VARIABLE RATE ACID INJECTION SYSTEM

VERDEGAAL BROTHERS, INC.®

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PLACEMENT OF ACID PROBE FOR INJECTING SULFURIC ACID

Grower to provide labor for digging trenches

On typical installations, the acid injection probe is placed downstream of filters and flow meter. This is so there is no potential long term damage to the filters and associated equipment. An exception is when the water quality is so bad that it is justified to inject upstream of the filters to keep them clean and operational.

Access for the probe is a ¾ threaded hole. If installing a new system, it is helpful to have the irrigation company pre-install a ¾ inch Tee into the PVC pipe. Put a threaded plug into the threaded hole until the installation is made. Otherwise, Verdegaal Brothers will drill a ¾ inch hole into the PVC and tap the threads.

If the manifold is PVC the probe is installed above ground, where it can be easily seen and accessed for service. If the decision is made to mount the probe into metal, the grower is asked to have a welder create the ¾ inch port prior to installation. If the manifold is metal or stainless steel. It is recommended to install the probe is below the underground flange fitting, and into PVC.

The problem with installing the probe into metal is that, eventually, a plume of sulfuric acid will cause one side of the wall downstream to deteriorate. This is due to the corrosive nature of concentrated sulfuric acid before it is thoroughly mixed in water.

The drawback of underground placement is that it cannot be observed for leaks or accessed for servicing. Often it is not accessed until after there is a puffing up of the ground from leaking sulfuric acid. The solution is to take a short section of approximately 10 to 12 inch diameter PVC pipe, and cut out a three inch lengthwise section. Install the pipe when backfilling the hole. Next, install a Kristie box or some sort of lid over the vertical pipe. This will allow simple observation of the probe and easier access than excavating the site to get to the probe for replacement.

Once installed, do not disturb the hose. When not injecting, the hose will have approximately 15 psi of acid. When the pump is running, the pressure will be greater than the pressure in the water line. If an acid hose needs to be relocated or replaced, please contact Verdegaal Brothers.

Preferred site if metal pipe manifold

For new installations, a 3/4 inch threaded port is needed to insert the acid injection probe.

Photo on left is of an above ground installation.

115 volt

Grower's electrician to provide:

- Fuse disconnect
- 115 volt non GFI plug
- 2 minute delay
- 15-30 amp plug wired to the same circuit as the irrigation well or booster pump

OR

220 volt

Install by Verdegaal Brothers preferred electrical contractor.

- 30 amp fuse disconnect junction box
- 3 kva Delta Wye transformer

Transformer and fuse disconnect are to be mounted on the grower's electrical backboard. Buried conduit, with 220 volt 3-phase service is to be brought to one of the pump backboard posts.

For existing Verdegaal Brothers systems, exchange the 115 volt fixed RPM 1/3 hp motor for a 220 volt 3 phase variable RPM motor, to be done by Verdegaal Brothers.

If a certificate of from California State Board of Equalization partial exemption is on file with Verdegaal Brothers, sales tax can be reduced to 2% for California growers. New customers are required to complete a credit agreement.

DESCRIPTION

GROWER RESPONSIBILITIES

The grower would need to contract an irrigation company or use their own backhoe and/or labor, to trench along the water discharge pipe. The trench must pass at least one elbow downstream of where the sulfuric acid is currently injected.

The grower or irrigation company will need to tap a 1/2 inch connection into the side of the irrigation pipe, and bring a 1/2 inch schedule 40 PVC line back along the irrigation pipe, in the exposed trench. The 1/2 inch line will terminate on the side of the newly installed stand. If desired, Verdegaal Brothers can install the 1/2 inch tap and the 1/2 inch line.

It is important that the 1/2 inch tap be made far enough downstream so the acid is uniformly distributed in the water pipe by the time the sensor stream of water is collected.

The grower would need to contact an electrician (at grower expense), to install the 30 amp fuse disconnect junction box and the 3 kva transformer, mentioned above, on the electrical panel backboard. Buried electrical conduit with 220 volt 3 phase electrical would need to be trenched to the other post of the newly installed stand. The electrical line will terminate with a 220 volt junction box on the side of the post.

A reliable hand held pH meter should be used to occasionally check the pH of the treated water to confirm the automated LED pH reading.

During freezing temperatures in winter, the sensor should be removed, brought indoors and sensor tip stored in storage solution.

VERDEGAAL BROTHERS RESPONSIBILITIES

For existing installations, Verdegaal Brothers would come on-site and replace the single pump post mount with a two post mount for both enclosures.

The controller box needs to face to the north. This minimizes sun glare on the LED pH readout on the face of the box. A metal shade cover can be installed above the enclosure to help reduce the temperature around the electronics.

If it is a new installation at the site, an acid injection system and field storage tank are also required.

After these two pre-installation operations are completed, Verdegaal Brothers will install the variable rate injection equipment, mounting the box directly above the sulfuric acid injection pump. The existing constant RPM electric motor would be replaced with a variable RPM motor. P trap for the 1/2 inch water line would be installed on the back side of the back board. The return line for the 1/2 inch stream of water would need to be diverted, based on where the grower decides is best. The P trap is where the pH sensor is installed.

The pH sensor will need to be replaced approximately every two years, at an approximate cost of $450. Manufacturer warranty is six months on pH sensor.

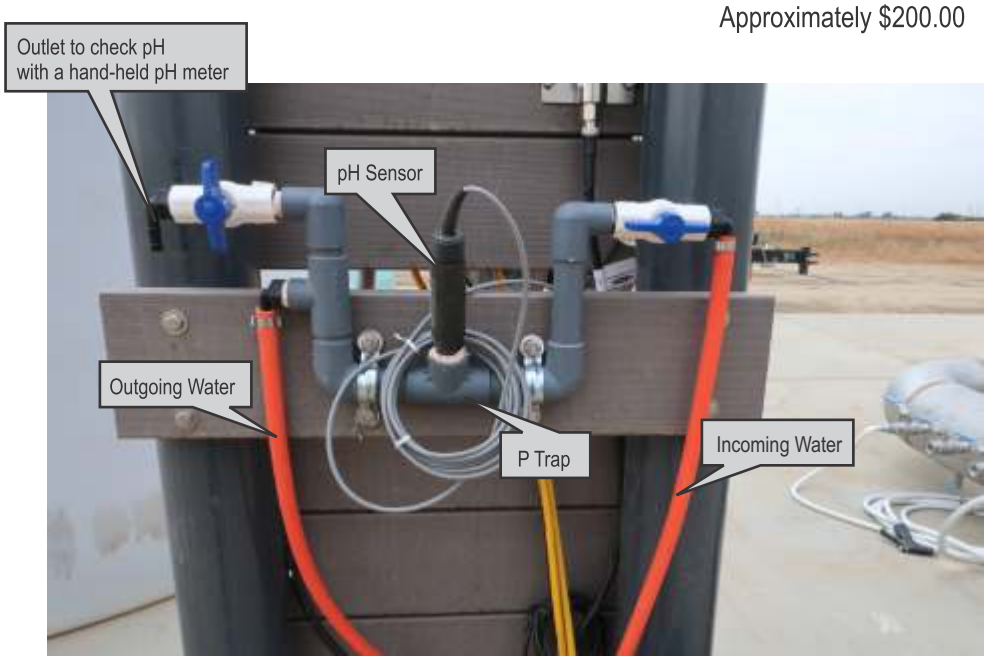
A Verdegaal Brothers technician is available to do a site pre-install visit to go over the preliminary work and discuss the new installation at the site.

The grower or irrigation company will need to install a 1/2 inch PVC line, from at least one but preferably two elbows downstream of the point of injection of acid.
Tap to be on the side.

This water stream goes to the pH sensor for detection.

Downstream water from the P trap needs to go back into the irrigation system reservoir or back flush

Optional shade for enclosure
Approximately $200.00



ELECTRONICS

115 Volt

220 Volt

View of the variable rate controller, with Emerson variable frequency control

LED light on top of box is normally set to go on if pH goes up to 8, or down to 6. These set points can be programmed to different pH levels

Verdegaal Brothers will install the two posts and backboard.

Boxes on backboard to face to the north, to eliminate light glare on the LED readout.

The grower must install (or have contractor install)

- 1/2" PVC line to one of the posts, terminating with a valve.

Occasionally growers will also use a second larger diameter PVC pipe so they can fill a tank for spray water because it has been pre-treated to a lower pH

- Electrical code typically requires buried electrical conduit to be 24 inches deep.

pH METERS AND SUPPLIES

Verdegaal Brothers maintains a small inventory of hand held pH meters. Minor repairs of some portable meters can be done by Verdegaal Brothers' staff.

Quart bottles of Sensor Storage Solution,
4, 7, and 10 buffer solutions
$20/quart

Box of 100 pH indicator strips generally accurate to pH of 0.5
$20

Options for variable rate systems include:

- Second pH sensor for measuring upstream water pH.
- Tank level ultrasound sensor to measure liquid level in tank.
- Data logger for recovering information, typically every 15 minutes.
- Data is uploaded to a thumb drive for putting into an Excel © document

https://demo.sensonix.net/login.aspx

Optional Wifi is available to send monitoring data by line-of-sight

Antenna for transmitting WiFi data

Line Voltage	24.232	
PH Meter	5.8786	PH
Tank Level	905.4462	Gallons

VERDEGAAL BROTHERS, INC.®

13555 S. 11th Avenue / Hanford, CA 93230
Ph. (559) 582-9205 • Fax (559) 582-4274 • Toll free: 888-742-8728
www.verdegaalbrothers.com • verdegaal@verdegaalbrothers.com

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