



AUTOMATED CHEMICAL SOLUTIONS

Chemicals and Controllers for Chemical Milling

Technical Data Sheet

ETCHpro FC-4020

Ferric Chloride Etch Controller



Description

The ETCHpro FC-4020 provides accurate and reliable control of your ferric chloride etching process through independent measurement and adjustment of the three critical control variables: ferric chloride concentration, free acid and total metal loading. Each process sensor is chosen specifically for optimum performance and maximum operating life in the harsh chemical milling process. The resulting Tri-Sensor System provides superior process capability and performance. The ETCHpro FC-4020's user friendly, easy-to-install design allows it to be readily adapted to control all conventional etching equipment systems. For increased etch rates and etch factors, use with REGENERATOR CC-4405 etch replenisher.

Features	Benefits
💡 Tri-Sensor System (ORP, Conductivity and Specific Gravity)	⊗ Optimize each control variable for specific performance requirements
💡 Toroidal (non-contact) conductivity measurement	⊗ Superior sensor performance and durability provides accurate, reliable control of free acid
💡 Multi-junction ORP electrode construction	⊗ Unparalleled accuracy and sensor life

Theory of Operation

The three critical control variables in controlling the ferric chloride etching process are ferric chloride concentration, total metal concentration and free acid concentration. The ETCHpro FC-4020 allows the user to optimize throughput, quality and operating costs according to their specific requirements through independent adjustment and control of each of the control variables.

As parts are processed, ferric chloride and acid are consumed while total metal concentration increases. The ETCHpro FC-4020 monitors process ORP, specific gravity and conductivity as indicators (manipulated variables) of ferric chloride concentration, total metal loading and free acid concentration, respectively. The ETCHpro FC-4020 replenishes REGENERATOR CC-4405 simultaneously with fresh ferric chloride to maintain ferric chloride concentration, hydrochloric acid to maintain free acid normality and water to maintain total metal concentration.

A continuous process sample loop is drawn from the spray manifold, passes ORP, conductivity and specific gravity sensors and returns to the process sump. When any of the manipulated variables is outside its specified range, the ETCHpro FC-4020 automatically delivers the appropriate replenishment chemical from its storage location (drum or bulk) directly to the process. Spent etchant is purged to the collection system automatically when process solution level reaches a predetermined height. A system of alarms and interlocks notifies process operators when replenishment chemicals or the spent drum need replacement.

Typical Operating Ranges and Tolerances

Parameter	Common ranges	Control Tolerance
Metal loading	35 – 45 Baume	± 1.5 Baume
HCl concentration	0.5 N – 3.0 N	± 0.2 N
ORP	450 mV – 650 mV	± 10 mV

System Requirements

Electrical	120 VAC, 60Hz, 20 amps
Dimensions	70" X 36" X 36" (H X W X D)
Water	1 – 5 gpm