



Technical Information / Blower Sizing

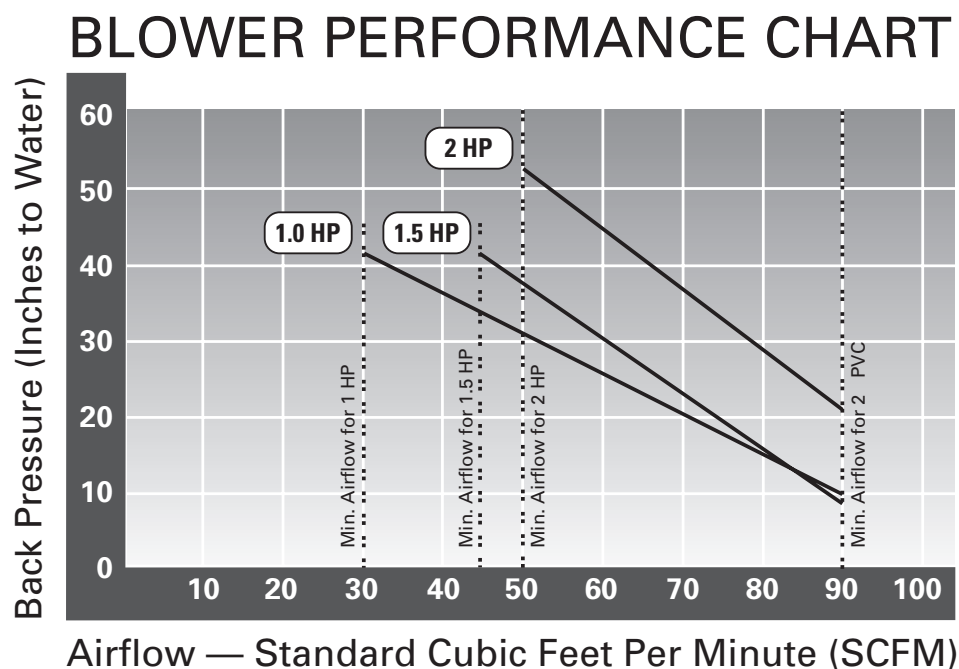
Friction loss of water in feet of head per 100 foot length of pipe.

1. Calculate water depth in inches:

A.	Actual water depth in injector	=	_____
B.	Add ½" of water per 90° elbow	=	_____
C.	Add ⅛" of water per 45° elbow	=	_____
D.	Add 1" of water per 10 feet of 2" pipe	=	_____
E.	Add 4" of water per ½" spring check valve	=	_____
TOTAL INCHES OF WATER		=	_____

2. Find the airflow or SCFM provided by your blower:

- On the **Blower Performance Chart**, find the number that corresponds to the **total inches of water** needed.
- Read across the chart until you **intersect the horsepower (HP)**, then go down for SCFM.
- Take total SCFM and divide by 10 to get corresponding hole sizes.



3. Calculate the number of holes by using the Air Hole Sizing Chart:

Air Hole Sizing Chart	
Air Hole Size	Number of Holes Needed per 10 SCFM
⅛"	24
⅕"	15
⅜"	11
½"	6
⅝"	4
Jet	1



Hole Saw Sizes

STORM JETS

Jets - Mini Storm	
Flat Gasket	2 3/16"
Grommet Gasket	2 1/4"
Jets - Poly Storm	
Flat Gasket	2 5/8"
Grommet Gasket	2 11/16"
Jets - Power Storm	
Flat Gasket	3 3/4"
Grommet Gasket	3 7/8"
Jets - Adjustable Cluster Storm	1 1/2"

JETS

Jets - CAD and 180°	2 1/2"
Jets - Euro	1 1/16"
Jets - Fog	9/16"
Jets - Jumbo	5 3/4"
Jets - Jumbo Storm	5 3/4"
Jets - Master Massage	5 3/4"
Jets - Mega Storm with Flat Gasket	4 3/4"
Jets - Neck	1 3/4"
Jets - Old Faithful	4 3/4"
Jets - Ozone/Cluster	1"
Jets - Poly	2 5/8"
Jets - Power Swim	3 1/2"
Jets - Quad Flo and Dual Flo	3 1/2"
Jets - Self-Draining Bath	1 3/4"
Jets - Standard Mini	1 3/4"
Jets - Swim	3 1/8"
Jets - Versatile	3 1/2"

SUCTIONS

Suction - Lo-Pro and Hi-Flo	
Flat Gasket	2 3/8"
Grommet Gasket	2 1/2"
Suction - Super Hi-Flo	
Flat Gasket	3 1/4"
Grommet Gasket	3 3/8"
Suction - Ultra Hi-Flo	
Flat Gasket	2 3/8"
Grommet Gasket	2 1/2"
Suction - Ultra Flo	
Flat Gasket	3 1/4"
Grommet Gasket	3 3/8"

AIR COMPONENTS

Air Bleed	1 5/16"
Air Button	1 1/2"
Air Control - Lo-Pro	1 5/8"
Air Control - 1/2"	1 5/16"
Air Control - 1/2" Top Access	3/4"
Air Injector - Button	3/8"
Air Injector - Lo-Pro	3/4"
Air Injector - Multi-Body	5/8"
Air Injector - Ozone	5/8"
Air Injector - Top Flow	1 3/16"

VALVES

Valves - Diverter - 1" Mini	2 1/16"
Valves - Diverter - 2" Top Access	3 1/4"
Valves - Spa Drain and Fill	1 5/8"
Valves - Turn On / Off	1 1/4"

LIGHTS

Light - 1/2"	3/8"
Light - 1"	5/8"
Light - 2 1/8"	1 5/8"
Light - 3"	2 5/8"
Light - 5" Jumbo	3 3/4"

SKIMMERS / FILTERS

Skim Filter - Bayonet	6 7/8"
Grommet Gasket	7"
Skim Filter - Dyna-Flo	6 7/8"
Grommet Gasket	7"
Skimmers - Strip	
Flat Gasket	2 3/8"
Grommet Gasket	2 1/2"
Filters - In-Line	6 7/8"
Grommet Gasket	7"
Filters - Top Load	6 7/8"
Grommet Gasket	7"
Teleweir Skim Filters	6.88"

SPECIALTY ITEMS

Aroma Therapy Canister	1 5/8"
Auto Vent	4"
Cup Holder	3 3/4"
Fittings - Thru Wall	1 5/16"
Master Massage	5 3/4"
Niche Body	8 3/4"
Power Massage	3 1/2"
Return Fitting	2 5/16"
Thermosensor	1"
Thermowell - Mini	1 3/16"
Waterway Cascade	(2) x 7/8"



1. Write in the number of jets needed and jet type.
2. Write in jet orifice size.
3. Use the Jet Flow Chart & Performance Curve (on page 259) to determine GPM and PSI.

**Total GPM is water volume needed to make jets work at desired PSI.
This is your TARGET FLOW and TARGET PRESSURE.
Take this number to Hydraulic Worksheet (next page) and use in Line 2.
This is the total GPM needed at a desired PRESSURE.**



1. Determine required turnover rate for spa in gallons per minute (GPM).

$$\frac{\text{Total Gallons}}{\text{Desired Turnover Rate (30 min. spa)}} = \text{GPM}$$

2. Determine GPM and PSI needed for maximum jet performance (use Jet Performance Flow Curves from page 114).

$$\frac{\text{Target Flow (GPM)}}{\text{Target Pressure (PSI)}}$$

3. A. Figure resistance head of system:

From Friction Flow Chart on page 258 and Friction Loss in Fittings on page 259, convert fittings and pipe lengths into feet of head.

EXAMPLE:

A. (4) 2" 90° elbows = 4 x 8.6 = 34.4 feet of 2" pipe

B. 50 feet of 2" pipe = 50 feet

A + B: 34.4 feet + 50 feet = 84.4 feet

Looking at the Friction Flow Chart, 2" pipe at 10 feet per second gives us 100 GPM at 14.4 feet of head. This is figured in 100 foot length of pipe. We multiply .844 times 14.4 = 12.15 feet of head. Or to convert to PSI x .433 = 5.26 PSI loss.

$$\text{A } \frac{\text{Quantity}}{\text{Fitting Type (Friction Loss)}} \times \text{Straight Length of Pipe}$$

$$\text{B } \frac{\text{Quantity}}{\text{Pipe}} \times \text{Straight Length of Pipe}$$

$$\frac{\text{A}}{\text{B}} + \frac{\text{B}}{\text{Total Pipe Length}}$$

$$\frac{\text{Pipe Length}}{\text{Head of Loss for 100 ft. Length}} \times \text{Feet of Head}$$

B. Figure Actual Head Loss of Components: (Refer to Head Loss Chart on Page 259)

EXAMPLE:

1) One 1 1/2" main drain at 50 GPM has 2 feet of head.

2) One 1 1/2" skimmer 50 GPM has 4 feet of head.

Total head loss of components is 6 feet of head.

Quantity	GPM	Head Loss
Total Head Loss of Components: _____		

C. Add Head Loss from B and C for Total Resistance Head:

EXAMPLE:

12.15 feet of head (from system resistance) + 6 feet of head (from component head loss) = 18.15 feet of head

$$\frac{\text{Resistance of Head Fittings, etc.}}{\text{Component Head Loss}} = \text{TDH}$$

D. Total of B and C is TDH (total dynamic head) of system. Convert total head into PSI by multiplying by .433:

EXAMPLE:

18.15 feet of head x .433 = 7.86 PSI

(This is the amount of pressure lost in the system)

$$\frac{\text{TDH}}{\text{PSI}} \times .433$$

E. Add Target PSI from Jet Worksheet (or Line #2) to Total Pressure Loss (PSI) Line D to find Total Pressure Required and Total Dynamic Head of System:

EXAMPLE:

14 PSI (Required for jets) + 7.86 PSI (Required for system) = 21.86 PSI

$$\frac{\text{Jets PSI Required}}{\text{System PSI Required}} = \text{Total PSI Required}$$

F. Match appropriate pump by looking at pump curves.

EXAMPLE:

At 22 PSI (or 50 feet of head) at 100 GPM, you can use The Executive 1 HP Pump or a 2 HP Hi-Flo Side Discharge Pump



Technical Information / Friction Flow Chart

Friction loss of water in feet of head per 100 foot length of pipe.

U.S. Gal. per Min.	3/4 PIPE			1 PIPE			1 1/4 PIPE			1 1/2 PIPE			2 PIPE			2 1/2 PIPE			3 PIPE		
	Vel. Ft. per Sec.	Loss in Feet	Loss in PSI	Vel. Ft. per Sec.	Loss in Feet	Loss in PSI	Vel. Ft. per Sec.	Loss in Feet	Loss in PSI	Vel. Ft. per Sec.	Loss in Feet	Loss in PSI	Vel. Ft. per Sec.	Loss in Feet	Loss in PSI	Vel. Ft. per Sec.	Loss in Feet	Loss in PSI	Vel. Ft. per Sec.	Loss in Feet	Loss in PSI
1	.60	.25	.11	.37	.07	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	1.20	.90	.39	.74	.28	.12	.43	.07	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	1.80	1.92	.83	1.11	.60	.26	.64	.16	.07	.47	.07	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	2.41	3.28	1.42	1.48	1.02	.44	.86	.25	.11	.63	.12	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	3.01	5.8	2.51	1.86	1.52	.65	1.07	.39	.17	.79	.18	.08	.....	.....	.....	.....	.....	.....	.....	.....	.....
6	3.61	7.0	3.0	2.33	2.15	.93	1.29	.55	.24	.95	.25	.11	.57	.07	.03	.....	.....	.....	.....	.....	.....
8	4.81	11.8	5.1	2.97	3.6	1.56	1.72	.97	.42	1.25	.46	.2	.76	.14	.06	.54	.05	.02	.....	.....	.....
10	6.02	17.9	7.75	3.71	5.5	2.4	2.15	1.46	.63	1.58	.69	.3	.96	.21	.09	.67	.09	.04	.....	.....	.....
15	9.02	37.8	16.37	5.57	11.7	5.07	3.22	3.07	1.33	2.36	1.45	.63	1.43	.44	.19	1.01	.18	.08	.65	.07	.03
20	.....	.....	.....	7.42	19.9	8.62	4.29	4.2	1.82	3.15	2.47	1.07	1.91	.74	.32	1.34	.30	.13	.87	.12	.05
25	.....	.....	.....	9.28	30.0	13.0	5.36	7.9	3.42	3.94	3.8	1.6	2.39	1.11	.05	1.67	.46	.2	1.08	.16	.07
30	.....	.....	.....	11.14	42.0	18.19	6.43	11.1	4.8	4.73	5.2	2.3	2.87	1.55	.67	2.01	.65	.28	1.30	.23	.1
35	.....	.....	.....	.....	.....	.....	7.51	14.7	6.37	5.52	7.0	3.03	3.35	2.06	.89	2.35	.88	.38	1.52	.30	.13
40	.....	.....	.....	.....	.....	.....	8.58	18.9	8.2	6.30	8.9	3.9	3.82	2.63	1.14	2.64	1.11	.48	1.73	.39	.17
45	.....	.....	.....	.....	.....	.....	9.65	23.5	10.18	7.09	11.1	4.8	4.30	3.28	1.4	3.01	1.39	.6	1.95	.48	.21
50	.....	.....	.....	.....	.....	.....	10.72	28.5	12.3	7.88	13.5	5.8	4.78	4.0	1.7	3.35	1.69	.73	2.17	.58	.25
60	.....	.....	.....	.....	.....	.....	.....	.....	.....	9.46	18.9	8.18	5.74	5.6	2.4	4.02	2.36	1.02	2.60	.81	.35
70	.....	.....	.....	.....	.....	.....	.....	.....	.....	11.03	25.1	10.9	6.69	7.4	3.2	4.69	3.14	1.36	3.04	1.09	.47
80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7.65	9.5	4.1	5.35	4.0	1.73	3.47	1.39	.6
90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8.60	11.8	5.1	6.03	5.0	2.2	3.91	1.73	.75
100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9.56	14.4	6.3	6.70	6.1	2.64	4.34	2.10	1.9
120	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11.95	21.8	9.4	8.38	9.2	4.0	5.42	3.19	1.38
150	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10.05	12.8	5.5	6.51	4.5	1.95
175	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7.59	5.9	2.55
200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8.68	7.9	3.4
225	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9.76	9.4	4.07
250	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10.85	11.5	4.99
275	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
300	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
325	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

AWG Wire Size												
Amps	14		12		10		8		6		4	
	115 Volts	230 Volts	115 Volts	230 Volts	115 Volts	230 Volts	115 Volts	230 Volts	115 Volts	230 Volts	115 Volts	230 Volts
2	595	1190	946	1891	1479							
3	397	794	630	1261	986							
4	298	595	470	946	740	1479	1161		1808			
5	238	476	378	756	592	1184	926	1858	1447			
6	198	397	315	630	493	986	774	1548	1206	2411	1842	
7	170	340	270	540	423	845	663	1327	1033	2067	1579	
8	149	293	236	473	370	740	581	1161	904	1808	1381	2763
9	132	265	210	420	329	658	516	1032	804	1607	1228	2456
10	119	238	189	376	296	592	464	929	723	1447	1105	2210
12	99	198	158	315	247	493	387	774	603	1206	921	1842
14			135	270	211	423	332	663	517	1033	789	1579
16			118	236	185	370	290	581	452	904	691	1381
18					164	329	258	516	402	804	614	1228
20					148	296	232	464	362	723	553	1105
22					134	269	211	422		658		1005
24					123	247	194	387		603		921
26								357		556		850
28								332		517		789
30								310		482		737
35								265		413		632
40										362		553
45										321		491
50										239		442



Friction Loss in Fittings

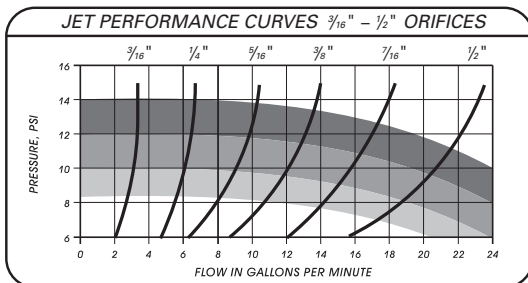
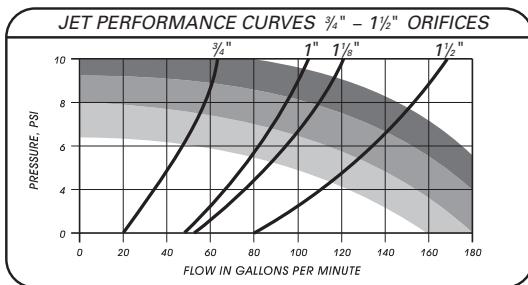
SIZE FITTING	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	4"
Gate Valve (Full Open)	0.6	0.7	0.9	1.2	1.3	1.6	1.7	2.0	2.7
Elbow - 90°	3.6	4.5	5.3	6.7	7.5	8.6	9.3	11.1	13.1
Elbow - 45°	0.7	0.9	1.4	1.8	2.2	2.8	3.2	4.1	5.6
Tee (Straight Thru)	1.8	2.5	3.3	4.7	5.7	7.8	9.3	12.1	17.1
Tee (Thru Side)	4.3	5.4	6.7	8.8	10.0	12.1	13.0	17.1	21.2
Swing Check Valve	8.1	8.9	11.2	13.1	15.2	19.1	22.0	27.1	38.2

Head Loss Charts

Component	GPM	Head Loss (ft.)	Component	GPM	Head Loss (ft.)	Cartridge Filters	GPM (.75)	Head Loss (ft.)
Main Drain 1 ½" Outlet	20	0.5	Skimmer 1 ½" Outlet	20	1.0	25 sq. ft.	18.75	1.1
Main Drain 1 ½" Outlet	30	1.0	Skimmer 1 ½" Outlet	30	2.0	35 sq. ft.	26.25	2.0
Main Drain 1 ½" Outlet	40	1.5	Skimmer 1 ½" Outlet	40	3.0	50 sq. ft.	37.50	4.3
Main Drain 1 ½" Outlet	50	2.0	Skimmer 1 ½" Outlet	50	4.0	70 sq. ft.	52.50	7.5
Main Drain 1 ½" Outlet	60	2.5	Skimmer 1 ½" Outlet	60	5.5	75 sq. ft.	56.25	8.0
						100 sq. ft.	75.00	17.5
Main Drain 2" Outlet	40	1.0	Skimmer 2" Outlet	20	0.5			
Main Drain 2" Outlet	50	1.5	Skimmer 2" Outlet	30	1.0			
Main Drain 2" Outlet	60	2.0	Skimmer 2" Outlet	40	2.0			
Main Drain 2" Outlet	70	3.0	Skimmer 2" Outlet	50	3.0			
Main Drain 2" Outlet	80	4.0	Skimmer 2" Outlet	60	4.0			
			Skimmer 2" Outlet	70	5.0			
Heater	--	7.0 avg.	Skimmer 2" Outlet	80	6.0			

Jet Flow Data

Jet orifices sized from ¾" to 1 ½" work better at a lower PSI. Use legend to size properly.



LEGEND:

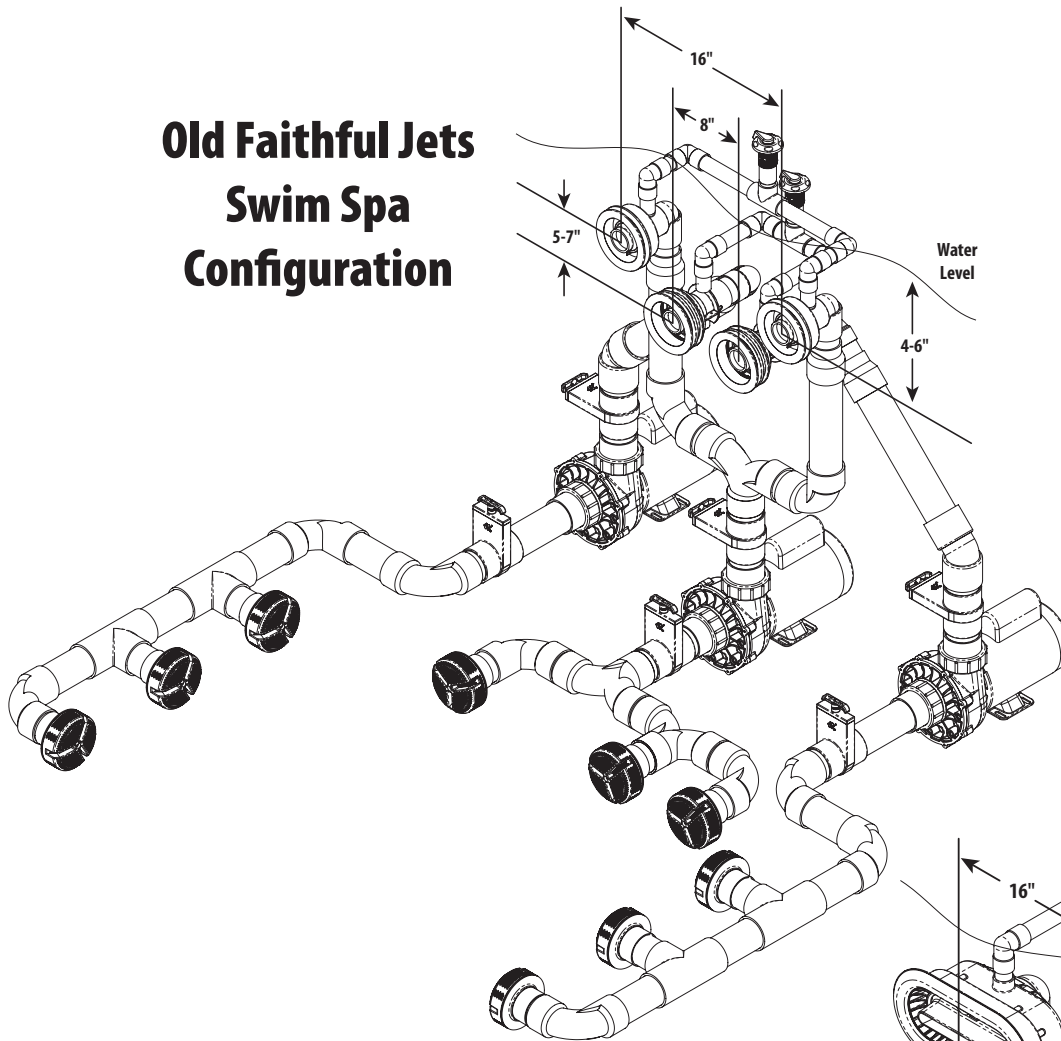
- WEAK
- MODERATE
- STRONG

JET FLOW CHART

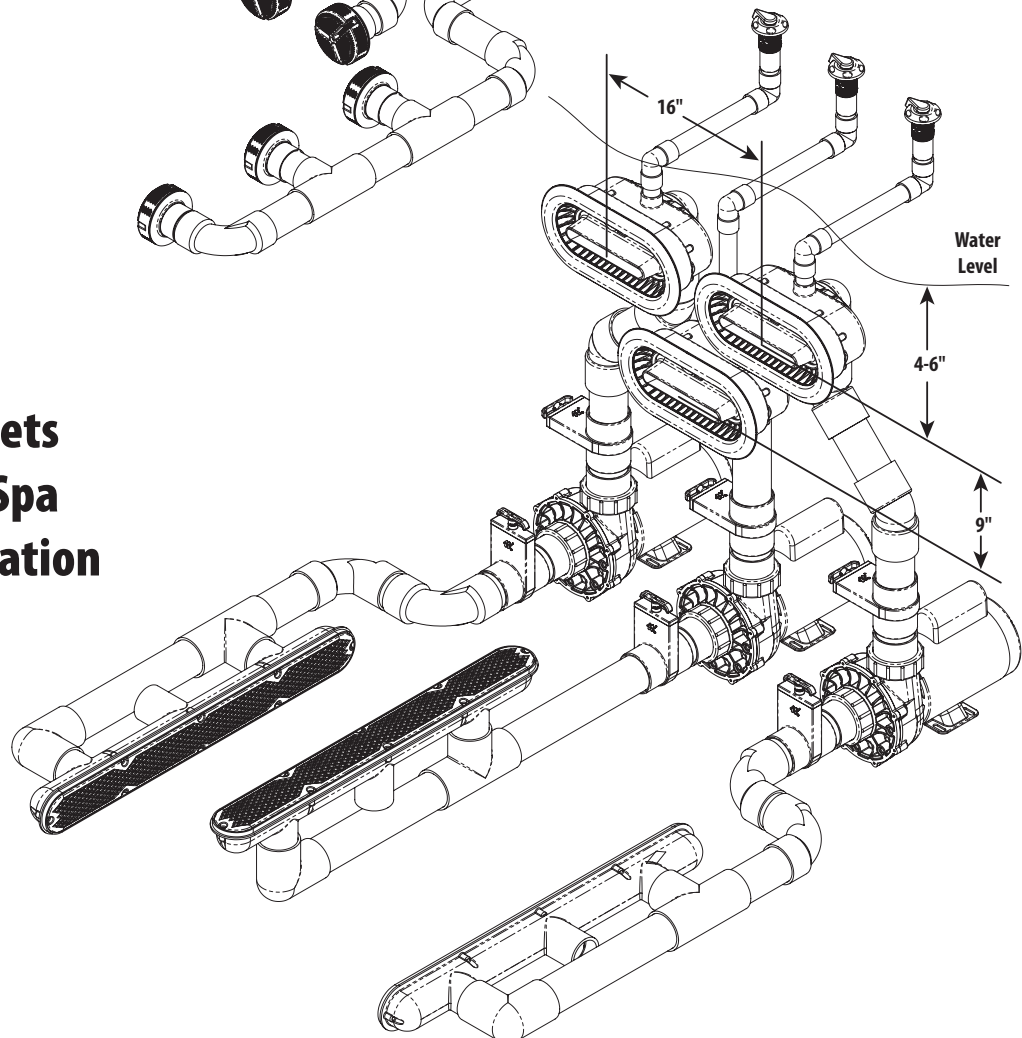
NOZZLE ORIFICE SIZE	JETS			
	10 PSI	15 PSI	20 PSI	
3/16"	3	4	5	GPM
1/4"	6	7	8	GPM
5/16"	9	10	12	GPM
3/8"	13	16	18	GPM
7/16"	17	19	22	GPM
1/2"	24	29	33	GPM
3/4"	63	65	75	GPM
1"	95	116	134	GPM
1 1/8"	120	147	170	GPM
1 1/2"	213	260	301	GPM



Old Faithful Jets Swim Spa Configuration



River Jets Swim Spa Configuration





Displays

Part No.	Description
150-0020	Executive 56-Frame Pump Cutaway Display
150-0030	Supreme Display
150-0045	150 sq. ft. Pro Clean Cartridge Filter Cutaway
150-0050	SVL56 Cutaway Display
150-0059-DKG	Mustang Cutaway Display
150-0067-A	Aqua Star 67 GPM D.E. Filter Cutaway
150-0070	2" S TruSeal Diverter Display
150-0102	ClearWater 100 sq. ft. 2" Ports Cartridge Cutaway
150-0110	Sweep Ell Display
150-0150	ClearWater II D.E. 12 sq. ft. Filter Cutaway
150-0151	Champion Pump Cutaway
150-0160	Champion Pump Stand Display with Valves - Assembled
150-0170	Champion Pump Stand Display with Valves - Unassembled
150-0217-A	Aqua Star Oval Sand Filter 19" Cutaway - Gray
150-0221	ClearWater Sand Filter 22" Cutaway - Black
150-0227-A	22" Aqua Star Filter Cutaway - Gray
150-0231	Carefree Sand Filter 22" Cutaway - Black
150-0237-A	Aqua Star Oval Sand Filter 22" Cutaway - Gray
150-0241	ClearWater Sand Filter 19" Cutaway - Black
150-0250	26" ClearWater Sand with Base
150-0271	Carefree Sand Filter 26" Cutaway - Black
150-0277-A	Aqua Star Oval Sand Filter 26" Cutaway - Gray
150-0300	Poly Gunitite Jet Display
150-0310	Power Storm Gunitite Jet Display
150-0600	Poly Storm Gunitite Jet Internal
150-0610	Poly Storm Gunitite Revo and 6-Spoke Metal/Plastic
150-1000	Santanna Blower Display
150-1007-A	Aqua Star 100 sq. ft. Cartridge Filter Cutaway
150-1500	ClearWater 150 sq. ft. Cartridge Filter Cutaway - Black
150-1507-A	Aqua Star 150 sq. ft. Cartridge Filter Cutaway
150-1507-CY	Cyclone 200 sq. ft. Cartridge Filter Cutaway
150-1507-SR	Sierra 150 sq. ft. Cartridge Filter Cutaway
150-2000	Poly Gunitite - Old Faithful Retail Display 12 x 12
150-2010	36 sq. ft. D.E. Crystal Water Cutaway Filter
150-2010-A	36 sq. ft. D.E. Aqua Clear Cutaway Filter
150-2020	60 sq. ft. D.E. Crystal Water Cutaway Filter
150-2020-A	60 sq. ft. D.E. Aqua Clear Cutaway Filter
150-2030	325 sq. ft. Cartridge Crystal Water Cutaway Filter
150-2040	525 sq. ft. Cartridge Crystal Water Cutaway Filter
150-2050	425 sq. ft. Cartridge Crystal Water Cutaway Filter
150-2060	48 sq. ft. D.E. Crystal Water Cutaway Filter
150-2060-A	48 sq. ft. D.E. Aqua Clean Cutaway Filter
150-2150	ClearWater 150 sq. ft. 2" Ports Cartridge Filter Cutaway
150-2200	ClearWater 200 sq. ft. 2" Ports Cartridge Filter Cutaway
150-3000	Spa Rotating Therapy Massage Fitting 8 x 8
150-3410G	Gunitite 3-Jet Manifold
150-4000	Pipe Extender/Insider Coupler
150-5000	Eyeball Return Fitting Ring
150-6000	Unions Ring
150-6400	Vinyl Liner In-Ground Main Drain
150-6407	Vinyl Liner In-Ground Main Drain - Gray
150-7000	Performance Plus Poster 3' x 2'
150-7010	Service Check Valve
150-8000	Pump Poster
150-8150	Smart Filtration - 10 vs. 24 - 11 x 17
150-8160	Smart Filtration - Op Costs - 11 x 17
150-8170	Skimmer Display Stand
150-8180	Power Storm Jet Internal
150-C012-W	Chlorinator In-Line - White

Brochures/Flyers

Part No.	Description
150-8010	SVL56 Pump
150-8010S	SVL 56 Pump (Spanish)
150-8050	ClearWater Chlorinator
150-8050-F	ClearWater Chlorinator (French)
150-8050-S	ClearWater Chlorinator (Spanish)
150-8120	ClearWater II Cartridge Deluxe Systems
150-8130	ClearWater Sand Deluxe Systems
807-0024	Crystal Water D.E. Filter
807-0024S	Crystal Water D.E. Filter (Spanish)
807-0025	Crystal Water Cartridge Filter
807-0025S	Crystal Water Cartridge Filter (Spanish)
807-0028	Carefree Sand Filter (only)
807-0028-S	Carefree Sand Filter (only) (Spanish)
807-0029	Carefree Sand Filter Deluxe Systems
807-0036	Renegade Venturi Gunitite Skimmers
807-0042	Champion Pump
807-0042F	Champion Pump (French)
807-0042S	Champion Pump (Spanish)
807-0044	ProClean Cartridge and D.E. Cartridge Filters
807-0054	Poly Storm Gunitite Jets
807-0055	TWM Sand Filter Systems
807-0056	ClearWater II D.E. Filter Systems (Standard & Deluxe)
807-0057	TWM Cartridge Filter Systems
807-0059	Viper Pump
807-0060	UltraClean Pro Sand Filters
807-0067	TruSeal Check Valves & TruSeal Diverter Valves
807-0068	EX2 Pump
807-0075	ClearWater Sand Standard Systems
807-0078	Renegade Gunitite Skimmers
807-0094	Carefree Sand Filter Standard Systems
807-0095	ClearWater II Cartridge Filter Standard Systems
807-0097	VGB Product Brochure
807-0103	3-Jet Manifold / Power Seat
808-0022	Waterway Window Decal
150-8400-P	Waterway Pool Products Note Pad
150-8400-S	Waterway Spa Products Note Pad



Fax Cover

To: **Waterway Customer Service**
Toll Free Fax: **888.772.5387 (888.spa jets)**

From:

Name: _____

Company: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

☐ **Builder** ☐ **Mfr./OEM** ☐ **Sub Assembly** ☐ **Dealer** ☐ **Service Firm**

☐ **Swimming Pool** ☐ **Distributor** ☐ **Spa** ☐ **Whirlpool Bath**

Quantity	Part No.	Description	Price Each	Price Total