AquaCal®

APPLICATION BULLETIN #0002

CONNECTING AND USING A THREE SPEED PUMP

REQUIRED FIRMWARE - EQUIPMENT

Heat Pump using an HP9 Control Board

Installed HP9 Expansion Board

Relay box with three (3) relays, Relay connectors, Wiring

Heat Pump Firmware Version 2.000 or higher

1 - Connecting a Three-Speed Circulation Pump

What is Required

1. Heat Pump with an HP9 Control Board and Expansion Board kit installed. See Figure 1.
   - If system does not contain an Expansion Board as shown, upgrade system using expansion kit # STK0247.

2. One relay box with three (3) relays.

3. Four (4) wires of sufficient length to run from the circulation pump to the relay box.
   - Check circulation pump manual for size and type of wires.

4. Six (6) wires of sufficient length to run from the relay box to the heat pump.
   - It is recommended that a shielded 6-conductor cable with stranded 20 gauge wire be used.

5. Relay connectors for expansion board. See Figure 2.
   - Six (6) crimp connectors (Digi-Key® part # SVH-21T-P1.1).
   - Three (3) connector housings (Digi-Key® part # VHR-2N).

6. At least six (6) wire butt connectors.

7. Heat Pump firmware with a revision number of 2.000 or higher. See Figure 3.
   - If unsure about firmware version, check information in the system menu.
   - The firmware can be upgraded if necessary. Check with an AquaCal Customer Support representative for a USB firmware upgrade drive if needed.
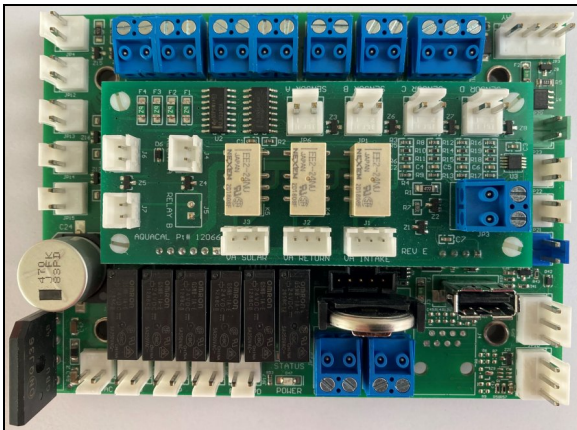
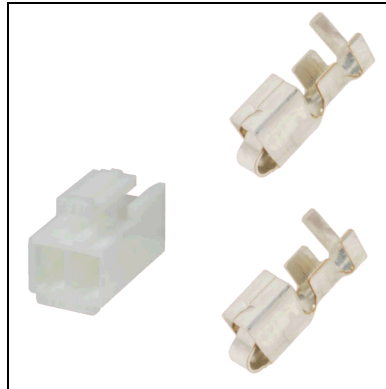Figure 1 - HP9 Control Board with Expansion Board Installed
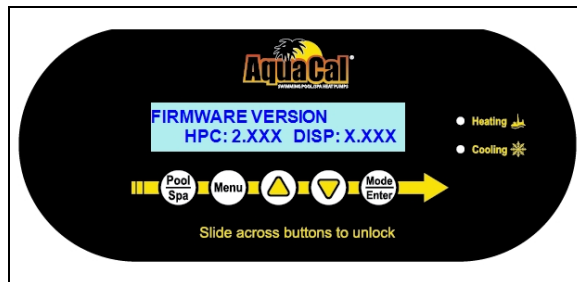
Figure 2 - Relay Connectors

Figure 3 - Firmware Version

Wiring

1. Turn off power to heat pump and circulation pump at breaker panel.
2. Wait two (2) minutes for power to discharge from heat pump's capacitors.
3. Using the circulation pump's manual, isolate the wiring that sends signals to the pump's speed configuration.
   - Identify which wire is used for each speed. Mark each wire for easy identification later.
   - Run the wires to the relay box through the circulation pump chassis (if needed) per circulation pump recommendations.
   - Be sure to secure the wires running to the relay box so they aren't a tripping hazard.

> *EXAMPLE USED:*
> 1. Pentair SUPERFLO® VS Circulation Pump (using three speeds).
> 2. Pentair 353129Z 25' Cord Digital Input Kit
>   - Red - power
>   - Green - speed 1 (high speed)
>   - Yellow - speed 2 (medium speed)
>   - Orange - speed 3 (low speed)
>
> These wires will be different depending on the model and manufacturer of the circulation pumps and cord kits used.

4. Connect the four (4) wires to run to the relay box as shown in the diagram. See Figure 4.
5. Remove the heat pump's access panels.
6. Mark each wire that will run from the relays with the same labeling as noted in Step 3.
7. Route the wires from the relay box to the heat pump's electrical enclosure as shown in diagram.
   - Again, be sure to secure the wires running to the relay box so they aren't a tripping hazard.
8. Connect the wires to the heat pump's relay connection points using relay connectors. See Figure 4.
9. Replace access panels on heat pump, relay box, and circulation pump.
10. Turn on power to heat pump and circulation pump.
11. Configure relays in heat pump to properly send speed commands to the circulation pump. See "*Configuring the Heat Pump to use the Three-Speed Pump*" on page 5.
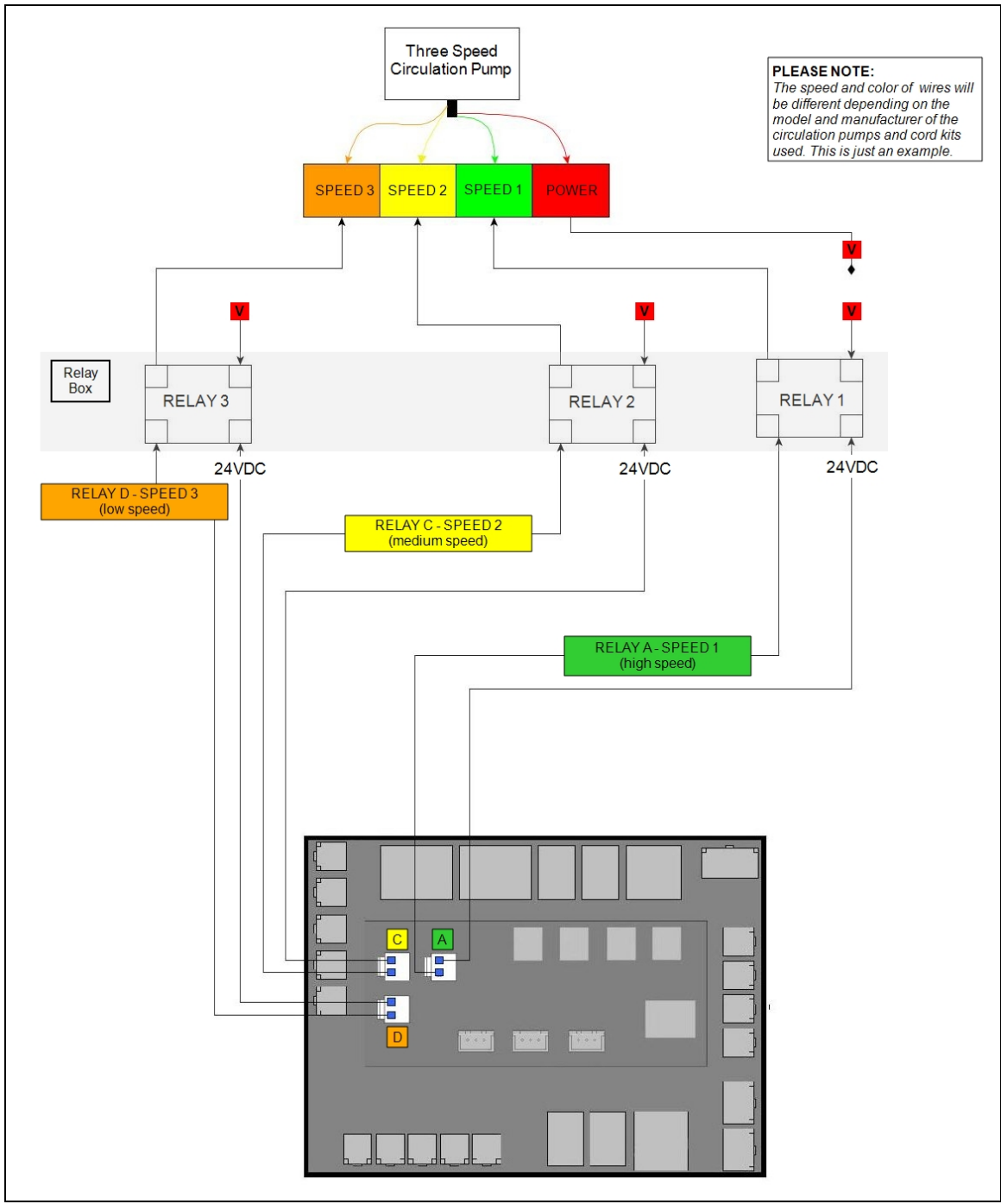
Figure 4 - Wire Connection Points

2 - Configuring the Heat Pump to use the Three-Speed Pump

> **PLEASE NOTE**
> *For the purposes of this paper, the installation wizard will not be used. If you see the heat pump's installation wizard upon starting your heat pump, choose "SKIP".*

In the following example three (3) relays have already been connected to the heat pump and are set to control the pump's three (3) speeds.

- Relay "A" is Speed 1 (high)
- Relay "C" is Speed 2 (medium)
- Relay "D" is Speed 3 (low)

Even though there is only one circulation pump, the system will be set up as if there are three (3) pumps in order to control the different speeds of the three-speed pump.

> **SETTING UP EQUIPMENT**
> In the example the device configuration is set up as follows:
> - POOL PUMP - using relay "A". This will use the highest speed.
> - BOOSTER PUMP - using relay "C" This will use the medium speed.
> - CIRCULATION PUMP - using relay "D". This will use the low speed.See "*Setting up Equipment*" below.

> **SETTING UP GROUPS**
> In the example the groups are configured to use the *different* pumps as needed.
> - A POOL GROUP - Uses the POOL PUMP (high speed)
> - A SPA GROUP - Uses the POOL PUMP (high speed)
> - A CLEANER GROUP - Uses the BOOSTER PUMP (medium speed)
> - A FILTRATION GROUP - Uses the CIRCULATION PUMP (low speed) See "*Setting up Groups*" on page 7.

Each of these groups can then be scheduled. And if the "POOL/SPA" button is pressed, it will automatically use the correct circulation pump speed.

> **PLEASE NOTE**
> *When the "POOL PUMP" is used it will continue to run at that speed regardless if the heat pump's set temperature has been reached. For finer control of RPM rates, a variable speed circulation pump is recommended.*

Setting up Equipment

Setup "CIRCULATION PUMP"

IF UNIT IS ASLEEP, SWIPE TO WAKE UP	**A** PRESS MENU BUTTON	**B** USE ARROWS TO "EQUIPMENT"
KEYPAD LOCKED	WATER TEMP ##°F HEAT SETPOINT ##°F	EQUIPMENT ENTER

C PRESS "ENTER"	**1** USE ARROWS TO NEW EQUIPMENT	**2** ENTER TO SELECT
EQUIPMENT ENTER	NEW EQUIPMENT SETUP	NEW EQUIPMENT SETUP

3 ARROWS TO EQUIPMENT TYPE "PUMP"	**4** ENTER TO SELECT	**5** ARROWS TO NAME "CIRCULATION PUMP"
EQUIPMENT TYPE PUMP	EQUIPMENT TYPE PUMP	NAME CIRCULATION PUMP

6 ENTER TO SAVE	**7** ARROWS TO PUMP TYPE "SINGLE SPEED"	**8** ENTER TO SELECT
NAME CIRCULATION PUMP	PUMP TYPE SINGLE SPEED	PUMP TYPE SINGLE SPEED

9 ARROWS TO PORT "D"	**10** ENTER TO SAVE	**11** PRESS BUTTON UNDER "YES" TO SAVE
PORT RELAY D	PORT RELAY D	SAVE EQUIPMENT SETUP? YES NO

SETUP 2 MORE PIECES OF EQUIPMENT:

I. Pool Pump (high speed) - Repeat steps 1 through 11
    - Select the name "POOL PUMP" and
    - Select relay "A" for the port

II. Booster Pump (medium speed) - Repeat steps 1 through 11,
    - Select the name "BOOSTER PUMP" and
    - Select relay "C" for the port

MENU TO EXIT, PRESS & HOLD TO STATUS

WATER TEMP ##°F
HEAT SETPOINT ##°F

Setting up Groups

Setup "FILTRATION" Group

IF UNIT IS ASLEEP, SWIPE TO WAKE UP KEYPAD LOCKED	**A** **PRESS "MENU" BUTTON** WATER TEMP ##°F HEAT SETPOINT ##°F	**B** **USE ARROWS TO "GROUPS"** GROUPS ENTER
C **PRESS "ENTER"** GROUPS ENTER	**1** **ARROWS TO "NEW GROUP SETUP"** NEW GROUP SETUP	**2** **ENTER TO SELECT** NEW GROUP SETUP
3 **ARROWS TO NAME "FILTRATION"** NAME FILTRATION	**4** **ENTER TO SAVE** NAME FILTRATION	**5** **ARROWS TO MAXIMUM ACTIVE TIME OF 24HR** MAXIMUM ACTIVE TIME 24HR
6 **ENTER TO SAVE** MAXIMUM ACTIVE TIME 24HR	**7** **ARROWS TO FREEZE PROTECT "ON"** FREEZE PROTECT ENABLED OFF	**8** **ENTER TO SAVE** FREEZE PROTECT ENABLED ON
9 **PRESS BUTTON UNDER "YES" TO SAVE** SAVE GROUP SETUP? YES NO	**10** **ENTER TO ADD EQUIPMENT** ADD EQUIPMENT SELECT	**11** **ARROWS TO "CIRCULATION PUMP"** ADD EQUIPMENT CIRCULATION PUMP
12 **ENTER TO SAVE** ADD EQUIPMENT CIRCULATION PUMP	**13** **ARROWS TO SET PUMP TO "ON"** CIRCULATION PUMP ON	**14** **ENTER TO SAVE** CIRCULATION PUMP ON

**MENU TO EXIT, PRESS
& HOLD TO STATUS**

| WATER TEMP | ##°F |
| HEAT SETPOINT | ##°F |

SETUP 3 MORE GROUPS:

   I. Pool Group - Repeat steps 1 through 14
- Select the name "POOL GROUP" and
- Add the "POOL PUMP" as a piece of equipment
- Add the Heat Pump as a piece of equipment.

  II. Spa Group - Repeat steps 1 through 14
- Select the name "SPA GROUP"
- Add the "POOL PUMP" as a piece of equipment
- Add the Heat Pump as a piece of equipment.

 III. Cleaner Group - Repeat steps 1 through 14
- Select the name "CLEANER GROUP"
- Add the "BOOSTER PUMP" as a piece of equipment

PLEASE NOTE

Be sure to schedule the "FILTRATION" group to allow for proper full water turn over rate. And allow the heat pump enough time for heating or cooling the water.