Domestic wells and home irrigation.

How to reduce undue wear and tear, while avoiding the expense and aggravation of pump replacement.

AKA the “Bucket Test”
• Home irrigation systems can be hard on your pump and components.
• The life expectancy of your pump is measured in cycle starts, as opposed to gallons or years.
• Low volume irrigation may be using substantially less than your wells actual output, leading to frequent cycle starts.
The solution is to design your irrigation system by determining the output at the desired operating pressure range, causing the pump to run continuously through an irrigation cycle.

It is quite simple and will extend the life of your pump, as well as conserve on electrical usage!
The “Bucket Test”
To begin, choose the intended method of water delivery to determine the operating pressure needed at the point of use.
Keep in mind that your well has a pressure switch, which turns the pump on and off, depending on that switch, your well's maximum pressure may be less than some sprinkler types require.

Pressure switches typically come preset in an on/off (psi) range of 20/40 or 30/50 though they are adjustable within a certain range.
Depending on that switch, your wells maximum pressure may be less than some sprinkler types require.
Pressure gauges can deteriorate in time. Check the accuracy of your pressure gauge by comparing to one of known accuracy. This is a good time to see what your on/off pressure is, by opening a faucet and watching gauge, as pressure tank empties and fills.
How to determine pressure/volume

• Having confirmed the accuracy of your pressure gauge, go out in the yard and open a faucet or two.
• Refer back to the gauge on the well, or better yet, attach one to the line closer to the point of use.
• Watching the gauge carefully, open or close faucets until gauge remains at the desired pressure while pump runs continuously.
• If using automatic valves, add about five psi for friction loss, to the desired pressure.
• The more fittings you have downstream of the valve, the more the friction loss.
Considerations:
• Be sure pipe, filters and valves are large enough to handle what your well produces.
• The more fittings you have, the more the friction loss.
In this example, we wanted 32 psi downstream of automatic valves for a sprinkler system using impact type sprinkler heads. Therefore our target pressure was 37 psi.

We opened two faucets fully and a third partially. The pump is running continuously and the gauge hasn’t moved for five minutes. We can now go measure the volume produced at that specific pressure.
Faucet #1
- Using a container marked in gallons and a stopwatch, measure for GPM (gallons per minute).
- Record the amount.
- Leave faucet running and go to the next.
Faucet # 2
• Repeat
Faucet #3
• Repeat
• Turn off the faucets.
• Now add the amounts from all faucets to arrive at the total volume at that pressure.
• You may need to do more than one “bucket test”, because your well will produce a different volume at a different pressure.
Helpful Hints

(aka Lessons learned the hard way)
Domestic wells and rainwater storage produce particulates that can cause automatic valves to malfunction, typically in the on position.

- Filter water **ahead** of automatic valves.
- **Standard wye filters sold in most garden centers are not designed for constant pressure and will malfunction quickly.**
- Purchase a filter that is designed for the higher/constant pressure.

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### Specifications:
- Includes convenient drain valve for flushing
- Includes durable stainless steel screen
- Replacement screens in a variety of mesh sizes available

<table>
<thead>
<tr>
<th>Part #</th>
<th>Filter Size (MPT)</th>
<th>Mesh</th>
<th>Flow (GPM)</th>
<th>Filter Area (Sq. In.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAM34</td>
<td>3/4&quot;</td>
<td>155</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>FAM34200</td>
<td>3/4&quot;</td>
<td>200</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>FAM1</td>
<td>1&quot;</td>
<td>155</td>
<td>30</td>
<td>26</td>
</tr>
<tr>
<td>FAM1200</td>
<td>1&quot;</td>
<td>200</td>
<td>30</td>
<td>26</td>
</tr>
</tbody>
</table>
• A clogged filter can negate efforts and lead to short cycling the pump.

• One solution is to position a filter on the downstream side of the filter.
Valves have a minimum operating pressure. If line pressure is below minimum operating pressure, the valve will not shut off. This can be a problem, especially if using a limited supply, such as harvested rainwater.

<table>
<thead>
<tr>
<th>Valve Series</th>
<th>DV/DVF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>Up to 110°F (43°C)</td>
</tr>
</tbody>
</table>
| Dimensions | Height: 4 1/2” (11.4 cm)  
Width: 5 1/5” (8.4 cm)  
Length: 4 3/8” (11.1 cm) |
| Electrical Specifications | 24 VAC 50/60 Hz (cycles per second) solenoid power requirement:  
0.30 A (7.2 VA) inrush current; 0.25 A (5.5 VA) holding current  
Solenoid coil resistance: 38 Ohms |
| Flow Range | 0.1 to 22 GPM (0.05 to 5.0 m³/h; 0.01 to 1.39 l/s). For flows below 5 GPM (0.75 m³/h; 0.21 l/s) or any Xenigation® application, use a 200 mesh filter installed upstream. |
| Operating Pressure | 15 to 150 psi (1.0 to 10.4 bar) |
Observe **pressure** and **filtration** requirements for the materials you are applying.

(And right side up is always a good idea too.)

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**Specifications:**
- Warranty: 6 months
- Pressure Range: 4-15 PSI
- Filtration Requirements: Minimum 155 mesh recommended
- Installation: Blue Stripe Up

<table>
<thead>
<tr>
<th>Part #</th>
<th>Emitter Spacing</th>
<th>Flow</th>
<th>Max Row Length</th>
<th>Flow per 100' @ 8 PSI</th>
<th>Max Row Length w/ LSB Fitting</th>
<th>Roll Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TA1508LSR</td>
<td>8° OC</td>
<td>Low</td>
<td>700 ft.</td>
<td>20 GPH</td>
<td>380 ft.</td>
<td>1,000 ft.</td>
</tr>
<tr>
<td>TA1508HSR</td>
<td>8° OC</td>
<td>High</td>
<td>460 ft.</td>
<td>40 GPH</td>
<td>200 ft.</td>
<td>1,000 ft.</td>
</tr>
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</table>
Designing or remodeling your irrigation system to match your well.

- Similar products, by various manufacturers, will have different flow rates and operating pressures.
- Match materials to your situation.
Example: Installing lawn sprinklers.
I will need 4- ¼ circles, 2- ½ circles and 2- full circles, with 15 foot radius.
Well produces 10 gallons per minute at 30 psi (after the valves).
There are 3 manufacturers providing performance data for sprinkler nozzles.
By manufacturer, the total gpm for the lawn is calculated.

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>4- ¼ circles</td>
<td>@ 1 gpm= 4</td>
<td>@1.25 gpm= 5</td>
<td>@1.13 gpm= 4.52</td>
</tr>
<tr>
<td>2- ½ circles</td>
<td>@ 2 gpm= 4</td>
<td>@ 2.5 gpm= 5</td>
<td>@ 2.26 gpm= 4.52</td>
</tr>
<tr>
<td>2 full circles</td>
<td>@ 4 gpm= 8</td>
<td>@ 5.0 gpm= 10</td>
<td>@ 4.52 gpm= 9.04</td>
</tr>
<tr>
<td>Total gpm</td>
<td><strong>16</strong></td>
<td><strong>20</strong></td>
<td><strong>18.08</strong></td>
</tr>
</tbody>
</table>

Total for manufacturer B is best match, being easily divisible by 10 gpm. This will give us 2 equal zones. Seldom does it work out as perfectly as this example. The main idea is save on cycle starts and the 20psi pressure fluctuations that come with them.

Hints:
- Calculate/implement slightly higher or lower pressures, as long as they are in an acceptable range.
- Adjust the size of turf or garden area.
Flat soaker - used on garden beds

- Pressure Range: 4-15 PSI
- Filtration Requirements: Minimum 155 mesh recommended
- Installation: Blue Stripe Up

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<td>Low</td>
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<td>380 ft.</td>
</tr>
<tr>
<td>TA1508HSR</td>
<td>8' OC</td>
<td>High</td>
<td>460 ft.</td>
<td>40 GPH</td>
<td>.67 GPM</td>
<td>200 ft.</td>
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</table>

My well produces 12 GPM (gallons per minute) at 22 psi in the well house.

12 gpm = 720 GPH (gallons per hour).

The TA1508LSR (low flow with drippers 8 inches apart) uses 20 GPH per 100 feet at 8 psi.

720 divided 20 = 36

I need 36 x 100 feet of the soaker on a garden.

Here with my heavy soils, I use the low flow. In sandier soils, the high flow is preferable.

In my raised beds, I place soakers 12 to 16 inches apart, depending on the crop.

On the long garden rows, I place 2 to 3 soakers, again depending on the crop and spacing.

For a single row, such as okra or melons, I place soakers close to seeds and then spread as plants root systems grow out from center.
It worked!

With 3600 feet of soaker installed, the pressure at the well is running a steady 22 psi.

Out in the garden, pressure on the header line is holding steady at 8 psi.

Note: For reading low pressures a special gauge with lower scale is helpful.
Shopping

• Read the label! Not all brands are compatible with one another.
• Color codes vary by manufacturer. One brand’s red emitter may be 2 gph, while another brand is ½ gph.
• When purchasing irrigation components, check for flow rate and pressure.
• If information is not available, move on.
• Don’t mix vastly differing components on the same valve.