



Technical Information / Blower Sizing

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

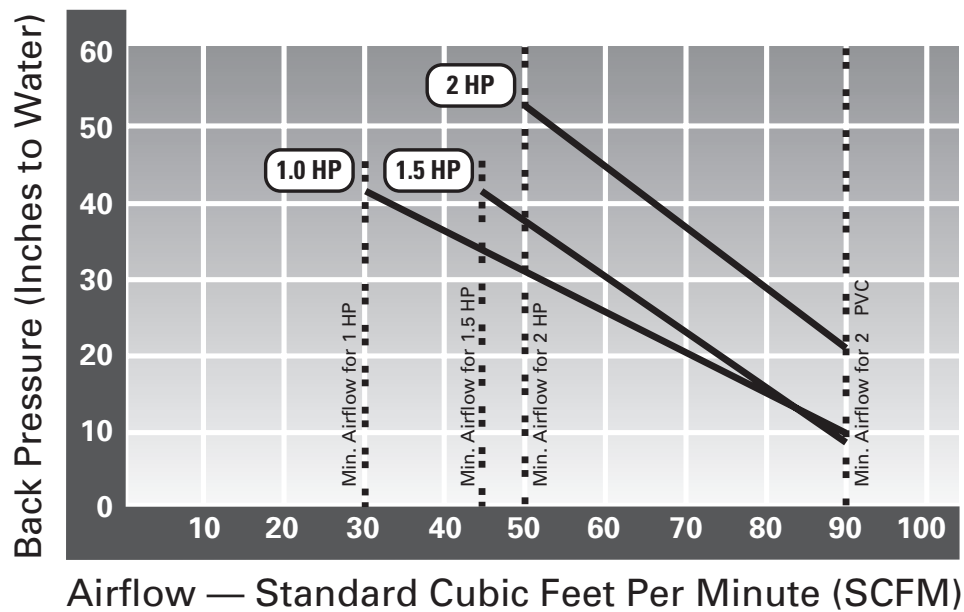
1. Calculate water depth in inches:

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.

BLOWER PERFORMANCE CHART



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
1/8"	24
5/32"	15
3/16"	11
1/4"	6
5/16"	4
Jet	1



Hole Saw Sizes

STORM JETS

Jets - Adjustable Cluster Storm	1 1/2"
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 - Mega Storm with Flat Gasket	4 3/4"

JETS

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 - Old Faithful	4 3/4"
Jets - Ozone/Cluster	1"
Jets - Poly	2 5/8"
Jets - Turbo	3 1/4"

SUCTIONS

Suction - Lo-Pro and Hi-Flo/Ultra High Flo	
Flat Gasket	2 3/8"
Grommet Gasket	2 1/2"
Suction - Super Hi-Flo/Designer Pro/Ultra High Flo	
Flat Gasket	3 1/4"
Grommet Gasket	3 7/16"

AIR COMPONENTS

Air Bleed	1 5/16"
Air Button	1 1/2"
Air Control - Lo-Pro	1 5/8"
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"
Light - 7" XL Jumbo	5 3/4"
Cup Holder with hole saw size	2 5/8"

SKIMMERS / FILTERS

5 1/2" Top Load Filter	4 1/8"
Skim Filter - Dyna-Flo	6 7/8"
Grommet Gasket	7"
Skimmers - Strip	
Flat Gasket	2 3/8"
Grommet Gasket	2 1/2"
Filters - Top Load	6 7/8"
Grommet Gasket	7"
Teleweir Skim Filters	6 7/8"

SGMS TOP SIDE CONTROLS

Air Control - 1"	2 7/16"
Valves - 1"	2 17/32"
Valves - 2"	3 3/4"

SGMS PIN LIGHTS

Fiberglass/Acrylic	9.8mm
Polypropylene	9.7mm

THE WEDGE

Suction - 5" Designer Pro	4"
5" Ultra Super Hi-Flo	4"
5" Super Hi-Flo	4"
3 1/2" Hi-Flo	3"
Dyna-Flo	7 1/2"
Master Massage	6 1/2"
Light - 5" Jumbo	4 3/8"
3 1/2"	3"

SPECIALTY ITEMS

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



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 254 and Friction Loss in Fittings on page 255, 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.

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

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

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

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

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

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

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)

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

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

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

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



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

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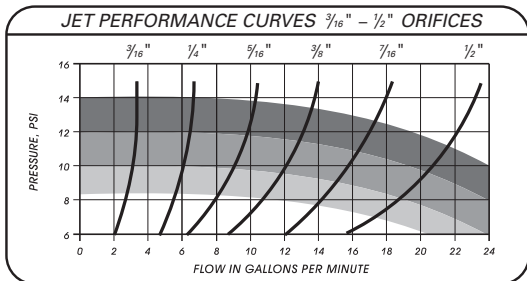
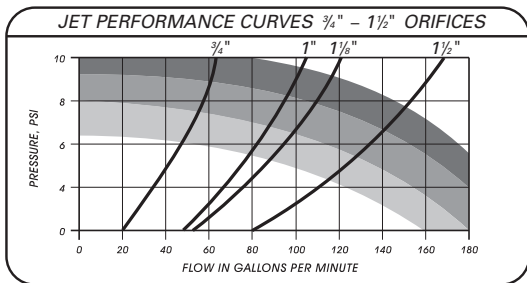


Friction Loss in Fittings									
SIZE FITTING	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	4"
Gate Valve (Full Open)	0.6	0.7	0.9	1.2	1.3	1.6	1.7	2.0	2.7
Elbow - 90°	3.6	4.5	5.3	6.7	7.5	8.6	9.3	11.1	13.1
Elbow - 45°	0.7	0.9	1.4	1.8	2.2	2.8	3.2	4.1	5.6
Tee (Straight Thru)	1.8	2.5	3.3	4.7	5.7	7.8	9.3	12.1	17.1
Tee (Thru 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			GPM
	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

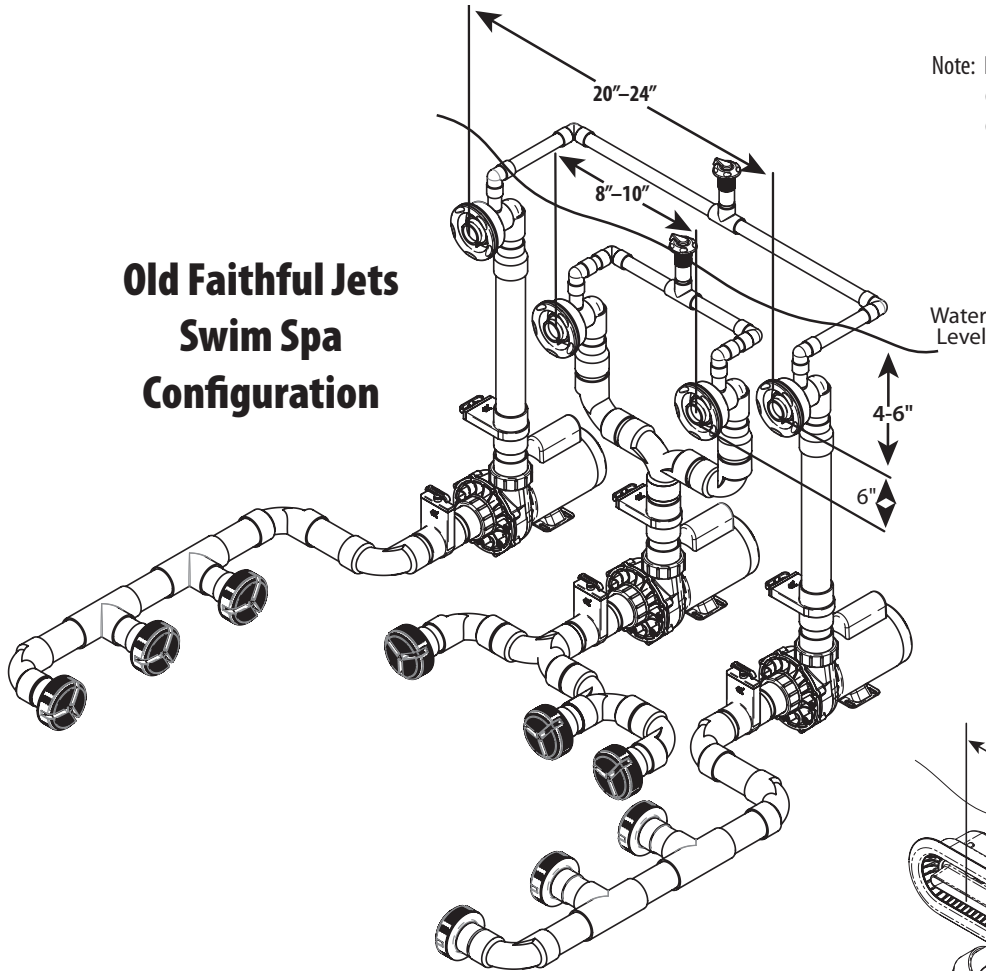
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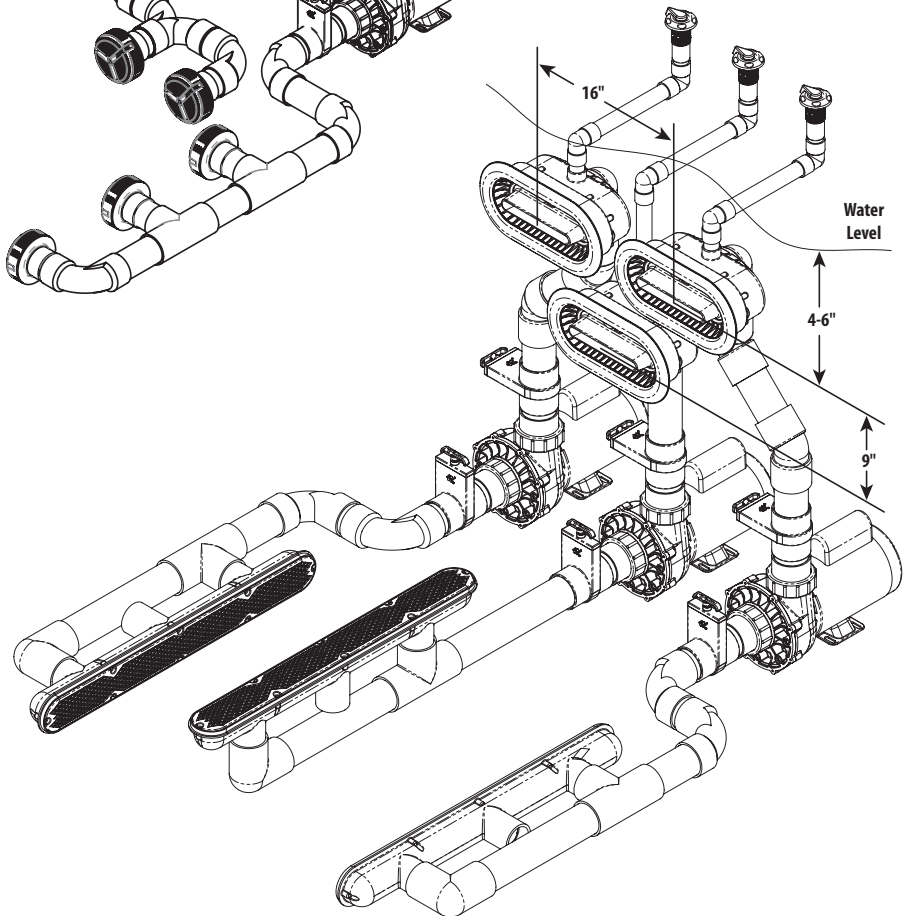
SWIM SPA CONFIGURATIONS

Note: Dimensions represent sample configuration only. Various custom configurations are possible.

Old Faithful Jets Swim Spa Configuration



River Jets Swim Spa Configuration





Displays

Part No.	Description
150-0020	Executive 56 Frame Pump Cutaway
150-0010	Vinyl Liner Builder's Pack
150-0031R	Supreme Pump - 90° Right, 3 Ft. Twist Lock Cord
150-0045	150 Sq. Ft. Pro Clean Plus Cartridge Cutaway
150-0050	SVL Cutaway
150-0100	ProClean Plus 100 Display
150-0110	Sweep Ell Display
150-0130	TruSeal & Swing Valve Display
150-0151	Champion Pump Display
150-0157	ClearWater II D.E. 12 Sq. Ft. 44 GPM Filter Cutaway - Gray
150-0160	Champion Pump With Valve - Assembly Cutaway
150-0165	Power Defender 165 (1.65HP) Pump Display
150-ECONOV5	Power Defender 270 (2.7HP) Pump Display
150-0180	River Swim Jet
150-0200	200 Sq. Ft. Pro Clean Cartridge Filter Cutaway
150-0237	Carefree Sand Filter 22" Cutaway
150-2047	ClearWater Sand Filter 19" Cutaway - Gray
150-0277	Carefree Sand Filter 26" Cutaway
150-0280R	Hi-Flo II 90° Right - 3 Ft. NEMA Display
150-0290	SMF Pump Display
150-0320	Poly Storm Gunitite Jet Display with Tee Body Thread-in
150-0330	Power Storm Gunitite Jet Display with Tee Body Thread-in
150-0340	Mini Storm Gunitite Jet Display with Tee Body Thread-in
150-0360	Gunitite Storm Jet Internal Display - Power, Poly & Mini Thread-in
150-0420	Carefree Oval Sand Filter 19" Cutaway w/Dummy Motor
150-0437	Carefree Oval Sand Filter 22" Cutaway, 1.5 HP, 3 Ft. Twist Lock Cord
150-0460	Carefree Oval Sand Filter 22" Cutaway, Sub Assembly
150-0730	Flex PVC Sample Kit
150-1000	Santanna II Blower Display
150-1010	Santanna II Blower - Working Display
150-1507	ClearWater 150 Sq. Ft. Cartridge Filter Cutaway - Gray
150-1527	ClearWater 150 Sq. Ft. Cartridge Filter, Supreme Motor, 3 Ft. NEMA Cord
150-1537	Clearwater 150 Sq. Ft. Cartridge Filter, Supreme Motor, 3 Ft. Twist Lock Cord
150-1547	Clearwater 150 Sq. Ft. Cartridge Filter, Hi-Flo Motor, 3 Ft. NEMA Cord
150-1600	VGB Drains Display Board - 6" / 8" / 10" / 9" x 9" / 12" x 12" / 18" x 18"
150-1610	VGB Drains Display Board - 32" Strip / 24" x 24"
150-1770	Spa Suction Display I
150-1780	Spa Suction Display II
150-2017	36 Sq. Ft. D.E. Crystal Water Cutaway Filter - Gray
150-2027	60 Sq. Ft. D.E. Crystal Water Cutaway Filter - Gray
150-2037	325 Sq. Ft. Cartridge Crystal Water Cutaway - Gray
150-2047	525 Sq. Ft. Cartridge Crystal Water Cutaway - Gray
150-2057	425 Sq. Ft. Cartridge Crystal Water Cutaway - Gray
150-2067	48 Sq. Ft. D.E. Crystal Water Cutaway Filter
150-3410G	Gunitite Jet, 3 Jet Manifold Straight Body Display
150-3600	Gunitite Poly Jet Display Threaded Bodies Only (8)
150-4000	Pipe Extender / Insider Coupler Display
150-8090	Hi-Flo II Pump Display
150-8150	Smart Filtration 10VS 24 - 11 x 17
150-8160	Smart Filtration OP Cost 11 x 17
150-8170	Skimmer Display Stand
150-C012-W	Chlorinator In-Line Display - White
150-8700	Booster Pump Display

Brochures/Flyers (continued next column)

Part No.	Description
150-8010	SVL56 Pump
150-8010-F	SVL56 Pump - Spanish
150-8010-S	SVL56 Pump - Spanish
150-8050	ClearWater II Chlorinator
150-8050-S	ClearWater II Chlorinator - Spanish
150-8050-F	ClearWater II Chlorinator - French

Brochures/Flyers (continued)

Part No.	Description
150-8070	Hi-Flo II Pump
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
807-0025-F	Crystal Water Cartridge Filter - French
807-0025-S	Crystal Water Cartridge Filter - Spanish
807-0028	Carefree Sand Filter
807-0028-S	Carefree Sand Filter - Spanish
807-0036	Renegade Venturi Gunitite Skimmer
807-0042	Champion Pump
807-0042F	Champion Pump - French
807-0042S	Champion Pump - Spanish
807-0044	ProClean Plus Cartridge Filter
807-0044-F	ProClean Plus Cartridge Filter - French
807-0044-S	ProClean Plus Cartridge Filter - Spanish
807-0055	TWM Sand Systems
807-0056	ClearWater II D.E. Systems (Standard & Deluxe)
807-0057	TWM Cartridge Filter Systems
807-0059	Viper Pump
807-0059-F	Viper Pump - French
807-0062-SPA	ShurFlex Pool & Spa Hose - Spa Specifications
807-0062-POOL	ShurFlex Pool & Spa Hose - Pool Specifications
807-0068	EX2 Pump
807-0075	ClearWater Sand Standard Systems
807-0078	Renegade Gunitite Skimmer
807-0089	Carefree Sand Filter Standard & Deluxe Systems
807-0095	ClearWater II Cartridge Standard Systems
807-0097	VGB Drains & Suctions
807-0100	SMF Pump
807-0100-FR	SMF Pump - French
807-0100-S	SMF Pump - Spanish
807-0107	TWM-30 Series Cartridge & Sand Systems
807-0116A	Crystal Water Hang Tag Assembly (with tie)
807-0120	Pool Products Worksheet 2017
807-0125	Storm Jets - Orion/Eclipse/Reverse Eclipse
807-0128	Power Defender SVL Variable Speed (300)
807-0183	Power Defender Variable Speed Booster Pump
807-0184	Power Defender Exec VS & EX2 VS Spa Pumps
807-0186	Power Defender High Performance EX2 Spa Pump
807-0187	Power Defender_2 Pole_6 Pole Spa Pumps
807-0188	Power Defender Viper VS Spa Pump
807-0352	Spa Steps
807-0352-F	Spa Steps - French
807-0354	Pump Cross-Reference w/Adjustable Base
807-1021	Power Defender 165 / 270 / 300 VS Pool Pumps
807-1021-F	Power Defender 165 / 270 / 300 VS Pool Pumps - French
807-1022	MniStorm, PolyStorm & PowerStorm Thread-in Gunitite Jets
807-1111	TruSeal Check & Diverter Valves
807-2010	Booster Pump
807-2030	NEO 2100 Spa Control
807-2030-F	NEO 2100 Spa Control - French
807-2031	NEO 1500 Spa Control
807-2031-F	NEO 1500 Spa Control - French
807-2032	NEO 1200 Spa Control
807-2032-F	NEO 1200 Spa Control - French
807-2033	OASIS Pool Pool & Spa Control
807-2035	NEO 2100_1500_1200_Configurations
807-8410	Santanna II - Stealth II Blowers

