

RAIN WATER EQUIPMENT

Tap into the Source.

Jim Wood

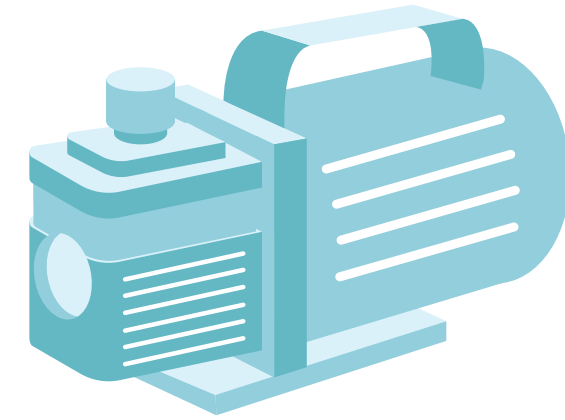
Residential Pump and Filtration / UV
System

Sizing and Selection

rainwaterequipment.com

817-246-4567

Selecting the Best Pump for the Job



- What is the application?

What do they want to do with the water?

- Residential whole home use only
- Irrigation only
- Whole home and irrigation
- Water transfer from 1 tank to another or from a lake to a tank
- Lift from shallow or deep well

What is the Water Source?

- Water Storage Tank

- Above Ground or Below Ground Tank (aka Cistern)? Tank size?

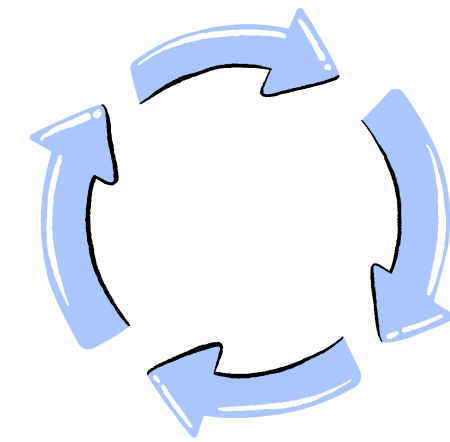
- Rainwater, well water, city water, or delivered water?

- City Water Boosting

- Lake / River Water



Centrifugal Pumps Push Water!!!



- Centrifugal pump uses an electric motor that powers a fast-rotating impeller using centrifugal force to push (rather than pull) fluid/water.
- Pumps perform best when they push water
 - **ProTip:** If the tank is downhill from the house, don't try to lift the water w/ an above ground pump. You're asking for problems.

On Demand Pumps vs. Dumb Pumps

- What's the difference, and when to use one vs. the other?
 - On Demand pump



Dumb pump

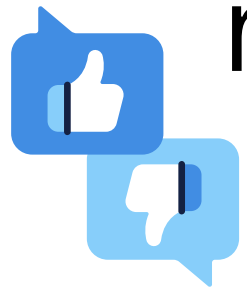


Above Ground Pump Pros/Cons



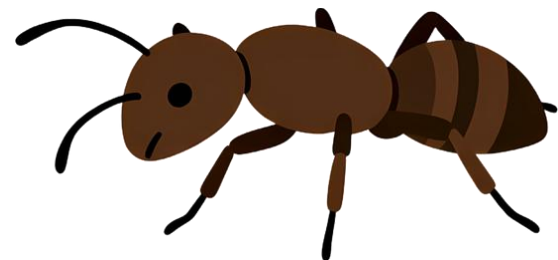
Pros

- Easy access, priming, trouble-shooting, pressure settings, repairs, swap-outs



Cons

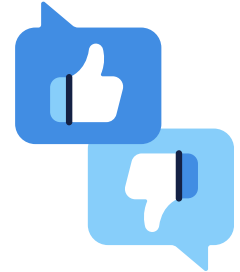
- Freezing, tampering, ants, failing pressure tanks, inability to stay primed



Submersible Pump Pros/Cons

Pros

- Tampering, out of site, freezing, push water, good for downhill tanks, insects





Cons

- Access, pressure setting (controllers), repairs, swap-outs, pressure tank placement
 - **Pro Tip:** Use camlocks or unions
 - No need to be a scuba diver



Which Voltage Should I Use?

- 115V  220V
 - 110V vs 115V? 208 vs. 240V?
 - 115V receptacles are more common & easily accessible in the U.S.
 - 220V uses less amperage, is more efficient, and is typically needed for pumps that move more water at higher pressure.
 - 1 Phase Wiring L1, L2 or N, 

Single Speed vs. Constant Pressure/Variable Speed (VFD)

- What's the difference, and when do I use one vs. the other?
 - Single speed pumps
 - VFD pumps



Do I Need a Pressure/Expansion Tank?

- How it works ($\frac{1}{3}$ to $\frac{1}{2}$ is water)
- Well, single speed, Jet pumps (pressure sensors/switches)
- Limit pump cycling
- Determine air pressure setting
- Single speed vs. VFD pumps
- Thermal expansion



Get the lay of the land



- Where will the pump be positioned
 - Downhill from the house in a pump house next to the tank?
 - Uphill from the tank?
 - Inside the tank?

Get the lay of the land



- How far will the pump be from the point of use?
- How many linear feet?
- What's the elevation difference?
- Is the house 2 story?

Mansion or cottage?



- How big is the house?
 - How many people live there?
 - Everyday home or a get-away?
 - High flow, walk-in rainhead showers?
 - Irrigation system running during the day?

Size and Type of Pipe?

- SCH40 PVC vs. PEX



What is Friction Loss & how do you calculate it?

**FRICITION LOSS CHARACTERISTICS
PVC SCHEDULE 40 IPS PLASTIC PIPE
(1120, 1220) C = 150
PSI loss of 100 feet of tube (PSI/100 FT)**

**Sizes 1/2" thru 6"
Flow GPM 1 thru 600**

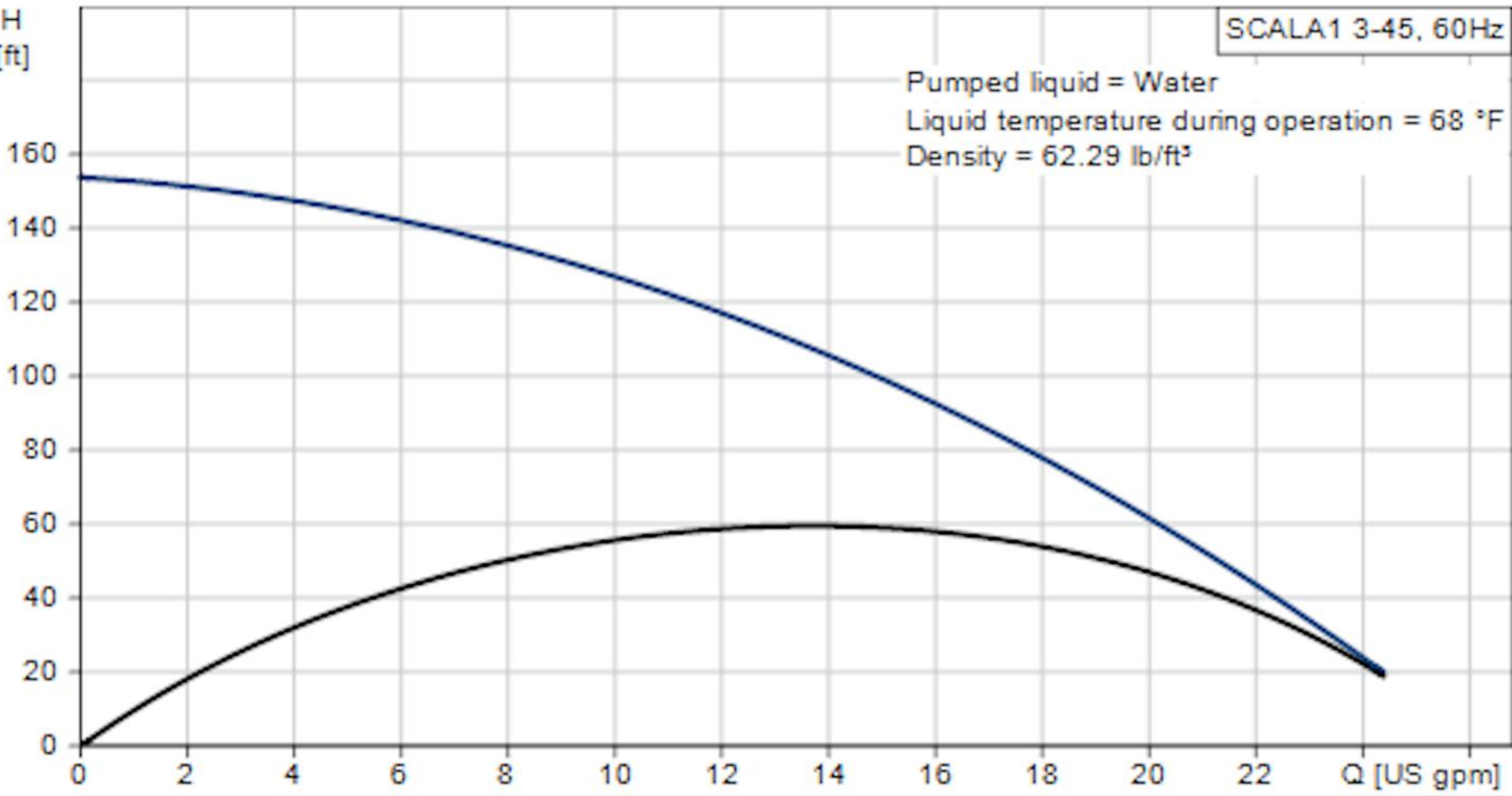
SIZE	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"						
OD	0.840	1.050	1.315	1.660	1.900	2.375						
ID	0.622	0.824	1.049	1.380	1.610	2.067						
WALL THK	0.109	0.113	0.133	0.140	0.145	0.154						
FLOW G.P.M.	VELOCITY F.P.S.	P.S.I. LOSS	VELOCITY F.P.S.	P.S.I. LOSS	VELOCITY F.P.S.	P.S.I. LOSS	VELOCITY F.P.S.	P.S.I. LOSS	VELOCITY F.P.S.	P.S.I. LOSS	VELOCITY F.P.S.	P.S.I. LOSS
1	1.05	0.43	0.60	0.11	0.37	0.03	0.21	0.01	0.15	0.00		
2	2.11	1.55	1.20	0.39	0.74	0.12	0.42	0.03	0.31	0.02	0.19	0.00
3	3.16	3.28	1.80	0.84	1.11	0.26	0.64	0.07	0.47	0.03	0.28	0.01
4	4.22	5.60	2.40	1.42	1.48	0.44	0.85	0.12	0.62	0.05	0.38	0.02
5	5.27	8.46	3.00	2.15	1.85	0.66	1.07	0.18	0.78	0.08	0.47	0.02
6	6.33	11.86	3.60	3.02	2.22	0.93	1.28	0.25	0.94	0.12	0.57	0.03
7	7.38	15.77	4.20	4.01	2.59	1.24	1.49	0.33	1.10	0.15	0.66	0.05
8	8.44	20.20	4.80	5.14	2.96	1.59	1.71	0.42	1.25	0.20	0.76	0.06
9	9.49	25.12	5.40	6.39	3.33	1.97	1.92	0.52	1.41	0.25	0.85	0.07
10	10.55	30.54	6.00	7.77	3.70	2.40	2.14	0.63	1.57	0.30	0.95	0.09
11	11.60	36.43	6.60	9.27	4.07	2.86	2.35	0.75	1.73	0.36	1.05	0.11
12	12.65	42.80	7.21	10.89	4.44	3.36	2.57	0.89	1.88	0.42	1.14	0.12
14	14.76	56.94	8.41	14.48	5.19	4.47	2.99	1.18	2.20	0.56	1.33	0.17
16	16.87	72.92	9.61	18.55	5.93	5.73	3.42	1.51	2.51	0.71	1.52	0.21
18	18.98	90.69	10.81	23.07	6.67	7.13	3.85	1.88	2.83	0.89	1.71	0.26
20	21.09	110.23	12.01	28.04	7.41	8.66	4.28	2.28	3.14	1.08	1.90	0.32
22			13.21	33.45	8.15	10.33	4.71	2.72	3.46	1.29	2.10	0.38
24			14.42	39.30	8.89	12.14	5.14	3.20	3.77	1.51	2.29	0.45

PSI^H
[ft]

SCALA1 3-45, 60Hz

Pumped liquid = Water
Liquid temperature during operation = 68 °F
Density = 62.29 lb/ft³

78
61
52
43
35
26
17
9



PSI

H
[ft]

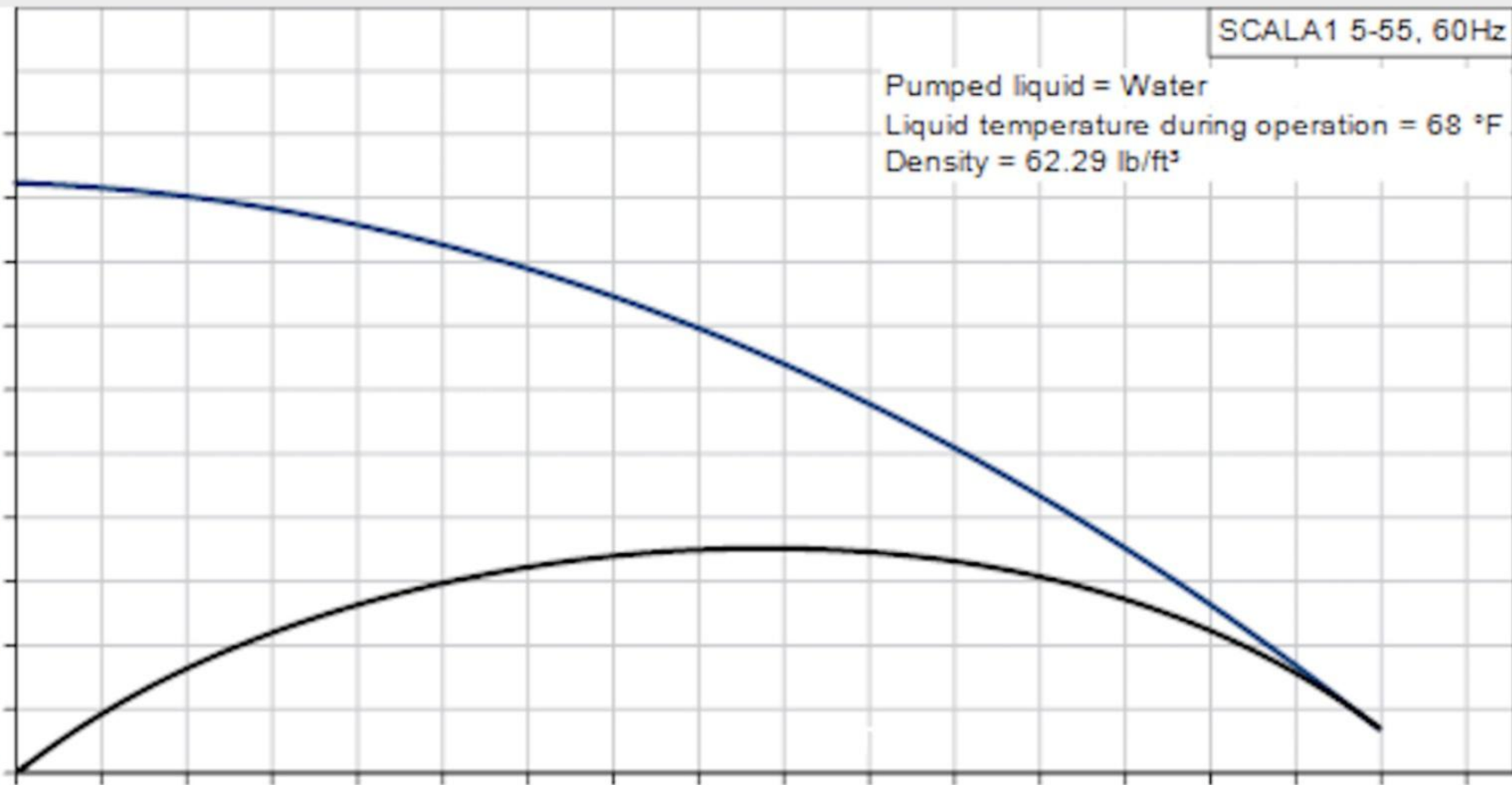
SCALA1 5-55, 60Hz

Pumped liquid = Water
Liquid temperature during operation = 68 °F
Density = 62.29 lb/ft³

78
69
60
52
43
34
26
17
8

200
180
160
140
120
100
80
60
40
20
0

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 Q [US gpm]



Sizing the UV System?



Specifications

The VIQUA Arros has been validated through microbial testing. Through this testing, performance data has been generated for UV dose delivery to inactivate *cryptosporidium*, *giardia*, *Escherichia coli* (*E. coli*), and fecal coliform.



**Arros 9 –
IHS10**

**Arros 9 –
IHS12**

**Arros 15–
IHS10**

**Arros 15 –
IHS12**

**Arros 15 –
IHS22**

**Arros 22 –
IHS22**

Flow rates¹ (@ 95% UVT)

U.S. Public Health 16 mJ/cm ²	17 gpm (64.3 lpm); 3.86 m ³ /hr	29 gpm (109.8 lpm); 6.59 m ³ /hr	42 gpm (159 lpm); 9.54 m ³ /hr
VIQUA Standard 30 mJ/cm ²	9 gpm (34.1 lpm); 2.0 m ³ /hr	15 gpm (56.8 lpm); 3.41 m ³ /hr	22 gpm (83.3 lpm); 5.0 m ³ /hr
NSF/EPA 40 mJ/cm ²	7 gpm (26.5 lpm); 1.59 m ³ /hr	12 gpm (45.4 lpm); 2.73 m ³ /hr	16 gpm (60.6 lpm); 3.63 m ³ /hr

40 GPM UV without Filters



Carbon Filters cannot handle the high flow rate.

Solution: Manifold Housings in parallel





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