Hayward/Summit Heat Pump

Troubleshooting Guide

Round Units

Square Units

TSG-HTPMPa

Safety Precautions

High voltage. Danger! Use extreme caution. Do not attempt if you are not a qualified servicer.

The following heat pump Troubleshooting Guide is to be used in diagnosing and repairing Hayward branded pool heat pump systems containing R-410A refrigerant . They are not intended for use with any other manufacturers heat pumps.

Heat Pump pool heaters are similar to the heat pumps for home heating and cooling in that they contain refrigerant. As such, service personnel should observe EPA regulations for refrigerant handling. Pool heat pumps operate on 240 volts A/C. There is a risk of electric shock at all terminals and the heat pump should only be serviced by trained personnel.

To use this guide, determine the model number of the heat pump and the nature of the problem. Refer to the Table of Contents to find the appropriate page for the problem and follow the flow charts to the solution.

If you have further questions:
Contact Hayward's Technical Service Department at 908-355-7995

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Table of Contents

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Heat Pumps covered in this guide

Round Heat Pumps

HP20654T, HP20654BT, HP20654TC, HP20854T, HP20854BT, HP20854TC, HP21104T, HP21104TC

Square Heat Pumps

SUM25TA, SUM3TA, SUM3TAC, SUM4TA, SUM4TAC, SUM5TA, SUM5TAC SUM8TA, HML50TA, HML65TA, HML65TAC, HML80TA, HML80TAC, HML110TA HML110TAC, HML125TA, HET50BTA, HET65BTA, HET110BTA, HET125BTA HCB50BTA, HCB65BTA, HCB65BTAC, HCB80BTA, HCB80BTAC, HCB110BTA, HCB110BTAC, HP50TA, HP21004T, HP21124T, HP21204T, HP21404T, SUMXL112, SUMXL140

Hayward/Summit Heat Pump

Sequence of Operation:

Sequence of Operation: Basic

Round Heat Pumps and Square heat pumps generally operate in the same fashion. Power is connected to the contactor per the installation instructions. Ensure the water line 'in' and 'out' connections are correct. Set the control for pool or spa operation. Adjust the thermostat setpoint above the water temperature. In approximately 3 to 5 minutes the heat pump will begin 'heating'. This 3 to 5 minute delay is important as it protects the compressor from short cycling. This time delay is part of the control circuit of the heat pump.

Round units have a 5 minute delay during which no operation will occur.

Square units have a 3 minute delay, but the fan will come on immediately once the heat pump is turned on and the thermostat raised to a setpoint above the pool temp.

The time delay will delay the start of the heat pump any time power is interrupted to the heat pump. When the heat pump satisfies the thermostat and shuts off, the time delay will not allow the heat pump to restart for 3-5 minutes.

The thermostat will turn the heat pump on and off as needed to keep the pool at the desired temperature.

Note: Heat pumps will not operate when the pool pump is off.

Sequence of Operation: Normal

All of the heat pumps covered in this guide are charged with R-410A refrigerant
If you have a system that is charged with R-22 refrigerant, and require assistance call our Technical Support Department at **908-355-7995**

Normal Refrigerant Operating Pressures

Low side **125-135psi**
Lower ambient temperatures will result in lower low side (suction) pressures.

High Side **290-400psi**
Higher water temperatures will result in higher high side (discharge) pressures.

Normal Air Temperature Differential

This is the difference in the temperature of the air entering the coil (ambient air), and the air being discharged out the top by the fan.
15-20 degrees Fahrenheit

Low relative humidity and/or lower than normal ambient temperatures can cause lower than normal temperature differentials.
Note: This is the best way to determine if a heat pump is heating

Sequence of Operation: Normal (cont.)

Water In and Around Heat Pump

The heat pump evaporator coil (the surrounding coil) condenses moisture out out of the surrounding air. As much as 3-5 gallons per hour of run time is common in higher humidity areas. This is normal and in fact increases the efficiency of the heat pump. The heat pump base pan design allows for a drain line to be attached using readily available components to drain this water away if it is a problem. In most installation situations however, this moisture simply runs off the pad and is absorbed into the ground.

Best Methods to Determine if Heat Pump is Actually Leaking Water

1. If the heat pump is leaking, it will continue to leak even when the heat pump is not running. If the water you are seeing is condensation from the evaporator coil it will dry up in a few hours.

2. Test the water with a chlorine test strip. If the water shows no or very low levels of chlorine the water is condensation. If the test strip shows levels of chlorine similar to pool water, you may have a leak.

Hayward/Summit Heat Pump

How To:

Refrigerant Leak Detection Methods

As our industry has evolved the issues we see with heat pumps today have become more diverse and complex.
It requires more than a set of gauges and a VOM to diagnose many of these problems.
One of the areas where new techniques and tools are required is in finding refrigerant leaks, particularly on R-410A systems. Due to the high operating pressures of this refrigerant it is possible to have a refrigerant leak that eludes a hand held Halon type leak detector. The leak rate may be significantly less when the heat pump is
off (the only time you can properly “sniff” the unit) than it would be when the heat pump is operating.

A second proven method of finding leaks it to pressurize the system with nitrogen and use a liquid leak detector
such as Big Blue to detect leaks. The maximum pressure you can use in this method is on the data plate of all heat pumps. This is the pressure Hayward pressurizes the system to during manufacture. The majority of leaks can be found using one or both of these methods.

Unfortunately, at times a leak may still remain elusive, even at the hands of the best technician.

A third proven method is to inject a fluorescent dye into the system and use an ultraviolet light to detect the leak.
We would recommend this method after attempting to discover the leak using the two methods outlined above. Given the sophistication of today’s systems as well as the compact designs we believe that having a dye system
leak detector is a requirement in your tool box. If you do not have a dye injector/ UV light detector kit you will need
to purchase one. You should be able to purchase a Spectronics kit that contains the UV light, UV protective glasses, cleaner, and enough dye for at least 2 systems for around 100.00 U.S.

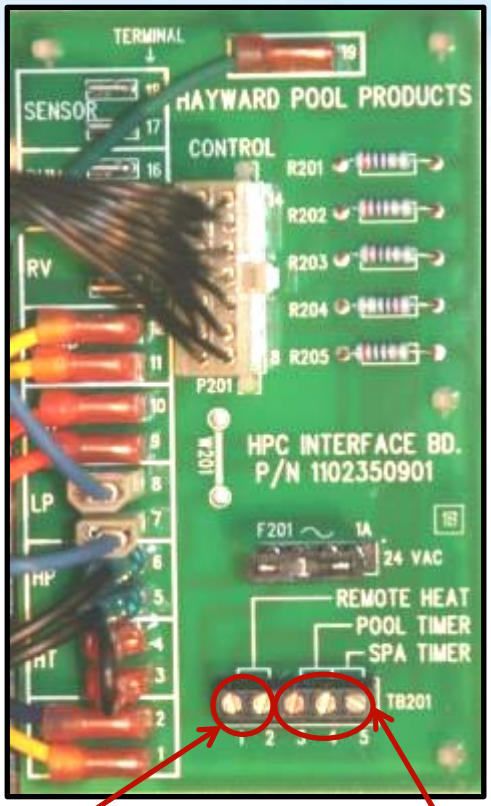
Remote Connection: Round Units

Round Heat Pumps

For 2 wire remotes such as Hayward's OmniLogic, attach the 2 low voltage wires from remote to terminals 1 and 2 on terminal block TB201. Set heat pump to standby mode (three red dots scrolling across screen). Heat pump is now ready for remote operation.

Round Heat Pumps

For 3 wire remotes where the desired temperature is set on the heat pump, attach the 3 wires from your remote to the 3, 4 and 5 terminals on terminal block TB201. Attach the pool wire to terminal 3, the common wire to terminal 4 and the spa wire to terminal 5. Set both the pool and spa desired temperature on the heat pump before turning on the remote. Once the remote is calling for pool or spa you will not be able to change the function on the heat pump without turning the remote off.



Use Terminals 1 and 2 for 2 wire remote connection

Use Terminals 3,4,& 5 for 3 wire remote connection

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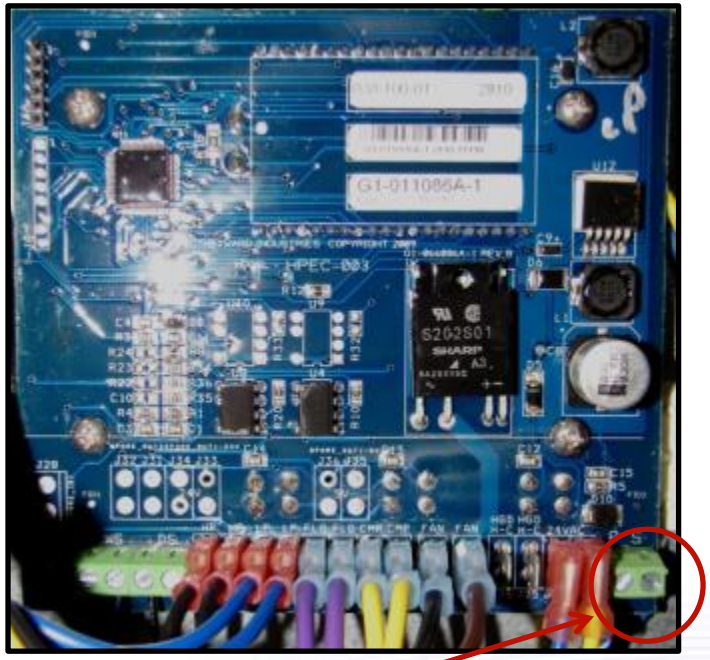
Remote Connection: Square Units

Square Platform Heat Pumps (Prior to Dec. 2016)

Attach 2 wires from remote to terminals marked ‘P’ and ‘S’ on the lower right corner of the control board. Set Pool temperature to off. Set Spa temperature to ‘104’. Press and hold ‘Set/Select’ button until ‘Loc’ appears. Release the ‘Set/Select’ button. Press up arrow until 50 appears. This unlocks the set up menu. Release up arrow. Press and release ‘Set/Select’ button 6 times or until ‘P_S’ appears. Press up or down arrow until ‘E appears. Heat pump is now ready for remote operation.

Note: Move quickly between steps, if the temperature shows on display you will have to start over.



Attach 2 wires from remote to terminals P and S

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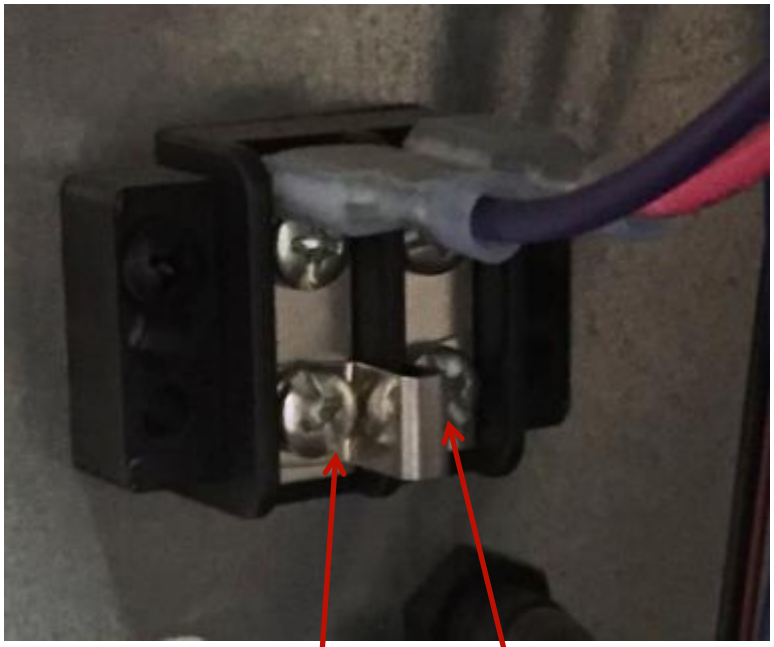
Remote Connection: Square Units (cont.)

Square Platform Heat Pumps (Beginning Dec. 2016)

Locate terminal block on right side of electrical box.
Remove jumper between two terminals on terminal block
Attach 2 wires from remote to terminals
Set pool thermostat to off
Set spa thermostat to 104°
Set heat pump to spa operation
Heat pump is now ready to be controlled by remote

NOTE: When remote is **not** calling for heat FLo will appear on display.

New Terminal Block Location



Attach 2 wires from remote to terminals after removing jumper

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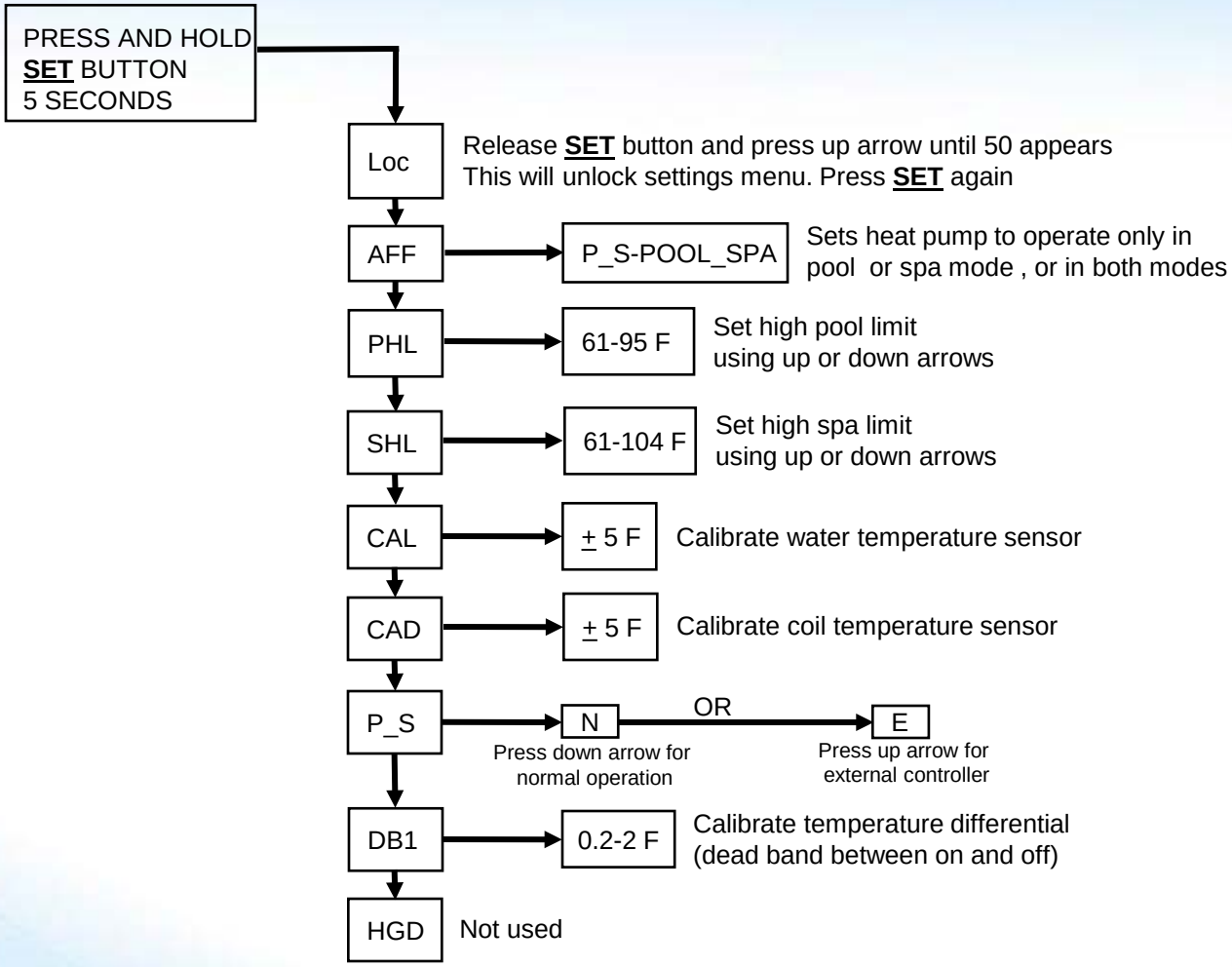
Set Up Menu: Square Unit



Combination Key Functions

Set + Dn

Bypass 3 minute time delay

Set + Up

Display coil temperature

Set+Up+Dn

Reset factory defaults

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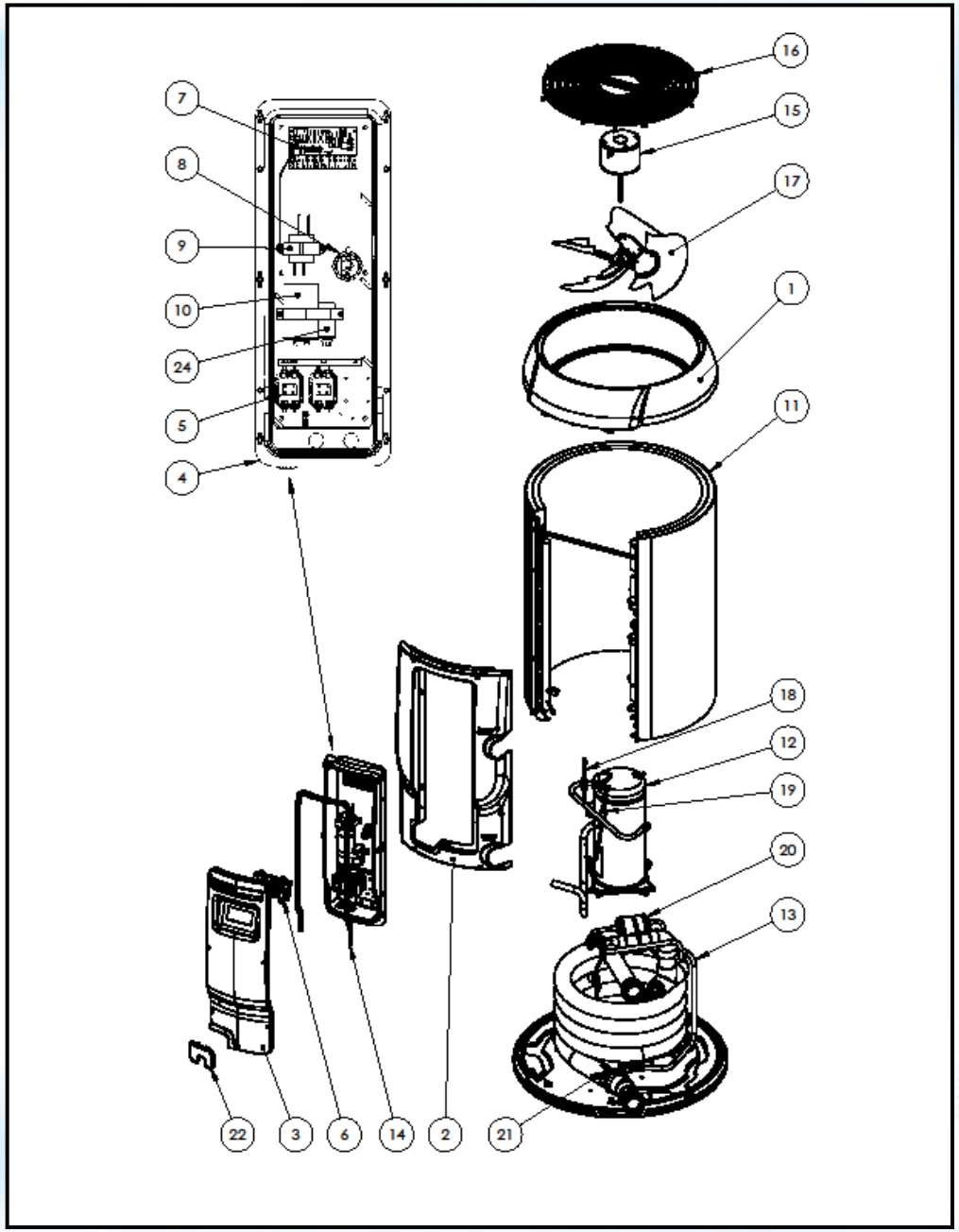
Hayward/Summit Heat Pump

Parts Diagrams & Lists:

Parts Diagram: Round Units



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Parts List: Round Units

	Part description	HP21104T	HP20854T	HP20854BT (Canada only)	HP20654T	HP20654BT (Canada only)
1	FAN TOP	HPX01023502	HPX01023502	HPX01024821	HPX01023502	HPX01024821
2	SIDE PANEL	HPX01023503	HPX01023503	HPX01024822	HPX01023503	HPX01024822
3	CONTROL BOX COVER	HPX01023504				
4	CONTROL BOX	HPX01023505				
5	CONTACTOR	HPX1985				
6	CONTROL BOARD ASSY	HPX26024139	HPX26024139			
7	INTERFACE BOARD	HPX11024130	HPX11024130			
8	WATER PRESSURE SWITCH	HPX2181				
9	TRANSFORMER	HPX11023693				
10	CAPACITOR	SMX11022320	HPX11024272		HPX11024270	
11	BENT COIL with GUARD	HPX24024241	HPX24024238			
12	COMPRESSOR	HPX11024203 or SMX11012753**	HPX11024204		HPX11024257	
13	CONDENSER	HPX24012850	HPX24024712			
14	COVER GASKET	HPX05023549	HPX05023549			
15	FAN MOTOR, 1or3 HP	HPX11023564	HPX11023564			
16	FAN GUARD	HPX01023561	HPX01023561			
17	FAN BLADE	HPX15024321	HPX15024321			
18	REPLACEMENT HP SWITCH	HPX11024258				
19	REPLACEMENT LP SWITCH	HPX11024259				
20	EXPANSION VALVE ASSY	HPX15024214 or HPX15012852**	HPX15024215		HPX15024216	
21	TEMPERATURE SENSOR	HPX2169	HPX2169			
22	ELECTRICAL ENTRY PLUG	HPX01023760	HPX01023760			
23	FAN RUN CAPACITOR	HPX11024151				
24	DEFROST SENSOR (NS)		HPX11024169			
25	HPC CABLE (NS)	HPX10023517	HPX10023517			
27	COMPRESSOR EL. PLUG (NS)	HPX10024289 or HPX10024732**	HPX10024289		HPX10024732	
28	REPLACEMENT FILTER DRIER	HPX1462				
29	UNION KIT	SPX3200UNKIT				
30	HOT GAS BYPASS VALVE (NS) C MODELS ONLY	SMX15026191	HPX15026180			
32	BRASS WATER PRESSURE FITTING	SMXHP2215				
	* Used on HP21254T after serial # 21131405101258001 and HP21404T after serial #	** Used on HP21104T and HP21104TC after serial # 21131410102317001				

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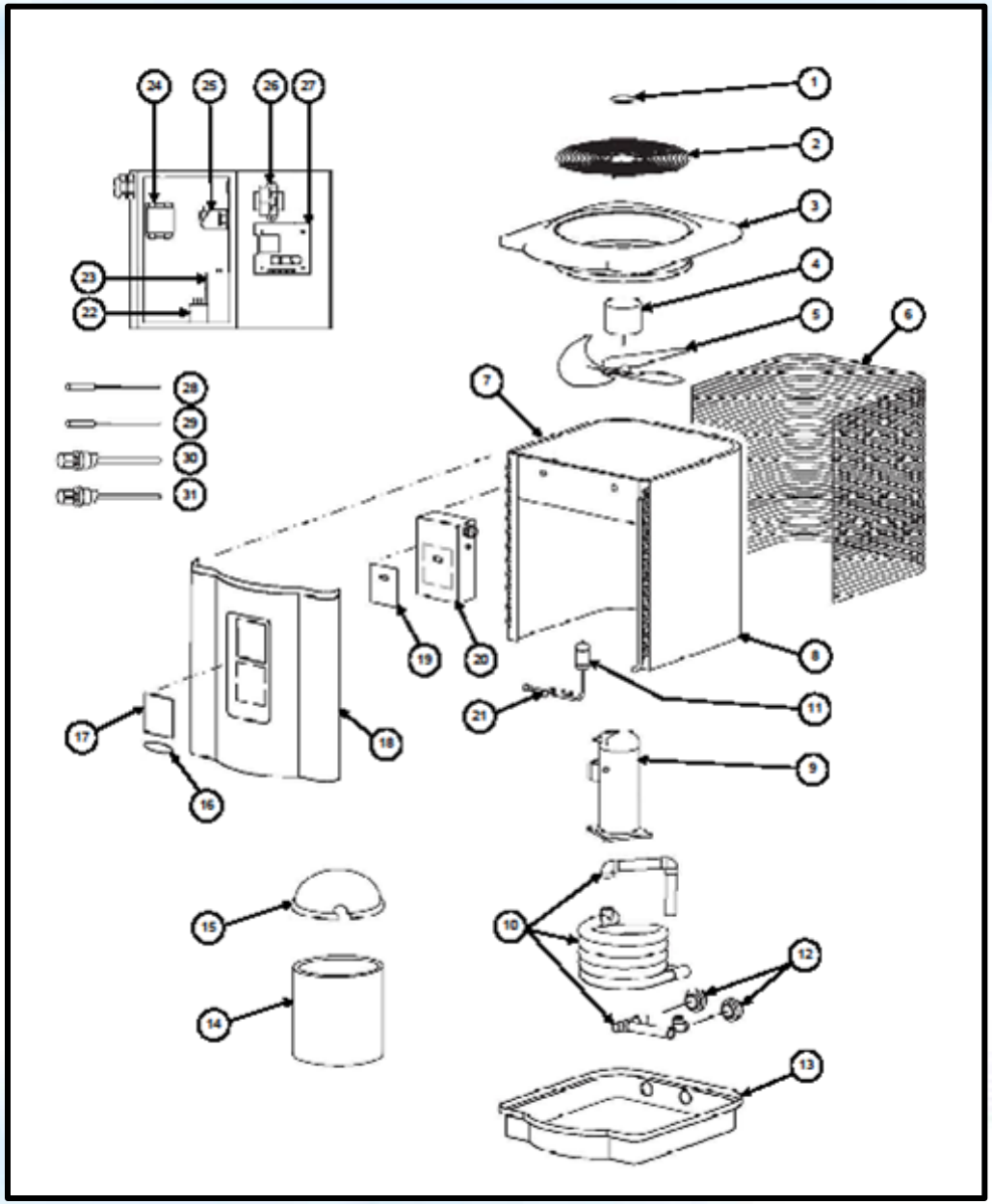
Parts Diagram: Square Units



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Parts List: Square Units

Summit By Hayward							
Part Description	**SUM25TA** (Canada only)	**SUM3TA**	**SUM4TA**	**SUM45TA**	**SUM5TA**		**SUM8TA**
FAN GUARD	SMX305000004						
FAN TOP	SMX309077011						
FAN MOTOR	SMX303088001			SMX300055036			
FAN BLADE	SMX15024648	SMX303140002		SMX303140003			
BENT COIL with GUARD	SMX24024427	SMX24024414			SMX24024408		SMX305099004
COMPRESSOR prior to 2015	SMX11024624	SMX11024622	SMX11024621	SMX11017204	SMX301150010	SMX11024201	
COMPRESSOR 2015 forward	SMX11024624	SMX11024622	SMX11024621	SMX11012751	SMX11012753	SMX11012755	
CONDENSER	SMX24024500	SMX24024804			SMX24024509		SMX24024864
FILTER DRIER	HPX1462						
COUPLING	SPX3200UNKIT						
SIDE PANEL	SMX309077013	SMX309099013					SMX309099015
TXV ASSEMBLY prior to 2015	SMX15024592	SMX15024593	SMX15024594	SMX15024595			SMX15024907
TXV ASSEMBLY 2015 forward	SMX15024592	SMX15024593	SMX15024594	SMX15012865	SMX15022368		SMX15024916
FAN RUN CAPACITOR	SMX306088001			HPX11024151			
COMPRESSOR CAPACITOR	SMX306150002	HPX11024154	HPX11024272	SMX11022320			
CONTACTOR	HPX1985						
WATER PRESSURE SWITCH	HPX2181						
TRANSFORMER	HPX11023693						
CONTROL BOARD ASSEMBLY	SMX306000016						
DEFROST (COIL) SENSOR	SMX306000023						
WATER SENSOR	SMX306000024						
LP SWITCH	HPX11024259						
HP SWITCH	HPX11024258						
COMPRESSOR ELECT. PLUG(NS)	SMX10024283	SMX306066002					
COMPRESSOR ELECT. PLUG 2015 forward	SMX10024283	SMX306066002		SMX10022329			

Parts List: Square Units (cont.)

Part Description	HeatMaster/EnergyTherm/EasyTemp					
	50TA (Canada only)	**65TA**	**80TA**	**110TA**	**125TA**	
FAN GUARD	SMX305000004					
FAN TOP	SMX309077021					
FAN MOTOR	SMX303088001			SMX300055036		
FAN BLADE	SMX15024648	SMX303140002		SMX303140003		
BENT COIL with GUARD	SMX24024427	SMX24024414		SMX24024408		
COMPRESSOR	SMX11024624	SMX11024622	SMX11024621	SMX301150010	SMX11024201	
CONDENSER	SMX24024500	SMX24024804		SMX24024509	SMX24024510	
FILTER DRIER	HPX1462					
COUPLING	SPX3200UNKIT					
SIDE PANEL	SMX309077023	SMX309099023				
TXV ASSEMBLY	SMX15024592	SMX15024593	SMX15024594	SMX15024595	SMX15024907	
FAN RUN CAPACITOR	SMX306088001			HPX11024151		
COMPRESSOR CAPACITOR	SMX306150002	HPX11024270	HPX11024272	HPX11024743		
CONTACTOR	HPX1985					
WATER PRESSURE SWITCH	HPX2181					
TRANSFORMER	HPX11023693					
CONTROL BOARD ASSEMBLY	SMX306000016					
DEFROST (COIL) SENSOR	SMX306000023					
WATER SENSOR	SMX306000024					
LP SWITCH	HPX11024259					
HP SWITCH	HPX11024258					
COMPRESSOR ELECT. PLUG(NS)	SMX10024283	SMX306000042				

Parts List: Square Units (cont.)

	HEATPRO SQUARE PLATFORM						SUMMIT XL	
Part Description	HP50TA	HP21004T	HP21124T	HP21254T	HP21404T/TC	HP31204T (H/C)	SUMXL112	SUMXL140
FAN GUARD	SMX305000004						SMX30500004	
FAN TOP	SMX309077011						SMX309077011	
FAN MOTOR	SMX303088001	SMX300055036					SMX300055036	
FAN BLADE	SMX15024648						SMX15024648	
BENT COIL with GUARD	SMX24024427	SMX24024414	SMX24024408		SMX305099004	SMX24024408	SMX24024408	SMX305099004
BENT COIL with GUARD after serial number 21131708100361001	SMX24024427	SMX24024414	SMX24013468	SMX24024408	SMX305099004	SMX24024408	SMX24013468	SMX305099004
COMPRESSOR prior to 2015	SMX11024624	SMX11017204	SMX301150010	SMX11024201		SMX11012754		
COMPRESSOR 2015 forward	SMX11024624	SMX11012751	SMX11012753	SMX11012755		SMX11012754	SMX11012753	SMX11012755
CONDENSER	SMX24024500	SMX24022372	SMX24024509	SMX24022371	SMX24024864	SMX24022306	SMX24024509	SMX24024864
FILTER DRIER	HPX1462					SMX15022309	HPX1462	
COUPLING	SPX3200UNKIT						SPX3200UNKIT	
FRONT PANEL	SMX309077023	SMX309099023			SMX309099016	SMX309099013	SMX309099023	SMX309099016
FRONT PANEL beginning 2018	SMX309077023	SMX309099023	SMX309099016	SMX309099023	SMX309099016	SMX309099013	SMX309099016	SMX309099016
TXV ASSEMBLY prior to 2015	SMX15026199	SMX15024595		SMX15024907		SMX15024595		
TXV ASSEMBLY 2015 forward	SMX15026199	SMX15012865	SMX15022368	SMX15024595	SMX15024916	SMX15024595	SMX15022368	SMX15024916
FAN CAPACITOR	SMX306088001	HPX11024151					HPX11024151	
COMPRESSOR CAPACITOR	SMX306150002	SMX11022320					SMX11022320	
CONTACTOR	HPX1985						HPX1985	
WATER PRESSURE SWITCH	HPX2181						HPX2181	
TRANSFORMER	HPX11023693						HPX11023693	
CONTROL BOARD ASSEMBLY	SMX306000016					SMX11023511	SMX306000016	
DEFROST (COIL) SENSOR	SMX306000023						SMX306000023	
WATER SENSOR	SMX306000024					SMX11024957	SMX306000024	
LP SWITCH	HPX11024259						HPX11024259	
HP SWITCH	HPX11024258						HPX11024258	
COMPRESSOR ELECT. PLUG prior to 2015	SMX10024283	SMX11024715				SXM10024899		
COMPRESSOR ELECT. PLUG 2015 forward	SMX10024283	SMX10022329				SXM10024899	SMX10022329	
MASTER ON/OFF SWITCH	SMX1101191101						SMX1101191101	
BARBED FITTING (wps)	SMXHP2215						SMXHP2215	
INTERFACE BOARD						HPX11023509		

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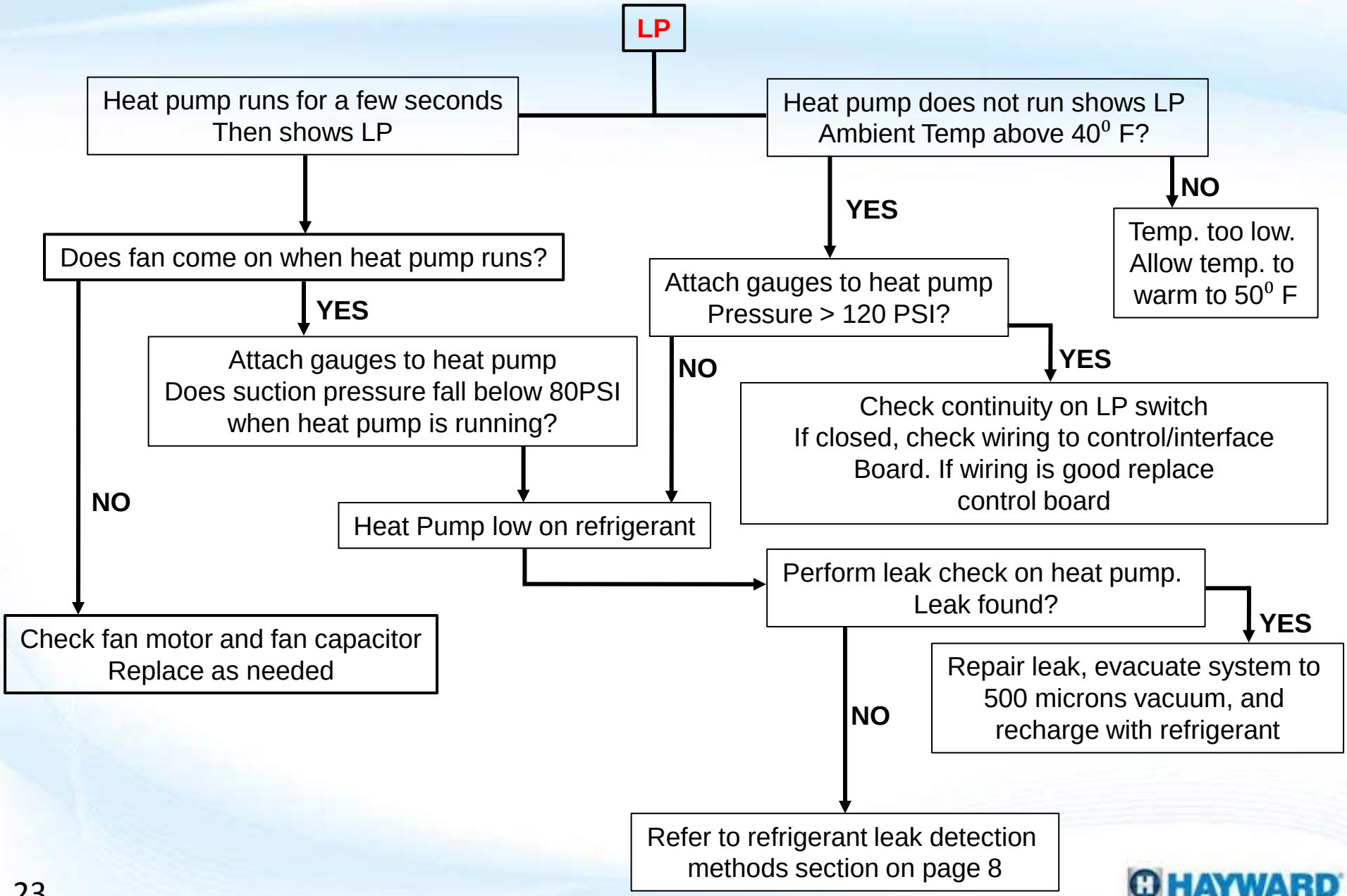
Hayward/Summit Heat Pump

Troubleshooting:

Flow Chart: LP



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Common Error Codes: LP

Square Display

LP on Display

LP is an indication the low pressure switch is open. The switch opens when the refrigerant pressure drops below 80PSI, and will automatically reset at 120PSI. Sustained ambient temperatures below 21ºF will cause the LP error, however once the ambient temperature rises above 40ºF the switch will close automatically.

Round Display

Troubleshooting LP

The most common cause of LP on display is a loss of refrigerant pressure from a leak in the refrigeration system. If refrigerant pressure is below 80PSI at your access port there has been a significant loss of charge. Thoroughly leak check the system with an electronic leak detector, or alternatively pressurize the system with dry
nitrogen and use a liquid leak detector such as “Big Blue”. If a leak still cannot be located inject UV dye into the system and recharge to full charge. Allow several days to as long as several leaks weeks -depending on apparent
severity of leak-, with normal heat pump operation for the dye to leak out with the refrigerant, and return with UV light to determine leak location.
Once leak is located: Repair leak, evacuate system to a minimum 500 micron vacuum, and recharge to factory charge (on data plate)


LP Switch

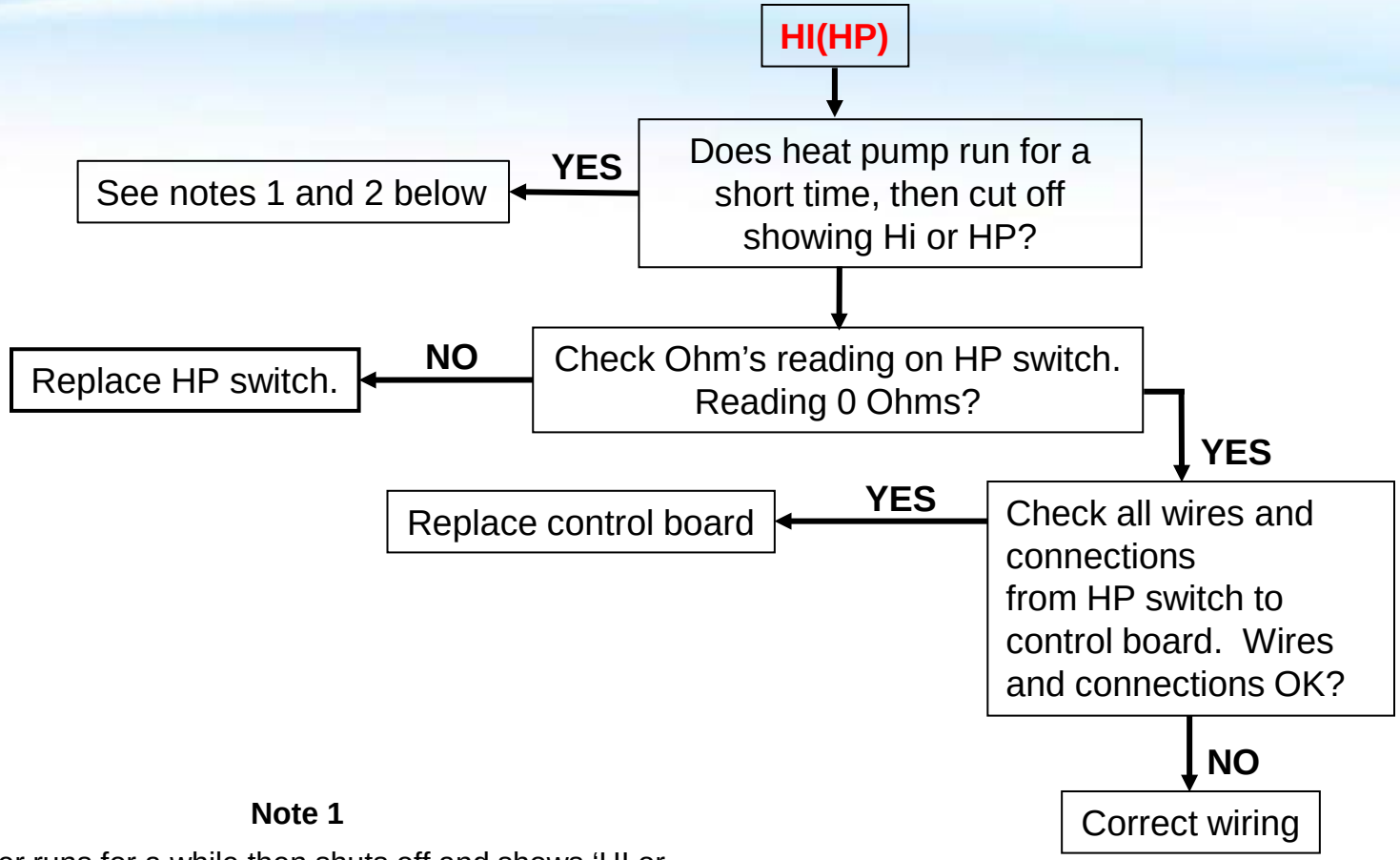
Note blue wires.
LP switch common to all R-410A heat pumps

Other causes of LP error code

An intermittent LP code can be caused by a bad fan motor or capacitor. Check capacitor and motor.
Bad LP switch. Check refrigerant pressure at access port. If pressure is above 120PSI check the continuity of LP switch. Switch should be closed. If open replace switch. The LP switch is a screw on style and does not require removing refrigerant charge to change. Be sure to use a thread sealant when installing new switch. Always use a back up wrench when installing new pressure switch.

If switch is closed, but LP is displayed check wires to switch for breaks. If no breaks are found replace control board.

Flow Chart: HI/HP



Note 1

Heater runs for a while then shuts off and shows 'HI or HP' on display. Low water flow is normally the problem. Check filter and pump. A common problem when running unit on spa exists when spa temperature of about 100º F is reached and the unit shuts off with the 'HI or HP' fault. At higher outdoor and water temperatures a higher flow rate may be required for proper operation. The unit requires a minimum of 30 GPM, but may require more under these conditions.

Note 2

HI/HP after the heat pump has run for a few seconds could be an indication of a failed TXV. If the failure is caused by the TXV, the low side (suction) pressure will fall rapidly once the compressor is running, and the high side (head) pressure will rise rapidly above 590 PSI.

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Common Error Codes: HP/HI

Square Display

HP/HI on Display

HP or HI is an indication the high pressure switch is open. The switch opens when the refrigerant pressure rises above 590PSI, and will automatically reset at 440PSI..

Round Display

Troubleshooting HP/HI

The most common cause of HP or HI error code is restricted water flow. An open bypass valve that allows the heat exchanger to be pressurized, but does not allow flow through it is a likely culprit. When heating a spa, there may not be sufficient flow through the system for proper operation at higher water temperatures. All heat pumps require a minimum of 30 gpm water flow, but at higher water temperatures a higher flow rate of at least 40 gpm may be required.


HP Switch

Note black wires. HP switch common to all R-410A heat pumps

Other causes of HP/HI error code

Heat Pump runs for a few seconds then fails on HP/HI error

Thermostatic Expansion Valve (TXV) failure. Loss of charge in the power head of the TXV closes the valve and will result in a HP or HI error code. To determine if this is the problem, observe both high and low pressure readings when heat pump is running. If TXV is bad high pressure will quickly rise to 590PSI, while at the same time the low pressure will quickly drop.

Refrigerant Overcharge Overcharge of the heat pump is unlikely, but not impossible. Heat pumps do not leave our factory overcharged, so the only way it can occur is if service has been previously performed on the system and the technician overcharged the refrigerant after or during a repair. To determine if this is the issue recover all refrigerant from the system, pull a 500 micron vacuum, and then recharge to factory charge (on data plate).

Heat Pump does not run- HP/HI on display

Bad HP switch. Since the HP switch is an automatic reset, and the pressures within the refrigeration system will equalize shortly after the heat pump cuts off, HP or HI on the display without the heat pump running will not be related to the refrigerant pressure check the continuity of HP switch. Switch should be closed. If open replace switch. The HP switch is a screw on style and does not require removing refrigerant charge to change. Be sure to use a thread sealant when installing new switch. Always use a back up wrench when installing new pressure switch.

If switch is closed, but HP/HI is displayed check wires to switch for breaks. If no breaks are found replace control board.

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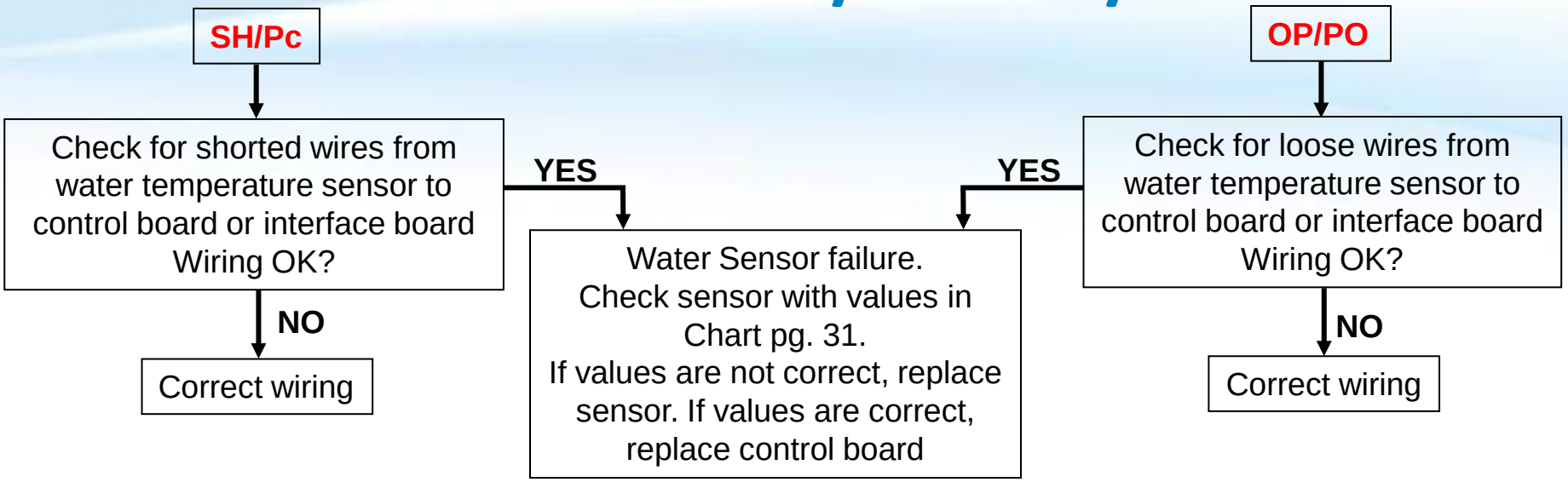
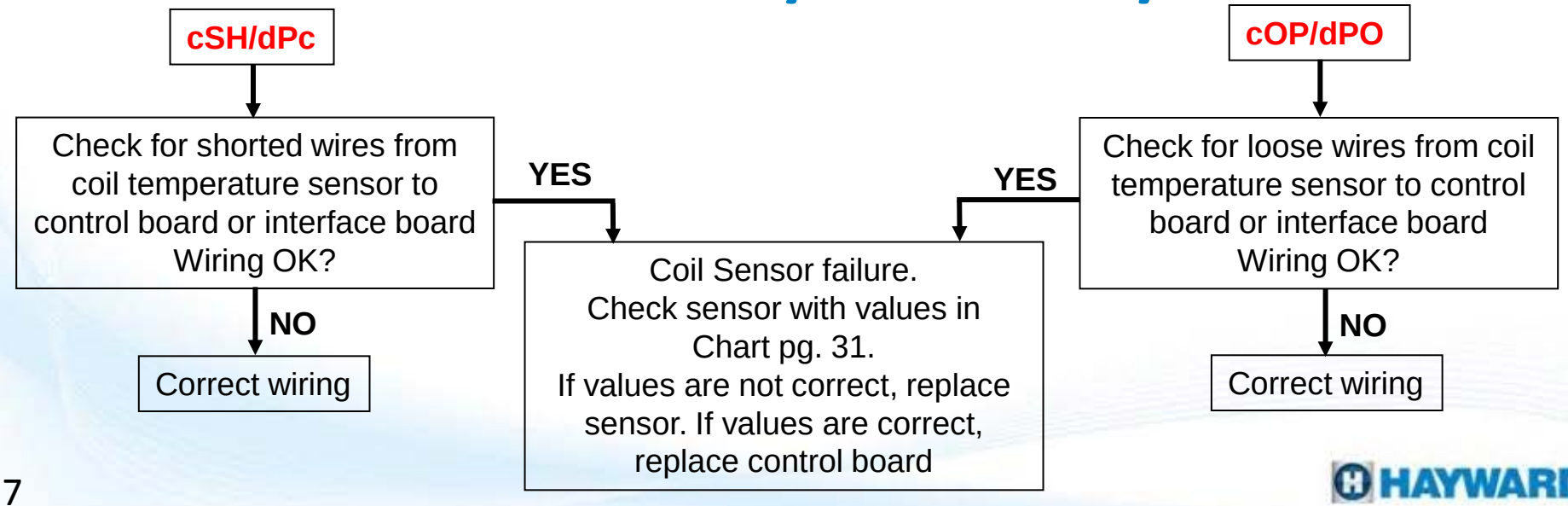
Flow Chart: SH/Pc - OP/PO



Flow Chart: cSH/dPc - cOP/dPO



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Common Error Codes: PO/OP or Pc/SH

Square Display

PO/OP on Display

PO or OP is an indication of an open water temperature sensor.
Square heat pumps use a 4.8k ohm sensor, and
Round heat pumps use a 10k ohm sensor.

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Round Display

Troubleshooting PO/OP

The most common cause of PO or OP error code is an open water temperature sensor.
Check sensor wiring for breaks, and check sensor resistance against the correct temperature/resistance chart located on page 31.
If resistance is infinite or very high according to the chart replace the sensor.
If sensor reads the correct resistance for the temperature of the water, replace control board

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Square Display

Pc/SH on Display

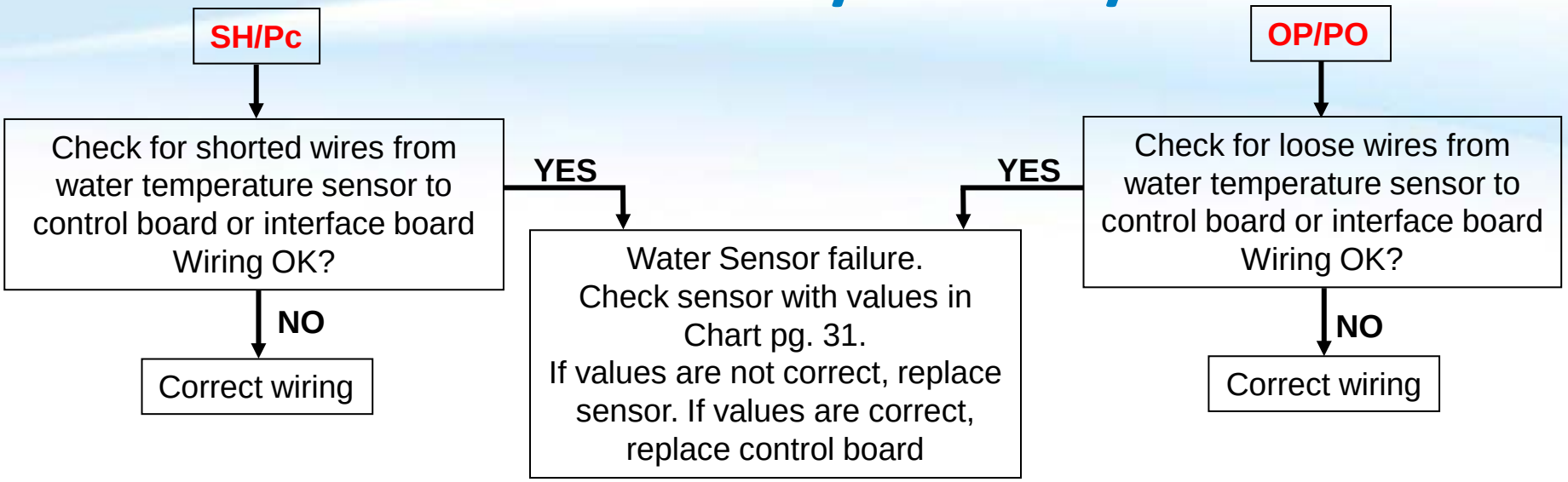
Pc or SH is an indication of an shorted water temperature sensor.
Square heat pumps use a 4.8k ohm sensor
Round heat pumps use a 10k ohm sensor

Round Display

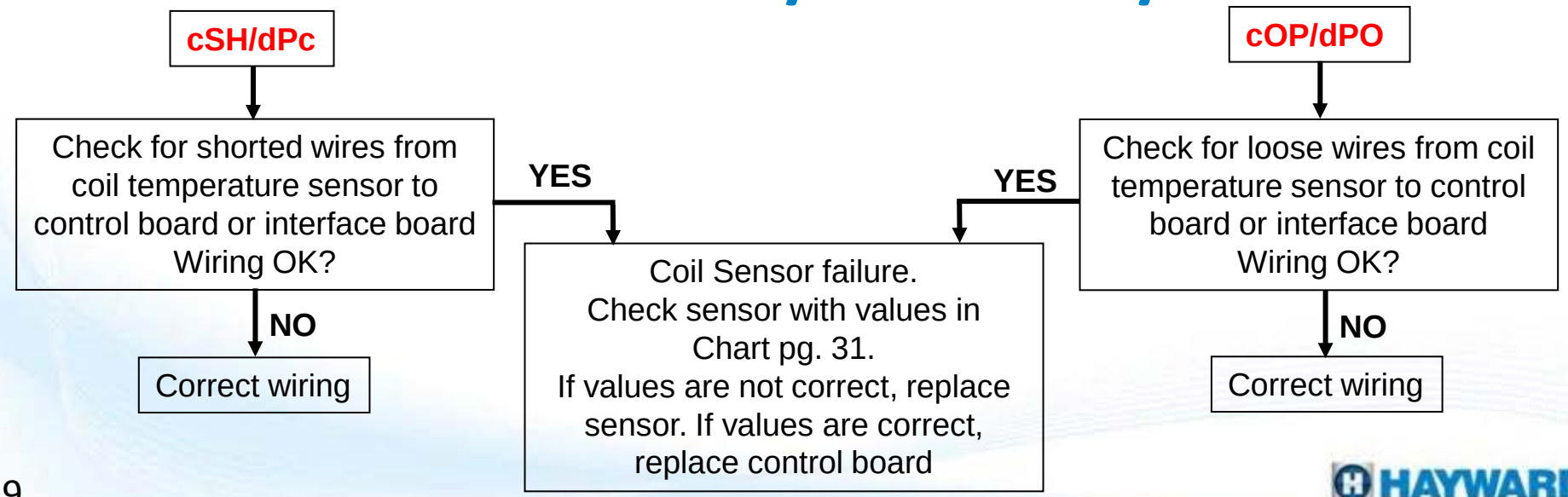
Troubleshooting Pc/SH

The most common cause of Pc or SH error code is a shorted water temperature sensor.
Check sensor wiring for shorted wires, and check sensor resistance against the correct temperature/resistance chart located on page 31.
If resistance is 0 or very low according to the chart, replace the sensor.
If sensor reads the correct resistance for the temperature of the water, replace control board

Flow Chart: SH/Pc - OP/PO



Flow Chart: cSH/dPc - cOP/dPO



HAYWARD

Common Error Codes: dPO/cOP or dPc/cSH

Square Display

dPO/cOP on Display

dPO or cOP is an indication of an open defrost temperature sensor.
Summit style heat pumps use a 4.8k ohm sensor, and HeatPro heat pumps use a 10k ohm sensor..

Round Display

Troubleshooting dPO/cOP

The most common cause of dPO or cOP error code is an open defrost temperature sensor.
Check sensor wiring for breaks, and check sensor resistance against the correct temperature/resistance chart located on page 31.
If resistance is infinite or very high according to the chart replace the sensor.
If sensor reads the correct resistance for the temperature of the water, replace control board

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Square Display

dPc/cSH on Display

Pc or SH is an indication of an shorted defrost temperature sensor.
Square heat pumps use a 4.8k ohm sensor
Round heat pumps use a 10k ohm sensor

Round Display

Troubleshooting dPc/cSH

The most common cause of Pc or SH error code is a shorted defrost temperature sensor.
Check sensor wiring for shorted wires, and check sensor resistance against the correct temperature/resistance chart located on the page 31.
If resistance is 0 or very low according to the chart, replace the sensor.
If sensor reads the correct resistance for the temperature of the water, replace control board

Temperature/Resistance Charts

For use with Square Heat Pumps

4.8 K ohm Sensor Temperature / Resistance Chart

Temperature °F	Temperature °C	Sensor resistance (Kohm)
180.0	82.2	0.549
175.0	79.4	0.601
170.0	76.7	0.659
165.0	73.9	0.722
160.0	71.2	0.793
155.0	68.4	0.872
150.0	65.7	0.961
145.0	62.9	1.06
140.0	60.2	1.17
135.0	57.4	1.294
130.0	54.7	1.434
125.0	51.9	1.591
120.0	49.2	1.768
115.0	46.4	1.968
110.0	43.7	2.194
105.0	40.9	2.451
100.0	38.2	2.741
95.0	35.4	3.072
90.0	32.7	3.448
85.0	29.9	3.879
80.0	27.2	4.37
75.0	24.4	4.935
70.0	21.7	5.583
65.0	18.9	6.328
60.0	16.2	7.187
55.0	13.4	8.18
50.0	10.7	9.334
45.0	7.9	10.671
40.0	5.2	12.23
35.0	2.4	14.044
30.0	-0.3	16.167
25.0	-3.1	18.655
20.0	-5.8	21.581
15.0	-8.6	25.036
10.0	-11.3	29.11
5.0	-14.1	33.95
0.0	-16.8	39.683

Defrost

Water

Using Temp/Resistance Charts

Determine correct temperature of air or water using accurate thermometer. Set VOM meter to a minimum of 20K ohms. Read resistance of sensor.(wire to wire) Resistance should match the temperature shown on the chart.

In the example above:

The meter on the left shows a temperature of 73.6ºF

The meter on the right shows a resistance through the sensor of 10.84K ohms.

Checking the chart on the right for 73.6 degrees shows the resistance should be somewhere between 11.882 (70º) and 10.50 (75º)

Sensor tests good.

For use with Round Heat Pumps

10K ohm Sensor Temperature / Resistance Chart

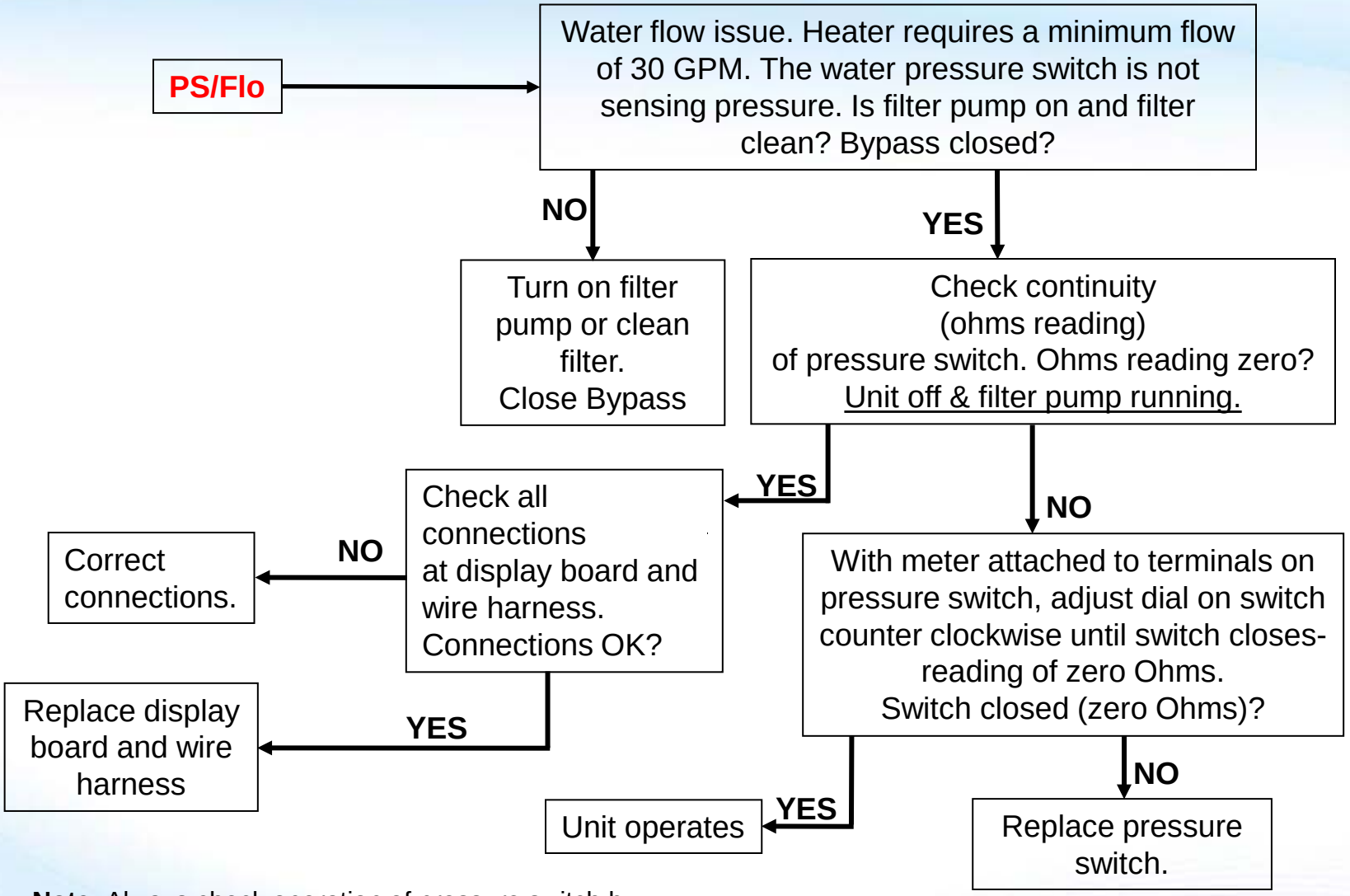
Temperature °F	Temperature °C	Sensor resistance (Kohm)
180.0	82.2	1.171
175.0	79.4	1.281
170.0	76.7	1.402
165.0	73.9	1.538
160.0	71.2	1.688
155.0	68.4	1.856
150.0	65.7	2.044
145.0	62.9	2.254
140.0	60.2	2.489
135.0	57.4	2.752
130.0	54.7	3.049
125.0	51.9	3.382
120.0	49.2	3.758
115.0	46.4	4.183
110.0	43.7	4.664
105.0	40.9	5.208
100.0	38.2	5.827
95.0	35.4	6.53
90.0	32.7	7.333
85.0	29.9	8.249
80.0	27.2	9.297
75.0	24.4	10.5
70.0	21.7	11.882
65.0	18.9	13.473
60.0	16.2	15.31
55.0	13.4	17.435
50.0	10.7	19.9
45.0	7.9	22.764
40.0	5.2	26.1
35.0	2.4	29.998
30.0	-0.3	34.561
25.0	-3.1	39.919
20.0	-5.8	46.225
15.0	-8.6	53.669
10.0	-11.3	62.479
5.0	-14.1	72.937
0.0	-16.8	85.387

Defrost

Water

HAYWARD

Flow Chart: Flo/PS



Note: Always check operation of pressure switch by turning off pool pump after adjusting pressure switch.
Heat pump should cut off when pool pump is not running.

Common Error Codes: Flo/PS

Square Display

Flo/PS on Display

Flo or PS on the display is an indication of an open water pressure switch. Though water pressure switches occasionally fail, the majority of Flo/PS errors are water flow related. Confirm that pump is running and filter is clean before proceeding with any further troubleshooting.
The water pressure switch is located in the electrical panel.

Round Display

Troubleshooting Flo/PS

The most common cause of FLo or PS error code is low or no water flow. Open bypass valves, time clocks in the off cycle, pumps turned off, or dirty filters account for the majority of Flo and PS errors. If water flow is confirmed check continuity of the flow switch with an Volt/Ohm meter. **See Below**
Disconnect wires from water pressure switch and with the pool pump running and any bypasses **closed** check for continuity through the switch, not through the wires. If there is no continuity, try adjusting the switch slightly by turning the thumbscrew counterclockwise 1 full turn. If there is still no continuity, replace switch.

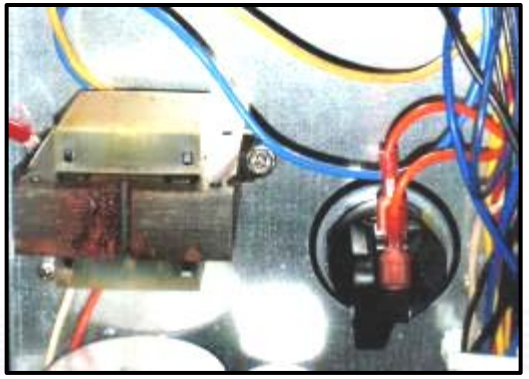
If switch is closed, but Flo/PS is displayed
Check wires to switch for breaks. If no breaks are found replace control board.

Note: Any time water pressure switch is adjusted- After adjusting switch cut off pool pump to ensure heat pump cuts off on no water flow.


Square Water Pressure Switch

To test continuity of flow switch:

Remove orange wires from switch for round hp
Remove purple wires from switch for square hp
Set VOM to Ohms, and check for continuity at switch- not wires.


Round Water Pressure Switch

Common Error Codes: Blank Display

Square Display

Blank Display

A blank display is an indication of no low voltage to control.
A tripped breaker is a likely cause.
On round models a blown 1 amp fuse will result in a blank display

Round Display

Troubleshooting a Blank Display

Check for 240 volts to contactor at L1 and L2 terminals. If there is 240 volts at L1 and L2 check for 24 volts between blue and yellow wires coming from transformer.

On Square units if 24 volts are present at blue and yellow wires replace control board.

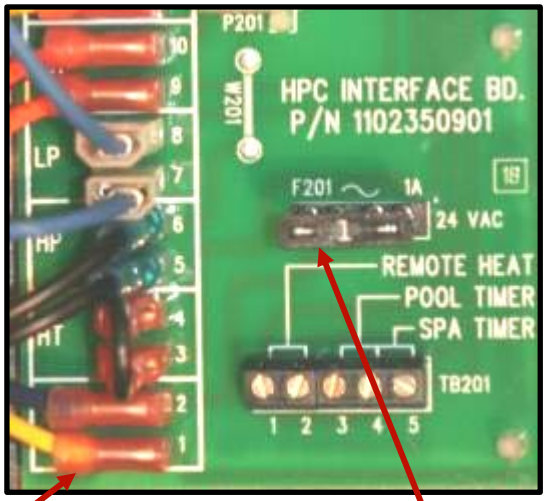
On Round units if 24 volts are present check for blown fuse on interface board. If fuse is good replace control board

Common causes of blown fuse or bad transformer are pinched or shorted low voltage wires to low and high pressure switches. Check all wiring for short or ground

Contactor coil shorted or grounded. Contactors should have approx. 10 Ohms resistance through coil, and there should be no reading of continuity to ground.

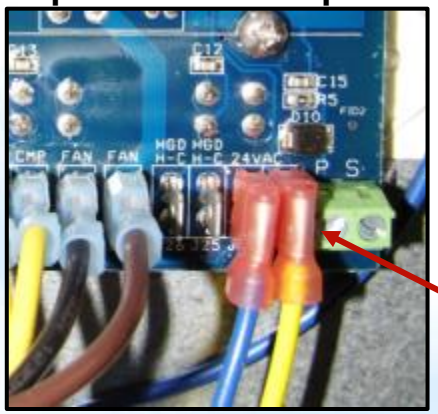
Replace contactor if resistance exceeds 12 Ohms, or there is any continuity to ground.

Round Heat Pump



1 Amp fuse to protect low voltage circuit HeatPro only

Square Heat Pump



Check for 24 volts AC at blue and yellow wires

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Common Error Codes: FS/deF

Square Display

FS/deF on Display

FS or deF on the display is an indication that the heat pump is in the defrost mode.
If outdoor ambient temperatures are low to mid 50's or below this is normal operation

Round Display

Troubleshooting FS/deF

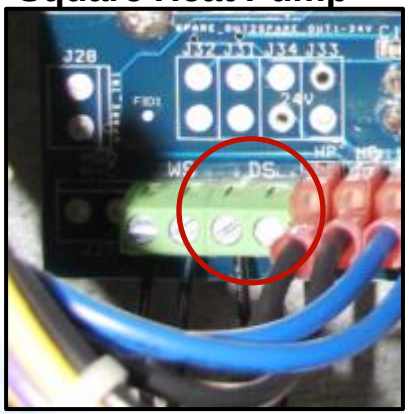
Normal display when heat pump is in defrost mode. Defrost can occur any time the outdoor ambient temperatures fall into the mid 50's or below.

If you have FS/ deF when temps are above mid 50's

This could be an indication the defrost temperature sensor is failing. Check sensor against resistance charts on page 31. If sensor resistance does not match with correct reading from chart replace sensor. If resistance is correct replace control board

Note: Defrost sensors are attached to suction refrigerant line near the TXV bulb.

Square Heat Pump



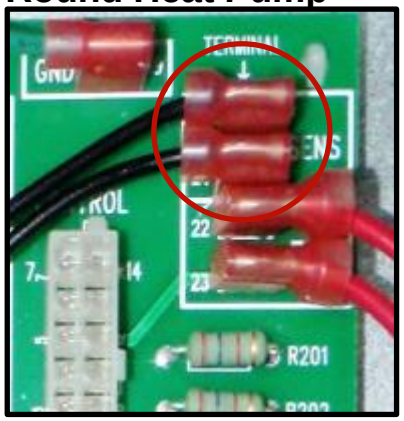
Defrost Sensor Wire Location

Defrost Sequence

Round Heat Pumps

When defrost sensor senses a coil temperature of 29ºF, the control board cuts the compressor off but leaves the fan running for 15 minutes, the display will show only the water temperature during this time. If temperature of sensor is 50ºF or above after 15 minutes the compressor will restart and the heat pump is operating normally. If the temperature has not reached 50ºF the heat pump will go through up to 2 more 15 minute cycles. If after the 3rd cycle the temperature is still not above 50ºF the heat pump will shut down for 2 hours and show deF on the display.

Round Heat Pump



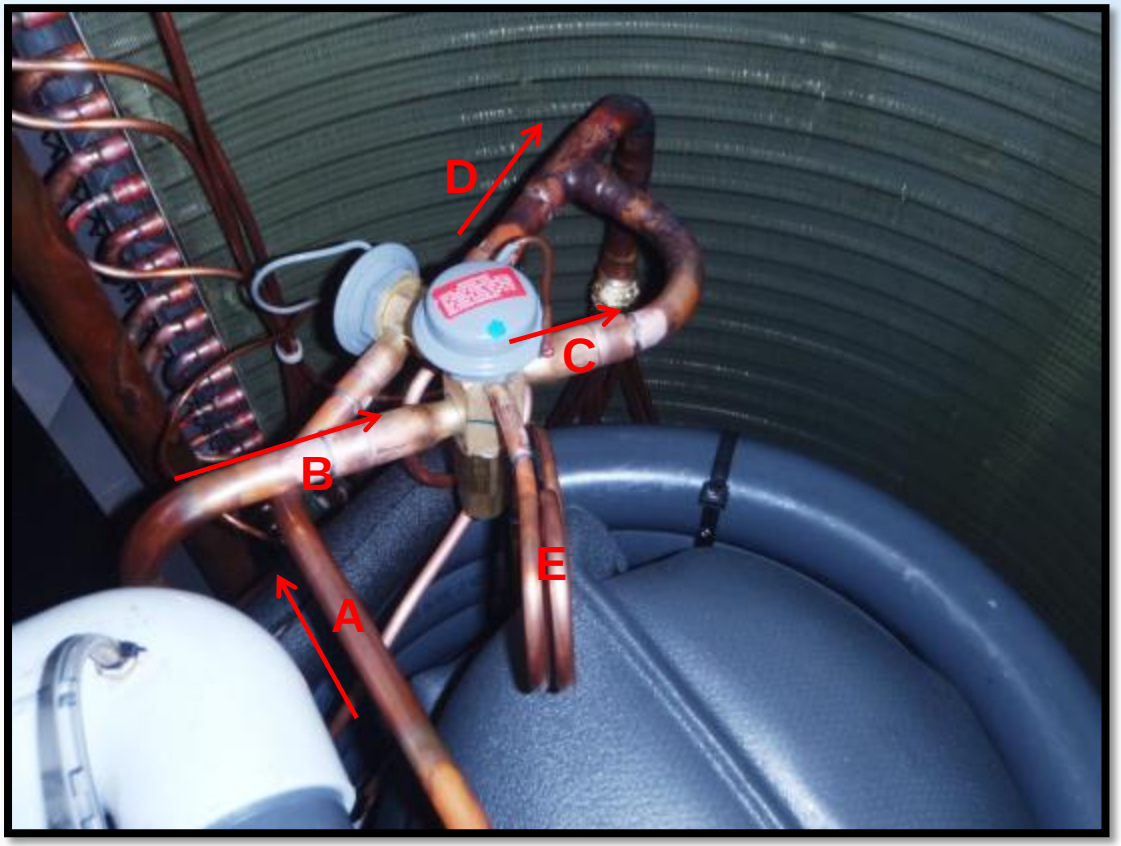
Defrost Sensor Wire Location

Square Heat Pumps

When defrost sensor senses a coil temperature of 29^{0}F, the control cuts the compressor off and leaves the fan running. The display shows FS. The heat pump will continue to operate in this way until the sensor senses 42^{0}F. Once the sensor reaches 42^{0}F the compressor will restart and the heat pump is operating normally.

Hot Gas Bypass (HGBP)

designated by a "C" at end of model number



A. Liquid line to TXV
B. Hot gas line to HGBP is tee'd into the hot gas line going to the condenser.
C. Hot gas line from HGBP is tee'd into liquid line downstream of TXV
D. Liquid line downstream of TXV
E. Low pressure tube attached to suction line entering compressor

Sequence of Operation

The diaphragm in the HGBP regulates the suction pressure by opening and closing the valve and allowing some of the hot gas that would normally go into the condenser to flow into the liquid line downstream of the TXV.

As the suction pressure drops below 98 psi, (~31° F) loss of pressure from the suction line on the diaphragm (E) will result in the HGBP valve opening to allow hot gas to enter the liquid line downstream of the TXV. This will keep the suction pressure up and the evaporator temperature above the defrost point, allowing the heat pump to operate in cooler temperatures.

Trouble Shooting:

Symptoms of a failed hot gas bypass

1. Stuck open- abnormally high superheat (more than 15° F), loss of heating capacity
2. Stuck closed- heat pump defrosts more than normal, will not run at lower temperatures (below 50° F)

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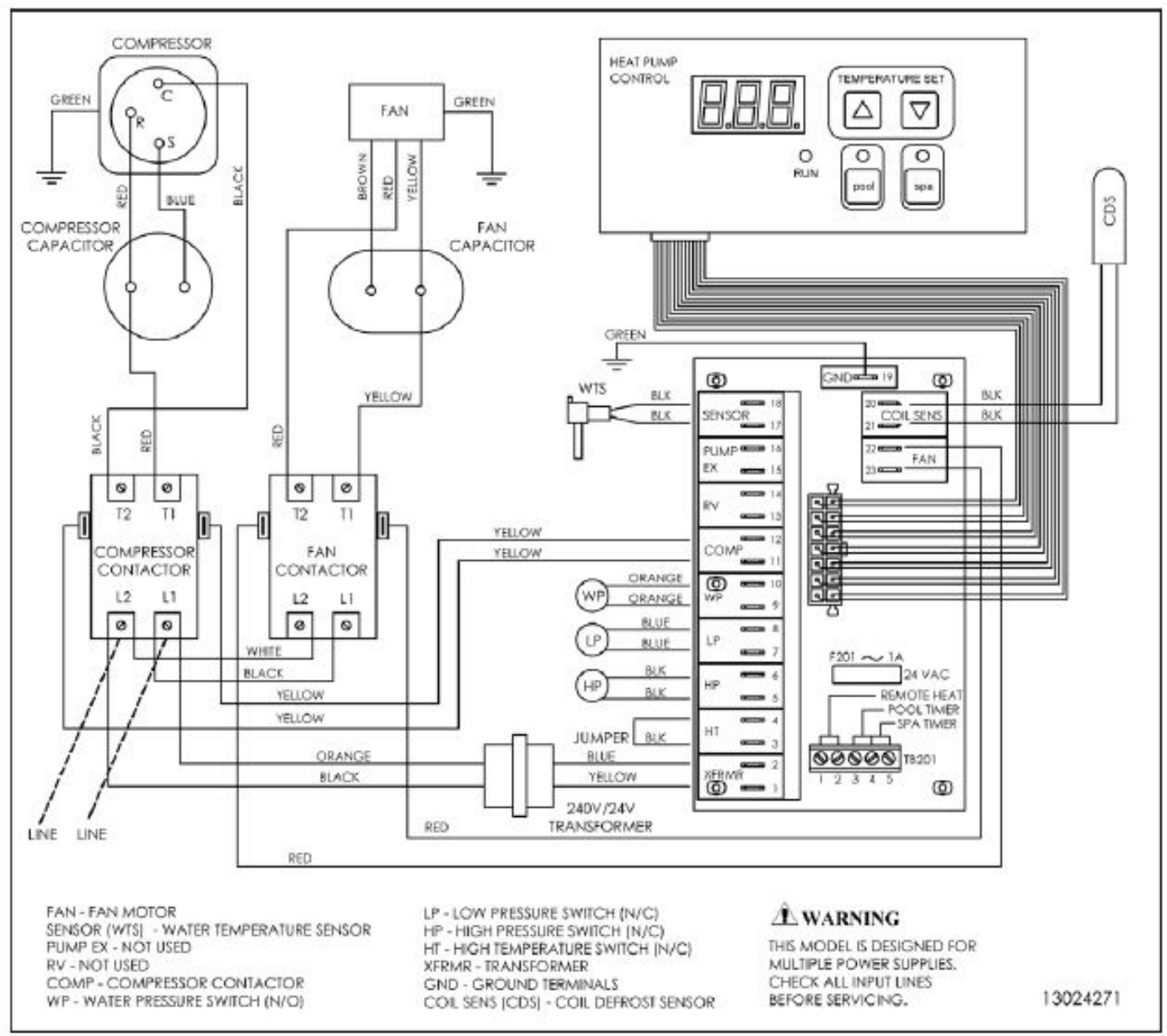
HAYWARD®

Hayward/Summit Heat Pump

Wiring Diagrams:

Wiring Diagram: Round Unit



FAN - FAN MOTOR
SENSOR (WTS) - WATER TEMPERATURE SENSOR
PUMP EX - NOT USED
RV - NOT USED
COMP - COMPRESSOR CONTACTOR
WP - WATER PRESSURE SWITCH (N/O)

LP - LOW PRESSURE SWITCH (N/C)
HP - HIGH PRESSURE SWITCH (N/C)
HT - HIGH TEMPERATURE SWITCH (N/C)
XFRMR - TRANSFORMER
GND - GROUND TERMINALS
COIL SENS (CDS) - COIL DEFROST SENSOR

WARNING
THIS MODEL IS DESIGNED FOR MULTIPLE POWER SUPPLIES. CHECK ALL INPUT LINES BEFORE SERVICING.

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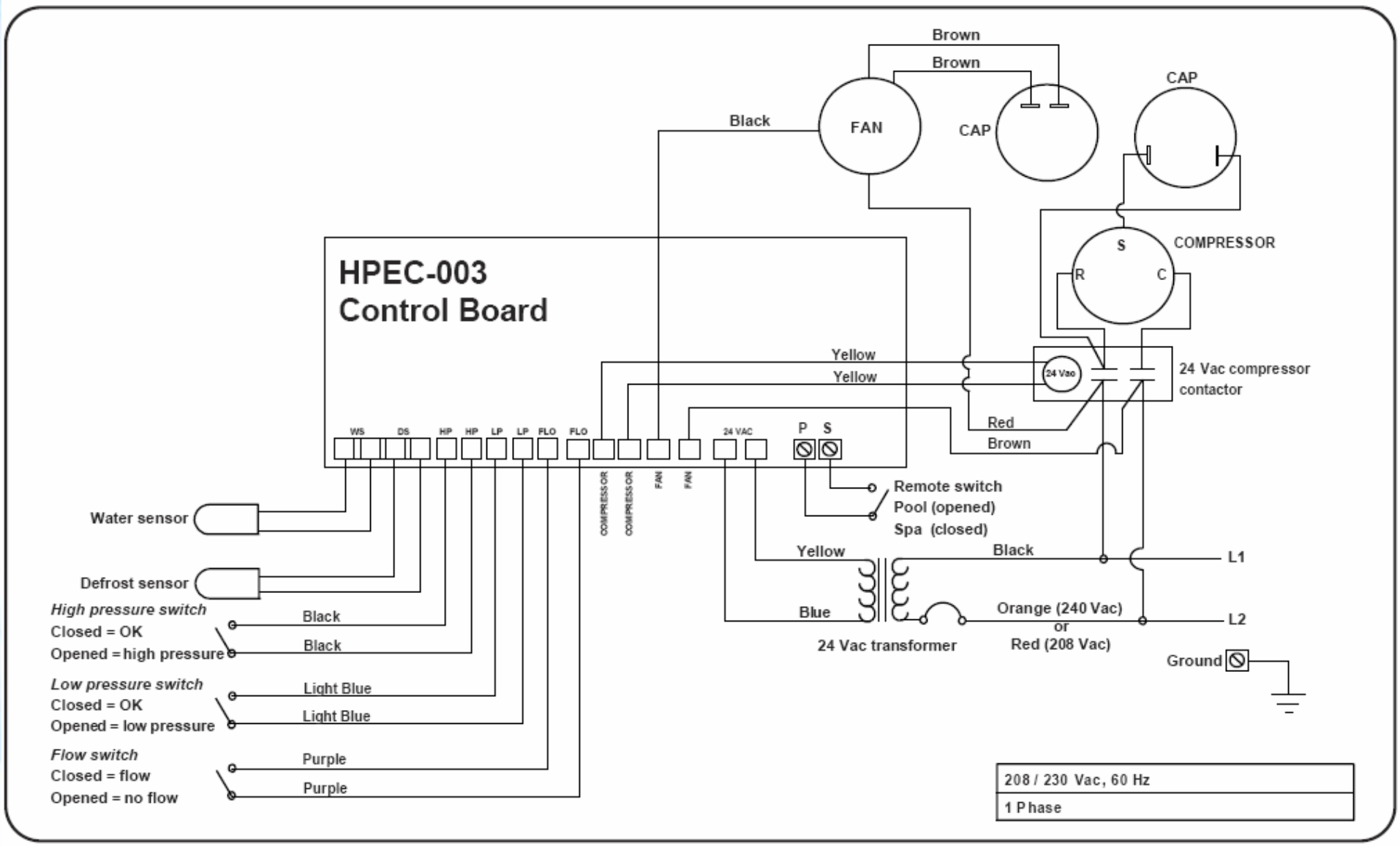
Wiring Diagram: Square Unit



Specifications

Heat Pump Data Plate Information									
	Variable Description	**50K BTU** SUM25TA, HML50TA, HP50TA	**65K BTU** SUM3TA, HCB65BTA	**95K BTU** SUM45TA, HCB95BTA, HP21004T	**110K BTU** SUM5TA, HML110TA, HCB110BTA, HP21124T	**110K BTU** HP21104T, HP21104TC (Round)	**125K BTU** HML125TA, HCB125BTA, HP21254T	**140K BTU** SUM8TA, HP21404T, HML125TA	**125K BTU Heat/Cool** HP31204T
A	Model Number	See Above							
B	Serial Number								
C	Refrigerant Type	R410A							
D	Factory Charge	3lb 0oz	4lb 1oz	4lb 10oz	5lb 13oz	5lb 3oz	5lb	5lb 14oz	7lb 6oz
E	Factory Test Pressure	440							
F	Compressor Amps	10.5	19.8	28	32	32	32	32	36.9
G	Compressor LRA	60	109	176	148	148	185	185	185
H	Fan Amps	1.3	1.3	2.4	2.4	1.8	2.4	2.4	2.4
J	Fan LRA	2.8	2.8	4.3	4.3	2.8	4.3	4.3	4.3
K	Minimum Water Flow	30							
L	Maximum Water Flow	75							
M	Maximum Inlet Water Temperature (SPA)	108							
N	Nominal Power Requirement	2400	3130	4500	5600	5400	6600	6600	6100
P	A/C Power	240V 60Hz 1Ph							
Q	Maximum Circuit Amps	20	40	60	70	70	70	70	80
R	Minimum Circuit Amps	14.4	26.1	37.8	42.4	42.4	42.4	42.4	48.5
S	Lo Side	236							
T	Hi Side	340							
U	Recommended Circuit Breaker Size	20	30	40	50	50	50	50	50

Reading Serial Numbers

21131802105459001

21131802 = **Common ID Tag**

21**13**1802 = **Plant of Manufacture**

2113**1**802 = **Year of Manufacture**

2113180**2** = **Day of Manufacture**

105459001 = **Manufacturing ID**

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