

Automatic Twin-Jet Electropolisher

The industry standard for producing high-quality
thin foils for transmission electron microscopy



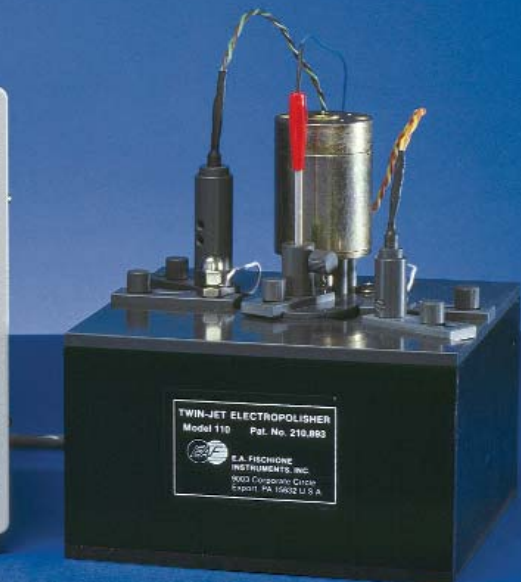
EXCELLENCE...MAGNIFIED

Automatic Twin-Jet Electropolisher

- *Twin jets simultaneously polish both sides of the sample.*
- *Electron transparent specimens within a few minutes.*
- *No induced artifacts.*
- *Electrolytic polishing or chemical etching.*
- *Easily adjustable.*
- *Electrolyte resistant materials in the polishing cell.*
- *Automatic process termination.*
- *Audible and visual shutoff alarms.*



Model 120 Automatic Power Control



Model 110 Twin-Jet Electropolisher

Electrolytic thinning of conductive materials is an effective method of producing electron transparent foils for transmission electron microscopy (TEM). By electro-chemically removing material, TEM specimens are made quickly and without any induced artifacts.

Automatic Twin-Jet Electropolisher

Quick, easy electropolishing

Fischione's Model 110 Twin-Jet Electropolisher uses two jets to direct electrolyte flow onto the specimen, simultaneously thinning and polishing both sides.

Light is transmitted from a light source on the lid of the polishing cell through fiber optics and onto the specimen. Fiber optics on the opposite side of the specimen carry light to a photocell detector.

Adjusting the sensitivity of this photocell detector varies the detection threshold of the light transmitted through the specimen, effectively determining the size of the hole created. At the time of perforation, both audible and visual alarms are activated.

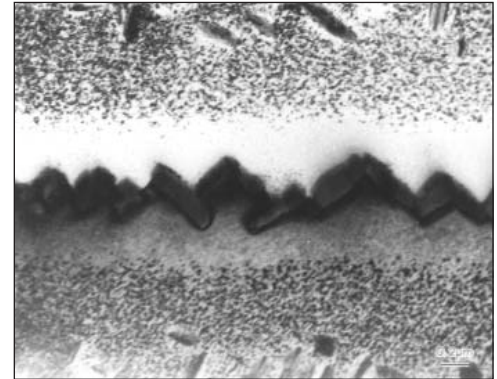
The variable flow rate pump works with the jet assemblies to provide a steady stream of electrolyte to the specimen. Cathode coils in the jet assemblies and the anodic platinum contact in the specimen holder allow current to flow through the electrolyte.

The polishing voltage and current can be adjusted at low levels to selectively dissolve metal ions from a specimen, that is, to chemically etch the specimen. Increasing the voltage until a plateau in current is reached results in electrolytic polishing. This electrochemical reaction dissolves metal ions uniformly at a controllable and reproducible rate.



Annealed Ni-Cr-Fe Alloy 600 containing high angle and twin boundaries, and isolated Cr-rich carbides. The electrolyte used was 20% perchloric acid, balance methanol, maintained at a temperature of -40°C . Voltage was set to 15VDC.

Image courtesy of J.J. Haugh and M.G. Burke, Westinghouse Electric Corporation (U.S.A.)



High-nickel content Superalloy 718 with a complex microstructure. Coarse and fine gamma double prime precipitates are found throughout the matrix. Preferential precipitation of delta precipitates occurs at the grain boundaries. A gamma-double-prime-precipitate-free zone also exists at the grain boundary. The electrolyte used was 20% perchloric acid, balance methanol, maintained at a temperature of -40°C . Voltage was set to 15VDC. The resulting current was in the range of 90 to 100mA.

Image courtesy of J.J. Haugh and M.G. Burke, Westinghouse Electric Corporation (U.S.A.)

Automatic Twin-Jet Electropolisher and Accessories

Enclosed process

The polishing cell consists of the electrolyte pump and motor, jet assemblies, specimen holder, and fiber optic assemblies (including the light source and photocell detector) mounted on a PVC lid. The lid and its components fit into an acrylic box that holds a glass dish for the electrolyte.

The specimen holder is specifically designed so that the specimen can be easily installed with a single screw-on insert firmly securing the specimen in place.

Model 110 specifications

Specimen holders	Available in standard 3mm and 2.3mm sizes Other sizes and configurations available upon request
Enclosure size	6" (152mm) W x 6.5" (165mm) H x 6" (152mm) D
Weight	3 lb (1.4kg)
Polishing range	0-120VDC; 0-100mA
Warranty	One year

Model 120 Automatic Power Control

The Model 120 Automatic Power Control provides complete electronic support for the Twin-Jet Electropolisher. It controls the electrolyte flow via the motor speed, polishing voltage circuit, light source, detection sensitivity, and photocell shutoff circuit including audible and visual indicators.

Two analog meters indicate the polishing voltage and current levels. A switch selects whether or not current is applied, enabling either electropolishing or chemical etching.

A single connecting cable links the Power Control to the Electropolisher.

Model 120 specifications

Model 120 Automatic Power Control	Contains main power switch and indicator, pump speed control, light and photocell circuit complete with sensitivity adjustment and an audible and visual alarm, voltage control circuit, and analog meters to indicate polishing voltage and current levels
Enclosure size	12" (305mm) W x 7.5" (191mm) H x 7.5" (191mm) D
Weight	12 lb (5.5kg)
Connecting cable	Contains light source, photocell, motor connection, and voltage connections
Power requirements	110/220VAC, 50/60Hz, 125 watts
Warranty	One year

Model 140 Digital Power Control



The Model 140 Digital Power Control is specifically designed for use with the Model 110 Twin-Jet Electropolisher. It controls the electrolyte flow, the polishing voltage and current, the light source and photocell shutoff circuit, and both visual and audible alarms. Digital displays allow precise setting and monitoring of the electropolishing voltage and current levels.

The photocell circuitry detects the first sign of light penetration through the specimen and activates both audible and visual alarms, independent of the position of the pump and polish switches.

A switch activates current flow and controls the light source. The amount of light required to activate the photocell shutoff can be adjusted to control the perforation size in the specimen. LEDs indicate which mode of operation is active.

Pump Auto mode. Stops the electrolyte flow when light penetrates the specimen.

Pump Continuous mode. Pump remains activated after light has penetrated the specimen and the photocell circuitry has activated the alarms. This feature allows polishing to be extended past the point of a small perforation in the specimen.

Polish Auto mode. Stops the polishing current when light penetrates the specimen.

Polish Continuous mode. The voltage remains activated after light has penetrated the specimen, allowing for continuous polishing while the switch is on.

At any time during an alarm condition, the audible alarm can be silenced. The alarm indication light remains illuminated.

Model 140 specifications

Model 140 Automatic Power Control	Contains main power switch and indicator, pump speed control, light and photocell circuit complete with sensitivity adjustment and an audible and visual alarm, voltage control circuit, and digital meters to indicate polishing voltage and current levels
Enclosure size	12" (305mm) W x 7.5" (191mm) H x 7.5" (191mm) D
Weight	9.0 lb (4.1kg)
Connecting cable	Contains light source, photocell, motor connection, and voltage connections
Power requirements	110/220VAC, 50/60Hz, 750 watts
Warranty	One year

Model 130 Specimen Punch

*Prepares high-quality
disk specimens*



A precision ground punch and die plate eliminate specimen stress and distortion. For convenient handling, a spring-loaded return plunger keeps the disk specimen on the die plate surface.

Model 130 specifications

Disk size	Available in standard sizes of 2.3mm and 3.0mm. Other sizes available upon request
Dimensions	1.0" (25mm) W x 2.5" (64mm) H x 1.1" (28mm) D
Weight	0.25 lb (115 grams)
Warranty	One year

Model 220 Low Temp Container

*For low temperature
polishing*



Use the Low Temp Container with the Model 110 Twin-Jet Electropolisher for applications at cryogenic temperatures. The electrolyte contained in the glass dish is cooled via conduction from a cooling medium such as liquid nitrogen and methanol.

Double wall, heavily insulated construction maintains temperature throughout the electropolishing process. A hole in the top plate provides access for a thermometer or thermocouple.

Manufactured entirely from electrolyte resistant materials.

Model 220 specifications

Temperature range	Room temperature to -70°C (with 50% liquid nitrogen and 50% methanol)
Dimensions	10.8" (274mm) Diameter x 6.4" (163mm) H
Weight	5 lb (2.3kg)
Warranty	One year



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Cover image: Intermetallic precipitates in thermally treated Zircalloy-4.

The electrolyte used was 20% perchloric acid, balance methanol, maintained at a temperature of -40°C. Voltage was adjusted to allow a current range of 35 to 45mA.

Image courtesy of J.J. Haugh, Westinghouse Electric Corporation (U.S.A.)