Model 8600 Series

-86C Ultra Low Temperature Freezer
Operating and Maintenance Manual
7038602 Rev. 5

Thermo
SCIENTIFIC

Important installer and user information:

A redundant temperature sensing device has been included in this ULT freezer. This device is a type "T" thermocouple. For convenient access, the thermocouple (Figure 1-3) terminates in an interconnect jack (Figure 1-5) behind the base front cover. (May be located differently in chests. See Section 1.) It is strongly recommended that this thermocouple be attached to a redundant 24 hour 7 day monitoring system with alarm capabilities. Connecting the sensor to a monitoring and alarm system separate from the freezer provides the utmost in product safety, should the integral system fail. ▲

Model	Capacity in Cubic Feet	Voltage
8602	13	230
8603	13	120
8604	17	120
8605	17	230
8606	23	230
8607	28	230
8656	23	120
Double Door Units		
8690	23	120
8691	13	230
8692	13	120
8693	17	120
8694	17	230
8695	23	230

MANUAL NUMBER 7038602

REV	ECR/ECN	DATE	DESCRIPTION	By
5	25693/FR-2080	7/29/09	Chg'd drier from 209016 to 209017 (refrig schematics), -205 drawing	ccs
4	25283/IN-10127	5/27/09	Updated 8602-200-1-B exploded parts drawing - 28 cu ft door change	ccs
3	25411/FR-2040	4/30/09	Changed drier from 209020 to 209016 (refrigeration schematics)	ccs
2	25018/FR-2016	10/29/08	Removed reference to VRP tool	ccs
1	24567/FR-2000,24605/ FR-2000, 24417/SI-9962 24191	5/22/08	Clarified chamber probe and thermocouple callouts, Important info above, updated exploded parts drawings (-203) to current production (color chg), software updated, 'Test BUS Operation' and Micro Board Failure Error, 8627 red cell deleted	ccs
0	23831/FR-1943	6/15/07	Release 4 heat exchanger	ccs

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. ▲

Caution All internal adjustments and maintenance must be performed by qualified service personnel. ▲

Material in this manual is for information purposes only. The contents and the product it describes are subject to change without notice. Thermo Scientific makes no representations or warranties with respect to this manual. In no event shall Thermo be held liable for any damages, direct or incidental, arising out of or related to the use of this manual.

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

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

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

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

Marking of electrical and electronic equipment, which applies to electrical and electronic equipment falling under the Directive 2002/96/EC (WEEE) and the equipment that has been put on the market after 13 August 2005.

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the WEEE symbol. Thermo Scientific has contracted with one or more recycling/disposal companies in each EU Member State European Country, and this product should be disposed of or recycled through them. Further information on Thermo's compliance with this directive, the recyclers in your country and information on Thermo products will be available at www.thermo.com.

- ✔ 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.

Do You Need Information or Assistance on Thermo Scientific Products?

If you do, please contact us 8:00 a.m. to 6:00 p.m. (Eastern Time) at:

1-740-373-4763	Direct
1-866-984-3766	Toll Free, U.S. and Canada
1-740-373-4189	FAX
http://www.thermo.com	Internet Worldwide Web Home Page
service.led.marietta@thermofisher.com	Service E-Mail Address

Our **Sales Support** staff can provide information on pricing and give you quotations. We can take your order and provide delivery information on major equipment items or make arrangements to have your local sales representative contact you. Our products are listed on the Internet and we can be contacted through our Internet home page.

Our **Service Support** staff can supply technical information about proper setup, operation or troubleshooting of your equipment. We can fill your needs for spare or replacement parts or provide you with on-site service. We can also provide you with a quotation on our Extended Warranty for your Thermo Scientific products.

Whatever Thermo Scientific products you need or use, we will be happy to discuss your applications. If you are experiencing technical problems, working together, we will help you locate the problem and, chances are, correct it yourself...over the telephone without a service call.

When more extensive service is necessary, we will assist you with direct factory trained technicians or a qualified service organization for on-the-spot repair. If your service need is covered by the warranty, we will arrange for the unit to be repaired at our expense and to your satisfaction.

Regardless of your needs, our professional telephone technicians are available to assist you Monday through Friday from 8:00 a.m. to 6:00 p.m. Eastern Time. Please contact us by telephone or fax. If you wish to write, our mailing address is:

Thermo Scientific
Controlled Environment Equipment
401 Millcreek Road, Box 649
Marietta, OH 45750

International customers, please contact your local Thermo Scientific distributor.

Table of Contents

Section 1 Installation and Start-Up

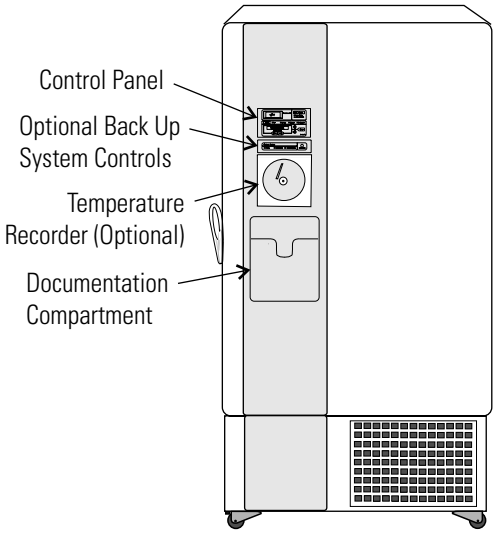


Figure 1-1. Front View

- Control Panel - keypad, displays and indicators.
- BUS (Optional Back Up System) panel.
- Optional temperature recorder - 7 day, one pen or datalogger.
- Documentation compartment - storage of user's manual and other documentation.

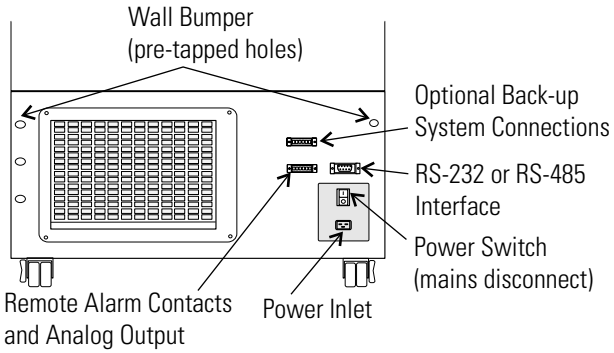


Figure 1-2. Rear View

- Remote alarm contacts and selectable analog output connection - 0-1V, 4-20mA (default), 0-5V.
- Power inlet for power cord connection.
- Optional BUS connections for probe and solenoid.
- RS-232 (default) or RS-485 interface.
- Power Switch (mains disconnect).

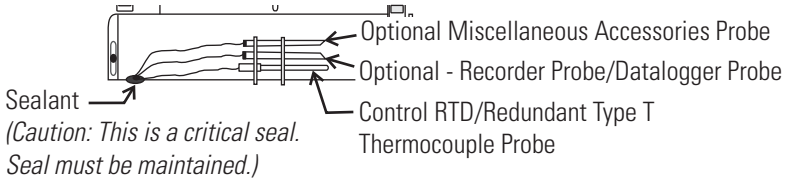


Figure 1-3. Chamber Probe

Figures 1-3 & 1-4

- Vacuum relief port - pressure equalization port
- Probe cover - houses control, optional recorder, datalogger or 1535 alarm probes

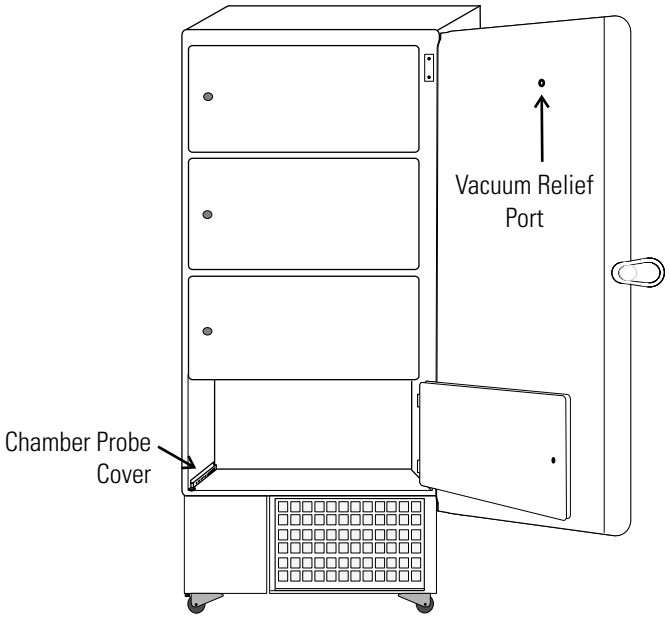


Figure 1-4. Vacuum Relief and Probe Cover Location

Figure 1-5

- Battery mounting bracket(s)
- Battery power switch (freezer and BUS)
- Freezer battery
- Optional BUS battery
- Freezer filter location

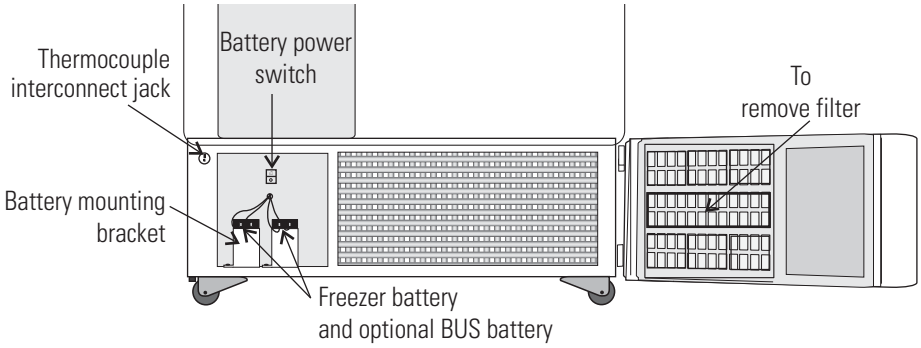


Figure 1-5. Battery(s) Location and Switch

Control Panel Keys, Displays & Indicators

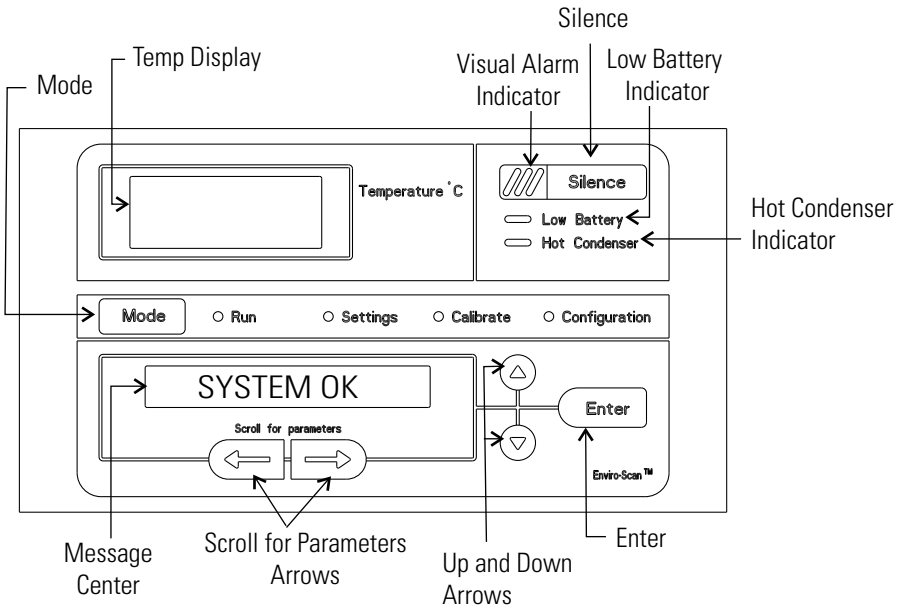


Figure 1-6. Control Panel

Mode Select Switch - Used to select Run, Settings, Calibrate and System Configuration Modes.

Mode Select Indicators -

Run: Run Menu

Settings: Set Points Menu

Calibrate: Calibrate Menu

Configuration: Configuration Menu

Temperature Display - Displays temperature in degrees Celsius.

Alarm Indicator - Light pulses on/off during a cabinet alarm condition.

Silence - Silences the audible alarm.

Low Battery - indicates a low battery condition of the freezer battery.

Hot Condenser - indicates a hot condenser condition.

Message Center - displays system status and alarms.

Scroll for Parameters Arrows - moves the operator through the choices of the selected mode.

Up and Down Arrows - Increases or decreases values, toggles between choices.

Enter - Stores the value into computer memory.

Keypad Operation

Model 8600 Series freezer has four basic modes which allow freezer setup: Run, Settings, Calibrate and Configuration.

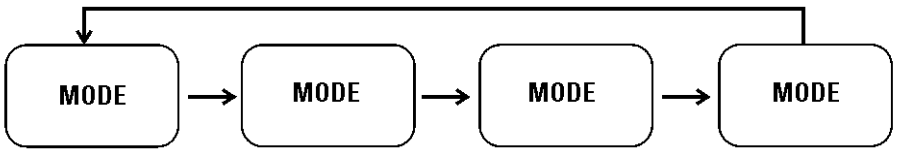
Run is the default mode for the freezer during normal operation.

Settings is used to enter system set points for freezer operation.

Calibrate is used to calibrate various system parameters.

Configuration allows for custom setup of various options.

The chart below shows the selections under each of the modes.



Run	Settings	Calibrate	Configuration
Default Mode System Ok	Control Set Point	Control Probe	High Alarm Test
Line Voltage	High Alarm Set Point	Optional Sample Probe	Low Alarm Test
Compensated Voltage	Low Alarm Set Point		System Battery Test
HSHX Temperature	Optional Back Up System Set Point		BUS Battery Test
			Display Temperature
			Clear High Stage Alarm
			Set Access Code
			RS485 Address
			BUS type CO2 or LN2

Scroll for Parameters Arrows: Steps the operator through the parameters of SETTINGS, CALIBRATE and CONFIGURATION Modes. The right arrow goes to the next parameter, the left arrow returns to the previous parameter.

Up Arrow: Increases or toggles the parameter value that has been selected in the SETTINGS, CALIBRATE, and CONFIGURATION Modes.

Enter: Must press Enter key to save to memory all changed values.

Down Arrow: Decreases or toggles the parameter values that have been selected in the SETTINGS, CALIBRATE and CONFIGURATION Modes.

Silence Key: Press to silence the audible alarm. See Section 4 for alarm ringback times.

Displays

Message Center: Displays the system status (Mode) at all times. Displays SYSTEM OK during normal operation, or alarm messages if the system detects an alarm condition. See Section 4 - Alarms.

Install the Freezer

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

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

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 the following section. If necessary, the doors and lower front panel may be opened to move the unit through tight openings. When the freezer is in position, set the front caster brakes.

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

Choose the 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.

Caution For proper ventilation and airflow, a minimum clearance of 5” at the rear and top and a clearance of 8” on the side of the freezer is required. Allow adequate space in the front of the freezer for door opening. ▲

Install the Wall Bumpers

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 1-2 for the locations of the pre-tapped holes.

Install 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.

Note On units having the optional 5 inner door option, refer to the instructions accompanying the inner door kit. ▲

RS-232 Communications

The Model 8600 Series freezer has a data communications interface. The factory default setting is RS-232.

The wiring identification for the interface is shown in Figure 1-7. One nine pin, sub "D" style connector is located on the back of the freezer. See Figure 1-2 for the location of the connector on the freezer.

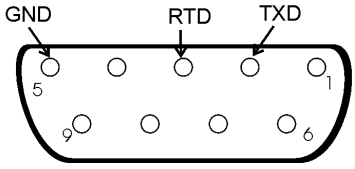


Figure 1-7. Wiring

The freezer transmits temperature information every 60 minutes. A standard DB9 serial extension cable can be used to connect the freezer to serial device. Some serial devices may require a null modem adapter.

Data format:

Baud 1200
Data bits . . . . . .8 (7 bit ASCII with leading zero)
Start bits 1
Stop bits 2
Parity . . . . . .none

RS-232 Communications (continued)

The data transfer sequence is transmitted in the following format. X refers to numerical temperature data.

(NUL) (-) XXX (SP) C (SP) (OVERTEMP) (SP) (LF) (CR) (EOT) (SP) (UNDER TEMP)

The words "OVER TEMP" or "UNDER TEMP" are transmitted when an alarm condition exists along with the temperature. If no alarm condition exists, spaces will be sent. A total of 20 characters will be sent.

SP - Space
LF - Line feed
CR - Carriage return
EOT - End of text (4)
NUL - Null character (00)

Note The RS-232 is not compatible with Model 1535 Monitor/Alarm System. ▲

Remote Alarm Contacts and Analog Output

Model 8600 Series freezer has remote alarm contacts and analog output. See Figure 1-2 for the location of the remote alarm contacts. The remote alarm connector is shipped in the parts bag provided with the manual. It must be installed if connecting the freezer to an alarm system. After installing the wiring from the alarm system to the connector, install the connector to the freezer microboard and secure with the two screws provided. The remote alarm provides a NO (normally open) output, a NC (normally closed) output and COM (common). The contacts will trip on a power outage, high temperature alarm or low temperature alarm. Figure 1-8 shows the remote contacts in alarm state.

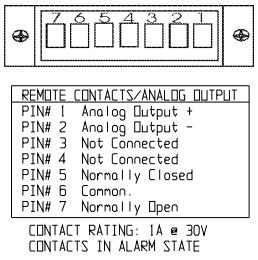


Figure 1-8. Remote Contacts in Alarm

The analog output function allows the freezer to output signals representing the temperature of the freezer cabinet. The factory default setting is 4-20 mA. Refer to Figure 1-9 for output specifications.

	4-20 mA	0-1V	0-5V
Temperature	-100 to +50°C	-100 to +50°C	-100 to +50°C

Figure 1-9. Output Specifications

IMPORTANT USER INFORMATION

Caution! Stored product should be protected by a redundant 24 hour/day monitoring system with alarm capability. An interconnect jack and thermocouple are installed for centralized monitoring, should on-board system fail.

Attach the Power Cord

Insert the power cord into the power inlet module. Place the retaining bracket (P/N 195763) over the connector. Tighten retaining screws to secure.

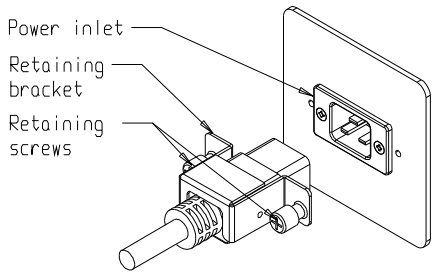


Figure 1-10. Secure Power Cord

Connect the Unit to Electrical Power

Caution See the serial tag on the side of the unit for electrical specifications or refer to the electrical schematics in this manual. ▲

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.

First, turn on the freezer power switch. Then open the lower front door by grasping the bottom left corner. Locate the battery switch (Figure 1-5) and turn it to Standby mode (⏻). During initial freezer start-up, the system battery may require charging and the Low Battery indicator may illuminate.

Caution Ensure the battery switch is turned to Standby mode (⏻). The rechargeable batteries require 36 hours to charge at initial start-up. A "Low Battery" alarm may occur until the batteries are fully charged. Should a power failure occur during the initial start-up period, the electronics will have limited operation. ▲

Freezer Start-Up

With the freezer properly installed and connected to power, system set points can be entered. The following set points can be entered in Settings mode: Control temperature, high temperature alarm set point, low temperature alarm set point, and (optional) BUS set point. Default settings are shown in Table 1.

Table 1-1. Default Settings

Control Set Point	-80°C
High Temperature Alarm	-70°C
Low temperature alarm	-90°C
Optional BUS Set Point	-60°C

Caution If the set point is changed and the low temperature and high temperature alarms are set 10° from the set point, the alarm set points will adjust automatically to maintain a distance of at least 10° from set point. ▲

Set the Operating Temperature

All Model 8600 Series freezers have an operating temperature range of -50°C to -86°C, depending on ambient temperature. The freezer is shipped from the factory with a temperature set point of -80°C. To change the operating temperature set point:

1. Press the Mode key until the Settings indicator lights.
2. Press the right arrow until "SET PT = -XX" is displayed in the message center.
3. Press the up/down arrow key until the desired temperature set point is displayed.
4. Press Enter to save the set point.
5. Press the Mode key until the Run indicator lights for Run mode or press the right/left arrow keys to go to next/previous parameter.

If no control keys are pressed, the freezer will automatically return to RUN mode after 5 minutes.

Set the High Temperature Alarm

The high temperature alarm will activate an audible/visual warning when the freezer chamber temperature has reached or exceeded the high temperature alarm set point. To set the high temperature alarm set point:

1. Press the Mode key until the Set indicator lights.
2. Press the right arrow until "HI ALM = -XX" is displayed in the message center.
3. Press the up or down arrow key until the desired high temperature alarm set point is displayed.
4. Press Enter to save the setting.
5. Press the Mode key until the Run indicator lights or press the right or left arrow to go to the next or previous parameter.

If no control keys are pressed, the freezer will automatically return to RUN mode after 5 minutes.

Note The high alarm set point must be set at least 5°C from the control set point. ▲

Note At initial start-up, the high temperature alarm is disabled until the cabinet reaches set point or 12 hours elapse. ▲

Set the Low Temperature Alarm

The low temperature alarm will activate an audible/visual warning when the freezer chamber temperature has reached or decreased below the low temperature alarm set point. To set the low temperature alarm set point:

1. Press the Mode key until the Settings indicator lights.
2. Press the right arrow until “LO ALM = -XX” is displayed in the message center.
3. Press the up or down arrow key until the desired low temperature alarm set point is displayed.
4. Press Enter to save the setting.
5. Press the Mode key until the Run indicator lights or press the right or left arrow to go to the next or previous parameter.

If no control keys are pressed, the freezer will automatically return to RUN mode after 5 minutes.

Note The low alarm set point must be set at least 5°C from the control set point. ▲

Access Code

An access code of 000 is required to access the Settings, Calibrate or Configuration modes. If the access code is not at the default 000, a code must be entered to leave RUN mode. See Section 3 to modify the access code.

Run Mode

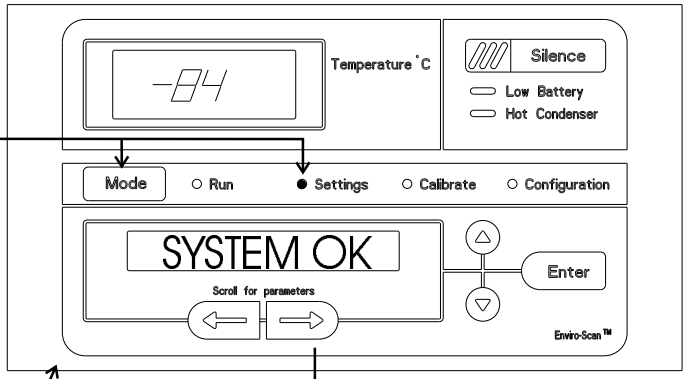
Run mode is the default mode for the freezer. Run mode will display the cabinet temperature on the temperature display and ‘SYSTEM OK’ on the message center under normal operating conditions. In addition, Run mode allows display of the following information:

LINE VOLTAGE
COMPENSATED VOLTAGE
HSHX TEMPERATURE (heat exchanger temperature)

This information is scrolled individually by pressing the right arrow key. In each case, the message center returns to SYSTEM OK in 10 seconds if no keys are pressed.

Chart 1-1

Settings Mode



Press MODE to light SETTINGS indicator

To Set:

Control Set Point

Press MODE to move to CALIBRATE mode

Mode | **SET PT = -XX** | *Scroll for Parameters*

Press ← to return to previous parameter

Numbers increase

Enter — Press Enter to save setting

Numbers decrease

High Alarm Set Point

Mode | **HI ALM = -XX** | *Scroll for Parameters*

Press ← to return to previous parameter

Numbers increase

Enter — Press Enter to save setting

Numbers decrease

Low Alarm Set Point

Mode | **LO ALM = -XX** | *Scroll for Parameters*

Press ← to return to previous parameter

Numbers increase

Enter — Press Enter to save setting

Numbers decrease

Optional Back Up System Set Point

Mode | **BACKUP = -XX**

Press ← to return to previous parameter

Numbers increase

Enter — Press Enter to save setting

Numbers decrease

Section 2 Calibrate

After the freezer has stabilized, the control or sample probe may require calibration. Calibration frequency is dependent on use, ambient conditions and accuracy required. A good laboratory practice would require at least an annual calibration check. On new installations, all parameters should be checked after the stabilization period.

Caution Before making any calibration or adjustments to the unit, it is imperative that all reference instruments be properly calibrated. ▲

Calibrate the Control Probe

Plug a type T thermocouple reader into the receptacle located inside the lower door (see Figure 1-5). Compare the control temperature set point to the temperature of the measuring device. See Chart 2-1 at the end of this section for more detail.

1. Press the Mode key until the Calibrate indicator lights.
2. Press the right arrow until “CONT T = -XX.X” appears in the message center.
3. Press up/down arrow to match the display to calibrated instrument.
4. Press Enter to store calibration.
5. Press the Mode key to return to Run or the right/left arrow to go to next/previous parameter.

Calibrate the Optional Sample Probe

For freezers with the optional sample probe, place the calibrated instrument in the center of the sample bottle. The bottle should contain an appropriate medium and the measuring instrument should be centered in the bottle.

1. Press the Mode key until the Calibrate indicator lights.
2. Press the right arrow until "SAMP T = -XX.X" appears in the message center.
3. Press up/down arrow to match display to calibrated instrument.
4. Press Enter to store calibration.
5. Press the Mode key to return to Run or the right/left arrow to go to next/previous parameter.

See Chart 2-1 for calibration process functions.

Temperature Stabilization Periods

Startup - Allow 12 hours for the temperature in the cabinet to stabilize before proceeding.

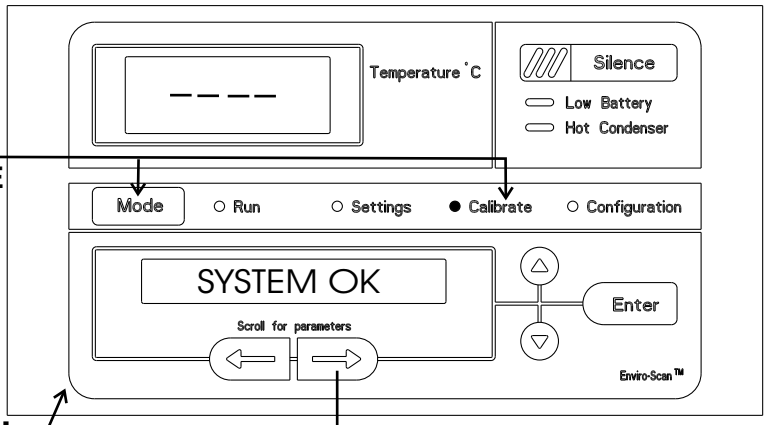
Already Operating - Allow at least 2 hours after the display reaches set point for temperature to stabilize before proceeding.

Note During calibration, the temperature display is not available. ▲

If no keys are pressed for approximately five minutes while in Calibration mode, the system will reset to Run mode.

Chart 2-1

Calibrate Mode



Press MODE to light CALIBRATE indicator

To Calibrate:

Control Probe

Press MODE to move to CONFIGURATION mode

Mode

CONT T = -XX.X

Scroll for Parameters

Press ← to return to previous parameter

Numbers increase

Enter

Press Enter to save setting

Numbers decrease

Optional Sample Probe

Mode

SAMPT = -XX.X

Scroll for Parameters

Press ← to return to previous parameter

Numbers increase

Enter

Press Enter to save setting

Numbers decrease

Section 3 Configuration

Configuration mode is used for testing and custom setup of the freezer. The configuration functions described below may not be necessary in all applications, but are available if needed. See Chart 3-1 for more detail.

High Alarm Test

The high alarm test is used to verify that the high alarm activates if the freezer temperature equals or exceeds the high alarm set point.

1. Press the Mode key until the Configuration indicator lights.
2. Press the right arrow until HI ALRM TEST is displayed in the message center.
3. Press Enter to initiate the test.

The temperature on the display begins to increase until the high alarm set point has been reached. The audible alarm sounds and the alarm indicator flashes. Press the Silence key to silence the alarm.

Low Alarm Test

The low alarm test is used to verify that the low alarm activates if the freezer temperature equals or decreased to less than the low alarm set point.

1. Press the Mode key until the Configuration indicator lights.
2. Press the right arrow until LO ALRM TEST is displayed in the message center.
3. Press Enter to initiate the test.

The temperature on the display begins to decrease until the low alarm set point has been reached. The audible alarm sounds and the alarm indicator flashes. Press the Silence key to silence the alarm.

System Battery Test

To test the freezer battery charge:

1. Press the Mode key until the Configuration indicator lights.
2. Press the right arrow until SYS BAT TEST is displayed in the message center.
3. Press Enter to initiate the test.

TESTING BATT displays during the testing period. Upon completion of the test, the message center displays BATT GOOD or BATT FAIL If a test fails, the audible alarm sounds, the alarm indicator and Low Battery indicator light. Press the Silence key and the alarm indicator will go off. The Low Battery light stays on until a future battery test is performed and passed.

BUS Battery Test

To test the charge of the back-up system (BUS) battery:

1. Press the Mode key until the Configuration indicator lights.
2. Press the right arrow until BUS BAT TEST is displayed in the message center.
3. Press Enter to initiate the test.

TESTING BATT displays during the testing period. Upon completion of the test, the message center displays BBAT GOOD or BBAT FAIL If a test is failed, the audible alarm sounds, the alarm indicator and the Low Battery indicator light. Press the Silence key. The audible alarm and alarm indicator will go off. The Low Battery light stays on. If this test fails, battery replacement is recommended.

Display Temperature

This function, only available on freezers with the optional sample probe, allows the user to select which temperature is displayed in the temperature display window. The options are CONTROL or SAMPLE.

1. Press the Mode key until the Configuration indicator lights.
2. Press the right arrow until DISP CONTROL or DISP SAMPLE is displayed in the message center.
3. Press up/down arrow to toggle between the two display selections.
4. Press Enter to save.

If control probe is selected, the temperature display will be on continuously. If sample probe is selected, the temperature display will be preceded with a letter ‘S’.

Clear High Stage Alarm

Should a high stage alarm occur, it may be necessary to clear the alarm condition after the condition has been corrected.

1. Press the Mode key until the Configuration indicator lights.
2. Press the right arrow until CLR HS ALARM is displayed in the message center.
3. Press Enter to clear the alarm.

Set an Access Code

To set the Access Code:

1. Press the Mode key until the Configuration indicator lights.
2. Press the right arrow until “SET ACC CODE” is displayed in the message center.
3. Press Enter.
4. The message center displays ACC CODE = 000. Press the up/down arrow until the desired access code is displayed (000 - 999). Press the left/right arrow to select digit 1, 2, 3.

Note The left and right arrow keys are used to move from the first through the third digits within the access code. ▲

5. Press Enter to save the setting
6. Press the Mode key until the Run indicator lights. A 3-digit Access Code can be entered to avoid unauthorized personnel from changing the set points, calibration, or configuration. A setting of 000 bypasses the access code. The factory setting is 000.

RS485 Address

If the freezer is configured for RS485 communications, it must have a unique identification address. This address is set through Configuration mode.

1. Press the Mode key until the Configuration indicator lights.
2. Press the right arrow until RS485ADDR is displayed in the message center.
3. Press Enter. The message center will display 485 ADDR XX.
4. Press up/down arrow to select the appropriate address for the freezer (1 - 24).
5. Press Enter to save.

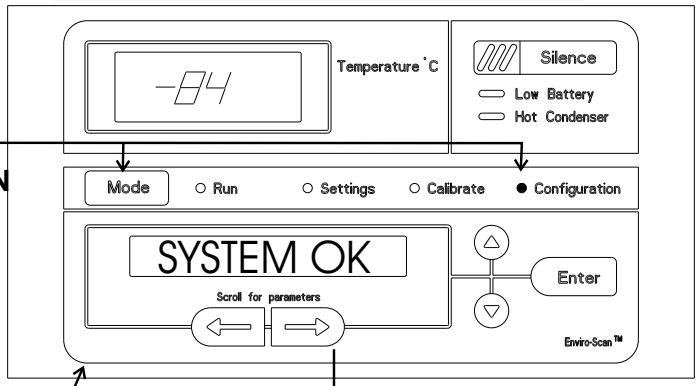
Back-Up System Type

This function, only available on freezers with the optional BUS (back up system), allows the user to select which type of gas is injected into the freezer chamber. The options are CO_2 and LN_2.

1. Press the Mode key until the Configuration indicator lights.
2. Press the right arrow until BUS TYPE CO2 or BUS TYPE LN2 is displayed in the message center.
3. Press up/down arrow to toggle between the two display selections.
4. Press Enter to save.

Chart 3-1

Configuration Mode



Press MODE to light CONFIGURATION indicator

To Configure:

High Alarm Test

Press MODE to move to RUN mode

Mode | **HI ALRM TEST** | Enter

Scroll for Parameters

Press ← to return to previous parameter

Press Enter to initiate test

Low Alarm Test

Mode | **LO ALRM TEST** | Enter

Scroll for Parameters

Press ← to return to previous parameter

Press Enter to initiate test

System Battery Test

Mode | **SYS BAT TEST** | Enter

Scroll for Parameters

Press ← to return to previous parameter

Press Enter to initiate test

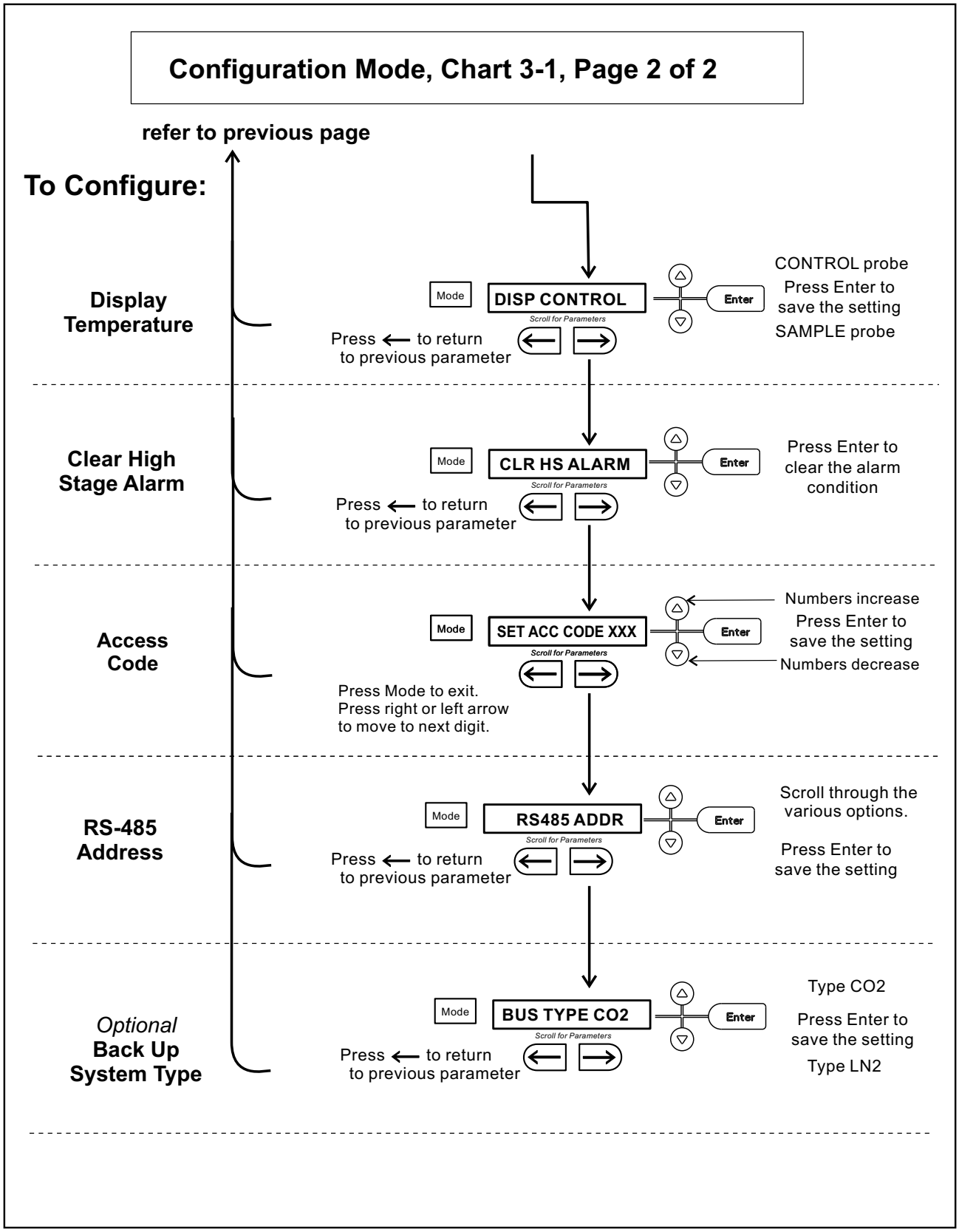
Optional **BUS Battery Test**

Mode | **BUS BAT TEST** | Enter

Scroll for Parameters

Press ← to return to previous parameter

Press Enter to initiate test


Configuration Mode, Chart 3-1, Page 2 of 2
refer to previous page
To Configure:
Display Temperature
Mode
DISP CONTROL
Scroll for Parameters
Enter
CONTROL probe
Press Enter to save the setting
SAMPLE probe
Press ← to return to previous parameter
Clear High Stage Alarm
Mode
CLR HS ALARM
Scroll for Parameters
Enter
Press Enter to clear the alarm condition
Press ← to return to previous parameter
Access Code
Mode
SET ACC CODE XXX
Scroll for Parameters
Enter
Numbers increase
Press Enter to save the setting
Numbers decrease
Press Mode to exit.
Press right or left arrow to move to next digit.
RS-485 Address
Mode
RS485 ADDR
Scroll for Parameters
Enter
Scroll through the various options.
Press Enter to save the setting
Press ← to return to previous parameter
Optional Back Up System Type
Mode
BUS TYPE CO2
Scroll for Parameters
Enter
Type CO2
Press Enter to save the setting
Type LN2
Press ← to return to previous parameter

Section 4 Alarms

Model 8600 Series freezer alarm system is shown in the table below. When an alarm is active, the message appears in the LED message center. Press the Silence key to disable the audible alarm for the ringback period. The visual alarm will continue until the freezer returns to a normal condition. The alarms are momentary alarms only. When an alarm condition occurs and then returns to normal, the freezer automatically clears the alarm condition and the message center.

Table 4-1. Alarms

Description	Message	Delay	Ringback	Relay
No alarm condition exists	SYSTEM OK	----	----	----
Power Failure	POWER FAIL	1 min.	15 min.	Yes
High Temperature Alarm	TEMP IS HIGH	1 min.	15 min.	Yes
Low Temperature Alarm	TEMP IS LOW	1 min.	15 min.	Yes
Door Ajar	DOOR IS OPEN	1 min.	15 min.	No
Low Battery*	LOW BATTERY	1 min.	12 hours	No
Control Probe Failure	PROBE 1 FAIL	1 min.	15 min.	No
Heat Exchanger Probe Failure	PROBE 2 FAIL	1 min.	15 min.	No
Condenser Probe	PROBE 3 FAIL	1 min.	15 min.	No
Sample Probe Failure (optional)	PROBE 4 FAIL	1 min.	15 min.	No
High Stage System Failure	HS SYST FAIL	1 min.	15 min.	No
Condenser Hot Condition	HOT CONDENSR	1 min.	none	No
Wrong Power	WRONG POWER	0 min.	none	No
Voltage Compensation	VCOMPEN FAIL	0 min.	15 min.	No
Micro Board Failure	MICRO FAIL	0 min.	15 min.	No

All alarm delays and ringback times are +30 seconds.

**The automatic battery test runs 12 hours after initial start-up, then every 12 hours thereafter. A user initiated battery test can be performed from the Configuration menu. See Section 3.*

Wrong Power Alarm

If a 230V freezer is connected to a 120V power source or a 120V freezer is connected to a 230V power source, the electronics will detect that an incorrect power source has been connected to the freezer. Under this condition, the fans and compressors will not turn on, and an audible and visual alarm will occur along with the "WRONG POWER" message in the LED message center.

The “WRONG POWER” alarm may also occur if the battery switch is turned to Standby mode (⏻) prior to applying power to the freezer. The audible and visual alarms will remain until the freezer is connected to the correct power source.

High Stage System Failure Alarm

This condition is created when the high stage compressor and fans run for 30 minutes and are not capable of cooling the interstage heat exchanger to the proper temperature. Under this condition, the high stage compressor and fans will turn off (after 30 minutes), and an audible and visual alarm will occur along with the "HS SYST FAIL" message in the LED message center.

Voltage Compensation Alarm

If the freezer is compensating for high or low line voltage, the system will measure the compensated AC voltage. If the voltage is incorrect, the unit will stop attempting to compensate, and the compressors will run on direct line voltage. Under this condition, the message center will display “VCOMPEN FAIL”.

Multiple Alarms

When multiple alarm conditions occur, active messages are displayed in the message center one at a time, updating at 5 second intervals. Pressing Silence during multiple alarms causes all active alarms to be silenced and to ringback in 15 minutes.

Micro Board Failure Alarm

An internal communications failure has occurred with the micro board. During this alarm, the compressor(s) attempt to run continuously. However, with this type of failure, freezer operation becomes undependable.

Lost Communication

Communication between the micro board and the display board has been lost. Under this condition, the visual alarm LED flashes along with dashes (----) in the temperature display. In addition, 'LOST COMM' flashes in the message center. Contact Technical Services.

Probe Failure Alarms

The microprocessor in Model 8600 Series freezers continually scans all probes including the control probe, heat exchanger probe, condenser probe and optional sample probe to ensure that they are operating properly.Should an error be detected, the "PROBE # FAIL" alarm will occur as described in Table 4-1. If an error is detected with the control probe (PROBE 1 FAIL), the high and low stage compressors will run continuously. As a result, the cabinet temperature will decrease until it reaches the lowest temperature that the refrigeration system can maintain. If an error is detected with the heat exchanger probe (PROBE 2 FAIL), the freezer will cycle properly at its temperature set point using a 5 minute step start between the high and low stage compressors. If an error is detected with the condenser probe (PROBE 3 FAIL) or optional sample probe (PROBE 4 FAIL), there is no impact on the performance of the freezer. However, the hot condenser alarm may also occur when the condenser probe fails. Contact the Technical Services Department (1-888-213-1790), or your local distributor.

Section 5 Maintenance

Caution If the unit has been in service, turn it off and disconnect the power cord connector before proceeding with any maintenance. ▲

Clean 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.

Clean Air Filter (minimum 4 x/year*)

1. Open the front lower door by grasping the bottom left corner.
2. Locate the grille on the door. See Figure 1-5. Grasp the middle of the grille material and gently pull out to remove.
3. Wash the filter material using water and a mild detergent.
4. Dry by pressing between two towels.
5. Install the filter back into the grille and attach the grille.

* The clean filter alarm occurs every three months as a reminder to clean the air filter. 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. Order part number 760203.

Clean the Condenser (minimum yearly*)

1. Open the front lower door by grasping the bottom left corner. See Figure 1-5.
2. Using a vacuum cleaner, exercising care to not damage the condenser fins, clean the condenser.

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

Clean 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.

Caution Do not use liquids that are corrosive to stainless steel or the brazing material (copper or nickel). ▲

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.

Defrost 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 off the battery switch (O). See Figure 5-8.
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. Turn the battery power switch to Standby mode (⏻).
10. Allow the freezer to operate empty overnight before reloading product.

Clean the Door Gasket (minimum monthly*)

Using a soft cloth, remove any frost build-up from the gasket and door(s). The Clean Gasket alarm occurs every three months as a reminder to remove frost build-up from the gasket and door(s). Press the Silence key to disable the audible alarm.

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

Vacuum Relief Port

The exterior door gasket provides an excellent seal that protects product, provides an energy efficient thermal barrier to keep cold air in and room temperature air out and reduces frost buildup on the inner doors.

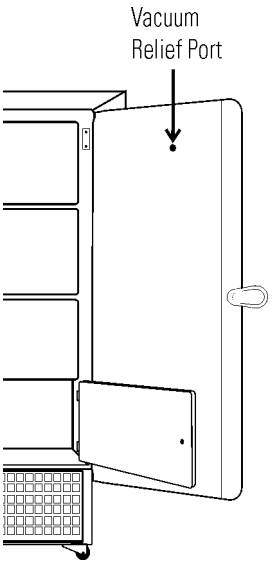


Figure 5-4. Location

Because the door gasket seals so well, a vacuum can be created after a door opening. Warm air enters the cabinet, cools and contracts, creating a vacuum that pulls the door in tightly against the seal.

To equalize the pressure inside the cabinet after a door opening requires 1.5-3.0 cu.ft. of ambient air to be drawn into the cabinet. The amount of air required to equalize the pressure varies depending on the cabinet size, cabinet temperature, duration of door opening, inventory volume and the temperature/humidity of the ambient air. The unit is designed with a "vacuum relief port" that allows the pressure to be equalized.

The time required to draw 1.5-3.0 cu.ft. of air into the cabinet depends on two factors:

a) the size and number of paths available for air to enter the cabinet, and
b) pressure difference between the internal cabinet and room ambient.

Cabinets with the vacuum relief port operating normally, (i.e. vacuum relief port not iced over) requires a minimum of 30 seconds up to a maximim of 120 seconds for the cabinet to equalize. This is also a good indication that the exterior door is well sealed.

The vacuum relief port requires routine maintenance. It will ice over unless preventive measures are taken. If the vacuum relief port becomes iced over, the freezer will take several hours to equalize pressure.

Caution Do not leave the freezer unattended with door unlatched. The vacuum could release, resulting in a door opening and product loss. ▲

Vacuum Relief Port (continued)

Observe the inner side of port periodically for frost and ice build-up. Remove any frost with a soft dry cloth. If the tube should become clogged with ice, it must be cleaned. Clear the vacuum relief tube completely free of ice to prevent rapid ice formation.

Factors that can affect the performance of the vacuum relief port include high ambient temperature, high humidity conditions and frequent door openings. Perform maintenance weekly, or as needed.

Note Failure to maintain the vacuum relief port may result in excessive ice build-up inside the tube, clogging the port, and inability to open the door. The vacuum relief port may need to be cleaned more often with frequent door openings and high humidity environments. ▲

Replace the Battery(s)

1. To gain access to the battery, open the lower door by grasping the bottom left corner. The battery is rectangular in shape, located on the front left corner of the compressor compartment and is secured in place by a mounting bracket with three bolts. See Figure 5-2.
2. Directly above the battery(s) is the battery power switch. Turn the battery power switch to the Off position.
3. Disconnect the battery connections.
4. Remove the tape securing the battery.
5. Remove the old battery and install the new battery.
6. Reconnect the battery (red to positive and black to negative).
7. Turn the battery power switch to Standby mode (⏻).
8. Close lower panel door.

Caution The % of charge can vary depending on the age, usage and condition of the battery. For a consistent and dependable charge, replace the battery every 2 years. Replacement batteries must be rechargeable and are available from Thermo. 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. ▲

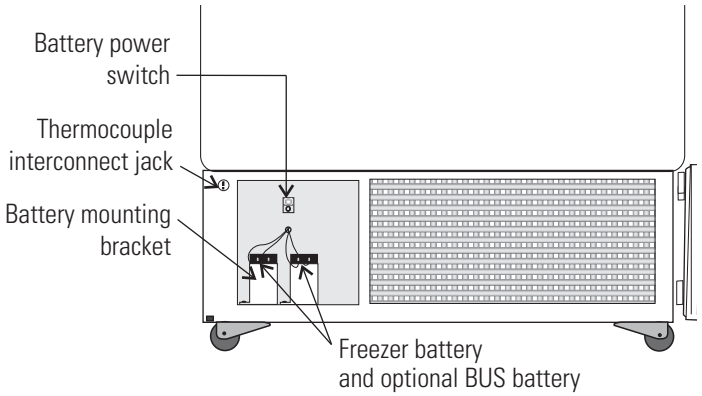


Figure 5-2. Battery Location

Prepare the Unit for Storage

Defrost the unit as described previously. This will prepare the unit for storage. Turn off the battery power switch. Turn off the freezer power switch. Disconnect power to the battery(s) and to the freezer.

PREVENTIVE MAINTENANCE
Freezers

Your 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.

We have 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 set point 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.
- Always make certain the vacuum relief port is free of frost and ice, to allow for timely re-entry into the freezer after a door opening.

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

Preventive Maintenance for Model 8600 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 for probe location 5	Check and clean probe cover, vacuum relief port, gaskets, hinges, and inner doors of ice and snow	☑ *More frequent cleaning may be required, depending on use and environmental conditions*		
5	Check air filter. Clean or replace as needed	☑		
1, 3	Check alarm back-up battery	☑		** Replace
--	Check condenser fan motor for unusual motor noise or vibration		☑	
2	* Verify and document calibration, at the minimum, annually		☑	
5	* Clean condenser compartment and wipe off condenser		☑	

* Qualified service technicians only
** Dispose of properly, according to all state and federal regulations

To minimize ice build-up inside of freezer:
- Locate the freezer away from drafts or heating/cooling vents
- Keep the number of door openings to a minimum
- Minimize the length of time door is open
- Make sure door latches securely after opening

Section 6 Factory Installed Options

Details for the factory installed options available, or already installed, are listed below.

BUS-Back-Up System (P/N 195875 & 195877)

Caution Before installation of BUS components, make sure the power to the freezer is disconnected, the battery switch is turned off (O) and the freezer has warmed to ambient temperature. ▲

The built-in BUS (back up system) will keep the freezer chamber temperature below the critical level in the event of a power or equipment failure. If power to the freezer fails, or temperature increases to the back up alarm set point, the BUS injects liquefied gas into the chamber to keep the chamber temperature within the specified range.

The BUS operates on an internal 12-volt, rechargeable battery which is kept charged during normal operation by the integral battery charger.

Install Injection Assembly, Vent Stack and Solenoid

1. Install the injection assembly through the 1/2" pre-punched hole, directly behind the 2" vent stack hole in the center of the chamber ceiling. Note: Cover the open end of injection assembly with tape to keep insulation from entering the nipple.
2. Slide 3/8" flatwasher over open end of nipple.
3. Insert the covered end of the injection assembly through the exterior hole.
4. Remove the tape covering from the end of the nipple and install the 1/8" NPT brass tee on the open end of the nipple. Place permagum sealant between the brass tee and the interior top.
5. Remove the two Phillips head screws securing the metal bracket on the vent stack assembly.

Injection Assembly, Vent Stack and Solenoid (cont.)

6. Install the vent stack through the opening and secure it to the top of the freezer, using screws.

7. Go to the interior and seal around the end of the vent stack with Permagum.

8. Install the transfer hose connecting one end to the injection assembly, the other end to the solenoid valve. Install the solenoid valve to the supply source. The solenoid mounting bracket is not required and may be discarded.

Caution When selecting a CO_2 supply cylinder, it must be equipped with a siphon tube. ▲

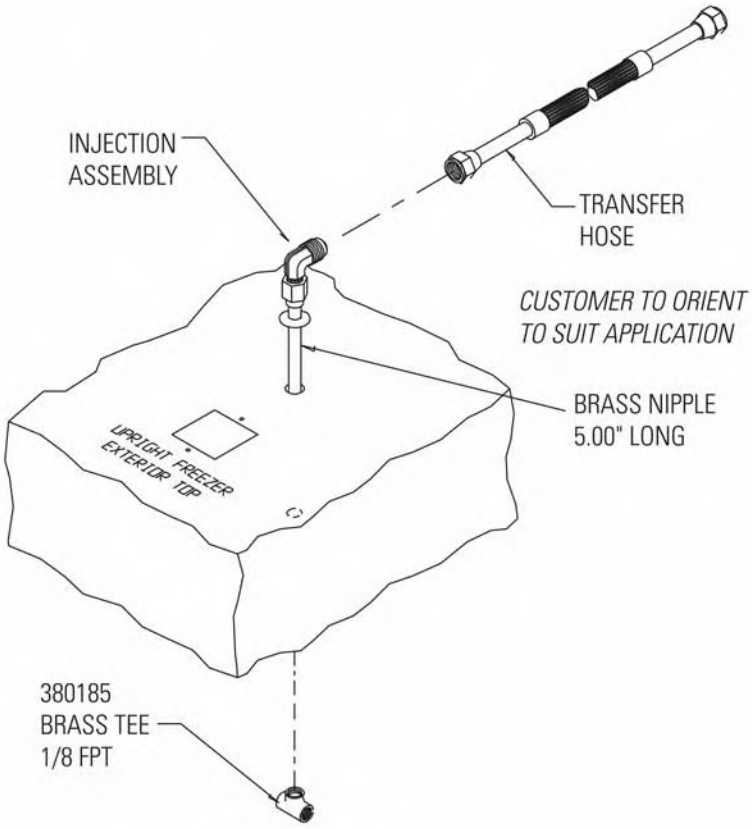


Figure 6-1. Injection Assembly

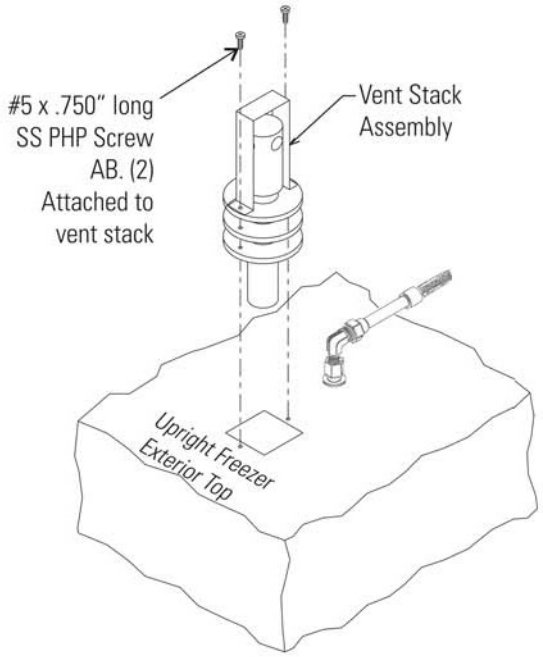


Figure 6-2. Vent Stack

Install the Temperature Probe

1. Locate the 0.500” pre-punched hole in the upper left hand back corner of the chamber ceiling. Remove the tie wrap securing the coiled probe/solenoid harness. Uncoil the probe lead and run the probe tip (approximately 12”) down through 0.500” porthole (Figure 6-4).

2. As shown in Figure 6-3, thread the small tie wrap through the openings in the front of the bracket. Secure the probe on the back of the bracket with the tie wrap.

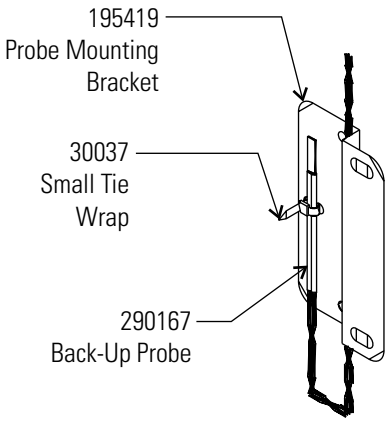


Figure 6-3. Secure Probe

3. Tap #8-32 the two pre-punched holes located on the interior left wall of the freezer. Mount the bracket. Figure 6-4 shows the back-up probe mounted on the interior left side wall of the freezer.

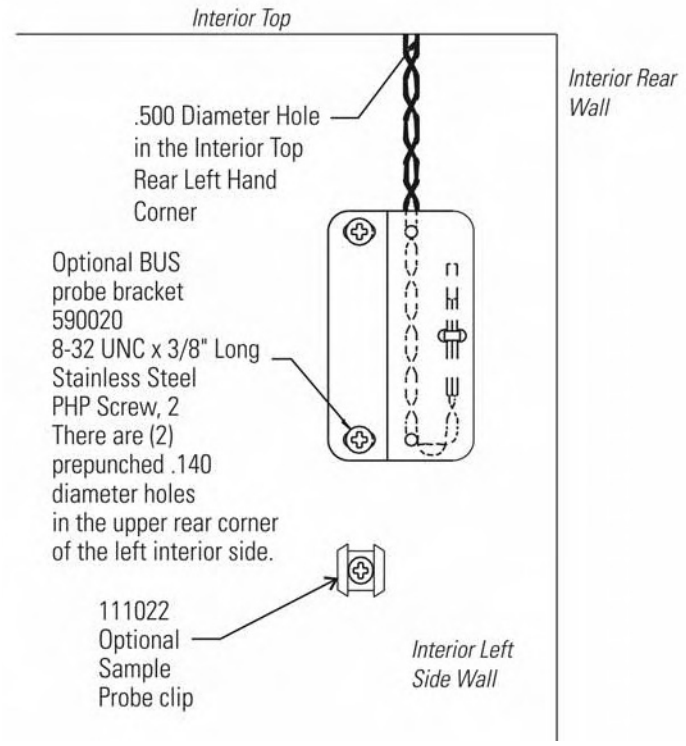


Figure 6-4. Mounted

Connect the Probe/Solenoid Harness

1. Remove the four screws on the freezer back panel and use them to mount the tie wrap anchors as shown in Figure 6-5. Secure the probe wire with tie wraps.
2. Plug the solenoid/probe connector into the BUS connection and secure with a screw on the right and left side. The connector is keyed.
3. Loosen the terminal screws on the solenoid. Slide the spade lug connectors under the screws and tighten to secure.

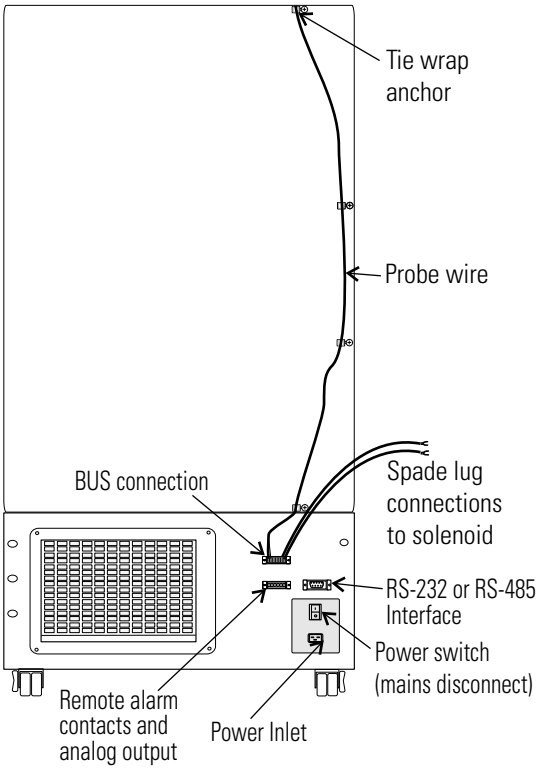


Figure 6-5. Routing

4. Connect power to the freezer. Turn the freezer On, with battery switch Off.
   a. The Solenoid Engaged light on the BUS control panel will illuminate (no injection occurs). This light stays on until the unit is below BUS setpoint.
   b. The Low Battery indicator may also illuminate.
5. Turn the battery switch to Standby mode (⏻) to charge both batteries.

BUS Control Panel

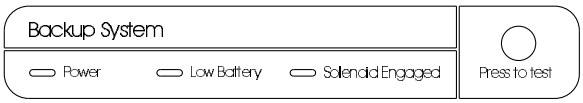


Figure 6-6. BUS Control Panel

Warning When activated, this unit injects liquid nitrogen or carbon dioxide. Liquid nitrogen can cause serious freezing (frostbite) if it comes in contact with unprotected skin or eyes. Nitrogen suppresses oxygen levels and may cause suffocation if area is not well ventilated. Refer to Appendix A for the proper handling of liquid LN_2. ▲

Caution Make sure the pressure relief valve on any LN_2 tank is adjusted to 30 PSI maximum blow-off. ▲

Warning Carbon dioxide gas suppresses oxygen levels and may cause suffocation if area is not well ventilated. Refer to Appendix B for the proper handling of liquid CO_2. ▲

Power - indicates the unit has AC power.

Low Battery - battery charge is low. The battery needs replaced or recharged.

Solenoid Engaged - BUS has opened the solenoid so it can inject gas (CO_2 or LN_2).

Press-To-Test - Activates the solenoid and injects LN2 or CO2 into the freezer chamber as long as the button is depressed. The solenoid engaged indicator should light. If the Low Battery indicator lights during the test, replace the BUS battery.

Note Solenoid will not engage if door is open. ▲

Set the Optional BUS Set Point

The optional back up system is designed to inject CO_2 or LN_2 into the freezer compartment if the temperature rises above back up system set point. To set the BUS set point:

1. Press the Mode key until the Settings indicator lights.
2. Press the right arrow until "BACKUP = -XX" is displayed in the message center.
3. Press the up or down arrow key until the desired BUS set point is displayed.
4. Press Enter to save the setting.
5. Press the Mode key until the Run indicator lights or press the right or left arrow to go to the next or previous parameter.

If no control keys are pressed, the freezer will automatically return to RUN mode after 5 minutes.

Caution Changing the operating temperature set point can affect the BUS set point. The BUS set point will self-adjust to maintain a temperature of at least 10°C above the operating temperature set point. ▲

Caution The BUS set point cannot be set colder than the high temperature alarm set point. (See Section 1.) If the back-up system is installed with CO_2, then -65°C is the coldest BUS set point that can be used (if cabinet set point is -75°C or colder). ▲

Test the BUS

After the freezer has stabilized and both batteries are fully charged, the BUS can be tested to verify proper operation.

1. Disconnect the AC power tot he freezer by turning power switch off.
2. As the freezer warms up, verify the BUS injects at the desired temperature. Displayed temperature may vary by a few degrees from inject temperature due to the differences in probe locations.

Clean the Vent Stack

Routinely check the vent stack for frost or ice build-up. The type of frost that forms in the vent stack is generally very soft and may be easily removed with a bristle brush or soft cloth. If ice build-up has occurred, a complete defrost may occasionally be required. See Section 5 for freezer defrost instructions.

Disconnect the Fitting Assembly & Transfer Hose

To disconnect the freezer back-up from the gas supply:

1. Close the supply valve.
2. Depress the test button on the back-up system control box to remove the gas from the line.
3. Slowly disconnect the fitting assembly from the supply (in the event that any gas remains in the line).

Chart Recorder

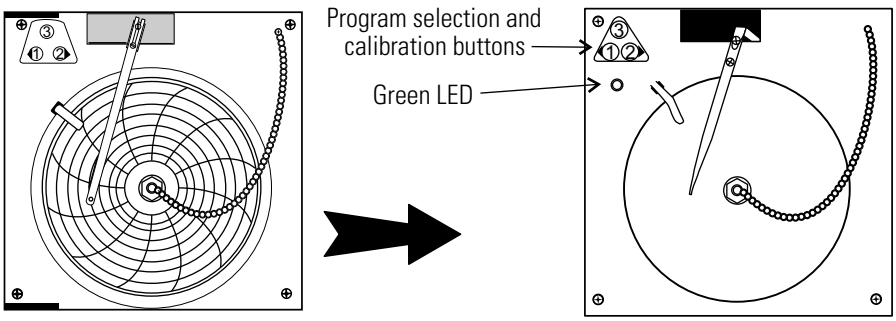


Figure 6-7. Recorder Buttons Location

Install 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 6-8. Buttons

Change Recorder Temperature 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.

Program	From	To
1	-40	30°C
2	0	60°C
3	-100	38°C
4	-5	50°C
5	0	100°C
6	-100	200°C
7	-115	50°C
8	-10	70°C

Calibrate 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. Refer to exploded parts drawings. ▲

Datalogger

Dataloggers and ELPRO evaluation software provide monitoring and documentation of temperature and alarm conditions. The dataloggers have a memory capacity of 64,000 measured values or data points. Temperature is measured, stored and displayed. Alarm conditions are recorded. Optional evaluation software permits data to be downloaded to a PC. A variety of statistical information is provided through calculations, analysis, graphs and printed reports. Refer to the ELPRO documentation for operating instructions for the datalogger.

Water-cooled Condenser

The water-cooled condenser (P/N 195964 [13cf], 195965 [17, 23, 28 cf], 195967 [12, 17, 20 cf chests]) is a factory installed option and requires a qualified technician at freezer installation. The installation should include proper adjustment of the regulating valve, which controls the discharge pressure. Specifications for this option are displayed in Table 6-1.

Table 6-1. Specifications

Water Source	**Tower**	**City**
Water Pressure	Not to exceed 150 psig	
Water Temperature Range	Not to exceed 29.4C (85F)	
Inlet Connection	0.5" compression	
Outlet Connection	0.5" compression	
Flow Rate Required	3.0 gallons (11.4 liters) per minute	1.0 gallon (3.8 liters) per minute
Drain Required	No (return line is required)	Yes

Five Inner Door Option

The five inner door option (P/N 189405 [13cf], 189406 [17cf], 189407 [23cf] & 195652 [28cf]) is factory installed. The freezer is converted to accommodate four adjustable specimen shelves with the fifth "shelf" as the bottom of the freezer chamber.

Section 7 Specifications

Model	8602	8603	8604	8605	8606
Temperature Range	-50°C (-58°F) to -86°C (-123°F) in an 18C to 32C* (64.4F to 89.6F) ambient				
Exterior Dimensions	33.3"W x 77.8"H x 31.0" 84.6 x 197.6 x 78.7 cm	33.3"W x 77.8"H x 31.0" 84.6 x 197.6 x 78.7 cm	33.3"W x 77.8"H x 37.0" 84.6 x 197.6 x 94.0 cm	33.3"W x 77.8"H x 37.0" 84.6 x 197.6 x 94.0 cm	40.8"W x 77.8"H x 37.0" 103.6 x 197.6 x 94.0 cm
Interior Dimensions	23.0"W x 51.5"H x 19.3" 58.4 x 130.8 x 49.0 cm	23.0"W x 51.5"H x 19.3" 58.4 x 130.8 x 49.0 cm	23.0"W x 51.5"H x 25.3" 58.4 x 130.8 x 64.3 cm	23.0"W x 51.5"H x 25.3" 58.4 x 130.8 x 64.3 cm	30.6"W x 51.5"H x 25.3" 77.7 x 130.8 x 64.3 cm
Capacity	13.0 cu. ft. (368.1 liters)	13.0 cu. ft. (368.1 liters)	17.3 cu. ft. (489.9 liters)	17.3 cu. ft. (489.9 liters)	23.0 cu. ft. (651.3 liters
Refrigeration	Two 1 HP (2545 BTUH each)				
Insulation	Non-CFC, foamed-in-place urethane: 5.0" (12.7 cm) cabinet; 4.5" (11.4 cm) door				
Electrical	230V, 50/60Hz, 12.0 FLA Operating Range: 208VAC-240VAC	120V, 60 Hz, 16.0 FLA Operating Range: 108-130V	120V, 60 Hz, 16.0 FLA Operating Range: 108-130V	230V, 50/60Hz, 12.0 FLA Operating Range: 208VAC-240VAC	230V, 50/60Hz, 12.0 FLA Operating Range: 208VAC-240VAC
Breaker Requirements	15 amp, 230V, Dedicated Circuit, 15 Amp Time Delay Breaker	20 amp, 120V, Dedicated Circuit, 20 amp Time Delay Breaker	20 amp, 120V, Dedicated Circuit, 20 amp Time Delay Breaker	15 amp, 230V, Dedicated Circuit, 15 Amp Time Delay Breaker	15 amp, 230V, Dedicated Circuit, 15 Amp Time Delay Breaker
Shipping Weight Motor	712 lbs. (323.0 kg)	712 lbs. (323.0 kg)	795 lbs. (360.6 kg)	795 lbs. (360.6 kg)	900 lbs. (408.2 kg)

***** *Compressors may not cycle off with cabinet running at -86C in a 32C ambient.*

Model	8607	8656	8690	8691	8692
Temperature Range	-50°C (-58°F) to -86°C (-123°F) in an 18C to 32C* (64.4F to 89.6F) ambient				
Exterior Dimensions	46.8"W x 77.8"H x 37.0" 118.9x197.6x94.0cm	40.8"W x 77.8"H x 37.0" 103.6x197.6x94.0cm	40.8"W x 77.8"H x 37.0" 103.6 x 197.6 x 94.0 cm	33.3"W x 77.8"H x 31.0" 84.6 x 197.6 x 78.7 cm	33.3"W x 77.8"H x 31.0" 84.6 x 197.6 x 78.7 cm
Interior Dimensions	36.6"W x 51.5"H x 27.0" 93.0x130.8x68.6cm	30.6"W x 51.5"H x 25.3" 77.7x130.8x64.3cm	30.6"W x 51.5"H x 25.3" 77.7 x 130.8 x 64.3 cm	23.0"W x 51.5"H x 19.3" 58.4 x 130.8 x 49.0 cm	23.0"W x 51.5"H x 19.3" 58.4 x 130.8 x 49.0 cm
Capacity	28.0 cu. ft. (792.8 liters)	23.0 cu. ft. (651.3 liters	23.0 cu. ft. (651.3 liters	13.0 cu. ft. (368.1 liters)	13.0 cu. ft. (368.1 liters)
Refrigeration	Two 1 HP (2545 BTUH each)				
Insulation	Non-CFC, foamed-in-place urethane: 5.0" (12.7 cm) cabinet; 4.5" (11.4 cm) door				
Electrical	230V,50/60Hz, 12.0FLA Operating Range: 208VAC-240VAC	120V, 60 Hz, 16.0 FLA Operating Range: 108-130V	120V, 60 Hz, 16.0 FLA Operating Range: 108-130V	230V,50/60Hz, 12.0FLA Operating Range: 208VAC-240VAC	120V, 60 Hz, 16.0 FLA Operating Range: 108-130V
Breaker Requirements	15 amp, 230V, Dedicated Circuit, 15 Amp Time Delay Breaker	20 amp, 120V, Dedicated Circuit, 20 amp Time Delay Breaker	20 amp, 120V, Dedicated Circuit, 20 amp Time Delay Breaker	15 amp, 230V, Dedicated Circuit, 15 Amp Time Delay Breaker	20 amp, 120V, Dedicated Circuit, 20 amp Time Delay Breaker
Shipping Weight Motor	980 lbs. (444.5 kg)	900 lbs. (408.2 kg)	900 lbs. (408.2 kg)	712 lbs. (323.0 kg)	712 lbs. (323.0 kg)

Model	8693	8694	8695
Temperature Range	-50°C (-58°F) to -86°C (-123°F) in an 18C to 32C* (64.4F to 89.6F) ambient		
Exterior Dimensions	33.3"W x 77.8"H x 37.0" 84.6 x 197.6 x 94.0 cm	33.3"W x 77.8"H x 37.0" 84.6 x 197.6 x 94.0 cm	40.8"W x 77.8"H x 37.0" 103.6 x 197.6 x 94.0 cm
Interior Dimensions	23.0"W x 51.5"H x 25.3" 58.4 x 130.8 x 64.3 cm	23.0"W x 51.5"H x 25.3" 58.4 x 130.8 x 64.3 cm	30.6"W x 51.5"H x 25.3" 77.7 x 130.8 x 64.3 cm
Capacity	17.3 cu. ft. (489.9 liters)	17.3 cu. ft. (489.9 liters)	23.0 cu. ft. (651.3 liters
Refrigeration	Two 1 HP (2545 BTUH each)		
Insulation	Non-CFC, foamed-in-place urethane: 5.0" (12.7 cm) cabinet; 4.5" (11.4 cm) door		
Electrical	120V, 60 Hz, 16.0 FLA Operating Range: 108-130VAC	230V, 50/60Hz, 12.0FLA Operating Range: 208VAC-240VAC	230V, 50/60Hz, 12.0FLA Operating Range: 208VAC-240VAC
Breaker Requirements	20 amp, 120V, Dedicated Circuit, 20 amp Time Delay Breaker	15 amp, 230V, Dedicated Circuit, 15 Amp Time Delay Breaker	15 amp, 230V, Dedicated Circuit, 15 Amp Time Delay Breaker
Shipping Weight Motor	795 lbs. (360.6 kg)	795 lbs. (360.6 kg)	900 lbs. (408.2 kg)

***** *Compressors may not cycle off with cabinet running at -86C in a 32C ambient.*

Certifications

Declaration of Conformity is available from the factory

Safety Specifications

Indoor Use Only

Altitude - up to 2,000 meters

Temperature - 5°C to 43°C

Humidity - maximum RH 80% for temperatures up to 31°C, decreasing linearly to 50% RH at 40°C

Mains Supply Fluctuations - Mains supply voltage fluctuations not to exceed ±10% of the nominal voltage

Installation Category II [1]

Pollution Degree 2 [2]

Class of Equipment I

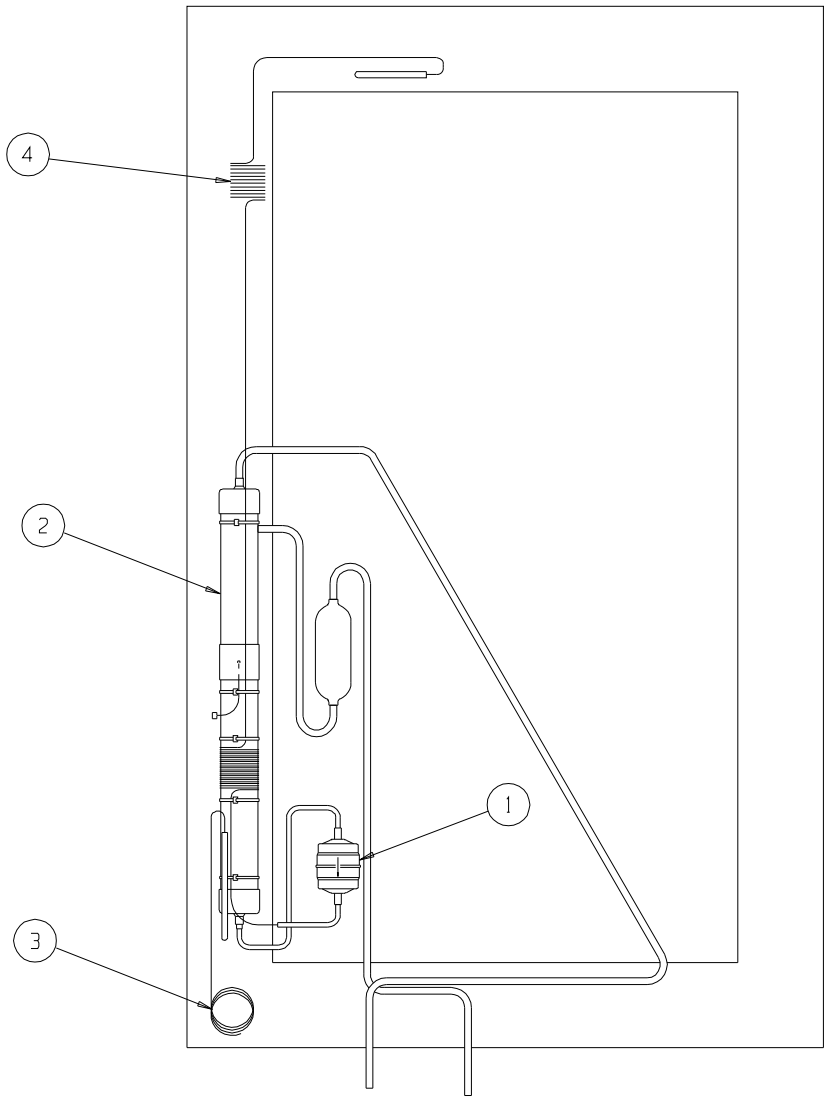
---

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.

REV	ECN NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
0	N/A	12-04-02	PDK	PDK	LDN	RELEASED FOR PRODUCTION
1	FR-1943	06-13-07	CRM	KDG	LDN	CHG. 211039/41 HEAT EXCHG. TO 211050
2	FR-2055	07-29-09	NWM	KDG	CCS	CHANGED 209016 DRYER TO 209017

BILL OF MATERIALS		
ITEM NO.	PART NO.	PART DESCRIPTION
1	209017	DRYER
2	211050	HEAT EXCHANGER
3	227927	HIGH STAGE CAP. TUBE
4	227928	LOW STAGE CAP. TUBE



ThermoFisher SCIENTIFIC

BOX 649, MARIETTA, OHIO 45750

MODEL/PART NAME: 8600 UP-RIGHT FREEZER

DWG TITLE: HEAT EXCHANGER ASSEMBLY

DWN: PDK	CAD: PDK	APPD: LDN	DATE: 12-04-02	SCALE: NTS

MATERIAL: N/A

PAINT COLOR: N/A

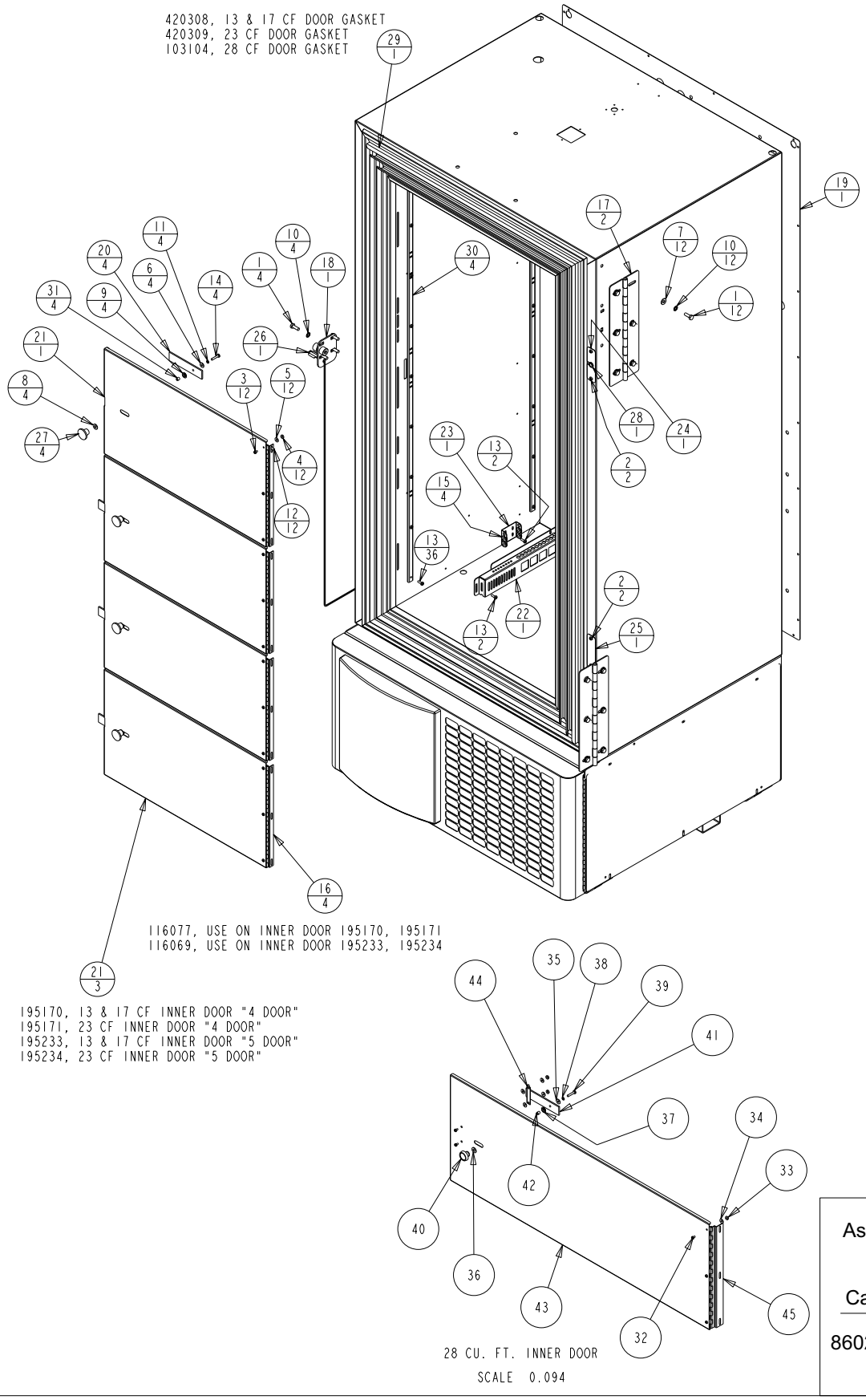
TOLERANCE UNLESS OTHERWISE SPECIFIED
ANGLES: DECIMAL: .XX=± .XXX=±

DRAWING NUMBER: 8602-205-1

SIZE: B

Exploded Drawing for Upright Freezer Heat Exchanger Assy

8602-205-1-D REV.1
Page 1 of 1



Assembly Drawing
Model:
8600 Series
Cabinet Assembly

8602-200-1-B Rev. 4
Page 1 of 2

BILL OF MATERIALS

ITEM NO.	PART NO.	PART DESCRIPTION
1	20003	1/4-20 X 3/4 SS HH CAP SCREW
2	22053	#8-32 X 1/2 SS PHP SCREW
3	22115	#6-32 X 1/4 SS PHP SCREW
4	23009	#6-32 SS HEX NUT
5	23020	#6 SS FLAT WASHER
6	23021	#8 SS FLAT WASHER
7	23023	1/4 SS FLAT WASHER
8	23043	NYLON FLAT WASHER
9	23044	1/4" NYLON SHOULDER WASHER
10	23062	1/4 SS EXT TOOTH LOCKWASHER
11	23080	#8 SS SPRING LOCKWASHER
12	24032	#8-32 X 3/8 SS PHP SCREW F POINT
13	24042	#8-32 X 1/2 SS PHP SCREW F POINT
14	59008	#8-32 X 7/8 SS PHP SCREW
15	114020	5/8" X 1/2" ID GROMMET
16	116077	FRONT PANEL HINGE
17	116092	EXTERIOR FREEZER DOOR HINGE
18	121069	FREEZER CAM LATCH STRIKE
19	189921	EXTERIOR BACK 13 & 17
20	195169	LATCH TAB
21	195170	13/17 CU. FT. INNER DOOR
22	195866	PROBE GUARD
23	195867	PROBE MOUNT
24	195874	CABINET CABLE COVER PLATE
25	195879	CABINET CABLE BLANK COVER PLATE
26	195900	SINGLE DOOR SWITCH ASSY.
27	285658	BLACK PLASTIC KNOB
28	330010	1/2" SPLIT SNAP BUSHING
29	420308	13 & 17 CU. FT. SINGLE DOOR FRAME GASKET
30	500177	PILSATER STRIPS
31	515083	1/4 DIA. X 1/4L SS SPACER
32	22115	#6-32 X 1/4 SS PHP SCREW
33	23009	#6-32 SS HEX NUT
34	23020	#6 SS FLAT WASHER
35	23021	#8 SS FLAT WASHER
36	23043	NYLON FLAT WASHER
37	23044	1/4" NYLON SHOULDER WASHER
38	23080	#8 SS SPRING LOCKWASHER
39	59008	#8-32 X 7/8 SS PHP SCREW
40	120400	BLACK PLASTIC KNOB
41	195169	LATCH TAB
42	515083	1/4 DIA. X 1/4L SS SPACER
43	1950217	28 CU. FT. INNER DOOR
44	1950218	28 CU. FT. INNER DOOR LATCH GUIDE
45	116090	FRONT PANEL HINGE

REV	ECN NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
2	FR-1698	09-19-03	JDL	PDK	LDN	ADDED SCREW TO VACUUM RELIEF PORT
3	FR-1789	06-02-05	DHG	DHG	LDN	REMOVED VRP IN TOP OF CABINET, DMHVRP
4	FR-2055	05-15-09	GJG	SAG	CCS	CHANGED 28 CU. FT. INNER DOOR

ThermoFisher SCIENTIFIC

BOX 649, MARIETTA, OHIO 45750

MODEL/PART NAME: 8600 UP-RIGHT FREEZER

DWG TITLE: 8602 UP-RIGHT FREEZER ASSEMBLY

DWN: PDK	CAD: PDK	APPD:MAH	DATE: 10-30-02	SCALE: 0.094

MATERIAL: N/A

PAINT: N/A

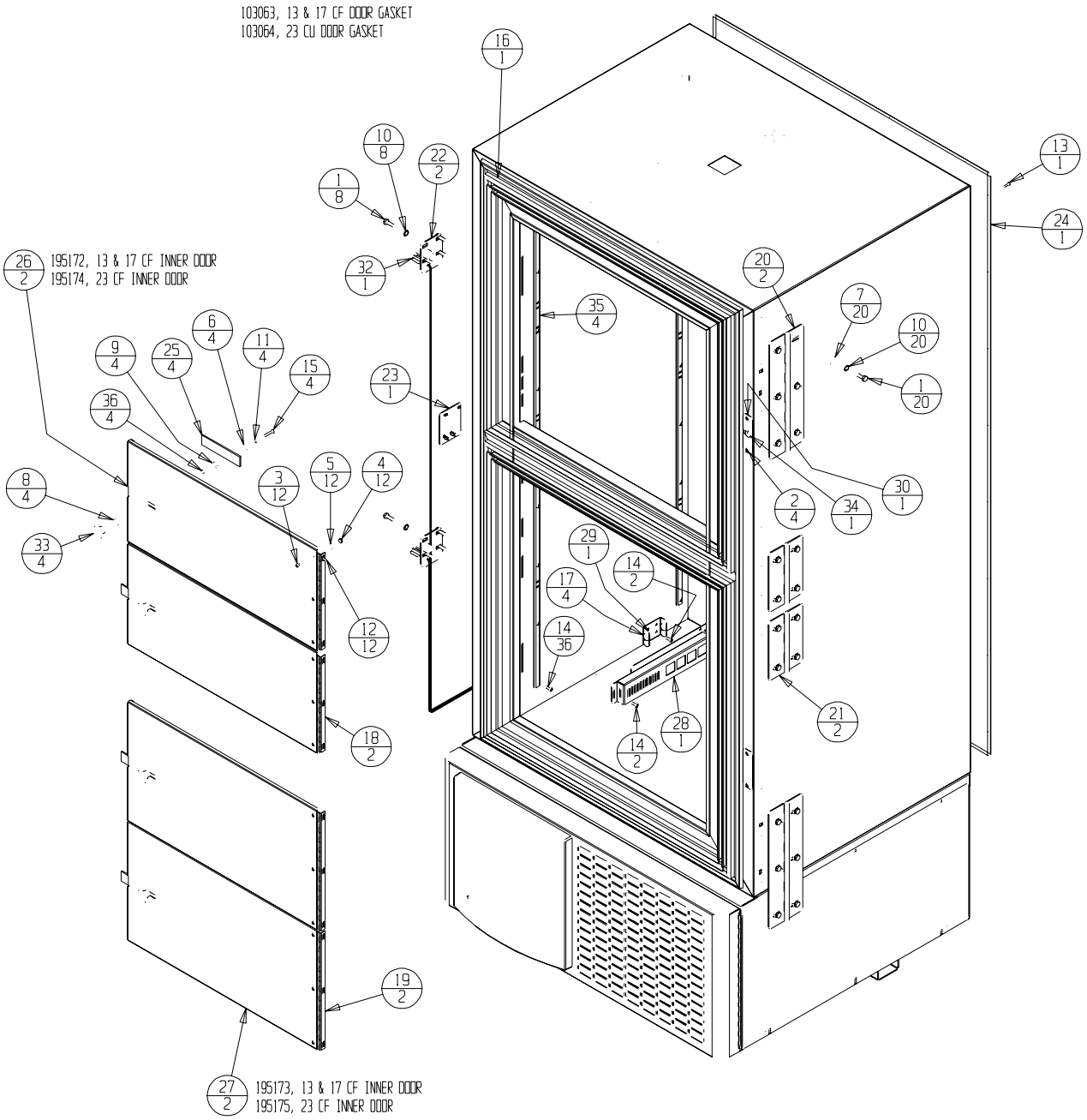
TOLERANCE UNLESS OTHERWISE SPECIFIED
ANGLES: DECIMAL: .XX=±
.xxx=±

DRAWING NUMBER: 8602-200-1

SIZE: B

Assembly Drawing
Model:
8600 Series
Cabinet Assembly

8602-200-1-B Rev. 4
Page 2 of 2



Upright Freezer
Cabinet
Assembly
Double Door

8602-200-2-D REV.4
Page 1 of 2

REV	ECN NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
2	FR-1698	09-19-03	JDL	PDK	LON	ADDED SCREW TO VACUUM RELIEF PORT
3	FR-1789	06-02-05	DHG	DHG	LON	REMOVED VRP IN TOP OF CABINET, DMHVRP
4	SI-9595	05-15-06	DHG	KDG	CCS	CHG. TO COMMON SWITCH ASSY 195900

BILL OF MATERIALS

ITEM NO.	PART NO.	PART DESCRIPTION
1	20003	1/4-20 X 3/4 SS HH CAP SCREW
2	22053	#8-32 X 1/2 SS PHP SCREW
3	22115	#6-32 X 1/4 SS PHP SCREW
4	23009	#6-32 SS HEX NUT
5	23020	#6 SS FLAT WASHER
6	23021	#8 SS FLAT WASHER
7	23023	1/4 SS FLAT WASHER
8	23043	NYLON FLAT WASHER
9	23044	1/4" NYLON SHOULDER WASHER
10	23062	1/4 SS EXT TOOTH LOCKWASHER
11	23080	#8 SS SPRING LOCKWASHER
12	24032	#8-32 X 3/8 SS PHP SCREW F POINT
13	24041	#6-32 X 1/2 SS PHP SCREW F POINT
14	24042	#8-32 X 1/2 SS PHP SCREW F POINT
15	59008	#8-32 X 7/8 SS PHP SCREW
16	103063	DOUBLE DOOR FRAME GASKET
17	114020	5/8" X 1/2" ID GROMMET
18	116069	FRONT PANEL HINGE
19	116077	FRONT PANEL HINGE
20	116092	EXTERIOR FREEZER DOOR HINGE
21	116093	EXTERIOR FREEZER DOOR HINGE
22	121069	FREEZER CAM LATCH STRIKE
23	180312	CAM LATCH STRIKE COVER
24	189921	EXTERIOR BACK 13 & 17
25	195169	LATCH TAB
26	195172	13/17 CU. FT. INNER DOOR, TOP
27	195173	23 CU. FT. INNER DOOR, TOP
28	195866	PROBE GUARD
29	195867	PROBE MOUNT
30	195874	CABINET CABLE COVER PLATE
31	195879	CABINET CABLE BLANK COVER PLATE
32	195900	TOP DOOR SWITCH ASSY.
33	285658	BLACK PLASTIC KNOB
34	330010	1/2" SPLIT SNAP BUSHING
35	500177	PILSATER STRIPS
36	515083	1/4 DIA. X 1/4L SS SPACER

MODEL/PART NAME: 8600 UP-RIGHT FREEZER

DWG TITLE: 8691 UP-RIGHT FREEZER ASSEMBLY

DWN: PDK	CAD: PDK	APPD: MAH	DATE: 10-30-02	SCALE: 0.094

MATERIAL: N/A

PAINT: N/A

TOLERANCE UNLESS OTHERWISE SPECIFIED
ANGLES: DECIMAL: .XX=±
.xxx=±

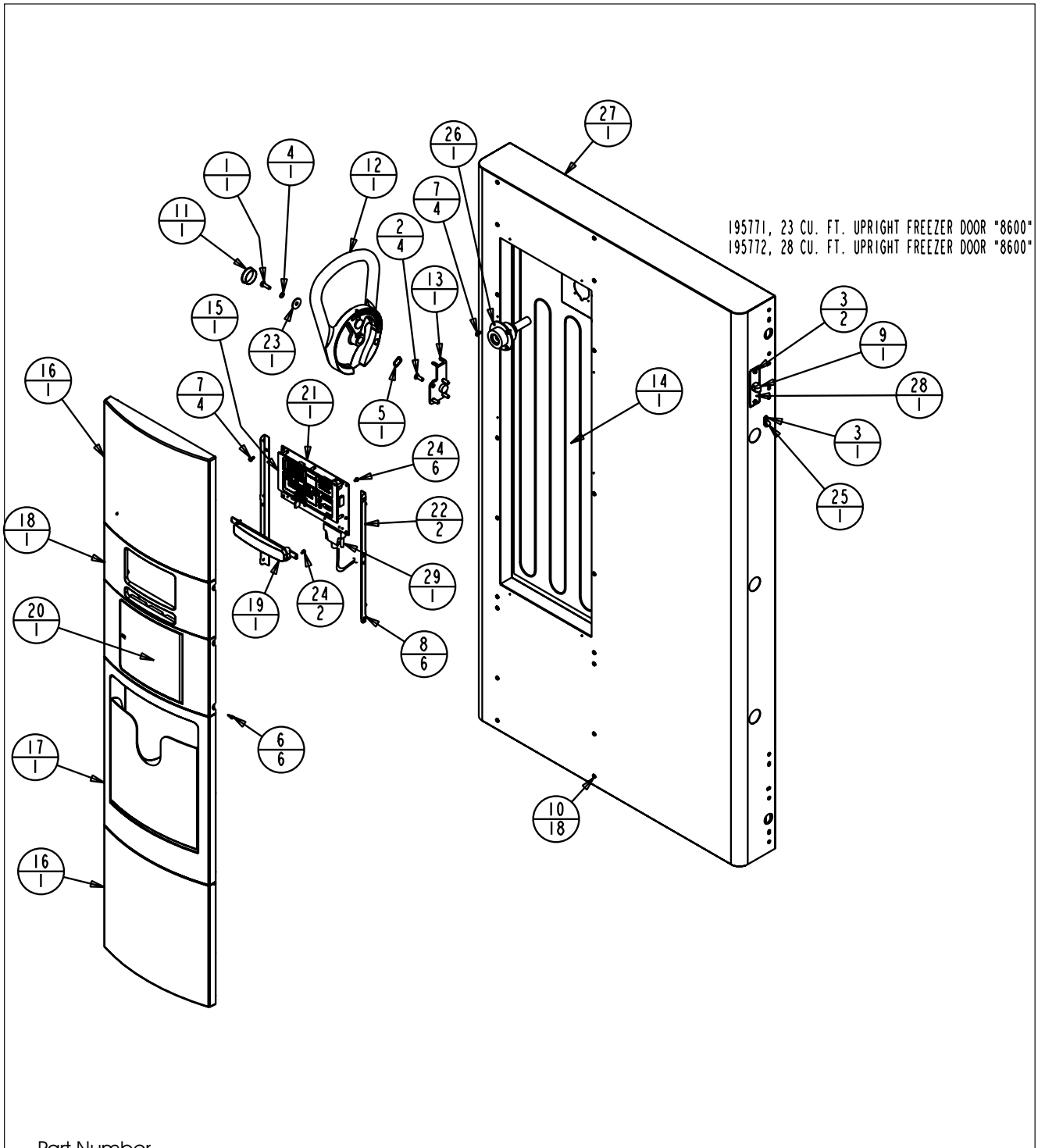
DRAWING NUMBER 8602-200-2

SIZE B

Upright Freezer Cabinet Assembly Double Door

8602-200-2-D REV.4
Page 2 of 2

Thermo
ELECTRON CORPORATION
Controlled Environment Equipment
Box 649, Marietta, Oh 45750



Part Number

1/3

Quantity

Upright Freezer
Door
Assembly
Single Door

8602-201-1-B Rev. 3
Page 1 of 2

REV	ECN NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
0	N/A	10-30-02	PDK	PDK	MAH	RELEASED FOR PRODUCTION
1	FR-1673	06-06-03	DHG	PDK	LDN	REVISED CONTROL PANEL FASTENERS
2	FR-1776	03-08-04	AT	pdk	LDN	CORRECTED CONTROL PANEL STK NUMBER
3	FR-1789	11-18-04	RSB	KDG	AKS	ADDED VACUUM RELIEF PORT

BILL OF MATERIALS

ITEM NO.	PART NO.	PART DESCRIPTION
1	20003	1/4-20 X 3/4 SS HH CAP SCREW
2	20058	#1/4-20 X 3/4 SS FHP UC SCREW
3	22053	#8-32 X 1/2 SS PHP SCREW
4	23033	1/4 SS INTERNAL TOOTH LOCK WASHER
5	23057	5/8 WAVE WASHER
6	24016	#6 X 1/2" SS PHP SCREW AB POINT
7	24032	#8-32 X 3/8 SS PHP SCREW F POINT
8	25040	#6 U SPEED NUT STL. STL.
9	30033	RIGHT ANGLE STRAIN RELIEF
10	111028	TINNERMAN TUBULAR SPEED CLIP
11	117038	1-3/8" DIA. THERMO WHITE HOLE PLUG
12	121068	121068 FINISHED HANDLE/LATCH ASSEMBLY
13	121075	CAM LATCH MOUNT
14	132115	HEATER, 5W, 14VDC
15	140367	CONTROL PANEL ASSEMBLY
16	180301	THERMO CONTROL CENTER BLANK PANEL
17	180304	THERMO DATA STORAGE POCKET ASSEMBLY
18	180305	CONTROL CENTER DISPLAY BEZEL
19	180306	THERMO BACK-UP SYSTEM BLANK PANEL
20	180308	THERMO CONTROL CENTER RECORDER BLANK
21	191802	FREEZER DISPLAY BOARD
22	195837	MOUNTING ANGLE FOR 180305
23	510305	1" OD FLAT WASHER
24	590027	#6-32 X 1/4 SS PHP EXT SEMS SCREW
25	600085	5/16 NYLON CABLE CLAMP
26	1950069	HEATED VACUUM RELIEF PORT
27	195770	13 & 17 CU. FT. UPRIGHT FREEZER DOOR "8600"
28	195830	UPRIGHT DOOR WIREWAY COVER PLATE
29	430336	15 FT, RS-232 CABLE 25 POS.

MODEL/PART NAME: ULT UP-RIGHT SERIES FREEZER

DWG TITLE: 8600 SINGLE DOOR BOM ASSEMBLY

DWN: PDK	CAD: PDK	APPD: MAH	DATE: 10-30-02	SCALE: 0.094

MATERIAL: N/A

PAINT: N/A

TOLERANCE UNLESS OTHERWISE SPECIFIED
ANGLES: DECIMAL: .XX=±
.XXX=±

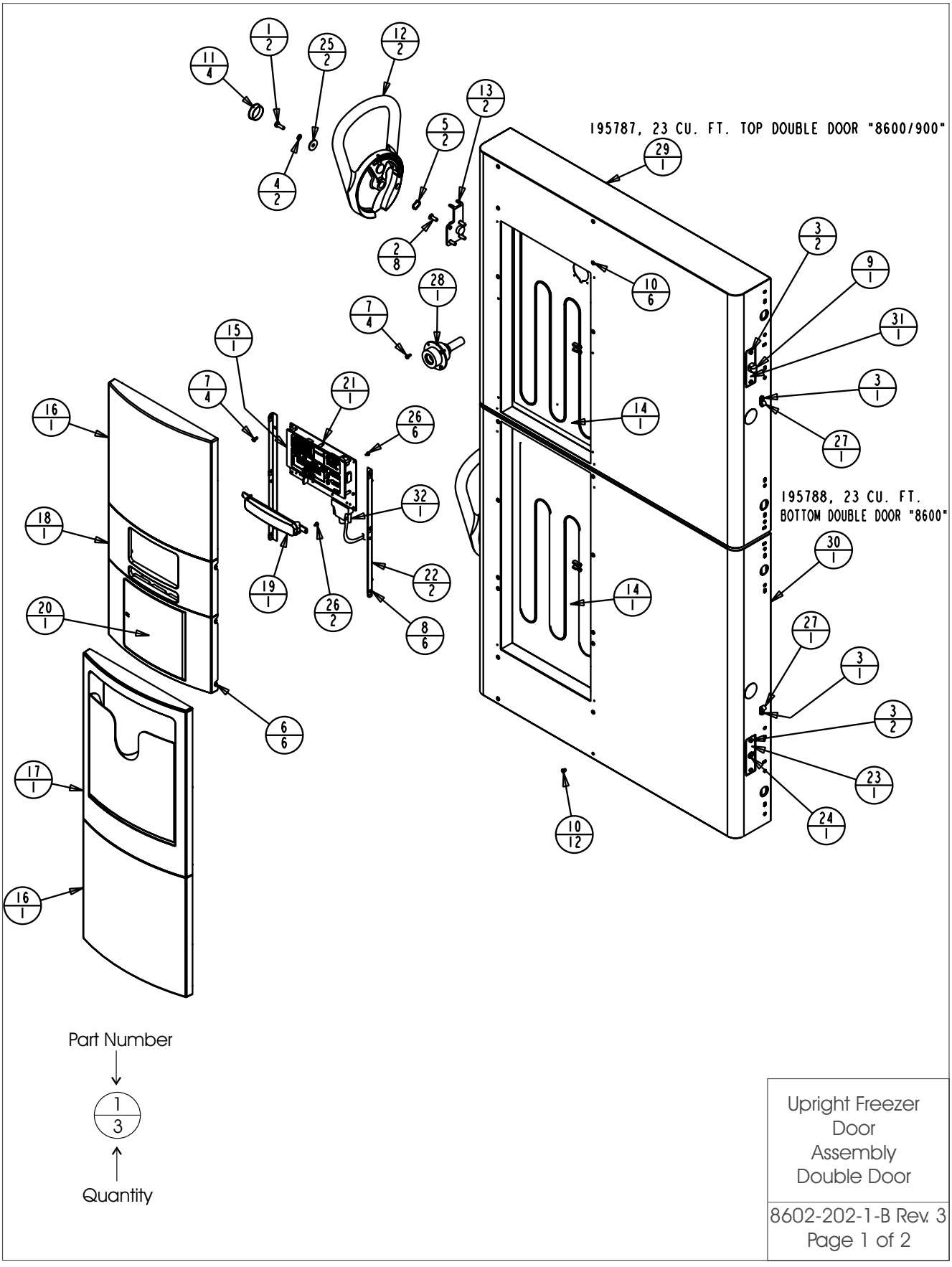
DRAWING NUMBER: 8602-201-1

SIZE: B

Thermo
ELECTRON CORPORATION
Controlled Environment Equipment
Box 649, Marietta, Oh 45750

Upright Freezer Door Assembly Single Door

8602-201-1-B Rev. 3



Upright Freezer
Door
Assembly
Double Door

8602-202-1-B Rev. 3
Page 1 of 2

REV	ECN NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
0	N/A	11-05-02	PDK	PDK	MAH	RELEASED FOR PRODUCTION
1	FR-1673	06-06-03	DHG	PDK	LDN	REVISED CONTROL PANEL FASTENERS
2	FR-1776	03-09-04	AT	pdk	LDN	CORRECTED CONTROL PANEL STK NUMBER
3	FR-1789	11-19-04	RSB	KDG	AKS	ADDED VACUUM RELIEF PORT

BILL OF MATERIALS

ITEM NO.	PART NO.	PART DESCRIPTION
1	20003	1/4-20 X 3/4 SS HH CAP SCREW
2	20058	#1/4-20 X 3/4 SS FHP UC SCREW
3	22053	#8-32 X 1/2 SS PHP SCREW
4	23033	1/4 SS INTERNAL TOOTH LOCK WASHER
5	23057	5/8 WAVE WASHER
6	24016	#6 X 1/2" SS PHP SCREW AB POINT
7	24032	#8-32 X 3/8 SS PHP SCREW F POINT
8	25040	#6 U SPEED NUT STL. STL.
9	30033	RIGHT ANGLE STRAIN RELIEF
10	111028	TINNERMAN TUBULAR SPEED CLIP
11	117038	1-3/8" DIA. THERMO WHITE HOLE PLUG
12	121068	121068 FINISHED HANDLE/LATCH ASSEMBLY
13	121075	CAM LATCH MOUNT
14	132114	HEATER, 3W, 14VDC
15	140367	CONTROL PANEL ASSEMBLY
16	180301	THERMO CONTROL CENTER BLANK PANEL
17	180304	THERMO DATA STORAGE POCKET ASSEMBLY
18	180305	CONTROL CENTER DISPLAY BEZEL
19	180306	THERMO BACK-UP SYSTEM BLANK PANEL
20	180308	THERMO CONTROL CENTER RECORDER BLANK
21	191802	FREEZER DISPLAY BOARD
22	195837	MOUNTING ANGLE FOR 180305
23	195874	CABINET CABLE COVER PLATE
24	330010	1/2" SPLIT SNAP BUSHING
25	510305	1" OD FLAT WASHER
26	590027	#6-32 X 1/4 SS PHP EXT SEMS SCREW
27	600085	5/16 NYLON CABLE CLAMP
28	1950069	HEATED VACUUM RELIEF PORT
29	195785	13/17 CF TOP DOUBLE DOOR "8600/900"
30	195786	13/17 CF BOTTOM DOUBLE DOOR "8600"
31	195830	UPRIGHT DOOR WIREWAY COVER PLATE
32	430336	15 FT, RS-232 CABLE 25 POS.

MODEL/PART NAME: ULT UP-RIGHT SERIES FREEZER

DWG TITLE: 8600 DOUBLE DOOR BOM ASSEMBLY

DWN: PDK	CAD: PDK	APPD: MAH	DATE: 11-05-02	SCALE: 0.094

MATERIAL: N/A

PAINT: N/A

TOLERANCE UNLESS OTHERWISE SPECIFIED
ANGLES: DECIMAL: .XX=±
.xxx=±

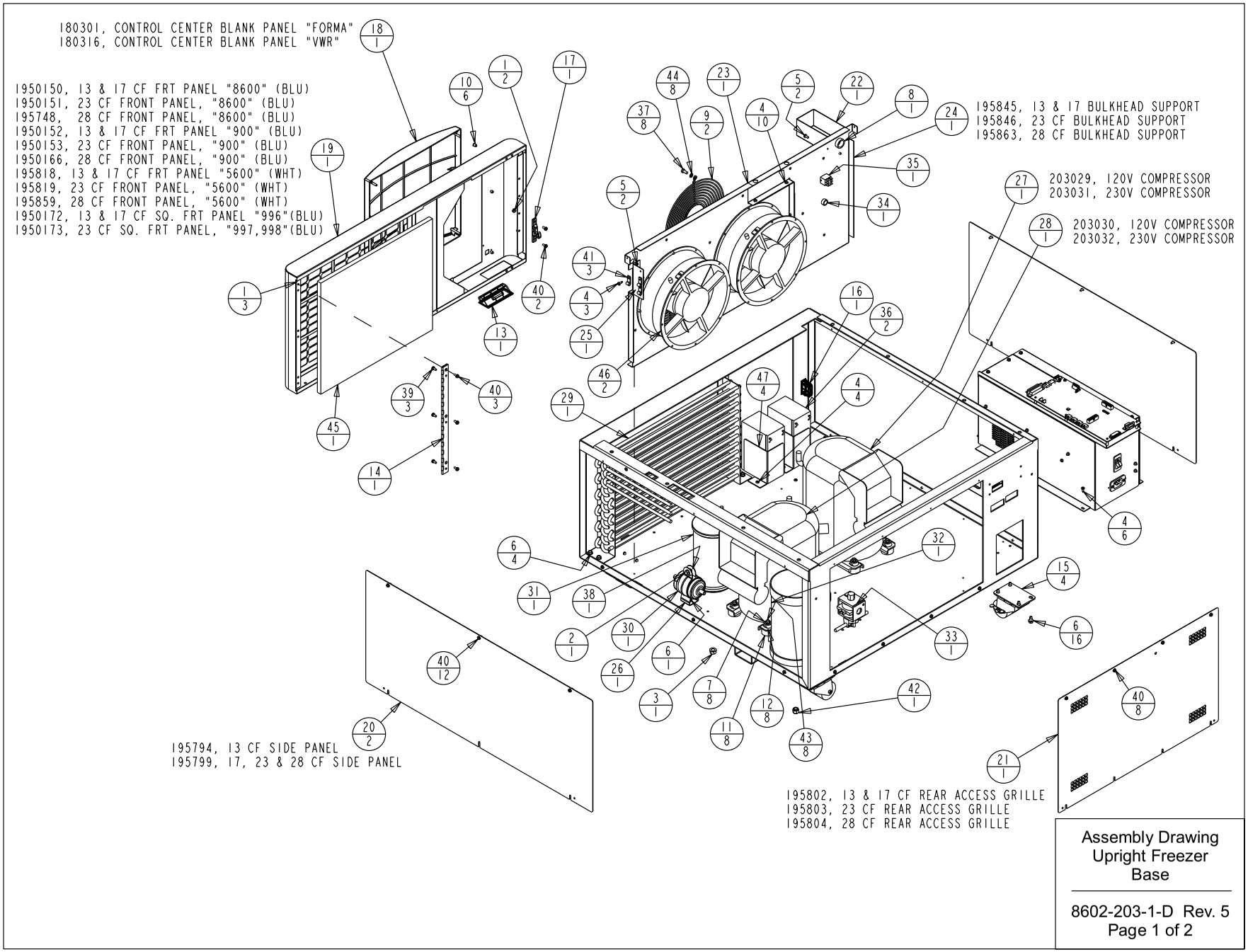
DRAWING NUMBER: 8602-202-1

SIZE: B

Upright Freezer Door Assembly Double Door

8602-202-1-B Rev. 3

Thermo
ELECTRON CORPORATION
Controlled Environment Equipment
Box 649, Marietta, Oh 45750


180301, CONTROL CENTER BLANK PANEL "FORMA"
180316, CONTROL CENTER BLANK PANEL "VWR"
1950150, 13 & 17 CF FRT PANEL "8600" (BLU)
1950151, 23 CF FRONT PANEL, "8600" (BLU)
195748, 28 CF FRONT PANEL, "8600" (BLU)
1950152, 13 & 17 CF FRT PANEL "900" (BLU)
1950153, 23 CF FRONT PANEL, "900" (BLU)
1950166, 28 CF FRONT PANEL, "900" (BLU)
195818, 13 & 17 CF FRT PANEL "5600" (WHT)
195819, 23 CF FRONT PANEL, "5600" (WHT)
195859, 28 CF FRONT PANEL, "5600" (WHT)
1950172, 13 & 17 CF SQ. FRT PANEL "996"(BLU)
1950173, 23 CF SQ. FRT PANEL, "997,998"(BLU)
195845, 13 & 17 BULKHEAD SUPPORT
195846, 23 CF BULKHEAD SUPPORT
195863, 28 CF BULKHEAD SUPPORT
203029, 120V COMPRESSOR
203031, 230V COMPRESSOR
203030, 120V COMPRESSOR
203032, 230V COMPRESSOR
195794, 13 CF SIDE PANEL
195799, 17, 23 & 28 CF SIDE PANEL
195802, 13 & 17 CF REAR ACCESS GRILLE
195803, 23 CF REAR ACCESS GRILLE
195804, 28 CF REAR ACCESS GRILLE
Assembly Drawing
Upright Freezer
Base
8602-203-1-D Rev. 5
Page 1 of 2

DWG. NUMBER: 8602-203-1-B

REV	ECN NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
3	SI-9962	03-26-08	KDG	KDG	LDN	CHG. FORMA FRONT PANEL TO BLUE/VBL
4	FR-2004	07-01-08	KDG	KDG	LDN	ADDED FRONT PANEL FOR 5607
5	FR-2004	07-28-08	KDG	KDG	CCS	ADDED FRONT PANEL FOR 996,997,998

BILL OF MATERIALS

ITEM NO.	PART NO.	PART DESCRIPTION
1	23002	#8-32 ZP LKWASH HEX NUT
2	23011	1/4-20 ZP LKWASH HEX NUT
3	23013	3/8-16 ZP LKWASH HEX NUT
4	24030	#8 X 1/2" TEKS SCREW
5	24032	#8-32 X 3/8 SS PHP SCREW F POINT
6	24038	1/4-20 X 1/2 SELF TAPPING SCREW
7	24049	1/4 ZP FLAT WASHER
8	30016	1" SNAP BUSHING
9	108020	10" WIRE FAN GUARD
10	111028	TINNERMAN TUBULAR SPEED CLIP
11	114033	COMPRESSOR MOUNTING FOOT
12	114034	COMPRESSOR MOUNTING SLEEVE
13	115032	BLACK ABS PLASTIC PULL
14	116115	FRONT PANEL HINGE
15	120011	DUAL WHEEL CASTER
16	121071	LATCH CATCH, PART OF 121071 ASSEMBLY
17	121071	LATCH KEEPER, PART OF 121071 ASSEMBLY
18	180301	THERMO CONTROL CENTER BLANK PANEL
19	195746	13&17 CU. FT. UR FRZ BASE FRONT PNL
20	195799	SIDE PANEL 17, 23 AND 28 CU. FT. UPRIGHT
21	195802	13/17 REAR ACCESS GRILLE
22	195829	MULLION/DOOR SWITCH WIRE COVER
23	195844	UR FRZ FAN BULKHEAD
24	195845	13&17 CU. FT. FAN BULKHEAD SUPPORT
25	195882	REFRIGERATION LINE SUPPORT BRACKET
26	200126	2" RIGID HANGER
27	203031	230V HIGH STAGE COMPRESSOR
28	203032	230V LOW STAGE COMPRESSOR
29	204009	REFRIGERATION CONDENSER
30	209020	LIQUID LINE FILTER DRYER WITH ACCESS PORT
31	214006	OIL SEPARATOR
32	214018	10.000" H X 5.000" DIA. EXPANSION TANK

BILL OF MATERIALS

ITEM NO.	PART NO.	PART DESCRIPTION
33	220626	120V - 50/60 HZ SOLENOID VALVE
34	330002	5/8" SNAP BUSHING
35	360248	MINI SNAP-IN POWER SWITCH
36	400159	SEALED LEAD ACID BATTERY - 12 VOLT - 7.2 Ah
37	510035	#12-24 X 1/2 SS HH CAP SCREW
38	550043	1/4-20 X 1"L ZP CARRIAGE BOLT
39	590020	#8-32 X 3/8 SS PHP EXT SEMS SCREW
40	590029	#8-32 X 3/8 SS PHP EXT SEMS SCREW W/PATCH
41	600080	1/4 ALUM CLAMP W/LINER
42	610053	3/8-16 NYLON INSERT LOCK NUT
43	680008	1/4-20 X 1-3/4 SELF TAPPING SCREW
44	730087	#12 SS EXT TOOTH LOCKWASHER
45	760203	AIR FILTER
46	900113	10" TUBEAXIAL FAN, 115V
47	1950074	BATTERY MOUNTING BRACKET

MODEL/PART NAME: 8600 UP-RIGHT FREEZER

DWG TITLE: 8605 UP-RIGHT FREEZER ASSEMBLY

DWN: PDK	CAD: PDK	APPD: MAH	DATE: 10-30-02	SCALE: 0.094

MATERIAL: N/A

PAINT: N/A

TOLERANCE UNLESS OTHERWISE SPECIFIED
ANGLES: DECIMAL: .XX=±
.XXX=±

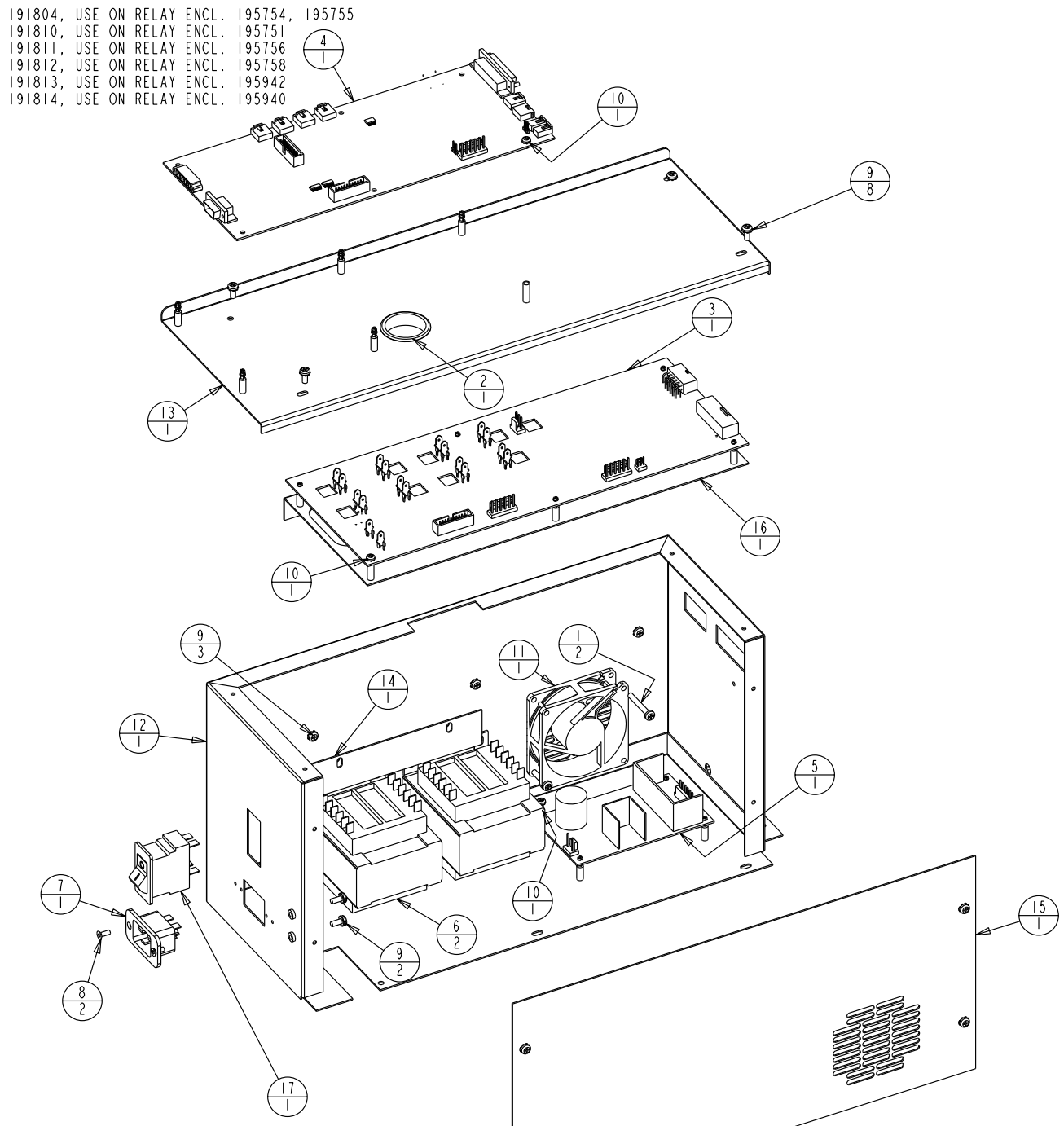
DRAWING NUMBER 8602-203-1

SIZE B

ThermoFisher SCIENTIFIC
BOX 649, MARIETTA, OHIO 45750

Assembly Drawing
Upright Freezer
Base

8602-203-1-D Rev. 5
Page 2 of 2



1. COMMON TO: 195751, 195754, 195755, 195756, 195758, 195940 & 195942

Part Number

15
1

Quantity

Exploded View Drawing
230V Relay Enclosure Assembly

8602-204-1-D Rev. 5
Page 1 of 2

REV	ECN NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
1	FR-1673	03-06-03	DHG	KDG	LDN	MADE COMMON TO 195940 & 195942
2	FR-1789	07-28-04	ADT	KDG	LDN	CHG. MICRO BOARD FOR VACUUM RELIEF
3	PIP-111	08-02-04	TJ	KDG	LDN	REMOVED 114031 GROMMET EDGING
4	FR-1806	08-23-04	JDL	KDG	LDN	SPECIFIED AMPERAGE OF CB SWITCHES
5	FR-2008	02-02-09	RTB	SAG	CCS	REFLECTS CHANGES MADE TO METALWORK

BILL OF MATERIALS

ITEM NO.	PART NO.	PART DESCRIPTION
1	22143	#8-32 x 1-1/4 SS PHP SCREW
2	30077	1-1/2" SNAP BUSHING
3	191658	HIGH VOLTAGE BOARD 230V
4	191804	MICRO BOARD (-86 HIGH END)
5	400165	SWITCHER BOARD
6	420090	175V TRANSFORMER
7	460169	POWER INLET, 16/20A
8	490009	#6-32 X 3/8 SS FHP UC SCREW
9	590020	#8-32 X 3/8 SS PHP EXT SEMS SCREW
10	590027	#6-32 X 1/4 SS PHP EXT SEMS SCREW
11	900134	TUBEAXIAL FAN, 30 CFM, 12V
12	195631-16-1	RELAY ENCLOSURE SPOTWELD SUB-ASSEMBLY
13	195631-16-4	RELAY ENCLOSURE COVER/191656 SUPPORT
14	195631-31-3	TRANSFORMER HOLD DOWN
15	195631-31-5	RELAY ENCLOSURE COVER (MAIN)
16	195730-16-1	191658 SUPPORT BRACKET SUB-ASSEMBLY
17	230184	15A DPDT SWITCH/CIRCUIT BKR

ThermoFisher SCIENTIFIC

BOX 649, MARIETTA, OHIO 45750

MODEL/PART NAME: RELAY ENCLOSURE ASSEMBLY

DWG TITLE: 230 VOLT RELAY ENCLOSURE ASSY (HIGH END)

DWN: DHG	CAD: DHG	APPD: MAH	DATE: 07-26-01	SCALE: 0.250

MATERIAL: -

PAINT: N/A

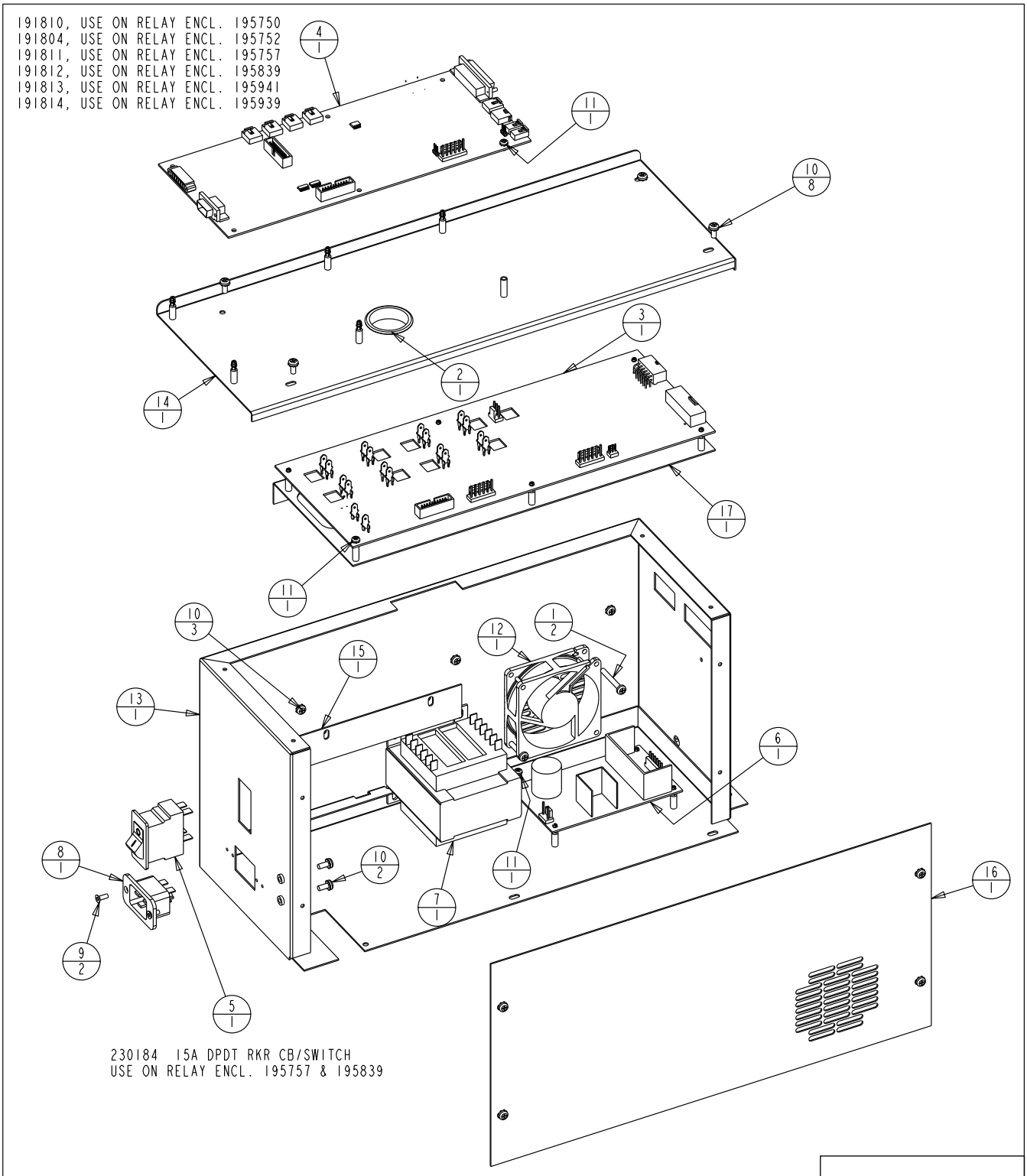
TOLERANCE UNLESS OTHERWISE SPECIFIED
ANGLES: DECIMAL: .XX=±
.XXX=±

DRAWING NUMBER: 8602-204-1

SIZE: B

Exploded View Drawing
230V Relay Enclosure Assembly

8602-204-1-D Rev. 5
Page 2 of 2



1. COMMON TO: 195750, 195752, 195757, 195839, 195939 & 195941

Exploded View Drawing
120V Relay Enclosure Assembly

8602-204-2-D Rev. 5
Page 1 of 2

REV	ECN NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
1	FR-1673	03-06-03	DHG	KDG	KDG	MADE COMMON TO 195939 & 195941
2	FR-1789	07-28-04	ADT	KDG	LDN	CHG. MICRO BOARD FOR VACUUM RELIEF
3	PIP-111	08-02-04	TJ	KDG	LDN	REMOVED 114031 GROMMET EDGING
4	FR-1806	08-23-04	JDL	KDG	LDN	SPECIFIED AMPERAGE OF CB SWITCHES
5	FR-2008	02-02-09	RTB	SAG	CCS	REFLECTS CHANGES MADE TO METAL WORK

BILL OF MATERIALS

ITEM NO.	PART NO.	PART DESCRIPTION
1	22143	#8-32 x 1-1/4 SS PHP SCREW
2	30077	1-1/2" SNAP BUSHING
3	191680	HIGH VOLTAGE BOARD 120V
4	191810	MICRO BOARD (-86 LOW END)
5	230183	20A DPDT SWITCH/CIRCUIT BKR
6	400165	SWITCHER BOARD
7	420065	175V TRANSFORMER
8	460169	POWER INLET, 16/20A
9	490009	#6-32 X 3/8 SS FHP UC SCREW
10	590020	#8-32 X 3/8 SS PHP EXT SEMS SCREW
11	590027	#6-32 X 1/4 SS PHP EXT SEMS SCREW
12	900134	TUBEAXIAL FAN, 30 CFM, 12V
13	195631-16-1	RELAY ENCLOSURE SPOTWELD SUB-ASSEMBLY
14	195631-16-4	RELAY ENCLOSURE COVER/191656 SUPPORT
15	195631-31-3	TRANSFORMER HOLD DOWN
16	195631-31-5	RELAY ENCLOSURE COVER (MAIN)
17	195730-16-1	191658 SUPPORT BRACKET SUB-ASSEMBLY

MODEL/PART NAME: RELAY ENCLOSURE ASSEMBLY

DWG TITLE: 120 VOLT RELAY ENCLOSURE ASSY (LOW END)

DWN: DHG	CAD: DHG	APPD: MAH	DATE: 07-26-01	SCALE: 0.250

MATERIAL: -

PAINT: N/A

TOLERANCE UNLESS OTHERWISE SPECIFIED
ANGLES: DECIMAL: .XX=±
.XXX=±

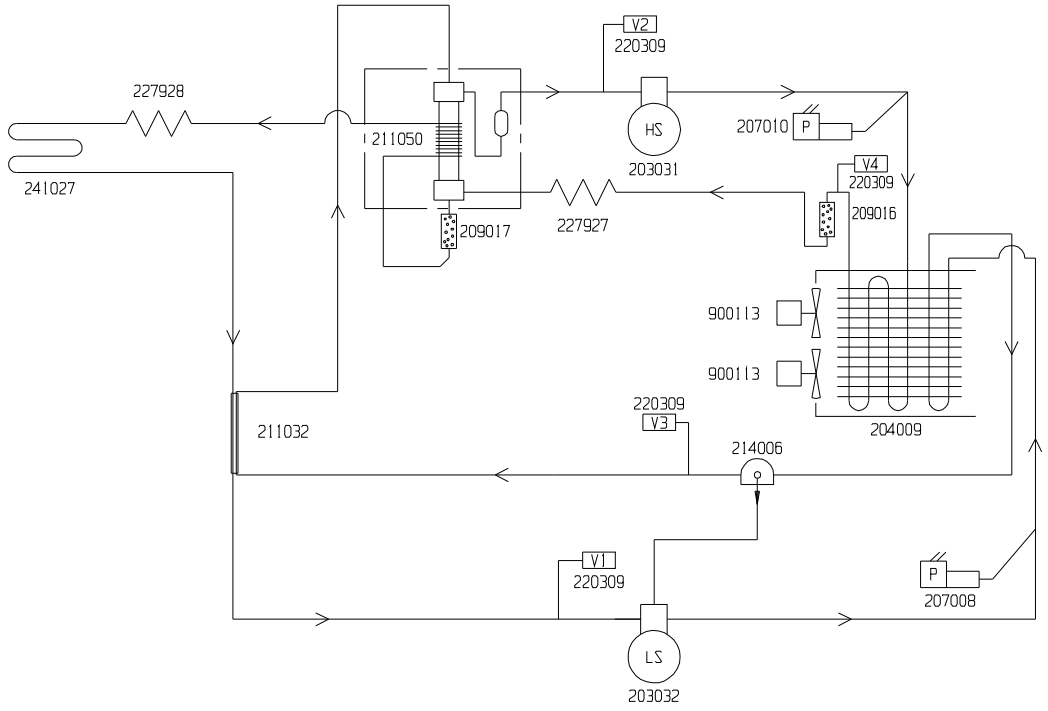
DRAWING NUMBER: 8602-204-2

SIZE: B

ThermoFisher SCIENTIFIC
BOX 649, MARIETTA, OHIO 45750

Exploded View Drawing
120V Relay Enclosure Assembly

8602-204-2-D Rev. 5
Page 2 of 2



CASCADE REFRIGERATION

HIGH TEMPERATURE STAGE REFRIGERANT:

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

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. (14g) MAX, ; VAC TO 20"
R-508B 13.5 OZ (382g) ± 1/4 OZ.(7g) OR
20" TO 147 PSIG ± 3 PSIG

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

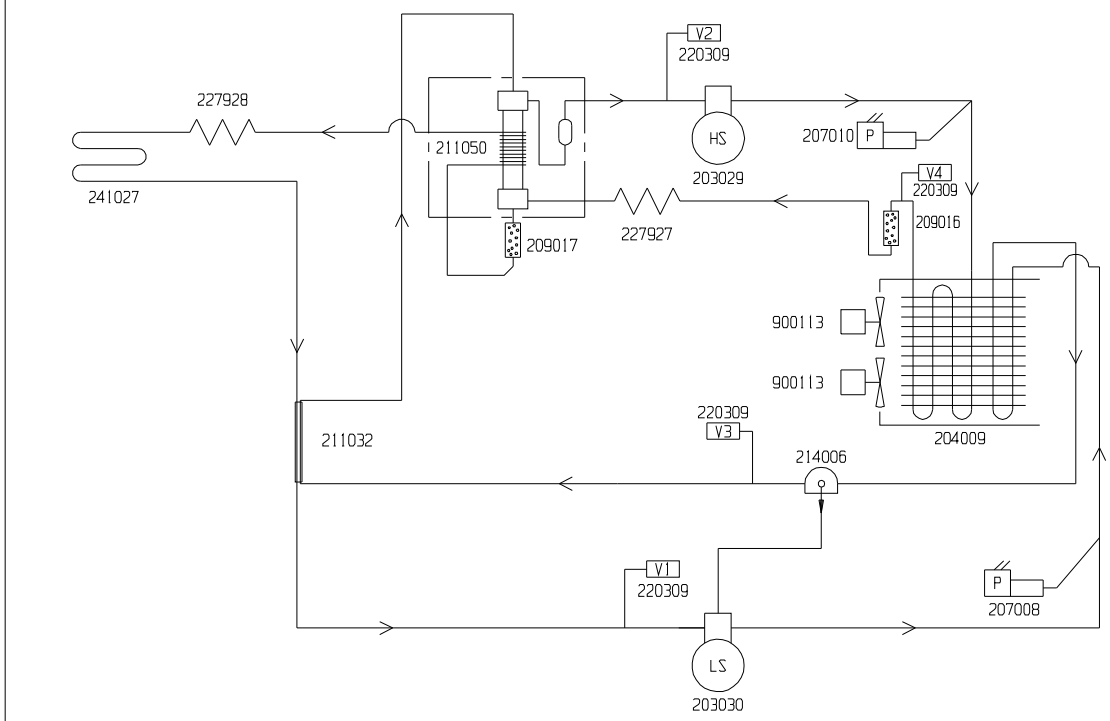
* ALL PSIG MEASUREMENTS WHEN SYSTEM IS AT 23°C

1. COMMON TO: 702, 902, 991, 996, 8602, 8627, 8691, 5702 & 5602 13 CU. FT. FREEZERS (230 V)

REV	ECR NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
9	FR-2080	07-27-09	NWM	KDG	CCS	209017 WAS 209016, 13 TO 13.5 OZ
8	FR-2049	04-06-09	NWM	SAG	LDN	209016 WAS 209020, ADD (1) 220309
7	FR-2004	07-25-08	KDG	KDG	LDN	ADDED COMMON TO 996
6	FR-1943	06-13-07	CRM	SAG	LDN	211050 WAS 211039
5	FR-1962	06-06-07	SJN	SAG	LDN	227928 WAS 241017, 227927 WAS 241036
4	FR-1867	07-26-05	RDS	DHG	LDN	REMOVED (2) 220553 ADDED (2) 220309

DATE 05-14-02	DWN MAH	CAD KDG	APPD MAH	SCALE NONE
CUSTOMER				
JOB TITLE -86°C 13 CU. FT. UPRIGHT FREEZERS (230 V)				
DWG TITLE REFRIGERATION SCHEMATIC				
LOCATION	JOB NUMBER	DRAWING NUMBER 8602-90-0-B		

ThermoFisher SCIENTIFIC
BOX 649, MARIETTA, OHIO 45750



CASCADE REFRIGERATION

HIGH TEMPERATURE STAGE REFRIGERANT:

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

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. (14g) MAX, ; VAC TO 20"
R-508B 13.5 OZ (382g) ± 1/4 OZ.(7g) OR
20" TO 147 PSIG ± 3 PSIG

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

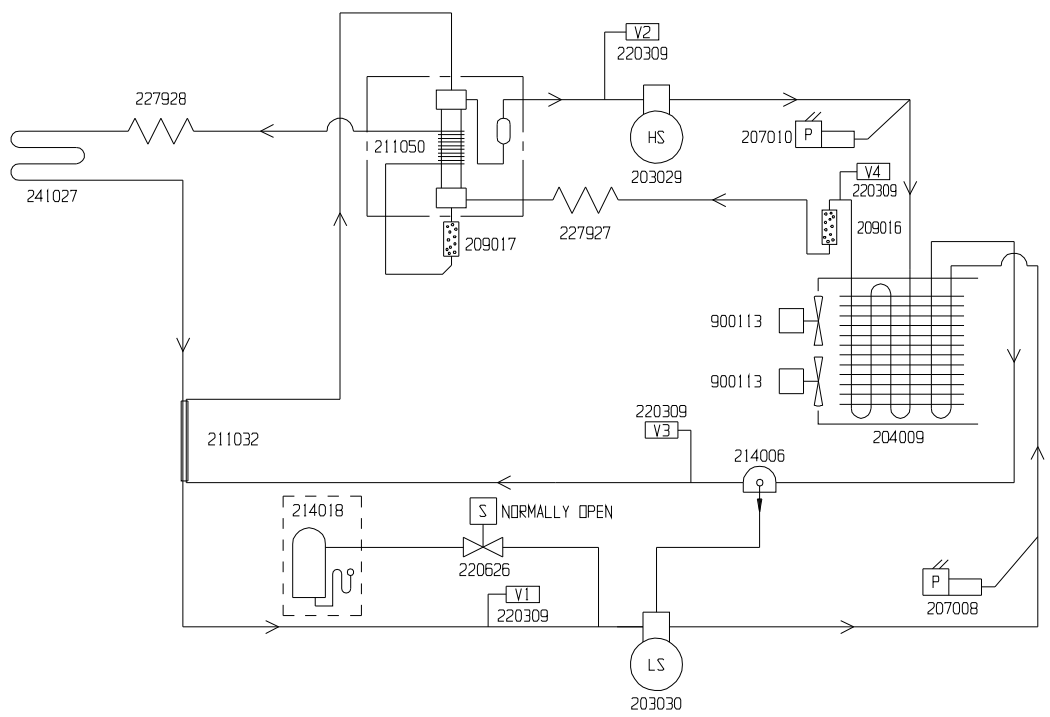
* ALL PSIG MEASUREMENTS WHEN SYSTEM IS AT 23°C

1. COMMON TO: 703, 903, 992, 8603, 8692, 5703 & 5603 13 CU. FT. FREEZERS (120 V)

REV	ECR NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
7	FR-2080	07-27-09	NWM	KDG	CCS	209017 WAS 209016, 13 TO 13.5 OZ
6	FR-2049	04-06-09	NWM	SAG	LDN	209016 WAS 209020, ADD (1) 220309
5	FR-1943	06-13-07	CRM	SAG	LDN	211050 WAS 211039
4	FR-1962	06-06-07	SJN	SAG	LDN	227928 WAS 241017, 227927 WAS 241036
3	FR-1867	07-26-05	RDS	DHG	MAH	REMOVED (2) 220553 ADDED (2) 220309
2	FR-1729	08-27-03	RDS	KDG	MAH	220554 ROTOLOCK VALVE TO 220553

DATE 05-14-02	DWN MAH	CAD KDG	APPD MAH	SCALE NONE
CUSTOMER				
JOB TITLE -86°C 13 CU. FT. UPRIGHT FREEZERS (120 V)				
DWG TITLE REFRIGERATION SCHEMATIC				
LOCATION	JOB NUMBER	DRAWING NUMBER 8603-90-0-B		

ThermoFisher SCIENTIFIC
BOX 649, MARIETTA, OHIO 45750



CASCADE REFRIGERATION

HIGH TEMPERATURE STAGE REFRIGERANT:

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

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

LOW TEMPERATURE STAGE REFRIGERANT:

17 CUFT UNITS: R-290 0.8 OZ. (23g) MAX, ; VAC TO 2 PSIG
R-508B 14.4 OZ (408g) ± 1/4 OZ.(7g) OR
2 PSIG TO 123 PSIG ± 3 PSIG

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

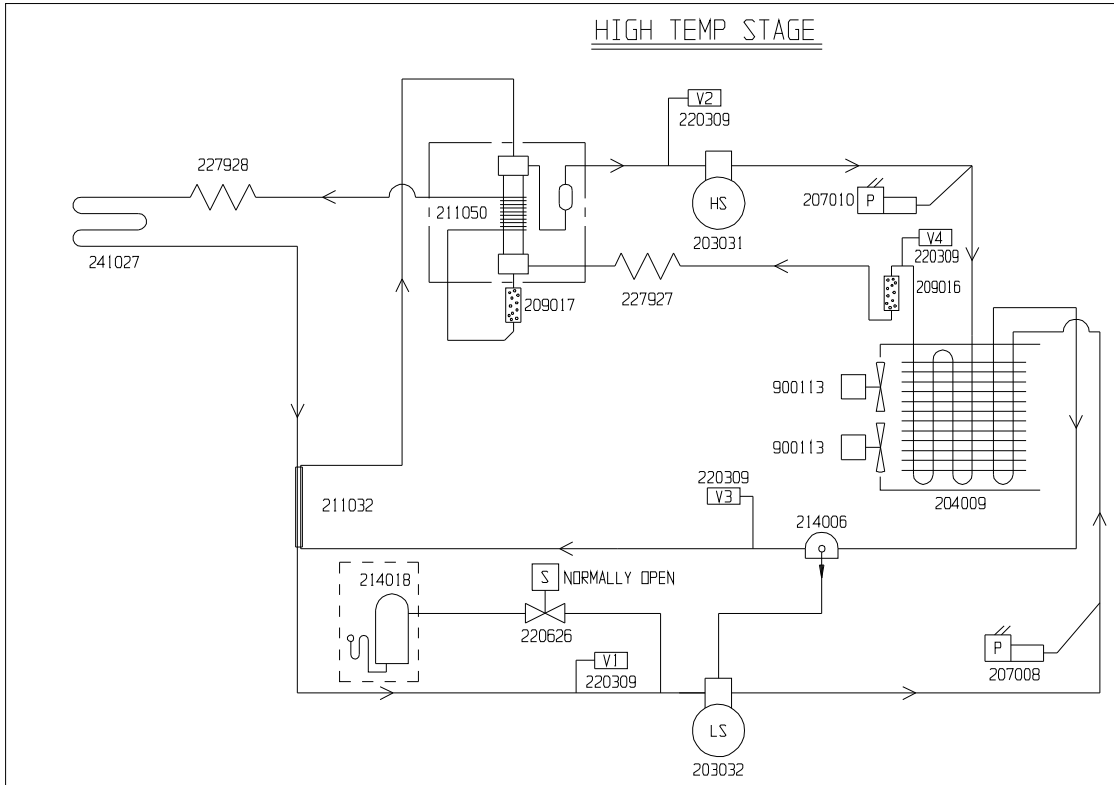
* ALL PSIG MEASUREMENTS WHEN SYSTEM IS AT 23°C

1. COMMON TO: 704, 904, 993, 8604, 8693, 5704 & 5604 17 CU. FT. FREEZERS (120 V)

REV	ECR NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
9	FR-2080	07-27-09	NWM	KDG	CCS	209017 WAS 209016, 15 TO 14.4 OZ
8	FR-2049	04-06-09	NWM	SAG	LDN	209016 WAS 209020,ADD (1) 220309
7	FR-1943	06-13-07	CRM	SAG	LDN	211050 WAS 211039
6	FR-1962	06-06-07	SJN	SAG	LDN	227928 WAS 241017,227927 WAS 241036
5	FR-1867	07-26-05	RDS	DHG	MAH	REMOVED (2) 220553 ADDED (2) 220309
4	FR-1729	08-27-03	RDS	KDG	MAH	220554 ROTOLOCK VALVE TO 220553

DATE 05-14-02	DWN MAH	CAD KDG	APPD MAH	SCALE NONE
CUSTOMER			
JOB TITLE -86°C 17 CU. FT. UPRIGHT FREEZERS (120 V)			
DWG TITLE REFRIGERATION SCHEMATIC			
LOCATION	JOB NUMBER	DRAWING NUMBER 8604-90-0-B	

ThermoFisher SCIENTIFIC
BOX 649, MARIETTA, OHIO 45750



CASCADE REFRIGERATION

HIGH TEMPERATURE STAGE REFRIGERANT:

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

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. (26g) MAX, ; VAC TO 3 PSIG
R-508B 16 OZ (453g) ± 1/4 OZ.(7g) 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)

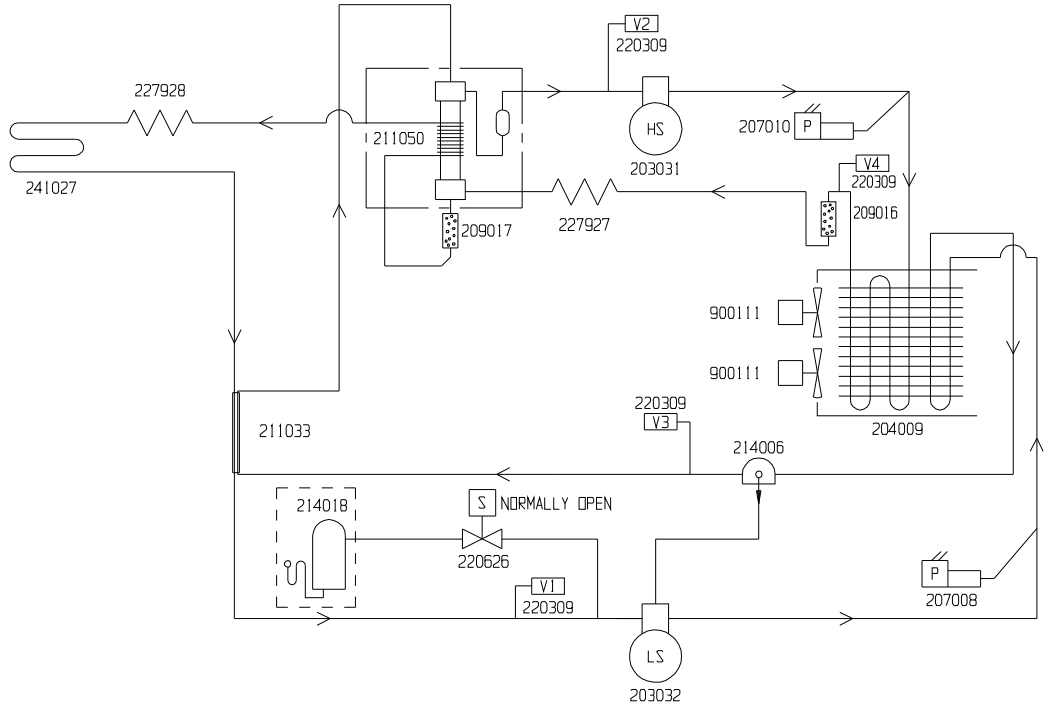
* ALL PSIG MEASUREMENTS WHEN SYSTEM IS AT 23°C

1. COMMON TO: 705, 905, 994, 997, 8605, 8694, 5705 & 5605 17 CU. FT. FREEZERS (230 V)

REV	ECR NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
10	FR-2080	07-27-09	NWM	KDG	CCS	209017 WAS 209016, 15 TO 16 OZ
9	FR-2049	04-06-09	NWM	SAG	LDN	209016 WAS 209020, ADD (1) 220309
8	FR-2004	07-25-08	KDG	KDG	LDN	ADDED COMMON TO 997
7	FR-1943	06-13-07	CRM	SAG	LDN	211050 WAS 211039
6	FR-1962	06-06-07	SJN	SAG	LDN	227928 WAS 241017,227927 WAS 241036
5	FR-1867	07-25-05	RDS	DHG	LDN	REMOVED (2) 220553 ADDED (2) 220309

DATE 05-14-02	DWN MAH	CAD KDG	APPD MAH	SCALE NONE
CUSTOMER				
JOB TITLE -86°C 17 CU. FT. UPRIGHT FREEZERS (230 V)				
DWG TITLE REFRIGERATION SCHEMATIC				
LOCATION	JOB NUMBER	DRAWING NUMBER 8605-90-0-B		

ThermoFisher SCIENTIFIC
BOX 649, MARIETTA, OHIO 45750



CASCADE REFRIGERATION

HIGH TEMP. STAGE REFRIGERANT: R-404A, 24 OZ. (680g) ±1/2 OZ. (14g)

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

LOW TEMP. STAGE REFRIGERANT: R-290 1.0 OZ. (28g) MAX. ; VAC TO 5 PSIG
R-508B 18.3 OZ. (518g) ± 1/4 OZ. (7g)
OR 5 PSIG TO 152 PSIG ± 3 PSIG

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

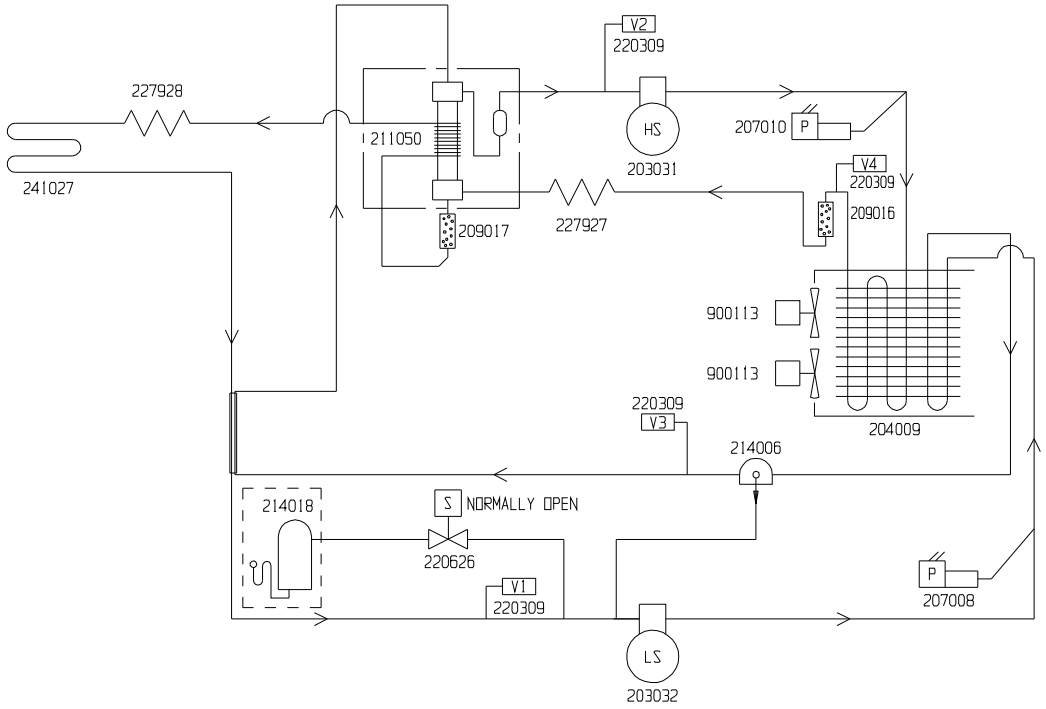
* ALL PSIG MEASUREMENTS WHEN SYSTEM IS AT 23°C

1. COMMON TO: 706, 906, 995, 998, 8606, 8695, 5706 & 5606 23 CU.FT. FREEZERS (230 V)

REV	ECR NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
10	FR-2080	07-27-09	NWM	KDG	CCS	209017 WAS 209016, 17.3 TO 18.3 OZ
9	FR-2049	04-06-09	NWM	SAG	LDN	209016 WAS 209020,ADD (1) 220309
8	FR-2004	07-24-08	KDG	KDG	LDN	ADDED COMMON TO 998
7	FR-1943	06-13-07	CRM	SAG	LDN	211050 WAS 211039
6	FR-1962	06-06-07	SJN	SAG	LDN	227928 WAS 241017,227927 WAS 241036
5	FR-1867	07-26-05	RDS	DHG	LDN	REMOVED (2) 220553 ADDED (2) 220309

ThermoFisher SCIENTIFIC
BOX 649, MARIETTA, OHIO 45750

DATE 05-14-02	DWN MAH	CAD KDG	APPD MAH	SCALE NONE
CUSTOMER			
JOB TITLE -86°C 23 CU. FT. UPRIGHT FREEZERS (230 V)			
DWG TITLE REFRIGERATION SCHEMATIC			
LOCATION	JOB NUMBER	DRAWING NUMBER 8606-90-0-B	



CASCADE REFRIGERATION

HIGH TEMPERATURE STAGE REFRIGERANT:

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

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

LOW TEMPERATURE STAGE REFRIGERANT:

28 CUFT UNITS: R-290 1.0 OZ. (28g) MAX, ; VAC TO 4 PSIG
R-508B 18.7 OZ (529g) ± 1/4 OZ.(7g) OR
4 PSIG TO 144 PSIG ± 3 PSIG

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

* ALL PSIG MEASUMENTS WHEN SYSTEM IS AT 23°C

1. COMMON TO: 8607, 907 & 5607 28 CU. FT. FREEZERS (230 V)

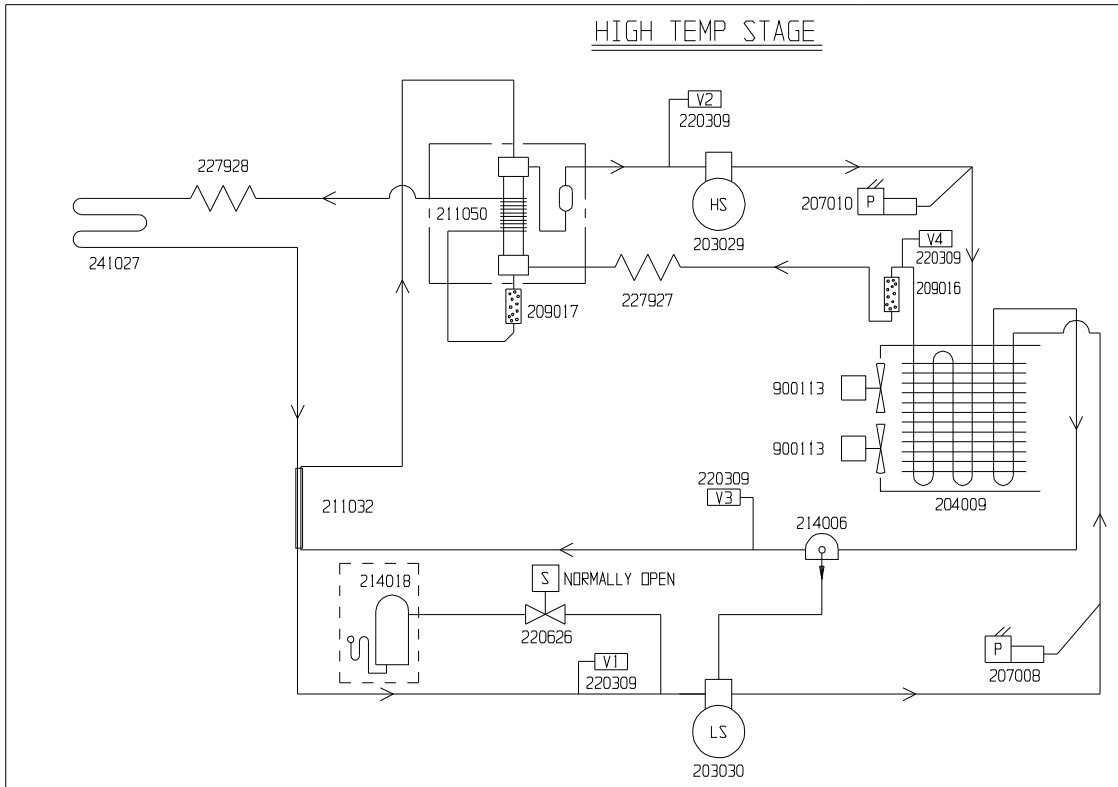
REV	ECR NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
10	FR-2080	07-27-09	NWM	KDG	CCS	209017 WAS 209016, 17.7 TO 18.7 OZ
9	FR-2049	04-06-09	NWM	SAG	LDN	209016 WAS 209020, ADD (1) 220309
8	FR-2004	07-01-08	KDG	KDG	LDN	ADDED COMMON TO 5607
7	FR-1943	06-13-07	CRM	SAG	LDN	211050 WAS 211041
6	FR-1962	06-11-07	SJN	SAG	LDN	227928 WAS 241017,227927 WAS 241036
5	FR-1867	07-26-05	RDS	DHG	LDN	REMOVED (2) 220553 ADDED (2) 220309

ThermoFisher SCIENTIFIC
BOX 649, MARIETTA, OHIO 45750

DATE 05-14-02	DWN MAH	CAD KDG	APPD MAH	SCALE NONE
CUSTOMER			
JOB TITLE -86°C 28 CU. FT. UPRIGHT FREEZERS (230 V)			
DWG TITLE REFRIGERATION SCHEMATIC			
LOCATION	JOB NUMBER	DRAWING NUMBER 8607-90-0-B	

DRAWING NUMBER: 8656-90-0-B

REV	ECN NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
2	FR-1893	12-20-05	JAS	KDG	LDN	CORRECTLY SHOWED EXP. TANK & VALVE
3	FR-1962	06-06-07	SJN	SAG	LDN	227928 WAS 241017, 227927 WAS 241036
4	FR-1943	06-13-07	CRM	SAG	LDN	211050 WAS 211039
5	FR-2049	04-06-09	NWM	SAG	LDN	209016 WAS 209020, ADD (1) 220309
6	FR-2080	07-27-09	NWM	KDG	CCS	209017 WAS 209016, 15 TO 16 OZ



CASCADE REFRIGERATION

HIGH TEMPERATURE STAGE REFRIGERANT:

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

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

LOW TEMPERATURE STAGE REFRIGERANT:

23 CUFT UNITS: R-290 0.9 OZ. (26g) MAX, ; VAC TO 4 PSIG
R-508B 16 OZ (453g) ± 1/4 OZ.(7g) OR
4 PSIG TO 133 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: 756, 956, 990, 8656, 8690, 5756 & 5656 23 CU. FT. FREEZERS (120 V)

ThermoFisher SCIENTIFIC
BOX 649, MARIETTA, OHIO 45750

MODEL/PART NAME: -86° 23 CU. FT. UP-RIGHT FREEZERS (120 VOLT)

DWG TITLE: REFRIGERATION SCHEMATIC

DWN: ADT	CAD: pdk	APPD: MAH	DATE: 03-09-04	SCALE: NONE

MATERIAL: N/A

PAINT COLOR: N/A

TOLERANCE UNLESS OTHERWISE SPECIFIED
ANGLES: DECIMAL: .XX=± .XXX=±

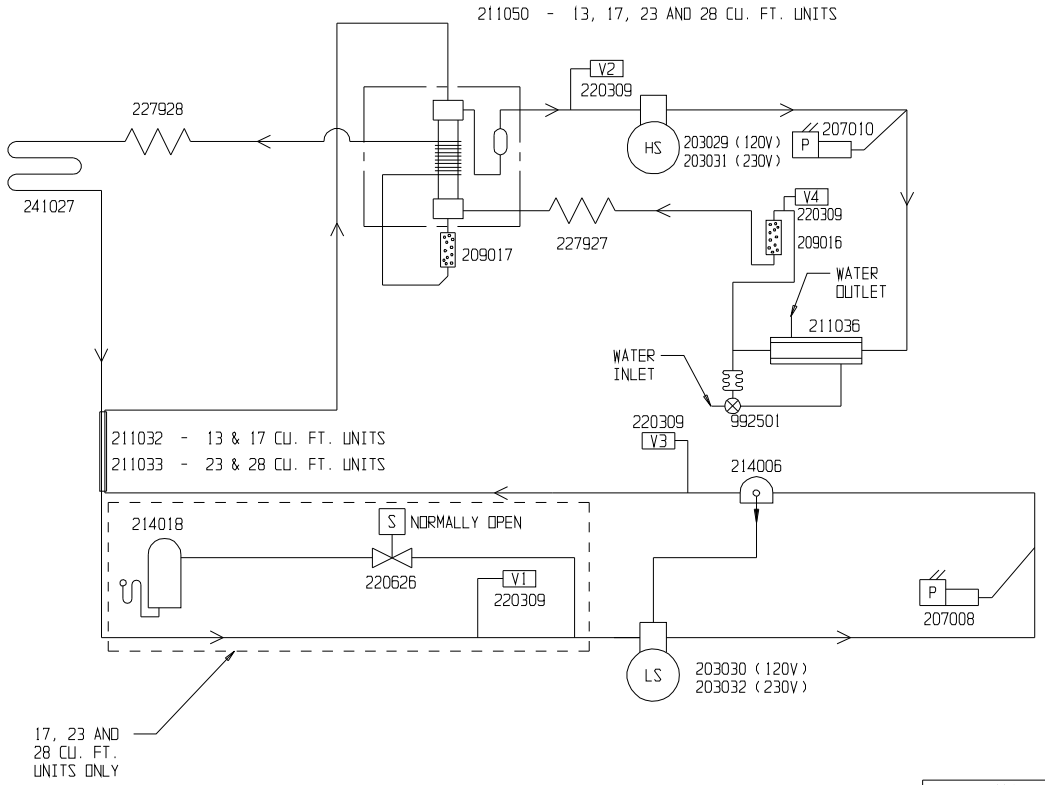
DRAWING NUMBER: 8656-90-0

SIZE: B

DRAWING NUMBER: 195964-90-1-B

REV	ECN NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
2	FR-1867	07-26-05	RDS	DHG	LDN	REMOVED (2) 220553 ADDED (2) 220309
3	FR-1962	06-13-07	SJN	SAG	LDN	227928 WAS 241017,227927 WAS 241036
4	FR-1943	06-13-07	CRM	SAG	LDN	MADE 211050 STANDARD
5	FR-2049	04-06-09	NWM	SAG	LDN	209016 WAS 209020,ADD (1) 220309
6	FR-2080	07-27-09	NWM	KDG	CCS	209017 WAS 209016 IN CAB.,CHG. CHARGES

HIGH TEMP STAGE



LOW TEMP STAGE

COMMON TO: 195965

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)
23 CUFT UNITS: R-404A 24 OZ. (680gr) ±1/2 OZ (14gr)
28 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 13.5 OZ (382gr) ± 1/4 OZ.(7gr) OR
20" TO 147 PSIG ± 3 PSIG

17 CUFT UNITS: R-290 0.8 OZ. (23gr) MAX, ; VAC TO 2 PSIG
(120 VOLTS) R-508B 14.4 OZ (408gr) ± 1/4 OZ.(7gr) OR
2 PSIG TO 123 PSIG ± 3 PSIG

17 CUFT UNITS: R-290 0.9 OZ. (26gr) MAX, ; VAC TO 3 PSIG
(230 VOLTS) R-508B 16 OZ (453gr) ± 1/4 OZ.(7gr) OR
3 PSIG TO 134 PSIG ± 3 PSIG

23 CUFT UNITS: R-290 1.0 OZ. (28gr) MAX, ; VAC TO 5 PSIG
R-508B 18.3 OZ (518gr) ± 1/4 OZ.(7gr) OR
5 PSIG TO 152 PSIG ± 3 PSIG

28 CUFT UNITS: R-290 1.0 OZ. (28gr) MAX, ; VAC TO 4 PSIG
R-508B 18.7 OZ (529gr) ± 1/4 OZ.(7gr) OR
4 PSIG TO 144 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

MODEL/PART NAME: -86°C 13, 17, 23 & 28 CU. FT. UPRIGHT H2O COOLED

DWG TITLE: FREEZER REFRIGERATION SCHEMATIC

DWN: DHG	CAD: DHG	APPD: MAH	DATE: 01-23-03	SCALE: NONE

MATERIAL: N/A

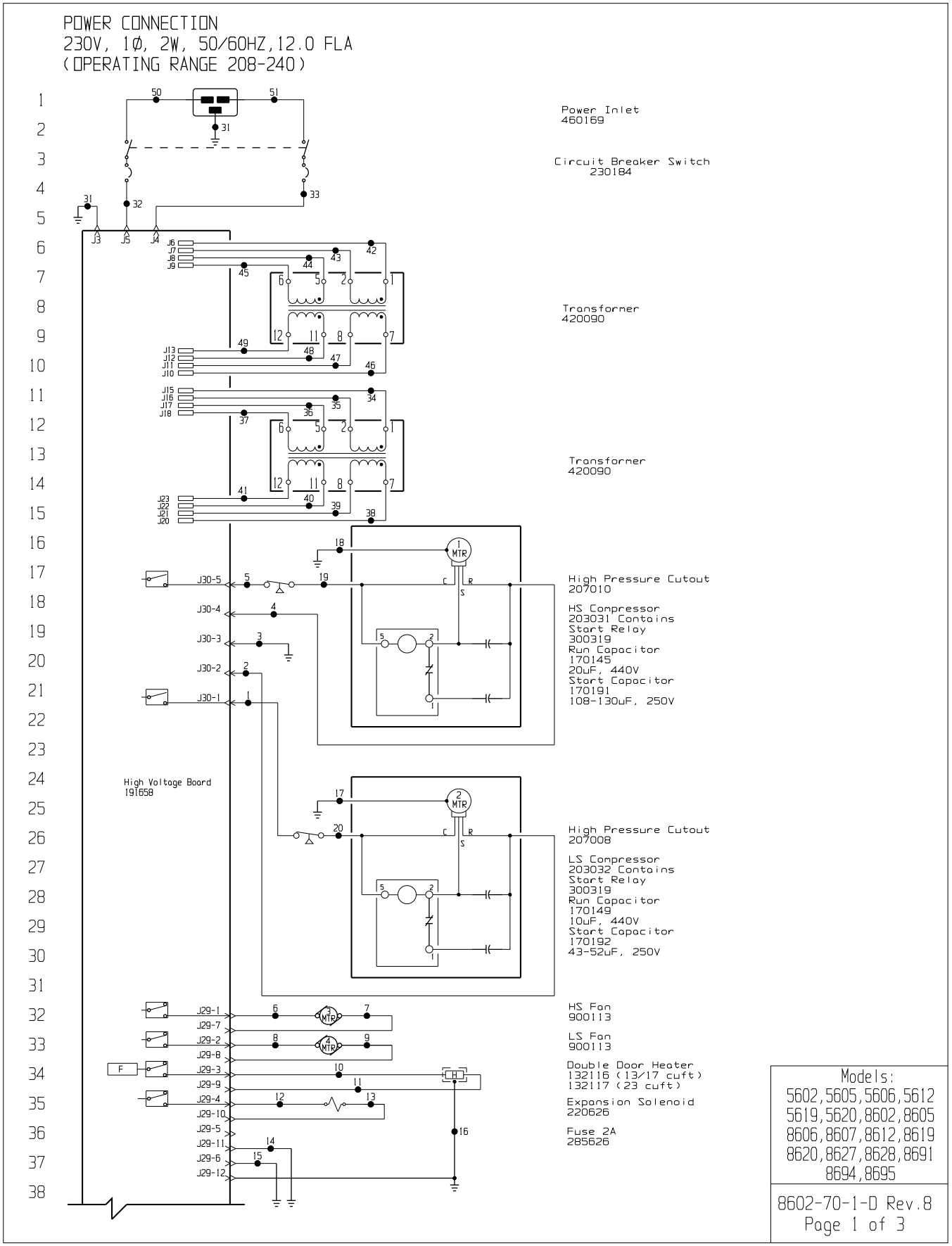
PAINT COLOR: N/A

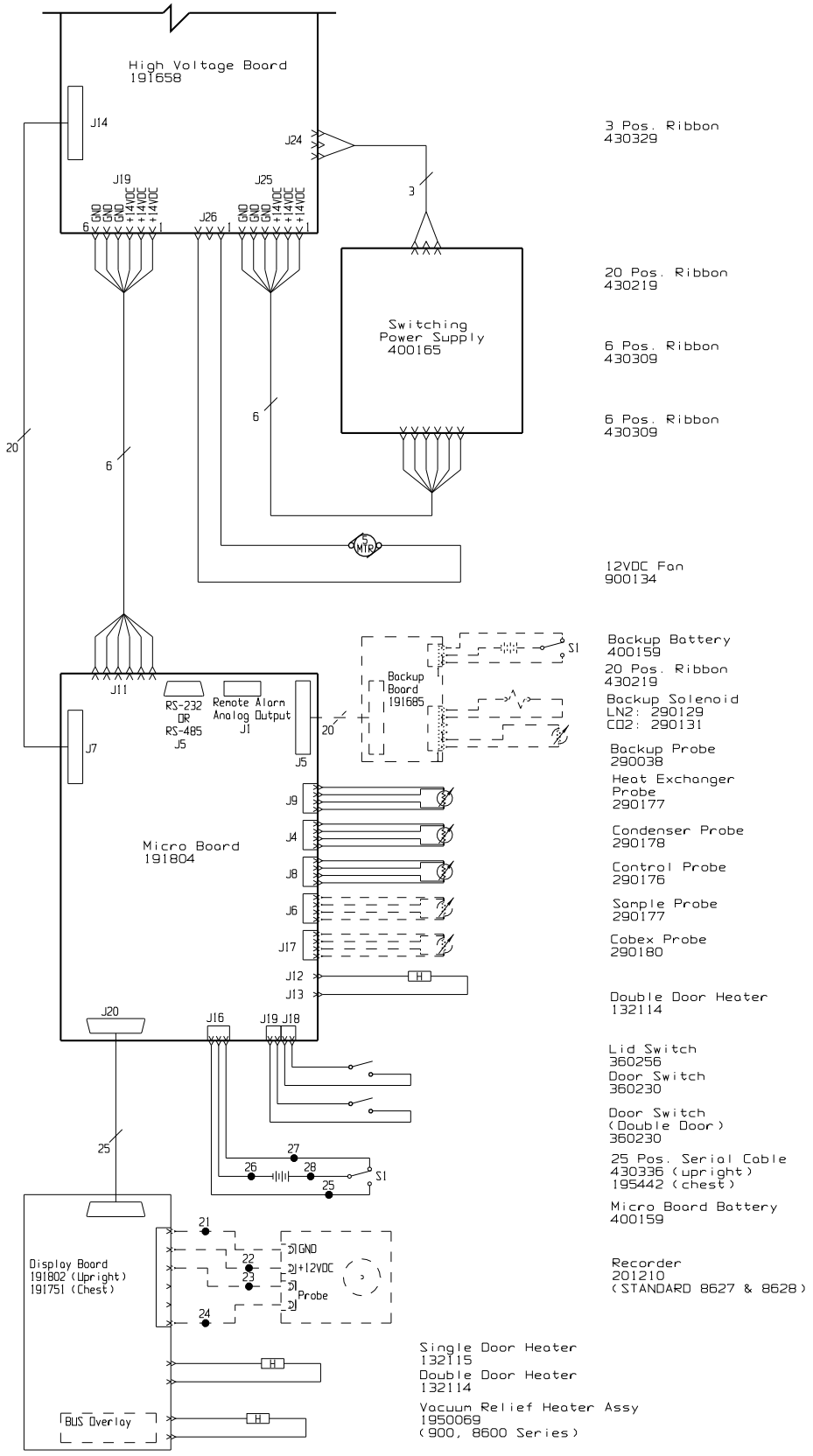
TOLERANCE UNLESS OTHERWISE SPECIFIED
ANGLES: DECIMAL: .XX=±
.XXX=±

DRAWING NUMBER: 195964-90-1

SIZE: B

ThermoFisher SCIENTIFIC
BOX 649, MARIETTA, OHIO 45750


POWER CONNECTION
230V, 1Ø, 2W, 50/60HZ,12.0 FLA
(OPERATING RANGE 208-240)
Power Inlet
460169
Circuit Breaker Switch
230184
Transformer
420090
Transformer
420090
High Pressure Cutout
207010
HS Compressor
203031 Contains
Start Relay
300319
Run Capacitor
170145
20uF, 440V
Start Capacitor
170191
108-130uF, 250V
High Voltage Board
191658
High Pressure Cutout
207008
LS Compressor
203032 Contains
Start Relay
300319
Run Capacitor
170149
10uF, 440V
Start Capacitor
170192
43-52uF, 250V
HS Fan
900113
LS Fan
900113
Double Door Heater
132116 (13/17 cuft)
132117 (23 cuft)
Expansion Solenoid
220626
Fuse 2A
285626
Models:
5602,5605,5606,5612
5619,5620,8602,8605
8606,8607,8612,8619
8620,8627,8628,8691
8694,8695
8602-70-1-D Rev.8
Page 1 of 3



Models:
5602,5605,5606,5612
5619,5620,8602,8605
8606,8607,8612,8619
8620,8627,8628,8691
8694,8695

8602-70-1-D Rev.8
Page 2 of 3

WIRE #	COLOR	GAUGE
1	BLK	14
2	RED	14
3	GRN/YEL	14
4	RED	14
5	BLK	14
6	BLK	18
7	BLK	18
8	BLK	18
9	BLK	18
10	BLK	18
11	BLK	18
12	BLK	18
13	BLK	18
14	GRN/YEL	18
15	GRN/YEL	18
16	GRN/YEL	18
17	GRN/YEL	14
18	GRN/YEL	14
19	BLK	14
20	BLK	14
21	BLK	18
22	RED	18
23	BLK	18
24	RED	18

WIRE #	COLOR	GAUGE
25	WHT	18
26	BLK	18
27	BLK	18
28	RED	18
29		
30		
31	GRN/YEL	14
32	BLK	14
33	BLU	14
34	BLK	14
35	BLU	14
36	BLK	14
37	BLU	14
38	BLK	14
39	BLU	14
40	BLK	14
41	BLU	14
42	BLK	14
43	BLU	14
44	BLK	14
45	BLU	14
46	BLK	14
47	BLU	14
48	BLK	14
49	BLU	14
50	BLK	14
51	BLU	14

Uprights

SIZE	THERMO	THERMO	VWR
13	8602	8691	5602
17	8605	8694	5605
23	8606	8695	5606
28	8607		
13	8627		

Chests

SIZE	THERMO	VWR
12.7	8612	5612
17	8619	5619
20	8620	5620
20	8628	

REMOTE CONTACTS/ANALOG OUTPUT
PIN# 1 Analog Output +
PIN# 2 Analog Output -
PIN# 3 Not Connected
PIN# 4 Not Connected
PIN# 5 Normally Closed
PIN# 6 Common.
PIN# 7 Normally Open

CONTACT RATING: 1A @ 30V
CONTACTS IN ALARM STATE

RS-232 SPECIFICATION

BAUD = 1200
PARITY = N
BITS = 8
STOP BITS = 2

RS-232 PORT
PIN# 2 TXD
PIN# 3 RXD
PIN# 5 GND

SW1 Settings for Analog Output

4-20mA Output

0-1V Output

0-5V Output

SW2 Settings for Communication Output

RS-485

RS-232

1. Schematic represents single & double door upright models and chest models. All heaters are on uprights only. Expansion solenoid on 17, 23 & 28 uprights only.
2. Door switches shown in open position.
3. Battery switch shown in the OFF position.
4. Circuit breaker switch shown in OFF position.
5. Options and acessories shown in dashed lines.

REV	ECN NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
8	FR-1854	06-13-05	HCE	GLS	AKS	REV. BATTERY CIRCUIT WIRING
7	FR-1789	06-13-05	RTB	KDG	LDN	ADD VACUUM RELIEF HEATER & CHG. DISPLAY BD.
6	FR-1766	11-09-04	ADT	KDG	LDN	CHANGED DISPLAY BD. 191751 FROM 191715
5	FR-1789	08-14-04	ADT	KDG	LDN	CHANGED MICRO BOARD 191656 TO 191804

MODEL/PART NAME: 8600 SERIES, 230V, ULT FREEZERS

DWG TITLE: UNIT SCHEMATIC

DWN: ADT	CAD: ADT	APPD: MAH	DATE: 3-22-02	SCALE: NONE

MATERIAL:

PAINT COLOR:

TOLERANCE UNLESS OTHERWISE SPECIFIED
ANGLES: DECIMAL: .XX=± .XXX=±

DRAWING NUMBER 8602-70-1

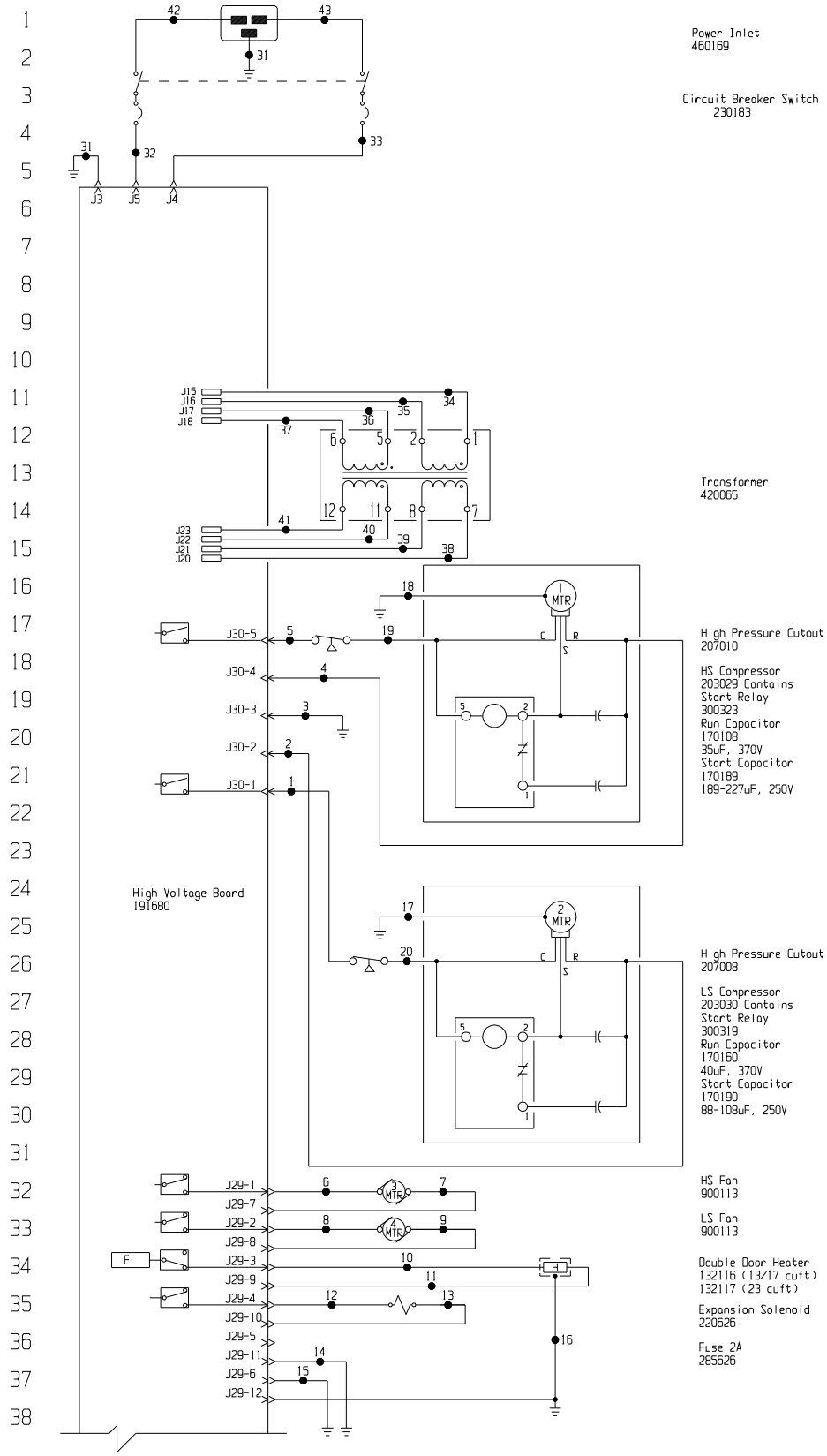
SIZE D

Models:
5602, 5605, 5606, 5612
5619, 5620, 8602, 8605
8606, 8607, 8612, 8619
8620, 8627, 8628, 8691
8694, 8695

8602-70-1-D Rev.8
Page 3 of 3

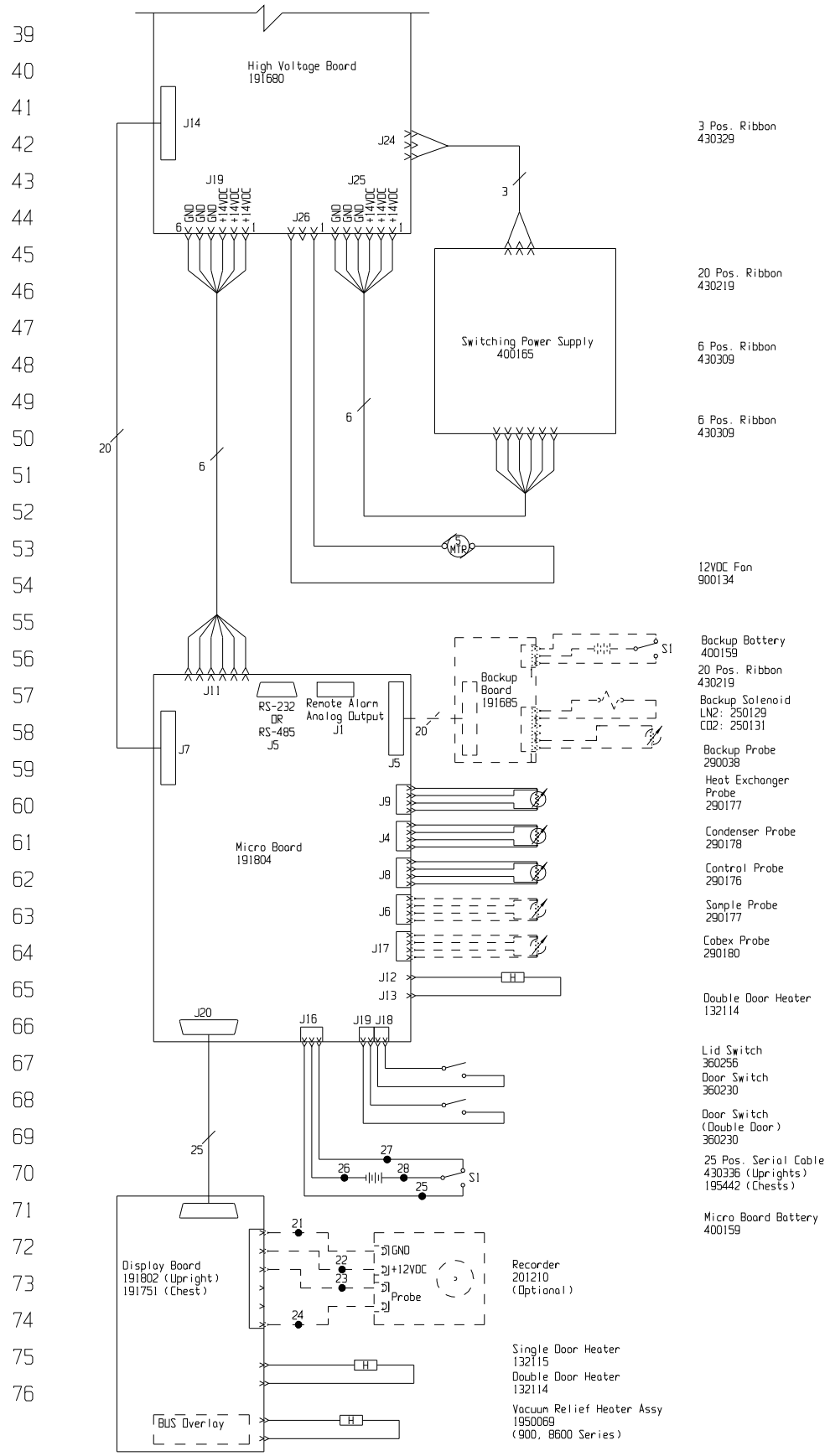
ATTENTION
OBSERVE PRECAUTIONS
ELECTROSTATIC
SENSITIVE DEVICES

Thermo
ELECTRON CORPORATION
Controlled Environment Equipment
Box 649, Marietta, Oh 45750



Electrical Schematic
Models
5603, 5604,5615, 5618
5621, 5656, 8603, 8604
8615, 8618, 8621, 8656
8690, 8692, 8693

8603-70-1-D REV. 9
Page 1 of 3



Electrical Schematic
Models
5603, 5604,5615, 5618
5621, 5656, 8603, 8604
8615, 8618, 8621, 8656
8690, 8692, 8693

8603-70-1-D REV. 9
Page 2 of 3

WIRE #	COLOR	GAUGE	WIRE #	COLOR	GAUGE
1	BLK	14	25	WHT	18
2	RED	14	26	BLK	18
3	GRN/YEL	14	27	BLK	18
4	RED	14	28	RED	18
5	BLK	14	29		
6	BLK	18	30		
7	BLK	18	31	GRN/YEL	14
8	BLK	18	32	BLK	14
9	BLK	18	33	BLU	14
10	BLK	18	34	BLK	14
11	BLK	18	35	BLU	14
12	BLK	18	36	BLK	14
13	BLK	18	37	BLU	14
14	GRN/YEL	18	38	BLK	14
15	GRN/YEL	18	39	BLU	14
16	GRN/YEL	18	40	BLK	14
17	GRN/YEL	14	41	BLU	14
18	GRN/YEL	14	42	BLK	14
19	BLK	14	43	BLU	14
20	BLK	14			
21	BLK	18			
22	RED	18			
23	BLK	18			
24	RED	18			

Uprights

SIZE	THERMO	THERMO	VWR
13	8603	8692	5603
17	8604	8693	5604
23	8656	8690	5656

Chests

SIZE	THERMO	VWR
12.7	8615	5615
17	8618	5618
20	8621	5621

RS-232 SPECIFICATION

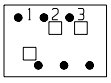
BAUD = 1200
PARITY = N
BITS = 8
STOP BITS = 2

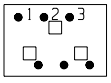
RS-232 PORT
PIN# 2 TXD
PIN# 3 RXD
PIN# 5 GND

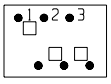
REMOTE CONTACTS/ANALOG OUTPUT
PIN# 1 Analog Output +
PIN# 2 Analog Output -
PIN# 3 Not Connected
PIN# 4 Not Connected
PIN# 5 Normally Closed
PIN# 6 Common.
PIN# 7 Normally Open

CONTACT RATING: 1A @ 30V
CONTACTS IN ALARM STATE

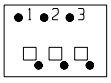
SW1 Settings for Analog Output

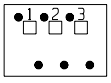
4-20mA Output 

0-1V Output 

0-5V Output 

SW2 Settings for Communication Output

RS-485 

RS-232 

1. Schematic represents single & double door upright models and chest models. All heater are for uprights only. Expansion solenoid on 17 & 23 cuft uprights only.
2. Door switches shown in open position.
3. Battery switch shown in the OFF position.
4. Circuit breaker switch shown in OFF position.
5. Options and acessories shown in dashed lines.

REV	ECN NO.	DATE	BY	CAD	APPD	DESCRIPTION OF REVISION
9	FR-1911	07-27-06	SJN	NSE	CCS	CHG'D START CAPACITORS HIGH/LOW COMPRESSORS
8	FR-1854	06-13-05	HCE	GLS	LDN	REV. BATTERY CIRCUIT WIRING
7	FR-1789	06-13-05	RTB	KDG	LDN	ADD VACUUM RELIEF HEATER & CHG. DISPLAY BD.
6	FR-1766	11-09-04	ADT	KDG	LDN	CHANGED DISPLAY BD. 191751 FROM 191715
5	FR-1789	08-14-04	ADT	KDG	LDN	CHANGED MICRO BOARD 191656 TO 191804

MODEL/PART NAME: 8600 SERIES, 120V, ULT FREEZERS
DWG TITLE: UNIT SCHEMATIC
DWN: ADT | CAD: ADT | APPD: MAH | DATE: 3-22-02 | SCALE: NONE
MATERIAL:
PAINT COLOR:
TOLERANCE UNLESS OTHERWISE SPECIFIED
ANGLES: DECIMAL: .XX=±, .XXX=±
DRAWING NUMBER: 8603-70-1
SIZE: D

ATTENTION
OBSERVE PRECAUTIONS
ELECTROSTATIC
SENSITIVE DEVICES

Thermo
ELECTRON CORPORATION
Controlled Environment Equipment
Box 649, Marietta, Oh 45750

Electrical Schematic
Models
5603, 5604,5615, 5618
5621, 5656, 8603, 8604
8615, 8618, 8621, 8656
8690, 8692, 8693

8603-70-1-D REV. 9
Page 3 of 3

THERMO FISHER SCIENTIFIC 900 & 8600 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 two years of the warranty period, component parts proven to be non-conforming in materials or workmanship will be repaired or replaced at Thermo's expense, labor included. The 900 Series ULT Freezers include an additional two year warranty on the compressors, parts only, F.O.B. factory. The 8600 Series ULT Freezers include an additional three year warranty on the compressors, parts only, F.O.B. factory. Installation and calibration is not covered by this warranty agreement. The Technical Services 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, the foamed-in-place cabinet design carries a unit production lifetime warranty (foamed-in-place cabinet, evaporator and foamed-in-place door; parts only). Please contact your sales representative or Thermo 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 two year warranty period. The Technical Services 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 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 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 Technical Services Department at 1-800-438-4851 (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.

Rev. 4 4/09

ISO 9001 REGISTERED

THERMO FISHER SCIENTIFIC 900 & 8600 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 Technical Services Department.

During the first two years of the warranty period, component parts proven to be non-conforming in materials or workmanship will be repaired or replaced at Thermo's expense, labor excluded. The 900 Series ULT Freezers include an additional two year warranty on the compressors, parts only, F.O.B. factory. The 8600 Series ULT Freezers include an additional three year warranty on the compressors, parts only, F.O.B. factory. Installation and calibration is not covered by this warranty agreement. The Technical Services 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, the foamed-in-place cabinet design carries a unit production lifetime warranty (foamed-in-place cabinet, evaporator and foamed-in-place door; parts only). Please contact your sales representative or Thermo 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 two year warranty period. The Technical Services 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 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 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 (1-800-438-4851 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.

Rev. 4 4/09

ISO 9001 REGISTERED

Appendix A Handling Liquid Nitrogen

Warning Contact of liquid nitrogen or cold gas with the skin or eyes may cause serious freezing (frostbite) injury. ▲

Handle liquid nitrogen carefully.

The extremely low temperature can freeze human flesh very rapidly. When spilled on a surface the liquid tends to cover it completely and intimately, cooling a large area. The gas issuing from the liquid is also extremely cold. Delicate tissue, such as that of the eyes, can be damaged by an exposure to the cold gas which would be too brief to affect the skin of the hands or face.

Never allow any unprotected part of your body to touch objects cooled by liquid nitrogen.

Such objects may stick fast to the skin and tear the flesh when you attempt to free yourself. Use tongs to withdraw objects immersed in the liquid, and handle the object carefully.

Wear protective clothing.

Protect your eyes with a face shield or safety goggles (safety glasses without side shields do not give adequate protection). Always wear gloves when handling anything that is, or may have been, in immediate contact with liquid nitrogen. Insulated gloves are recommended, but heavy leather gloves may also be used. The gloves should fit loosely, so that they can be thrown off quickly if liquid should splash into them. When handling liquid in open containers, it is advisable to wear high-top shoes. Trousers (which should be cuffless if possible) should be worn outside the shoes.

Introduction

The safe handling and use of liquid nitrogen in cryogenic refrigerators and dewar flasks is largely a matter of knowing the potential hazards and using common-sense procedures based on that knowledge. There are two important properties of liquid nitrogen that present potential hazards:

1. It is extremely cold. At atmospheric pressure, liquid nitrogen boils at -320°F (-196°C).

2. Very small amounts of liquid vaporize into large amounts of gas. One liter of liquid nitrogen becomes 24.6 cu. ft. (700l) of gas.

The safety precautions in this booklet must be followed to avoid potential injury or damage which could result from these two characteristics. Do not attempt to handle liquid nitrogen until you read and fully understand the potential hazards, their consequences, and the related safety precautions. Keep this booklet handy for ready reference and review.

Note Because argon is an inert gas whose physical properties are very similar to those of nitrogen, the precautions and safe practices for the handling and use of liquid argon are the same as those for liquid nitrogen. ▲

Use only containers designed for low temperature liquids.

Cryogenic containers are specifically designed and made of materials that can withstand the rapid changes and extreme temperature differences encountered in working with liquid nitrogen. Even these special containers should be filled SLOWLY to minimize the internal stresses that occur when any material is cooled. Excessive internal stresses can damage the container.

Do not cover or plug the entrance opening of any liquid nitrogen refrigerator or dewar. Do not use any stopper or other device that would interfere with venting of gas.

These cryogenic liquid containers are generally designed to operate with little or no internal pressure. Inadequate venting can result in excessive gas pressure which could damage or burst the container. Use only the loose-fitting necktube core supplied or one of the approved accessories for closing the necktube. Check the unit periodically to be sure that venting is not restricted by accumulated ice or frost.

Use proper transfer equipment.

Use a phase separator or special filling funnel to prevent splashing and spilling when transferring liquid nitrogen into or from a dewar or refrigerator. The top of the funnel should be partly covered to reduce splashing. Use only small, easily-handled dewars for pouring liquid. For the larger, heavier containers, use a cryogenic liquid withdrawal device to transfer liquid from one container to another. Be sure to follow instructions supplied with the withdrawal device. When liquid cylinders or other large storage containers are used for filling, follow the instructions supplied with those units and their accessories.

Do not overfill containers.

Filling above the bottom of the necktube (or specified maximum level) can result in overflow and spillage of liquid when the necktube core or cover is placed in the opening.

Never use hollow rods or tubes as dipsticks.

When a warm tube is inserted into liquid nitrogen, liquid will spout from the top of the tube due to gasification and rapid expansion of liquid inside the tube.

Warning Nitrogen Gas Can Cause Suffocation Without Warning! ▲

Store and use liquid nitrogen only in a well-ventilated place.

As the liquid evaporates, the resulting gas tends to displace the normal air from the area. In closed areas, excessive amounts of nitrogen gas reduce the concentration of oxygen and can result in asphyxiation. Because nitrogen gas is colorless, odorless and tasteless, it cannot be detected by the human senses and will be breathed as if it were air. Breathing an atmosphere that contains less than 18% oxygen can cause dizziness and quickly result in unconsciousness and death.

Note The cloudy vapor that appears when liquid nitrogen is exposed to the air is condensed moisture; not the gas itself. The issuing gas is invisible. ▲

Never dispose of liquid nitrogen in confined areas or places where others may enter.

Disposal of liquid nitrogen should be done outdoors in a safe place. Pour the liquid slowly on gravel or bare earth where it can evaporate without causing damage. Do not pour the liquid on pavement.

Appendix B Handling Liquid CO_2

Warning High concentrations of CO_2 gas can cause asphyxiation! OSHA Standards specify that employee exposure to carbon dioxide in any eight-hour shift of a 40-hour work week shall not exceed the eight-hour time weighted average of 5000 PPM (0.5% CO_2). The short term exposure limit for 15 minutes or less is 30,000 PPM (3% CO_2). Carbon dioxide monitors are recommended for confined areas where concentrations of carbon dioxide gas can accumulate. ▲

Store and use liquid CO_2 only in a well-ventilated place.

As the liquid evaporates, the resulting gas tends to displace the normal air from the area. In closed areas, excessive amounts of CO_2 gas reduce the concentration of oxygen and can result in asphyxiation. Because CO_2 gas is colorless, odorless and tasteless, it cannot be detected by the human senses and will be breathed as if it were air. Breathing an atmosphere that contains less than 18% oxygen can cause dizziness and quickly result in unconsciousness and death.

Note The cloudy vapor that appears when liquid CO_2 is exposed to the air is condensed moisture; not the gas itself. The issuing gas is invisible. ▲

Never dispose of liquid CO_2 in confined areas or places where others may enter.

Disposal of liquid CO_2 should be done outdoors in a safe place. Pour the liquid slowly on gravel or bare earth where it can evaporate without causing damage. Do not pour the liquid on pavement.

Appendix C First Aid

If a person seems to become dizzy or loses consciousness while working with liquid nitrogen or carbon dioxide, move to a well-ventilated area immediately. If breathing has stopped, apply artificial respiration. If breathing is difficult, give oxygen. Call a physician. Keep warm and at rest.

If exposed to liquid or cold gas, restore tissue to normal body temperature (98.6° F) as rapidly as possible, followed by protection of the injured tissue from further damage and infection. Remove or loosen clothing that may constrict blood circulation to the frozen area. Call a physician. Rapid warming of the affected part is best achieved by using water at 108° F. Under no circumstance should the water be over 112° F, nor should the frozen part be rubbed either before or after rewarming. The patient should neither smoke nor drink alcohol.

Declaration of Conformity

Manufacturer's Name: Thermo Fisher Scientific (Asheville) LLC

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

Product Description: Laboratory Freezer

Product Designations: **8602**

Year of Initial CE Marking: 2002

Affected Serial Numbers: Release 4
(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
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 (applicable sections)
	UL 61010A-1

Richard L. Miller, CQE
Regulatory Compliance Manager

ThermoFisher SCIENTIFIC

25 June 2007

Declaration of Conformity

Manufacturer's Name: Thermo Fisher Scientific (Asheville) LLC

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

Product Description: Laboratory Freezer

Product Designations: **8603**

Year of Initial CE Marking: 2002

Affected Serial Numbers: Release 4
(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
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 (applicable sections)
	UL 61010A-1

Richard L. Miller, CQE
Regulatory Compliance Manager

ThermoFisher SCIENTIFIC

25 June 2007

Declaration of Conformity

Manufacturer's Name: Thermo Fisher Scientific (Asheville) LLC

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

Product Description: Laboratory Freezer

Product Designations: **8604**

Year of Initial CE Marking: 2002

Affected Serial Numbers: Release 4
(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
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 (applicable sections)
	UL 61010A-1

Richard L. Miller, CQE
Regulatory Compliance Manager

ThermoFisher SCIENTIFIC

25 June 2007

Declaration of Conformity

Manufacturer's Name: Thermo Fisher Scientific (Asheville) LLC

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

Product Description: Laboratory Freezer

Product Designations: **8605**

Year of Initial CE Marking: 2002

Affected Serial Numbers: Release 4
(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
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 (applicable sections)
	UL 61010A-1

Richard L. Miller, CQE
Regulatory Compliance Manager

ThermoFisher SCIENTIFIC

25 June 2007

Declaration of Conformity

Manufacturer's Name: Thermo Fisher Scientific (Asheville) LLC.

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

Product Description: Laboratory Freezer

Product Designations: **8606**

Year of Initial CE Marking: 2002

Affected Serial Numbers: Release 4
(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
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 (applicable sections)
	UL 61010A-1

Richard L. Miller, CQE
Regulatory Compliance Manager

ThermoFisher SCIENTIFIC

14 June 2007

Declaration of Conformity

Manufacturer's Name: Thermo Fisher Scientific (Asheville) LLC

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

Product Description: Laboratory Freezer

Product Designations: **8607**

Year of Initial CE Marking: 2002

Affected Serial Numbers: Release 4
(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
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 (applicable sections)
	UL 61010A-1

Richard L. Miller, CQE
Regulatory Compliance Manager

ThermoFisher SCIENTIFIC

14 June 2007

Declaration of Conformity

Manufacturer's Name: Thermo Fisher Scientific (Asheville) LLC

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

Product Description: Blood Bank Freezer

Product Designations: **8627**

Year of Initial CE Marking: 2002

Affected Serial Numbers: Release 4
(Release level [REL#] shown on Serial Tag)

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

EMC: 89/336/EEC
MDD: 93/42/EEC

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

EMC:	**MDD:**
EN 61326-1:1997	EN 61010-1
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 (applicable sections)
	UL 61010A-1

Richard L. Miller, CQE
Regulatory Compliance Manager

ThermoFisher SCIENTIFIC

25 June 2007

Declaration of Conformity

Manufacturer's Name: Thermo Fisher Scientific (Asheville) LLC

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

Product Description: Laboratory Freezer

Product Designations: **8656**

Year of Initial CE Marking: 2004

Affected Serial Numbers: Release 4
(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
EN 50081-1:92	Amendments 1 and 2
EN 50082-1:97	CSA C22.2 No. 1010.1
	UL 471 (applicable sections)
	UL 61010-1

Richard L. Miller, CQE
Regulatory Compliance Manager

ThermoFisher SCIENTIFIC

14 June 2007

Declaration of Conformity

Manufacturer's Name: Thermo Fisher Scientific (Asheville) LLC

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

Product Description: Laboratory Freezer

Product Designations: **8690**

Year of Initial CE Marking: 2004

Affected Serial Numbers: Release 4
(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
EN 50081-1:92	Amendments 1 and 2
EN 50082-1:97	CSA C22.2 No. 1010.1
	UL 471 (applicable sections)
	UL 61010-1

Richard L. Miller, CQE
Regulatory Compliance Manager

ThermoFisher SCIENTIFIC

14 June 2007

Declaration of Conformity

Manufacturer's Name: Thermo Fisher Scientific (Asheville) LLC

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

Product Description: Laboratory Freezer

Product Designations: **8691**

Year of Initial CE Marking: 2002

Affected Serial Numbers: Release 4
(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
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 (applicable sections)
	UL 61010A-1

Richard L. Miller, CQE
Regulatory Compliance Manager

ThermoFisher SCIENTIFIC

25 June 2007

Declaration of Conformity

Manufacturer's Name: Thermo Fisher Scientific (Asheville) LLC

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

Product Description: Laboratory Freezer

Product Designations: **8692**

Year of Initial CE Marking: 2002

Affected Serial Numbers: Release 4
(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
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 (applicable sections)
	UL 61010A-1

Richard L. Miller, CQE
Regulatory Compliance Manager

ThermoFisher SCIENTIFIC

25 June 2007

Declaration of Conformity

Manufacturer's Name: Thermo Fisher Scientific (Asheville) LLC

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

Product Description: Laboratory Freezer

Product Designations: **8693**

Year of Initial CE Marking: 2002

Affected Serial Numbers: Release 4
(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
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 (applicable sections)
	UL 61010A-1

Richard L. Miller, CQE
Regulatory Compliance Manager

ThermoFisher SCIENTIFIC

25 June 2007

Declaration of Conformity

Manufacturer's Name: Thermo Fisher Scientific (Asheville) LLC

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

Product Description: Laboratory Freezer

Product Designations: **8694**

Year of Initial CE Marking: 2002

Affected Serial Numbers: Release 4
(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
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 (applicable sections)
	UL 61010A-1

Richard L. Miller, CQE
Regulatory Compliance Manager

ThermoFisher SCIENTIFIC

25 June 2007

Declaration of Conformity

Manufacturer's Name: Thermo Fisher Scientific (Asheville) LLC

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

Product Description: Laboratory Freezer

Product Designations: **8695**

Year of Initial CE Marking: 2002

Affected Serial Numbers: Release 4
(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
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 (applicable sections)
	UL 61010A-1

Richard L. Miller, CQE
Regulatory Compliance Manager

ThermoFisher SCIENTIFIC

14 June 2007

Thermo Scientific
Controlled Environment Equipment
401 Millcreek Road
Marietta, Ohio 45750
United States

www.thermofisher.com