

SURGE VALVES

Phases of Furrow Irrigation

1. Advance Cycle – The phase in which the dry furrow is wetted. This cycle creates multiple pluses down the field.
2. Out Time – The time required for water to reach the end of the furrow.
3. Soaking Cycle – The phase in which the required application depth is infiltrated. This is a single pulse, with each pulse reaching the tail ditch.
4. Soaking Time – The time it takes the required application depth to infiltrate.

Cracking Clay Soil Setup:

When programming the advance cycle of the Star controller for a clay soil types, producers need to refer to the Phaucet or Pipe Planner printout for the time required to apply 3 acre inches and set the advance cycle accordingly.

For example, if the printout says that 22 hours are required to apply 3 acre inches, the advance cycle would be set for 22 hours. After setting the advance cycle time producers need to adjust the total number of cycles per side for the valve to complete. It is recommended to subtract two cycles from the value displayed on the controller, but never less than a total number of 3 cycles. Press the “custom” tab, lets say the controller displays 6 cycles per side, use the down arrow key to subtract 2 cycles from the number of cycles per side (#cycles/side). The display should display 6-2 (or 4 cycles per side) Never use less than 3 cycles per side, so if the controller displays 4 cycles per side, do not subtract the recommended two, use 4-1. (3 cycles per side) Please see example:

Surge Valve Star Controller Recommendations for Clay Soils

It is recommended that the number of cycles per side equals the default setting minus two. The total cycles per side should never be less than three.

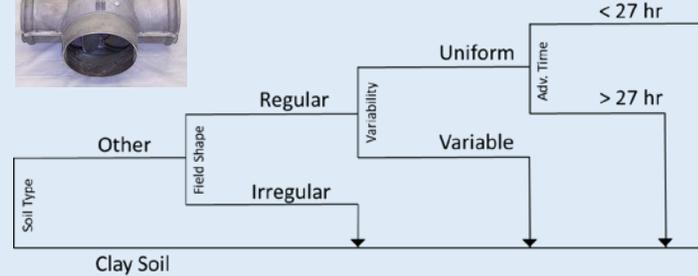
Advance Setting Input by user	Default Cycles/Side Setting Under Custom tab	Custom Cycles/Side Recommendation use down arrow to adjust Total
5	4	4-1 (3) Total
10	5	5-2 (3) Total
15	6	6-2 (4) Total
20	6	6-2 (4) Total
30	6	6-2 (4) Total

Sealing Soils / Silt Loam / Sandy Loam Setup:

1. Determine the Out Time from past experience.
2. Set the Advance Cycle to ½ of the Out Time + one hour. For example, if you have a field that has historically required 24 hours to get the water across and you now have this same field set up with a surge valve, the Advance Cycle would be set to 13 hours.
3. It is critical that the time required for water to actually reach the tail ditch be recorded. Any adjustments to the Advance Cycle of the surge valve need to be made before the Soaking Cycle begins. You made need to add or subtract time from the original settings of the Advance Cycle. If you miss this timing, adjustments can only be made after the completion of the Soaking Cycle.
4. The Soaking Time or completion time can be found on your PHAUCET printout. If PHAUCET requires 20 hours to apply 3 acre inches on each set, then the total system run time is 40 hours before you shut the system and well off. It is equally important to adjust the Soaking Time, if the single pulse is falling short of the tail ditch, time should be added, if the single pulse is putting water in the ditch, time should be subtracted.



6" if ≤ 700 gpm
 8" if ≤ 1200 gpm
 10" if ≤ 2000 gpm
 12" if ≤ 2600 gpm



Flow Estimates for Holes in Irrigation Tube - Gallons Per Minute (GPM)

Pressure In Feet (see below)	Hole Size — Inches																						
	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"	7/8"	1 1/8"											
0.5	0.6	0.9	1.3	1.7	2.3	2.9	3.5	4.3	5.1	6.0	6.9	7.9	9.0	11.4	14.1	17.1	20.3	23.8	27.6	31.7	36.1	43.4	
1.0	0.8	1.3	1.8	2.4	3.2	4.0	5.0	6.0	7.2	8.4	9.8	11.2	12.8	16.1	20.0	24.1	28.7	33.7	39.1	44.9	51.0	61.3	
1.5	1.0	1.5	2.2	3.0	3.9	4.9	6.1	7.4	8.8	10.3	12.0	13.7	15.6	19.8	24.4	29.5	35.2	41.3	47.9	54.9	62.5	75.1	
2.0	1.1	1.8	2.5	3.5	4.5	5.7	7.1	8.5	10.2	11.9	13.8	15.9	18.0	22.8	28.2	34.1	40.6	47.6	55.3	63.4	72.2	86.7	
2.5	1.3	2.0	2.8	3.9	5.0	6.4	7.9	9.5	11.4	13.3	15.4	17.7	20.2	25.5	31.5	38.1	45.3	53.3	61.8	70.9	80.7	97.0	
3.0	1.4	2.2	3.1	4.2	5.5	7.0	8.6	10.4	12.4	14.6	16.9	19.4	22.1	28.0	34.5	41.8	49.7	58.3	67.7	77.7	88.4	106.2	

* Adapted from USDA NRCS Information

Recommended PolyPipe Size and Pressure

Pipe Size	Diameter (in)	Thickness (Mil)	Length	Flow Range	Optimum Hd. Press.
10x10	10	10	1320	317 - 635	1.5 - 3.0
12x10	12	10	1320	650 - 950	1.5 - 3.0
15x10	15	10	1320	950 - 1850	1.5 - 3.0
18x10	18	10	1320	1850 - 2775	1.5 - 3.0
22x10	22	10	1320	2775 - 4755	1.5 - 3.0
12 Trans	12	15	660	635 - 1745	2.5 - 5.0
15 Trans	15	15	660	1750 - 3175	2.5 - 5.0
18 Trans	18	15	660	3175 - 4750	2.5 - 5.0

Recommended Furrow Flow Rates

Short Run (<1200ft)	Long Run (1200+ft)
Clay Silt Loam 15-25 GPM	Clay Silt Loam 25-35 GPM
Clay Silt Loam 3-6 GPM	Silt Loam 6 GPM

Ideal set time for 3 ac-in applied is 24 hrs. For sealing silt loam soils, ideal set time is 24-36 hrs, but no more than 36 hr/set. In addition, clay fields with long runs down furrow are excellent Surge Valve candidates. Sealing soils with a history of low infiltration and fast out-times should be considered for Surge also.

