HYDROQUIP™
THE SMART CHOICE™

TECHNICAL FACTS SHEET

510-A N. Sheridan St., Corona, CA 92880 Ph 951-273-7575 Fax 951-273-7550

Amperage & Ohms Measurements

Kilowatts	Watts	Voltage	Amps	Ohms
11	11000	240	45.8	5.24
8	8000	240	33.3	7.21
5.5	5500	240	22.9	10.4
4.5	4500	240	18.75	12.8
4	4000	240	16.7	14.4
3	3000	240	12.5	19.2
2.5	2500	240	10.4	23.04
2	2000	240	8.3	28.8
1.5	1500	120	12.5	9.6
1	1000	120	8.3	14.4
*	650	120	5.4	22.15

(1 Kilowatt = 1,000 Watts)

Unit Weights and Unit Conversions :

1 cubic foot of water weighs 62.4 pounds

1 cubic foot of water equals 7.5 gallons

1 gallon of water weighs 8.34 pounds

Multiply	By	To get
Gallons of Water	8.35	Pounds of Water
Pounds of Water	27.65	Cubic Inches
Gallons	231	Cubic Inches
Watts	0.001341	Horsepower
Amps	Volts	Watts

Fahrenheit and Celsius Conversions

To convert Fahrenheit temperatures into Celsius:

- Begin by subtracting 32 from the Fahrenheit number.
- Divide the answer by 9.
- Then multiply that answer by 5.

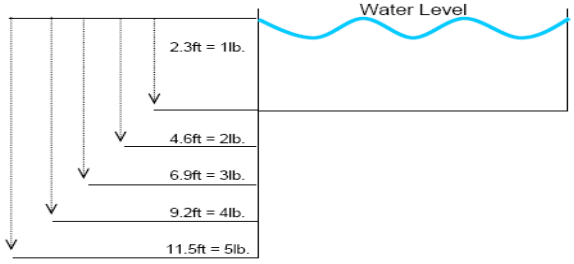
To convert Celsius temperatures into Fahrenheit:

- Begin by multiplying the Celsius temperature by 9.
- Divide the answer by 5.
- Now add 32.

PSI Conversions

Multiply	By	To get
Inches of Water	0.03612625	PSI
PSI	27.6807	Inches of Water

PSI settings for control systems below water level

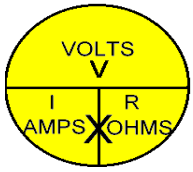


Ohm's Law

Ohm's Law is made from 3 mathematical equations that shows the relationship between electric voltage, current and resistance.

V = I x R (Voltage = Current multiplied by Resistance)
R = V / I (Resistance = Voltage divided by Current)
I = V / R (Current = Voltage Divided by Resistance)

Knowing any two of the values of a circuit, one can determine (calculate) the third, using Ohm's Law.



The Wheel:

Volts V (on top of the dividing line)
Amps (amperes) I (lower left below the dividing line)
Resistance R (lower right below the dividing line)
X represents the (multiply by sign)

To use, just cover the unknown quantity you need with your minds eye and what is left is the formula to find the unknown.

Blower Sizing

HORSEPOWER

To Get This	Divide This	By This
Horsepower	KiloWatts	0.75
Horsepower	Watts	746
Horsepower	Torque(ft.lbs.) X RPM	33000
Horsepower	Torque(ft.lbs.) X RPS	550
Horsepower required to pump water at a given rate to a given height, assuming 100% eff. AKA Water Horsepower	GPM x TDH (ft.)	3960
	GPM x TDH (psi)	103000
Brake hp	Water hp	Pump eff.

AIR BLOWER SIZING CHART

Blower Motor Size	Volts	Amps	Maximum In. of Water Depth	Number of Jets Only
1 HP	120V	6.6	35"	5-10
1 1/2 HP	120V	7.4	45"	9-15
2 HP	120V	9.3	55"	12-17
1 HP	240V	3.9	30"	4-9
1 1/2 HP	240V	4.3	40"	8-13
2 HP	240V	5	50"	12-17

BLOWER SIZING FORMULA

Measure total depth of water in spa (not total spa depth)

Add 1" water for each 10ft. Of 2" air pipe

Add 1/2" water for each 90 deg. 2" elbow

Compare your total with maximum inches of water columm and select that size or the next size higher blower than your toyal, in your selected voltage.

The number of holes in the air channel (both floor and seat) should be approximately 1.6sq in. total.

1/8" hole=.0123 sq. in. 3/16" hole=.0276 sq. in.

5/32" hole=.0192sq. In. 1/4" hole=.0491 sq. in.

HEATER SIZING

SPA WATER VOLUME - when the rate of recovery and the spa heat-up time are important, or when the spa is used infrequently, determine the proper heater size with the following calculations:

- **Capacity of spa in gallons** = Length x width x average depth x 7.5 (gal./cu. Ft.)
  OR Surface area x average depth x 7.5 (gal./cu. Ft.)
- **Desired temperature rise per hour:** ºF
- **KW required** = Gallon capacity x 8.3 (lbs./gal.) x temperature rise in ºF/hr
  3413

HEATING CAPACITY IN GALLONS PER HOUR (GPH)

Heater KW	Water Temperature Rise In ºF/Hour				
	5º	10º	15º	20º	25º
1.44	118 gph	59 gph	39 gph	--	--
5.75	472 gph	236 gph	157 gph	118 gph	95 gph
11.0	902 gph	451 gph	301 gph	226 gph	189 gph

Current Capacity (Amps) of Wire*

Wire Size	Amperes	
	Copper	Aluminium
14	20	-
12	25	20
10	30	25
8	40	30
6	55	40
4	70	55

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HQ TECHNICAL INFO

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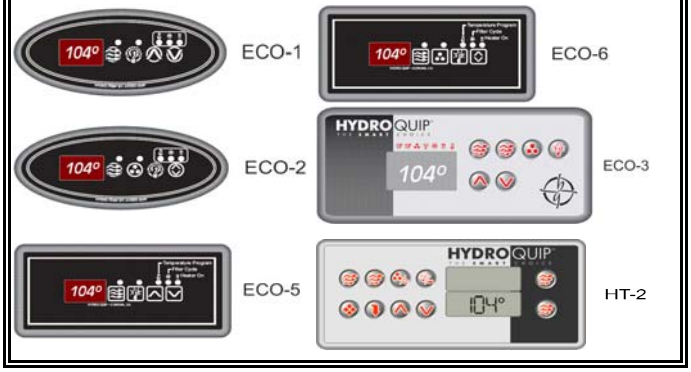
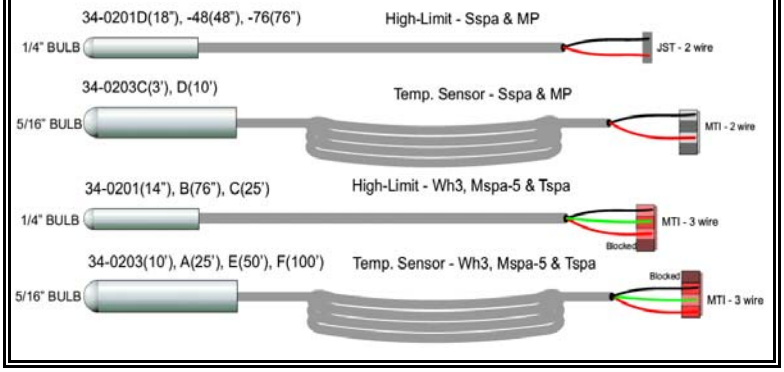
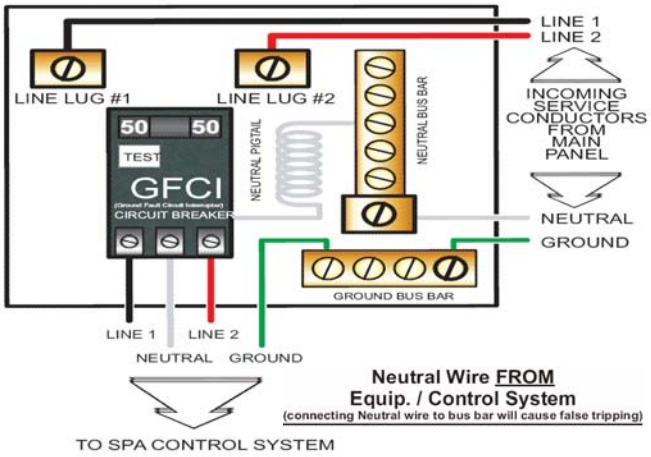
Spaside Control Reference



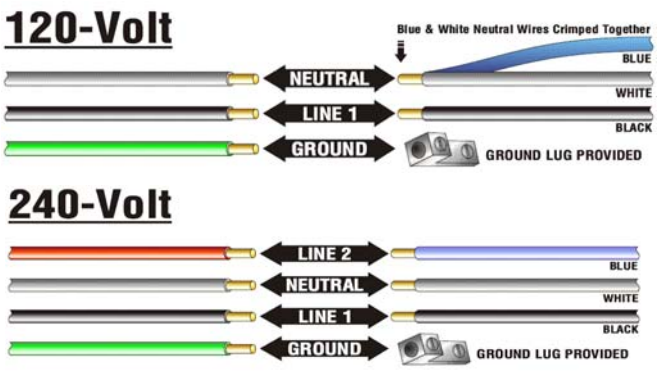
Sensor I.D.



GFCI Breaker Connection / Electrical Wiring Information



The number one cause for repeated tripping of a GFCI breaker on a new install is that the breaker has been incorrectly wired. The illustration above shows a typical installation. Note that the Neutral "pigtail" is connected at the neutral bus bar and the Neutral wire coming from the spa control system is connected directly to the breaker. Connecting the Neutral wire from the spa control system to the Neutral bus bar will cause the repeated tripping. **Warning - The illustration is meant to be used as a guide ONLY. This does not in any way supersede any manufacturers installation instruction.**



Error Messages

"FLO"	Pressure switch is open, when system expects it to be closed.
"FLC"	Pressure switch is closed, when system expects it to be open.
"OH"	The spa water has exceeded 112 degrees.
"HL"	The spa water has exceeded 119 degrees.
"Prr"	Temperature sensor malfunction.

Receptacle Color Chart

Red Pump 1 (2 speed)	**Brown** Pump 2 (2speed)
Pink Pump 2	**Violet** Blower
Lt. Violet Blower (optional)	**Yellow** Ozone
Blue Circ Pump	**White** Gas Heater
Orange Fiber Optics	**Green** Accessory

Normal Voltage Test Readings