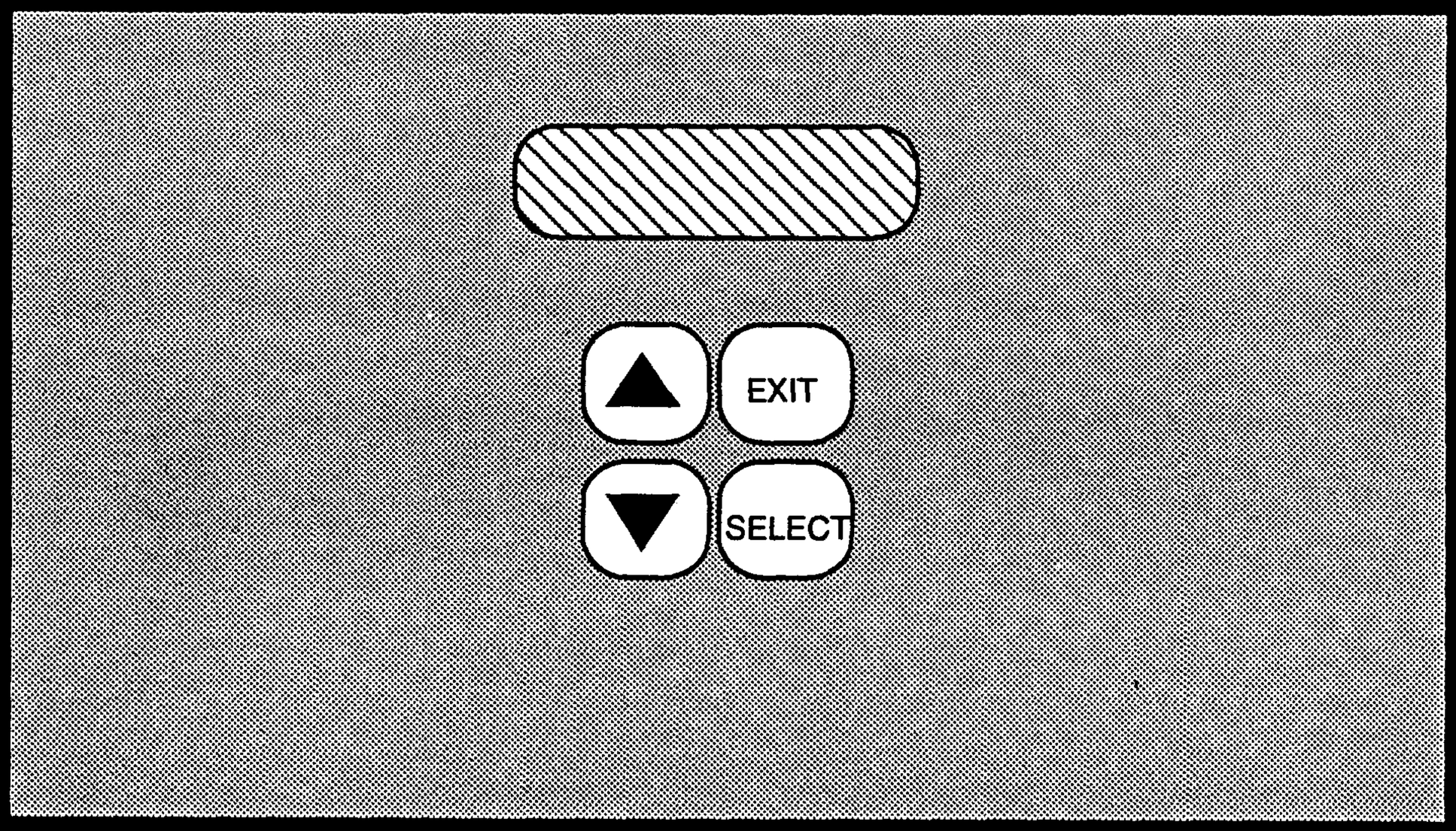
HUSSMANN®

EPC-100

Electronic Conventional Controller



Installation & Operation Manual

P/N 365531
EPC-100
June, 1993

EPC–100 INSTALLATION AND OPERATING INSTRUCTIONS

P/N 365531

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WARRANTY

INTRODUCTION

PURPOSE

The EPC–100™ Conventional Control is designed to operate all functions of a condensing unit. The EPC–100 controller is distinguished by the simplicity of its front panel, which offers minimum, yet versatile keys and functions (see Figure 1–1). The EPC–100 will control up to 2 compressors, or 1 compressor and an unloader. The control can also operate single speed or 3–speed condenser fans. There is an alarm for abnormal operating conditions.

DISPLAY

The EPC–100 has a vacuum fluorescent 10–character display, which is protected by a blue shield. The display will remain ON for two hours after the last manual key entry. It will then perform a power down function (to extend the display life), but may be brought back up at any time by pressing any key.

NOTE: The display will not power down if the system is in alarm. Should an alarm occur after a power down, the display will automatically come on to signal the alarm.

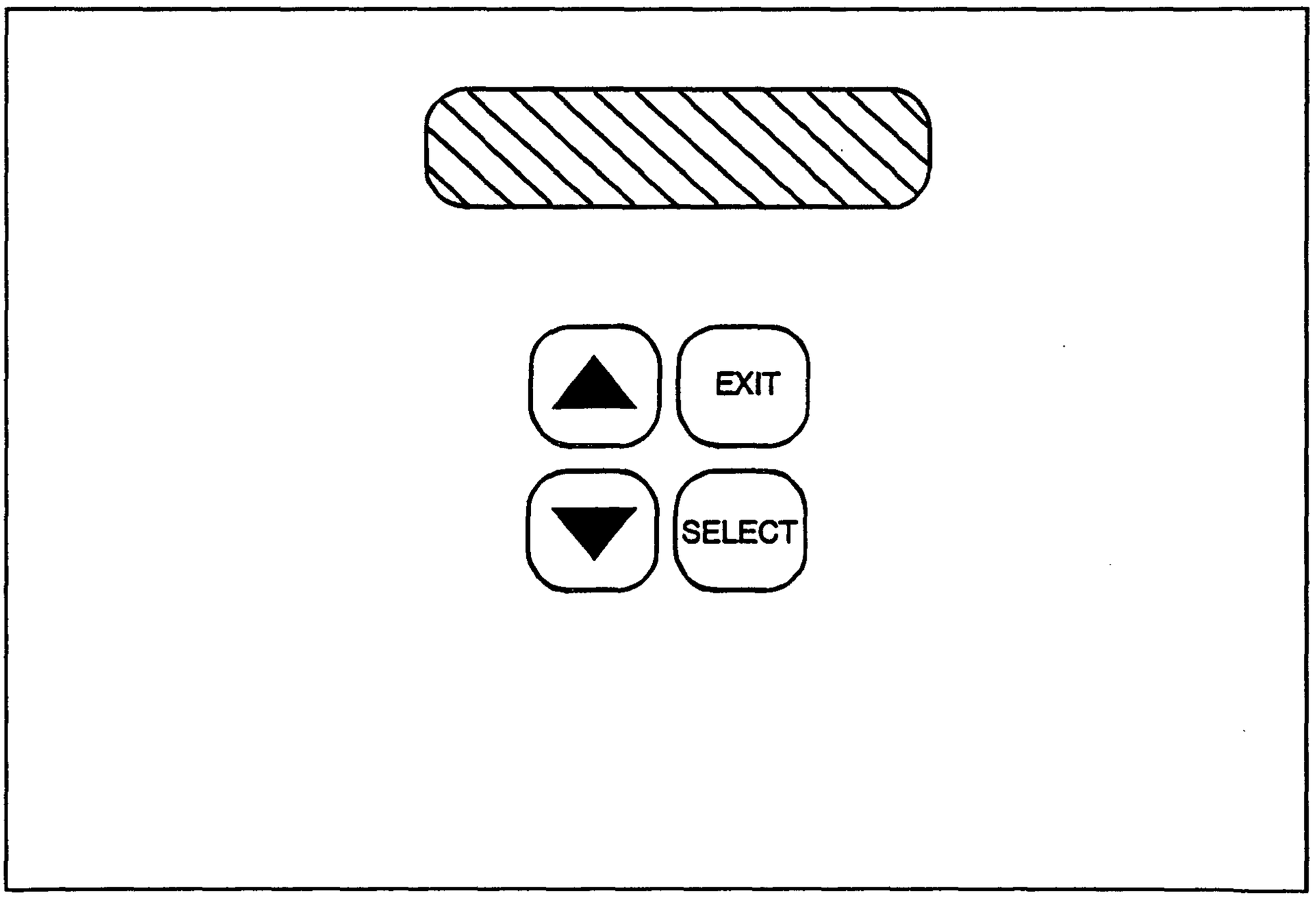


Figure 1–1. EPC–100 Front View

INPUT/OUTPUT

The EPC–100 is a self contained unit which combines the controller with input and output terminals. The input section accommodates the suction pressure transducer, head pressure transducer, case temperature sensor, and defrost temperature termination contact. These inputs attach to identified screw terminals which are located on the left side of the control when facing the front (See Figure 1–2). There are also inputs for liquid line temperature, and oil pressure failure, as shown in Figure 1–2.

Control of the outputs is accomplished through the tab type connectors on the right side (when facing the front) of the control.

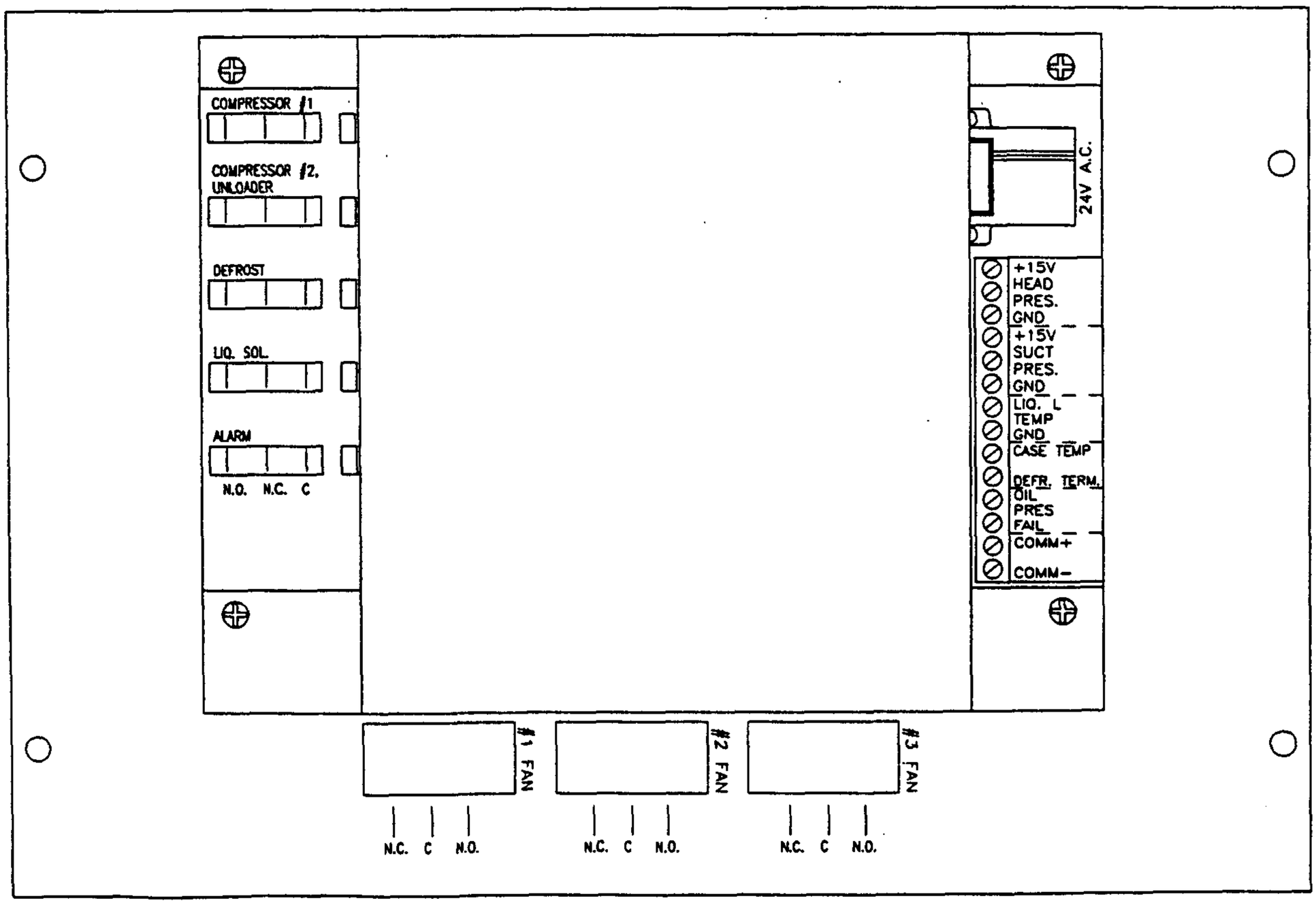


Figure 1–2. EPC–100 Rear View

COMPONENTS

Head Pressure Transducer
Suction Pressure Transducer
Liquid Line Temperature Sensor (Optional)
Defrost Temperature Termination Switch
Case Temperature Sensor
Oil Pressure Failure Switch
24V AC Power Plug Assembly

Temperature Sensors

The case and liquid line temperature sensors are fast response, non polarized, resistive type. See Figure 1–3.

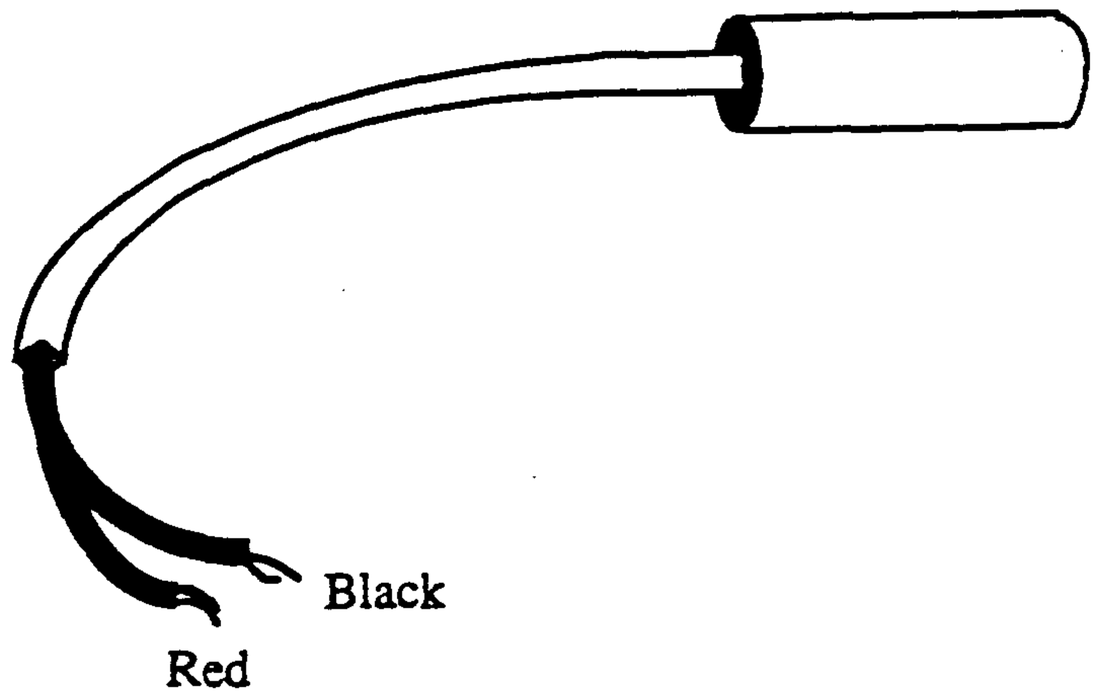


Figure 1–3. Typical Temperature Sensor

Pressure Transducers

The suction and head pressure transducers provide a 0 to 15V analog signal back to the processor which is proportional to the pressure detected. See Figure 1–4. Read the transducer labels for wire color and function.

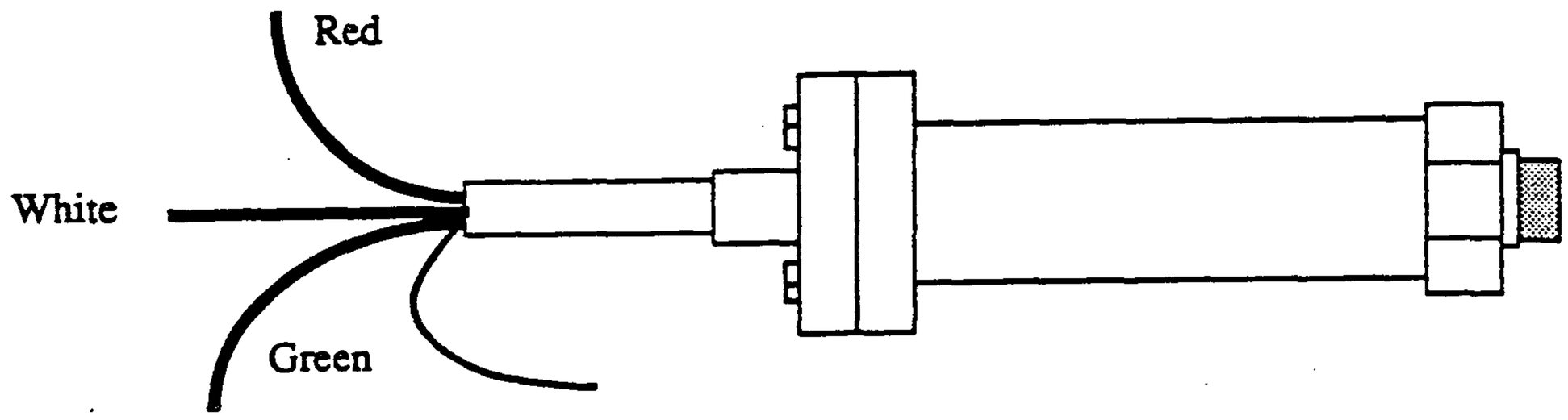


Figure 1–4. Typical Pressure Transducer

Transformer

The Class 2 control transformer is the power source for the EPC–100, providing conversion from the power line voltages to 24V AC. See Figure 1–5. The transformer is connected to the processor assembly by the fused power cable assembly (Figure 1–6).

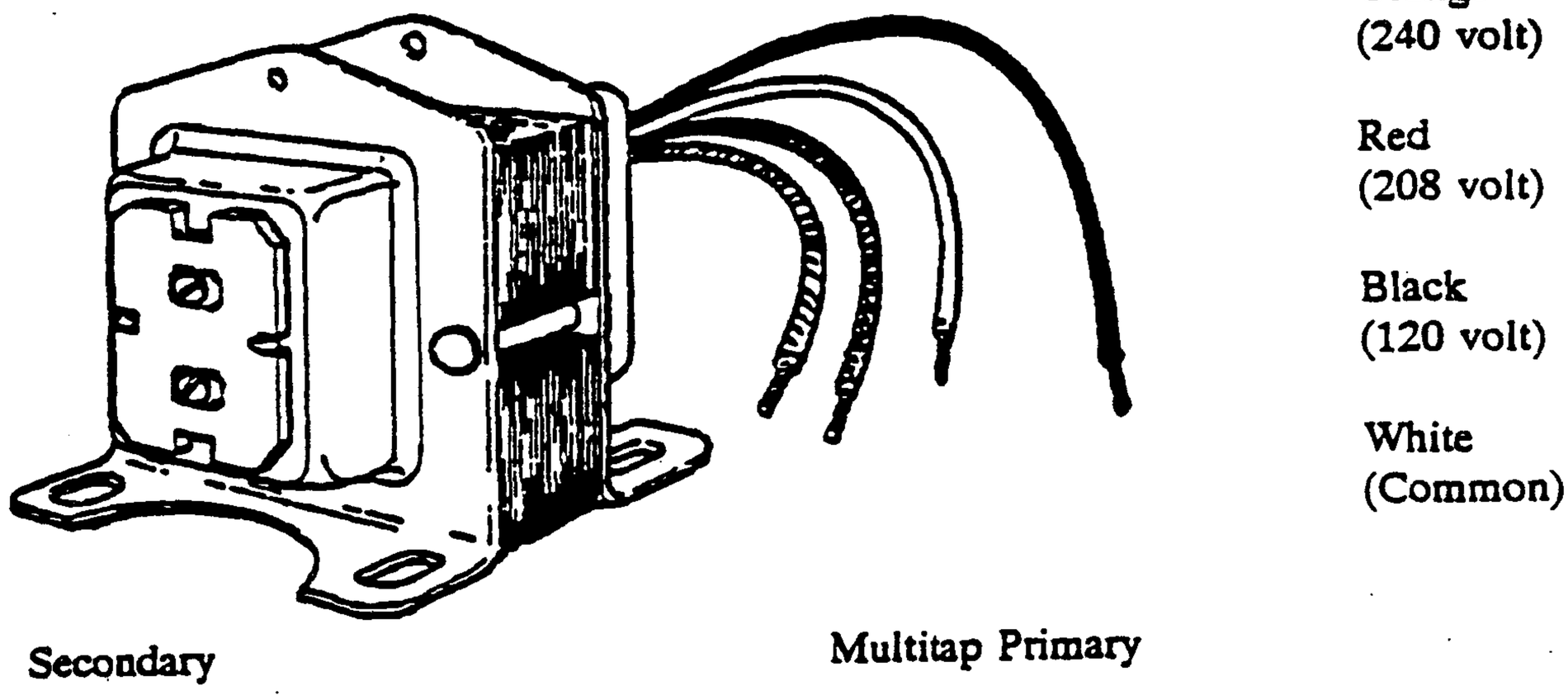


Figure 1–5. Control Transformer

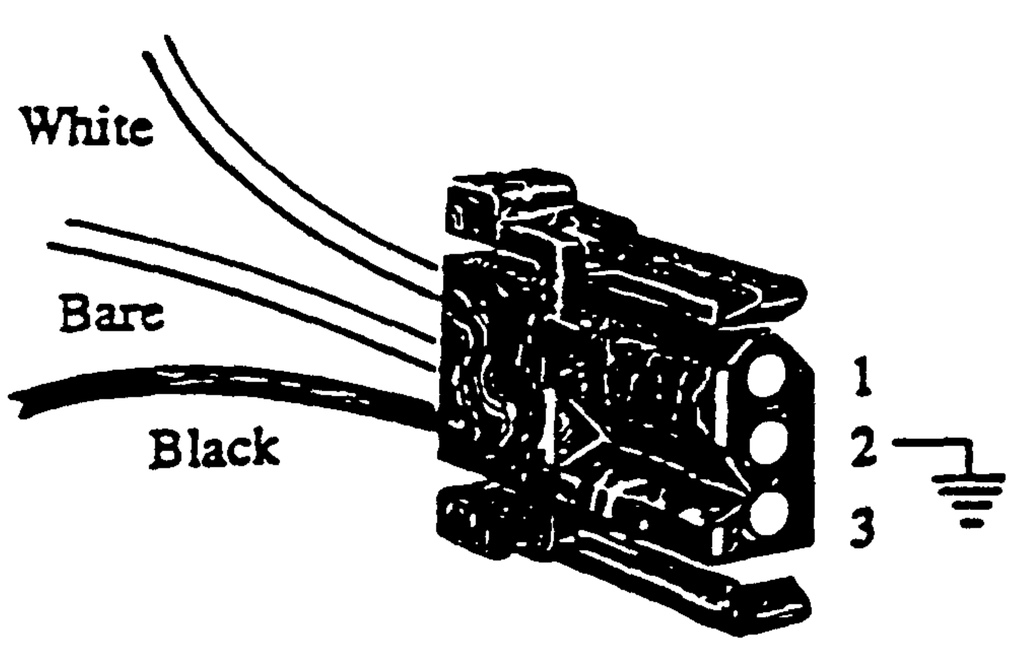


Figure 1–6. 24V AC Power Plug Assembly

INSTALLATION

GENERAL

This section covers factory installed EPC–100 on indoor and outdoor condensing units.

This section describes the wiring that was completed at the factory, and wiring that must be completed in the field. It also includes a start–up sequence for the EPC–100.

Control circuit wiring diagrams for panel wiring are located at the end of this section. Refer to Figure 4–1 for sensor connections to the EPC–100.

FACTORY INSTALLED EPC–100

The EPC–100 is mounted on the control panel door of the condensing unit. The transformer is mounted inside the panel, directly behind the EPC–100. All wiring integral to the control panel is completed at the factory, except for the suction pressure reset temperature sensor which must be field wired to the EPC–100 terminal.

The specific components are wired as follows:

Transformer

The transformer is a multi–tap Class II type (Figure 1–5). The 240V AC primary leads are connected to terminals L1 and L2 in the control panel. Power is connected to the EPC–100 by the fused 24 VAC power plug assembly.

EPC–100 Inputs

Head Pressure Transducer (Optional)

If the control was specified with the head pressure transducer, then this transducer has been mounted to the compressor discharge line, and wired to the appropriate terminals on the controller.

The discharge pressure transducer (Figure 1–4) is wired with three conductor cable (Belden 8618 or equivalent). Use the color code on the head pressure transducer to wire it to the appropriate terminals "+15V", "HEAD PRES", and "GND" on the EPC–100. If the pressure transducer has a braid type shield, the braid should be connected to the nearest EPC–100 mounting screw – use a ring terminal.

Suction Pressure Transucer (Optional)

The suction pressure transducer has been mounted to the compressor suction line, and wired to the appropriate terminals on the controller.

As with the head pressure transducer, use the color code on the suction pressure transducer to wire it to the appropriate terminals "+15V", "SUCT PRES", and "GND" on the EPC–100. Again, if the transducer has a braided type shield, the braid should be connected to the nearest EPC–100 mounting screw.

Liquid Line Temperature Sensor (Optional)

If the control is equipped with this sensor, then it has been connected to the liquid line at the condenser outlet. The wires from this sensor are connected to the appropriate terminals on the EPC–100.

Case Temperature Sensor/Defrost Termination Contact (Optional)

These items are not wired at the factory, and must be field installed. The leads from the case temperature sensor/defrost termination thermostat must be connected to the appropriate terminals on the EPC–100.

Attach the tempertaure sensor with Belden 8618 or equivalent cable. Extend the temperature sensor cable back to the condensing unit's control panel. **Do not allow the sensor cable to be grouped with high voltage wiring. Keep the sensor wiring segregated from the power wiring on long runs of adjacent cases where case raceways form a long duct prior to exiting into floor conduits.** Attach the cable wires to the terminals marked "CASE TEMP DEFR TERM" on the EPC–100. Note that at the display case, the defrost termination thermostat (Klixon) should be wired in parallel with the case temperature sensor.

Oil Pressure Failure Contact (Optional)

The oil pressure safety switch on the compressor has been wired to the appropriate terminals marked "OIL PRES FAIL" on the controller.

EPC–100 OUTPUTS

Compressor #1 Output Relay

Typically, the normally open contact of this output has been wired to the compressor motor contactor.

Compressor #2/Unloader Output Relay

On units with 2 compressors, typically, the normally open contact of this output has been wired to the compressor #2 motor contactor. On units with an unloader, this output has been wired directly to the unloader solenoid.

Defrost Output Relay

On units with electric defrost, the normally open contact of this output has been connected to the defrost heater contactor. On units with gas defrost, the normally open contact of this output has been connected directly to the 4–way defrost valve's pilot solenoid. On units with offtime defrost, this output is not used.

Liquid Line Solenoid Relay

The liquid line solenoid is typically used only on outdoor units. If the unit is equipped with a liquid line solenoid, this output control has been wired to the valve's solenoid coil .

Alarm Contact

The alarm contact may be wired to a machine room or other alarm as desired. However, it has not been wired at the factory. Note that the unit alarms (and fails) in the normally closed mode.

Condenser Fan Relays

The condenser fans have been wired for either single speed or 3–speed operation For single speed operation, each fan (up to three fans total) has been connected directly to the normally closed contacts of one of the three fan relays, and no fan contactor is used. With single speed fans, the fan switching is done with the relays on the unit.

For 3–speed fans, the fans are wired as shown in attached wiring diagram (p/n 0365817). When 3–speed fans are used, the #1 Fan Relay controls the fan contactor, while the #2 and #3 Fan Relays control the fan speed; slow, medium or fast. If the EPC–100 fails, the 3–speed fans will default to high speed operation.

START–UP

Complete the following sequence to start–up the unit:

1. Carefully check all wiring before start–up

2. Before applying power to the condensing unit, be sure that the 24V power plug assembly is **disconnected** from the controller.

3. Turn on the condensing unit's pilot circuit breaker (labeled "Control Circuit and Auxiliary").

4. Using a multimeter, verify 24 VAC secondary supply across terminals 1 and 3 of the power plug assembly (Figure 1–6).

5. If the power supply is between 21 and 30V, connect the power plug assembly to the 24V AC connection on the side of the processor. When the EPC–100 is first powered up, the initial display will read "HUSSMANN CORPORATION EPC–100 CONVENTIONAL UNIT CONTROL COPYRIGHT 1992".

CHECKOUT PROCEDURE

NOTE: To complete the remaining steps of the start–up procedure, you must be familiar with Section 3, Operation.

1. Check the EPC–100 factory setup. This setup can be viewed using the CONFIGURATION and SYSTEM menus (Pages 3–20 and 3–13).

2. Verify that the suction pressure, discharge pressure (or liquid line temperature if so equipped), and case air temperature sensors are operating correctly, refer to Section 3.

3. Force the compressor(s), and condenser fans off using the MAINTENANCE menu (Page 3–10). (You must first enable the Maintenance Menu by using the Keylock menu, Page 3–4.)

4. Using the MAINTENANCE menu, force the condenser fans ON and OFF (for single speed fans),or HI, MED, LO, and OFF (for 3–speed fans).

5. Close the compressor(s) circuit breaker(s). Using the MAINTENANCE menu, force the compressor(s) ON and OFF.

   CAUTION: Do not force the condenser fans off while the compressor is running.

6. If the unit has an unloader, check its operation by forcing the unloader ON and OFF while the compressor is running.

7. On units with gas or electric defrost, force the unit into defrost using the MAINTENANCE menu. Verify that the defrost contact closes.

If any problems are detected, go to Section 4, Service/Troubleshooting.

OPERATION

KEYPAD FUNCTIONAL DESCRIPTION

The EPC–100 operation is simple; yet it is powerful enough to display current information, log prior history, log alarms, and set control limits.

As shown in Figure 3–1, the panel keys are "Scroll Up", "Scroll Down", "Exit", and "Select".

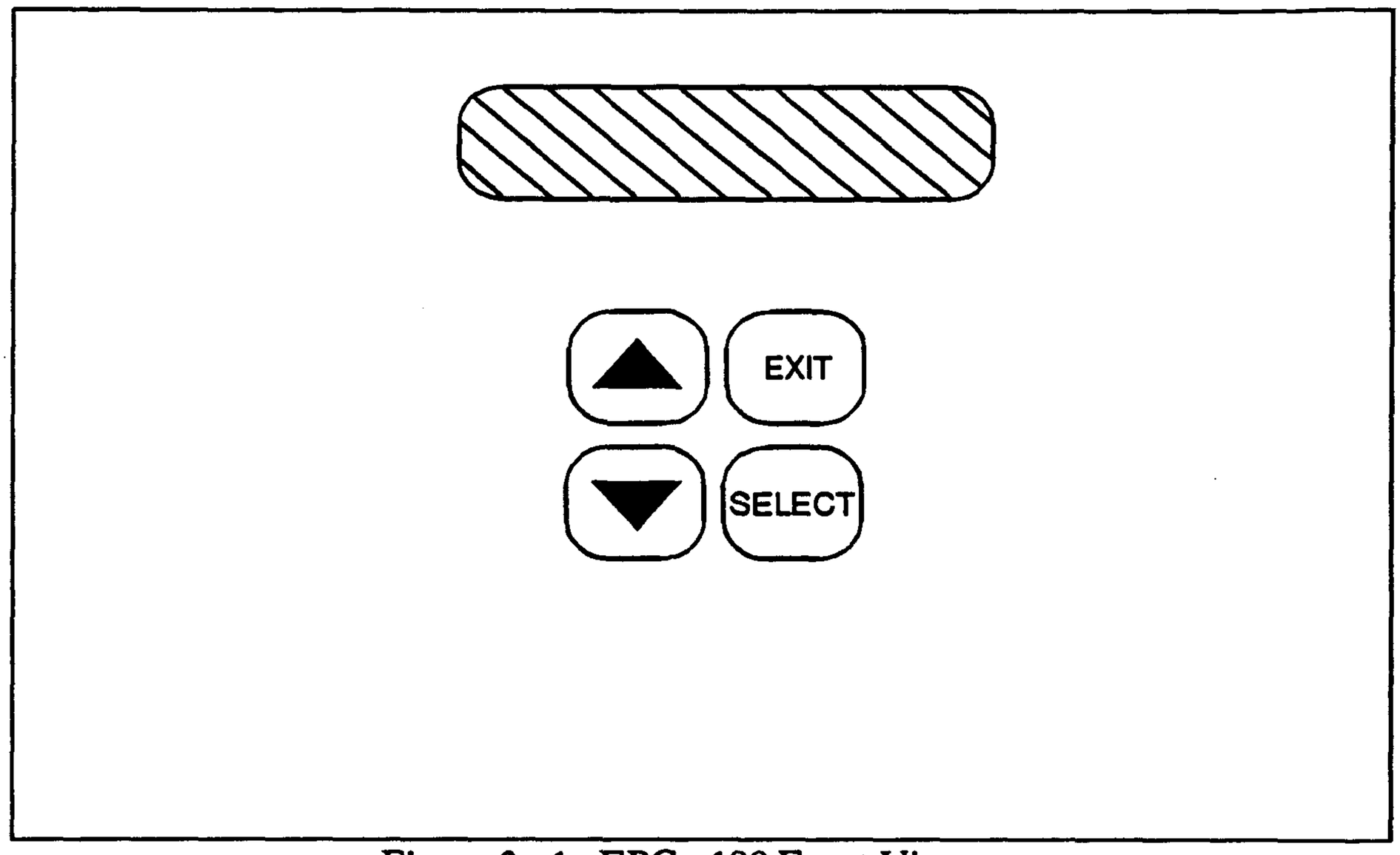


Figure 3–1. EPC–100 Front View

Scroll Up/Scroll Down Keys

The scroll up and down arrow keys allow the user to move to the next screen (scroll down) or to the previous screen (scroll up). These keys are also used to change values and to return to the menus from submenus ("exit" will take the user back to the main display).

When using the scroll down key, and the last screen of a menu is reached, the controller will return back to the top of that menu.

"Exit Key"

This key allows the user to return to the main display from a menu or sub–menu.

"Select" Key

The select key has numerous functions depending on where the user is within the menu selections. Select allows the user to:

1. Enter a menu.
2. Enter a sub–menu.
3. Return to a menu from a sub–menu (exit would take the user back to the main display).
4. Change the value of a control parameter.
5. Store the final value of a control parameter in memory.

POWERING UP THE SYSTEM

Power Up Display

When the controller is first powered up the display will read: HUSSMANN CORPORATION EPC–100 CONVENTIONAL CONTROL COPYRIGHT 1992.

Default Displays

After the power up message has scrolled across the screen, the EPC–100 will cycle through its default display screens as follows: SUCT P XX (current suction pressure), SUCT SP XX (suction setpoint), HEAD P XX (current head pressure, and HEAD SP (head setpoint).

If the SPR (Suction Pressure Reset) option is installed, then SPR SP XX will replace the SUCT SP XX screen. See Figure 3–2. Also, as shown in Figure 3–2, if the unit is configured for direct case air temperature control, then CASE SP XX will replace the SUCT SP XX screen.

If the liquid line temperature sensor option is installed, then LIQ T XX, and LIQ SP XX will replace, HEAD P XX, and HEAD SP XX, respectively.

In addition to these default displays, the controller will also show appropriate messages depending how the unit is configured, and on the current operating cycle. Other possible messages which may show up on the default display are the following: IN PUMP DN (unit in pump down cycle), IN DEFRST (unit in defrost), IN DRIP (unit in drip cycle), OIL FAIL or IN ALARM.

NOTE: To keep the displays from rotating
- Hold down the Exit key to view only the SUCT P XX screen, or
- Hold down the Select key to view only the HEAD P XX screen (or LIQ T XX if so configured).

When you release either of the above keys (Exit or Select) the display will begin to rotate again.

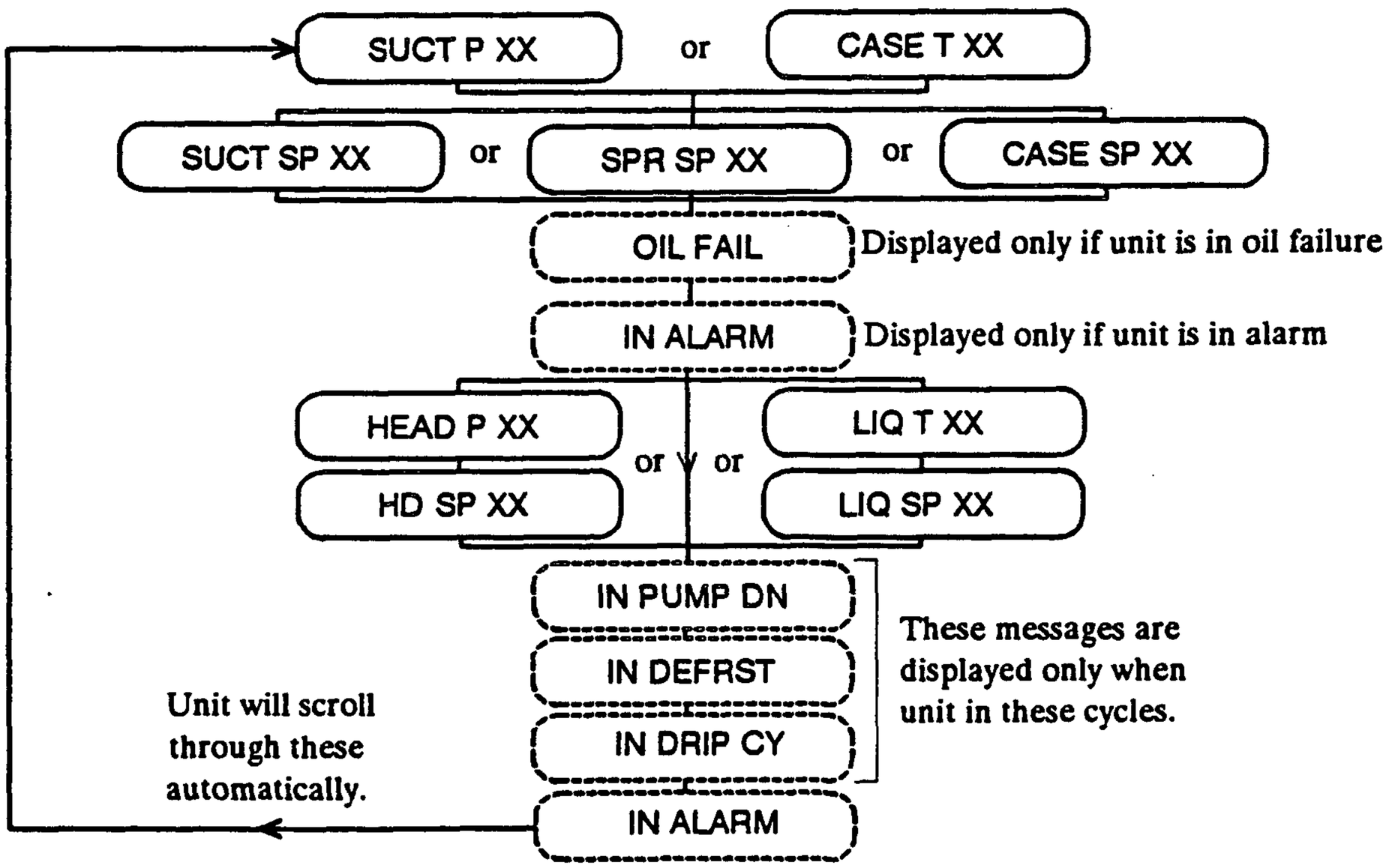


Figure 3–2. EPC–100 Default Displays

Alarm Display

As shown in Figure 3–2, the alarm message will appear if the unit is in alarm. The display will not power down if an alarm has occurred. Should an alarm occur after a power down, the display will automatically come on to alarm.

By using the alarm output relay, the EPC–100 may be linked to an external alarm such as a bell. The EPC–100 alarm alone is a silent display.

To view, force, or clear an alarm, scroll to the alarm menu, and press "Enter" to procede. See "Alarm Menu".

MAIN DISPLAY

This display allows the user to access nine menus. The menus and their descriptions are shown below.

Description	Press This Key	This will be Displayed
When unlocked, allows user to change various control settings.	▼	KEYLOCK
Displays (view only) controller status information.	▼	STATUS
Displays last five alarms; allows user to clear or set alarms.	▼	ALARM
Allows user to force compressor(s) and/ or condenser fans on and off.	▼	MAINT
Displays and allows the user to change the controller's setpoints.	▼	SYSTEM
Displays and allows the user to modify the controller's configuration.	▼	CONFIG
Displays and allows the user to reset compressor(s) run times.	▼	RUN METER
Displays and allows the user to reset sensor historical data.	▼	DATA LOG
Used for sensor calibration.	▼	CALIBRATE

KEYLOCK MENU

As the name implies, this menu allows the user to "lock" or "unlock" the controller. When the Keylock menu is unlocked, the various settings in other menus can be changed. If the Keylock menu is locked, and changes are attempted, the controller will display "VIEW ONLY".

Description	Press This Key	This will be Displayed
Use up/down arrow keys to locate the Keylock menu.	▼	KEYLOCK
Press Select to enter the Keylock menu; "LOCK" or "UNLOCK" will be displayed.	SELECT	LOCK
Press Select to toggle the display from "LOCK" to "UNLOCK".	SELECT	UNLOCK
Press Exit to leave menu. Controller will be locked or unlocked depending on previous message displayed.	EXIT	EXIT MENU

STATUS MENU

This menu allows the user to view–but not change–the various controller parameters. To change settings, use the System menu.

Description	Press This Key	This will be Displayed		
To enter the Status menu, scroll to STATUS, and press Select.	▼	STATUS		
Displays the current year.	SELECT	YEAR XXXX		
Displays the current month and day.	▼	MO/D XX.XX		
Displays the current hour and minute.	▼	HR/M XX.XX		
Shows compressor status. On units with two compressors, "CMP ON ON" or "CMP OFF.OFF" will be displayed.	▼	CMP ON(or OFF)		
Shows unloader status (only if unit is configured with an unloader).	▼	UNLOAD ON(or OFF)		
Shows current system suction pressure (or case air temperature).	▼	SUCT P XX	or	CAS T XX
Displays suction setpoint (or case setpoint if unit is configured with direct case air temperature control). If Suction Pressure Reset option is installed, then SPR setpoint is displayed.	▼	SUCT SP XX	or	CAS SP XX
	▼	SPR SP XX		
Displays setting for suction high pressure (or case high temperature) alarm.	▼	SUCT HI XX	or	CAS HI XX
Displays setting for suction low pressure (or case low temperature) alarm.	▼	SUCT LO XX	or	CAS LO XX
Displays case air temperature if SPR option is installed.	▼	CAS T XX		
Displays current case air temperature setpoint if SPR option is installed.	▼	CAS SP XX		

This data will appear if unit is configured with direct case air temperature control.

Description	Press This Key	This will be Displayed
Displays current head pressure or liquid line temperature, depending on how unit is configured.	▼	HEAD P XX or LIQ T XX
Displays head pressure (or liquid temperature) setpoint.	▼	HD SP XX or LIQ SP XX
Displays high head pressure (or high liquid temperature) alarm setpoint.	▼	HD HI XX or LIQ HI XX
Displays low head pressure (or low liquid temperature) alarm setpoint.	▼	HD LO XX or LIQ LO XX
Displays current condenser fan speed on units with 3–speed fans. On single speed units shows status; on or off.	▼	FAN SPD LO/MED/HI OR FANS OFF or FANS ON/OFF
Displays type of defrost. If defrost is not configured, this line will not appear.	▼	GAS DEFRST or OFFTM DFT / ELECT DFT
Displays current step of defrost. The "IN PUMP DN" (unit in pump down), and "IN DRIP CY" (unit in drip cycle) messages will appear only if the unit is configured for these respective cycles. Also, if no defrost is configured, none of these messages will appear.	▼	DEFROST OFF or IN PUMP DN / IN DEFROST / IN DRIP CY
Displays the status of the temperature termination contact for defrost, will not appear if no defrost is configured.	▼	TEMP T OPEN(or CLSD)
Displays the number of defrosts per day.	▼	DFR/DAY XX
Displays the fail–safe defrosts duration.	▼	DF LEN XX
Displays the pump down cycle duration.	▼	PUMP DN XX
Displays the drip cycle duration.	▼	DRIP XX

Description	Press This Key	This will be Displayed
Displays defrost No. 1 start time.	▼	DF 1 XX.XX
Displays defrost No. 2 start time.	▼	DF2 XX.XX
Displays defrost No. X (up to 12) start time.	▼	DF X XX.XX
Displays the termination pressure if the pressure termination option is selected.	▼	TERM P XX
Displays the refrigerant type.	▼	R12/22/502 SYSTEM
Displays the software version of the unit.	▼	VER X.XX
Checks internal data management.	▼	CKSUM XXXX
Returns to top of status menu.	▼	
Press Exit at any time to return to the Default Display.	EXIT	EXIT MENU

ALARM MENU

This menu records the time, date, and cause of the last five alarms. The table at the end of this section summarizes the different types of alarms.

Description	Press This Key	This will be Displayed
To enter the Alarm menu, scroll to ALARM, and press Select.	▼	ALARM
If Unit is in Alarm To clear an alarm: Press Select to show "CLR/SET AL" display, press Select again to toggle to Yes, and to activate the change indicator (blinking dot), then press the down arrow key to acknowledge the command and move to the next screen. "AL CLEARED" will appear for a moment before the display moves to the next screen.	SELECT	CLR/SET AL
	SELECT	CLR AL NO
	SELECT	CLR AL YES*
	▼	LAST ALARM
If Unit is NOT in ALARM To set an alarm (for testing or maintenance) press Select to show the "SET AL NO" display, press Select again to toggle to "SET AL YES", and to activate the change indicator (blinking dot). Press the down arrow key to acknowledge the command and move to the next screen. "AL ON" will appear for a moment before the display moves to the next screen. Be sure to clear the alarm after testing is complete.	SELECT	CLR/SET ALARM
	SELECT	SET AL NO
	SELECT	SET AL YES*
	▼	LAST ALARM
To View Alarm Logs The "LAST ALARM" is the most recent alarm, the "LAST –1 AL" is the next most recent, the "LAST –4" AL is the least recent. Press Select to view the alarm message for each alarm. Press Select again to view the time of the alarm (hour and minute). Press Select a third time to view the date of the alarm (month and day). Use the up and down arrow keys to move to the most recent, or least recent alarm log.	SELECT	(Alarm Description)
	SELECT	HR/M XX.XX
	SELECT	MO/D XX.XX

Alarm message time, and date are repeated for the five most recent alarms.

* = Blinking Dot (Change Indicator)

Description	Press This Key	This will be Displayed
Displays information for 2nd most recent alarm.	▼	LAST AL –1
Press Select to view cause of alarm.	SELECT	(Alarm Message)
Press Select again to view time of alarm.	SELECT	HR/M XX.XX
Press Select a third time to view date of alarm.	SELECT	MO/D XX.XX
Third most recent alarm. Press Select to view cause of alarm, time, and date.	▼	LAST AL –2
Fourth most recent alarm. Press Select to view cause of alarm, time, and date.	▼	LAST AL –3
Fifth most recent alarm. Press Select to view cause of alarm, time, and date.	▼	LAST AL –4
Press Exit at any time to return to the Default Display.	EXIT	EXIT MENU

Possible Alarm Messgaes:

Alarm Message	Description
SUCT P HI	Suction pressure high limit exceeded for more than 30 min.
SUCT P LO	Suction pressure low limit exceeded for more than 30 min.
HEAD P HI	Head pressure high limit exceeded for more than 2 min.
HEAD P LO	Head pressure low limit exceeded for more than 2 min.
LIQ T HI	Liquid temperature high limit exceeded for more than 2 min.
LIQ T LO	Liquid temperature low limit exceeded for more than 2 min.
FORCED ALM	Alarm manually set by user.
POWER UP	Unit has reset due to a power outage or electrical surge.
CONFIG ERR	Internal data managment error.
NONE	No alarm.
OIL FAIL	Unit has tripped due to low oil pressure.
CAS T LO	Case temperature low limit exceeded for more than 30 min.
CAS T HI	Case temperature high limit exceeded for more than 30 min. or defrost temperature termination contact closed for more than 30 min.

MAINTENANCE MENU

Description	Press This Key	This will be Displayed
To enter the Maintenance menu, scroll to MAINT, and press Select.	▼	MAINT
To Kill Force Present only if a controller function has been forced (such as a compressor or condenser fans) ON or OFF. To kill the forced condition, press Select to toggle the change indicator (blinking dot), then press the down arrow key to acknowledge the command and move to the next screen.	SELECT	KILL FORCE
	SELECT	KILL FORCE*
	▼	Down Arrow Acknowledges Command
To Force Compressor(s) On Press Select to activate the change indicator, then press the down arrow to set the force action. Note that the display will move to the "KILL FORCE" screen after this function is forced. In a similar way, the "FORC C2 ON" command can be used to force compressor No. 2 On (if the unit is configured with two compressors).	▼	FORC C1 ON
	SELECT	FORC C1 ON*
	▼	KILL FORCE
To Force Compressor(s) Off Press Select to activate the change indicator, then press the down arrow to set the force action. Note that the display will move to the "KILL FORCE" screen after this function is forced. In a similar way, the "FORC C2 OFF" command can be used to force compressor No. 2 Off (if the unit is configured with two compressors).	▼	FORC C1 OFF
	SELECT	FORC C1 OFF*
	▼	KILL FORCE

* = Blinking Dot (Change Indicator)

Description	Press This Key	This will be Displayed
To Force Unloader On (or Off) This line will appear only if the unit is configured with the unloader option. Press Select to activate the change indicator, then press the down arrow to set the force action. The display will move to the "KILL FORCE" screen after this function is forced.	▼	FORC U1 ON
	SELECT	FORC U1 ON*
	▼	KILL FORCE
In a similar way, the "FORC U1 OFF" command can be used to force the unloader off.		
To Force Condenser Fans to Desired Speed (Units with 3–speed fans) Use the up/down arrow keys to locate the desired operating speed. For example, "FRC FAN HI" will force the fans into high speed operation. Press Select to activate the change indicator, then press the down arrow key to set the force action. The display will move to the "KILL FORCE" screen after this function is forced.	▼	FRC FAN HI
	SELECT	FRC FAN HI*
	▼	KILL FORCE
In a similar way, the "FR FAN MED", "FRC FAN LO", and "FR FAN OFF" commands can be used to force the condenser fans to medium speed, low speed, or off, respectively.		
To Force Condenser Fans On or Off (Units with single–speed fans) Use the up/down arrow keys to locate the "FRC FAN ON" command. Press Select to activate the change indicator, then press the down arrow key to set the force action. The display will move to the "KILL FORCE" screen after this function is forced.	▼	FR FAN ON
	SELECT	FR FAN ON*
	▼	KILL FORCE
In a similar way, the "FR FAN OFF" command can be used to force the condenser fans off.		

* = Blinking Dot (Change Indicator)

Description	Press This Key	This will be Displayed
To Force Unit Into Defrost Use the up/down arrow keys to locate the "FRC DEFRST" command. Press Select to toggle the change indicator (blinking dot), then press the down arrow key to acknowledge the command. The display will show "DEFROST ON" for a moment after this function is forced.	▼	FRC DEFRST
	SELECT	FRC DEFRST *
In a similar way, the "CLR DEFRST" command can be used to stop a defrost.	▼	DEFROST ON

Important Notes Concerning Force Functions

1. If a compressor is forced ON and then OFF, it will stay forced ON. The force ON overides the force OFF.

2. A forced condition will remain active for 30 minutes; the unit will then automatically return to its normal operating state.

3. The "KILL FORCE" command will immediately return the controller to its normal operating state.

To Reset the Controller Resetting has the same effect as turning the power off and back on. The controller will return to the power–up display, and then to the default screens.	▼	RESET UNIT
	SELECT	RESET UNIT *
To reset, use the up/down arrow keys to locate the "RESET UNIT" command. Press select to activate the change indicator, then press the down arrow key to acknowledge the command.	▼	RESETTING
To Exit Menu Press Exit at any time to return to the Default Display.	EXIT	EXIT MENU

* = Blinking Dot (Change Indicator)

SYSTEM MENU

Description	Press This Key	This will be Displayed
To enter the System menu, scroll to the "SYSTEM" display, and press Select.	▼	SYSTEM
To Change Suction Pressure Setpoint (or Case Temperature Setpoint on Units with Direct Case Temperature Control) Use the up/down arrow keys to locate the "SUCT SP" (or "CAS SP") command. Press Select to toggle the change indicator.	SELECT	SUCT SP XX or CAS SP XX
	SELECT	SUCT SP XX *
Once the change indicator is active, use the up/down arrow keys to raise or lower the setpoint (the setpoint is limited to between +10 and −5 of the suction default setting, see Page 3–20).	▲▼	Scroll to new value
	SELECT	SUCT SP XX
When the desired setpoint is reached, press Select again to store the value in memory. Press the down arrow to move to the next screen.		
To Change Suction High Limit Alarm (or Case High Limit on Units with Direct Case Temperature Control) Use the up/down arrow keys to locate the "SUCT HI" (or "CAS HI") command. Press Select to toggle the change indicator.	▼	SUCT HI XX or CAS HI XX
	SELECT	SUCT HI XX *
Once the change indicator is active, use the up/down arrow keys to raise or lower the setting. When the desired setpoint is reached, press Select again to store the value in memory.	▲▼	Scroll to new value
	SELECT	SUCT HI XX
Press the down arrow to move to the next screen.		
In a similar way, the "SUCT LO" (or "CAS LO") command can be used to change the low limit alarm.	▼	SUCT LO XX or CAS LO XX

* = Blinking Dot (Change Indicator)

Description	Press This Key	This will be Displayed
To Change the Case Air Temperature Setpoint, Units with Suction Pressure Reset (SPR) Use the up/down arrow keys to locate the "CAS SP" command. Press Select to toggle the change indicator (blinking dot). Once the change indicator is active, use the up/down arrow keys to raise or lower the setting. When the desired setpoint is reached, press Select again to store the value in memory.	▼	CAS SP XX
	SELECT	CAS SP XX*
	▲▼	Scroll to new value.
	SELECT	CAS SP XX
To Change Case Temperature Differential Setting (Units with Direct Case Temperature Control) The differential is the control band around the setpoint. Use the up/down arrow keys to locate the "CAS DIF" command. Press Select to toggle the change indicator (blinking dot). Once the change indicator is active, use the up/down arrow keys to raise or lower the setting to either 1, 2, or 3°F. When the desired setpoint is reached, press Select again to store the value in memory.	▼	CAS DIF X
	SELECT	CAS DIF X*
	▲▼	Scroll to new value.
	SELECT	CAS DIF X
To Change Head Pressure (or Liquid Temperature) Setpoint Use the up/down arrow keys to locate the "HD SP" (or "LIQ SP") command. Press Select to toggle the change indicator (blinking dot). Once the change indicator is active, use the up/down arrow keys to raise or lower the setting. When the desired setpoint is reached, press Select again to store the value in memory.	▼	HD SP XX or LIQ SP XX
	SELECT	HD SP XX*
	▲▼	Scroll to new value.
	SELECT	HD SP XX

* = Blinking Dot (Change Indicator)

Description	Press This Key	This will be Displayed
To Change Head Pressure (or Liquid Temperature) High and Low Alarm Settings Use the up/down arrow keys to locate the "HD HI" (or "LIQ HI") command. Press Select to toggle the change indicator (blinking dot).	▼	HD HI XX or LIQ HI XX
	SELECT	HD HI XX*
Once the change indicator is active, use the up/down arrow keys to raise or lower the setting.	▲▼	Scroll to new value
When the desired setting is reached, press Select again to store the value in memory.	SELECT	HD HI XX
In a similar way, the "HD LO" (or "LIQ LO") command can be used to change the head pressure (or liquid temperature) low limit alarm.	▼	HD LO XX or LIQ LO XX

* = Blinking Dot (Change Indicator)

Description	Press This Key	This will be Displayed
To Change Number of Defrosts per Day (Units Configured for Defrost) Use the up/down arrow keys to locate the "DFR/DAY" command. Press Select to toggle the change indicator (blinking dot). Once the change indicator is active, use the up/down arrow keys to raise or lower the setting (up to 12 per day). When the desired number is reached, press Select again to store the value in memory.	▼	DFR/DAY XX
	SELECT	DFR/DAY XX*
	▲▼	Scroll to new value.
	SELECT	DFR/DAY XX
To Change Fail–Safe Defrost Duration Use the up/down arrow keys to locate the "DF LEN" command. Press Select to toggle the change indicator (blinking dot). Once the change indicator is active, use the up/down arrow keys to raise or lower the setting. When the desired setting is reached, (up to 180 min.) press Select again to store the value in memory.	▼	DF LEN XX
	SELECT	DF LEN XX*
	▲▼	Scroll to new value.
	SELECT	DF LEN XX
To Change Start Times of Individual Defrosts When the number of defrosts per day is configured, the unit will automatically space them evenly throughout the day. These times can be manually changed as follows: Use the up/down arrow keys to locate the desired defrost ("DF 1", "DF 2", "DF 3", etc.) Press Select to toggle the change indicator (blinking dot). Once the change indicator is active, use the up/down arrow keys to raise or lower the setting (settings are shown in hr:min, 24 hour/military time). Defrosts can begin only on the quarter–hour. For example, 1:00, 1:15, 1:30, and 1:45. When the desired setting is reached, press Select again to store the value in memory.	▼	DF 1 XX:XX
	SELECT	DF 1 XX:XX*
	▲▼	Scroll to new value.
	SELECT	DF 1 XX:XX

* = Blinking Dot (Change Indicator)

Description	Press This Key	This will be Displayed
To Change Duration of Pump Down Cycle Use the up/down arrow keys to locate the "PUMP DN" command. Press Select to toggle the change indicator (blinking dot).	▼	PUMP DN XX
	SELECT	PUMP DN *
Once the change indicator is active, use the up/down arrow keys to raise or lower the setting. Enter zero (0) for no pump down cycle.	▲▼	Scroll to new value
When the desired setpoint is reached (up to 30 min.), press Select again to store the value in memory.	SELECT	PUMP DN XX
To Change Duration of Drip Cycle Use the up/down arrow keys to locate the "DRIP" command. Press Select to toggle the change indicator (blinking dot).	▼	DRIP XX
	SELECT	DRIP XX *
Once the change indicator is active, use the up/down arrow keys to raise or lower the setting. Enter zero (0) for no drip cycle.	▲▼	Scroll to new value
When the desired setpoint is reached, press Select again to store the value in memory.	SELECT	DRIP XX
To Change Defrost Pressure Termination Setting (on Units Configured with Pressure Termination) Use the up/down arrow keys to locate the "TERM P" command. Press Select to toggle the change indicator (blinking dot).	▼	TERM P XX
	SELECT	TERM P XX *
Once the change indicator is active, use the up/down arrow keys to raise or lower the setting.	▲▼	Scroll to new value
When the desired setting is reached, press Select again to store the value in memory.	SELECT	TERM P XX

* = Blinking Dot (Change Indicator)

Description	Press This Key	This will be Displayed
To Change the Year, Date, or Time Use the up/down arrow keys to locate the "YEAR" command. Press Select to toggle the change indicator (blinking dot).	▼	YEAR XXXX
Once the change indicator is active, use the up/down arrow keys to raise or lower the setting.	SELECT	YEAR XXXX *
When the desired setting is reached, press Select again to store the value in memory.	▲▼	Scroll to new value.
	SELECT	YEAR XXXX
In a similar way, the date (month and day) and time (hour and minute) can be changed by using the "MO/D" and "HR/M" commands.		MO/D XX/XX and HR/M XX.XX
To Change the Data Recording Interval (Log Interval) Use the up/down arrow keys to locate the "LOG MIN" command. Press Select to toggle the change indicator (blinking dot).	▼	LOG MIN XX
	SELECT	LOG MIN XX *
Once the change indicator is active, use the up/down arrow keys to raise or lower the setting. This setting gives the frequency that data is recorded in the unit, in minutes. Logged data can be viewed using the DATA LOG menu. The last forty readings are recorded.	▲▼	Scroll to new value.
	SELECT	LOG MIN XX
When the desired setting is reached, press Select again to store the value in memory.		* = Blinking Dot (Change Indicator)

Description	Press This Key	This will be Displayed
To Change BAUD Rate (for External Communication) Use the up/down arrow keys to locate the "BAUD" command.	▼	BAUD 1200
Once the BAUD command is located, use the Select key to rotate through the available Baud settings (1200, 2400, 4800, or 9600 BAUD).	SELECT	BAUD 2400
	SELECT	BAUD 4800
Use the down arrow to move to the next screen.	SELECT	BAUD 9600
To Change the Station No. (for Data Communication) Use the up/down arrow keys to locate the "STA NO" command. Press Select to toggle the change indicator (blinking dot).	▼	STA NO XX
	SELECT	STA NO XX *
Once the change indicator is active, use the up/down arrow keys to raise or lower the setting.	▲▼	Scroll to new value
When the desired setting is reached, press select again to store the value in memory.	SELECT	STA NO XX
To Exit Menu Press Exit at any time to return to the Default Display.	EXIT	EXIT MENU

* = Blinking Dot (Change Indicator)

CONFIGURATION MENU

Description

To Enter the Configuration menu, scroll to the "CONFIG" display and press Select. This menu allows the user to setup the basic operation of the EPC–100.

NOTE: The suction pressure and case temperature transducers must be disconnected from the EPC–100 before changes are made in the Configuration menu. If these transducers are not disconnected the message "DENY" will be displayed.

To Change Refrigerant Type

There are three (3) refrigerant choices: R12, R22, and R502. Press select to rotate through these choices. Press the down arrow key to store the value in memory and move to the next screen.

To Select Suction Pressure or Case Air Temperature Control of Compressor

Use the up/down arrow keys to locate the "SUCT P" command.

Press Select to toggle between "SUCT P YES" and "SUCT P NO". If "SUCT P NO" is selected, the unit will default to cycling of the compressor based only on the case air temperature. Press the down arrow key to store the setting in memory, and move to the next screen.

To Change Suction Default Setting

Use the up/down arrow keys to locate the "SUCT DFA" command. Press Select to toggle the change indicator (blinking dot).

Once the change indicator is active, use the up/down arrow keys to raise or lower the setting.

When the desired setting is reached, press Select again to store the value in memory.

Press This Key	This will be Displayed
▼	CONFIG
SELECT	REFRIG R12
SELECT	REFRIG R502
SELECT	REFRIG R22
▼	SUCT P NO
SELECT	SUCT P YES
▼	Stores setting and moves to next screen
▼	SU DFA XX
SELECT	SU DFA XX *
▲ ▼	Scroll to New Value
SELECT	SU DFA XX

* = Blinking Dot (Change Indicator)

Description	Press This Key	This will be Displayed
To Change No. of Compressors Use the up/down arrow keys to locate the "COMP" command. Press Select to activate the change indicator (blinking dot).	▼	COMP X
Once the change indicator is active, use the up/down arrow keys to raise or lower the setting. Note that zero (0) compressors would be selected if, for example, the unit were to be used for cycling of condenser fans only.	SELECT	COMP X*
	▲▼	Scroll to new value
When the desired setting is reached, press Select again to store the value in memory.	SELECT	COMP X
To Change the Compressor Relays Action (Normally Open or Normally Closed) Use the up/down arrow keys to locate the "C RLY" command.	▼	C RLY N.O.
Press Select to toggle between normally open relay action (N.O.) or normally closed relay action (N.C).	SELECT	C RLY N.C.
Press the down arrow key to store the setting in memory, and move to the next screen.	▼	Stores setting and moves to next screen
To Configure with Unloader (can not be used with 2 compressors). Use the up/down arrow keys to locate the "UNLDR" command.	▼	UNLDR NO
Press Select to toggle between "UNLDR YES" and "UNLDR NO".	SELECT	UNLDR YES
Press the down arrow key to store the setting in memory, and move to the next screen.	▼	Stores setting and moves to next screen

* = Blinking Dot (Change Indicator)

Description	Press This Key	This will be Displayed
To Set the Suction Pressure Reset (SPR) Option SPR will automatically change the suction pressure setpoint depending on the case temperature. Use the up/down arrow keys to locate the "SPR" command. Press Select to toggle between "SPR YES" and "SPR NO". Press the down arrow key to store the setting in memory, and move to the next screen.	▼ SELECT ▼	SPR NO SPR YES Stores setting and moves to next screen
To Set the Condenser Option Use the up/down arrow keys to locate the "CONDSR" command. Press Select to toggle between "CONDSR YES" and "CONDSR NO". Note that no condenser control would be selected if, for example, the condenser fans were controlled by an external pressure control. Press the down arrow key to store the setting in memory, and move to the next screen.	▼ SELECT ▼	CONDSR NO CONDSR YES Stores setting and moves to next screen
To Set Condenser Fans, 3–Speed, Single Speed, or "Zero" Speed Use the up/down arrow keys to locate the "FAN SPD" command. Press Select to scroll through "FAN SPD 0", "FAN SPD 1", or "FAN SPD 3". If "FAN SPD 0" is selected, the condenser fans will run whenever the compressor is running. Press the down arrow key to store the setting in memory, and move to the next screen.	▼ SELECT SELECT ▼	FAN SPD 0 FAN SPD 1 FAN SPD 3 Stores setting and moves to next screen

* = Blinking Dot (Change Indicator)

Description	Press This Key	This will be Displayed
To Set the Defrost Option Use the up/down arrow keys to locate the "DEFRST" command.	▼	DEFRST NO
Press Select to toggle between "DEFRST YES" and "DEFRST NO".	SELECT	DEFRST YES
Press the down arrow key to store the setting in memory, and move to the next screen.	▼	Stores setting and moves to next screen
To Set the Type of Defrost Use the up/down arrow keys to locate the "DF WAY" command.	▼	DF WAY ELEC
	SELECT	DF WAY GAS
Press Select to rotate through the 3 defrost types; "DF WAY ELEC" (electric defrost), "DF WAY GAS" (gas defrost), or "DF WAY OFT" (offtime defrost).	SELECT	DF WAY OFT
Press the down arrow key to store the setting in memory, and move to the next screen.	▼	Stores setting and moves to next screen
To Set Defrost Pressure Termination Option Use the up/down arrow keys to locate the "PRS–TM" command.	▼	PRS–TM NO
	SELECT	PRS–TM YES
Press Select to toggle between "PRS–TM NO" and "PRS–TM YES".	▼	Stores setting and moves to next screen
Press the down arrow key to store the setting in memory, and move to the next screen.		

✳ = Blinking Dot (Change Indicator)

Description	Press This Key	This will be Displayed
To Configure for Head Pressure or Liquid Temperature Condenser Fan Control Use the up/down arrow keys to locate the "HEAD P" command.	▼	HEAD P NO
Press Select to toggle between "HEAD P YES" and "HEAD P NO". If "HEAD P NO" is selected, the condenser fans will cycle based on liquid temperature. Press the down arrow key to store the setting in memory, and move to the next screen.	SELECT ▼	HEAD P YES Stores setting and moves to next screen
To Enable the Oil Failure Function Use the up/down arrow keys to locate the "OIL CK" command.	▼	OIL CK NO
Press Select to toggle between "OIL CK NO" and "OIL CK YES". If "OIL CK NO" is selected, the oil failure function is disabled. Press the down arrow key to store the setting in memory, and move to the next screen.	SELECT ▼	OIL CK YES Stores setting and moves to next screen
To Set the Oil Failure Control Use the up/down arrow keys to locate the "OIL 3T" command.	▼	OIL 3T NO
Press Select to toggle between "OIL 3T YES" and "OIL 3T NO". If "OIL 3T YES" is selected, the unit will try to start the compressor up to three times before signalling an oil failure alarm. If "OIL 3T NO" is selected, the unit acts exactly like a time delay oil failure switch, and will trip the compressor if oil pressure is not detected for 2 min (Copeland compressors), or 45 sec (Carlyle compressors). Press the down arrow key to store the setting in memory, and move to the next screen.	SELECT ▼	OIL 3T YES Stores setting and moves to next screen
To Set Compressor Type (Copeland or Carlyle) Use the up/down arrow keys to locate the "COMP" command.	▼	COMP COPE
Press Select to toggle between "COMP COPE" (Copeland compressor) and "COMP CARL" (Carlyle compressor). Press the down arrow key to store the setting in memory and move to the next screen.	SELECT ▼	COMP CARL Stores setting and moves to next screen

* = Blinking Dot (Change Indicator)

Description	Press This Key	This will be Displayed
To Set the Suction Pressure Transducer Type (100 psig or 200 psig) Use the up/down arrow keys to locate the "XDR200" command.	▼	XDR200 NO
Press Select to toggle between "XDR200 NO" and "XDR200 YES". Use "XDR200 NO" if the range of the suction pressure transucer is 0–100 psig. Use "XDR200 YES" if the range of the suction pressure transducer is 0–200 psig (the range is shown on the transducer's nameplate).	SELECT	XDR 200 YES
Press the down arrow key to store the setting in memory, and move to the next screen.	▼	Stores setting and moves to next screen
To Clear the Alarm Logs and Memory Use the up/down arrow keys to locate the "CL ALM" command.	▼	CL ALM NO
Press Select to toggle between "CL ALM NO and "CL ALM YES". When "CL ALM YES" is displayed, press the down arrow.	SELECT	CL ALM YES
Press Select to toggle between "DO CLR NO" and "DO CLR YES". When "DO CLR YES" is displayed, press the down arrow.	▼	DO CLR NO
	SELECT	DO CLR YES
Pressing the down arrow acknowledges the command, clears the alarm log, and moves the display to the next screen.	▼	CLEARING
In a similar way, the "CL MEM" command can be used to clear the unit's memory.		CLEARED
CAUTION: Clearing the memory will erase all configuration data previously entered (except for sensor calibration data). If the memory is cleared, you must reconfigure the unit.		
To Exit Menu Press Exit at any time to return to the Default Display.	EXIT	EXIT MENU

✳ = Blinking Dot (Change Indicator)

RUN METER MENU

Description

To enter the Run Meter menu, scroll to the "RUN METER" display, and press Select.

A screen will be displayed for each compressor that is configured (if the unit is configured with only one compressor only the "1 XXXXX HR" screen will show up).

Press the down arrow key to move to the next screen.

NOTE: Meter readings are in hours. The time shown is the compressor's total run time since last clearing. Meter rollover occurs at 65,000 hours.

To Clear Run Meter

Whenever a compressor is installed or replaced, its run time should be cleared, so that it reads 0 HR.

Press Select to activate the change indicator (blinking dot).

Press the down arrow key to acknowledge the command and move to the next screen. "CLEAR DONE" will appear for a moment. Repeat this procedure for each compressor you wish to clear.

To Exit Menu

Press Exit at any time to return to the Default Display.

Press This Key	This will be Displayed
▼	RUN METER
SELECT	1 XXXXX HR
▼	2 XXXXX HR
▼	CLR 1 METR
SELECT	CLR 1 METR *
▼	CLEAR DONE
EXIT	EXIT MENU

* = Blinking Dot (Change Indicator)

DATA LOG MENU

The Data Log menu stores the last 40 readings for suction pressure, head pressure (or liquid temperature), and case air temperature. Some of these data log points may or may not appear depending on how the unit is configured. The time between each log is set in the System menu under "LOG MIN" (see page 3–18), which sets the log time in minutes. If the log time is set to zero ("LOG MIN 0") then "NOT ACTIVE" will appear, and this menu cannot be accessed.

Description	Press This Key	This will be Displayed
To enter the Data Log menu, scroll to the "DATA LOG" display, and press Select.	▼	DATA LOG
To View Suction Pressure Log (or other Logged Data) Use the up/down arrow keys to locate the "SUCT P LOG" command.	SELECT	SUCT P LOG
Press Select to toggle into/out of the suction pressure log's submenu.	SELECT	LOG 1 XX
Use the up/down arrow keys to view the individual data points. The data points are numbered 1 through 40 (LOG 1 XX through LOG 40 XX).	▲▼	Use up/down arrow keys to scroll through logs, numbered 1 through 40.
In a similar way, the "CASE T LOG", and "HEAD P LOG" (or "LIQ T LOG") can be used to view the last 40 respective data points.		CAS T LOG HEAD P LOG or LIQ T LOG
To Exit Menu Press Exit at any time to return to the Default Display.	EXIT	EXIT MENU

CALIBRATION MENU

Description	Press This Key	This will be Displayed
To enter the Calibration menu, scroll to the "CALIBRATE" display, and press select.	▼	CALIBRATE
To Recalibrate Suction Pressure, Head pressure (or Liquid Temperature), and Case Temperature Sensors. Use the up/down arrow keys to locate the desired transducer; for example, the "SUCT SENSR" command will calibrate the suction pressure transducer reading. Press Select to enter the suction pressure calibration submenu. Press Select again to activate the change indicator.	SELECT	SUCT SENSR
	SELECT	SUCT P XX
	SELECT	SUCT P XX *
Once the change indicator is active, use the up/down arrow keys to raise or lower the setting. Use an external pressure gauge (or a thermometer for temperature sensors) to verify that the setting is correct.	▲ ▼	Scroll to new value
	SELECT	SUCT P XX
When the desired setting is reached, press Select again to store the value in memory. Press the down arrow key to acknowledge the command and move to the next screen. "CAL DONE" will be displayed for a moment.	▼	CAL DONE
In a similar way, the "CASE SENSR", and "HEAD SENSR" (or "LIQ SENSR") commands can be used to recalibrate the case air temperature sensor, and head pressure transducer (or liquid temperature sensor). Some of these calibration points may or may not appear, depending on how the unit is configured.		CASE SENSR
		HEAD SENSR or LIQ SENSR

* = Blinking Dot (Change Indicator)

Description	Press This Key	This will be Displayed
To Reset Factory Calibration Use the up/down arrow keys to locate the "RST CAL" command.	▼	RESET CAL
Press Select to toggle between "RESET NO" and "RESET YES". When "RESET YES" is displayed press the down arrow to acknowledges the command. "RESET DONE" will appear for a moment.	SELECT	RESET NO
	SELECT	RESET YES
CAUTION: Resetting the calibrations will replace the current values with values used when the unit was shipped from the factory.	▼	RESET DONE
To Exit Menu Press Exit at any time to return to the Default Display.	EXIT	EXIT MENU

* = Blinking Dot (Change Indicator)

SERVICE

CHECKOUT AND TROUBLE–SHOOTING PROCEDURE

This section is designed to assist in troubleshooting the EPC–100. A table is included at the end of this section to help isolate the cause of a malfunction.

Recording Information

Upon arrival at the condensing unit, make a record of the following information.

1. Conventional Unit's Model and Serial No.
2. EPC–100 Serial No.
3. EPC–100 options installed on condensing unit.

Record the following applicable* settings and readings from the STATUS menu:

Suction Pressure	_____	psi
Suction Setpoint	_____	psi
SPR Setpoint	_____	psi
Suction High Alarm	_____	psi
Suction Low Alarm	_____	psi
Case Temperature	_____	°F
Case Setpoint	_____	°F
Case High Alarm	_____	°F
Case Low Alarm	_____	°F
Head Pressure	_____	psi
Head Setpoint	_____	psi
Head High Alarm	_____	psi
Head Low Alarm	_____	psi
Liquid Temperature	_____	°F
Liquid Setpoint	_____	°F
Liquid High Alarm	_____	°F
Liquid Low Alarm	_____	°F
Type Of Defrost	_____	
Software Version	_____	

*Screens may or may not appear depending on how the unit is configured.

Troubleshooting

Use the ALARM menu and record the cause, time, and date of the last five alarms. Use Table 4–2 to determine the likely cause of the problem.

WARNING

Portions of the checkout procedure must be performed with the power applied to the condensing unit's control circuit and to the EPC–100.

Use caution when probing any voltage.

CAUTION: When performing continuity and resistance checks in this procedure, make sure that the circuit being tested is disconnected from any other circuits or unplugged from the EPC–100.

Power Supply Test

The EPC–100 is powered by a nominal 24 Volt transformer. The primary is multitap 120V/208/240V, while the secondry is 24V. Accepatable secondary voltage is 21 to 30V AC.

Using an AC voltmeter, verify the primary and secondary volatges. Replace the transformer if the measured voltages are outside of the specified range.

Unplug the 24VAC power plug from the processor, and verify the secondary voltage across pins 1 and 3 (see Figure 1–5). If no voltage is shown check the fuse in the power plug assembly. Replace the fuse if necessary.

If the fuse is not blown, but the voltage is less than 21V AC, replace the power plug assembly. If the voltage is within the specified range but the EPC fails to operate when the 24V AC power plug is connected, replace the EPC–100. Also, there must be continuity from pin 2 (center) of the power plug assembly to ground.

Head Pressure and Suction Pressure Transducer and Cable Check

Overview

The head pressure transducer used by the EPC–100 is a 0 to 500 psig sealed part (see Figure 1–4). The output voltage range which corresponds to 0 to 500 psig is 1 to 6 volts DC.

The unit can be configured to accept either a 0 to 100 psig suction pressure transducer, or a 0 to 200 psig suction pressure transducer. As with the head pressure transducer, an output voltage of 1 volt corresponds to 0 psig. However, an output voltage of 6 volts corresponds to 100 psig for the 100 psig transducer, while 6 volts output corresponds to 200 psig for the 200 psig tranducer. The correct transducer range must be set in the Configuration menu, see page 3–25.

As with the head pressure transducer, the suction pressure transducer is a sealed part (Figure 1–4).

Transducer Checkout

Using a DC voltmeter, place the positive probe on the "+15V" terminal and place the negative probe on the "COMMON" terminal of the transducer on the EPC–100's input terminal strip (see Figure 4–1). If the voltage is greater than 15.25V DC, replace the EPC–100. If the voltage measured is less than 14.5VDC, go on to the input terminal strip and cable continuity checks.

If the tranducer appears to operating normally, use a DC voltmeter, and measure the voltage across the "IN" and "COMMON" terminals. The positive probe of the voltmeter should be on the "IN" terminal. The measured voltage should be proportional to the pressure being measured according to the following formula:

$$P = (V-1) \times F \quad (+/- 2 \text{ psi})$$

Where;
P = Measured Pressure
V = Measured Voltage
F = Scale Factor = 20 for 100 psig transducer
= 40 for 200 psig transducer
= 100 for 500 psig transducer

Using a pressure gauge, measure the actual pressure. If the EPC–100 readout does not match the pressure indicated by the gauge, compare the calculated pressure from the formula above to the pressure shown on the gauge. Replace the processor if the problem is not found in the input terminal strip or cable assembly. Also, replace the EPC–100 if the calculated pressure and gauge pressure match, but the EPC–100 display does not match.

If the display matches the calculated pressure but is not within 2 psi of the gauge pressure, replace the transducer.

Liquid Temperature and Case Air Temperature Sensor Check

The same temperature sensor (Figure 1–3) is used for both EPC–100 temperature inputs, except that the liquid line temperature sensor does not have the plastic coating (heat shrink wrap) that is found on the case air temperature sensor.

Testing and verification of both temperature sensors will be identical except for the location of the sensor connection on the input terminal strip.

General Check

For the case temperature sensor, the basic checkout is to place a calibrated thermometer in the air stream near the sensor bulb, and make a direct comparison between the reading of the thermometer and the reading of the EPC–100.

In a similar way, the liquid line temperature sensor can be checked by comparing the reading of a thermometer placed on the condenser outlet line to the reading of the EPC–100. When measuring the temperature of the liquid line, make sure that there is very good contact between the thermometer's sensing bulb, and the liquid line, otherwise an incorrect reading will result.

If the readings of the thermometer and the EPC–100 are within 3°F, the sensor and other components are working correctly. If the readings are not within 3°F, then the following items should be checked to isolate the problem.

Sensor Mounting

For the case temperature sensor, check that the entire sensor is in the air stream. Clamping the sensor to the metal wall of a flue can allow the metal wall temperature to adversely effect the temperature reading.

For cases with single air curtain passages, this mounting of the sensor on the metal wall is typically not a problem. However, clamping the sensor to the sheet metal divider between two–temperature air curtains can effect the temperature sensor reading. Make sure that the entire sensor is within the air stream you wish to measure.

Also, make certain that the liquid line temperature sensor is in intimate contact with the liquid line at the outlet of the condenser.

Finally, as mentioned earlier, the plastic shrink–wrap coating must be removed from the temperature sensor mounted on the liquid line. This coating can be removed with a utility knife.

Resistance Check

Remove the sensor's cable from the EPC–100 input terminal strip. Using an ohmmeter, measure the resistance of the sensor with the cable leads removed from the input terminal strp. The sensor is non–polarized, therefore the polarity of the ohmmeter leads will not effect the measurement.

Compare the ohmmeter reading to Table 4–3 to find the equivalent temperature value. If the resistance–equivalent temperature is more than 3°F from the actual thermometer measurement, check the sensor and cable installation. Replace the sensor if no problems are found with the sensor mounting/installation. If the problem still exists, replace the EPC–100.

Oil Failure Input Check

Overview

The oil failure input on the EPC–100 is a digital input. If continuity (a short circuit) exists across the oil failure input terminals, the unit recgonizes that the compressor has adequate oil pressure. Conversely, if the oil failure input terminals present an open circuit, the EPC–100 recognizes loss of oil pressure.

Oil Failure Switch Checkout

With the compressor off, remove the leads of the oil pressure switch from the EPC–100. Using an ohmmeter, check the resistance between the leads. If the resistance between the leads is less than 1M ohm, replace the oil failure switch and the connecting cable between the switch and the EPC–100.

With the compressor running, use two separate, calibrated, pressure gauges to measure the compressor crankcase pressure, and the oil pressure at the discharge of the compressor's oil pump.

CAUTION: Do not allow an external flow path to be created between the discharge of the oil pump and the compressor suction as the oil will bypass through this flow path back to the compressor suction.

With the compressor running, check the continuity of the leads from the oil pressure switch with an ohmmeter. For Copeland compressors, the ohmmeter should show continuity (short circuit) if the difference between the oil pump discharge pressure and the crankcase pressure is greater than 9 psi. For Carlyle compressors, the switch should show continuity if the oil pressure differential is greater than 6.5 psi.

If the oil pressure differential is greater than the values indicated above, but the switch fails to close, replace the switch and cable leading to the EPC–100.

Replace the EPC–100 if the switch closes at the correct setting, but the EPC–100 continues to alarm on oil failure.

Compressor(s) Output Relay Check

Using the configuration menu, check if the unit is configured for normally open or normally closed compressor output function –see page 3–21. The control circuit for the compressor contactor must be wired to the correct tabs on the compressor output of the EPC–100, either normally open or normally closed, as indicated in the configuration menu.

Using an ohmmeter, check the fuse on the compressor output. Replace the fuse if it is blown.

Using the maintenance menu, force the compressor on. Check for the appropriate contact closure on the compressor output. For example, if the compressor is configured for normally open operation, the normally open contact on the compressor output should be closed (a short circuit) when the compressor is forced on. If not, replace the EPC–100.

Again, using the maintenance menu, force the compressor off. Check for the appropriate contact closure on the compressor output. For example, if the compressor is configured for normally open operation, the normally open contact on the compressor output should be open when the compressor is forced off. If not, replace the EPC–100.

Unloader Output Check

Using the Configuration menu, check that the unit is configured for an unloader, see page 3–21. The unloader must be wired to the normally open and common tabs of the EPC–100's unloader output.

Using an ohmmeter, check the fuse on the unloader output. Replace the fuse if it is blown.

Using the Maintenance menu, force the unloader off. Using an ohmmeter, check for an open circuit between the normally open and common tabs of the unloader output. Using the Maintenance menu again, force the unloader on. Check that continuity exists between the normally open and common tabs of the unloader output. If either of these checks indicates a problem, replace the EPC–100.

Defrost Output Check

Using the Configuration menu, check that the unit is configured for defrost, see page 3–23. Also, check the type of defrost; the defrost relay will not operate if the unit is configured for offtime defrost.

Using an ohmmeter, check the fuse on the defrost output. Replace the fuse if it is blown.

Using the Maintenance menu, force the unit into defrost. When the unit is forced into defrost, the entire defrost cycle will be performed, including the pump–down and drip steps. Before checking the defrost output, make sure that the unit is not in the pump–down or drip steps by viewing the default display which will show "IN DEFROST" when the unit is in the defrost step.

Once the unit is in the defrost step, use an ohmmeter and check for continuity between the normally open and common tabs of the defrost output.

Using the Maitenance menu, clear the defrost. Using an ohmmeter, check for an open circuit between the normally open and common tabs of the defrost output. If a problem is identified during these continuity checks, replace the EPC–100.

Liquid Line Solenoid Output Check

Using the Configuration menu, check that the unit is configured for defrost, and the type of defrost. The liquid line solenoid output relay will be energized during the pump–down, defrost, and drip steps of either an electric or offtime defrost. With gas defrost, liquid line solenoid relay will be energized during the pump–down and drip steps, but de–energized during the defrost step of the gas defrost cycle (this allows the refrigerant to flow back through the evaporator coil during the defrost step).

Check that the correct tabs of the liquid solenoid output are being used. If the liquid line solenoid valve is a fail open type, it must be wired to the normally open and common tabs of the liquid line solenoid output. Conversely, if the liquid line solenoid valve is a fail closed type, it must be wired to the normally closed and common tabs of the liquid line solenoid output.

Using an ohmmeter, check the fuse on the liquid line solenoid output. Replace the fuse if it is blown.

Using the Maintenance menu, force the unit into defrost. When the unit is forced into defrost, the entire defrost cycle will be performed, including the pump–down and drip steps. Before checking the liquid line solenoid output, make sure that the unit is in a step where the relay is supposed to be energized, as discussed above.

With the unit in the pump–down or drip step of defrost, check for continuity between the appropriate tabs of the liquid line solenoid output. For example, if the liquid line solenoid valve is a fail open type, check for continuity between the normally open and common tabs of the liquid solenoid ouput.

Using the Maintenance menu, clear the defrost. Using an ohmmeter, check for continuity between the appropriate tabs of the liquid line solenoid output. For example, if the liquid line solenoid valve is a fail open type, check for an open circuit between the normally open and common tabs of the liquid solenoid output.

If a problem is identified during these continuity checks, replace the EPC–100.

Alarm Output Check

The alarm relay on the EPC–100 is energized during normal operation, and de–energized during alarm. Accordingly, the normally closed tab of the alarm output will be open during normal operation, and closed when the unit is in alarm.

Using an ohmmeter, check the fuse on the alarm output. Replace the fuse if it is blown.

Using the Alarm menu, set the unit into alarm. Use an ohmmeter to check for continuity between the normally closed and common tabs of the alarm output.

Use the Alarm menu to clear the alarm. Check for an open circuit between the normally closed and common tabs of the alarm output.

If a problem is identified during these continuity checks, replace the EPC–100.

Fan Output Relays Check

Use the Configuration menu and check if the unit is configured for condenser control. Also check if the unit is configured for single–speed or 3–speed condenser fans, see page 3–22.

WARNING: Be certain that the unit is configured correctly, with either single speed or 3–speed fans. If the unit has 3–speed fan motors and it is configured for single–speed fans (or vice–versa), serious damage to the EPC–100 and/or fan motors will occur.

For single–speed fans, the fan motors must be wired to the normally closed (and common) tabs of the fan relays. For 3–speed fans, the fan motors must be wired as shown in the attached wiring diagram (p/n 0365817).

Single Speed Fans Check

Using the Maintenance menu, force the fans on. Use an ohmmeter to check for continuity between the normally closed and common tabs of each of the fan output relays.

Using the Maintenance menu, force the fans off. Use an ohmmeter to check for an open circuit between the normally closed and common tabs of the fan output relays.

If a problem is identified during these continuity checks, replace the EPC–100.

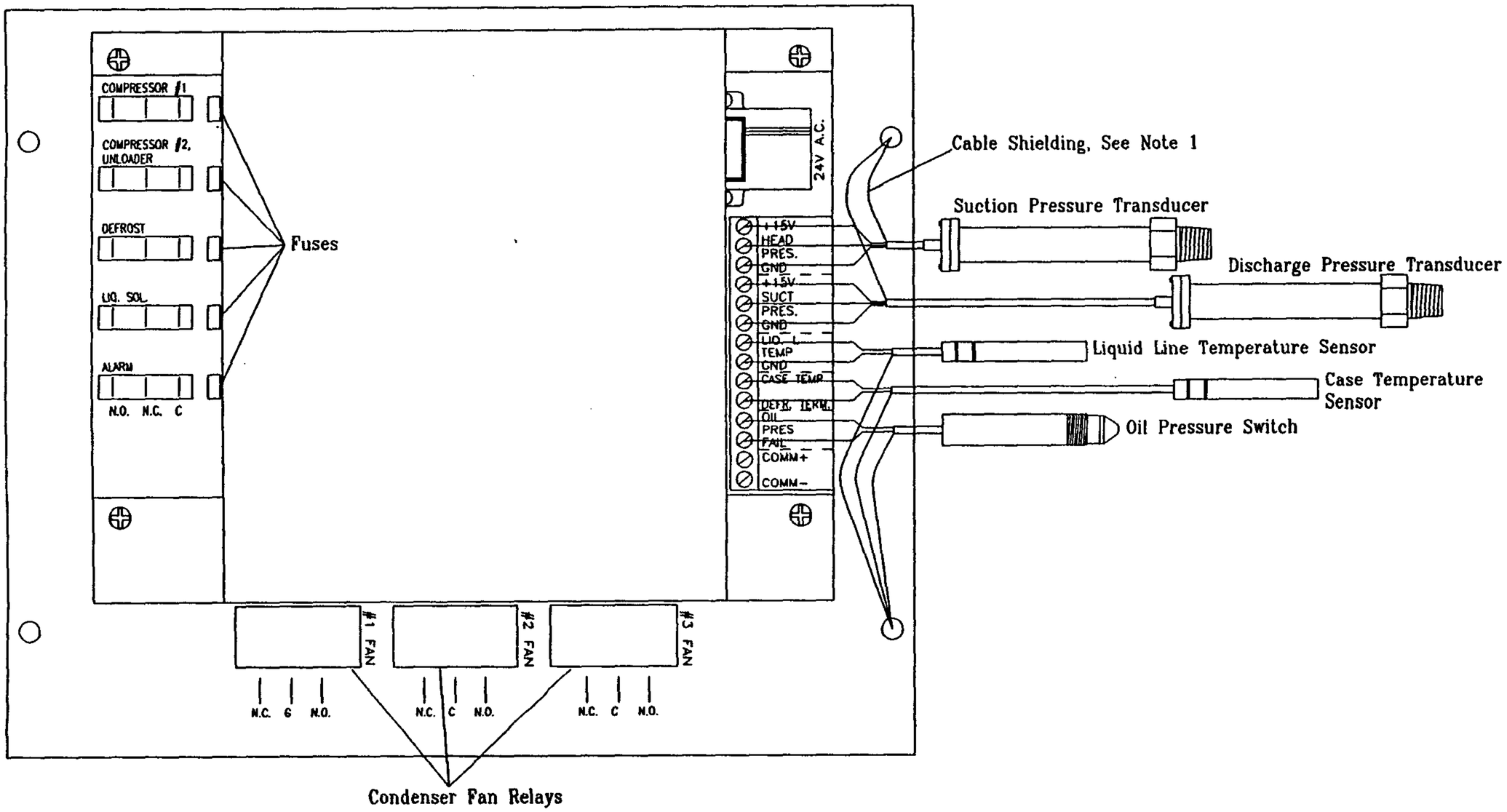
3–Speed Condenser Fans Check

Using the maintenance menu, force the fans into high speed. Using an ohmmeter, check the status of each of the three fan relays. For high speed fan operation, all three relays should be de–energized, as indicated in Table 4–1 below.

Repeat the above continuity check for medium, slow and stopped fan speeds. Use an ohmmeter to verify the condition of each fan relay as shown in Table 4–1. If a problem is identified, replace the EPC–100.

Table 4–1
Fan Relays Status at Various Operating Speeds, 3–Speed Condenser Fans

Fan Speed	Fan Relay No. 1 Status	Fan Relay No. 2 Status	Fan Relay No. 3 Status
High	De–Energized	De–Energized	De–Energized
Medium	De–Energized	Energized	De–Energized
Slow	De–Energized	De–Energized	Energized
Off	Energized	De–Energized	De–Energized



NOTES:

1. Ground the shielding from the transducer cables to the bolts that hold the EPC-100 on the control panel door.

Figure 4-1. Rear View of EPC-100 Showing Transducer Locations

TABLE 4–2, TROUBLESHOOTING AND CHECKOUT PROCEDURES

OBSERVATION	POSSIBLE CAUSE	CHECKOUT PROCEDURE	PAGE 4–
Display blank and will not come on.	–Power failure –Fuse failure –Transformer failure –24V AC power cable failure –Processor failure	–Power supply check	1
Displayed head pressure does not match gauge	–Improper calibration –Transducer failure –Wrong tranducer being used –Input terminal strip failure –Transducer wired incorrectly –Processor failure	–Calibrate head pressure transducer –Head pressure transducer and cable check	2
Displayed suction pressure does not match gauge	–Improper calibration –Transducer failure –Wrong tranducer being used –Input terminal strip failure –Transducer wired incorrectly –Processor failure	–Calibrate suction pressure transducer –Suction pressure transducer and cable check	2

TABLE 4–2, TROUBLESHOOTING AND CHECKOUT PROCEDURES

OBSERVATION	POSSIBLE CAUSE	CHECKOUT PROCEDURE	PAGE 4–
Incorrect liquid line temperature reading.	–Improper calibration –Transducer failure –Wrong tranducer being used –Input terminal strip failure –Transducer wired incorrectly –Processor failure	–Calibrate liquid line temperature sensor –Liquid line temperature sensor and cable check	2
Incorrect case temperature reading.	–Improper calibration –Defrost termination contact closed –Transducer failure –Wrong tranducer being used –Input terminal strip failure –Processor failure	–Calibrate liquid line temperature sensor –Liquid line temperature sensor and cable check –Check operation of defrost termination contact.	2
Unit tripped on oil failure	–Faulty oil pressure sensing switch –Input terminal strip failure –Processor failure –Compressor oil pump failure	–Oil safety switch operation and cable check	4

TABLE 4–2, TROUBLESHOOTING AND CHECKOUT PROCEDURES

OBSERVATION	POSSIBLE CAUSE	CHECKOUT PROCEDURE	PAGE 4–
Compressor status does not match EPC–100 display, compressor will not start/stop	–Blown fuse on compressor output –Unit is in alarm –Incorrect compressor contact being used (normally open instead of normally closed) –Incorrect suction pressure or case temperature reading –Suction pressure or case temperature setpoint too high/low –Compressor output terminal failure –Processor failure	–Check fuse on compressor output –Clear alarm using alarm menu –Check configuration menu to see if unit is configured for noramlly open or normally closed compressor operation – see page 3–21 –Check operation of suction pressure and case temperature transducers –Check suction pressure and case temperature setpoints –Compressor output relay check	4 2 4
Unloader status does not match EPC–100 display, unit will not load/unload	–Blown fuse on unloader output –Incorrect contact being used –Unloader output terminal failure –Unit not configured for an unloader –Processor failure	–Check fuse on unloader output –Unloader output relay test –Check configuration, see page 3–21	5
Unit will not go into defrost, actual defrost status does not match EPC–100 display	–Blown fuse on defrost output –Unit not configured for defrost –Defrost schedule programmed incorrectly –Units internal clock does not match actual time –Defrost output terminal failure –Processor failure	–Check fuse –Check configuration, see page 3–18 –Check time, see page 3–18 –Check defrost schedule, page 3–16 –Defrost output relay check –Defrost checkout procedure	5

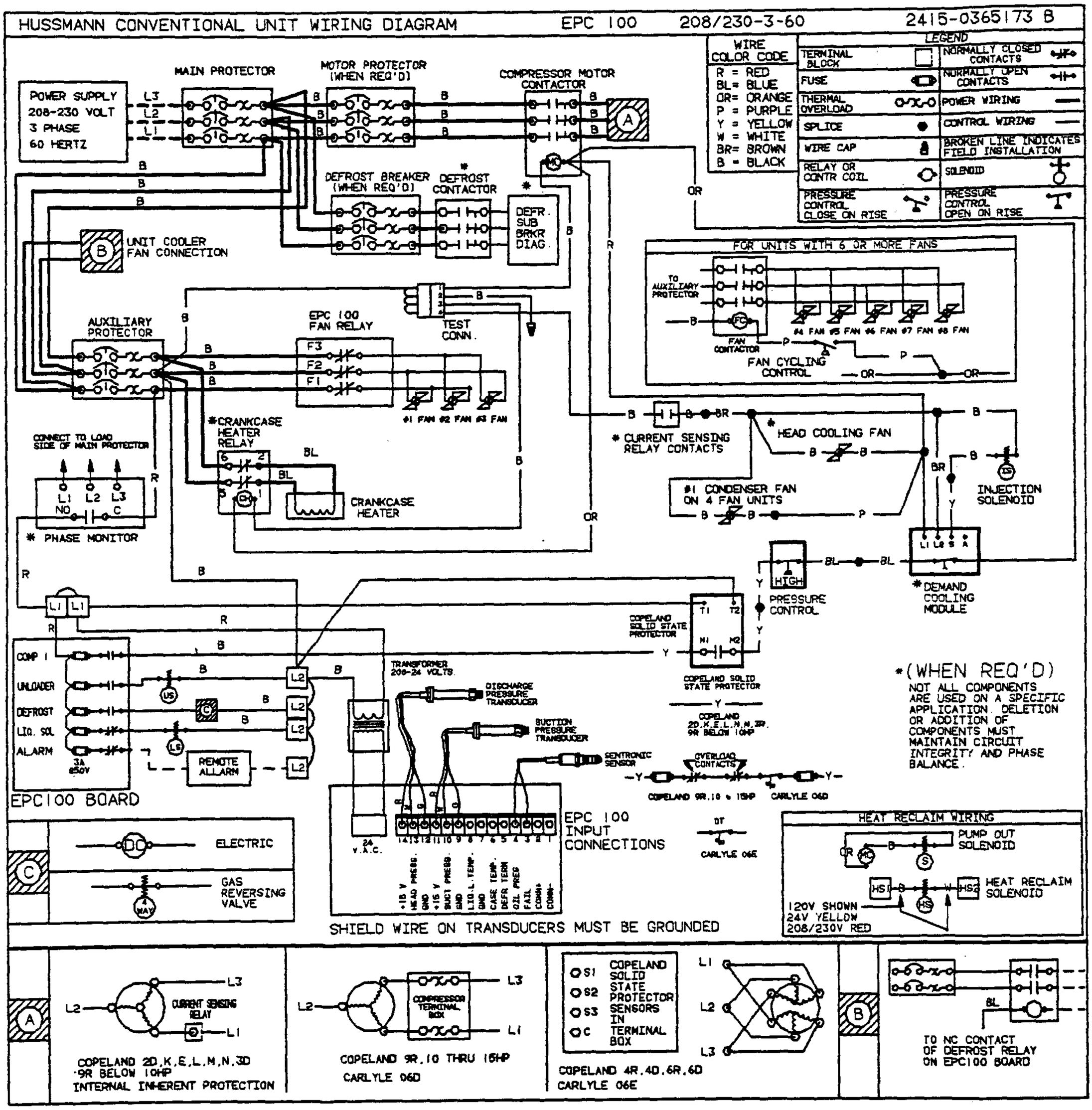
TABLE 4–2, TROUBLESHOOTING AND CHECKOUT PROCEDURES

OBSERVATION	POSSIBLE CAUSE	CHECKOUT PROCEDURE	PAGE 4–
Liquid line solenoid does not energize/de–energize	–Blown fuse on output –Liquid solenoid output terminal failure –Processor failure	–Check fuse –Liquid solenoid output relay check	5
External alarm does not activate	–Blown fuse on output –Alarm output terminal failure –Processor failure	–Check fuse –Alarm output relay check	6
Condenser fan status does not match EPC–100 display, *fans will not start/stop* Fans will not run at low, medium, or high speeds (3–speed fans)	–Unit not configured with condenser control or configured for 3–speed instead of single–speed operation –Head pressure or liquid temperaure setpoint too high/low – Incorrect head pressure or liquid temperature reading, sensor failure or out of calibration –Faulty fan relay(s) –Liquid sensor not secured to condenser outlet line –Single–speed fans not wired to normally closed fan relay output terminals –3–speed fans wired incorrectly –Processor failure	–Check configuration, see page 3–22 –Check operation of head pressure or liquid temperature sensor –Check head pressure or liquid temperature setpoint –Fan relay checkout procedure	 2 6

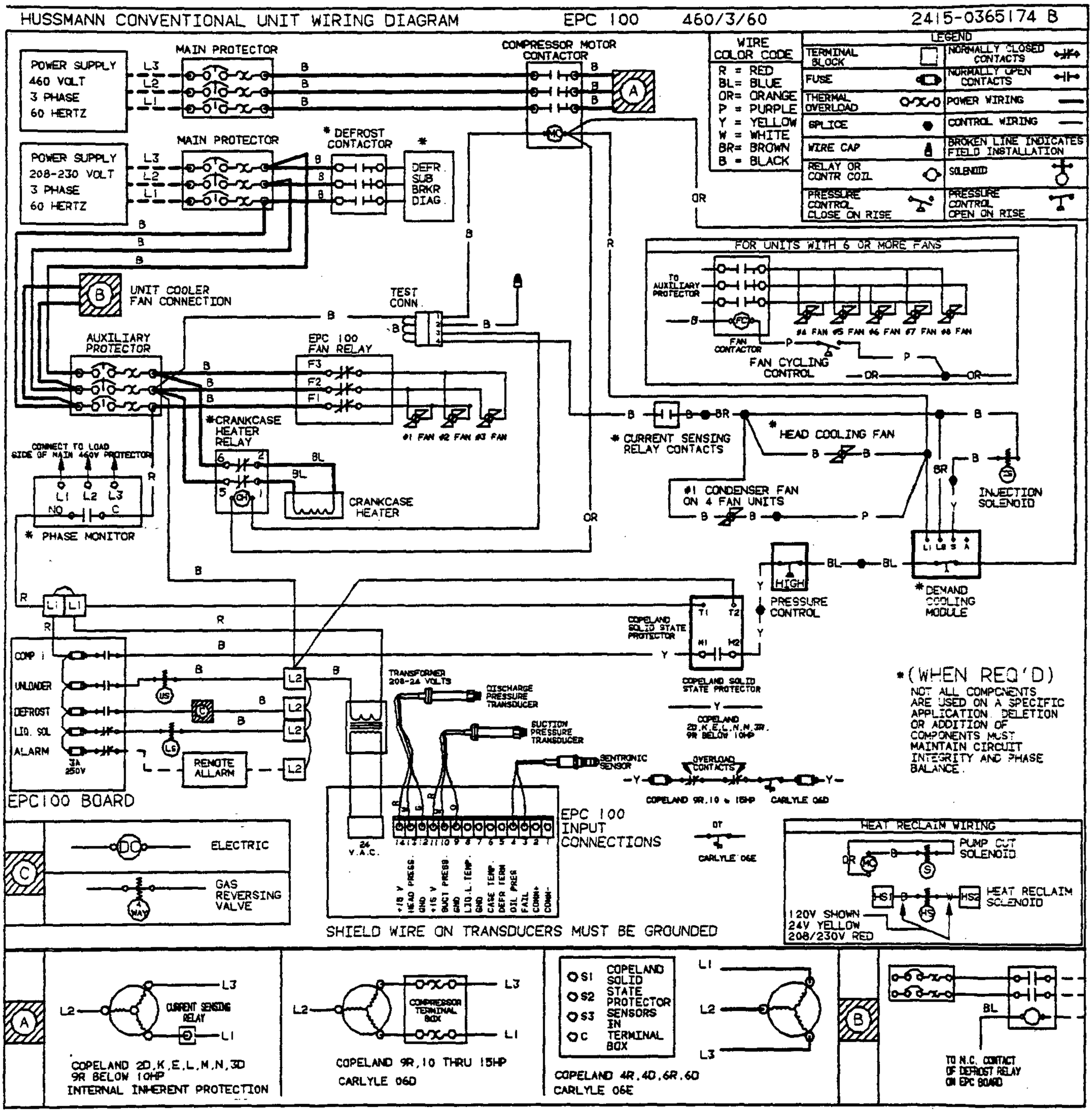
Table 4–3
EPC–100 Temperature Sensors Resistance versus Temperature

Temp. °F	Resistance Ohms	Temp. °F	Resistance Ohms	Temp. °F	Resistance Ohms	Temp. °F	Resistance Ohms
–40	1584	0	1731	40	1886	80	2050
–39	1588	1	1735	41	1890	81	2054
–38	1591	2	1738	42	1894	82	2058
–37	1595	3	1742	43	1898	83	2062
–36	1598	4	1746	44	1902	84	2066
–35	1602	5	1750	45	1906	85	2070
–34	1606	6	1754	46	1910	86	2074
–33	1609	7	1758	47	1914	87	2078
–32	1613	8	1761	48	1918	88	2082
–31	1616	9	1765	49	1922	89	2086
–30	1620	10	1769	50	1927	90	2091
–29	1624	11	1773	51	1931	91	2095
–28	1627	12	1777	52	1935	92	2099
–27	1631	13	1781	53	1939	93	2103
–26	1635	14	1784	54	1943	94	2107
–25	1638	15	1788	55	1947	95	2111
–24	1642	16	1792	56	1951	96	2115
–23	1646	17	1796	57	1955	97	2119
–22	1649	18	1800	58	1959	98	2123
–21	1653	19	1804	59	1963	99	2127
–20	1657	20	1808	60	1967	100	2131
–19	1660	21	1811	61	1971	101	2135
–18	1664	22	1815	62	1975	102	2139
–17	1668	23	1819	63	1980	103	2144
–16	1671	24	1823	64	1984	104	2148
–15	1675	25	1827	65	1988	105	2152
–14	1679	26	1831	66	1992	106	2156
–13	1682	27	1835	67	1996	107	2160
–12	1686	28	1839	68	2000	108	2164
–11	1690	29	1843	69	2004	109	2168
–10	1694	30	1847	70	2008	110	2172
–9	1697	31	1851	71	2012	111	2176
–8	1701	32	1855	72	2017	112	2181
–7	1705	33	1859	73	2021	113	2185
–6	1708	34	1863	74	2025	114	2189
–5	1712	35	1866	75	2029	115	2193
–4	1716	36	1870	76	2034	116	2198
–3	1720	37	1874	77	2038	117	2202
–2	1724	38	1878	78	2042	118	2206
–1	1727	39	1882	79	2046	119	2210

HUSSMANN CONVENTIONAL UNIT WIRING DIAGRAM EPC 100 208/230-3-60 2415-0365173 B



*(WHEN REQ'D)
NOT ALL COMPONENTS ARE USED ON A SPECIFIC APPLICATION. DELETION OR ADDITION OF COMPONENTS MUST MAINTAIN CIRCUIT INTEGRITY AND PHASE BALANCE.


HUSSMANN CONVENTIONAL UNIT WIRING DIAGRAM
EPC 100
460/3/60
2415-0365174 B
POWER SUPPLY 460 VOLT 3 PHASE 60 HERTZ
MAIN PROTECTOR
L3
L2
L1
COMPRESSOR MOTOR CONTACTOR
POWER SUPPLY 208-230 VOLT 3 PHASE 60 HERTZ
* DEFROST CONTACTOR
DEFR. SUB BRKR DIAG.
WIRE COLOR CODE
R = RED
BL= BLUE
OR= ORANGE
P = PURPLE
Y = YELLOW
W = WHITE
BR= BROWN
B = BLACK
LEGEND
TERMINAL BLOCK
FUSE
THERMAL OVERLOAD
SPLICE
WIRE CAP
RELAY OR CONTR COIL
PRESSURE CONTROL CLOSE ON RISE
NORMALLY CLOSED CONTACTS
NORMALLY OPEN CONTACTS
POWER WIRING
CONTROL WIRING
BROKEN LINE INDICATES FIELD INSTALLATION
SOLENOID
PRESSURE CONTROL OPEN ON RISE
FOR UNITS WITH 6 OR MORE FANS
TO AUXILIARY PROTECTOR
FAN CONTACTOR
#6 FAN #5 FAN #4 FAN #7 FAN #8 FAN
FAN CYCLING CONTROL
UNIT COOLER FAN CONNECTION
TEST CONN.
AUXILIARY PROTECTOR
EPC 100 FAN RELAY
F3
F2
F1
#1 FAN #2 FAN #3 FAN
*CRANKCASE HEATER RELAY
CRANKCASE HEATER
CONNECT TO LOAD SIDE OF MAIN 460V PROTECTOR
* PHASE MONITOR
* CURRENT SENSING RELAY CONTACTS
* HEAD COOLING FAN
#1 CONDENSER FAN ON 4 FAN UNITS
INJECTION SOLENOID
HIGH PRESSURE CONTROL
* DEMAND COOLING MODULE
COPELAND SOLID STATE PROTECTOR
COPELAND SOLID STATE PROTECTOR
COPELAND 2D.K.E.L.M.N.3D. 9R BELOW 10HP
COMP
UNLOADER
DEFROST
LIQ. SOL
ALARM
3A 250V
REMOTE ALLARM
EPC100 BOARD
TRANSFORMER 208-24 VOLTS
DISCHARGE PRESSURE TRANSDUCER
SUCTION PRESSURE TRANSDUCER
SENTRONIC SENSOR
OVERLOAD CONTACTS
COPELAND 9R,10 & 15HP
CARLYLE 06D
24 V.A.C.
+15 V HEAD PRESS
GND
+15 V SUCT PRESS
GND
L10.L TEMP
GND
CASE TEMP
DEFR TERM
OIL PRES
FAIL
COMM+
COMM-
EPC 100 INPUT CONNECTIONS
CARLYLE 06E
SHIELD WIRE ON TRANSDUCERS MUST BE GROUNDED
*(WHEN REQ'D)
NOT ALL COMPONENTS ARE USED ON A SPECIFIC APPLICATION. DELETION OR ADDITION OF COMPONENTS MUST MAINTAIN CIRCUIT INTEGRITY AND PHASE BALANCE.
HEAT RECLAIM WIRING
PUMP OUT SOLENOID
HEAT RECLAIM SOLENOID
120V SHOWN
24V YELLOW
208/230V RED
ELECTRIC
GAS REVERSING VALVE
CURRENT SENSING RELAY
COPELAND 2D,K,E,L,M,N,3D 9R BELOW 10HP
INTERNAL INHERENT PROTECTION
COMPRESSOR TERMINAL BOX
COPELAND 9R,10 THRU 15HP
CARLYLE 06D
S1 COPELAND SOLID STATE PROTECTOR SENSORS IN TERMINAL BOX
S2
S3
C
COPELAND 4R,4D,6R,6D
CARLYLE 06E
TO N.C. CONTACT OF DEFROST RELAY ON EPC BOARD

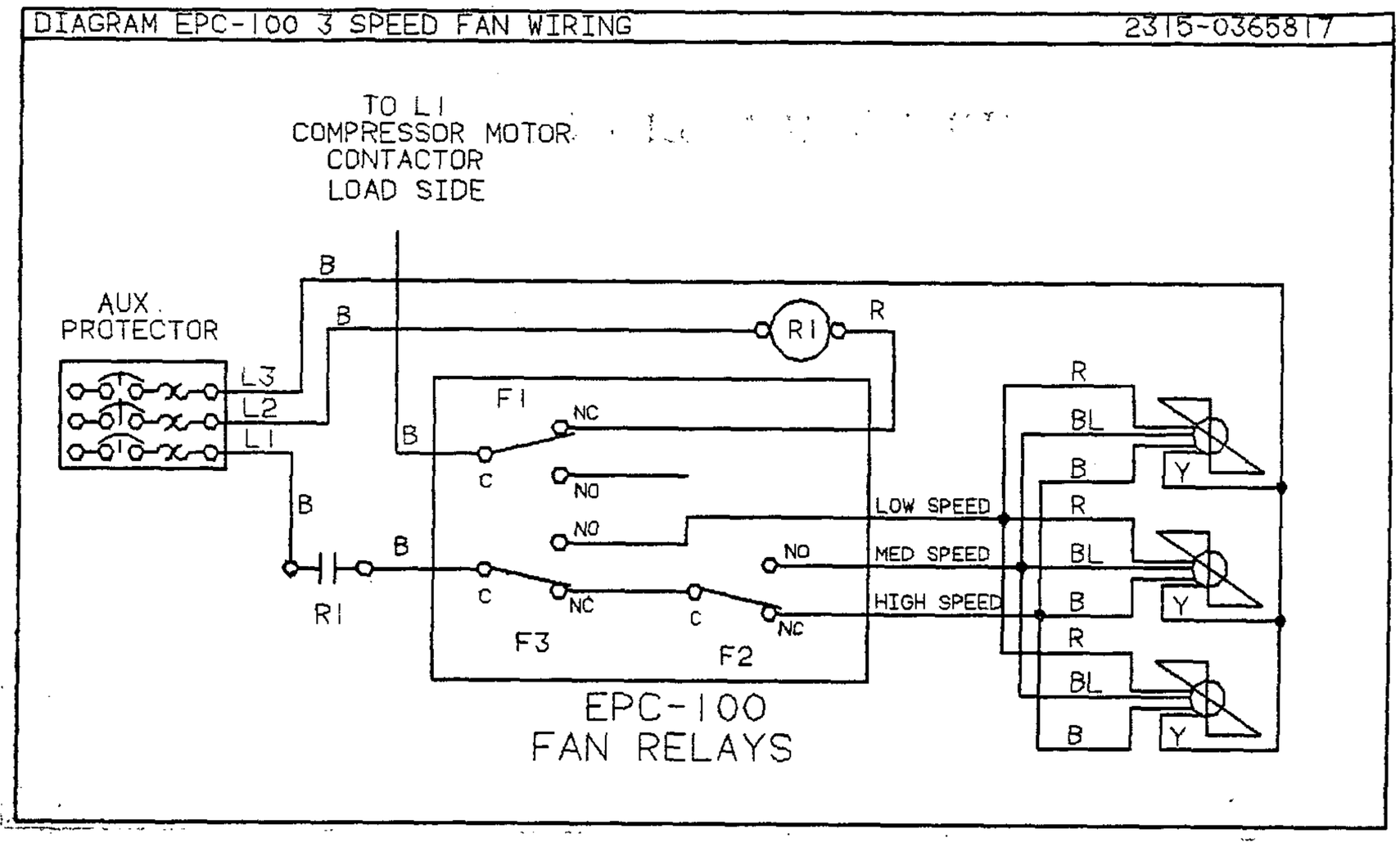


DIAGRAM EPC-100 3 SPEED FAN WIRING
2315-0365817
TO L1
COMPRESSOR MOTOR
CONTACTOR
LOAD SIDE
AUX.
PROTECTOR
L3
L2
L1
B
R1
R
F1
NC
NO
C
LOW SPEED
MED SPEED
HIGH SPEED
F3
F2
BL
Y
EPC-100
FAN RELAYS