G&F Manufacturing
Service Manual
Version 2.0
April 2010

AHRI MEMBER

Any tech working on these units must read this manual. Any questions, please call service department from the job site.
954-318-6900

Table of Content

Introduction

This manual was put together to introduce you to G&F Manufacturing's new R-410A Swimming Pool Heat Pump. Please read the manual before you begin to service unit. If you have any questions, we have a dedicated service department to help you.

Only put your refrigerant gauges on these units as a last resort.
It is a package unit that has had many steps taken at the factory to assure the system is contaminant free. Almost all problems can be diagnosed without the use of gauges.

Check to see that the unit is bonded and that the electric conduit is connected to the electrical box inside the unit.

WARNING:
Only certified service providers to work on unit. Anyone else will void warranty.

WARNING:
Turn off all electrical power to unit before servicing

ATTENTION:
If you find that it is mis-plumbed, un-bonded, etc. contact the warranty department and let them handle it.
Do not bad mouth an installation!

Attention, Warning, and Caution boxes have been place through out this manual to help point out important information to look out for.

Attention- Points out important information to be aware of

Warning- Indicates an action that might void warranty

Caution- Alerts service or user regarding safety issues.

Sequence of Operation

In order to properly diagnose a problem you must understand the sequence of operation. When the pool pump comes on and the water flows through the heater, the water pressure closes the normally open pressure switch. When the switch closes, the control board then checks the thermostat to see if the pool water temp is below the board set point. If it is, it checks the normally closed high and low pressure switches. If both are closed it will then send 24v to the compressor/ fan contactor and the unit will start to heat or cool, depending on unit and mode.

Note: There is a 5-minute delay on make timer built into the control board so it will have a delay before starting.

Control Board Operation

The control board has an "LCD" display and was kept as simple as possible for ease of customer use, to minimize nuisance-programming calls, and to be able to handle most scenarios found in the field.

The board will display which mode it is in (Pool Heat, Spa Heat). Simply raise or lower temp by pushing the Up or Down arrows. To switch modes simply push the "Mode" button to toggle from pool to spa. For Pool Cool, there will be a Heat / Cool setting in the service menu. We also added Auto Feature so you may set temp at max temp and min temp, and board will automatically heat or cool the pool/spa. The board also has the capability to control your solar system.

Control Board Hidden Menu

All options and calibrations are in a hidden menu. To access the hidden menu press and hold both up and down arrows simultaneously until first option appears on display. The board will also rest to Pool/Spa heat screen after 20 seconds of no activity.

Control Board Options

Use "Mode" Button To Toggle Through Options

1st Option: Language Select (English)

(Options are: English, Spanish, French, Portuguese, German) Use arrows to toggle to selection, English is set as default.

ATTENTION:

You will find the Pool/Spa remote is no longer necessary; the board is programmed to automatically recognize the switch and self-program.

2nd Option: Remote T- Stat (Disable)

This option is used for external controller systems with its own thermostat such as an Aqua logic® or Aqua link®. Default is disabled. To enable, push Up or Down arrows until display says "Enable."

3rd Option: Pool Heat/Cool (Disable)

Once this is enabled a Heat/ Cool setting will come up on display. The board will recognize when the temp of the pool has raise or dropped by 1˚ and will heat or cool the pool until it reaches set point again. (This option is only for Heat/Cool units.)

4th Option: Pool – Cool (Disable)

Once this option is enabled, it will give you a pool cool mode on display, use "Mode" buttonto toggle (This option is only for Heat/Cool units.)

5th Option: Solar Control (Disable)

This option allows your pool heater (with additional wiring) to monitor the pool solar system's performance and will automatically control the temperature.

6th Option: Time Delay (5)

Default is 5 minutes. You may temporarily set to 0 for service purposes, unit will reset to 5 Mins after 10 Mins have passed.

7th Option: Spa Timer (Continuous)

This option is for rental properties or homeowners who do not want the spa left on indefinitely. Options are "Continuous", "Off", or "Up to 20 hours" in 15-minute increments.

CAUTION:

"Off" will not allow spa to run.

8th Option: Even Heat (Disabled)

Will periodically turn pool pump on according to delay setting. Options are: Off, 0 Hr (for testing), 1 Hr, 2 Hr, 3 Hr, 4 Hr, Default is off

9th Option: Temperature scale (F)

Sets display for Centigrade or Fahrenheit. Use arrows to toggle.

10th Option: Defrost Mode (Air Defrost)

Options are Air Defrost and Reverse Cycle. This option is set at the factory.

11th Option: Evaporator Temperature Calibration

For calibrating the defrost sensor located on the suction line. If this calibration is changed it will show by how much in plus or minus at bottom of display.

12th Option: Water Temperature Calibration

This option is for calibrating the water temperature sensor and will show the amount of calibration in plus or minus at the bottom of display.

13th Option: Load Defaults

In this mode you can reload all defaults by pressing the up arrow once.

Board Diagnostics

The control board will alert you to most problems.

DISPLAY MESSAGES

No Flow

Means the water pressure switch is not closed. Check water flow to heater. Make sure any water bypass valves are not redirecting water around heater, filter is clean, pump is on, and water level in pool is up in the middle of the pool tile, this prevents skimmer from sucking air

Defrosting

Means the suction line has dropped to 28 degrees. It will shut the unit down until it reaches 40 degrees and the system will run again.

Low Refrigerant Pressure
Low pressure cut out is 37 pounds cut in is 80 pounds. Unless the defrost sensor is way out of calibration, you should never see this code because of low ambient temperatures. You should only see this code if there is a refrigerant leak. Find and repair the leak.

Water Flow Lockout
High Refrigerant pressure is 540 cut in is 360. This error code is almost always a lack of water flow, so check everything under "No Flow" before putting on gauges or condemning High Pressure switch.

Evaporator Sensor Malfunction
This is a 10k sensor. If it is open or outside its range you'll get this error. Check connections before replacing.

Water Sensor Malfunction
This is also a 10k sensor. If it is open or outside of its range you'll get this error. Check connections before replacing.

ATTENTION:

This is a standard refrigeration system and most diagnostics are the same as air conditioners. However, you must keep in mind that the Heat Exchanger is the condenser and the large air coil around unit is the evaporator. The system consists of a compressor, water-cooled condenser, TXV, and air heated evaporator.

ATTENTION:

Diagnosing the refrigeration system is something all A/C technicians should know. However, there are a few points we would like to point out.

Charge

The system holds 4 pounds for Turbotec R-410A unit, because the sub cooling & super heat vary greatly with air and water temperature. For field charging we use a condensing temperature of 24 degrees. After power is on and water has been running through unit for at least 5 minutes your high side temperature should be 24 degrees above water temperature. Read on control board. Unless the ambient temperature is less than 62 degrees, we expect a superheat of at least 15 degrees. You may read the suction line temperature by pushing and holding the "Up" arrow on control board. After about 15 seconds, the board will display suction line temperature, the board will read Evap and a temp. Please wait for at least 10 minutes run time before checking superheat.

TXV (Thermal Expansion Valve)

All units are manufactured with adjustable TXV's. If you suspect the TXV needs to be adjusted, please call 954-318-6900 from the jobsite and technical support will walk through it with you.

ATTENTION:

Check temperature on both sides of filter. If more than 2 degrees different the filter is clogged.

Compressor

Broken valves, shafts, (not pumping) and shorted to ground are obvious problems. However, no starts are commonly misdiagnosed. Check the capacitor for correct MFD's. Check connections, voltage and open windings. If open windings, check to see if compressor is hot. If so, let it cool down, or run cool water over it before condemning. Check Ohm's: common to run and common to start should equal run to start. If everything above is correct, then add hard start to capacitor.

Fan

Please check connections and capacitor before condemning fan motor. If you do have to change fan motor ALWAYS change capacitor also.

ATTENTION:

Although the components of this system are the product of an engineer, the design of the unit was created by a service technician of 35 years. Therefore, wherever possible, the unit was put together with *ease of service in mind*. Time is important to both your company and ours so when replacing refrigerant components please start with recovering refrigerant, and then move on to disconnecting component.

Remove and Replace Parts

R&R Compressor

Turn power to unit off. Start recovery of refrigerant.
Remove the 4 screws holding the top on unit.
Cut wire tie on fan wire bundle outside of the control box.
Lift top of unit, flip over and stand on end next to unit.
Bleed run capacitor.
Remove wires from compressor (Note: colors and positions)
Unbolt compressor from base.
Remove TXV bulb from suction line.
When recovery is done cut out filter.
Unsolder compressor and move through top.
Solder in new Filter/ Dryer. Solder in compressor.
Pressurize system and check for leaks.
Start evacuation.
Rebolt compressor to base.
Rewire compressor and reinstall wire cover.
Reinstall TXV bulb.
Put top back on unit and rescreen.
Change Capacitor once system has reached 500 microns of vacuum then charge system to.
Turn power back on and check unit operation.
Reinstall front cover.

R&R TXV and/ or Filter

Turn off power. Start refrigerant recovery.

Remove 4 screws holding top on unit.

Cut wire tie holding fan wires bundled at side of control box.

Lift top off, flip over and lay on end next to unit.

After recovery has finished remove component from system.

Replace with new filter/ dryer.
Solder in new component.
Leak check, start vacuum.
Replace top on unit.
After vacuum has reached 500 microns, charge system to 4 lbs of R-410A for Turbotec Titanium unit,
Start unit and check operation. Replace front cover.

ATTENTION:

Alwavs cut the filter out. DO NOT UNBRAZE.

R&R Heat Exchanger

Turn off power. Start recovery of refrigerant.

Cut wire tie holding fan wires bundled next to control box.

Remove 4 screws holding top on unit.

Lift top off, flip top over and lay on end next to unit.

Cut or break female half of unions off back of unit.

Cut wire ties holding PVC ells to bottom of base.

When recovery is complete cut refrigerant filter out.

Unsolder and remove heat exchanger through top of unit.

Set new heat exchanger in base of unit.

Solder in heat exchanger.

Start system on vacuum.

Rebolt heat exchanger to base.

Restrap PVC ells to bottom of unit and glue on new female half of unions. Reinstall top.

After system has reached 500 microns of vacuum, charge system to 4 pounds R-410A.

Turn power on, check system operation, and reinstall front cover.

WARNING:

DO NOT Cut old WTS wire and splice in new WTS

R&R Water Temp Sensor

Turn off power. Remove front cover.
Unscrew water temp sensor (WTS) and take out. Screw in new WTS.
Take old WTS spade clips off of the back of the board.
Place new spade clip in same slot.
Close HP up.

ATTENTION:

The water temp probe is located on the lower water inlet elbow and is unserviceable. Therefore when it's necessary to replace probe, drill a 3/8 hole in upper elbow and install new probe there. After it's installed, wrap it once with cork tape then with closed cell insulation, then again with cork tape.

R&R Fan Motor

Turn off power. Remove front cover.

Disconnect fan wires from contactor, capacitor and ground.

Remove strain relief bushing and holding wires where they penetrate control box.

Feed wires out of control box.

Cut wire ties holding wires in a bundle.

Remove plastic fan motor cap from fan guard.

Remove 4 screws holding top on unit and remove top.

Flip top over and lay on ground or on level surface.

Loosen setscrew and then remove fan blade.

Lift one side of top up to a 45 degree angle and remove 4 nuts holding fan motor to fan guard.

Lay top back down and remove motor.

Reverse procedure to install new motor.

Be sure to reinstall strain relief bushing where wires penetrate control box and replace fan motor capacitor.

R&R Defrost Sensor

Turn off power. Remove front cover.

Disconnect connectors from T-7 and T-8 on control board.

Remove strain relief bushing where wires penetrate side of control box and feed sensor wires out of control box.

On the suction line cut the cork tape and peel back exposing TXV bulb and strap.

Loosen strap and slide old sensor out.

Reverse procedure to reinstall being sure to reinsulate and reinstall strain relief bushing.

R&R Water Pressure Switch

Turn off power. Turn off water. Remove front cover.
Remove wires from pressure switch.
Remove 2 screws holding control box back to coil on right side of control box.
Bend control box enough to get to back of flow switch.
Cut tubing as close to flow switch as possible.
Remove 1/2" nut holding flow switch to control box.
Install new switch and reverse procedure.

R&R High or Low Pressure Switch

Turn off power. Remove front cover.
Cut high-pressure switch wires near switch.
Unscrew HP switch using back up wrench.
Use leak lock when reinstalling switch.
Remove strain relief bushing where wires penetrate control box.
Feed old HP switch wires out and new HP switch wires in.
Reinstall strain relief bushing.
Install spades at HP terminals on control board. Start and check unit operation.
Reinstall front cover.

R&R Control Board

Turn off power. Remove front cover.
Loosen 4 screws holding control board to cover.
Remove control board and let hang on wires.
Push 4 screws through board and install new board.
Remove wires from old board and install on new board one at a time, being sure to place wires from same terminals from old board to new board as you are taking them off.
Turn power on. Start unit, check operation, and reinstall front cover.

Installation

 **ATTENTION:** 

Before installing this heater there are several things to consider for performance, serviceability and warranty.

Direction of Placement:

Access panel should always face out away from wall. If you must face the service panel toward the wall, leave a minimum of 24" between the wall and the unit.

 **ATTENTION:** 

You will not have a happy customer if they have to squeeze between the wall and the heater to use the controller.

Placement:

Airflow is critical to the performance and efficiency of a heater, therefore leave as much space around and above heater as possible. Installations under palm trees, inside screened porches etc. may help hide unit but will drastically reduce the performance of the unit. You will not have a happy customer. The unions were to the side of the unit to keep pipes out of the way of the control panel so that they are not stepped on while adjusting controls or

 **WARNING:** 

Do not plumb the pipes back around front where pipes will be stepped on, or prohibit access to the front panel.
Make sure unit is bonded and conduit is connected all the way up to the control box.

 **ATTENTION:** 

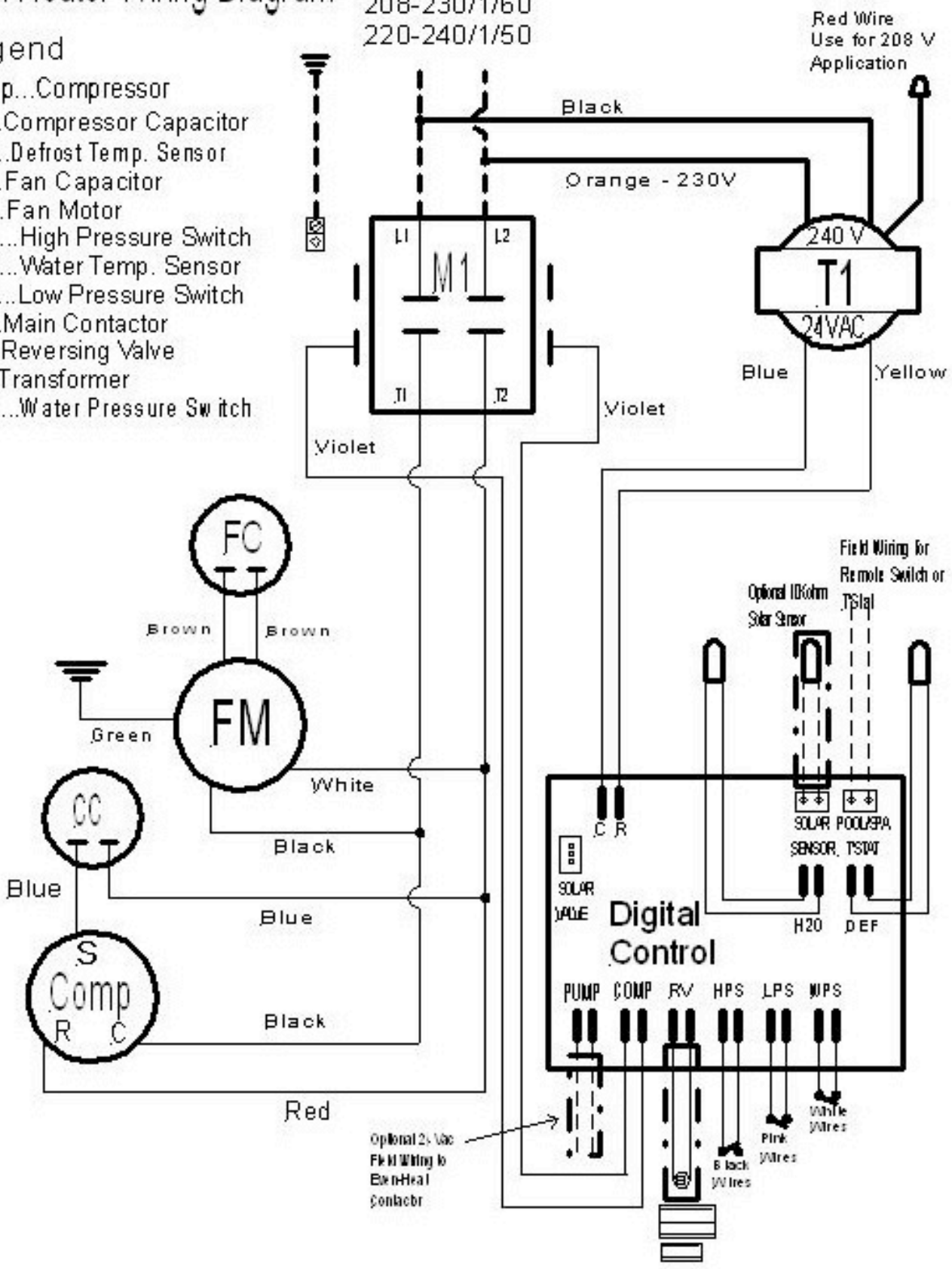
For a more detailed installation manual, please visit our website *Gulfstreamheatpump.com*, and the manual will be there for you to download. If no internet access, call service department **954-318-6900** and we will fax or mail a copy to you.

Pool Heater Wiring Diagram

High Voltage
Field Connection
208-230/1/60
220-240/1/50

Legend

Comp...Compressor
CC...Compressor Capacitor
DEF...Defrost Temp. Sensor
FC...Fan Capacitor
FM...Fan Motor
HPS...High Pressure Switch
H2O...Water Temp. Sensor
LPS...Low Pressure Switch
M1...Main Contactor
RV...Reversing Valve
T1...Transformer
WPS...Water Pressure Switch



Bill of Materials

DRAWING NO.	COMPONENT DESCRIPTION	PART NO.
1	COMPRESSOR PLUG	1001001
2	FAN MOTOR, 2/5HP, 825 RPM	1001002
3	CONTROL	1001003
4	TEMP SENSOR, SUCTION	1001004
5	TEMP SENSOR, WATER	1001005
6	CONTACTOR, 2 POLE, 40A	1001006
7	TRANSFORMER, 40VA	1001007
8	CAPACITOR, 80UF, 370V	1001028
9	CAPACITOR, 7.5UF, 370V	1001009
10	PRESSURE SWITCH, HIGH, 540	1001054
11	PRESSURE SWITCH, LOW, 37	1001055
12	WATER PRESSURE SWITCH	1001012
13	TOP COVER	3003014
14	BASE PAN	3003013
15	FRONT PANEL	3003015
16	TOP CAP	3003033
17	ELECTRICAL BOX	3003017
18	FAN BLADE, 3P24CCW36	6006001
19	FAN GUARD	6006008
20	EVAP GUARD, 32 X 86	6006009
21	2" S-S UNION #200-100	7007023
22	EVAPORATOR, 32 X 84	8008078
23	FILTER/DRIER	8008052
24	TXV	8008081
25	CONDENSER, TI	8008084
26	COMPRESSOR, HLH061T1LP6	8008098

10K Sensor Ohms Chart

F	OHM	F	OHM	F	OHM	F	OHM	F	OHM
20	46225	40	26100	60	15310	80	9297	100	5827
21	44879	41	25391	61	14921	81	9076	101	5697
22	43577	42	24704	62	14543	82	8861	102	5570
23	42318	43	24037	63	14176	83	8651	103	5446
24	41099	44	23391	64	13820	84	8447	104	5326
25	39919	45	22764	65	13473	85	8249	105	5208
26	38777	46	22156	66	13136	86	8056	106	5094
27	37671	47	21566	67	1209	87	7867	107	4982
28	36601	48	20993	68	12491	88	7684	108	4873
29	35565	49	20438	69	12182	89	7506	109	4767
30	34561	50	19900	70	11882	90	7333	110	4664
31	33590	51	19377	71	11589	91	7164	111	4563
32	32648	52	18870	72	11305	92	6999	112	4464
33	31737	53	18377	73	11029	93	6839	113	4368
34	30853	54	17899	74	10761	94	6683	114	4274
35	29998	55	17435	75	10500	95	6530	115	4183
36	29169	56	16985	76	10246	96	6382	116	4094
37	28365	57	16548	77	9999	97	6238	117	4007
38	27587	58	16123	78	9758	98	6097	118	3922
39	26832	59	15711	79	9525	99	5960	119	3839

WARNING:

Using any company that is not certified by G&F Manufacturing will cause the warranty on the unit to void.

SERVICE

All service must be handled by an Authorized Service Center. Warranty may be void if a non-authorized service representative does service. Do not return the heater to your dealer, as they do not provide service. Before calling for assistance or service, please check the Troubleshooting section of this manual or call your dealer. This may save you the cost of a service call. If you still need help, follow the instructions below.

Service can be obtained by calling us at: (954) 318-6900

When asking for help or service please provide a detailed description of the problem, your heater's complete serial number, the purchase date and dealer purchased from. This information will help us respond properly to your request.

Keep a copy of the sales receipt showing the date of purchase.
Proof of purchase will assure you of in-warranty service.

MANUFACTURED BY:
G & F MANUFACTURING, INC.
7902 INTERSTATE COURT
NORTH FORT MYERS, FL 33917

AHRI MEMBER Air-Conditioning, Heating, and Refrigeration Institute