

## INSTRUCTIONS: CASCADE FREEZER

### 1.1 RANGE OF ENVIRONMENTAL CONDITIONS FOR WHICH THIS EQUIPMENT IS DESIGNED

1. Indoor use.
2. Altitude up to 2000m.
3. Temperatures 15°C to 32°C ( 60°F TO 85°F )
4. Recommended humidity range of 30% to 90%.
5. Mains supply fluctuations up to -5% to +10% of the nominal voltage.
6. Transient overvoltages typically present on the mains supply (overvoltage category II). Pollution degree 1.



**CAUTION! THIS FREEZER IS PROVIDED WITH AN INPUT CIRCUIT PROTECTIVE DEVICE WHICH SHALL BE MAINTAINED AND SERVICED BY QUALIFIED PERSONNEL ONLY.**



FUSES OR BREAKERS USED INSIDE PROTECTIVE DEVICE  
15A OR 20A 250V TIME DELAY

**WARNING! UPLUG FREEZER BEFORE ANY TECHNICAL SERVICE IS PERFORMED ON THE UNIT!**



**CAUTION! DO NOT POSITION EQUIPMENT SO IT IS DIFFICULT TO DISCONNECT FROM THE POWER SUPPLY.**

### 1.2 STARTING INSTRUCTIONS

1. Plug the freezer into the proper outlet with an adequate power supply.
2. Confirm the freezer has at least 6" of air space on each side, for air circulation.
3. Turn the refrigeration switch (located in back of unit) to the **ON position** (if applicable).
4. The compressor(s) will start to operate and pull down to the set point on the temperature control.
5. When the freezer reaches the set point, the compressor(s) will cycle on and off to maintain the set point desired by the user on the temperature control.

### 1.3 CLEANING PROCEDURE

1. Wipe down the exterior of the freezer with a soft cloth and spray type polish.
2. If frost builds up in the chamber, a bucket and ice-scraper can be used to the ice. If excessive ice builds up, the unit can be defrosted (see below).

### 1.4 DEFROST PROCEDURE

1. Remove any product in the freezer and store it in a back-up freezer or elsewhere.
2. Unplug the freezer, and open the freezer front door / lid.  
**For upright units, use a cloth to protect the control from dripping water.**
3. Air out the freezer for at least 12 hours, allowing the unit to reach room temperature.
4. Take a rag and wipe up all the excess water in the unit (melted frost).
5. Plug the unit in and set your temperature to the desired setpoint
6. Once the desired temperature is reached, add product back into the unit.

**NOTE: It is recommended to slowly re-add your product into the freezer to prevent an extreme load on the compressors, which could shorten freezer life expectancy.**

### 1.5 AUTOMATIC STARTING SYSTEM

The automatic starting system is provided on all freezer systems in case of power failure. If there is an electrical power interruption to the unit and power is not restored immediately, the unit will automatically start up whenever power is returned.



**ATTENTION: Always leave the refrigeration switch in ON position, as this will automatically activate the automatic starting system.**

Cascade
A timer will engage after power is restored to the unit, the low stage will start to operate and the automatic starting timer will not operate again until power is disconnected from the unit or the low stage system cycles off on high pressure control.





**CAUTION! COVER SCREEN ON BACK OF FREEZER TO BE REMOVED BY AUTHORIZED PERSONNEL ONLY. FOR CONNECTIONS TO THE EXTERNAL ALARM COVER SCREEN MUST BE REPLACED BEFORE PUTTING FREEZER INTO SERVICE. FAILURE TO REINSTALL COVER COULD RESULT IN HAZARD.**

## 1.6 HIGH PRESSURE CONTROL

The high-pressure control is factory set to shut off the low stage system in case of high pressure. The control is set to cut-out at 298 p.s.i.. The low stage system will automatically restart after a preset time delay.

## 1.7 WARNING SYMBOLS

	BLACK WITH YELLOW BACKGROUND	LIGHTNING BOLT	CAUTION: RISK OF ELECTRICAL SHOCK
	BLACK WITH YELLOW BACKGROUND	EXCLAMATION POINT	CAUTION: REFER TO ACCOMPANYING DOCUMENTS



## 1.8 TEMPERATURE CONTROL

The temperature control is manually adjustable to the desired temperature in 1° C increments within the limits of the control range.

**WARNING**

Unauthorized entry into this control will void warranty.

PARTLOW NO. 1160, FDC 4100, FDC 4000  
ELECTRONIC CONTROL

**NOTE: USE ONLY THE “UP” AND “DOWN” KEYS   WHEN MAKING CHANGES ON THIS CONTROL. WARRANTY WILL BE VOID IF USED IN ANY OTHER WAY. CONTACT FACTORY FOR ALL OTHER ADJUSTMENTS IN SETTINGS.**

**TEMPERATURE SET POINT:** The control has two displays, the upper display is the actual chamber temperature and the lower display is the temperature set point. The temperature set point has been preset at the factory.

**CHANGING TEMPERATURE SET POINT:** The temperature set point can be changed by simply pressing the “up” arrow to raise or the “down” arrow to lower the temperature set point.

## 1.9 ALARM SYSTEM

MODEL	OPERATION INSTRUCTIONS
FDC 4000	Alarm will <u>automatically</u> activate when the freezer reaches set point or 8 hours after the unit has been first plugged in.
FDC 4100	Manually activate the alarm by moving the toggle switch to the on position once the freezer reaches setpoint.
PARTLOW 1160	Manually activate the alarm by moving the toggle switch to the on position once the freezer reaches setpoint.

The alarm will not sound again until the temperature varies 12°C (20°F) from the temperature control set point. Please note that the alarm will sound if there is a power outage to the freezer.



**Alarm system should be tested every 30 days.**

- Non-rechargeable batteries should be changed approximately every two years.
- Rechargeable batteries should be changed approximately every three years with lead acid rechargeable 1.2 Ah min, model *PS-640F1* or equivalent.

## 2.0 ALARM BATTERY TESTING

If applicable, the alarm switch has a test position that can be used anytime to see if the battery is charged or if the buzzer is working properly.

### OPTIONAL EQUIPMENT – DRY CONTACT ALARM RELAY

Located on the back of the freezer is a terminal strip marked ALARM RELAY CONTACTS. Rating of this connection:

ALARM RELAY CONTACTS CONNECTION RATING		
PARTLOW 1160	FDC 4100	FDC 4000
10A 250VAC	10A 250VAC	2A 125 VAC
10A 30VDC	10A 30VDC	2A 30 VDC

RED – NORMALLY CLOSED

WHITE – COMMON

BLUE – NORMALLY OPEN



**CAUTION! IF IT IS NECESSARY TO REMOVE METAL COVER SCREEN ON BACK OF FREEZER TO MAKE CONNECTIONS TO ALARM RELAY, COVER MUST BE REPLACED BEFORE FREEZER IS PUT INTO OPERATION**

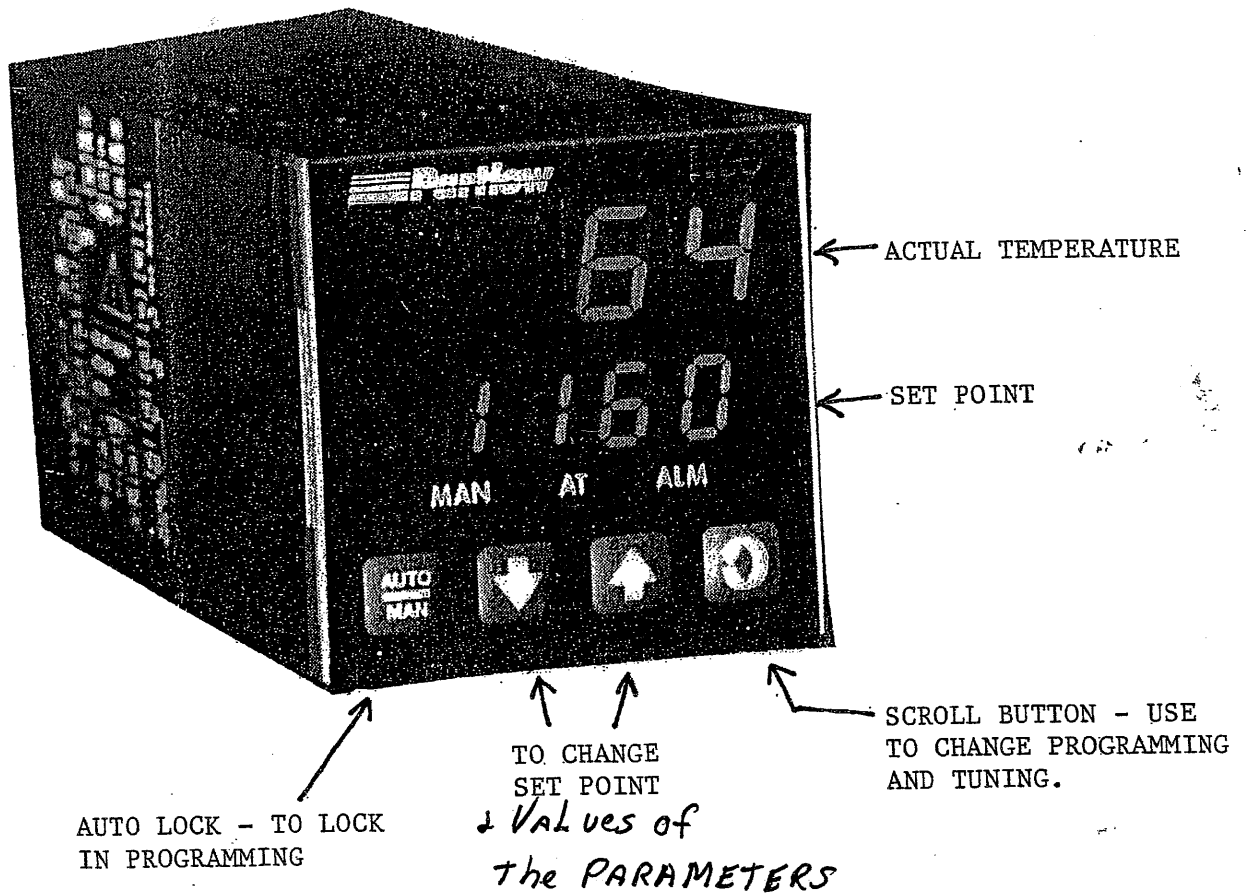
## CONTROL UNLOCK PROCEDURE

1. Hold *UP* and *DOWN* keys together until display stops flashing and **ENAB** appears.
2. Release keys and **EPRO** will appear.
3. Push *SCROLL* key and **OFF** will appear at top.
4. Push *UP* key and turn program to **ON**.
5. Push *SCROLL* key again and **ETUN** will appear.
6. Push *SCROLL* key again and **OFF** will appear.
7. Push *UP* key and turn this program **ON**.
8. Push *SCROLL* key again and top display will go blank.
9. At this time if you wish to **LOCK ESPC** (set point) push *SCROLL* key again and **ON** will appear. Push *DOWN* key and turn this program **OFF**. Repeat steps 8 and 10.
10. Push *UP* key twice, *DOWN* key once and control will return to temperature display and set point.

## CONTROL CALIBRATION PROCEDURE

1. If control is not in alarm state\* - push *SCROLL* key 3 times and bring in **tunE** on bottom display.
  2. Push *DOWN* arrow key until **iCor** appears on bottom display.
  3. Push *SCROLL* key and a **NUMBER** will appear in the top display.
  4. Push the *UP* and *DOWN* arrows keys to make the necessary change.
  5. Push *SCROLL* key to **BLANK** out the top display.
  6. Push the *UP* key twice and the *DOWN* key once and you will return to the temperature / set point display.
- \* If control is in alarm state push the *SCROLL* key, then push the *UP* key and then *SCROLL* key twice to bring control to **tunE** mode.

PARTLOW TEMPERATURE CONTROL *m/n: 1160*  
*or*  
*1400*



1400 PARTLOW  
1160 PARTLOW

Configuration 3.2

All configurable parameters are provided in Tables 3-1 through 3-3 on the following pages. These tables illustrate the display sequence, parameter adjustment and factory setting for each step.

Depression of the SCROLL key will cycle the display if Setpoint Ramp Rate is not enabled (top display is blank, lower display shows the parameter code) through all enabled modes as follows:

CONTROL ---- PROGRAM ---- TUNE  
(Ctrl) (Prog) (tunE)

If a mode is not enabled it will be skipped over by the routine.

3.2.1 ENABLE MODE

The Enable mode provides a means of enabling or disabling access to the Program and Tune modes. If a mode has been disabled, then that mode will not be displayed or available to the user in the Control mode. See Table 3-1 (page 25) for the Enable Mode procedure.

3.2.2 PROGRAM MODE

The Program mode is used to configure or re-configure the instrument. The input and output selections are made in the Program mode. All possible parameters are illustrated in Table 3-2 (page 25). Only those parameters that are applicable to the hardware options chosen will be displayed.

3.2.3 TUNE MODE

The Tune mode is used to adjust the tuning parameters, alarm settings, setpoint limits, and retransmit scaling needed for proper operation of the instrument. See Table 3-3 (page 27) for Tune mode. Only those parameters that are applicable will be displayed.

TABLE 3-1 ENABLE MODE

To enter the Enable mode, press and hold the UP and DOWN keys. After 5 seconds (the AT LED should have flashed once), the display returns to normal. After 5 more seconds, "EnAb" will be displayed. Release the keys, the display should show "EPro". Pressing the DOWN key will display the Enable mode codes in the following sequence:

EPro -- Etun -- ESPC

Pressing the SCROLL key will display the Enable mode codes with the upper display blank. The next depression of the SCROLL key will add the Enable code status (ON or OFF) to the upper display. With the Enable code status displayed, use the UP key to change the status to ON and the DOWN key to change the status to OFF.

To exit the Enable mode, press the UP key with the Enable code displayed in the lower display and the upper display blank.

STEP	DESCRIPTION	DISPLAY CODE	AVAILABLE SETTINGS	FACTORY SETTING
1	Program Mode	EPro	ON/OFF	ON
2	Tune Mode	Etun	ON/OFF	ON
3	Setpoint Changes	ESPC	ON/OFF	ON

TABLE 3-2 PROGRAM MODE

To enter the Program mode, press and release the SCROLL key until "Prog" is displayed. Use the DOWN key to enter the Program mode. Depress and release the SCROLL key to sequence through the parameters and their values, alternately showing the parameter code in the lower display with the upper display blank, then the parameter code with the parameter value displayed. Use the UP and DOWN keys to adjust the parameter values. After adjusting a parameter, the upper display will flash, indicating that the new setting has yet to be confirmed. When the setting is as required, it may be confirmed by pressing the AUTO/MANUAL key and the upper display stops flashing. After confirming a change, press the SCROLL key to proceed to the next parameter. Use the DOWN key to advance to the next parameter when a parameter code is showing in the lower display and the upper display is blank.

To exit the Program mode, press the UP key whenever a parameter code is displayed in the lower display and the upper display is blank.

DEFAULT PARAMETER INDICATION

If a parameter value, such as Input Select, was changed while in the Program mode, when returning to the Control mode, a decimal point after each digit will be lit. This display indicates all Tune mode parameters have been set to their default condition. To clear this condition, enter the Tune mode and make a parameter value change and review each parameter for its proper setting.



("1" - not used)

1525 °C ← 1526 °F

STEP	DESCRIPTION	DISPLAY CODE	AVAILABLE SETTINGS	FACTORY SETTING
1	Input Select	inPS	See App. D*	1420
2	Output 1 Action	Out1	Reverse <u>Direct</u>	REV
3	Alarm 1 Type (Output 3 position)	ALA1	P_hi = Proc High <u>nonE = No Alarm</u> <u>BAND = Band</u> dE = Deviation P_Lo = Proc Low	P_hi
4	Alarm 2 Type (Output 2 position)	ALA2	Same selection as ALA1 <u>BAND</u>	nonE
5	Output 2 Usage	USE2	Out2 = Control (action opposite of Out1) LP_r = Loop Reverse LP_d = Loop Direct Ad_r = Rev Logic AND Ad_d = Dir Logic AND Or_r = Rev Logic OR Or_d = Dir Logic OR A2_r = Alm Rev A2_d = Alm Dir	Out2
6	Output 3 Usage	USE3	Al_d = Alm Dir rEcP = Rcdr Out P.V. rEcS = Rcdr Out S.P. LP_r = Loop Reverse LP_d = Loop Direct Ad_r = Rev Logic AND Ad_d = Dir Logic AND Or_r = Rev Logic OR Or_d = Dir Logic OR Al_r = Alm Rev	Al_d
7	Com Bit Rate	CbS	1200, 2400, 4800, 9600	4800

A2-d

STEP	DESCRIPTION	DISPLAY CODE	AVAILABLE SETTINGS	FACTORY SETTING
8	Com Address	CAd	1 - 32	1
9	CJC Enable	CJC	<u>EnAb</u> dISA	EnAb

\* The Hardware Definition Code and input jumper configuration may need to be changed. See Appendix B and C.

### TABLE 3-3 TUNE MODE

To enter the Tune mode, press and release the SCROLL key until tunE is displayed. Use the DOWN key to enter the Tune mode. Depress and release the SCROLL key to sequence through the parameters and their values, alternately showing the parameter code in the lower display with the upper display blank, then the parameter code with the parameter value displayed. Use the UP and DOWN keys to adjust the parameter values. After adjusting a parameter, depress the SCROLL key to proceed to the next parameter. Use the DOWN key to advance to the next parameter when a parameter code is showing in the lower display and the upper display is blank.

To exit the Tune mode, press the UP key whenever a parameter code is displayed in the lower display and the upper display is blank.

1	Ramping Setpoint Value	SPrP	± Setpoint Limits	Read Only
2	Setpoint Ramp Rate	SPrr	1 to 9999 units/hour and <u>OFF</u>	<u>OFF</u>
3	Input Filter	Filt	0.0 to 100.0 seconds in .5 sec. increments	<u>2.0</u>
4	Input Correct	iCor	± Span	<u>0</u>
5	Output 1% (Continued on next page)	Po1	0 to <u>100%</u>	Read Only

\* ↑

CALIBRATION

1 means NOT used

STEP	DESCRIPTION	DISPLAY CODE	AVAILABLE SETTINGS	FACTORY SETTING
<del>6</del>	Output 2%	Po2	0 to 100%	Read Only
7	1st Output Prop. Band	Pb1	0 to 999.9% of Input Span 0%=On/OFF	0.0
<del>8</del>	2nd Output Prop. Band	Pb2	0 to 999.9% of Input Span 0%=ON/OFF	5.0
<del>9</del>	Automatic Reset	ArSt	OFF to 99 mins. 59 secs	OFF
<del>10</del>	Rate	rAtE	0 sec to 99 mins. 59 secs.	0 secs.
<del>11</del>	Overlap/Deadband	SPrd	-20 to 20% of Pb1 + Pb2	0%
<del>12</del>	Manual Reset	rSEt	0 to 100% Output 1 100 to 100% Out 2	25%
13	Hysteresis	- OFF TIME		0.5 OF
	Output 1	HyS1	0.1 to 10.0% of span	0.5
	Output 2	HyS2	0.1 to 10.0% of span	0.5
	Out 1 & Out 2	HySt	0.1 to 10.0% of span	0.5
	(Alarm hysteresis is fixed at 2 deg.)			
14	Setpoint Upper Limit	SPuL	Span Max. 0°C or 32°F	Span Max. 40
15	Setpoint Lower Limit	SPLL	Span Min. -67°C or -50°F	Span Min. -100°C or -150°F
<del>16</del>	Process Output Upper	Pou	-1999 to 9999	Span Max.

single stage models (-40°)  
cascade models

STEP	DESCRIPTION	DISPLAY CODE	AVAILABLE SETTINGS	FACTORY SETTING
<del>17</del>	Process Output Lower	PoL	-1999 to 9999	Span. Min.
<del>18</del>	Output 1 % Limit	o1PL	0 to 100%	100
<del>19</del>	Output 1 Cycle Time	Ct1	.5, 1, 2, 4, 8, 16, 32, 64, 128, 256, 512 secs	32
<del>20</del>	Output 2 Cycle Time	Ct2	.5, 1, 2, 4, 8, 16, 32, 64, 128, 256, 512 secs	32
<del>21</del>	Process High Alarm 1	PHA1	± Span	Span Max.
<del>22</del>	Process Low Alarm 1	PLA1	± Span	Span Min.
<del>23</del>	Band Alarm 1	bAL1	0 to Span	5
<del>24</del>	Deviation Alarm 1	dAL1	± Span	5
<del>25</del>	Process High Alarm 2	PHA2	± Span	Span Max.
<del>26</del>	Process Low Alarm 2	PLA2	± Span	Span Min.
<del>27</del>	Band Alarm 2	bAL2	0 to Span	5
<del>28</del>	Deviation Alarm 2	dAL2	± Span	5

1 means NOT USED

ALARM DIFF.  
11  
19

(Abridged Version)  
PART Low 1160 - 1400

\* Factory To Change  
OFF ON  
OFF ON  
ON-S.P. ON-S.P.

PROGRAM\*

TUNE

INPS - 1525°C  
1526°F  
QUEL1 - dir  
ALAI - NONE  
ALAI2 - band  
USE2 - A2-d  
CJC - ENAB

SPrr - OFF  
ALSE - 2  
File - 2.0  
Cor - 0 <sup>DIFF</sup> <sub>TEMP</sub> <sub>CHANGE</sub> > CALIBRATION  
Poi - 100  
Pbi - 0.0  
HY51 - 0.6°C (0.4) ← for tighter cycle  
SPuL - -40°C - 40°F  
SPLL - 100°C - 150°F  
BAL2 - 11°C - 19°F

U40-22	+32°F
	(0°C)
	-67°F
	(-67°C)
CH-40 or 45	

THIS MAY BE EASIER TO FOLLOW

ONCE YOU GET INTO PROGRAM & TUNE MODE

\* Any changes made in the Program Mode must be  
locked in by pressing the Auto/Man button

SCROLL

UP ↑

SCROLL

DOWN ↓

SCROLL 1525 or 1526°F

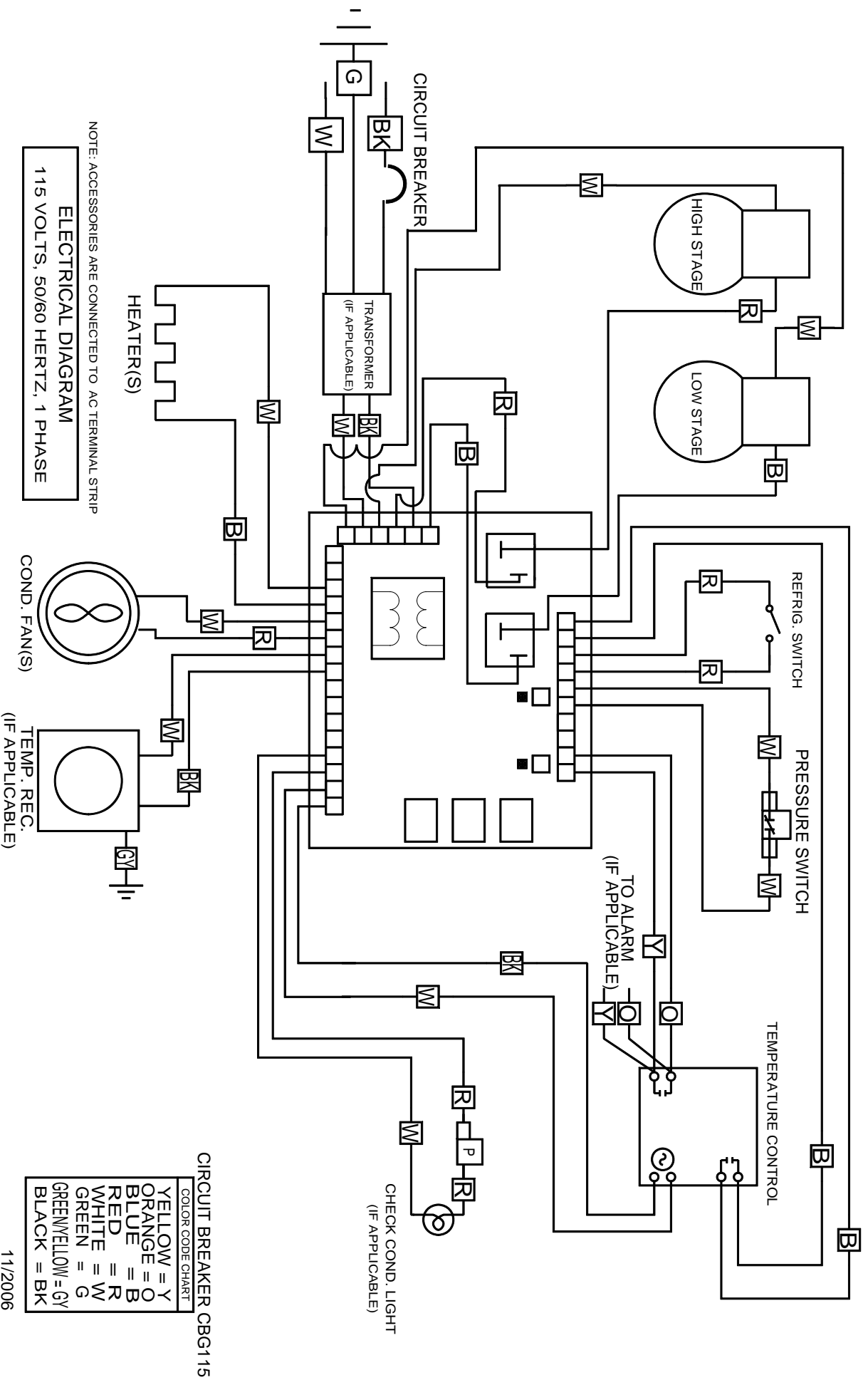
ENAB

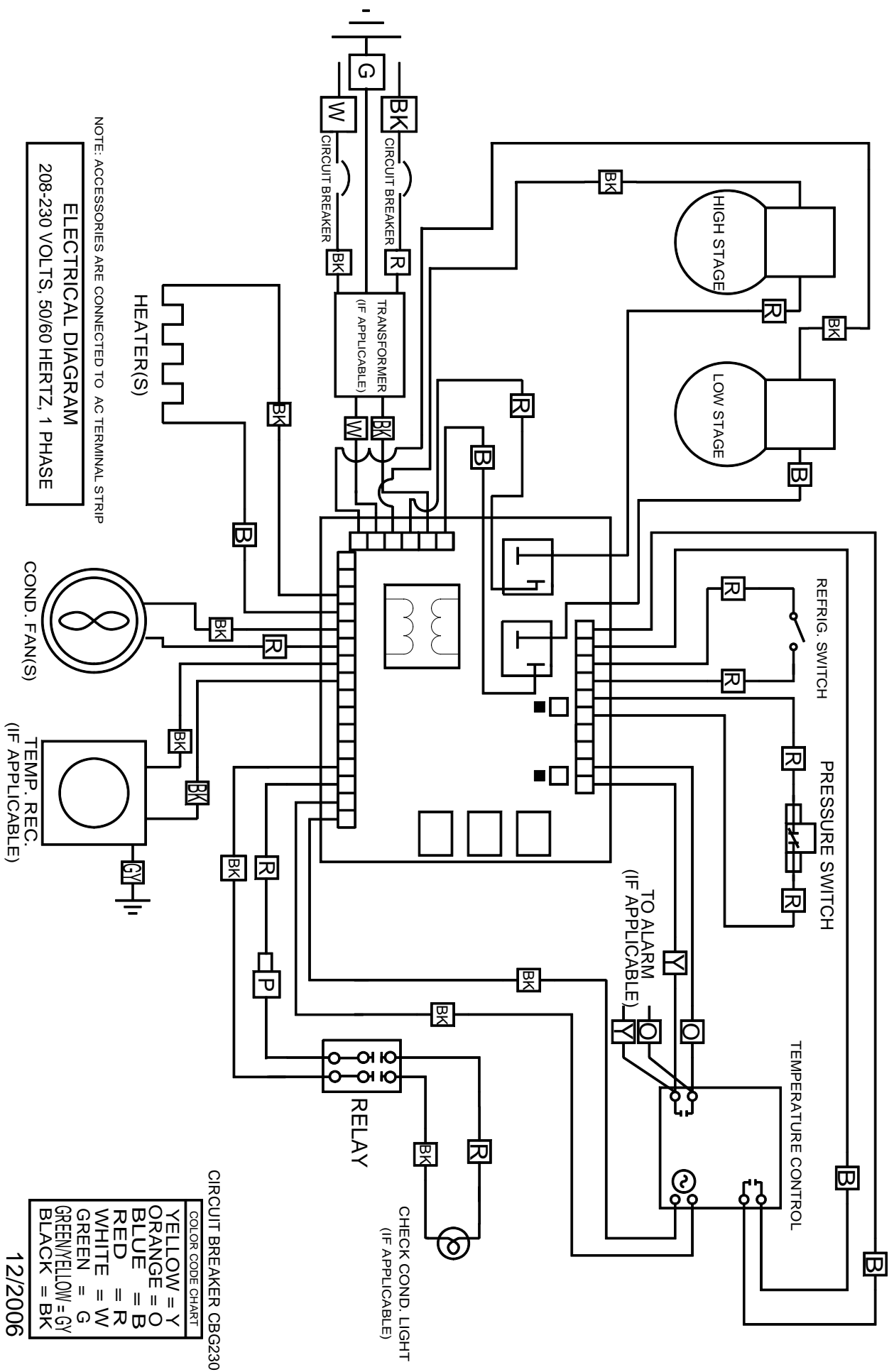
SCROLL

EPRO OFF TO ON!

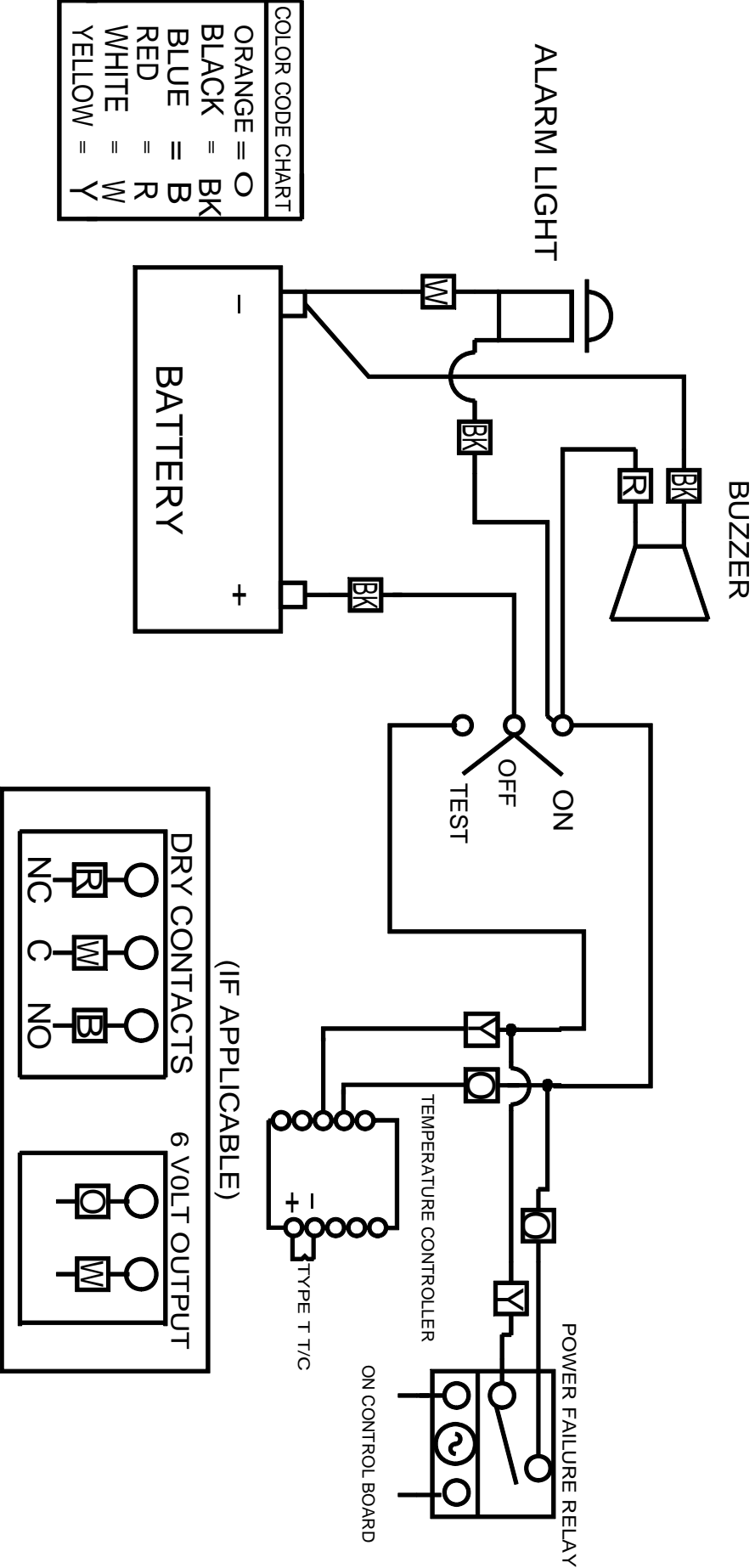
ETUN OFF TO ON!

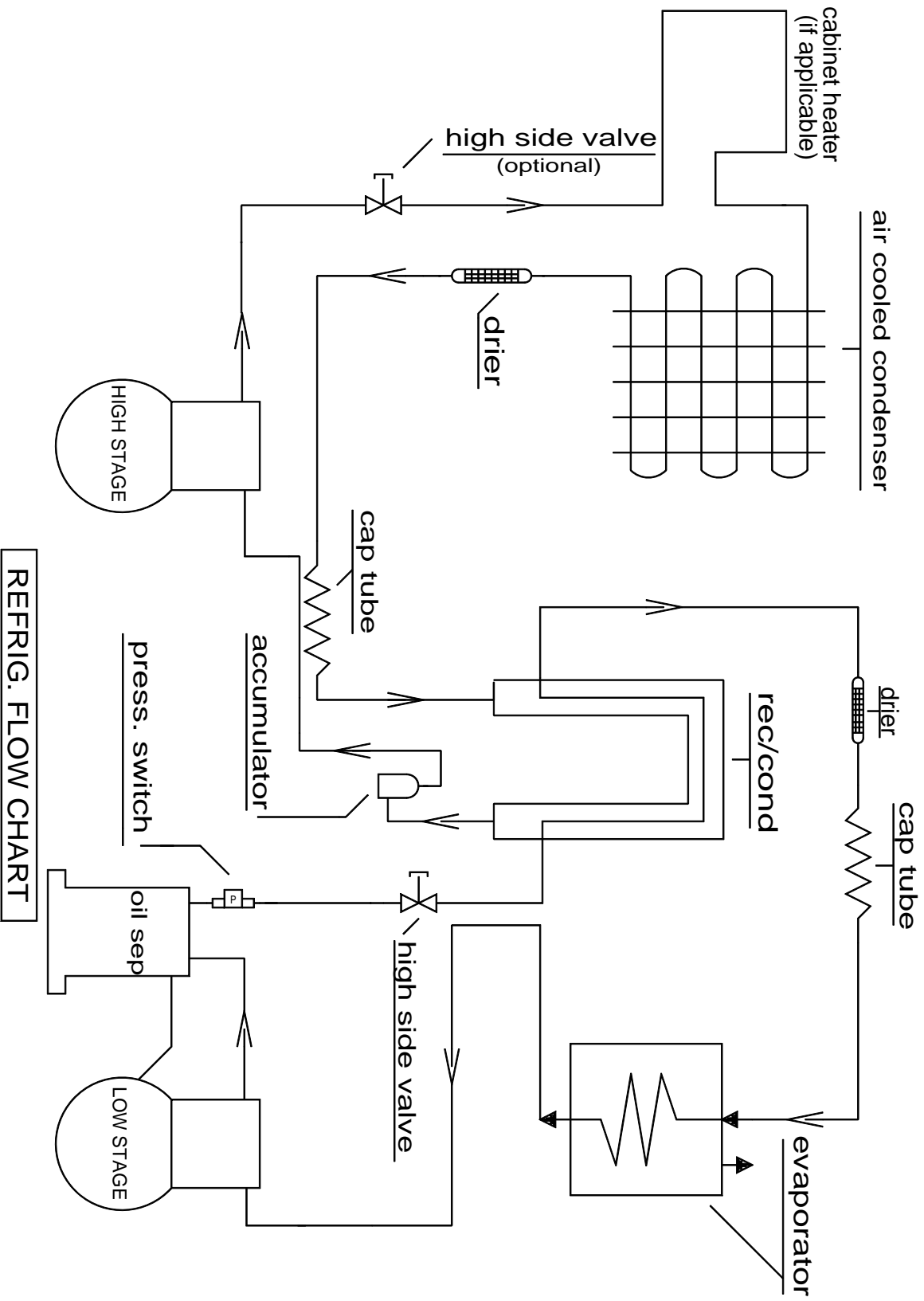
ALWAYS ON = LOCKS (FACTORY)





PARTLOW 1160 / FDC4100





REFRIG. FLOW CHART

HOT GAS BYPASS CASCADE FLOW CHART

## CS REFRIGERATION & HARDWARE PARTS LIST



TO ENSURE YOU ARE PROVIDED THE CORRECT PARTS,  
THE **MODEL AND SERIAL NUMBER** OF YOUR UNIT  
MUST BE PROVIDED WHEN ORDERING.

COMPRESSOR MODEL	HP	VOLTAGE	HERTZ	PHASE	SO-LOW PART #
TECUMSEH AJB2433ZXA	1	115	50/60	1	<b>AJB24-115</b>
TECUMSEH AJB2433ZXD	1	208/220/230	50/60	1	<b>AJB24-208</b>
EMBRACO FFI12HBX	$\frac{1}{3}$	115	50/60	1	<b>FF12-115</b>
DANFOSS SC15FTX	$\frac{1}{3}$	115	50/60	1	<b>SC15-115</b>
DANFOSS SC18FTX	$\frac{1}{2}$	208/220/230	50/60	1	<b>SC15-208</b>

TEMPERATURE CONTROL PARTS	SO-LOW PART #
FDC 4100	<b>4100</b>
FDC 4000	<b>4000</b>
FDC nCOMPASS	<b>nCOMPASS</b>

CASCADE ELECTRICAL PARTS	SO-LOW PART #
Heater Harness No. H-200	<b>217-VOLTAGE</b>
Refrigeration Switch No. 2X464	<b>TOGGLE</b>
Condenser Fan Motor No. GE-5411 - 115/60/1	<b>500-115</b>
Condenser Fan Motor No. GE-5421 - 230/50-60/1	<b>500-VOLTAGE</b>
Electrical Cord No. 8-3 <b>(Please Specify Voltage)</b>	<b>PWRCRD-VOLTAGE</b>
Control Board No. CECB2TUV <b>(Please Specify Voltage)</b>	<b>231-VOLTAGE</b>

REFRIGERATION HIGH STAGE PARTS	SO-LOW PART #
Air Cooled Condenser No. 3CZ0602B	<b>254</b>
Drier No. C-053-S	<b>256H</b>
Capillary Tube	<b>HS-17, HS-20</b>
Oil Separator, Temprite Series 900 <b>(If Applicable)</b>	<b>900</b>

REFRIGERATION LOW STAGE PARTS	SO-LOW PART #
Pressure Control No. 20PS01-0039	<b>259</b>
Receiver Condenser	<b>RCN-LS</b>
Drier No. CO-52S-S	<b>256L</b>
Capillary Tube	<b>LS-28, LS-31</b>
Oil Separator, Temprite Series 900 <b>(If Applicable)</b>	<b>900</b>

HARDWARE PARTS	SO-LOW PART #
Latch No. METL-L1-99	<b>REX37L1-3</b>
Chest Hinge	<b>59-928M</b>
Upright Hinge No. Polar 109-LH	<b>59-928U</b>
Cabinet Gasket	<b>NX504B1</b>
Lid or Door Gasket	<b>PSOS</b>
Grill No. 650H	<b>356F, 356S</b>
Sub-Lids <b>(Must have Model Number)</b>	<b>SL-MODEL NUMBER</b>
Inner Door <b>(Must have Model &amp; Serial Number)</b>	<b>357-MODEL NUMBER-SERIAL NUMBER</b>
Clips & Rollers for Inner Doors <b>(Quantity 10 minimum)</b>	<b>405</b>
Shelves for Freezer <b>(Must have Model Number)</b>	<b>4015-MODEL NUMBER</b>