

# Service Repair Guide

## Signature Series



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# Common Operating Concerns

- Heat pump not turning on, no power/Unit not heating pool water.....P6
- Water is leaking from heat pump.....P7
- Heat pump is turning off/on sporadically.....P8
- Temperature display reading incorrect.....P9
- Ice build up.....P10
- Time expectations for heating your pool.....P10
- Fireman’s switch.....P11

# Identify Heat Pump Code

- Common Error Codes

- F1/Flo- low/no water flow .....P12/P13
- FS- flow switch open.....P12/P13
- HP- high refrigerant pressure.....P14/P15
- LP- low refrigerant pressure .....P16-P18
- Do- defrost sensor open.....P19
- Dc- defrost sensor closed.....P19
- Po- temperature sensor open.....P20
- Hc- temperature sensor closed.....P20
- Bo- low supply voltage to control board.....P21

# Problem Solving

- No display, have power.
  1. Control board(Automation).....P21
  2. Transformer.....P22
  3. Contactor.....P.23
- Fan not running/compressor running
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- Fan running/compressor not running/no heat
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# Problem Solving

- Unit shakes/ makes noise
  1. Fan blade.....P31
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- Water leak/Rattling Noise when heat pump is off
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- Parts and Refrigeration Information
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# Concerns Answered

- **Unit not turning on.**
- **Heat Pump not heating**

When the heat pump doesn't have a display and will not turn on, the breaker and fuses outside of the heat pump are the most likely cause of the issue. If the breaker is always popping turn to page 29. If there is power going into the unit then please turn to page 22 to continue with diagnosing the problem.

When a new heat pump is installed, the most common service call is the "not heating call." This is due to lack of run time in most cases, when the heat pump starts up in the beginning of the season it needs time to heat the pool when the weather is cool, if the time clock is prohibiting run time then the pool will not heat.

# Concerns Answered

- **Water is leaking from Heat Pump.**

A very common concern on a new heat pump install is that there is water leaking from the unit.

In a majority of calls that water is leaking out of the heat pump, condensation is the cause and there are 2 very easy methods to prove water is not leaking out of the pool.

1) take a chlorine test strip and stick it the water leaking out of the heat pump, no chlorine, no leak.

2) turn the heat pump off and leave the filter running, if the water dries up, then it was condensation. Remember that even when the heat pump is off water still runs through the heat exchanger.

Do you have an older heat pump with a leak, see page 32.

# Concerns Answered

- **Heat Pump turning off/on Sporadically.**

If a heat pump is turning itself on and off when the temperature reading is close to the set temperature then the dead band or “DB” setting has to be reset.

- 1) Go to the control panel on the heat pump.
- 2) Hold down the temperature up and down buttons at the same time until you see the letters LC appear on the display.
- 3) Hit the up arrow until the number 50.
- 4) Now hit the Pool/Spa button and the letters SC will be on the screen.
- 5) Use the down arrow to scroll through the service menu, when you get to Db hit the Pool/ Spa button again. (note: if you scroll past Db just keep going it will come back around).
- 6) After hitting the Pool/Spa button a number will appear on the screen, use the up button to increase the dead band setting to 8.

# Concerns Answered

- **Temperature display reading incorrect.**

If a signature heat pump temperature is 10-15 degrees off from the pool temperature then it is possible to recalibrate the control board to correct the temperature.

- 1) Go to the control panel on the heat pump.
- 2) Hold down the temperature up and down buttons at the same time until you see the letters LC appear on the display .
- 3) Hit the up arrow until the number 50.
- 4) Now hit the Pool/Spa button and the letters SC will be on the screen.
- 5) Now hit the Pool/Spa button and a number between negative 10 and 10 or a dash should appear. Use the up or down arrow to adjust the difference in temperature.

Example – pool water temp 80 degrees

Heat pump temp is 70 degrees

Push the up arrow until the display goes from 0 to 10 or negative 10 to 0 degrees, if this doesn't solve the temp issue please go to page 20.

# Concerned Answered

- **Ice build up**

At 55 degrees or lower it is possible to see significant ice build up on a heat pump. The machine is designed to keep running (possibly for a couple of hours) so that the heat pump is spending more time heating your pool. When the heat pump reaches its limit of ice build up, it will kick into defrost mode to melt the ice, its around a 10 minute process, then it will start heating the pool again.

- **Heating Expectations**

Every pool is unique, size, shape, location, time of year and size of heat pump are all factors which will affect how fast a pool heat pump will heat the water. For example a 20' by 40' pool in NJ will take approximately 2-4 days to go from 60 degree water to 85 degrees depending on the outside weather in early May.

Remember that a heat pump is designed to provide warm water every day of the week at a low cost, use the pool every day of the summer and get the most value out of the investment.

# Concerns Answered

- **Fireman's switch**

On Aqua Comfort heat pumps there is no need for a fireman's switch. There are several safety controls that prevent the heat pump from ever over heating. 1) there is a flow switch that will disengage the compressor when no water is running though, 2) there is a high pressure switch that will turn the heat pump off if refrigerant pressure exceed capacity and 3) the compressor will shut off on thermal overload if the first two safety measures were not effective. If there is a permit issue please contact your sales representative or our main office for assistance.

# Common Error Codes and Repairs

- **F1/Flo**- This code will appear on a heat pump every time the filter is shut off. The heat pump is letting you know that it is not running because no water is going through the system. A **FS** code will appear if the system is set to an automation system.

If the filter pump is running and this code is flashing then the first thing to do is make sure that the filter was recently cleaned/back washed so that proper water flow is reaching the heat pump.

Next make sure no by-pass is allowing water to flow around the heat pump's plumbing, most by-passes consist of 3-way valves and adjusting them to the correct position will allow the heat pump to run properly.

Finally, if a heat pump is getting the water flow it needs then it is time to adjust the flow switch or replace it. Continued page 13.

## Flow Switch 19P562-01

### Replace

The flow switch can be found attached to the outside right panel of the control box. To replace it, turn breaker off, remove the two purple wires from the top and the hose and hex nut from the bottom.



### Adjust

The flow switch can be adjusted by turning the black dial you see in the middle of it, right to increase PSI needed to activate it or Left to lower the PSI. There is a lock in the back of the switch that needs to be slid up in order to adjust pressure.

- **HP – high refrigerant pressure.** - This code is most commonly mistaken as high water pressure but actually refers to the refrigerant pressure inside the heat pump. Poor water flow can sometimes trigger a HP code, this means that the heat pump is creating heat but there is not enough water going through the machine to carry the heat out into the pool. Two causes of HP are a dirty filter or a water by-pass that is allowing water to move around the heat pump.

HP can also be a result of a low ground installation. If a pool is installed where the water level in the pool is higher than the plumbing on the heat pump, pressure will constantly be applied to the flow switch and the heat pump will try and run, after 3 tries it will cut off on HP until reset manually. An adjustment to the flow switch as described on page 13 will resolve this problem.

If none of the above describes your HP situation then the next step will be to replace the high pressure switch. Continued page 15.

## High Pressure Switch

R22 – 100-206

410A – 100-206A

### Replacing the High Pressure Switch

On this model heat pump the pressure switches are connected by solid copper piping that will need to be cut off, after removing the refrigerant from the heat pump.

Then the new sensor can be braised back on.

A temporary fix would be to screw on a HP switch (pictured right) to the open schrader valve. This will allow you to use the heat pump and confirm that the HP switch was faulty.



Wiring- Follow the wires from the switch into the control box, disconnect the old wires from the terminal strip and replace with the new ones.

- **LP- low refrigerant pressure.**- This means that the heat pump has shut down because the LP switch circuit has been opened.
- Weather related LP codes are most common in the beginning and end of a swim season when the temperature is in the 40 degree range and the temperature of the pool water is below 60 degrees. In this case the heat pump needs warmer temperatures to operate.

Another cause of low pressure can be a dirty evaporator coil, if you cannot see into you machine through the coil around the side and back, it should be cleaned with a garden hose.

- LP- continued.

First, reset the machine, if the code immediately appears after it turns on, check the refrigerant to confirm it hasn't leaked out. If there isn't any pressure in the machine it will need to be leak tested, if there is water coming out of the schrader valve then please contact our main office.

If there is refrigerant in the machine, or it does try and turn on then the next step will be to confirm that the fan motor/capacitor/relay are functional, if for any reason the fan doesn't come on and the compressor does, one of those three components are the cause of the LP<sub>3</sub> lockout.

## Low Pressure Switch

R22 – 100-207

410A – 100-207A

### Replacing the Low Pressure Switch

On this model heat pump the pressure switches are connected by solid copper piping that will need to be cut off, after removing the refrigerant from the heat pump. Then the new sensor can be braised back on.

A temporary fix would be to screw on a LP switch (pictured right) to the open schrader valve. This will allow you to use the heat pump and confirm that the LP switch was faulty.

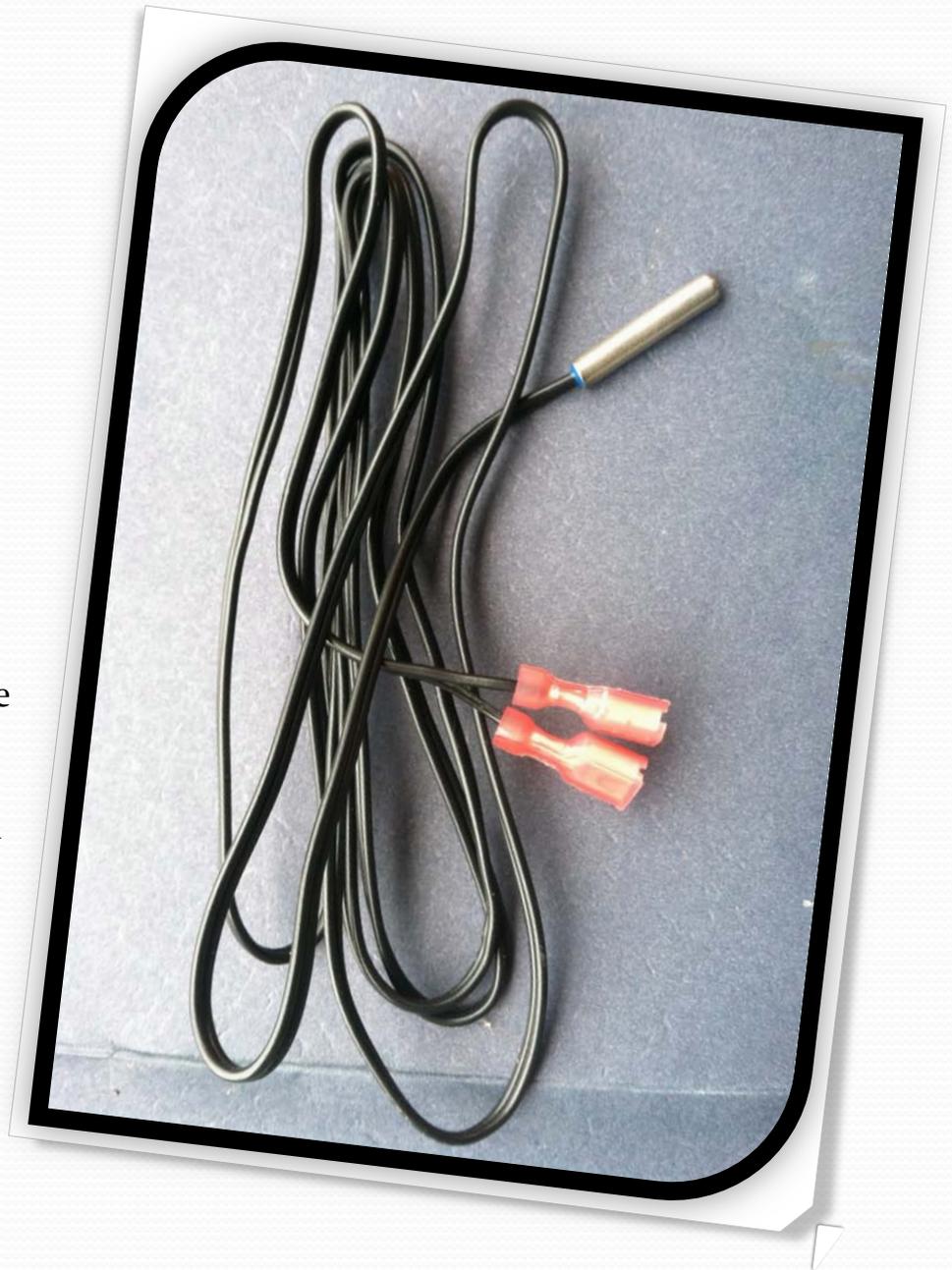


Wiring- Follow the wires from the switch into the control box, disconnect the old wires from the terminal strip and replace with the new ones.

## Defrost Sensor 12P550-01

**Do/DC error codes -**  
the defrost sensor has either a closed or open circuit, the only way to fix this error is to replace the defrost sensor

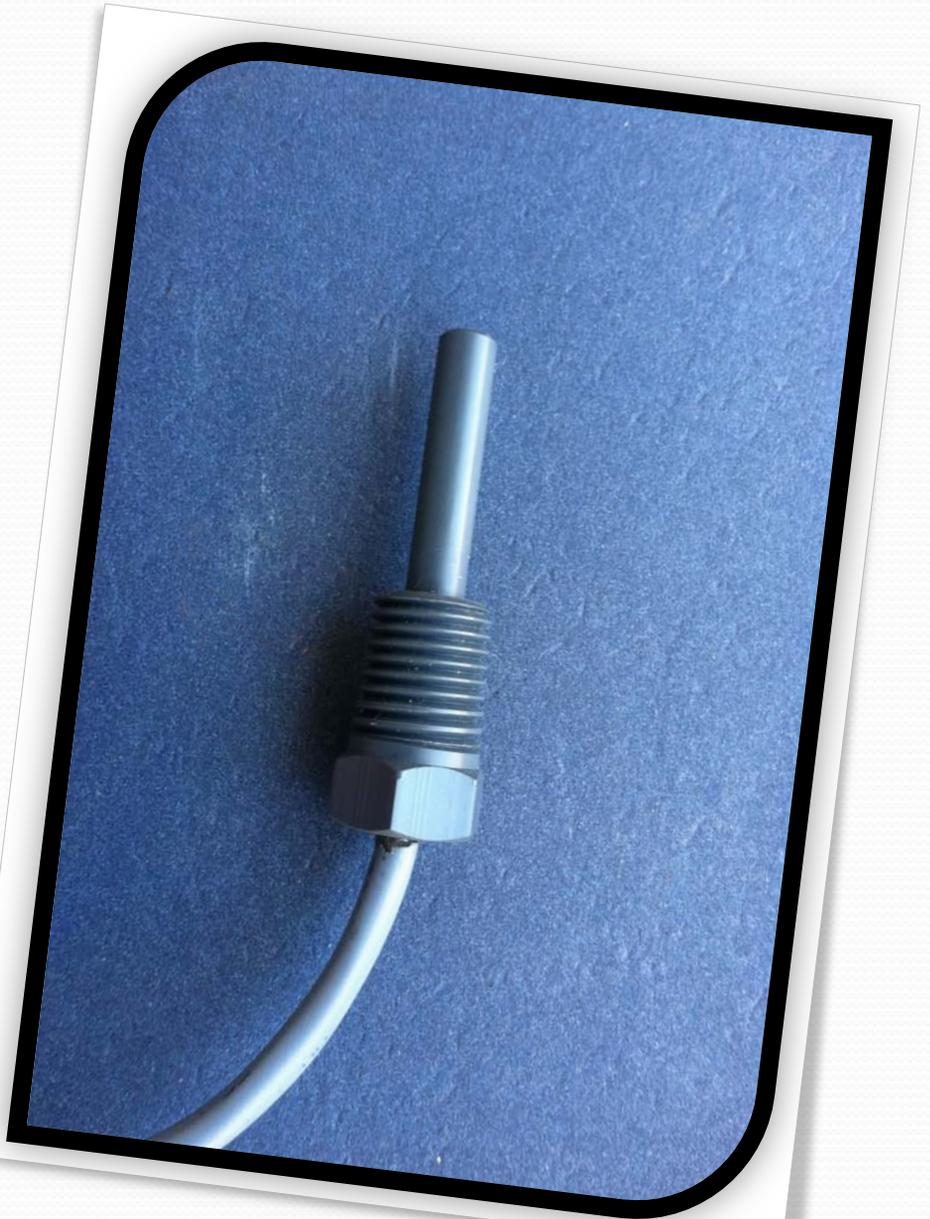
**Replacing the defrost sensor** – First locate the defrost sensor, in older machines you will find it located on the inside right of the evaporator coil (black) in newer machines it is located at the top right in the front of the evaporator coil (silver). Both sensor wires lead into the control box where they connect at the top left of the terminal strip. Use a pair of needle nose pliers to prevent breaking the terminal strip.



## Temperature Sensor A-2455 or A-2609 pictured below

**Po/Hc error codes** - the temperature sensor has either a closed or open circuit, the only way to fix this error is to replace the temperature sensor

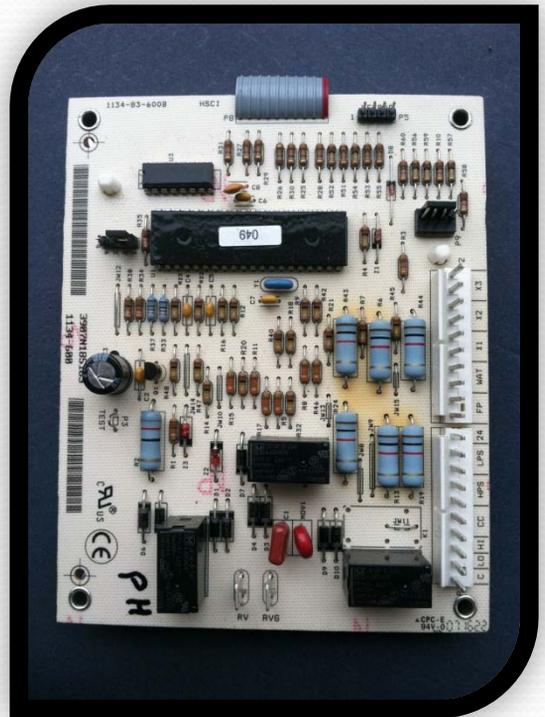
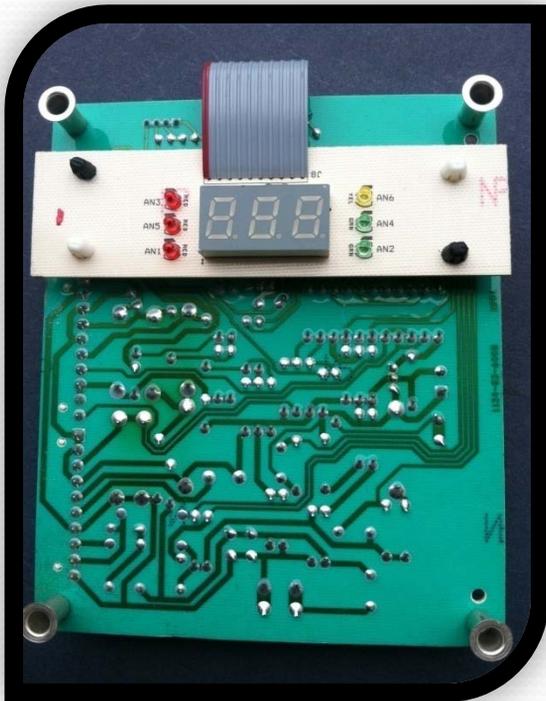
**Replacing the temperature sensor** - in all models the temp sensor is located in the rear of the machine in the water header assembly. Older heat pumps require a smooth sensor that will be clamped in the manifold while newer machines have a thread on the sensor and it is screwed into the manifold. The wiring can be followed back into the control box where it connects to the terminal strip in the upper left hand corner, be sure to use needle nose pliers to prevent breaking the strip.



# Control Board

## 17P549-01

To replace a control board first remove the two wires harnesses from the ports on the bottom right of the control board. Then remove the wire harness at the top of the control board that connects to the touch pad.



Then remove the four screw holding the board to the front of the control box. Finally reattach the new board and reconnect the three wire harnesses previously removed.

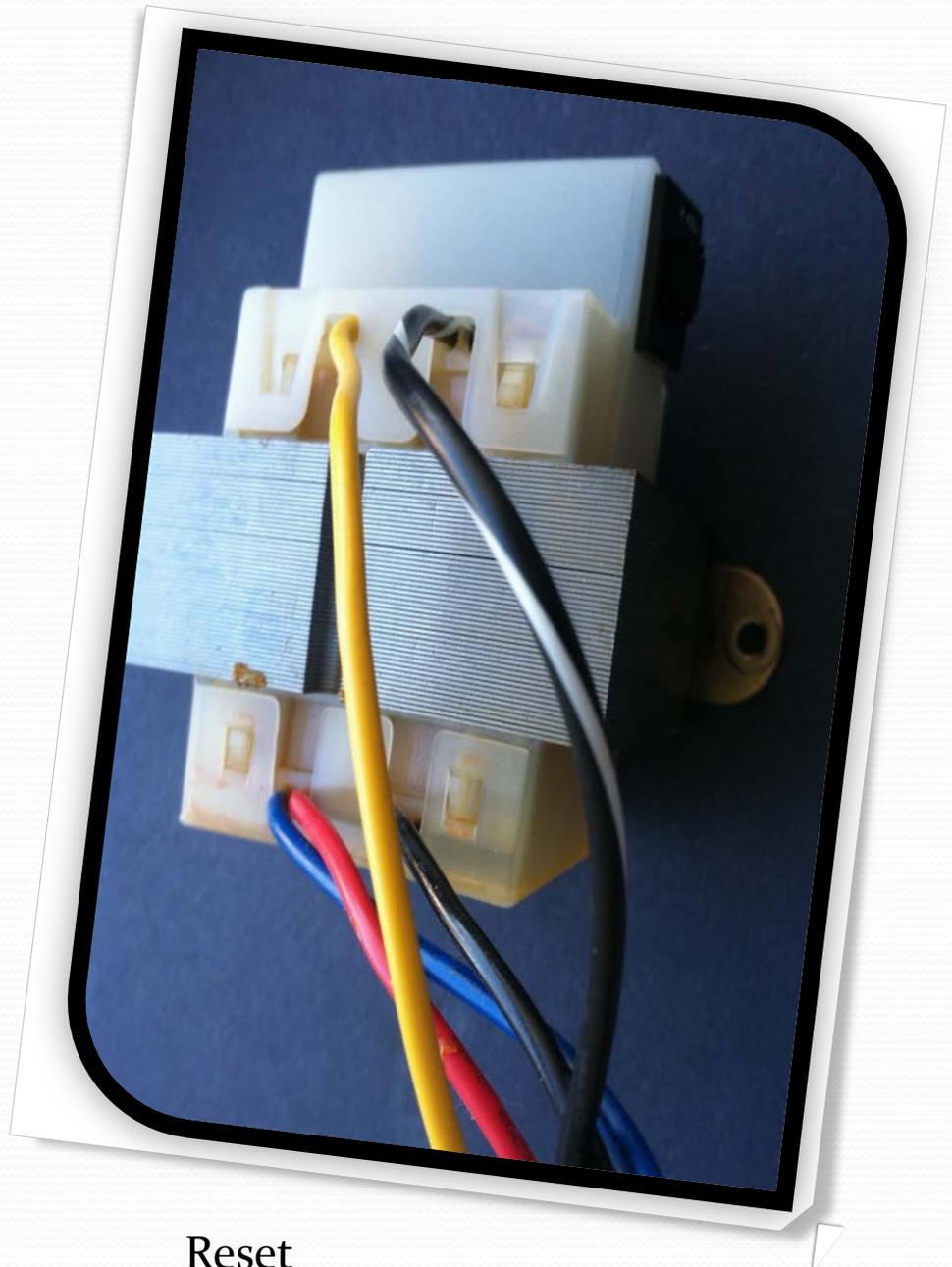
**Automation** – to automate the heat pump locate the jumper in the upper left side of the control board, it will be connecting pins 1 and 2, remove jumper and place on pins 3 and 4 to complete automation set up.

## Transformer 15P501B01

### Replace

If resetting the transformer doesn't turn the heat pump on and there are no signs of worn wires outside the control box then you must replace the transformer. First follow the black and yellow wires to their connection points and switch them with the new transformer wires. Then do the same with the wires from the top. After all new wires are connected, unscrew the old transformer and attach the new one in the control box.

**Warning – never hold in the reset button.**



### Reset

If you have no power to your control board the first test is to reset the transformer. The button you see in the picture above must be pushed in to reset. Whenever you are working inside the heat pump make sure you turn the power off..

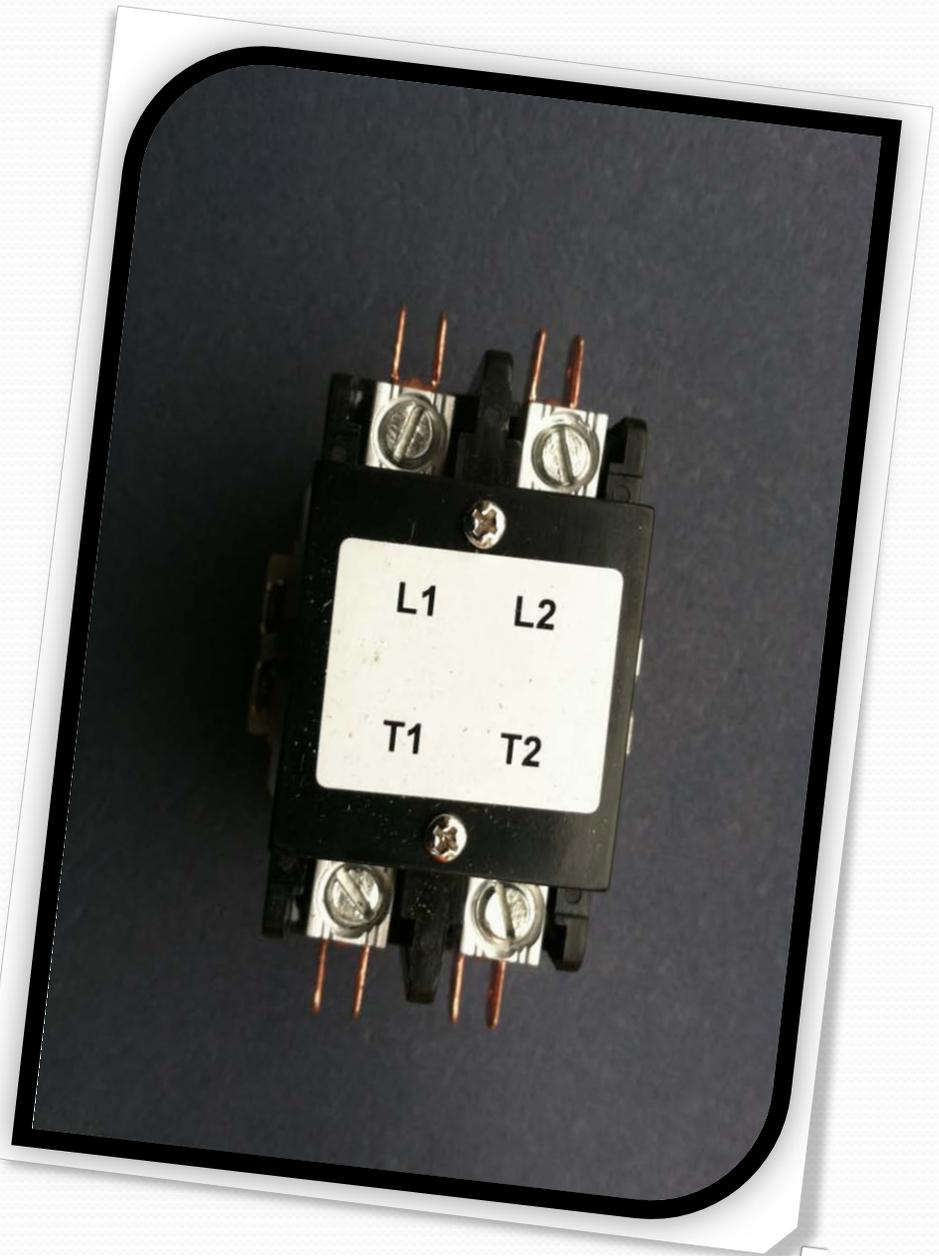
# Contactor

## 13P004A03

The contactor is commonly associated with compressor and not heating issues.

If a heat pump seems to be fully functional but the pool is not heating check all wire connections on the contactor, if there are burnt wires or terminals on the contactor, repair the wires and replace the contactor.

No visible damage, open the front of the contact to look for signs of damage. Turn the machine on and let it run, check to see if the contactor is pulling in after the time delay(1-5minutes).



There are many wires on a contactor , when changing it out it is best to remove one at a time and connect them to the new piece so that they don't get mixed up. Then remove the old contactor from the control box and mount the new contactor.

## Fan Capacitor

### See page 34

The fan capacitor is the first part to check when the fan motor is not running properly.

The fan capacitor pictured to the right has 10 micro farads and 370 volts. When replacing a capacitor always check to make sure that the specifications match.

### Safety

When removing an old capacitor it is important to ground the voltage after the breaker has been turned off.

This can be accomplished by removing the fan wires from the top and touching a screw driver across the top and to the back of the control box. Once the voltage has leaked then you can either test for micro farads with a MFD tester or replace the capacitor. 609-386-1012



## Fan Relay 13P003B

After checking the fan capacitor, the fan relay is the next step in resolving any fan issues that could be affecting the heat pump.

A fan relay can cause a fan motor to run all of the time, not run at all or run in reverse.

If the fan is running non stop or in reverse, the fan relay will definitely need to be replaced. If the fan doesn't run at all, with the breaker off, remove the black fan wire connected to number 2 on the relay and connect to the bottom left of the contactor and turn the machine on. If the fan turns on then the relay needs to be replaced, if fan doesn't turn on then the fan motor or capacitor needs to be replaced.



# Fan Motor

## 14P529-01

If the fan motor is not running or runs for a short period of time then shuts down and the capacitor and fan relay were checked, the motor will need to be replaced.

First unscrew the fan grate that the fan motor is mounted to, then gently flip the grate towards the front of the heat pump. Set the grate down on the edge of top cover, use a crescent wrench to loosen the hex bolt on the golden hub slide the fan blade off.



Next remove the black wire from the relay, the yellow and brown wires from the capacitor and the green wire from the back of the control box. The wires need to be pulled through the side control box, through the header plate and finally the plastic mould where the fan is located. (Next Page)

# Fan Motor (Continued)

- After the wires have been pulled through take the fan motor/grate assembly and place it on the ground. Remove the four hex nuts that hold the fan motor to the grate.
- Place the new motor on the grate and attach the hex nuts, do not over tighten. Place the grate back on the top of the heat pump and run the wires back to the control box.
  1. Black to the relay.
  2. Yellow and Brown to the capacitor.
  3. Green to the back on the control box.
- Make sure the Yellow wire is attached to the side with the orange wire that connects to the bottom right of the contactor.

## Compressor Capacitor

### See Page 34

The compressor capacitor is the first part to check when your compressor is not running properly.

The compressor capacitor pictured to the right has 50 micro fahrens and 370 volts. When replacing a capacitor always check to make sure that the specifications match.

### Safety

When removing an old capacitor it is important to ground the voltage after the breaker has been turned off.

This can be accomplished by removing the compressor wires from the top and touching a screw driver across the top and to the back of the control box. Once the voltage has leaked then you can either test for micro fahrens with a MFD tester or replace the capacitor.



## Checking a Compressor for Grounded Winding

See Page 34

With the power to the heater turned off remove the cap from the compressor terminals and disconnect the wires. Then use a screw driver to scrape some of the paint off the side of the compressor which will expose a shiny steel wall. This will offer the best grounding surface. Using a continuity meter test each of the compressor terminals S,R and C separately to the grounding point. If the meter rings out to ground then the compressor is grounded.



## How to Test the Windings on a Compressor

1. Turn the power off and remove the cap from the compressor and remove the wires from the compressor.
2. Use an ohm meter, by placing the leads on S and R, record the ohm reading. Repeat the process for R and C, C and S. Record the findings.
3. Example of a recording.

$$(R+C)+(S+C)=(R+S)$$

$$.4 + 1.6 = 2$$

The result of adding (R+C) to (S+C) should always equal (R+S).

If it shows correct ohms across (R+S) but show open across (R+C) or (S+C) it is possible the internal overload has tripped.



An additional indicator will be that the compressor will be very hot to the touch. The compressor will need time to cool down and the overload switch will have to close before the compressor will work. (you can not manually close the switch) If a test results in an open winding (OL) the compressor will not turn on.

# Replacing a Fan Blade

## 52P502-01

There are two common reasons that a fan blade might need to be replaced.

- 1) The heat pump shakes, meaning that the fan blade is unbalanced or it is hitting against the shroud.
- 2) The golden hub that attaches the blade to the shaft of the fan has come loose causing a loud screeching noise.



### How to Replace

First unscrew the fan grate that the fan motor is mounted to, then gently flip the grate towards the front of the heat pump. Set the grate down on the edge of top cover, use a crescent wrench to loosen the hex bolt on the golden hub. Slide the fan blade off and replace with the new blade. Make sure the new blade is secure to prevent any damage to the inside of the heat pump.

## Water Header Assembly 72P002-01

This part is found in the back of the heat pump, it makes the connection between the outside water supply/return and the heat exchanger. There are 2 reasons that this part could need to be replaced, 1) manifold is cracked and leaking due to freeze damage or 2) the check valve inside has been damaged and is making a loud rattling sound.

To replace disconnect the unions on the outside of the heat pump, then remove the clamps on the pressure hoses leading to the heat exchanger. Be sure to disconnect water pressure hose from top of manifold.



After everything is disconnected the best way to get the old manifold out of the machine is to cut it out with a rope saw, if your going to use a reciprocating saw be very careful not to hit the aluminum coil. When installing the new manifold you will notice that it is a very tight fit, slide the hoses onto the heat exchanger as far as possible create more room for installation.

# Parts List

12P503-03 TERMINAL BLOCK  
12P503-10 LINE VOLTAGE POWER STRIP  
12P550-01 THERMISTOR-DEFROST SENSOR  
13P003B RELAY 24VAC SPNO 8FLA 250VAC  
13P004A03 2 POLE CONTACTOR 24 VAC-40A  
14P529-01 MOTOR 1/2 HP 208-230/1  
15P501B01 TRNSFMR 75VAC 208-230 24V LEAD  
16P002D06 CAPACITOR 10 MFD 370 V (Fan capacitor)  
16P002D23 CAPACITOR 60MFD 370V  
16P002D24 CAPACITOR 80MFD 370V  
16P002D35 CAPACITOR 50MFD 370V  
16P002D39 CAPACITOR 80MFD 440V  
17P549-03 CONTROL BOARD-PH/EW-NOTES (.N)  
19P531A01 CAPACITOR BOOT OVAL  
19P562-01 FLOW SWITCH  
19S560-01 CNTL COVR W/SWITCH-POOL HTR  
21B498-99 PVB TUBE 1-1/4 ID x 5IN LONG  
21B499-99 CLEAR PVC TUBING 5/32IDx9/32OD  
33P534B07 TXV-4-TON-N/ADJ-W/BLD (100 / 1050 - R22)  
33P534B14 TXV-5-TON-N/ADJ-W/BLD (125 / 1250 - R22)  
33P534B15 TXV-5-TON-N/ADJ-W/BLD (135 / 1350 - R22)  
33P534B17 TXV-6-TON-N/ADJ-W/BLD (150 / 1500 - R22)  
33P605-07 TXV-5-TON-NON/ADJ-W/BLD (150 / 1500 - R410)  
33P605-06 TXV-6-TON-NON/ADJ-W/BLD (175 / 1750 - R410)  
34P522B01 COMP ZR61K3-PFV-250 (125 / 1250 - R22)

# Parts List Continued

34P536B01 COMP AVD5548EXN (100 / 1050 - R22)  
34P563-01 COMP ZR80KW-PFV-250 (150 / 1500 - R22)  
34P566-01 COMPRESSOR ZP70KWE-PFV-250 (150 / 1500 - R410)  
34P605-01 COMPRESSOR HLJ083T1LP6 230/1 (175 / 1750 - R410)  
34P567-01 COMPRESSOR HCM068T1LP6 208-230/1 (135 / 1350 - R22)  
35P507-01 LO PRESS SWTCH POOL HEATER  
35P507-02 HI PRESS SWTCH POOL HEATER  
36P510-01 FLTR-DRIER 5/8ODF X 1/2ODF  
40P541-01 FRT ACCS PNL-PLASTIC-POOL HTR  
41P026-01 BTM PANEL-PLASTIC-POOL HEATER  
42P039-01 TOP PANEL-PLASTIC-POOL HEATER  
43C737-01 CORNER SPRT-POOL HEATER  
45F376-02 CNTL BOX-POOL HTR  
47C697-01 COVER-FAN GUARD-POOL HTR  
47U692-01 PLATE-COMP MNTG-POOL HEATER  
52P502-01 FAN BLADE ASY-POOL HEATER  
59P506-01 FAN GUARD ASY-POOL HEATER  
62P546-02 COAX CTHCN-45-ES-RH (100 / 1050 / 125 / 1250)  
62P547-02 COAX CTHCN-67-ES-6S-RH (135 / 1350 / 150 / 1500)  
72P002-01 WATER HEADER ASY (OLD / NEW STYLE)  
NPN POOL HEATER UNIONS (SETS) (OLD / NEW STYLE)  
A-2455 WATER SENSOR (OLD STYLE)  
A-2609 WATER SENSOR (NEW STYLE)  
WFDPKIT DEALER PART KIT

# Dealer Part Kit

## WFDPKIT

- (10) 12P550-01 THERMISTOR-DEFROST SENSOR
- (2) 13P003B RELAY 24VAC SPNO 8FLA 250VAC
- (4) 13P004A03 2 POLE CONTACTOR 24 VAC-40A
- (2) 14P529-01 MOTOR 1/2 HP 208-230/1
- (6) 16P002D06 CAPACITOR 10 MFD 370 V (Fan capacitor)
- (1) 16P002D23 CAPACITOR 60MFD 370V
- (1) 16P002D39 CAPACITOR 80MFD 440V
- (4) 17P549-03 CONTROL BOARD-PH/EW-NOTES (.N)
- (2) 19P562-01 FLOW SWITCH
- (6) 52P502-01 FAN BLADE ASY-POOL HEATER
- (4) 72P002-01 WATER HEADER ASY (OLD / NEW STYLE)
- (10) A-2455 WATER SENSOR (OLD STYLE)
- (10) A-2609 WATER SENSOR (NEW STYLE)

## Have More Questions?

Please Contact  
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