Series LFOV
Sulfuric Acid H_2SO_4 Feed Systems

The Hydro Instruments Series LFOV Vacuum Feed Systems for Sulfuric Acid *(H_2SO_4)* provides reliable automatic delivery into a water stream. This system brings the reliability, low maintenance, and simplicity of a vacuum system to the delivery of Sulfuric Acid solutions. Systems can be used to feed up to 98% concentration Sulfuric Acid.

Principle of Operation

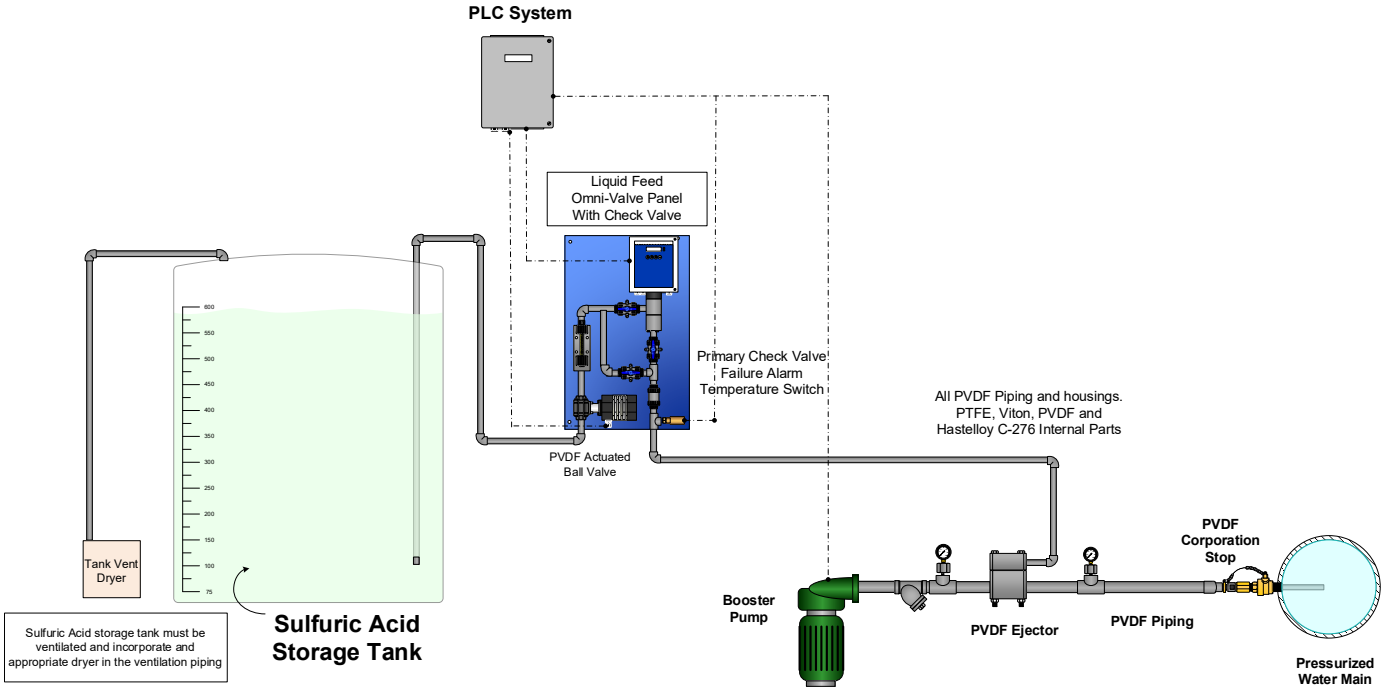
Water flow supplied to a Venturi nozzle in the Hydro Instruments ejector assembly creates a vacuum which draws the Sulfuric Acid from the storage drum. Feed rate is controlled with a v-notch and visually monitored with a chemical flow meter tube and controlled with a valve. Two check valves and a positive shut off with a PVDF ball valve all serve to prevent backflow of water into the storage drum. Temperature and pressure devices are recommended to give early detection of primary check valve failure.

The Omni-Valve includes a self flushing feature where it can be set to periodically move to full open position and return to feeding position. This helps to prevent clogging of the v-notch.

Reliability & Safety of Vacuum Feed Systems

- Chemical flows under vacuum to avoid pressurized chemical leaks.
- Provides visual indication of actual chemical feed rate
- Simplified piping and reduced number of components/connections for low maintenance.
- Automatic feed rate control and sell flushing feature for stable feed rate control

Sulfuric Acid vacuum liquid feed system



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Sulfuric Acid Storage Tanks and Safety Considerations

Sulfuric Acid is delivered and fed with concentrations as high as 93% to 98%. Sulfuric Acid does not tend to off gas, but when sulfuric acid (H_2SO_4) reacts with water, it releases a significant amount of heat in a highly exothermic reaction. For this reason, storage tank vents must be fitted with appropriate dryers to prevent water entering through condensation and system design must prevent the possibility of water back flooding through equipment into the storage tank. To ensure avoidance of water back flooding, the system is designed with two check valves. An additional positive shut off electronic ball valve between the storage container and the feed control panel can also be added.. Piping and feed line components are of PVDF construction in order to withstand possible high temperatures and chemical corrosion. It is to be expected that heat will be generated inside the ejector where the water is mixing with the Sulfuric Acid and ejector water flow rate should be sufficient to minimize temperature increase in the ejector and downstream solution piping.

Consult Hydro Instruments and our LF Material Resistance Guide document for more information.

Liquid Vacuum Feed System Operation & Control

Commencement of feeding: When feeding of Sulfuric Acid is to begin, the PLC must first turn on the booster pump so that the ejector will create the required suction followed by opening the optional electronic ball valve to allow feeding of Sulfuric Acid. 4-20mA (or Modbus RS-485) signals are to be transmitted to the Hydro Instruments Omni-valve to control Sulfuric Acid feed rate using either in proportional, pH set point, or compound loop control method. The Omni-valve will provide feedback of current feed rate based on v-notch position and linearization.

When Sulfuric Acid feed is to be stopped: then the optional electronic ball valve (shut off valve) should be closed, then the booster pump is to be turned off (stopping the vacuum). During shut off there will be no vacuum production in the ejector and the check valves will be relied upon to prevent water back flowing into the equipment. It will be important to perform preventative maintenance on check valves as needed to keep them in good operating condition. If the electronic ball valve is closed first and the booster pump afterward, then this process can drain the feed equipment of sulfuric acid and minimize the concern of water back flooding past one or both check valves.

Check Valve failure monitoring method to guide preventative maintenance

A suitably protected temperature switch is to be used to detect failure of the primary ejector check valve (during times when the system is shut down and not feeding).

This temperature switch will be mounted at the LFOV feed panel outlet to detect and alarm for temperature increase which would indicate that water is getting back past the ejector check valve and generating heat due to reaction with sulfuric acid. If any such alarm is detected, then the check valves must be serviced promptly.

System PLC ON/OFF Control

A dedicated PLC or SCADA system is required to ensure that the ejector booster pump and chemical shut off electronic ball valve operation is synchronized properly.