Thermo Forma

# Model:
# 916/917

Ultra Low Temperature
Upright Freezer
17 cu. ft. capacity

Operating and Maintenance Manual

**Manual No. 7050916 Rev. 7**

***CAUTION! All internal adjustments and maintenance must be performed by qualified service personnel.***

**IMPORTANT!**

**Read This Instruction Manual**

Failure to read, understand and follow the instructions in this manual may result in damage to the unit, injury to operating personnel and poor equipment performance.

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**MANUAL NO. 7050916**

| REV | ECR/ECN | DATE | DESCRIPTION | By |
|---|---|---|---|---|
| -- | 20775/SI-8506 | 6/3/02 | Updated to 40°C Pepi thermostat from 43°C Klixon | ccs |
| 7 | 20762/FR-1606 | 5/20/02 | Added 'Normally Open' description to expansion tank solenoid valve | ccs |
| | 20845/FR-1606 | 5/22/02 | Updated refrigerant charge on schematics (oil return issue) | ccs |
| -- | 20684/FR-1596 | 3/28/02 | Added sample pull-down curve after specs | ccs |
| 6 | 20644/FR-1557 | 3/8/02 | Added two expansion tanks to refrig system | ccs |
| 5 | 20251/FR-1526 | 2/19/02 | Cordset connector | aks |
| 4 | 20522/FR-1557 | 12/7/01 | Updated 917 schematic to 12 FLA | ccs |
| 3 | 20400/FR-1557 | 11/16/01 | Added expansion tank with solenoid and relay timer (Release 11) | ccs |
| -- | 19363/FR-1429 | 10/18/00 | New thermostat hot condenser temp reaches 43°C | ccs |
| 2 | 19404/FR-1441 | 9/22/00 | New temperature control board | ccs |
| 1 | 19154/FR-1421 | 9/1/00 | Updated parts and refrigeration drawings (dryer part number) | ccs |
| 0 | -- | 6/12/00 | New Manual | aks |

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# General Safety Notes used in this Manual

Important operating and/or maintenance instructions. Read the accompanying text carefully.

Ce symbole attire l'attention de l'utilisateur sur des instructions importantes de fonctionnement et/ou d'entretien. Il peut être utilisé seul ou avec d'autres symboles de sécurité. Lire attentivement le texte d'accompagnement.

Wichtige Betriebs- und/oder Wartungshinweise. Lesen Sie den nachfolgenden Text sorgfältig.

Importante instruccions de operacion y/o mantenimiento. Lea el texto acompanante cuidadosamente.

---

Potential electrical hazards. Only qualified persons should perform procedures associated with this symbol.

Ce symbole attire l'attention de l'utilisateur sur des risques électriques potentiels. Seules des personnes qualifiées doivent appliquer les instructions et les procédures associées à ce symbole.

Gefahr von Stromschlägen. Nur qualifizierte Personen sollten die Tätigkeiten ausführen, die mit diesem Symbol bezeichnet sind.

Potencial de riesgos electricos. Solo personas das capacitadadas deben ejecutar los procedimientos asociadas con este simbulo.

---

Equipment being maintained or serviced must be turned off and locked off to prevent possible injury.

Risques potentiels liés à l'énergie. L'équipement en entretien ou en maintenance doit être éteint et mis sous clé pour éviter des blessures possibles.

Geräte, an denen Wartungs- oder Servicearbeiten durchgeführt werden, müssen abgeschaltet und abgeschlossen werden, um Verletzungen zu vermeiden.

El equipo recibiendo servicio o mantenimiento debe ser apagado y segurado para prevenir danos.

---

Hot surface(s) present which may cause burns to unprotected skin or to materials which may be damaged by elevated temperatures

Présence de surface(s) chaude(s) pouvant causer des brûlures sur la peau non protégée, ou sur des matières pouvant être endommagées par des températures élevées.

Heiße Oberfläche(n) können ungeschützter Haut Verbrennungen zufügen oder Schäden an Materialien verursachen, die nicht hitzebeständig sind.

Superficias calientes que pueden causar quemaduras a piel sin proteccion o a materiales que pueden estar danados por elevadas temperaturas.

---

- ☑ Always use the proper protective equipment (clothing, gloves, goggles etc.).
- ☑ Always dissipate extreme cold or heat and wear protective clothing.
- ☑ Always follow good hygiene practices.
- ☑ Each individual is responsible for his or her own safety.

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# Section 1 - Installation and Start-Up

## 1.1 Unloading and Moving the Freezer

To remove the freezer from the pallet, use the 7/16" wrench to remove all the bolts securing the shipping bracket to the pallet.

***If tipped more than 45°, allow the unit to set upright for 24 hours before start up.***

Remove the shipping bracket. Remove the ramp boards from the pallet and place the slotted end over the ramp brackets on the pallet. The support blocks on the ramps will be facing down. Before moving the freezer, make sure the casters are unlocked and moving freely. Align the caster with the ramp boards. Use adequate personnel to roll the freezer off the pallet.

The freezer can be easily pushed to the desired approved location, described in Section 1.6. If necessary, the doorstop may be removed to allow the door to swing fully open to move the unit through tight openings. When the freezer is in position, set the front caster brakes.

***The freezer must not be moved with the product load inside.***

## 1.2 Getting to Know Your Freezer

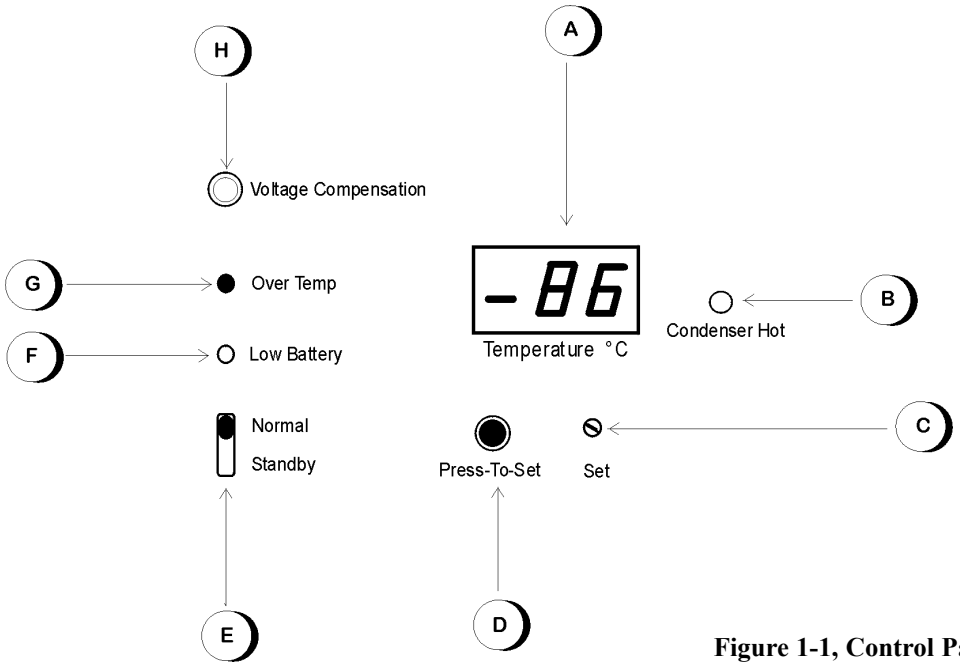


**Figure 1-1, Control Panel**

**A** LED display - Shows actual chamber temperature and indicates the control temperature set point when the Press-To-Set button is pressed.

**B** Condenser Hot indicator - Lights when the thermostat on the condenser reaches approximately 40°C, indicating typically a dirty air filter, a clogged condenser, a fan failure or high ambient temperature.

**C** Set Point Adjustment screw - Used to set the control temperature set point.

**D** Press-To-Set button - Press to display control temperature set point.

**E** Normal/Standby switch - Silences the audible alarm.

**F** Low Battery indicator - Flashes when the battery needs to be replaced.

**G** Over Temp indicator - Flashes when the chamber temperature rises above the Over Temperature Alarm setting.

**H** Voltage Compensation indicator - Indicates when the incoming electrical power is being automatically adjusted to ensure that the compressor operates within specification.

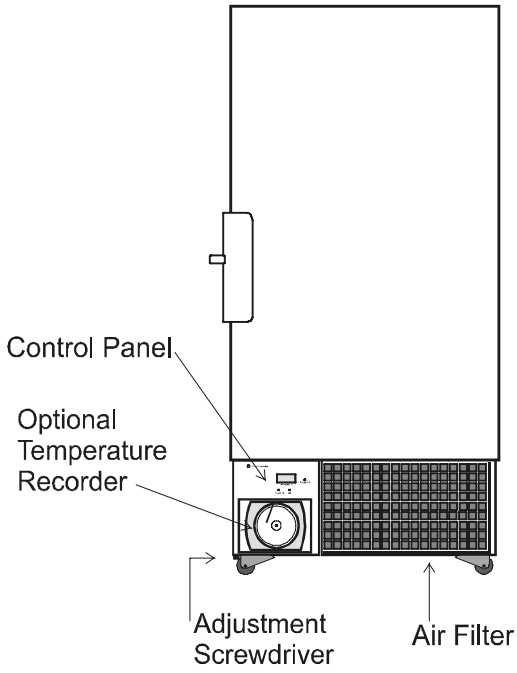


**Figure 1-2**
**Freezer Exterior, front view**

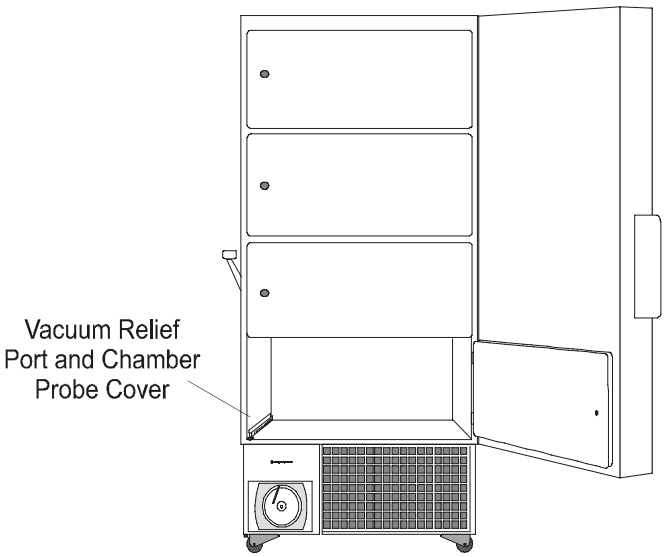


**Figure 1-4, Vacuum Relief Port and Chamber Probe**

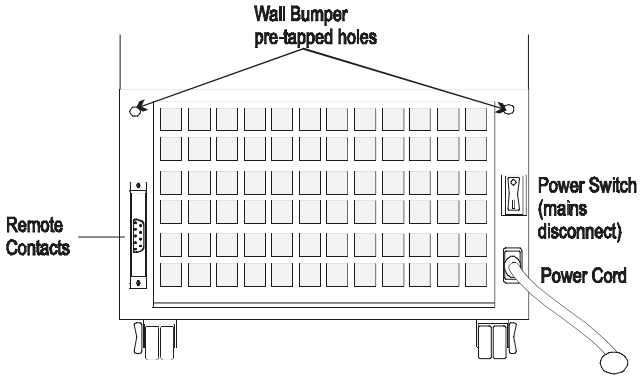


**Figure 1-3**
**Freezer Base, rear view**

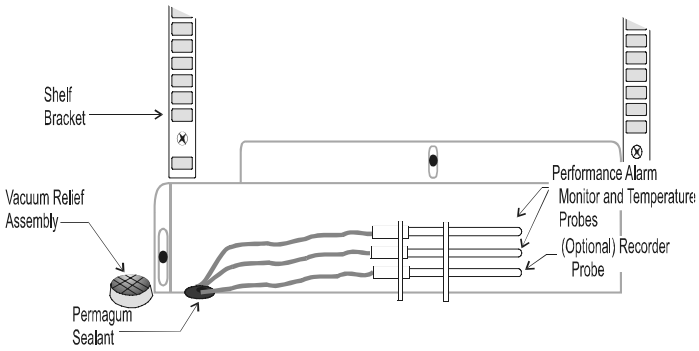


**Figure 1-5, Vacuum Relief Port and Chamber Probe Assembly (without cover)**

### 1.3 Environmental Conditions

The ULT Freezers are designed to be electrically safe in the following environmental conditions:

- Indoors
- Altitude: Up to 2,000 meters
- Temperature: 5°C to 43°C
- Humidity: 80% RH at or below 31°C, decreasing linearly to 50% RH at 40°C
- Mains Supply Fluctuations: ± 10% of nominal.
- Installation Category II [1]
- Pollution Degree 2 [2]
- Class of Equipment I
- Climatic Class T (Tropical)[3]

[1] Installation category (overvoltage category) defines the level of transient overvoltage which the instrument is designed to withstand safely. It depends on the nature of the electricity supply and its overvoltage protection means. For example, in CAT II which is the category used for instruments in installations supplied from a supply comparable to public mains such as hospital and research laboratories and most industrial laboratories, the expected transient overvoltage is 2500V for a 230V supply and 1500V for a 120V supply.

[2] Pollution degree describes the amount of conductive pollution present in the operating environment. Pollution degree 2 assumes that normally only non-conductive pollution such as dust occurs with the exception of occasional conductivity caused by condensation.

[3] Class T (Tropical) means that the freezers are electrically safe in a 43°C ambient.

### 1.4 Installing the Wall Bumpers (Refer to Figure 1-3)

The parts bag, located inside the cabinet, contains the following parts.

| Qty. | Stock # | Description | Purpose |
|---|---|---|---|
| 2 | 510016 | 1/4-20 x 5-1/2" Bolt | Wall Bumper |
| 2 | 380520 | Neoprene Cap | Cap Protector |

Install the bolts into the pre-tapped holes on the back of the compressor section. Install a neoprene cap on each bolt. Refer to Figure 1-3 for the locations of the pre-tapped holes.

### 1.5 Installing the Shelves

Install the shelf clips into the shelf pilasters (front and back) at the desired shelf level. Install the shelves in the cabinet onto the clips.

### 1.6 Location

Locate the freezer on a firm, level surface in an area with an ambient temperature between 18°C and 32°C. Provide ample room to reach the mains disconnect switch (power switch) located on the rear of the freezer.

***For proper ventilation and airflow, a minimum clearance of 5" at the rear, at the top and on the side of the freezer is required. Allow adequate space in the front of the freezer for door opening.***

### 1.7 Connecting the Alarm Battery

**NOTE:** The battery must be connected upon start-up so that the alarm will activate during an Overtemperature condition.

1. To gain access to the battery, remove the grill on the front of the freezer. The grill is attached to the freezer by friction plugs on each of the four corners and is readily pulled off. The battery is the rectangle fastened by Velcro to the compressor compartment frame and has a connector with red and black wires. Another red and black wire set with connector is secured to the wiring harness passing through the area of the freezer. Join the two wire connectors and replace the grill.

2. When the battery is connected, the OVERTEMP light will flash and the alarm will sound. Turn the NORMAL/STANDBY switch to the STANDBY position. This will silence the alarm. The alarm will remain silent until the unit is below alarm setpoint. The alarm setpoint is factory set for -65°C. If another setpoint is required, see Section 2.2.

### 1.8 Remote Alarm Contacts

Remote alarm contacts are located on the rear of the unit. See Figure 1-6 for pin description, shown in the alarm state. The Thermo Forma part number for the plug required is 195482. Maximum rating for this plug is 1.0A @ 30VAC.

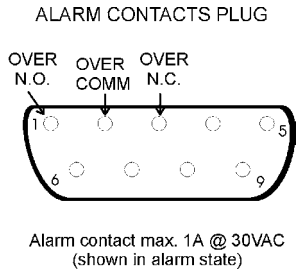


**Figure 1-6**
**Remote Alarm Contact**

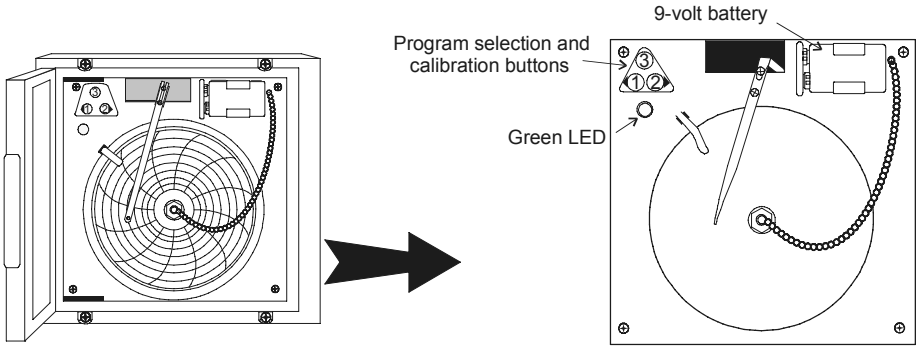


**Figure 1-8**
**Chart Recorder, detail view**

## 1.9 Optional Temperature Recorder

### a. Connecting recorder battery

Open the glass door of the recorder and connect the 9-volt battery. The green light on the recorder will come on.

### b. Installing the chart paper

1. Open the glass door of the recorder and press button #3 until the pen begins to move outward.
2. Unscrew the knob at the center of the chart and remove the paper.
3. Install the new chart paper, position the paper to the correct time line and replace the knob.
4. Remove the cap from the felt pen and press button #3.

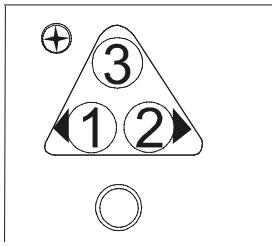


**Figure 1-9**
**Recorder Buttons**

## 1.10 Attaching the Power Cord

1. Insert the power cord into the power outlet module (A).
2. Tighten screws (B) on the power cord retainer.

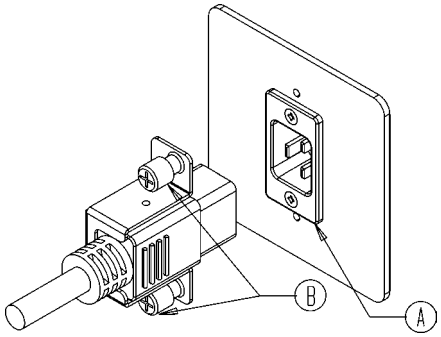


**Figure 1-10**
**Power Cord Assembly**

***Make sure the power cord connection is completely seated.***

## 1.11 Power Switch (mains disconnect)

The power switch is located on the rear of the unit, directly above the power cord. The power switch is also a circuit breaker that protects the entire unit.

## 1.12 Water-cooled Condenser

An accessory available for your freezer is the water-cooled condenser. Details for the use of this condenser follow:

**Water Supply**

•Connections:
Inlet - ½" compression
Outlet - ½" compression
• Maximum water pressure:
150 PSIG
• Water usage:
City water - 65°F (18°C), 1 GPM (3.4 liters)/HP
Tower water - 85°F (29°C), 3GPM (11.4 liters)/HP

**Water Strainer (P/N 780268)**

Included in the parts bag within the freezer is a water strainer recommended to be installed in the water inlet line. The connection size is ½" FPT.

## 1.13 Electrical Requirement and Connection

The freezer should be operated on a dedicated grounded service. Check the voltage rating on the serial tag of the unit and compare it with the outlet voltage. Then with the power switch turned off, plug the line cord into the wall outlet.

## 1.14 Factory Settings

· Temperature: -80°C
· High Temperature Alarm: -65°C

If you wish to change any of these settings, see the appropriate section(s) in Section 2.

## 1.15 Start Up and Loading

· Turn the freezer on and allow it to run empty over night.
· When the empty freezer has stabilized over night at the control temperature set point, load the chamber with pre-frozen product.

***The freezer was designed for the storage of pre-frozen product only. The addition of warm product may cause a temporary rise in the cabinet temperature.***

# Section 2 - Operation

### 2.1 Changing the Control Temperature Set Point

1. Remove the screwdriver on the front left corner of the control panel.
2. Press and hold in the PRESS-TO-SET key on the control panel.
3. Using the screwdriver, turn the SET screw until the desired temperature is displayed. Clockwise lowers the temperature and counter clockwise raises the temperature. The approved operating temperature range for the unit is -50°C to -86°C.

***The unit should NEVER be set to operate below -86°C.***

### 2.2 Changing the Over Temperature Alarm Set Point

The following procedure sets the alarm for a precise temperature during initial set up. If a precise temperature is not required, set R9 to the desired temperature.

1. Set the unit to operate at the desired alarm point (see Section 2.1) and allow the unit to operate until it reaches the set point.
2. Remove the top two screws securing the control panel and loosen the bottom two screws. Carefully remove the control panel.
3. Remove the six screws securing the cover of the box attached to the inside of the control panel to expose the alarm board.
4. Turn the switch on the control panel to the NORMAL position.
5. If the unit alarms, slowly adjust R9 clockwise (warmer) until the alarm turns off. If the unit is not in alarm, slowly adjust R9 counterclockwise (colder) until the alarm turns on.
6. The alarm is now set for the desired temperature. Reinstall the box cover and secure with screws. Carefully install the control panel to its proper location and secure with screws.
7. Set the unit to the desired control temperature. See Section 2.1.

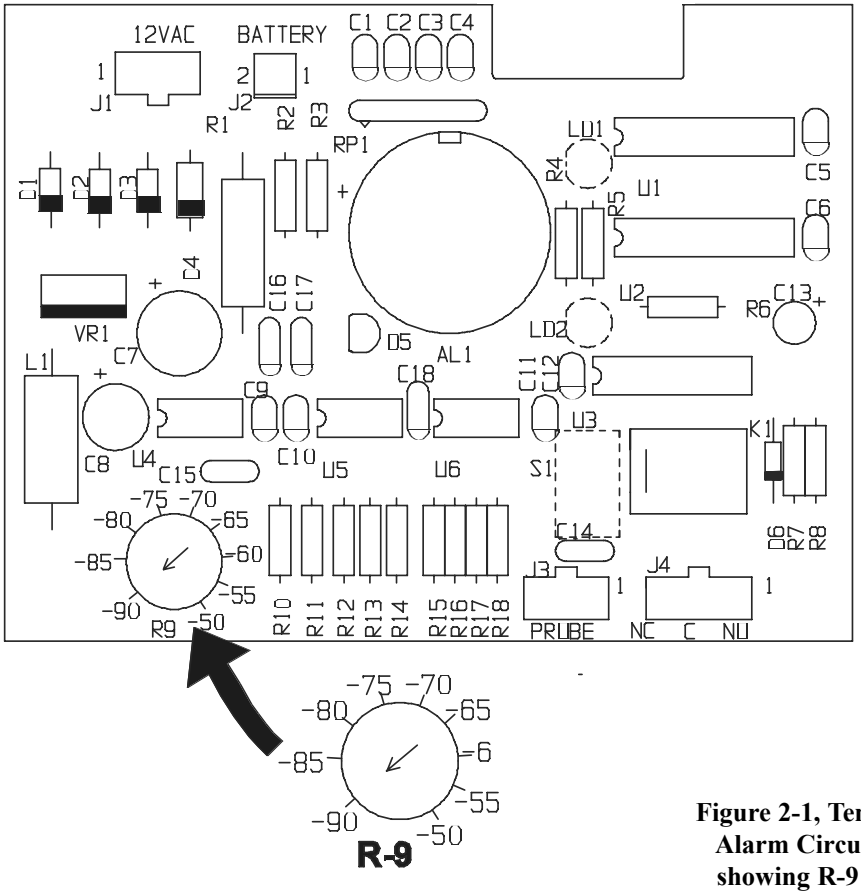


**Figure 2-1, Temperature Alarm Circuit Board showing R-9 Control**

**2.3 Alarms**

| Alarm Description | Visual | Audible | Cause | Action Required |
|---|---|---|---|---|
| Over Temperature | Flashing (red) | On | · Unit is above alarm setpoint<br>· Addition of excessive product load | · Check freezer operation. |
| Condenser Hot | On (red)* | --- | · Filter and/or condenser dirty.<br>· Operating freezer in greater than 40°C ambient. | · See section 4.2 and 4.3 for cleaning filter and condenser. |
| Low Battery | Flashing (red) | --- | · Rechargeable battery not connected.<br>· Rechargeable battery needs replaced. | · See Section 1.6.<br>· Replace battery. See section 4.7 for battery replacement instructions. See spare parts list for battery part number. |
| Voltage Compensation | On (green) | --- | · Incoming voltage too high or too low | · Check if line voltage is within operating range. See 6 - Electrical. If within specification no action required. |

**2.4 Silencing the Over Temperature Alarm:**

· Move the switch from the NORMAL position to the STAND-BY position. When the alarm condition has been corrected, the alarm will sound. The switch must then be returned to the NORMAL position.

**NOTE:** When the problem has been corrected and the alarm condition no longer exists an alarm will sound reminding the operator to press *Standby* to exit the STANDBY mode.

***If the unit is left in the STANDBY mode, none of the alarms listed will sound, alarm lights only will turn on.***

## Section 3 - Calibration

**CAUTION**
**Contains Parts and Assemblies Susceptible to Damage by Electrostatic Discharge (esd)**

***Calibration must be performed when the unit is at operating temperature.***

**Required equipment:** Accurate low temperature remote bulb thermometer or thermocouple of known accuracy.

### 3.1 Temperature Display Calibration

Place a measuring device near the probe cover. See Figures 1-4 and 1-5.

1. Allow the unit to stabilize at the operating temperature.
2. Remove the top two screws securing the control panel and loosen the bottom screws.
3. Carefully remove the control panel.
4. Remove the six screws securing the cover of box attached to the inside of the control panel. Remove the cover.
5. Adjust R17 until the control panel display matches the independent measuring device. Several turns of R17 may be required to achieve the desired temperature.
6. Reinstall cover to the box and secure.
7. Check the control temperature set point. Set point may have been altered during the calibration procedure.

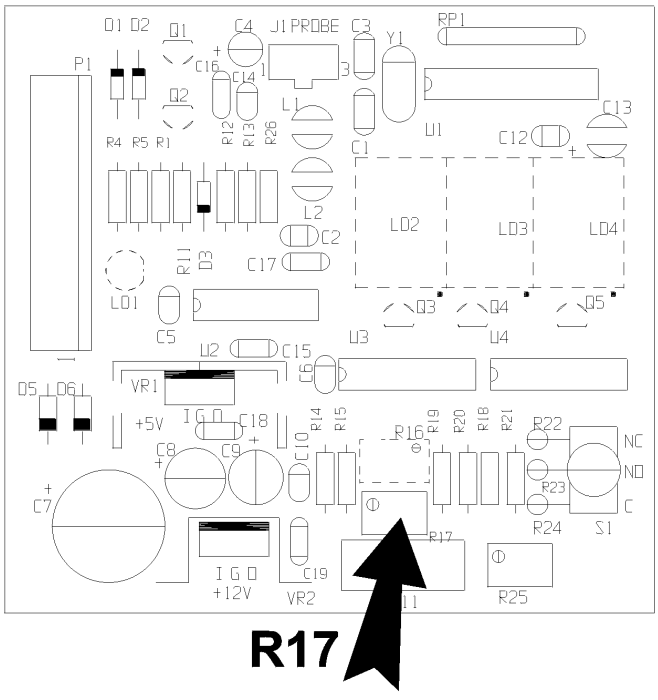


**Figure 3-1, Temperature Control Board, R-17 Location**

### 3.2 Optional Recorder Calibration

**a. Changing the recorder range:**

The chart recorder contains eight temperature ranges and is factory-programmed for the freezer.

1. Press and hold button #3 for one second, then let the pen move off the chart paper.
2. Press and hold for five seconds either button #1 or button #2.
3. Release the button and the green LED will begin to flash. Count the number of flashes to determine the present program setting.
4. To change the program setting, press the left or right arrows to increase or decrease the count.
5. When the desired program number is flashing, press button #3 to bring the pen arm back onto the chart. Recording will begin in the new program.

NOTE: Changing ranges may require an offset calibration as outlined in Section 3.2.b.

| Program No. | Range | | |
|---|---|---|---|
| Program 1 | -40°C | to | 30°C |
| Program 2 | 0°C | to | 60°C |
| Program 3 | -100°C | to | 38°C |
| Program 4 | -5°C | to | 50°C |
| Program 5 | 0°C | to | 100°C |
| Program 6 | -100°C | to | -200°C |
| Program 7 | -115°C | to | 50°C |
| Program 8 | -10°C | to | 70°C |

**Table 3-1**
**Recorder Range Chart**

**b. Calibrating the chart recorder:**

The recorder must be in service for 24 hours before performing the following calibration procedure.

1. Place an accurate thermometer in the chamber next to the recorder probe.
2. Temperature probes for the recorder are located in the left front corner of the freezer chamber (Figure 1-4).
3. After about three minutes, compare the thermometer reading with the chart recorder reading.
4. If an adjustment is necessary, press the #1 button to move the pen to the left or the #2 to move the pen to the right. The button must be held about five seconds before the pen begins to move. Release the button when the pen position matches the thermometer.

**NOTE:** The felt-tip pen on the recorder requires periodic replacement. Usually the ink will appear to fade before replacement becomes necessary. Additional pen tips may be purchased from Thermo Forma. Refer to Parts List, Section 7.

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# PREVENTIVE MAINTENANCE
# SUVA Freezers

Your Thermo Forma equipment has been thoroughly tested and calibrated before shipment. Regular preventive maintenance is important to keep your unit functioning properly. The operator should perform routine cleaning and maintenance on a regular basis. For maximum performance and efficiency, it is recommended that the unit be checked and calibrated periodically by a qualified service technician.

The following is a condensed list of preventive maintenance requirements. See the specified section of the instruction manual for further details.

Thermo Forma has qualified service technicians, using NIST traceable instruments, available in many areas. For more information on Preventive Maintenance or Extended Warranties, please contact us at the number below.

Cleaning and calibration adjustment intervals are dependent upon use, environmental conditions and accuracy required.

Tips:
- Fill an upright by starting at the bottom near the probe and add racks to one shelf at a time. Allow freezer to recover to setpoint between shelves.
- Fill a chest by starting at the left side near the probe. Filling with room temperature racks will result in a long pull-down time.
- Fill unit with frozen product to help overall performance; frozen water jugs, for example.

•Millcreek Road, Box 649 •Marietta, Ohio 45750 USA •740-373-4763
•USA and Canada 888-213-1790 •Telefax: 740-373-4189 •email: service@thermoforma.com

# Preventive Maintenance for 900 Series Freezers

| Refer to Manual Section | Action | Monthly | Yearly | Every 2 Years |
|---|---|---|---|---|
| -- | Verify ambient temperature, <90°F | ☑ | | |
| -- | * Adjust door handle for firm latching, as needed | ☑ | | |
| Figure 1-4 probe location 4.5 | Check and clean probe and cover, gaskets, hinges and doors of ice and snow. | ☑ *More frequent cleaning may be required, depending on use and environmental conditions.* | | |
| 4.2 | Check air filter. Clean or replace as needed | ☑ | | |
| 1.7 | Check alarm back-up battery. | ☑ | | ** Replace |
| -- | Check condenser fan motor for unusual motor noise or vibration. | | ☑ | |
| -- | * Verify and document calibration, at the minimum, annually. | | ☑ | |
| 4.3 | * Clean condenser compartment and wipe off condenser | | ☑ | |

* Qualified service technicians only

** Dispose of properly, according to all state and federal regulations.

## Section 4 - Routine Maintenance

### 4.1 Cleaning the Cabinet Exterior

***Avoid the excessive use of water around the control area due to the risk of electrical shock. Damage to the controls may also result.***

Wipe down the freezer exterior using soap and water and a general use laboratory disinfectant. Rinse thoroughly with clean water and dry with a soft cloth.

### 4.2 Cleaning the Air Filter (minimum of twice a year*)

1. Locate the grille on the right side of control panel. See Figure 1-2. Grasp the corner of the grille and gently pull to remove.
2. Remove the filter material and wash, using water and a mild detergent.
3. Dry by pressing between two towels.
4. Install the filter back into the grille and attach the grille.

* Depending upon environmental conditions, the filter may need to be cleaned or replaced more frequently. If the filter becomes torn or excessively dirty, a replacement can be purchased from Thermo Forma. See the exploded parts list, Section 7, for filter part number. A filter kit (set of 5) part number 195517 is also available.

### 4.3 Cleaning the Condenser (minimum of twice a year*)

1. Locate the grille on the right side of control panel. See Figure 1-2. Grasp the corner of the grille and gently pull to remove.
2. Using a vacuum cleaner, exercising care to not damage the condenser fins, clean the condenser.
3. Install the grille.

* Depending upon environmental conditions, the condenser may need to be cleaned more frequently.

### a. Cleaning the Water-cooled Condenser

The water-cooled condenser can be cleaned-in-place by using the CIP procedure. Cleaning solutions can be used, depending on type of deposits or build-up to be removed.

***Do not use liquids that are corrosive to stainless steel or the brazing material (copper or nickel). Do not leave the unit on stand-by after cleaning.***

**CIP (Clean-In-Place) Procedure**

1. Disconnect the unit from the water supply.
2. Drain the unit.
3 . Rinse with fresh water and drain the unit again.
4. Fill with fresh water.
5. Add cleaning agent (solution and concentration dependent on deposits or build-up).
6. Circulate cleaning solution (if feasible).
7. Drain the cleaning solution.
8. Add and circulate a passivating liquid for corrosion inhibition of plate surfaces.
9. Drain this liquid.
10. Rinse with fresh water and drain.
11. Reconnect the water supply and fill the unit.
12 . Return to service.

### 4.4 Defrosting the Chamber

1. Remove all product and place it in another freezer.
2. Turn the unit off and disconnect it from the power source.
3. Turn the Alarm switch to Standby, or disconnect the battery.
4. Open all of the doors and place towels on the chamber floor.
5. Allow the frost to melt and become loose.
6. Remove the frost with a soft cloth.
7. After defrosting is complete, clean the interior with a non-chloride detergent. Rinse thoroughly with clean water and dry with a soft cloth.
8. Plug unit in and turn power switch on.
9. Allow the freezer to operate empty overnight before reloading the product.

### 4.5 Cleaning the Door Gasket (minimum monthly*)

Using a soft cloth, remove any frost build-up from the gasket and door(s).

*The door gasket may need to be cleaned more frequently if dirt or excessive frost build-up prevents the door from closing properly.

### 4.6 Cleaning the Vacuum Relief Port (minimum monthly*)

Using a soft cloth, remove any frost build-up from the vacuum relief, located in the front left corner of the chamber. See Figure 1-4 and 1-5.

***The vacuum relief port contains a small heating element. If the freezer is not disconnected from the electrical supply or turned off at the power switch, the heating element will continue to operate and may cause injury to personnel cleaning the freezer chamber.***

**The vacuum relief port may need to be cleaned more frequently if dirt or excessive frost buildup prevents the door from closing properly.*

### 4.7 Replacing the Battery

***For a consistent and dependable charge, replace the battery every 2 years. Replacement batteries must be rechargeable and are available from Thermo Forma. Refer to the parts list for stock number and description of the replacement batteries.***

***Dispose of the used batteries in a safe manner and in accordance with good environmental practices.***

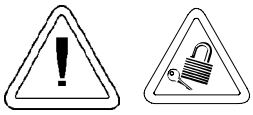
1. Turn off the power switch and unplug the unit from the AC power supply
2. To gain access to the battery, remove the grill on the front of the freezer. The grill is attached to the freezer by friction plugs on each of the four corners and is readily pulled off. The battery is the rectangle fastened by Velcro to the compressor compartment frame and has a connector with red and black wires. Another red and black wire set with connector is secured to the wiring harness passing through this area of the freezer.
3. Disconnect the two wire connectors, replace the battery pack and secure with the Velcro.
4. Reconnect the battery and replace the grill.
5. Plug unit in and turn power switch on.

### 4.8 Preparing the Unit for Storage

Defrost the unit as described in Section 4.4. Disconnect the battery. This will prepare the unit for storage.

***The battery must be disconnected to prevent the battery from becoming completely discharged during storage.***

## Section 5 - Service



***Servicing must only be performed by service personnel who are qualified to repair cascade refrigeration systems. Always use standard safety practices when servicing the equipment.***

### 5.1 Servicing the Refrigeration System

Before opening the refrigeration system, use the troubleshooting chart to check out the electrical system. Electrical schematics and refrigeration drawings with parts are included with this manual.

Refer to the troubleshooting chart on the following page.

**5.2 Troubleshooting Chart**

| Symptom | Possible Cause |
|---|---|
| No Temperature Display | • Power line cord disconnected or not properly installed<br>• External power circuit breaker tripped/open<br>• Main power switch OFF<br>• 24 volt transformer fuses open. |
| Chamber Temperature Deviates from Set Point | • Too much warm product added<br>• Door open too long<br>• Inadequate air circulation<br>• Calibration<br>• Dirty condenser<br>• High ambient temperature |
| Too Much Frost Build-Up | • Door not properly sealed. |
| Freezer not Being Refrigerated (unit is receiving power) | • Compressor thermal overload open<br>• Loss of refrigerant in either system<br>• Defective compressor(s)<br>• Defective temp control<br>• Defective high pressure cut-off |
| Display Problems in General | • Defective temp control board. |
| Condenser Hot Light On | • Clogged air filter<br>• Clogged condenser<br>• Fan failure |

## Section 6 - Specifications

**MODEL 916/917**

| | |
|---|---|
| **Temperature Range** | -50°C (-58°F) to -86°C (-123°F) |
| **Exterior Dimensions** | 33.3" W x 77.9" H x 37.0" F-B<br>(84.6cm x 197.9cm x 94.0cm)<br><br>Add 3.0" (7.6cm) to W for latch/hinge; add 6.5" (16.5cm) to F-B for control panel/wall spacer. |
| **Interior Dimensions** | 23.0" W x 51.5" H x 25.3" F-B<br>(58.4cm x 130.8cm x 64.3cm) |
| **Capacity** | 17 cu. ft. (489.9 liters) |
| **Refrigeration** | Cascade system, (2) hermetically-sealed compressors |
| **Insulation** | Non-CFC, foamed-in-place urethane;<br>5.0" (12.7cm) cabinet; 4.5" (11.4cm) door |
| **Electrical** | **916**<br>120VAC, 1 PH, 60 Hz, 16 FLA<br>Operating Range, 108VAC - 130VAC<br><br>**917**<br>230VAC, 1 PH, 50/60 Hz, 12.0 FLA<br>Operating Range: 208VAC - 240VAC |
| **Breaker Requirements** | **916**, 20 Amp, 120V<br>**917,** 15 Amp, 230V |

**Automatic Voltage**

**Low:**

| | | |
|---|---|---|
| Cut In: 110V | Cut Out: 115V | Volts Boost: 10 |
| Cut In: 210V | Cut Out: 220V | Volts Boost: 18 |

**High:**

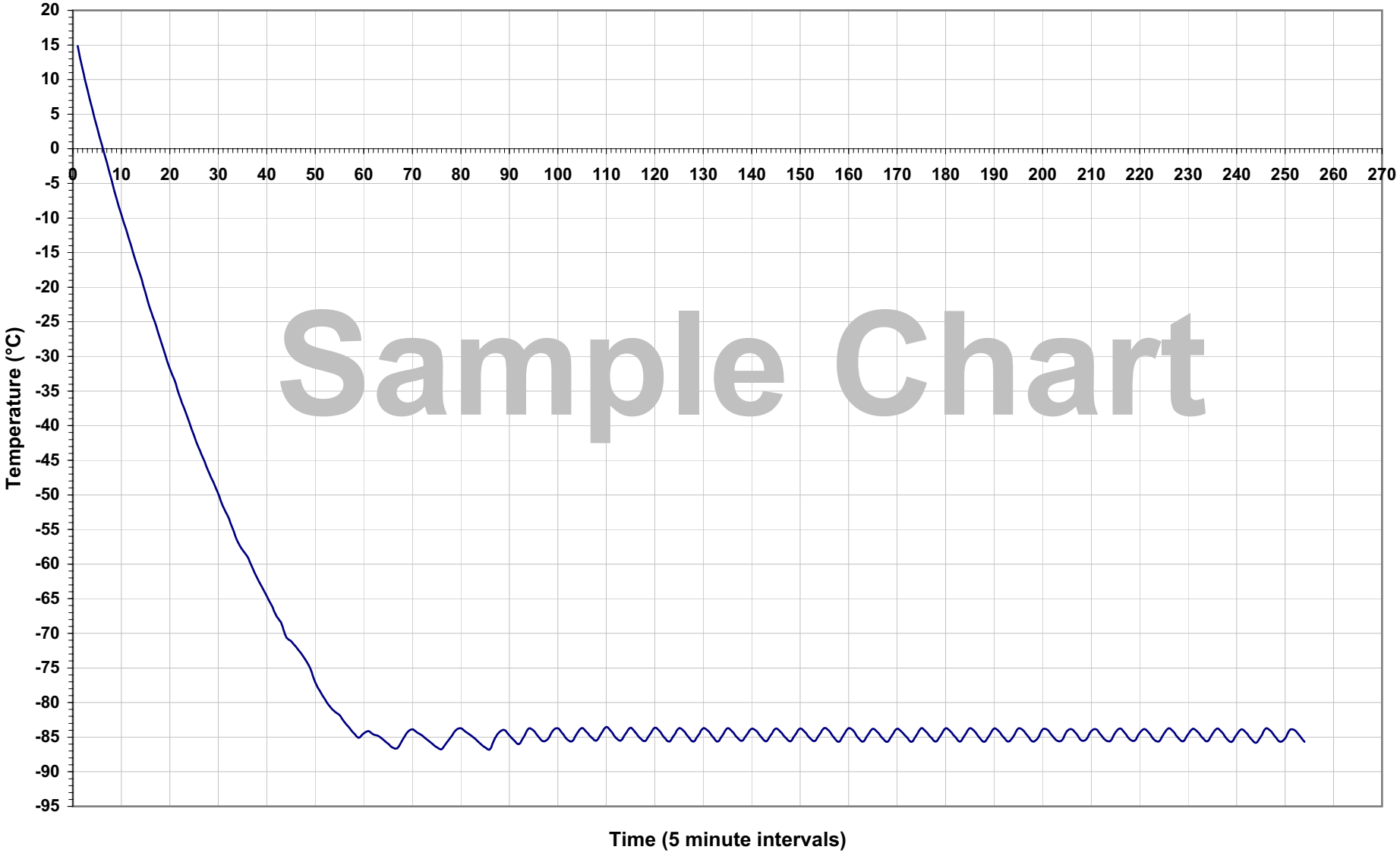
| | | |
|---|---|---|
| Cut In: 125V | Cut Out: 120V | Volts Buck: 10 |
| Cut In: 235V | Cut Out: 225V | Volts Buck: 18 |

**Shipping Weight**

**Ocean:** 1025 lbs. (464.91kg)
**Air/Container:** 785 lbs. (356.1kg)
**Motor:** 785 lbs. (356.1kg)

## Thermo Forma - Representative Pulldown and Cycling Curve

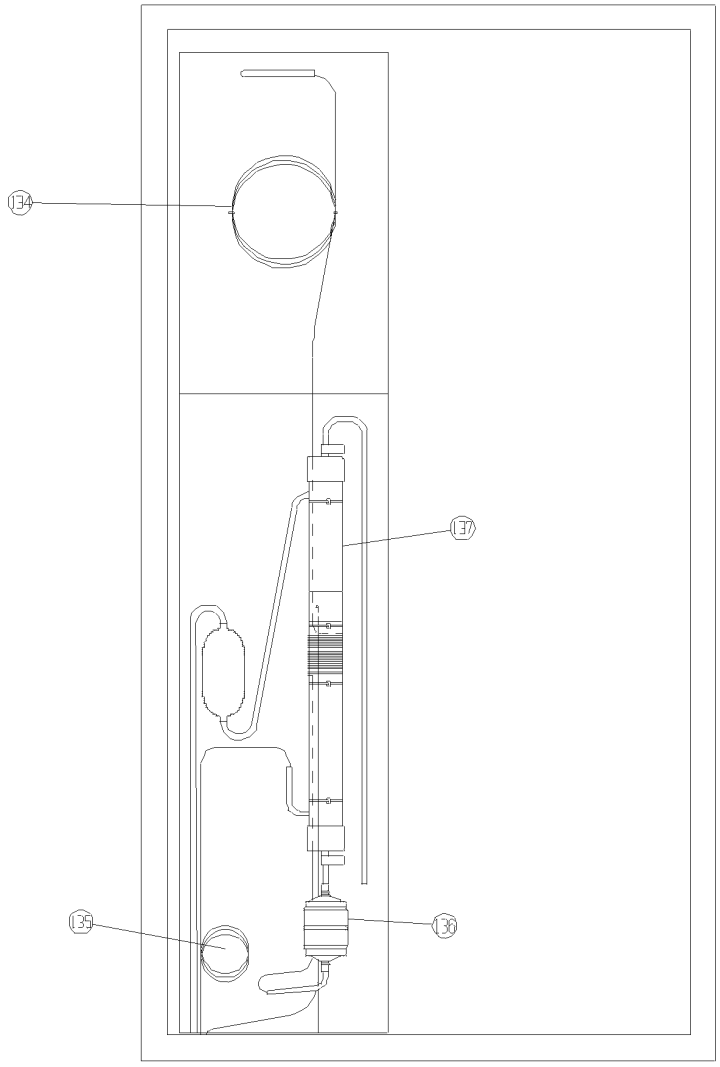
**for 17 Ft.$^3$ -86°C Freezers**




Sample Chart

17ft3-86.xls 2/02

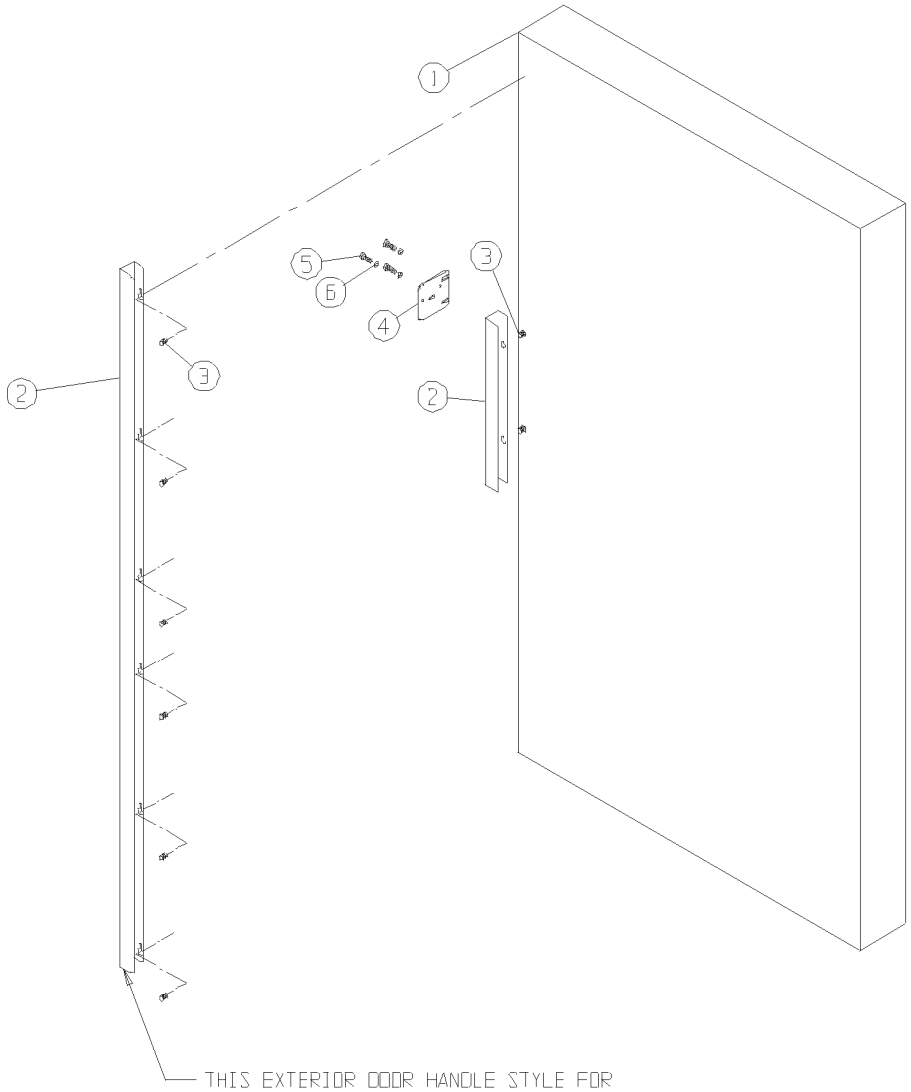
| | | |
|---|---|---|
| 134 | 227928 | Low stage cap. tube |
| 135 | 227927 | High stage cap. tube |
| 136 | 209016 | Dryer |
| 137 | 211028 | Heat exchanger |




HEAT EXCHANGER ASSEMBLY

8516-206-0-D REV. D
Page 1 of 1

| | | |
|---|---|---|
| 1 | 195570 | Door (13 & 17 cuft) |
| | 195649 | Door (23 cuft) |
| | 195650 | Door (28 cuft) |
| 2 | 189934 | Handle |
| | 19554B | Handle (28 cuft) |
| 3 | 510022 | #10-32 x 1/2 Hex head screw |
| 4 | 121062 | Can latch strike |
| 5 | 20003 | 1/4-20 x 3/4 Bolt |
| 6 | 23062 | 1/4 Star washer |
| 7 | 24042 | #8-32 x 1/2 F screw |
| 8 | 510303 | Can latch |
| 9 | 189192 | .063 Shim |
| | 18928B | .125 Shim |
| 10 | 22115 | #6-32 Screw |
| 11 | 23020 | #6 Washer |
| 12 | 23015 | #6-32 Cap nut |
| 13 | 420308 | Door gasket (13&17 cuft) |
| | 420309 | Door gasket (23 cuft) |
| | 103104 | Door gasket (28 cuft) |
| 14 | 116092 | Door hinge |
| 15 | 189287 | Door stop (23 & 28 cuft only) |
| 16 | 201120 | Recorder |
| 17 | 245231 | Recorder pen |
| 18 | 195170 | Interior door (4 door 13&17 cuft) |
| | 195171 | Interior door (4 door 23 cuft) |
| | 195233 | Interior door (5 door 13&17 cuft) |
| | 195234 | Interior door (5 door 23 cuft) |
| | 195511 | Interior door (4 door 28 cuft) |
| 19 | 285658 | Knob (13, 17 & 23 cf) |
| | 120400 | Knob (28 cf) |
| 20 | 23043 | Washer |
| 21 | 195169 | Latch |
| 22 | 515083 | Spacer |
| 23 | 23044 | Shoulder washer |
| 24 | 23021 | Flat washer |
| 25 | 23080 | Spring washer |
| 26 | 590008 | #8-32 x 7/8 screw |
| 27 | 23023 | 1/4 Flat washer |
| 28 | 23033 | 1/4 Int. lockwasher |
| 29 | 510305 | Washer |
| 30 | 121032 | Latch |
| 31 | 23057 | Washer |
| 32 | 20058 | 1/4 x 3/4 Screw |




THIS EXTERIOR DOOR HANDLE STYLE FOR
28 CF SINGLE DOOR FREEZER ONLY

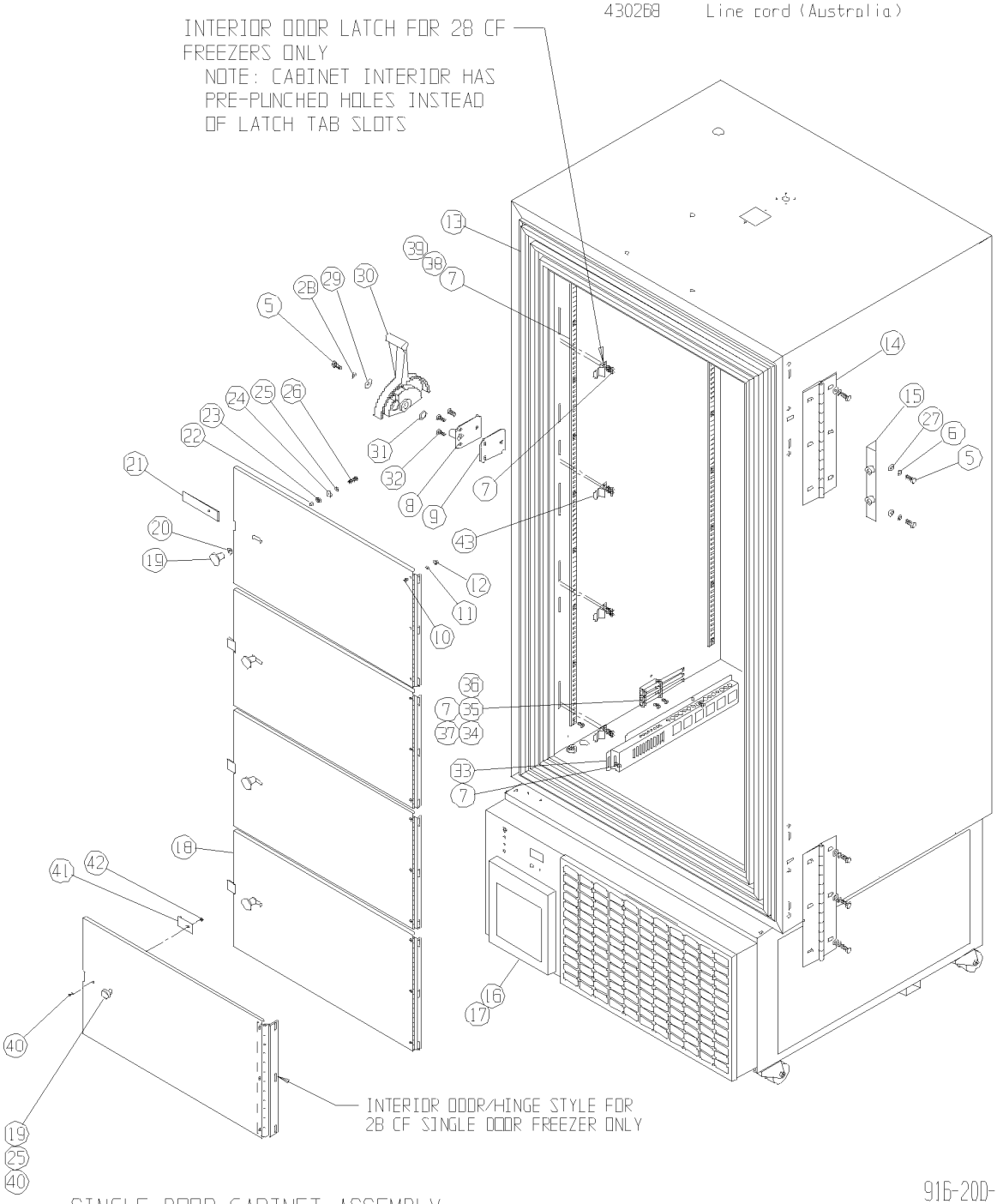
SINGLE DOOR CABINET ASSEMBLY

916-20D-0-D REV. 4
Page 1 of 2

| | | |
|---|---|---|
| 33 | 189532 | Probe Guard |
| 34 | 195176 | Probe mount |
| 35 | 114020 | Recorder probe grommet |
| 36 | 30073 | Control/alarm probe grommet |
| 37 | 290165 | Control/alarm probe |
| 38 | 500177 | Pilaster (900 only) |
| 39 | 500175 | Pilaster clip (flat) (900 only) |
| | 500184 | Pilaster clip (tab) (900 only) |
| 40 | 22051 | 8-32 x 1/4 SS PHP screw |
| 41 | 195602 | Interior door latch tab |
| 42 | 23010 | 8-32 SS hex nut |
| 43 | 195614 | Interior door latch |

NOT SHOWN:

| | |
|---|---|
| B30011 | Shelf (13 & 17 cuft) |
| B30025 | Shelf (23 cuft) |
| B3002B | Shelf (28 cuft) |
| 430263 | Line cord (N. American 120V/20A) |
| 430264 | Line cord (N. American 230V/15A) |
| 430270 | Line cord (Continental Europe) |
| 430272 | Line cord (Italy) |
| 430269 | Line cord (Great Britian) |
| 430271 | Line cord (India) |
| 430273 | Line cord (Israel) |
| 430268 | Line cord (Australia) |




SINGLE DOOR CABINET ASSEMBLY

916-20D-0-D REV. 4
Page 2 of 2

| | | |
|---|---|---|
| 40 | | |
| 41 | 195097 | Fan shroud |
| 42 | 510305 | Can latch washer |
| 43 | 680014 | 1/4-20 x 2-1/4 bolt |
| 44 | 515095 | 5/16 spacer |
| 45 | 190891 | Alarm board |
| 46 | 191644 | Temperature control board |
| 47 | 220474 | Gray window |
| 48 | 111025 | 1/8" dia. clamp |
| 49 | 330005 | 5/8 split bushing |
| 50 | 111034 | 1/4" dia. clamp |
| 50A | 111033 | 3/16" dia. clamp |
| 51 | 189658 | Front grille |
| 52 | 760162 | Air filter |
| 53 | 189712 | Recorder cover plate |
| 54 | 280060 | LED lens |
| 55 | 400116 | Battery |
| 56 | 195678 | Front panel (13 & 17) |
| | 195679 | Front panel (23) |
| 57 | 195382 | Boost/Buck LED |
| 58 | 710002 | .125 stud receiver |
| 59 | 235013 | Screwdriver |
| 60 | 195383 | Hot condenser T-stat |
| 61 | 24038 | 1/4-20 x 1/2 bolt |
| 62 | 204009 | Condenser |
| 63 | 207008 | Low stage pressure switch |
| 64 | 207010 | High stage pressure switch |
| 65 | 209020 | Dryer |
| 66 | 200126 | 2" rigid hanger |
| 67 | 195094 | Air block (13 & 17) |
| | 195096 | Air block (23) |
| 68 | 195761 | Main harness |
| 69 | 195381 | Fan harness |
| 70 | 22130 | #4-40 x 1/4 screw |
| 71 | 440022 | Push mount tie wrap |

NOT SHOWN:

220553 Rotoloc valve 3/8" (high stage)

220554 Rotoloc valve 1/2" (low stage)

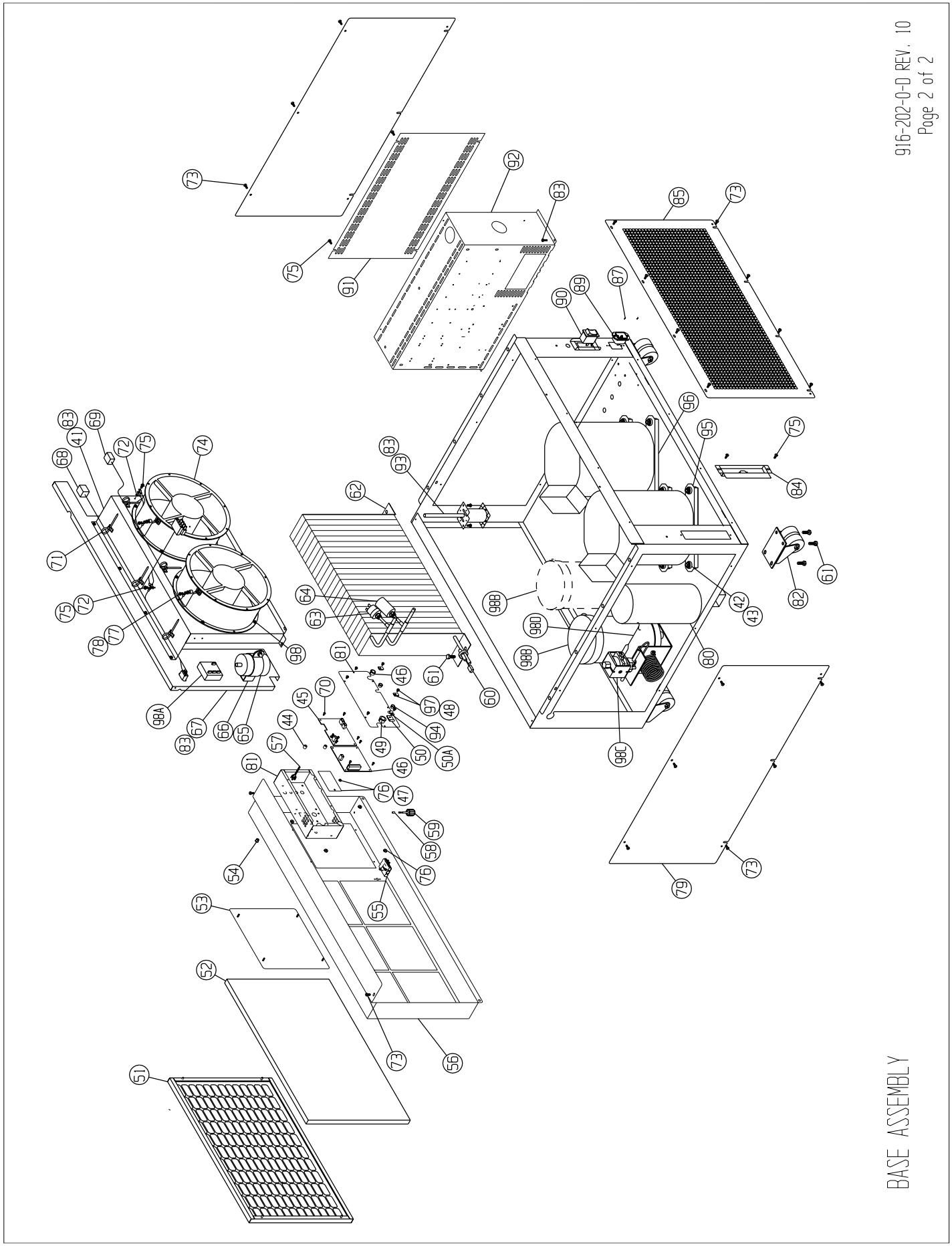
| | | |
|---|---|---|
| 72 | 23059 | #8 Ext. lockwasher |
| 73 | 590029 | #8-32 x 3/8 sems screw w/patch |
| 74 | 900111 | Fan (230V) |
| | 900113 | Fan (120V) |
| 75 | 590020 | #8-32 x 3/8 sems screw |
| 76 | 23002 | #8-32 keps nut |
| 77 | 22054 | #10-32 x 1/4 screw |
| 78 | 23032 | #10 Ext. lockwasher |
| 79 | 189156 | Side panel (13) |
| | 189161 | Side panel (17&23) |
| 80 | 214006 | Oil separator |
| 81 | 140204 | Control box & cover |
| 82 | 120011 | Caster |
| 83 | 24030 | #8 x 1/2 teks screw |
| 84 | 195470 | Communication port recept. box |
| 85 | 195223 | Rear grille (13 & 17) |
| | 195224 | Rear grille (23) |
| 86 | | |
| 87 | 490009 | #6-32 x 3/8 flathead undercut screw |
| 88 | | |
| 89 | 460169 | Power inlet |
| 90 | 230183 | Power switch/circuit breaker (120V) |
| | 230184 | Power switch/circuit breaker (230V) |
| 91 | 195410 | Relay enclosure cover |
| 92 | SEE RELAY ENCLOSURE DRAWING 916-204-0-D | |
| 93 | 195152 | Vacuum relief heater (230V) |
| | 195153 | Vacuum relief heater (120V) |
| 94 | 330003 | 3/8 split bushing |
| 95 | 1203019 | High stage compressor (230V) |
| | 1203023 | High stage compressor (120V) |
| 96 | 1203022 | Low stage compressor (230V |
| | 1203024 | Low stage compressor (120) |
| 97 | 24015 | #6 x 3/8 AB screw |
| 98 | 24032 | #8-32 x 3/8 F screw |

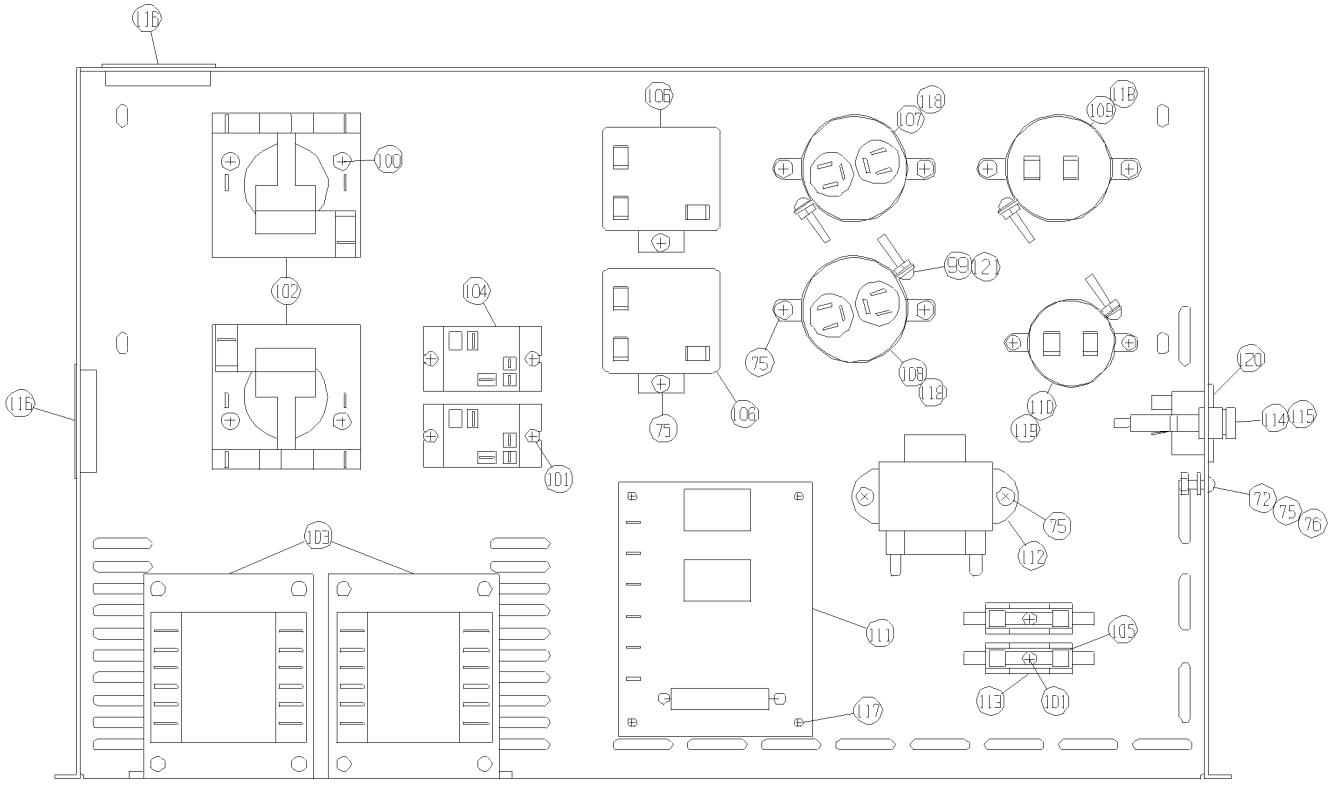
NOTE FOLLOWING FOR (17,23,28 UNITS ONLY)

| | | |
|---|---|---|
| 98A | 300363 | 8 hr.interval timer (230V) |
| | 300359 | 8 hr. interval timer (120V) |
| 98B | 214018 | Expansion tank (2 Req'd. 17 cu. ft. 120V) |
| 98C | 220627 | Solenoid valve (230V) (NORMALLY OPEN) |
| | 220626 | Solenoid valve (120V) (NORMALLY OPEN) |
| 98D | 195759 | Solenoid harness |

BASE ASSEMBLY

916-202-0-D REV. 10


916-202-0-D REV. 10
Poge 2 of 2
BASE ASSEMBLY

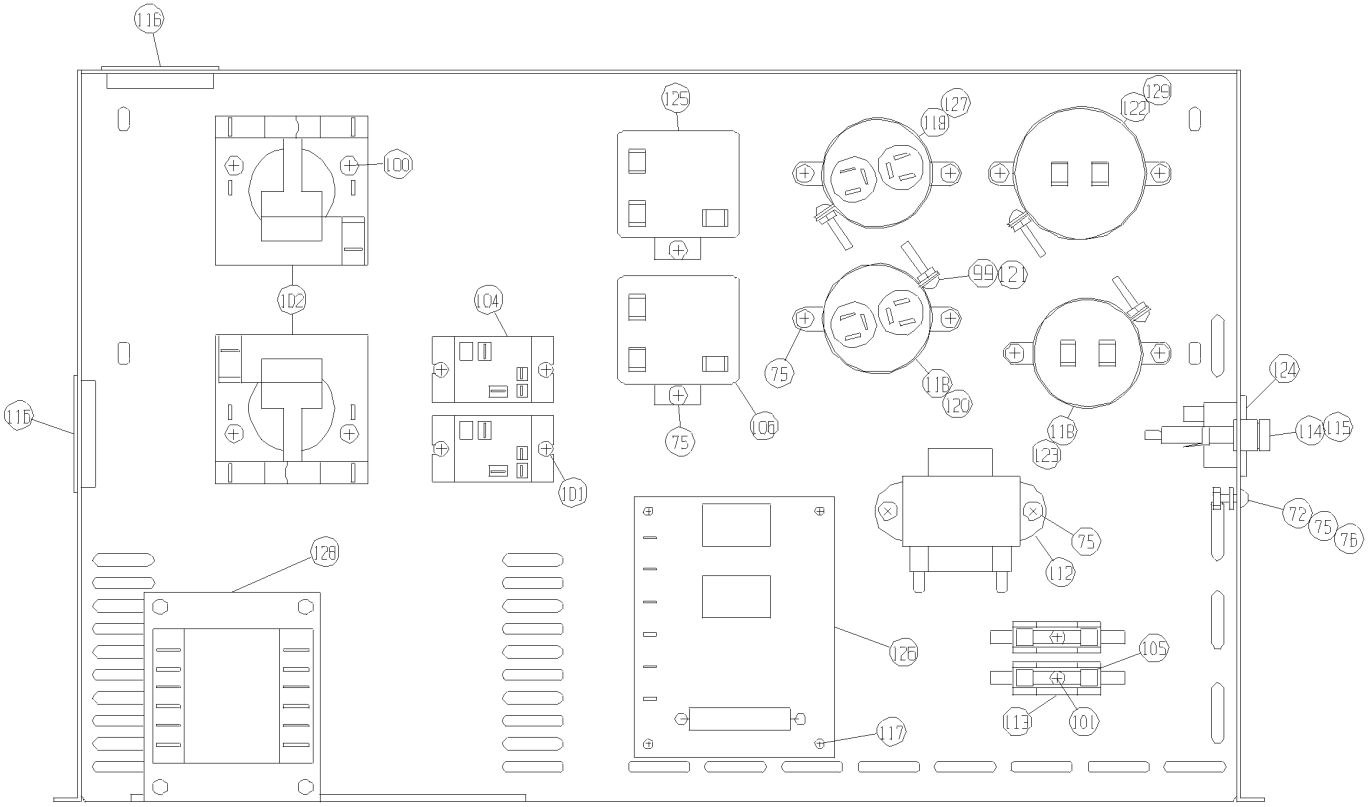



230 Volt relay enclosure

| | | |
|---|---|---|
| 72 | 23059 | #8 Ext. lockwasher |
| 75 | 590020 | #8-32 x 3/8 sens screw |
| 76 | 23002 | #8-32 keps nut |
| 99 | 23001 | #6-32 keps nut |
| 100 | 22053 | #8-32 x 1/2 screw |
| 101 | 22049 | #6-32 x 3/8 screw |
| 102 | 300073 | Boost & buck relay |
| 103 | 420066 | Transformer |
| 104 | 300261 | Relay (Qty. 1, -40°C) |
| 105 | 230110 | 1A slo blow fuse |
| 106 | 300319 | High & low stage start relay (H.S. only, -40°C) |
| 107 | 170145 | High stage run capacitor |
| 108 | 170149 | Low stage run capacitor (N/A -40°C) |
| 109 | 170158 | High stage start capacitor |
| 110 | 170159 | Low stage start capacitor (N/A -40°C) |
| 111 | 191628 | Boost/buck board |
| 112 | 420101 | 24V transformer |
| 113 | 230039 | Fuse holder |
| 114 | 285632 | Fuse holder |
| 115 | 230115 | .15A slo blow fuse |
| 116 | 330001 | Snap bushing |
| 117 | 59007 | #4-40 x .375 screw |
| 118 | 170091 | 1.75 dia. bracket |
| 119 | 170095 | 1.438 dia. bracket |
| 120 | 460024 | Outlet |
| 121 | 22050 | #6-32 x 1/2 screw |

Relay Assembly

916-204-0-D REV. 3
Page 1 of 2

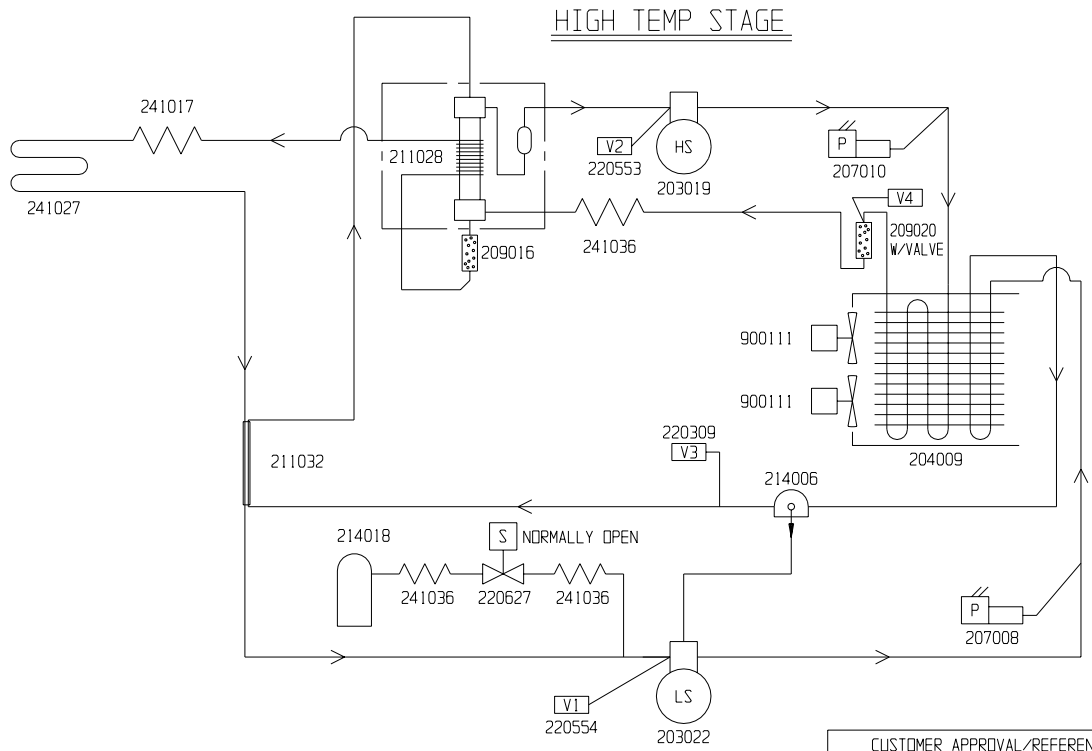



120 Volt relay enclosure

| | | |
|---|---|---|
| 72 | 23059 | #8 Ext. lockwasher |
| 75 | 590020 | #8-32 x 3/8 sems screw |
| 76 | 23002 | #8-32 keps nut |
| 99 | 23001 | #6 keps nut |
| 100 | 22053 | #8-32 x 1/2 screw |
| 101 | 22049 | #6-32 x 3/8 screw |
| 102 | 300073 | Boost & buck relay |
| 104 | 300261 | Relay (Qty. 1, -40°C) |
| 105 | 230110 | 1A slo blow fuse |
| 106 | 300319 | Low stage start relay (N/A -40°C) |
| 112 | 420101 | 24V transformer |
| 113 | 230039 | Fuse holder |
| 114 | 285632 | Fuse holder |
| 115 | 230115 | .15A slo blo fuse |
| 116 | 330001 | Snap bushing |
| 117 | 59007 | #4-40 x 3/8 screw |
| 118 | 170091 | 1.75 dia. bracket |
| 119 | 170095 | 1.438 dia. bracket |
| 120 | 170160 | Low stage run capacitor (N/A -40°C) |
| 121 | 24032 | #8-32 x 3/8 F screw |
| 122 | 170157 | 2.5 dia. bracket |
| 123 | 170010 | Low stage start capacitor (N/A -40°C) |
| 124 | 460024 | Outlet |
| 125 | 300323 | High Stage Start relay |
| 126 | 190676 | Boost/buck board |
| 127 | 170108 | High stage run capacitor |
| 128 | 420065 | Transformer |
| 129 | 170155 | High stage start capacitor |

Relay Assembly

916-204-0-D REV. 3
Page 2 of 2




## CASCADE REFRIGERATION

HIGH TEMPERATURE STAGE REFRIGERANT:

17 CUFT UNITS: R-404A 24 OZ. (680gr) ±1/2 OZ (14gr)

HIGH TEMPERATURE STAGE OIL: MOBILE EAL ARCTIC 22CC POLYOL ESTER OIL
COMPRESSOR, 24 OZ.(710ml)

LOW TEMPERATURE STAGE REFRIGERANT:

17 CUFT UNITS: R-290 0.9 OZ. (26gr) MAX, ; VAC TO 3 PSIG
R-508B 15 OZ (425gr) ± 1/4 OZ.(7gr) OR
3 PSIG TO 134 PSIG ± 3 PSIG

LOW TEMPERATURE STAGE OIL: ZEROL 150T WITH 2% ADDITIVE
COMPRESSOR: 24 OZ.(710ml)
OIL SEPARATOR: 15 OZ. (444ml)

* ALL PSIG MEASUREMENTS WHEN SYSTEM IS AT 23°C

1. COMMON TO: 717, 917, 982, 8517, 8582, 5467 & 5417 17 CU. FT. FREEZERS

CUSTOMER APPROVAL/REFERENCE
APPROVED BY
APPROVING FIRM
DATE OF APPROVAL

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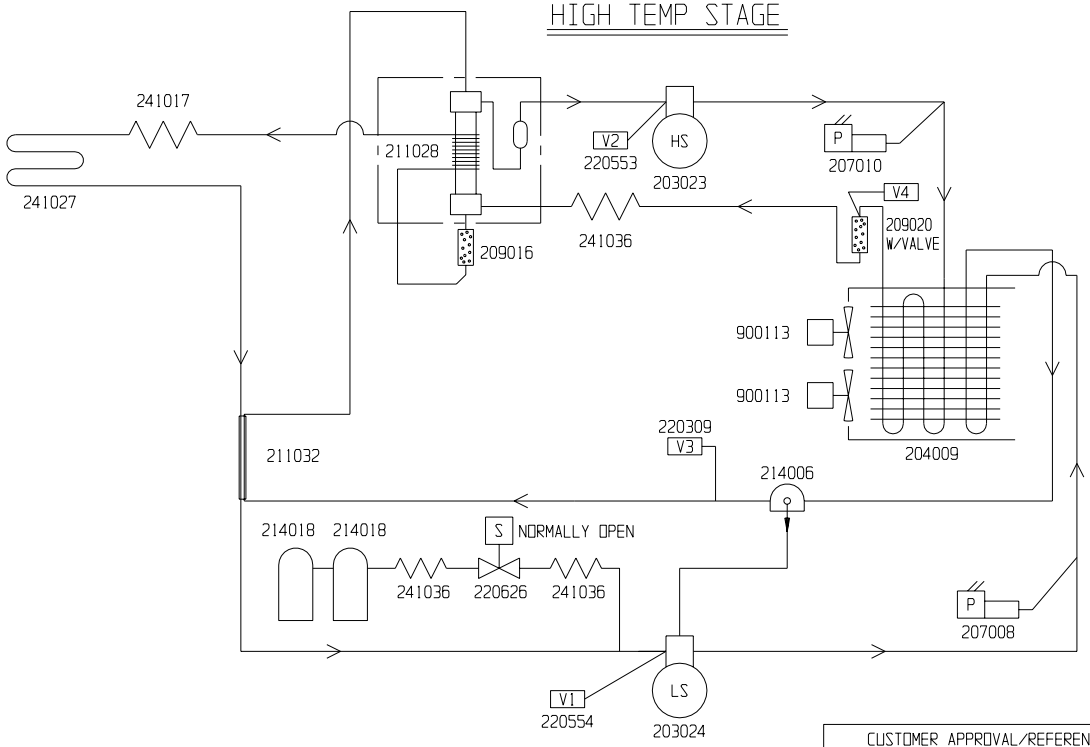
| REV | ECR NO. | DATE | BY | CAD | APPD | DESCRIPTION OF REVISION |
|---|---|---|---|---|---|---|
| 3 | FR-1616 | 05-21-02 | DAS | KDG | | REV. LOW STAGE REFRIG. CHARGES |
| 2 | FR-1606 | 05-08-02 | RDS | KDG | LDN | NOTED SOLENOID AS NORMALLY OPEN |
| 1 | FR-1557 | 02-25-02 | AFC | KDG | LDN | ADDED 241036 CAP. TUBE TO 220627 |
| 0 | FR-1557 | 11-12-01 | LDC | KDG | LDN | RELEASED FOR PRODUCTION, REL.11 |

| | | | | |
|---|---|---|---|---|
| DATE 04-21-98 | DWN LDC | CAD LDC | APPD LDN | SCALE NONE |
| CUSTOMER | | | | |
| JOB TITLE -86°C 17 CU. FT. UPRIGHT FREEZERS (230 V) | | | | |
| DWG TITLE REFRIGERATION SCHEMATIC | | | | |
| LOCATION | JOB NUMBER | DRAWING NUMBER 8517-91-0-B | | |

ThermoForma
BOX 649, MARIETTA, OHIO 45750




## CASCADE REFRIGERATION

HIGH TEMPERATURE STAGE REFRIGERANT:

17 CUFT UNITS: R-404A 24 OZ. (680gr) ±1/2 OZ (14gr)

HIGH TEMPERATURE STAGE OIL: MOBILE EAL ARCTIC 22CC POLYOL ESTER OIL COMPRESSOR, 24 OZ.(710ml)

LOW TEMPERATURE STAGE REFRIGERANT:

17 CUFT UNITS: R-290 1.0 OZ. (28gr) MAX, ; VAC TO 1 PSIG
R-508B 16.5 OZ (468gr) ± 1/4 OZ.(7gr) OR
1 PSIG TO 118 PSIG ± 3 PSIG

LOW TEMPERATURE STAGE OIL: ZEROL 150T WITH 2% ADDITIVE
COMPRESSOR: 24 OZ.(710ml)
OIL SEPARATOR: 15 OZ. (444ml)

* ALL PSIG MEASUREMENTS WHEN SYSTEM IS AT 23°C

1. COMMON TO: 716, 916, 981, 8516, 8581, 5466 & 5416 17 CU. FT. FREEZERS

CUSTOMER APPROVAL/REFERENCE
APPROVED BY _____
APPROVING FIRM _____
DATE OF APPROVAL _____

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| REV | ECR NO. | DATE | BY | CAD | APPD | DESCRIPTION OF REVISION |
|---|---|---|---|---|---|---|
| 2 | FR-1616 | 05-21-02 | DAS | KDG | LDN | REV. LOW STAGE REFRIG. CHARGES |
| 1 | FR-1606 | 05-08-02 | RDS | KDG | LDN | NOTED SOLENOID AS NORMALLY OPEN |
| 0 | FR-1557 | 02-25-02 | LDC | KDG | LDN | RELEASED FOR PRODUCTION, REL.11 |

| DATE | DWN | CAD | APPD | SCALE |
|---|---|---|---|---|
| 04-21-98 | LDC | LDC | LDN | NONE |

CUSTOMER

JOB TITLE -86°C 17 CU. FT. UPRIGHT FREEZERS (120 V)

DWG TITLE REFRIGERATION SCHEMATIC

| LOCATION | JOB NUMBER | DRAWING NUMBER |
|---|---|---|
| | | 8516-91-0-B |

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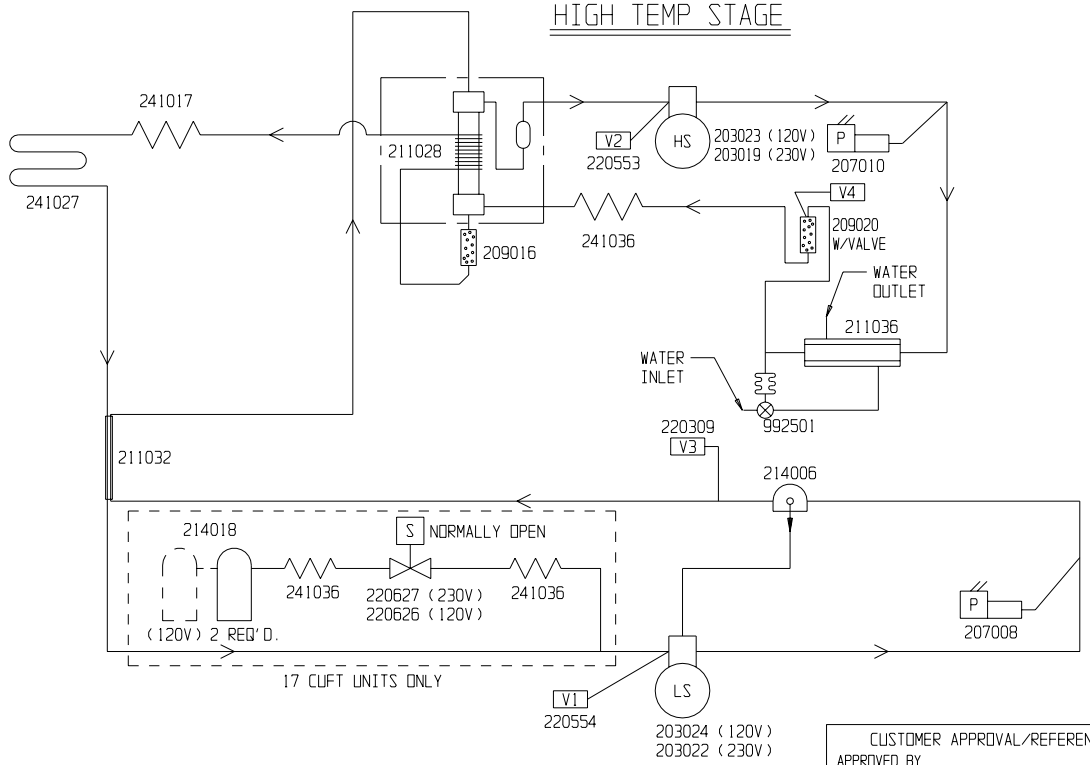


## CASCADE REFRIGERATION

HIGH TEMPERATURE STAGE REFRIGERANT:

13 CUFT UNITS: R-404A 24 OZ. (680gr) ±1/2 OZ (14gr)
17 CUFT UNITS: R-404A 24 OZ. (680gr) ±1/2 OZ (14gr)

HIGH TEMPERATURE STAGE OIL: MOBILE EAL ARCTIC 22CC POLYOL ESTER OIL COMPRESSOR, 24 OZ.(710ml)

LOW TEMPERATURE STAGE REFRIGERANT:

13 CUFT UNITS: R-290 0.5 OZ. (14gr) MAX, ; VAC TO 20"
R-508B 13 OZ (369gr) ± 1/4 OZ.(7gr) OR
20" TO 147 PSIG ± 3 PSIG

17 CUFT UNITS: R-290 1.0 OZ. (28gr) MAX, ; VAC TO 1 PSIG
(120 VOLTS) R-508B 16.5 OZ (468gr) ± 1/4 OZ.(7gr) OR
1 PSIG TO 118 PSIG ± 3 PSIG

17 CUFT UNITS: R-290 0.9 OZ. (26gr) MAX, ; VAC TO 3 PSIG
(230 VOLTS) R-508B 15 OZ (425gr) ± 1/4 OZ.(7gr) OR
3 PSIG TO 134 PSIG ± 3 PSIG

LOW TEMPERATURE STAGE OIL: ZEROL 150T WITH 2% ADDITIVE
COMPRESSOR: 24 OZ.(710ml)
OIL SEPARATOR: 15 OZ. (444ml)

***SET WATER REGULATING VALVE FOR 170 PSIG

* ALL PSIG MEASUREMENTS WHEN SYSTEM IS AT 23°C

CUSTOMER APPROVAL/REFERENCE
APPROVED BY _____
APPROVING FIRM _____
DATE OF APPROVAL _____

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| REV | ECR NO. | DATE | BY | CAD | APPD | DESCRIPTION OF REVISION |
|---|---|---|---|---|---|---|
| 6 | FR-1616 | 05-21-02 | DAS | KDG | LDN | REV. LOW STAGE REFRIG. CHARGES |
| 5 | FR-1606 | 05-08-02 | RDS | KDG | LDN | NOTED SOLENOID AS NORMALLY OPEN |
| 4 | FR-1557 | 02-25-02 | LDC | KDG | LDN | ADDED EXPANSION TANK 17 CF 120V |
| 3 | FR-1557 | 11-12-01 | LDC | KDG | LDN | ADDED EXPANSION TANK 17 CF 230V |
| 2 | FR-1421 | 07-28-00 | AFC | KDG | LDN | CHG. 209016 TO 209020 W/VALVE |

| | | | | |
|---|---|---|---|---|
| DATE 12-10-99 | DWN CAW | CAD CAW | APPD CAW | SCALE NONE |
| CUSTOMER | | | | |
| JOB TITLE -86°C 13 & 17 CU. FT. UPRIGHT H2O COOLED FREEZERS | | | | |
| DWG TITLE REFRIGERATION SCHEMATIC | | | | |
| LOCATION | JOB NUMBER | DRAWING NUMBER 195145-90-0-B | | |

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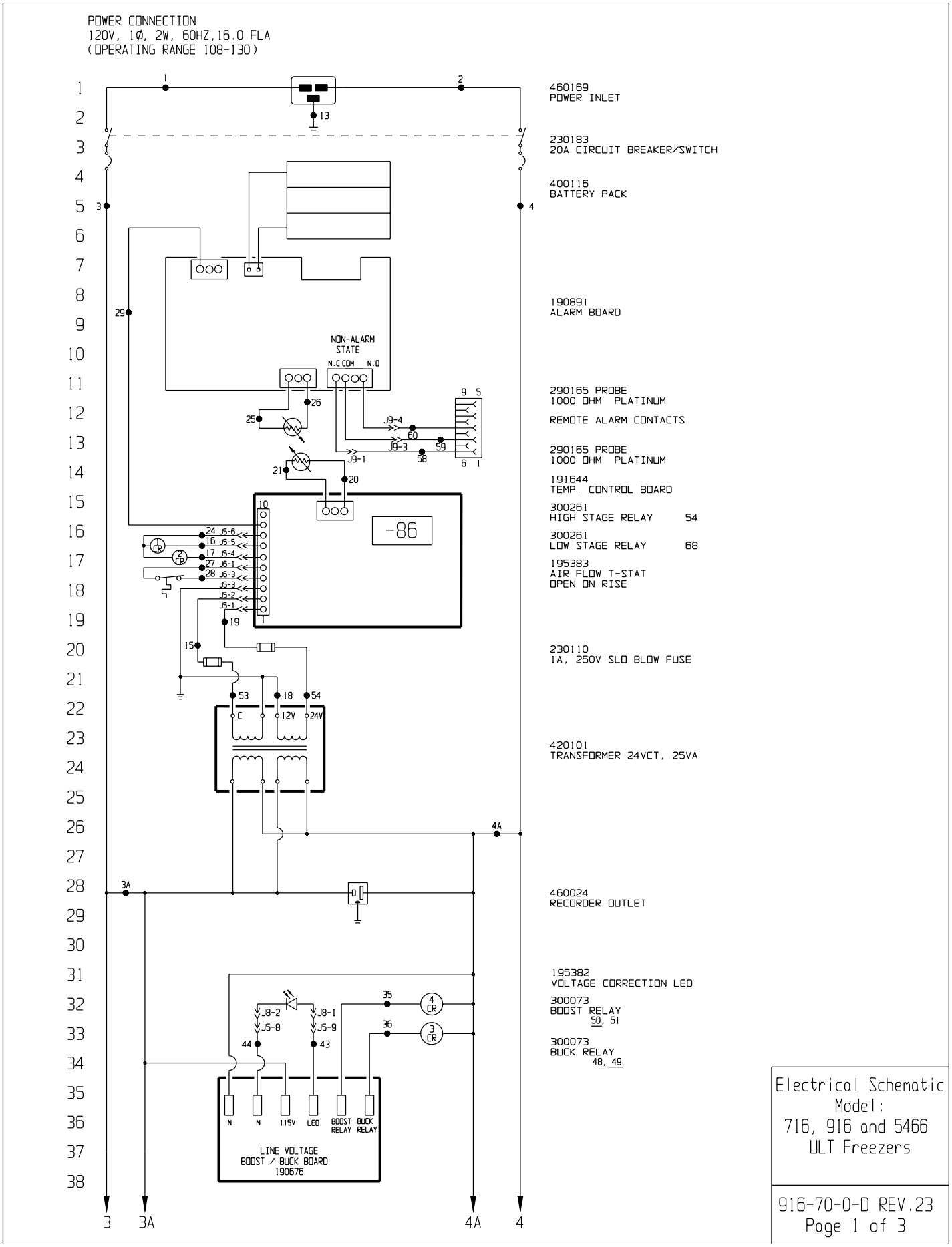
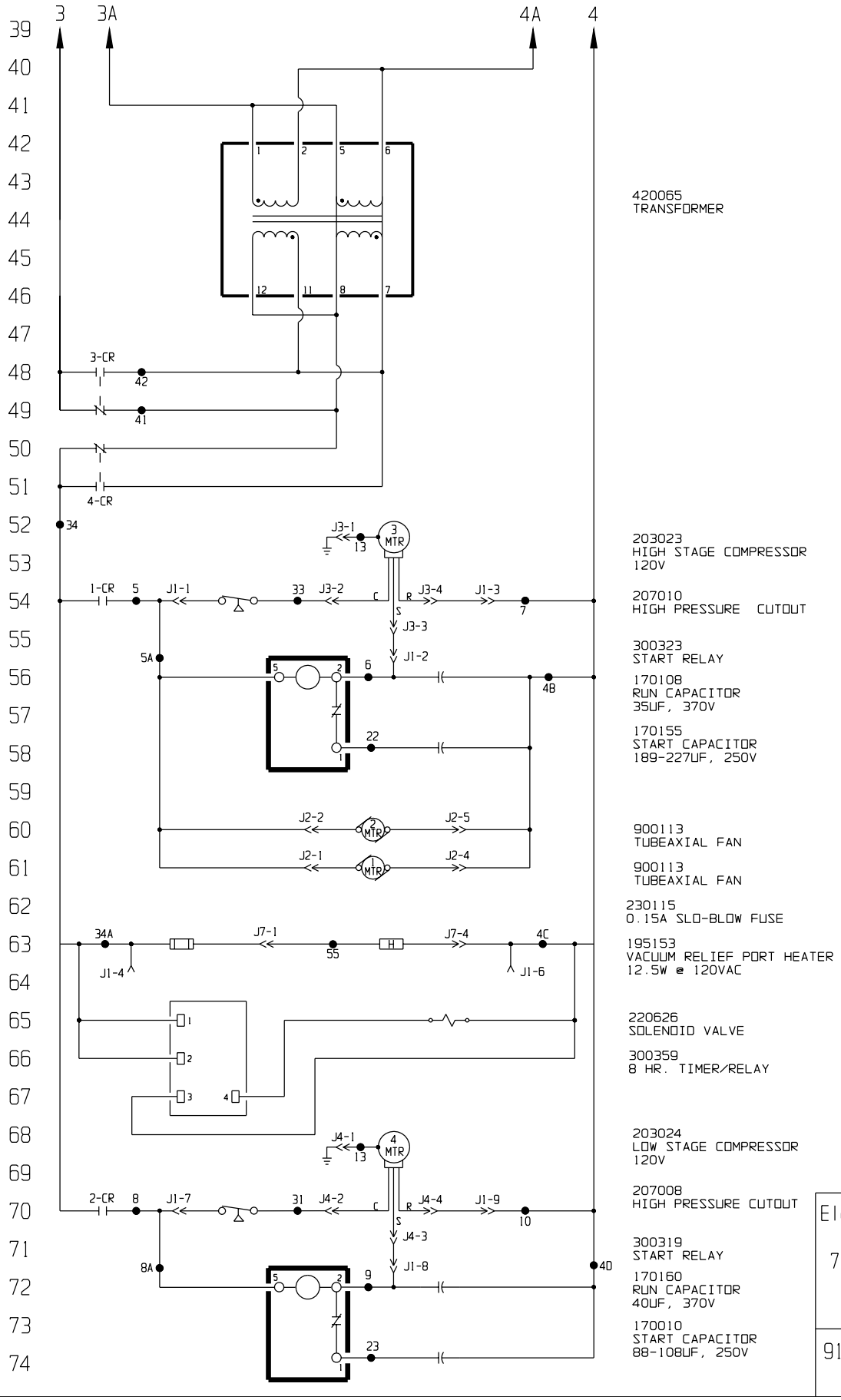



Electrical Schematic
Model:
716, 916 and 5466
ULT Freezers

916-70-0-D REV.23
Page 1 of 3




Electrical Schematic
Model:
716, 916 and 5466
ULT Freezers

916-70-0-D REV.23
Page 2 of 3

## WIRE REFERENCE CHART

| WIRE # | GAUGE | COLOR |
|---|---|---|
| 1 | 14 | BRN |
| 2 | 14 | BLU |
| 3 | 14 | BLK |
| 3A | 14 | BLK |
| 4 | 14 | BLU |
| 4A | 18 | BLU |
| 4B | 18 | BLU |
| 4C | 18 | BLU |
| 4D | 18 | BLU |
| 5 | 14 | BRN |
| 5A | 18 | BRN |
| 6 | 18 | RED |
| 7 | 14 | YEL |
| 8 | 14 | BLK |
| 8A | 18 | BLK |
| 9 | 18 | PUR |
| 10 | 14 | ORG |
| 13 | 14 | GRN/YEL |
| 15 | 22 | RED |
| 16 | 22 | YEL |
| 17 | 22 | ORG |
| 18 | 22 | BLK |
| 19 | 22 | WHT |
| 20 | 22 | RED |
| 21 | 22 | WHT |
| 22 | 18 | GRY |
| 23 | 18 | GRY |
| 24 | 22 | BLU |
| 25 | 22 | RED |

## WIRE REFERENCE CHART

| WIRE # | GAUGE | COLOR |
|---|---|---|
| 26 | 22 | WHT |
| 27 | 22 | BLK |
| 28 | 22 | BLK |
| 29 | 22 | BLK |
| 31 | 14 | BLK |
| 33 | 14 | BRN |
| 34 | 14 | BRN |
| 34A | 18 | BRN |
| 35 | 18 | ORG |
| 36 | 18 | YEL |
| 41 | 14 | RED |
| 42 | 14 | GRY |
| 43 | 18 | RED |
| 44 | 18 | BLU |
| 48 | 18 | BRN |
| 53 | 22 | RED |
| 54 | 22 | WHT |
| 55 | 18 | BRN |
| 58 | 24 | RED |
| 59 | 24 | BLK |
| 60 | 24 | WHT |

| REMOTE CONTACTS |
|---|
| PIN# 1 NORMALLY CLOSED |
| PIN# 2 COMMON |
| PIN# 3 NORMALLY OPEN |

CONTACT RATING: 1A @ 30V

| REV | ECN NO. | DATE | BY | CAD | APPD | DESCRIPTION OF REVISION |
|---|---|---|---|---|---|---|
| 23 | FR-1557 | 02-18-02 | AT | KDG | CCS | ADDED TIMER & SOLENOID (REL.11) |
| 22 | FR-1441 | 09-11-00 | RSB | KDG | LDN | CHANGE 190860 TEMP. BOARD TO 191644 |
| 21 | FR-1402 | 05-24-00 | AT | GLS | LDN | REVISED ALARM BD PWR CONNECTION |
| 20 | FR-1284 | 04-28-99 | AT | KDG | LDN | REVISED MODELS IN TITLE BLOCK |
| 19 | N/A | 11-03-98 | AT | AT | LDN | SUVA & EMC UPDATES |

ATTENTION
OBSERVE PRECAUTIONS
ELECTROSTATIC
SENSITIVE DEVICES

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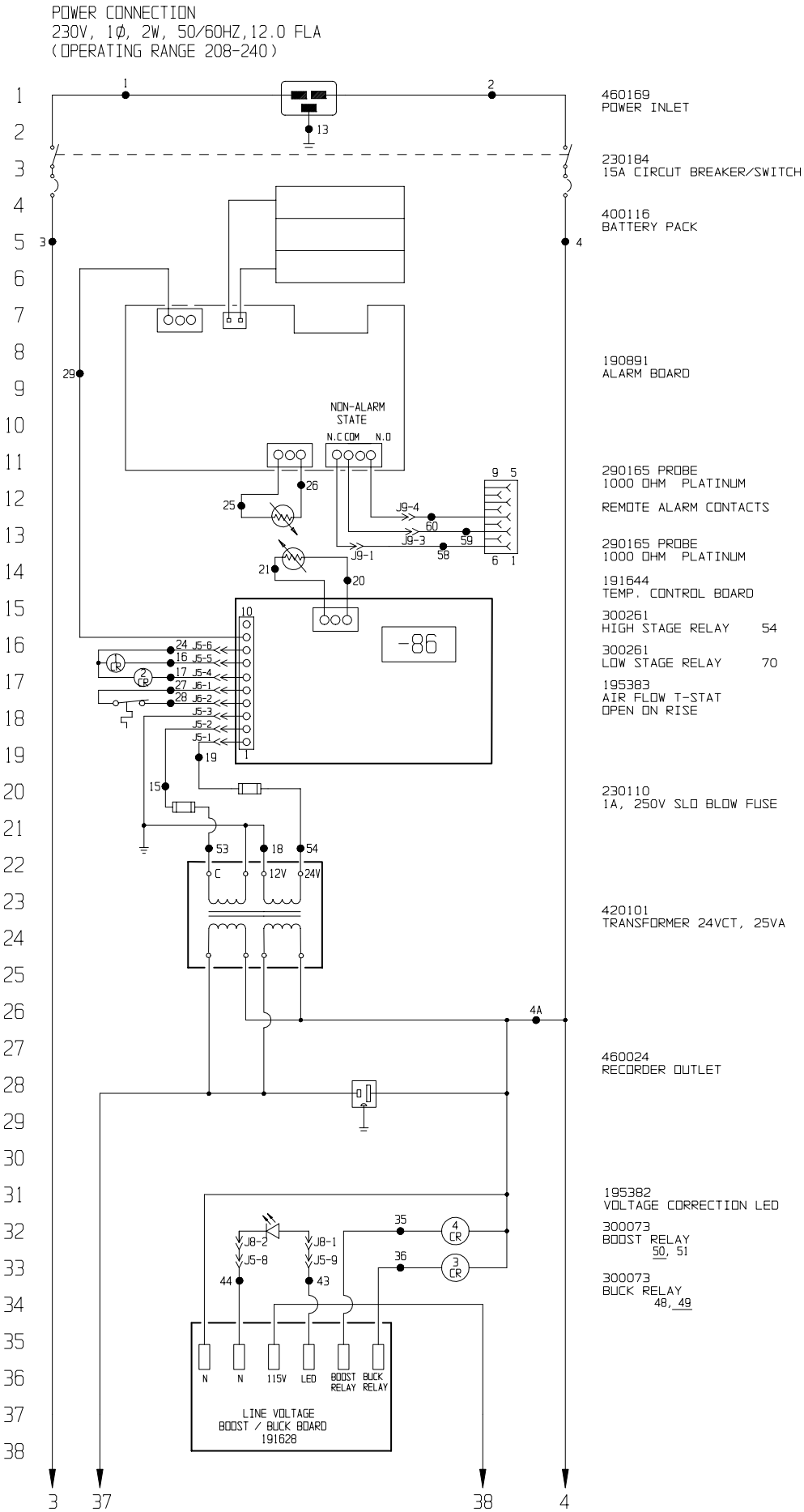
ThermoForma
BOX 649, MARIETTA, OHIO 45750

MODEL/PART NAME: 716, 916 & 5466 UPRIGHT ULT FREEZERS
DWG TITLE: ELECTRICAL SCHEMATIC
DWN: AT | CAD: AT | APPD: CBL | DATE: 7-2-96 | SCALE: NONE
MATERIAL:
PAINT COLOR:
TOLERANCE UNLESS OTHERWISE SPECIFIED
ANGLES: DECIMAL: .XX=±, .XXX=±
DRAWING NUMBER 916-70-0
SIZE D

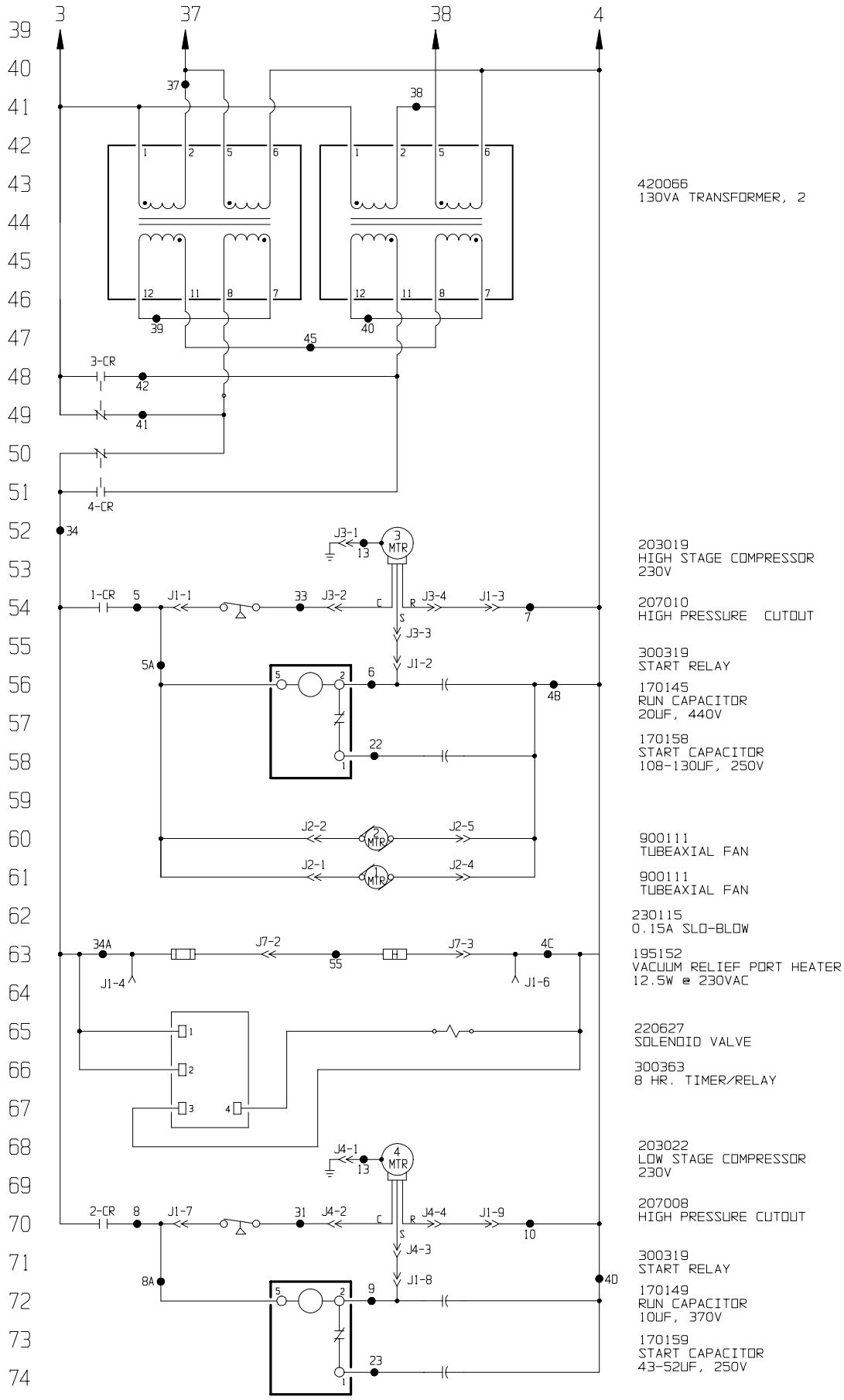
Electrical Schematic
Model:
716, 916 and 5466
ULT Freezers

916-70-0-D REV.23
Page 3 of 3




Electrical Schematic
Model:
717, 723, 917, 923,
929, 5463 and 5467
Upright Freezer

917-70-0-D REV.30
Page 1 of 3




Electrical Schematic
Model:
717, 723, 917, 923,
929, 5463 and 5467
Upright Freezer

917-70-0-D REV.30
Page 2 of 3

## WIRE REFERENCE CHART

| WIRE # | GAUGE | COLOR |
|---|---|---|
| 1 | 14 | BRN |
| 2 | 14 | BLU |
| 3 | 14 | BRN |
| 4 | 14 | BLU |
| 4A | 18 | BLU |
| 4B | 18 | BLU |
| 4C | 18 | BLU |
| 4D | 18 | BLU |
| 5 | 14 | BRN |
| 5A | 18 | BRN |
| 6 | 18 | RED |
| 7 | 14 | YEL |
| 8 | 14 | BLK |
| 8A | 18 | BLK |
| 9 | 18 | PUR |
| 10 | 14 | ORG |
| 13 | 14 | GRN/YEL |
| 15 | 22 | RED |
| 16 | 22 | YEL |
| 17 | 22 | ORG |
| 18 | 22 | BLK |
| 19 | 22 | WHT |
| 20 | 22 | RED |
| 21 | 22 | WHT |
| 22 | 18 | GRY |
| 23 | 18 | GRY |
| 24 | 22 | BLU |
| 25 | 22 | RED |

## WIRE REFERENCE CHART

| WIRE # | GAUGE | COLOR |
|---|---|---|
| 26 | 22 | WHT |
| 27 | 22 | BLK |
| 28 | 22 | BLK |
| 29 | 22 | BLK |
| 31 | 14 | BLK |
| 33 | 14 | BRN |
| 34 | 14 | BRN |
| 34A | 18 | BRN |
| 35 | 18 | ORG |
| 36 | 18 | YEL |
| 37 | 18 | BLK |
| 38 | 18 | BLK |
| 39 | 14 | ORG |
| 40 | 14 | ORG |
| 41 | 14 | RED |
| 42 | 14 | GRY |
| 43 | 18 | RED |
| 44 | 18 | BLU |
| 45 | 14 | YEL |
| 48 | 18 | BRN |
| 53 | 22 | RED |
| 54 | 22 | WHT |
| 55 | 18 | BRN |
| 58 | 24 | RED |
| 59 | 24 | BLK |
| 60 | 24 | WHT |

| REMOTE CONTACTS |
|---|
| PIN# 1 NORMALLY CLOSED |
| PIN# 2 COMMON |
| PIN# 3 NORMALLY OPEN |

CONTACT RATING: 1A @ 30V

| REV | ECN NO. | DATE | BY | CAD | APPD | DESCRIPTION OF REVISION |
|---|---|---|---|---|---|---|
| 30 | FR-1557 | 12-07-01 | AT | KDG | AKS | CORRECT 10.0 FLA RATING TO 12.0 FLA |
| 29 | FR-1557 | 10-26-01 | AT | KDG | LDN | ADDED TIMER & SOLENOID (REL.11) |
| 28 | FR-1441 | 09-11-00 | RSB | KDG | LDN | CHANGE 190860 TEMP. BOARD TO 191644 |
| 27 | FR-1402 | 05-24-00 | AT | GLS | LDN | REVISED ALARM BD PWR CONNECTION |
| 26 | FR-1357 | 01-31-00 | AT | KDG | LDN | CHG. H.S. RUN CAPACITOR FROM 170097 |

ATTENTION
OBSERVE PRECAUTIONS
ELECTROSTATIC
SENSITIVE DEVICES

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Thermo Forma
BOX 649, MARIETTA, OHIO 45750

MODEL/PART NAME: 717, 723, 917, 923, 929, 5463 & 5467 UR FREEZERS
DWG TITLE: ELECTRICAL SCHEMATIC
DWN: AT | CAD: AT | APPD: CBL | DATE: 7-2-96 | SCALE: NONE
MATERIAL:
PAINT COLOR:
TOLERANCE UNLESS OTHERWISE SPECIFIED
ANGLES: DECIMAL: .XX=± .XXX=±
DRAWING NUMBER 917-70-0 | SIZE D

Electrical Schematic
Model:
717, 723, 917, 923,
929, 5463 and 5467
Upright Freezer

917-70-0-D REV.30
Page 3 of 3

# THERMO FORMA 900 & 8500 SERIES ULT FREEZER WARRANTY

The Warranty Period starts two weeks from the date your equipment is shipped from our facility. This allows for shipping time so the warranty will go into effect at approximately the same time your equipment is delivered. The warranty protection extends to any subsequent owner during the warranty period.

During the first year of the warranty period, component parts proven to be non-conforming in materials or workmanship will be repaired or replaced at Thermo Forma's expense, labor included. The 900 Series ULT Freezers include a second year warranty on the compressors, parts only, F.O.B. factory. The 8500 Series ULT Freezers include an additional four year warranty on the compressors, parts only, F.O.B. factory. Installation and calibration is not covered by this warranty agreement. The Thermo Forma Service Department must be contacted for warranty determination and direction prior to any work being performed. Expendable items, i.e., glass, filters, pilot lights, light bulbs and door gaskets are excluded from this warranty.

In addition to the standard warranty, effective March 1, 2000, the foamed-in-place cabinet design carries a unit production lifetime warranty. Please contact your sales representative or Thermo Forma for additional information.

Replacement or repair of component parts or equipment under this warranty shall not extend the warranty to either the equipment or to the component part beyond the original one year warranty period. The Thermo Forma Service Department must give prior approval for the return of any components or equipment.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL, OR IMPLIED. NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY. Thermo Forma shall not be liable for any indirect or consequential damages including, without limitation, damages relating to lost profits or loss of products.

Your local Thermo Forma Sales Office is ready to help with comprehensive site preparation information before your equipment arrives. Printed instruction manuals carefully detail equipment installation, operation, and preventive maintenance.

If equipment service is required, please call your Thermo Forma Service Office at 1-888-213-1790 (USA and Canada) or 1-740-373-4763. We're ready to answer your questions on equipment warranty, operation, maintenance, service, and special applications. Outside the USA contact your local distributor for warranty information.

ISO 9001 REGISTERED

# THERMO FORMA 900 & 8500 SERIES ULT FREEZER INTERNATIONAL DEALER WARRANTY

The Warranty Period starts two months from the date your equipment is shipped from our facility. This allows for shipping time so the warranty will go into effect at approximately the same time your equipment is delivered. The warranty protection extends to any subsequent owner during the warranty period. Dealers who stock our equipment are allowed an additional four months for delivery and installation, providing the warranty card is completed and returned to the Thermo Forma Service Dept.

During the first year of the warranty period, component parts proven to be non-conforming in materials or workmanship will be repaired or replaced at Thermo Forma's expense, labor excluded. The 900 Series ULT Freezers include a second year warranty on the compressors, parts only, F.O.B. factory. The 8500 Series ULT Freezers include an additional four year warranty on the compressors, parts only, F.O.B. factory. Installation and calibration is not covered by this warranty agreement. The Thermo Forma Service Department must be contacted for warranty determination and direction prior to any work being performed. Expendable items, i.e., glass, filters, pilot lights, light bulbs and door gaskets are excluded from this warranty.

In addition to the standard warranty, effective March 1, 2000, the foamed-in-place cabinet design carries a unit production lifetime warranty. Please contact your sales representative or Thermo Forma for additional information.

Replacement or repair of component parts or equipment under this warranty shall not extend the warranty to either the equipment or to the component part beyond the original one year warranty period. The Thermo Forma Service Department must give prior approval for the return of any components or equipment.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL, OR IMPLIED. NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY. Thermo Forma shall not be liable for any indirect or consequential damages including, without limitation, damages relating to lost profits or loss of products.

Your local Thermo Forma Sales Office is ready to help with comprehensive site preparation information before your equipment arrives. Printed instruction manuals carefully detail equipment installation, operation, and preventive maintenance.

If equipment service is required, please contact your local distributor or Thermo Forma (1-888-213-1790 in USA and Canada, or 1-740-373-4763). We're ready to answer your questions on equipment warranty, operation, maintenance, service, and special applications. Outside the USA, contact your local distributor for warranty information.

ISO 9001 REGISTERED

# Declaration of Conformity

**Manufacturer's Name:** Thermo Forma, Inc.

**Manufacturer's Address:** 401 Millcreek Road
Marietta, Ohio 45750
U.S.A.

**Product Description:** Laboratory Freezer

**Product Designations:** **917**

**Year of Initial Marking (CE):** 1996

**Affected Units:** **Release Level 11**
Release Level (REL#) shown on Serial Tag

This product conforms to the following European Union Directive(s):

**EMC:** 89/336/EEC
**LVD:** 73/23/EEC

This product conforms to the following Harmonized, International and National Standards:

| **EMC:** | **LVD:** |
|---|---|
| EN 61326-1:1997 | EN 61010-1:1993 |
| EN 50081-1:92 | Amendments 1 and 2 |
| EN 50082-1:97 | EN 60335-2-24 (applicable sections) |
| | CSA C22.2 No. 1010.1 |
| | UL 471 |

Louis E. Urschel, Jr.
V. P. of Quality & Service

**Thermo** Forma

15 November 2001

Rev. 4

**Thermo** Forma

**Millcreek Road, P.O. Box 649**
**Marietta, Ohio 45750**
**U.S.A.**

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**Telephone: (740) 373-4763**
**Telefax: (740) 373-4189**