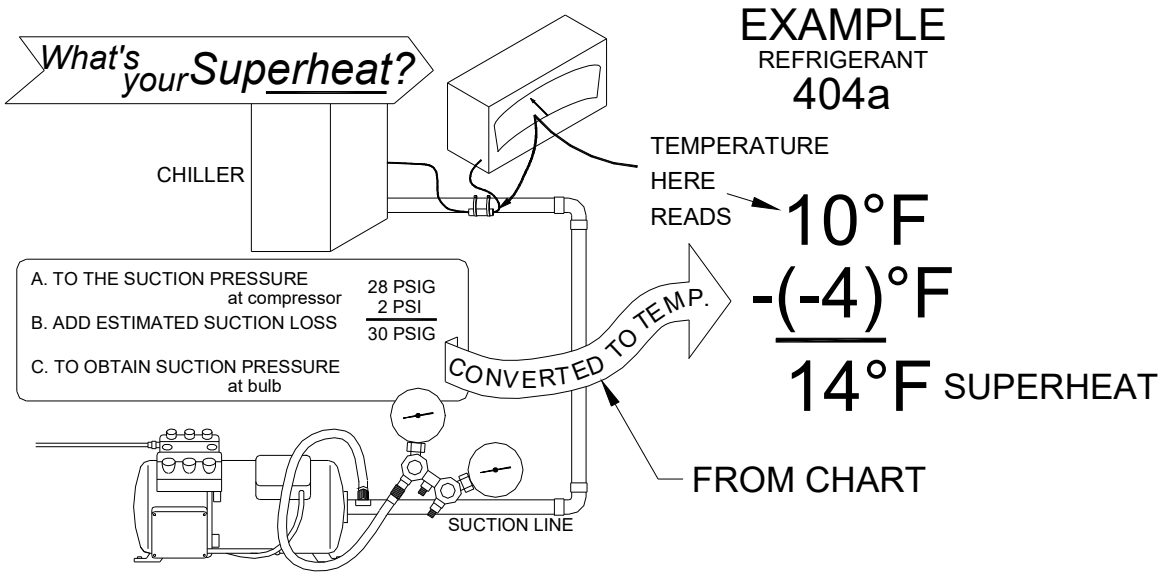
A. Corrosion of steel parts.
B. Copper plating of the shaft and bearing.
C. Sludging or gumming of the oil.
D. Plugging of the strainers and dryers.
E. Freezing and plugging of expansion valve

Whenever it is necessary to open the system for any reason, always take precautions to prevent the entrance of air into the system, as air always contains some water vapor. Isolate as much of the system as possible from the portion to be opened by closing suitable valves.

5.9 SUPERHEAT

Adjustment of TX Valve

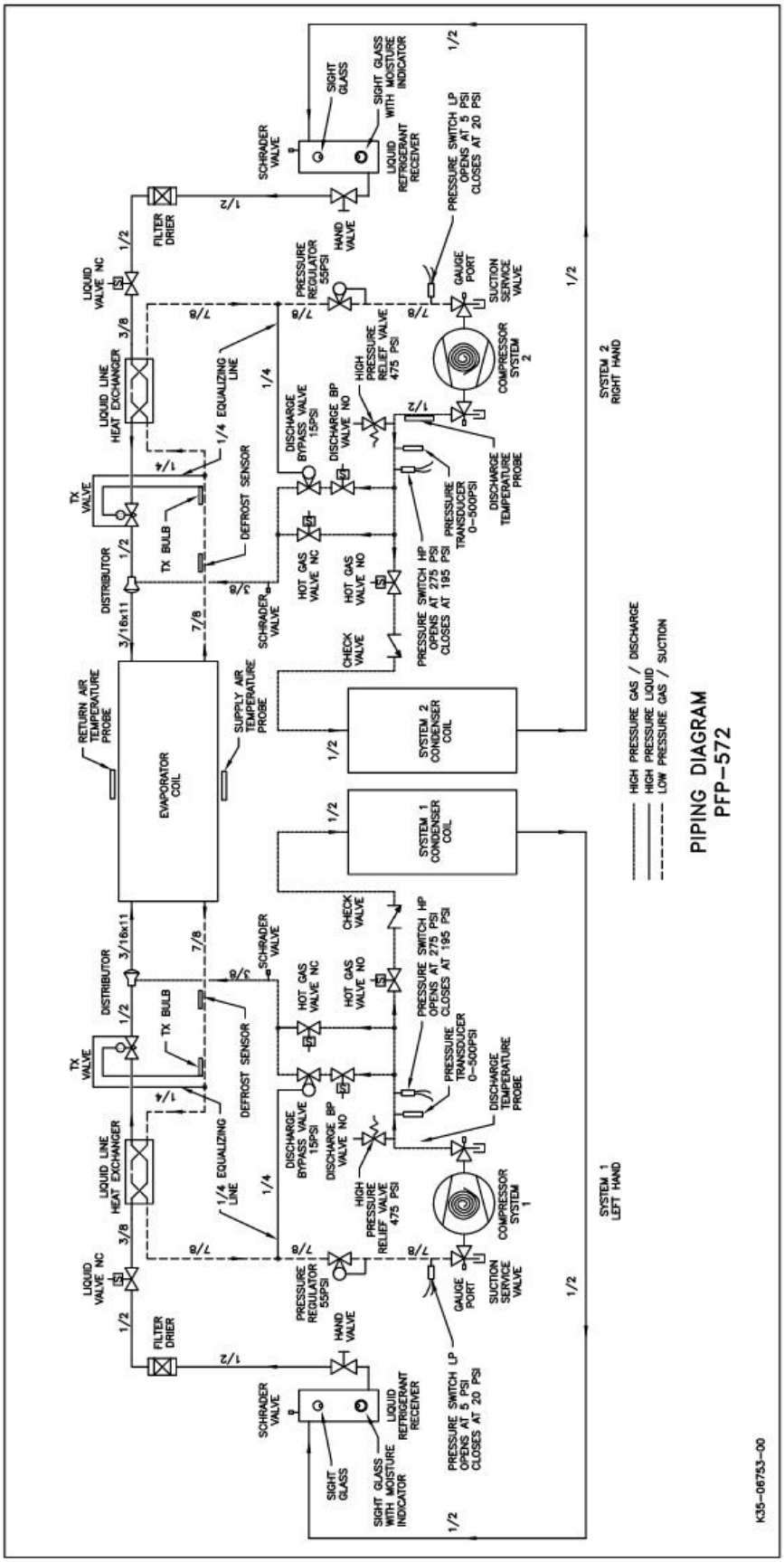
The expansion valve is set and tested at the factory before shipping. Klinge DOES NOT recommend adjusting the super heat setting of the TX valve. However, in very rare situations when the TXV is faulty, the super heat can be adjusted.
The expansion valve adjustment is capped for protection. Remove the protective cap. To reduce the superheat, turn the adjustment stem counterclockwise or to the left. To increase, turn the adjustment stem clockwise or to the right.
Only make one full turn at a time, it may take approximately 30 minutes after each adjustment before a new balance can be acquired.
To properly check the super heat, set the thermostat to -10°F. After waiting 5 minutes observe the suction line, it should be frosted back to the suction service valve without frost on the valve. The bottom of the compressor should be warm to the touch.



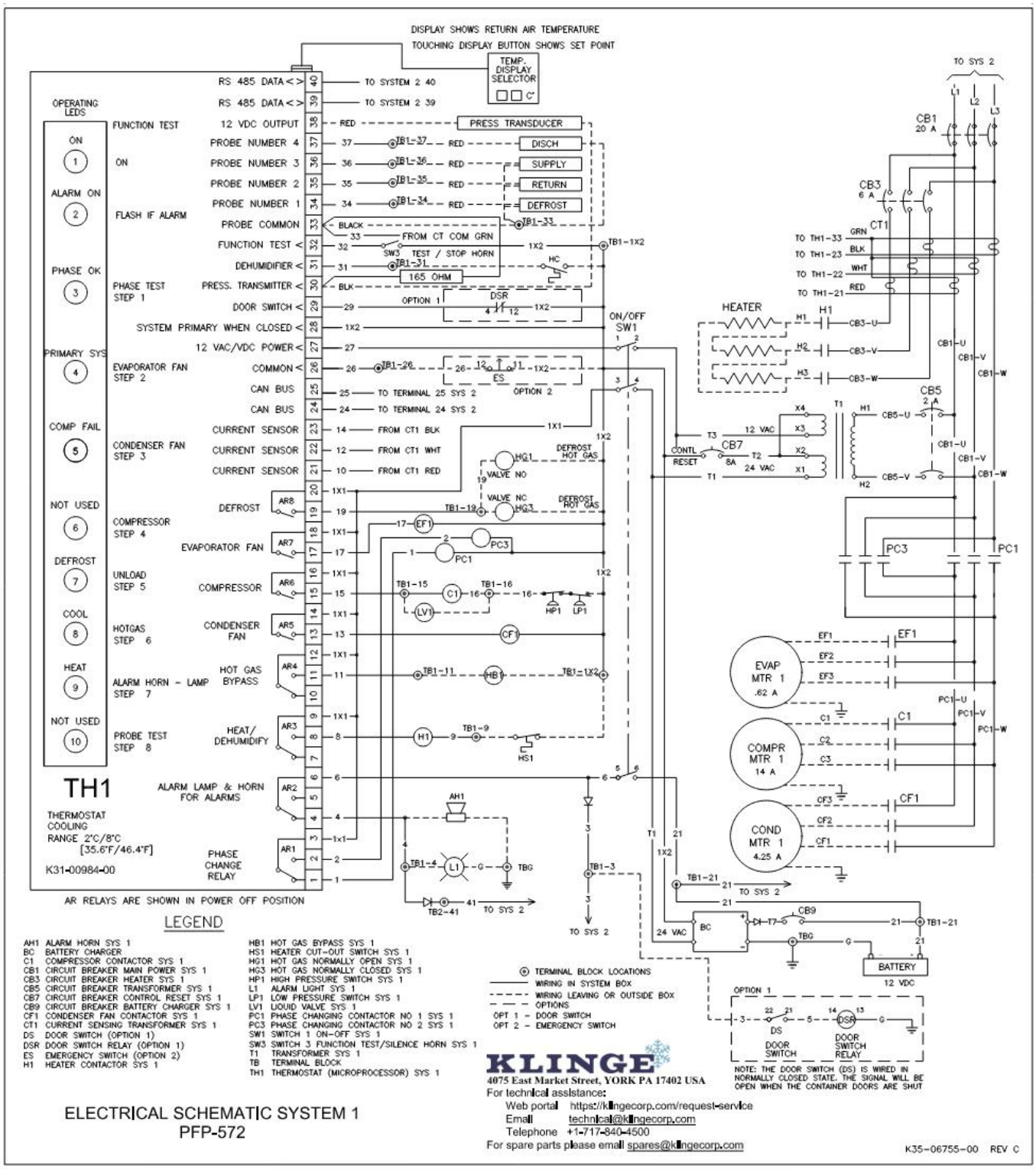
Measuring the Superheat

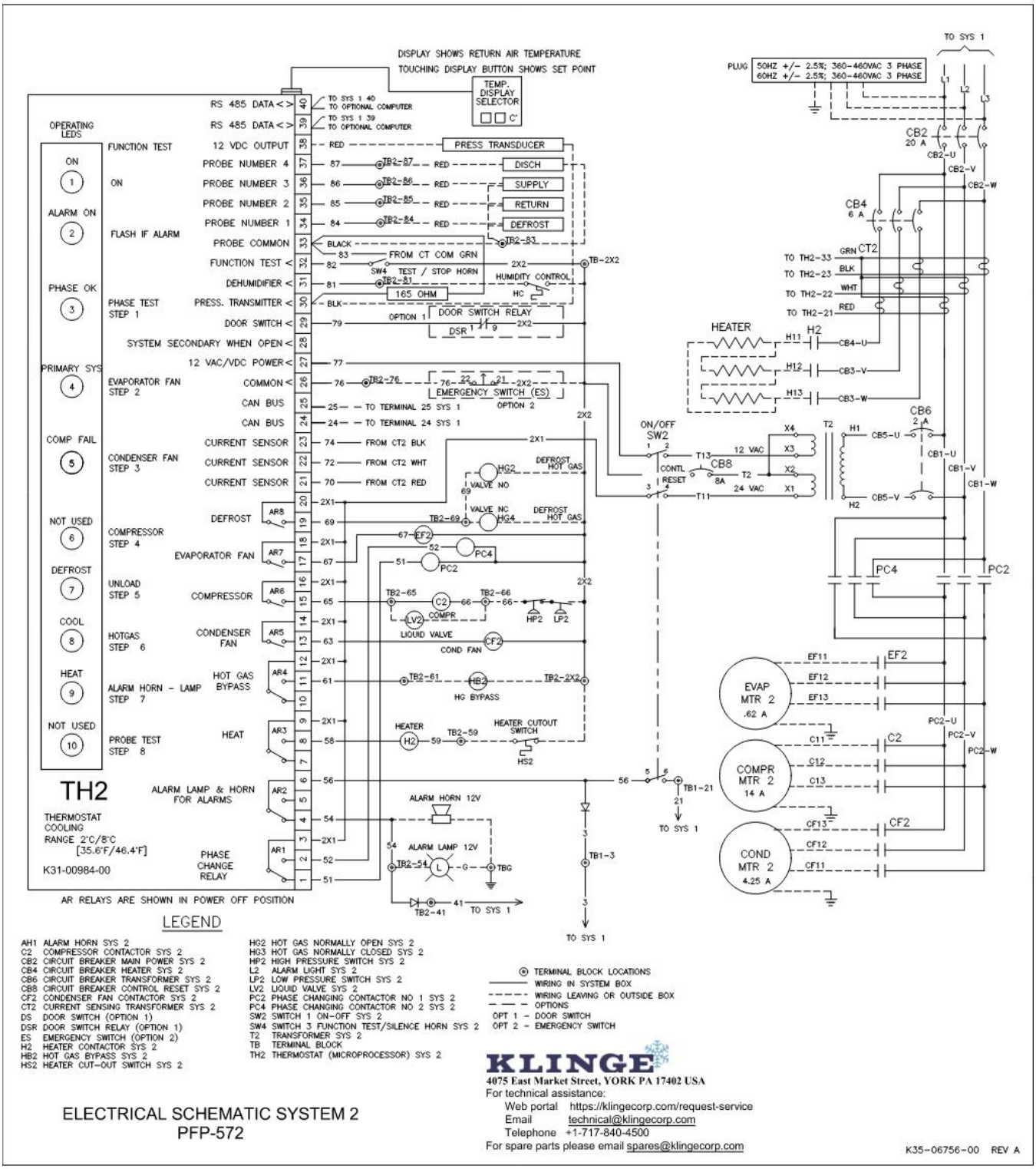
1. Measure the temperature of the suction line at the point the TXV bulb is clamped.
2. Obtain the suction pressure that exists in the suction line at the bulb as follows:
   a. Read the gauge at the suction valve of the compressor. To the pressure add the estimated pressure drop through the suction line between bulb location and compressor suction valve.
   b. The sum of the gauge reading, and the estimated pressure drop will equal the approximate suction line pressure at the bulb.
3. Convert the pressure obtained in 2 to saturated evaporator by using the temperature /pressure chart provided in this manual.
4. Subtract the two temperatures obtained in 1 and 3 – the difference is the superheat.

5.10 PIPING DIAGRAM



5-11 ELECTRICAL SCHEMATICS




DISPLAY SHOWS RETURN AIR TEMPERATURE
TOUCHING DISPLAY BUTTON SHOWS SET POINT
TEMP. DISPLAY SELECTOR
TO SYS 1
PLUG 50HZ +/- 2.5%; 360-460VAC 3 PHASE
60HZ +/- 2.5%; 360-460VAC 3 PHASE
L1 L2 L3
CB2 20 A
CB4 6 A
CB6 2 A
CT2
HEATER
H2
ON/OFF SW2
CONTL RESET
CB8 8A
12 VAC
24 VAC
EVAP MTR 2 .62 A
COMPR MTR 2 14 A
COND MTR 2 4.25 A
EF2
PC2
C2
CF2
TH2
THERMOSTAT COOLING
RANGE 2°C/8°C [35.6°F/46.4°F]
K31-00984-00
OPERATING LEDS
ON
ALARM ON
PHASE OK
PRIMARY SYS
COMP FAIL
NOT USED
DEFROST
COOL
HEAT
NOT USED
FUNCTION TEST
FLASH IF ALARM
PHASE TEST STEP 1
EVAPORATOR FAN STEP 2
CONDENSER FAN STEP 3
COMPRESSOR STEP 4
UNLOAD STEP 5
HOTGAS STEP 6
ALARM HORN - LAMP STEP 7
PROBE TEST STEP 8
RS 485 DATA
12 VDC OUTPUT
PROBE NUMBER 4
PROBE NUMBER 3
PROBE NUMBER 2
PROBE NUMBER 1
PROBE COMMON
FUNCTION TEST
DEHUMIDIFIER
PRESS. TRANSMITTER
DOOR SWITCH
SYSTEM SECONDARY WHEN OPEN
12 VAC/VDC POWER
COMMON
CAN BUS
CURRENT SENSOR
DEFROST
COMPRESSOR
EVAPORATOR FAN
HOT GAS BYPASS
HEAT
ALARM LAMP & HORN FOR ALARMS
PHASE CHANGE RELAY
PRESS TRANSDUCER
DISCH
SUPPLY
RETURN
DEFROST
FROM CT COM GRN
SW4 TEST / STOP HORN
HUMIDITY CONTROL
165 OHM
DOOR SWITCH RELAY
EMERGENCY SWITCH (ES)
HG2 VALVE NO
HG4 VALVE NC
DEFROST HOT GAS
LIQUID VALVE
COND FAN
HG BYPASS
HEATER CUTOUT SWITCH
ALARM HORN 12V
ALARM LAMP 12V
AR RELAYS ARE SHOWN IN POWER OFF POSITION
LEGEND
AH1 ALARM HORN SYS 2
C2 COMPRESSOR CONTACTOR SYS 2
CB2 CIRCUIT BREAKER MAIN POWER SYS 2
CB4 CIRCUIT BREAKER HEATER SYS 2
CB6 CIRCUIT BREAKER TRANSFORMER SYS 2
CB8 CIRCUIT BREAKER CONTROL RESET SYS 2
CF2 CONDENSER FAN CONTACTOR SYS 2
CT2 CURRENT SENSING TRANSFORMER SYS 2
DS DOOR SWITCH (OPTION 1)
DSR DOOR SWITCH RELAY (OPTION 1)
ES EMERGENCY SWITCH (OPTION 2)
H2 HEATER CONTACTOR SYS 2
HB2 HOT GAS BYPASS SYS 2
HS2 HEATER CUT-OUT SWITCH SYS 2
HG2 HOT GAS NORMALLY OPEN SYS 2
HG3 HOT GAS NORMALLY CLOSED SYS 2
HP2 HIGH PRESSURE SWITCH SYS 2
L2 ALARM LIGHT SYS 2
LP2 LOW PRESSURE SWITCH SYS 2
LV2 LIQUID VALVE SYS 2
PC2 PHASE CHANGING CONTACTOR NO 1 SYS 2
PC4 PHASE CHANGING CONTACTOR NO 2 SYS 2
SW2 SWITCH 1 ON-OFF SYS 2
SW4 SWITCH 3 FUNCTION TEST/SILENCE HORN SYS 2
T2 TRANSFORMER SYS 2
TB TERMINAL BLOCK
TH2 THERMOSTAT (MICROPROCESSOR) SYS 2
TERMINAL BLOCK LOCATIONS
WIRING IN SYSTEM BOX
WIRING LEAVING OR OUTSIDE BOX
OPTIONS
OPT 1 - DOOR SWITCH
OPT 2 - EMERGENCY SWITCH
KLINGE
4075 East Market Street, YORK PA 17402 USA
For technical assistance:
Web portal https://klingecorp.com/request-service
Email technical@klingecorp.com
Telephone +1-717-840-4500
For spare parts please email spares@klingecorp.com
ELECTRICAL SCHEMATIC SYSTEM 2
PFP-572
K35-06756-00 REV A

SECTION SIX - TROUBLE SHOOTING

6.1 GENERAL INFORMATION

Several components are incorporated into the unit to assist the serviceman in finding the cause of problems concerning the operation of the unit.

LED indicators are located on the front edge of the thermostat to indicate functions and modes that should be operating.

To indicate alarms the ALARM LED will flash, and an ALARM CODE will be shown in the display.

On the side of the thermostat and adjacent to each output relay are red LED indicators to show which output relay (AR1 through AR8) is energized.

These indicators along with discharge and suction pressure gauges attached by the serviceman can be used to determine if certain cycles are operating. Compressor and fan operation can be determined by sound. Defrost hot gas solenoid operation normally is audible, but feel may be required if there is too much background noise.

6.2 THERMOSTAT LED INDICATIONS

DURING FUNCTION TEST

Use label on the side of the thermostat. (Reference Section 2.5)

DURING OPERATION

Use label on front edge of thermostat (Reference Section 4.4)

6.3 SERVICE COMPONENTS

A. Sight glasses - mounted in the liquid receiver to determine if the refrigerant charge is correct. Check the system refrigerant charge at 32°F (0°C) container temperature. The lower receiver sight glass is also a moisture indicator, used to determine if moisture is in the system. (See Section 5.2, 5.3 & 5.4).
B. Filter drier - a dirty, clogged filter can be detected by a noticeable temperature change between the filter inlet tube and its outlet tube.

6.4 TROUBLE SHOOTING CHART

The following trouble shooting chart is by no means complete, but covers the more general type of problems, which would be most likely if a breakdown is experienced. Also see the alarm codes (Section 6.5) for more help.

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION SUGGESTED
Power to unit but unit will not start	CB2 Tripped	Reset
	CB1 Tripped	Reset
	No control circuit voltage at T1	Check primary side for 480V @ T1
		Check for proper connections at T1
		Replace T1 if defective
	No control circuit voltage at thermostat	Faulty SW1, replace SW1 T27 to T26 (12V), T20 to T26 (24V)
Thermostat will not function test	No voltage (12V) between T27 & T32 when SW2 is depressed	Faulty SW2, replace SW2
	Faulty thermostat	Replace
Compressor will not run	Compressor contactor "C" coil faulty	Replace contactor or mechanical failure of contactor
	High Pressure switch (HP) open	Remedy reason for high discharge pressure
	Discharge pressure too high	Remedy reason for high discharge pressure
	Defective HP switch	Replace
	Open compressor windings due to thermal protection switch being open	Remedy cause of overheating
	Open compressor windings when compressor is cool	Replace compressor
	Current overload OL3 is open	Determine cause of high current draw and remedy
	OL3 not adjusted for auto reset	Adjust to auto reset
	Compressor trips CB1, but does not run due to mechanical restriction	Replace compressor
	System is in secondary mode	Normal (should not run)
Evaporator fan does not run	Faulty current sensor or controller	Replace
	"PC1" or "PC2" phase changing contactor faulty	Replace contactor
	Motor internal thermal protection open or windings open	Replace motor
	OL2 overload open	Motor amperage too high, replace fan motor
	Faulty OL2	Replace
Secondary evaporator fan does not run	Secondary system not turned on	Turn on
	CB2 of secondary system tripped	Reset
	Temperature is @ set point	Normal

Condenser fan and evaporator fans do not run		See - Evaporator fans **DO NOT RUN**
Condenser fan only will not run	"CF" condenser fan contactor faulty	Replace
	OL1 overload open	Motor amperage too high, replace fan motor
	Faulty OL1	Replace
One of the 2 fans runs backwards, same system	Motor or condenser fan, "CF" contactors may be mis-wired	Correct wiring
No hot gas for defrosting	Coil of HG valve faulty	Replace coil
	Mechanical fault in valve body	Replace valve
	Compressor not running	See-**Compressor will not run problems**
Unit runs on 480V but not on 230V	Dual voltage transformer faulty or mis-wired	Replace dual voltage transformer or correct wiring
	Faulty 230V plug or faulty 480V connector	Replace or repair
Box temperature too high	Return air probe circuit open	Check wiring; replace probe
	Faulty thermostat	Replace
Box temperature too low	Return air probe circuit shorted	Check wiring; replace probe
	Faulty thermostat	Replace
Defrost too often	Air flow too low or no air flow	Check evaporator fans for operation and rotation
Defrost duration too long	Too little hot gas	See - **NO HOT GAS FOR DEFROSTING**
	Defrost probe not in proper location	Locate probe correctly
Cooling capacity problem	Refrigerant level too low	Check & add refrigerant if required
	Partially or completely blocked filter drier	Check & replace
	Low airflow, fans not running or not running in the proper direction	Check & correct
	Non-condensable (air) in refrigerant system	Purge condenser coil and receiver
	Faulty TXV	Replace
	One or both kazoos missing from condensate hose	Install where required
	Hot gas leaking through Hg valve	Replace valve
	Severe lube oil overcharge	Remove excess oil. Check oil level. (Allow oil level to be within sight glass when compressor is hot and has been running for 10 to 15 minutes)
	Compressor mechanical problem reducing pumping capacity	Replace defective compressor
Alarm lamp fails to light	Bulb burn out	Replace bulb
	No 12V DC battery power	Check battery & correct problem
	Faulty SW1	Replace switch

Alarm horn fails to sound	No 12V DC battery power	Check battery & correct problem
	Faulty horn	Replace
	Faulty SW1	Replace switch
	Temperature recorder inoperative	Repair or replace
Battery does not get charged while operating on house power	Battery charger in L.H. electrical box failed	Replace
	Transformer T2 in L.H. box failed or is mis-wired	Replace T2 or correct wiring
	Circuit breaker CB3 is tripped	Reset

6.5 ALARM CODE

Alarm **LED** indicators are reset if control system power is turned **OFF**.

ALARM CODE	ALARM NAME	ALARM CONDITION	ALARM ACTION	ALARM CLEAR	SUGGESTION FOR REPAIR	ALARM LEVEL (HIGH = SYSTEM CHANGEOVER)
A01	Defrost sensor short	The sensor or the wire to the sensor is shorted.	LED 2 will flash. AR 2 will de-energize.	If there has not been an alarm for 60 minutes, then the controller clears the alarm. Or by C/F key.	Replace sensor. Check wire for damage.	High
A02	Defrost sensor open	The sensor or the wire to the sensor is open.	LED 2 will flash. AR 2 will de-energize.	If there has not been an alarm for 60 minutes, then the controller clears the alarm. Or by C/F key.	Replace sensor. Check wire for damage.	High
A03	Return sensor short	The sensor or the wire to the sensor is shorted.	1: Controller switches over and use defrost sensor to read container temperature. 2: If defrost sensor is open or short, then if set point is > -7°C, then unit stops. If set point <-7°C, then unit runs 100% cool all time. LED 2 will flash. AR 2 will de-energize.	If there has not been an alarm for 60 minutes, then the controller clears the alarm. Or by C/F key.	Replace sensor Check wire for damage.	High
A04	Return sensor open	The sensor or the wire to the sensor is shorted.	1: Controller switches over and use defrost sensor to read container temperature. 2: If defrost sensor is open or short, then if set point is > -7°C then unit stop. If set point <-7°C, then unit run 100% cool all time. LED 2 will flash. AR 2 will de-	If there has not been an alarm for 60 minutes, then the controller clears the alarm. Or by C/F key.	Replace sensor Check wire for damage.	High

			energize.			
A05	Supply sensor short	The sensor or the wire to the sensor is shorted.	LED 2 will flash. AR 2 will de-energize.	If there has not been an alarm for 60 minutes, then the controller clears the alarm. Or by C/F key.	Replace sensor Check wire for damage.	High
A06	Supply sensor open	The sensor or the wire to the sensor is open.	No action.	No action.	Replace sensor Check wire for damage.	High
A07	Compressor sensor short	The sensor or the wire to the sensor is shorted.	Compressor runs without any safety at the compressor discharge temperature. LED 2 will flash. AR 2 will de-energize.	If there has not been an alarm for 60 minutes, then the controller clears the alarm. Or by C/F key.	Replace sensor Check wire for damage.	High
A08	Compressor sensor open	The sensor or the wire to the sensor is open.	No action.	No action.	Replace sensor Check wire for damage.	High
A09	Pressure transmitter out of range.	The sensor or the wire to the sensor is defective.	No action	If there is a pressure transmitter on the unit, then display C/F key clears the alarm. Else no action.	Replace sensor Check wire for damage.	Low
A11	Phase sensor fail	The sensor cannot find the 3 phase at the main power. (Test is performed at unit start up)	The unit will stop, and every 5 minutes the controller will test the sensor to see if the sensor is ok. LED 2 will flash. AR 2 will de-energize.	If the sensor passes a new test, then the controller clears the alarm. Or by C/F key.	Check Main power Check evaporator fan. Check condenser Fan. Check CT sensor. Check wire for damage.	High
A14	Low current on evaporator fan	The fan motor is using too little power. (Test is performed at unit start up and at system changeover)	LED 2 will flash. AR 2 will de-energize.	Display C/F key clears the alarm	Check if relay is switched on. Check output from controller.	Low

A15	High current on evaporator fan	The fan motor is using too much power. (Test is performed at unit start up and at system changeover)	LED 2 will flash. AR 2 will de-energize.	Display C/F key clears the alarm	Check amps at evaporator fan motor. Check if fan is rotating.	Low
A16	Low current on condenser fan	The condenser fan is using too little power. (Test is performed at unit start up and at system changeover)	LED 2 will flash. AR 2 will de-energize.	Display C/F key clears the alarm	Check if relay is switched on. Check output from controller.	Low
A17	High current on condenser fan	The condenser fan is using too much power. (Test is performed at unit start up and at system changeover)	LED 2 will flash. AR 2 will de-energize.	Display C/F key clears the alarm	Check amps at condenser motor. Check if fan is rotating.	Low
A18	Low current on compressor	The compressor is using too little power. (Test is performed at unit start up and at system changeover)	LED 2 will flash. AR 2 will de-energize.	If there has not been an alarm for 60 minutes, then the controller clears the alarm. Or by C/F key.	Check if relay is switched on. Check overload relay. Check output from controller. Check gas at the ref. system. Check if HP is switched out.	Low
A19	High current on compressor	The compressor is using too much power. (Test is performed at unit start up and at system changeover)	LED 2 will flash. AR 2 will de-energize.	If there has not been an alarm for 60 minutes, then the controller clears the alarm. Or by C/F key.	Check amps at compressor motor.	Low
A20	Different current on heating elements	The heater elements are drawing different amounts of current	LED 2 will flash. AR 2 will de-energize.	Display C/F key clears the alarm	Check heaters for shorts of if relay is missing a phase.	Low

A21	Different current on evaporator fan motor	There is a difference between the phases. (Test is performed at unit start up and at system changeover)	LED 2 will flash. AR 2 will de-energize.	Display C/F key clears the alarm	Check if relay is missing a phase. Check if voltage is too low. Check the motor element for defect with a clamp ammeter	Low
A22	Different current on condenser fan	There is a difference between the phases. (Test is performed at unit start up and at system changeover)	LED 2 will flash. AR 2 will de-energize.	Display C/F key clears the alarm	Check if relay is missing a phase. Check if voltage is too low. Check the motor element for defect with a clamp ammeter	Low
A23	Different current on compressor	There is a difference between the phases. (Test is performed at unit start up and at system changeover)	LED 2 will flash. AR 2 will de-energize.	If there has not been an alarm for 60 minutes, then the controller clears the alarm. Or by C/F key.	Check if relay is missing a phase. Check if voltage is too low. Check the motor element for defect with a clamp ammeter	Low
A24	Compressor unload fail	If compressor current is not dropping when the unload valve is on, then there will be an alarm. (Test is performed at unit function test)	LED 2 will flash. AR 2 will de-energize.	Display C/F key clears the alarm	Check controller output. Check unload valve.	Low
A29	Temperature sensor difference too large under test.	Difference between the temperature sensors is too large. (Test is performed at unit function test)	LED 2 will flash. AR 2 will de-energize.	Display C/F key clears the alarm	Check sensors for correct reading.	Low

A30	Container temperature too low	If the rate of temperature change is too slow, less than 0.06 °C / hour, (i.e. not heating fast enough) and the return probe temperature is outside of a 2°C window of the set point there is an alarm. OR if the return probe temperature has been inside a 2 °C window of set point at some time since power up or since the set point was changed, and if the return air temperature is outside a 2°C window of set point for 2 hours or more, there is an alarm.	LED 6 will flash, and LED 2 will flash. AR 2 will de-energize.	If the return air is inside the 2°C window of the set point, then the controller clears the alarm. Or by C/F key.	Check hot gas system Check evaporator fan motor Check air flow. Check container door is closed.	High
A31	Container temperature too high	If the rate of temperature change is too slow, less than 0.06 °C / hour, (i.e. not cooling fast enough) and the return probe temperature is outside of a 2°C window of the set point there is an alarm. OR if the return probe temperature has been inside a 2 °C window of set point at some time since power up or since the set point was changed, and if the return air temp is	LED 6 will flash, and LED 2 will flash. AR 2 will de-energize.	If the return air is inside the 2°C window of the set point, then the controller clears the alarm. Or by C/F key.	Check refrigerant gas. Check TX valve. Check evaporator fan motor. Check air flow. Check compressor. Check if condenser is dirty. Check condenser fan motor. Check container door is closed.	High

		outside a 2°C window of set point for 2 hours or more, there is an alarm.				
A32	Defrost time too long	The defrost cycle lasts longer than one hour	The defrost will stop, and the unit will go back to normal operation. LED 2 will flash. AR2 will de-energize.	The alarm is clear by display C/F key.	Check hot gas valve. Check refrigerant gas. Check compressor.	High
A33	Evaporator temperature too low	If the controller calls for a defrost less than 30 minutes after last defrost end. (the delta T between the return air and the defrost probe is too large)	Unit will run cooling mode until 90 minutes after last defrost end. LED 2 will flash. AR2 will de-energize.	The alarm is clear by display C/F key.	Check evaporator fan motor. Check airflow. Check if fins at evaporator coil are bent. Check door to container is closed. Check defrost and return sensors for correct reading.	Low
A34	Compressor temperature too high	If the compressor sensor is above 120°C	Unit will stop until compressor sensor is below 90°C, or the alarm is reset.	If there has not been an alarm for 60 minutes, then the controller clears the alarm. Or by C/F key.	Check refrigerant gas. Check if there is air in the refrigeration system. Check if condenser is dirty. Check condenser fan motor.	High

A35	External temperature fail	These conditions will produce an open at terminal 31. If terminal 31 has been open in 60 minutes, then the alarm is set.	LED 6 will flash, and LED 2 will flash. AR 2 will de-energize.	The alarm is clear by display C/F key	Check setting of temperature alarm recorder. Check evaporator fan motor. Check gas on system. Check TX valve. Check hot gas system. Check container door is closed.	High
A36	High pressure cut out. Cool mode	If there has been 3 HP cut out in an hour when the unit is in cool mode, then the alarm will be set to on.	LED 2 and LED 4 will flash. AR 2 will de-energize.	The alarm is clear by display C/F key	Check condenser fan motor is running. Check if condenser needs cleaning. Check if there is air in the gas system. Check adjustment of suction regulator valve. Check HP switch for fault.	High
A37	High pressure cut out. Hot gas mode	If there has been 3 HP cut out in an hour when the unit is in hot gas mode, then the alarm will be set to on.	LED 2 and LED 4 will flash. AR 2 will de-energize.	The alarm is clear by display C/F key.	Check if condenser coil needs cleaning. Check hot gas solenoid valve for proper orientation. Check hot gas solenoid head for proper orientation. Check for	Low

					proper refrigerant charge. Check evaporator coil is free of ice or blockage. Make sure suction and discharge regulators are set correctly.	
A41	Set point different from Sys 1 to Sys 2.	If the set points of the (2) systems are more than 1°C out of sync with each other than alarm will activate	LED 2 and alarm code on display	Adjusting the set point temperature to within 1°C of each other automatically clears	N/A	N/A
A42	No response from system to system	Unit will display alarm if only one unit is powered ON for more than 3 minutes	LED 2 and alarm code on display	Turn ON the second unit and alarm will automatically clear, or allow to operate as is, if necessary.	N/A	Low
A44	Container door open	Container door open timer exceeded	LED 2 will flash. AR 2 will de-energize.	Close container door or turn unit OFF	Close container door or turn unit OFF	Low
A49	Set point error flash bank error	Unit will display alarm if set point is not loaded in controller	Control will not start up before a set point is put into the controller.	The alarm is clear by putting set point in controller.	This is normally if new software is uploaded to the controller.	High

- Low Level A Low Level Alarm will give the Alarm Number on the Touch Pad. The alarm lamp will light, and the horn will sound.
- High Level A High Level Alarm will give the Alarm Number on the Touch Pad. The alarm lamp will light, and the horn will sound. The unit will switch over to the backup system.

6.6 DATA LIST

Electrical All data are approx. and based on 480 volt/60 Hz	
Input power	480 volts,3 phase 60Hz
Current total unit (1 system running with 2 evap fans)	Full load – 18.1 Amps
Compressor motor	3400 Rpm - full load – 12.0 Amps
Condenser motor	3430 Rpm - full load – 2.1 Amps
Evaporator motor	3450 Rpm - full load – 2.0 Amps
CB1	20 Amps

Refrigerant System	
System charging R-134a (per system)	3.6 kg
Compressor oil charge (per system)	1.9 Liter (64.25 fl oz)
High-pressure switch, R-134a (cannot be adjusted)	Cut-out approx. 27.57 bar +/-0.7 (400 Psig +/- 10) Cut-in approx. 20.68 bar +/-0.7 (300 Psig +/- 10)
Low-pressure switch, R-134a (cannot be adjusted)	Cut-out approx. 0.34 bar +/-0.7 (5 Psig) Cut-in approx. 1.37 bar +/-0.7 (20 Psig)
Crankcase pressure regulator	Set to suction pressure at max. 3 bar = 43.5 Psig
Safety Relief valve	32.75 bar = 475 Psig

6.7 PTI FORM

It is important that a Pre-Trip Inspection (PTI) be completed prior to each shipment.

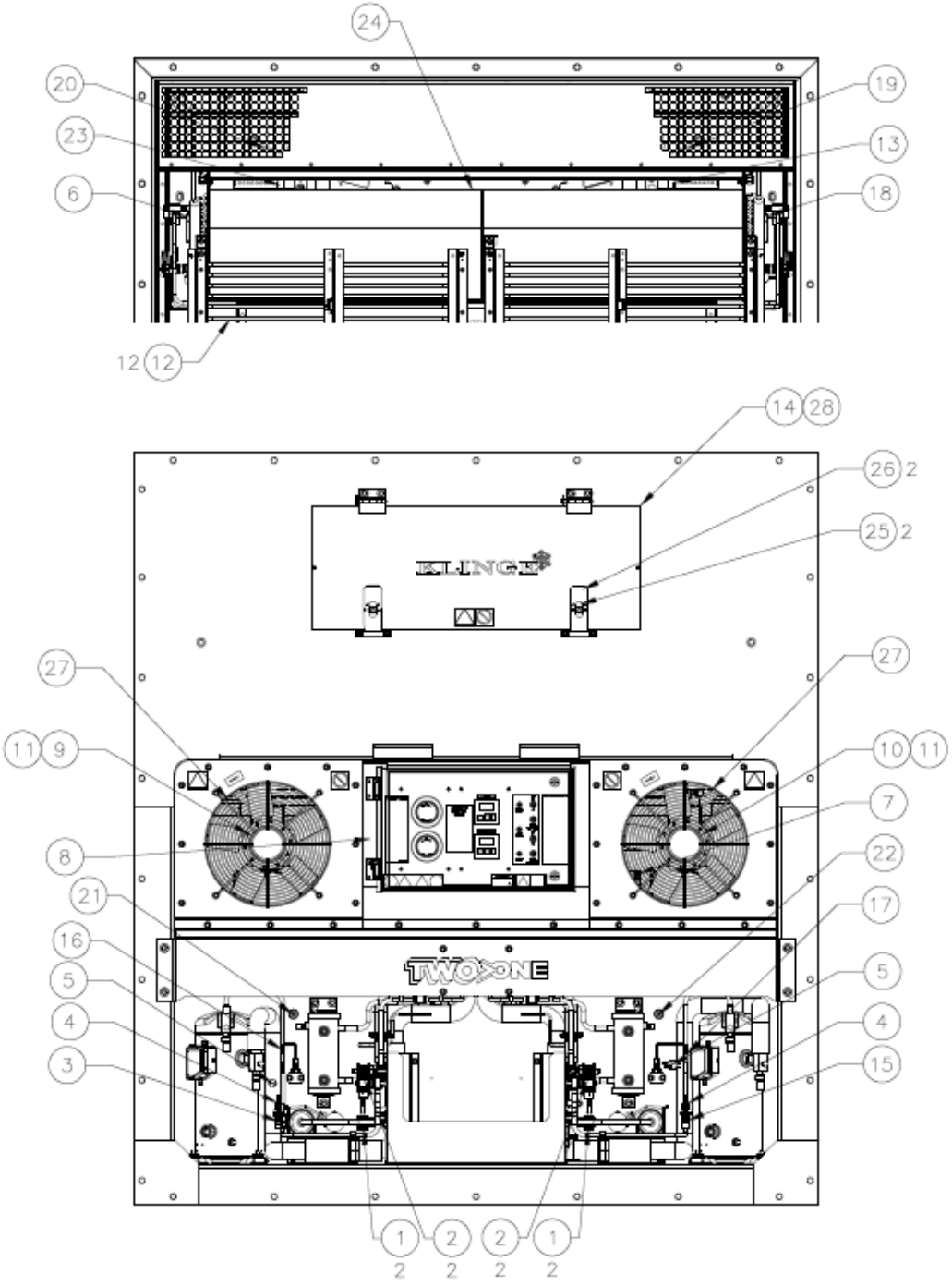
The PFP-572 PTI form can be found on Klinge's website at: http://www.klingecorp.com/**pti**/

6.8 LOADING CONFIGURATION

Placement of cargo within the container must be considered for optimum airflow and uniform temperatures for protection of the cargo.

Best practices for container cargo loading can be found on Klinge's website at:
http://www.klingecorp.com/cargoloading/

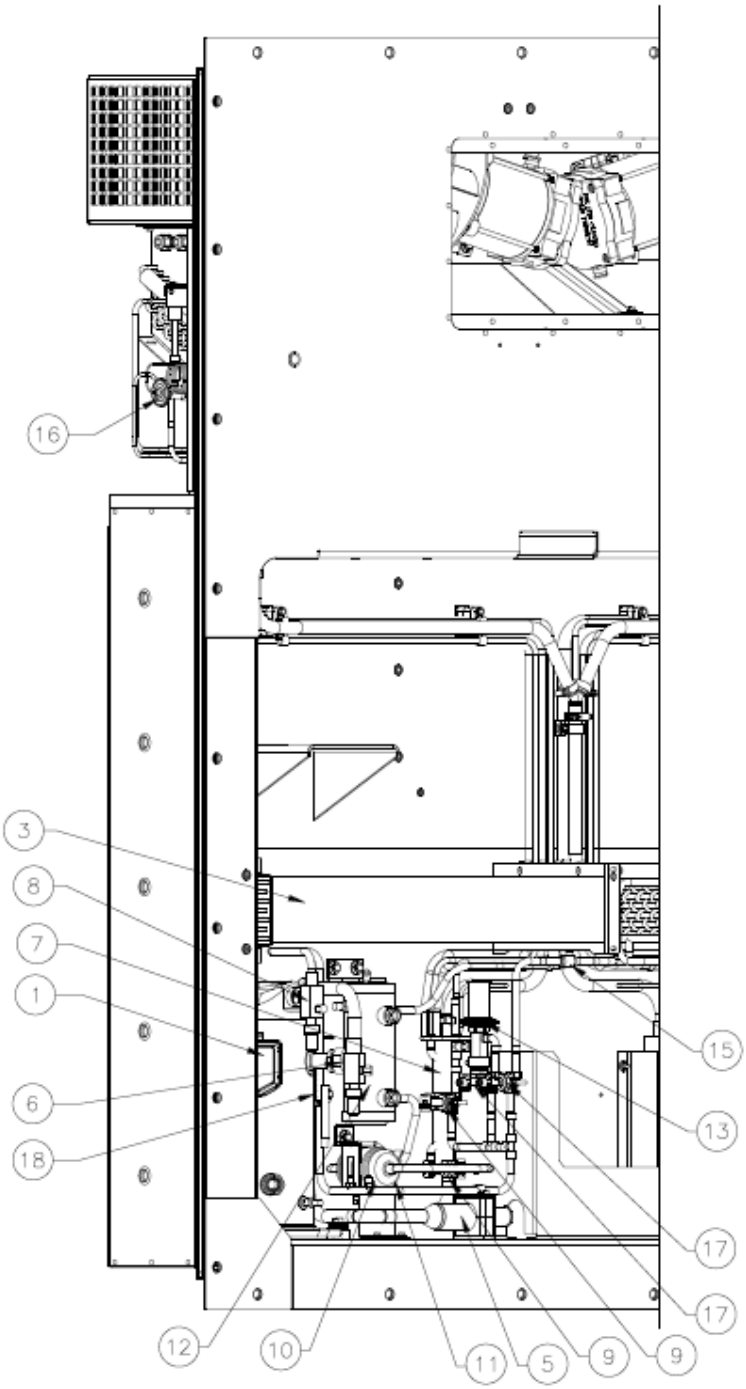
SECTION SEVEN - SERVICE PARTS



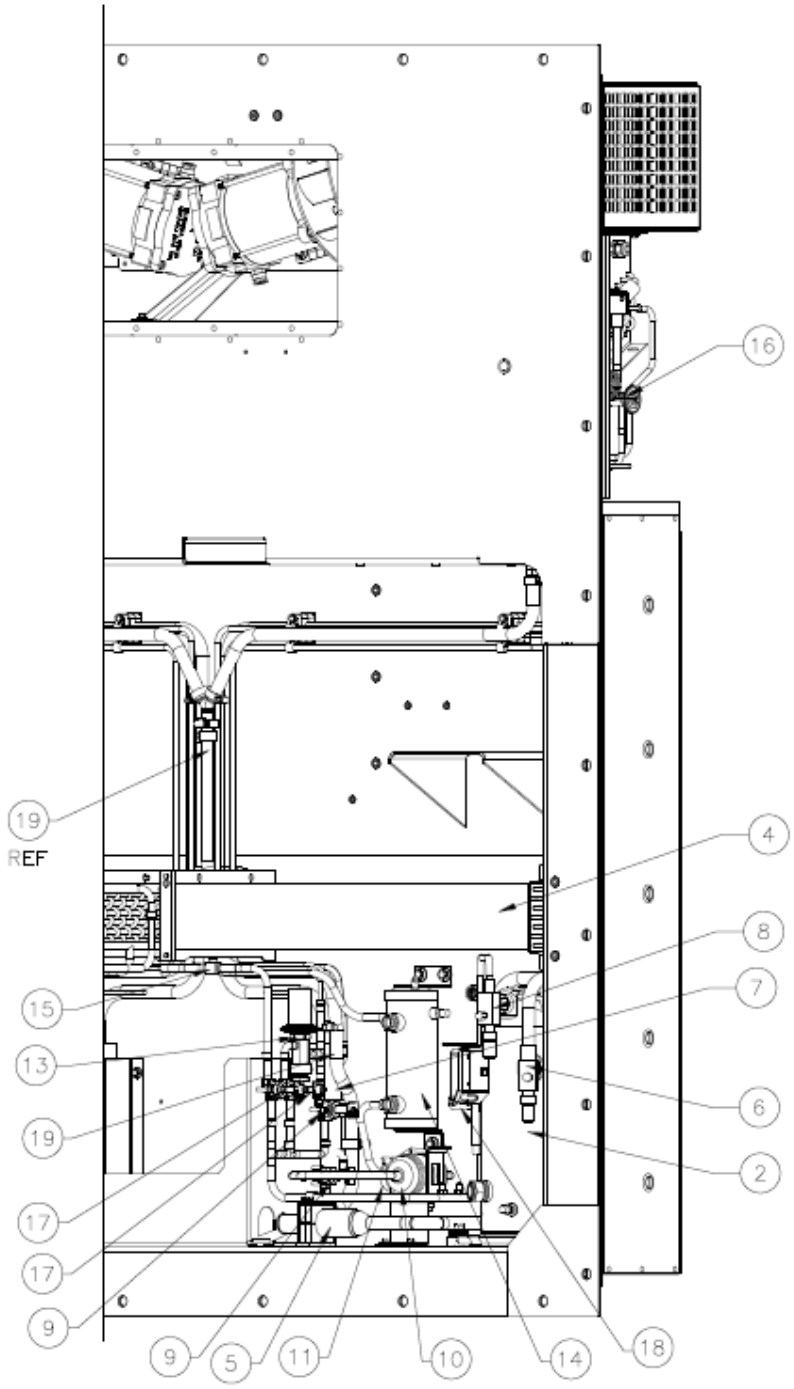
SECTION 7.1
UNIT FRONT & BACK TOP VIEW

7.1 UNIT FRONT & BACK TOP VIEW

ITEM	PART NO.	DESCRIPTION	QTY
1	360-19258-00	COIL SOLENOID LIQUID VALVE HOT GAS NC	4
2	360-17300-05	COIL SOLENOID HOT GAS NO	4
3	360-19196-01	CABLE HIGH PRESSURE TRANSDUCER SYS 1	1
4	360-16405-20	SWITCH HIGH PRESSURE	2
5	360-18155-01	SWITCH LOW PRESSURE	2
6	360-19192-02	PROBE DEFROST SYS 2	1
7	360-19188-00	CABLE DUAL HORN W/HARNESS	1
8	360-19013-00	BOX ELECTRICAL COMPLETE PFP-572	1
9	360-19100-01	MOTOR CONDENSER SYSTEM 1	1
10	360-19100-02	MOTOR CONDENSER SYSTEM 2	1
11	K26-25321-00	FAN 14 INCH DIA 1500CFM 27 DEG 19MM BORE 5 BLADES	2
12	K25-27035-00	HEATER 480V 750W 10.2MM OD 790MM LG M4X18 ENDS	12
13	360-19200-01	HYGROSTAT WIRED SYS 1	1
14	360-11105-01	DOOR EVAPORATOR METRIC COMPLETE PFR	1
15	360-19196-02	CABLE HIGH PRESSURE TRANSDUCER SYS 2	1
16	360-19189-01	PROBE DISCHARGE SYS 1	1
17	360-19189-02	PROBE DISCHARGE SYS 2	1
18	360-19192-01	PROBE DEFROST SYS 1	1
19	360-19191-01	PROBE RETURN SYS 1	1
20	360-19191-02	PROBE RETURN SYS 2	1
21	360-19193-01	PROBE SUPPLY SYS 1	1
22	360-19193-02	PROBE SUPPLY SYS 2	1
23	360-19200-02	HYGROSTAT WIRED SYS 2	1
24	360-19040-00	EVAPORATOR COIL MODIFIED PFP	1
25	060-07971-00	KNOB PASSIVATION AND POLISH	2
26	360-07969-00	LATCH WELDED PASSIVATION	2
27	K26-25322-01	GUARD FAN 14 INCH DIA SS PASS/POL	2
28	K28-10860-00	GASKET DOOR EVAPORATOR FAN OUTSIDE	1



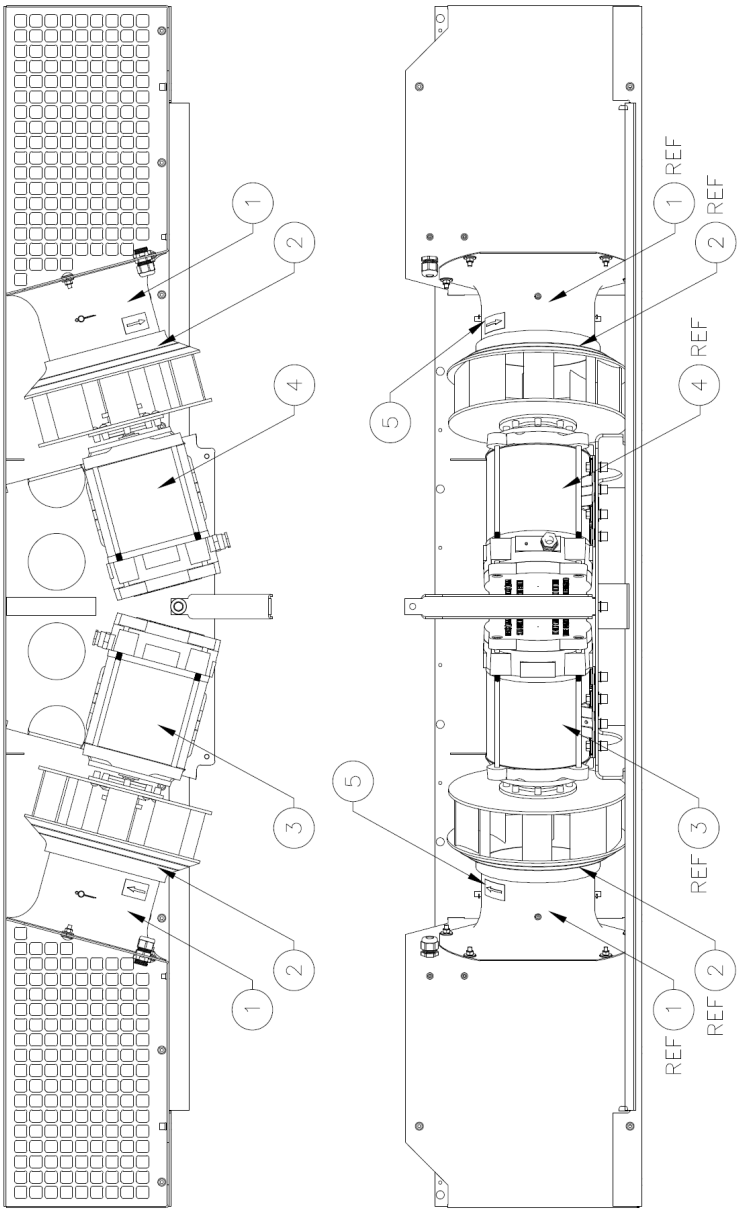
SECTION 7.2
PIPING SYSTEM 1



SECTION 7.2
PIPING SYSTEM 2

7.2 PIPING

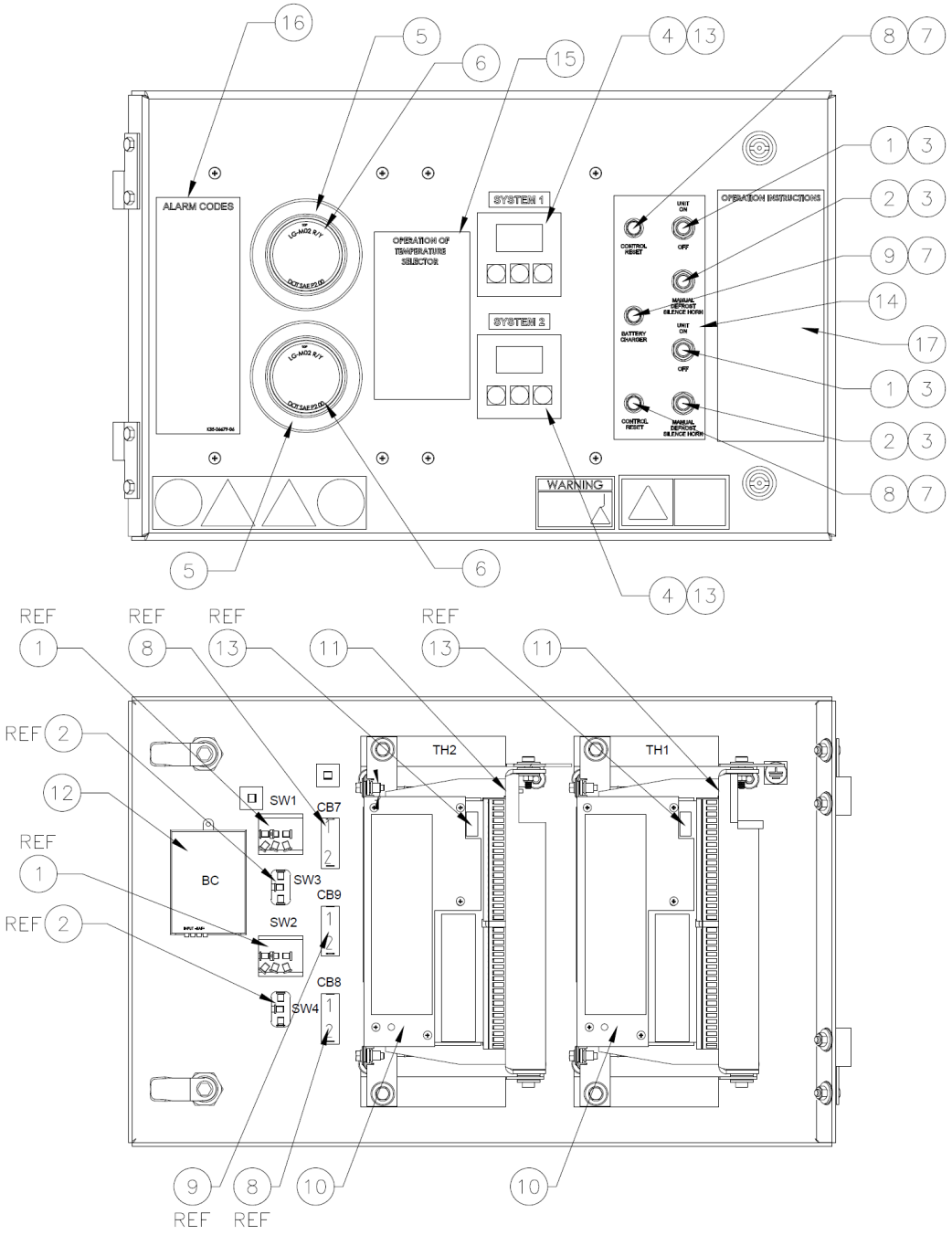
ITEM	PART NO.	DESCRIPTION	QTY
1	360-19041-00	COMPRESSOR SYSTEM 1	1
2	360-19041-02	COMPRESSOR SYSTEM 2	1
3	360-19125-01	COIL CONSENSER LH MODIFIED WITH INSERT	1
4	360-19125-02	COIL CONSENSER RH MODIFIED WITH INSERT	1
5	K22-06950-13	VALVE SUCTION REGULATOR 7/8 0-60 PSI WITH STRAINER	2
6	K22-06910-00	VALVE ROTA 1 1/4-12 X 7/8C BRASS ANGLE TOP PORT	2
7	K26-17451-01	HEAT EXCHANGER 7/8CX1/2C 11 IN LONG NMR-071	2
8	K22-06970-00	VALVE ROTA 1-14X5/8C BRASS ANGLE TOP PORT	2
9	K25-26089-01	VALVE SOLENOID 1/2 ODF NORM CLOSED LESS MKC1 COIL	4
10	K26-10795-01	FILTER DRIER 1/2C	2
11	K22-01672-00	VALVE HAND SHUT OFF 1/2 C BRASS	2
12	K26-25323-01	RECEIVER LEFT HAND METRIC PIT-GUARD BLACK	1
13	K22-07044-00	DISCHARGE BYPASS VALVE 1/2 x 1/2 x 1/4	2
14	K26-25324-01	RECEIVER RIGHT HAND METRIC PIT-GUARD BLACK	1
15	K26-25319-00	VALVE CHECK 1/2 ID BRASS	2
16	K25-27028-00	VALVE TX 3/8 IN 1/2 OUT X 1/4 EQ ERJE-1-1/2 (R-134a)	2
17	K25-27029-00	VALVE SOL 1/2 ODF NORM OPEN LESS MKC1 COIL	4
18	K22-07045-33	VALVE PRESSURE RELIEF 1/4 MALE NPTFE 475 PSIG	2
19	360-19082-46	HOSE EVAPORATOR DRAIN WITH KAZOO 5/8 ID X 46 LG	1



SECTION 7.3
EVAPORATOR SECTION

7.3 EVAPORATOR SECTION

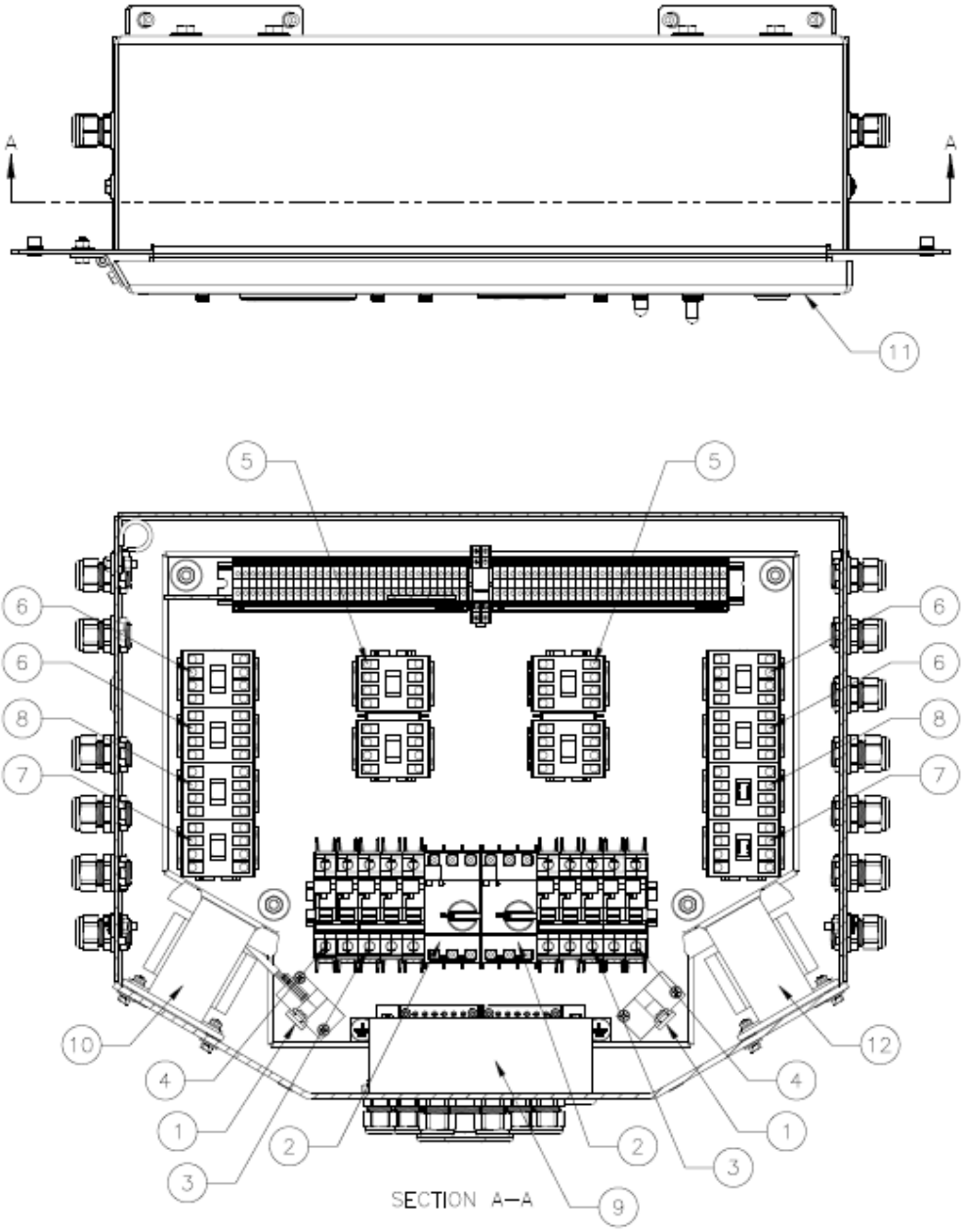
ITEM	PART NO.	DESCRIPTION	QTY
1	360-16630-00	ASSEMBLY DAMPER EVAPORATOR PFR-582 METRIC	2
2	K26-25139-00	IMPELLER CENTRIFUGAL 11 IN DIA 5/8 IN SHAFT W 3/16 KEY	2
3	360-19038-01	MOTOR EVAPORATOR 3400 RPM 1.5 HP SYSTEM 1	1
4	360-19038-02	MOTOR EVAPORATOR 3400 RPM 1.5 HP SYSTEM 2	1
5	K35-05606-00	LABEL ARROW	2



SECTION 7.4
ELECTRICAL BOX DOOR

7.4 ELECTRICAL BOX DOOR

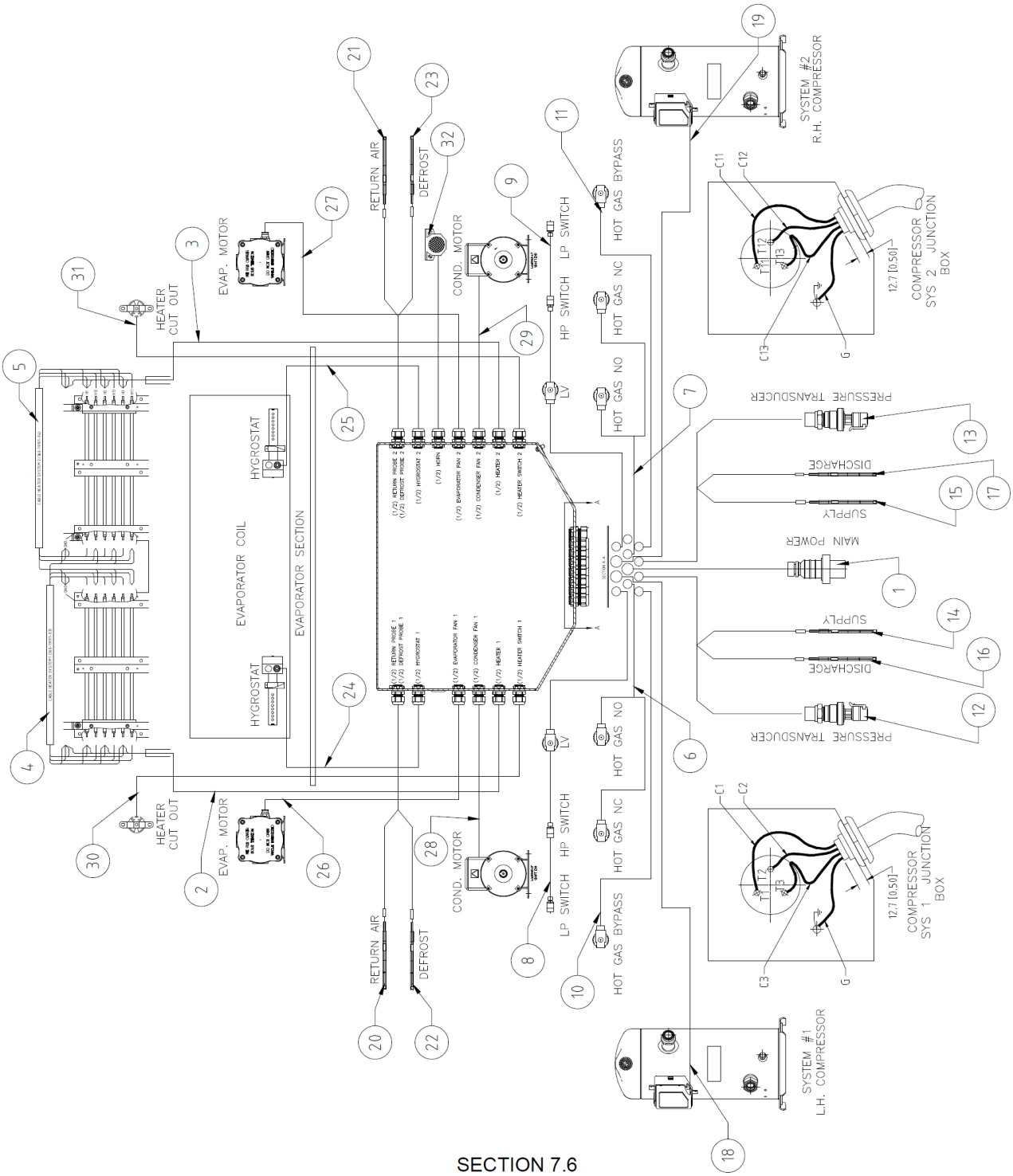
ITEM	PART NO.	DESCRIPTION	QTY
1	K24-22144-00	SWITCH TOGGLE 3 PST ON-OFF NO 6 SCR	1
2	K24-21355-00	SWITCH TOGGLE SPDT ON-ON 3 6SCREW NO CENTER POSITION	2
3	K24-17239-00	BOOT TOGGLE SWITCH FULL IP 66/68	2
4	K31-00811-00	DISPLAY TEMPERATURE AND SELECTOR F/C W/SOFTWARE	2
5	K28-11052-00	GROMMET ALARM LAMP BLACK VINYL NMR-171/2	2
6	K25-26579-00	LAMP ALARM RED LED 2.5 IN OD 12V	2
7	K24-18164-00	BOOT CIRCUIT BREAKER 3/8-27 THD CLEAR	3
8	K24-20565-00	CIRCUIT BREAKER 8 AMP 1 POLE 1/4 PO PANEL MTG	2
9	K24-22330-00	CIRCUIT BREAKER 4 A 1P 1/4PO PANEL MOUNTING	1
10	K31-00984-00	THERMOSTAT LABELED PFP-572	2
11	360-10829-00	BASE THERMOSTAT GREEN 5 PIECE WITH LABELS	2
12	360-15580-01	BATTERY CHARGER MOD 24VAC INPUT 13.6VDC 2A OUTPUT	1
13	360-12540-04	CABLE RIBBON SHIELD 30 IN 10 WIRES	2
14	K35-07046-00	LABEL ELECTRICAL BOX PFP	1
15	K35-05906-05	LABEL OPERATION TEMPERATURE SELECTOR	1
16	K35-06679-06	LABEL ALARM CODES	1
17	K35-05905-10	LABEL OPERATION INSTRUCTIONS	1



SECTION 7.5
ELECTRICAL BOX & SUB-PANEL

7.5 ELECTRICAL BOX & SUB-PANEL

ITEM	PART NO.	DESCRIPTION	QTY
1	360-16398-01	CURRENT SENSING TRANSFORMER	2
2	K24-22363-26	CKT BKR IEC 3P 18-26A	2
3	K24-22567-01	CIRCUIT BREAKER 6A 3 POLE 480VAC B-TRIP CURVE 10kA	2
4	K24-22543-02	CIRCUIT BREAKER 2P 2A CURVE 10kA 480VAC	2
5	K24-22576-18	CONTACTOR REVERSING 18A AC3 6 POLE 24 VAC 50/60 HZ	2
6	K24-22575-10	CONTACTOR 10A AC3 3P 460VOLT 24VAC 50/60 Hz COIL	4
7	K24-22575-14	CONTACTOR 14A AC3 3P 24V 50/60 Hz COIL	2
8	K24-22575-18	CONTACTOR 18A AC3 3P 460VOLT 24VAC 50/60 Hz COIL	2
9	360-13396-01	BATTERY 12V 2.3AH	1
10	360-19204-01	TRANSFORMER WITH WIRES SYSTEM 1	1
11	360-19026-00	DOOR ASSEMBLY ELECTRICAL BOX	1
12	360-19204-02	TRANSFORMER WITH WIRES SYSTEM 2	1



SECTION 7.6
CABLE DIAGRAM

7.6 CABLE DIAGRAM

ITEM	PART NO.	DESCRIPTION	QTY
1	360-19187-00	MAIN POWER 460 VOLTS 32 AMPS 64 FT	1
2	360-19197-01	CABLE HEATER FROM CONTROL BOX SYS 1	1
3	360-19197-02	CABLE HEATER FROM CONTROL BOX SYS 2	1
4	360-19197-03	CABLE HEATER EVAPORATOR SYS 1	1
5	360-19197-04	CABLE HEATER EVAPORATOR SYS 2	1
6	360-19201-01	CABLE HOT GAS SYS 1	1
7	360-19201-02	CABLE HOT GAS SYS 2	1
8	360-19194-01	CABLE HIGH PRESSURE SWITCH SYS 1	1
9	360-19194-02	CABLE HIGH PRESSURE SWITCH SYS 2	1
10	360-19202-01	CABLE HOT GAS BYPASS SYS 1	1
11	360-19202-02	CABLE HOT GAS BYPASS SYS 2	1
12	360-19196-01	CABLE HIGH PRESSURE TRANSDUCER SYS 1	1
13	360-19196-02	CABLE HIGH PRESSURE TRANSDUCER SYS 2	1
14	360-19191-01	PROBE RETURN SYS 1	1
15	360-19191-02	PROBE RETURN SYS 2	1
16	360-19192-01	PROBE DEFROST SYS 1	1
17	360-19192-02	PROBE DEFROST SYS 2	1
18	360-19137-01	CABLE POWER COMPRESSOR SYS 1	1
19	360-19137-02	CABLE POWER COMPRESSOR SYS 2	1
20	360-19193-01	PROBE SUPPLY SYS 1	1
21	360-19193-02	PROBE SUPPLY SYS 2	1
22	360-19189-01	PROBE DISCHARGE SYS 1	1
23	360-19189-02	PROBE DISCHARGE SYS 2	1
24	360-19199-01	CABLE HYGROSTAT SYS 1	1
25	360-19199-02	CABLE HYGROSTAT SYS 2	1
26	360-19092-01	CABLE ASSEMBLY ELECTRICAL EVAPORATOR MOTOR LH PFP	1
27	360-19092-02	CABLE ASSEMBLY ELECTRICAL EVAPORATOR MOTOR RH PFP	1
28	360-19101-01	CABLE MOTOR CONDENSER SYSTEM 1	1
29	360-19101-02	CABLE MOTOR CONDENSER SYSTEM 2	1
30	360-19198-01	CABLE HEATER CUT-OUT SYS 1	1
31	360-19198-02	CABLE HEATER CUT-OUT SYS 2	1
32	360-19188-00	CABLE DUAL HORN W/HARNESS	1

7.7 SPARE PARTS KIT

Klinge Corporation recommends keeping a supply of certain parts on hand for immediate replacement in the event of component failure.

The spare parts kit is mounted to the front wall of the unit, within the cable tray.

Suggested Spare Parts

DESCRIPTION	Qty	PART NO.
Base Thermostat	2	360-10829-00
Cable Ribbon 24”	2	360-12540-04
Battery 12V 2.3AH	1	360-13396-01
Kit Replacement Probe 6” Universal	3	360-13807-00
Battery Charger	1	360-15580-01
Current Sensing Transformer	2	360-16398-01
Switch High Pressure	2	360-16405-20
Coil Solenoid Hot Gas	4	360-17300-05
Switch Low Pressure	2	360-18155-01
Transformer	1	360-19204-01
Transformer	1	360-19204-02
Coil Solenoid Valve	4	360-19258-00
Valve Pressure Relief 475 PSIG	2	K22-07045-33
Boot Toggle Switch	4	K24-17239-00
Boot Circuit Breaker	3	K24-18164-00
Circuit Breaker 8 Amp	2	K24-20565-00
Switch Toggle	2	K24-21355-00
Switch Toggle	2	K24-22144-00
Relay 12 VDC Coil	1	K24-22264-01
Circuit Breaker 4 Amp	1	K24-22330-00
Circuit Breaker 18-26 Amp	2	K24-22363-26
Circuit Breaker 2 Amp	2	K24-22543-02
Circuit Breaker 6 Amp	2	K24-22567-01
Contactor 10 Amp	4	K24-22575-10
Contactor 14 Amp	2	K24-22575-14
Contactor 18 Amp	2	K24-22575-18
Contactor Reversing 18 Amp	2	K24-22576-18
Control Temperature	1	K25-19557-00
Display Temperature and Selector	2	K31-00811-00
Thermostat Labeled	2	K31-00984-00