

[KOSCN Valves × Precious Metal Recycling] Automated Acid Dosing Solution with Precision Flow Control

Background

According to a report by MarketsandMarkets, the global high-purity acid market is experiencing steady growth. The high-purity sulfuric acid segment alone is projected to grow from USD 500 million in 2025 to USD 670 million by 2030, with a compound annual growth rate (CAGR) of 6.1%. With increasing demand from industries such as new energy, electronic chemicals, and precious metal recycling for the precise handling of highly corrosive acids, manufacturing processes are facing stricter requirements for flow stability, material resistance, and automation control capabilities.

In particular, for mixed acid dosing applications, traditional manual valve control often fails to meet the required standards for dosing accuracy and real-time responsiveness. This can result in raw material waste, ratio errors, and higher process risks. In this article, we will share how KOSCN's pressure regulators, fine adjustment valves, and pneumatic on/off valves are integrated into a "Mixed Acid Dosing System for Precious Metal Recycling," delivering a corrosion-resistant, automated, and precisely controlled fluid transfer solution.

What is a Mixed Acid Dosing System?

Mixed Acid Dosing System is a control system designed to proportionally mix and deliver various acids (such as nitric acid, sulfuric acid, hydrofluoric acid, etc.) into industrial processes.

To prevent overdosing or human error, modern mixed acid dosing systems are increasingly adopting automation, modularization, and remote monitoring. Due to the highly corrosive and reactive nature of mixed acids, all system components must exhibit excellent acid resistance, sealing performance, and operational stability. The core objective is to enhance process safety and stability while reducing operational risks and maintenance costs.



Current State & Challenges

Real-World Application – Jin Zheng Long Precious Metal Recycling

In the precious metal recycling process, the client needs to mix nitric acid and sulfuric acid in specific proportions, then dose the mixture into a reaction tank to dissolve impurities and extract recoverable metals such as gold plating. The previous system relied on manual valves, pressure gauges, and level meters for control. This setup resulted in large operational errors, delayed reaction times, and frequent overdosing due to unstable acid dosing, increasing raw material costs and process risks. The client sought to implement an automated transfer solution that is corrosion-resistant, capable of precise pressure regulation, and fully integrable with a PLC control system to improve operational efficiency and safety.

Current Situation	Details / Description	Impact
Current Setup	Manual valve + pressure gauge + level meter to control acid dosing	Slow reaction speed, unstable acid dosing accuracy, leading to higher raw material costs
Acid Properties	Mixed acid (nitric + sulfuric) with high corrosiveness	Easily causes valve and pipeline wear, increasing maintenance frequency and risk of downtime
Operation Method	Relies on manual valve operation and visual measurement by personnel	Inaccurate acid dosing timing, making reaction conditions difficult to reproduce, affecting product quality
Control Interface	No PLC connection or real-time flow control	Unable to automatically stop dosing or trigger abnormal alarms; no data logging for flow and operational records

Improvement Goals

1. Stabilize inlet pressure to prevent flow fluctuations caused by acid pressure changes
2. Control acid dosing timing and volume with full PLC integration for automated operation
3. Enhance valve corrosion resistance to reduce wear and extend equipment lifespan
4. Implement a modular system design for flexible installation and efficient future maintenance

Solution

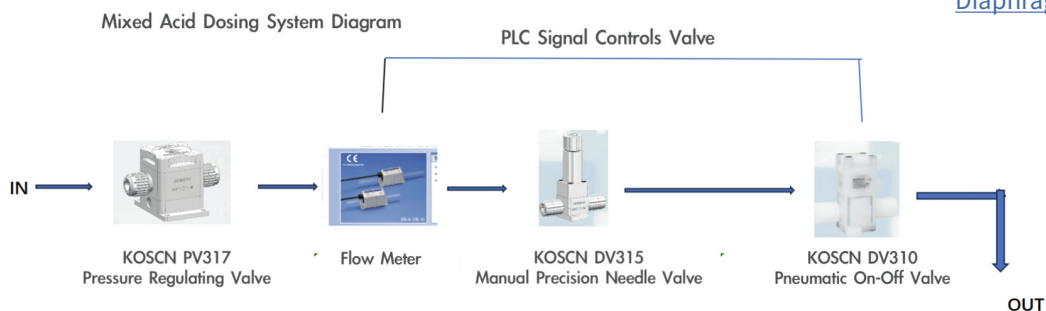
Eliminate Manual Errors and Corrosion Risks : KOSCN Valve System Enables Precise and Stable Automated Acid Dosing Control

The original manual acid dosing system faced flow instability, delays, and corrosion issues. By integrating valves, a flow meter, and PLC control, an automated dosing solution was successfully implemented.

The customer implemented the automated acid dosing system as shown in the diagram.



→ [DV310 Pneumatic Diaphragm Valve](#)



- » First, KOSCN PV317 pressure regulating valve is installed downstream of the pump to ensure stable acid pressure before entering the control unit, preventing pressure fluctuations from affecting flow stability.
- » Acid passes through the flow meter, which monitors real-time flow rate and sends data to the PLC for accurate dosing control.
- » Operators can manually pre-set the target flow rate using the DV315 precision needle valve—for example, 16 L/min—to maintain a consistent acid output.
- » Once the flow meter detects the preset volume, the PLC controller sends a signal to the KOSCN DV310 pneumatic on-off valve to shut off the flow, completing one automatic acid dosing cycle.
- » The entire system is constructed with high-corrosion-resistant PVDF material and features a compact, modular design, ensuring stable flow control and safe automation—making the overall process more precise and hassle-free.

Results

How KOSCN Valves Meet Customer Needs

Goals	QUANTM Solution Result
Stabilize inlet pressure to prevent acid pressure fluctuations from affecting flow rate	✓ Equipped with the PV317 pressure regulator featuring automatic pressure stabilization, maintaining steady outlet pressure under varying conditions. This effectively reduces dosing errors and flow fluctuations.
Control acid dosing start/stop timing, integrate with PLC for automated operation	✓ After implementation, the system pumps mixed acid with real-time monitoring via a flow meter. The flow signal is sent to the PLC, which controls valve opening/closing. Once the PLC detects that the target flow volume is reached, it instantly signals the KOSCN DV310 pneumatic on/off valve to close, achieving fully automated closed-loop dosing control. This significantly improves dosing efficiency, stability, and safety.
Improve valve corrosion resistance to reduce wear and extend equipment lifespan	✓ All components are made of PVDF material with excellent acid resistance, ensuring stable operation even with prolonged exposure to mixed acids such as nitric and sulfuric acid, effectively reducing maintenance frequency.
Implement modular system design to enhance installation flexibility and maintenance efficiency	✓ Built-in I/O and Modbus-RTU support enable direct PLC integration. Real-time feedback to SCADA for start/stop, flow, and pressure monitoring.