



METALTHIN Mk 4

***TWIN JET
ELECTROPOLISHING SYSTEM***



SOUTH BAY TECHNOLOGY INC.

The **METALTHIN** twin-jet electropolisher was originally developed for producing high quality thin foils from radioactive materials. It is robust, compact, economical and easy to use.

The electrolyte tank, sample holder, thinning cell and tank base stand are machined from **solid PVC** to provide maximum resistance to corrosive electrolytes. The Cell parts are held together by stainless steel screws so that the Cell is easy to disassemble.

The **METALTHIN Mk4** system incorporates the accumulated experience of many years of use in Universities, Industrial and Nuclear Research Centres and comprises Thinning Cell and Control/Power Supply plus the optional Unipump and Dewar Flask.

Thinning Cell

The thinning cell is contained in an electrolyte tank that press fits into a solid PVC base stand especially designed to collect drips of electrolyte. An additional electrolyte tank is provided for washing the cell after use.

The electrolyte is pumped from the tank into the thinning cell and jets by an impeller pump driven by a 12v dc motor. A stainless steel plate fitted to the base of the motor protects it from the corrosive electrolyte vapour. The pump motor cover is easily removed so that lead sheet may be placed around the motor to shield it from radiation, if required.

The photo-cell detector and light source plug into sockets at the ends of their respective leads. They are protected from corrosive electrolytes and ionising radiation by screw-on stainless steel housings that push-fit into the thinning cell.

Perforation can be determined by eye when the photo-cell detector is removed from the cell. This is necessary if composite specimens of 1mm discs pressed into 3mm discs are to be thinned because perforations occurring at the interface must be ignored. Such composites can substantially reduce the amount of radioactivity and magnetism because only the 1mm disc is the radioactive or magnetic specimen.

Thinning from one side only is achieved by placing a thin piece of glass over the disc. The glass is held in position during electropolishing by the screw-in portion of the disc holder.

Hazards associated with the use of inflammable/corrosive electrolytes and their disposal are reduced by the low volume of (100-220ml) of electrolyte required.

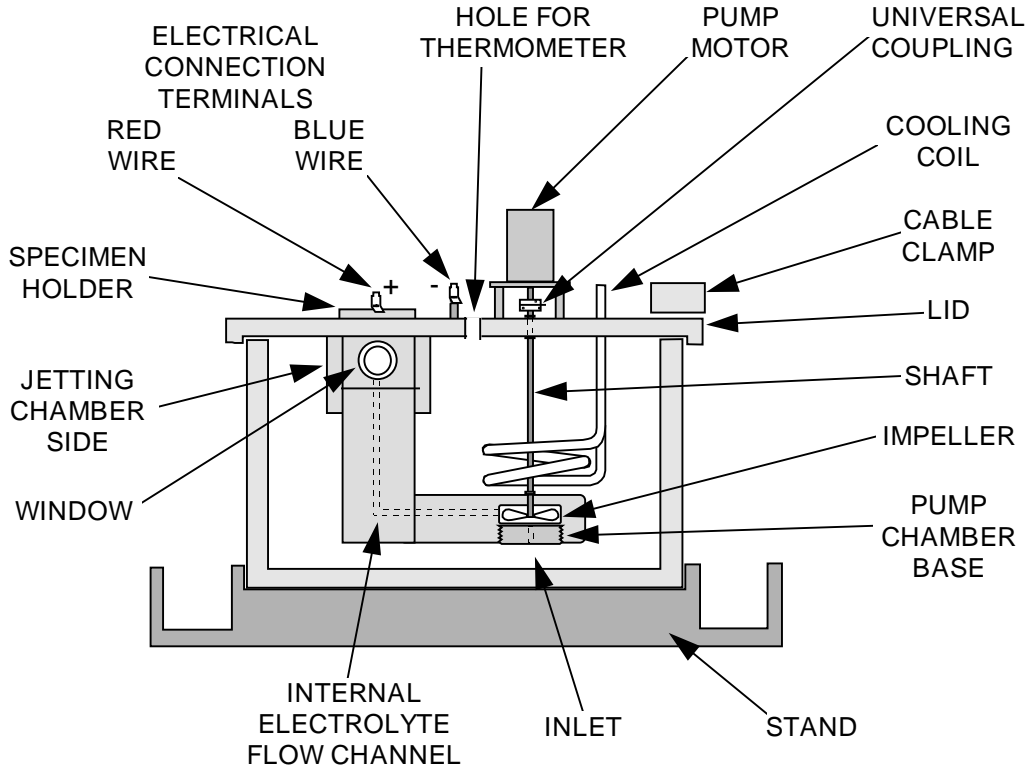
The thinning cell may be sited remotely from the power supply to protect the latter from corrosive electrolytes and radiation.

Main features

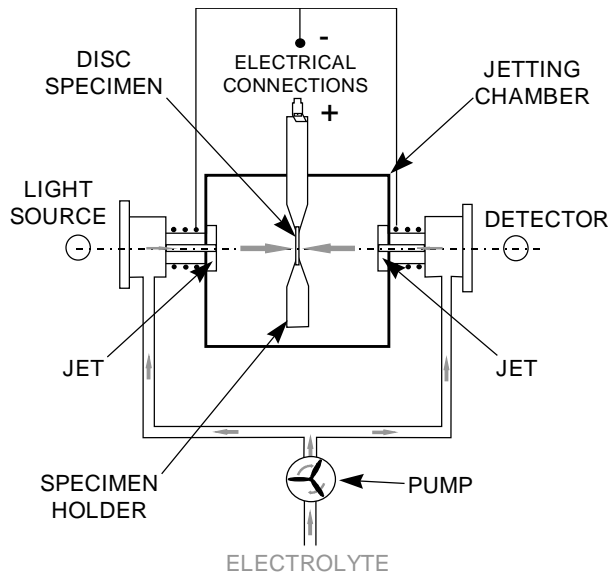
- A stainless steel cooling coil is an integral part of the thinning cell. It has three turns and the resulting increased surface area improves the cooling speed and temperature control.
- The photo-cell detector and light source plug into connectors at the ends of their respective leads.
- The photo-cell detector and light source are contained in stainless steel housings that push-fit into the thinning cell.
- A base stand that holds the thinning cell securely and collect drips of electrolyte.
- An additional electrolyte tank is provided for washing/cleaning the thinning cell.
- The impeller screws onto the pump shaft.
- Push-on electrical connections facilitate setting up and operation.
- The base of the pump motor is protected from the electrolyte by a stainless steel plate.

New feature

- Changes in the design of the specimen holder have improved the holding of thin discs at low temperatures.



Cross-section of the Metalthin Mk 4 Thinning Cell with Schematic view below



Power Supply

Completely separate from the thinning cell and cannot be operated until a key is inserted into the mains switch and turned.

The following functions of the Mk3 are retained in the **Mk4**:

- a) control of the electrolyte flow rate.
- b) control of the coolant flow rate through the internal cooling coil.
- c) control of the dc current to the electrodes.
- d) illumination of the disc and detection of perforation followed by automatic cessation of electrolyte flow and dc current.
- e) option to apply a small reverse potential i.e. cathodic protection to the disc when perforation is detected.
- f) option for an audible alarm to sound when perforation is detected.
- g) A key operated mains switch.
- h) A switch to cancel automatic tripping of electrolyte jetting so that jetting can continue after perforation without the dc current applied to the thin foil.
- i) A switch that introduces a 20% variation in the dc current. This may assist in the retention of particles in multi-phase alloys.

New features

Thinning Current Control: During the thinning process, small changes in electrical resistivity are caused by variations in the temperature of the electrolyte and by the thinning process itself. The **CONTROL CURRENT** facility automatically maintains the current that is initially set by the operator. This avoids the need to constantly monitor and adjust the setting.

The range of cell resistances to which automatic control of the thinning current can be applied are those that apply to the majority of electrolytes. If the conditions are outside the range of automatic control, the control current switch will flash to show that manual control is required.

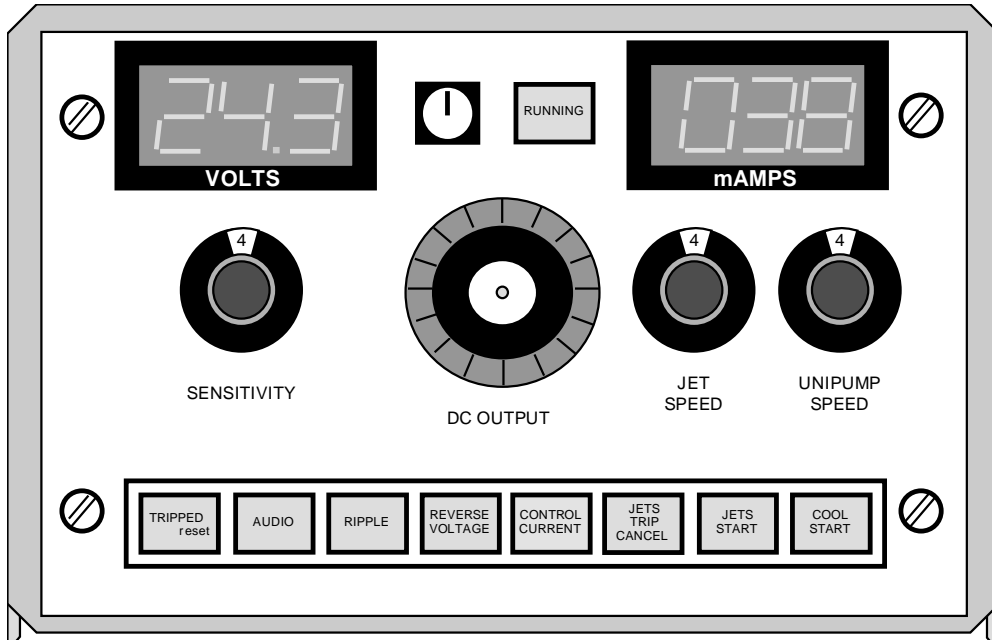
- The external case has greatly increased strength and resistance to corrosive electrolytes.
- The electrical and instrumentation leads plug into the rear of the power supply to protect the connections from accidental contact with the electrolyte.
- The push switches are arranged in a single line on the front of the power supply.
- The push switches are fitted with flexible transparent covers to protect them from accidental contact with the electrolyte.
- The voltage and thinning current are displayed digitally.

Connecting Cable - Power Supply to Thinning Cell

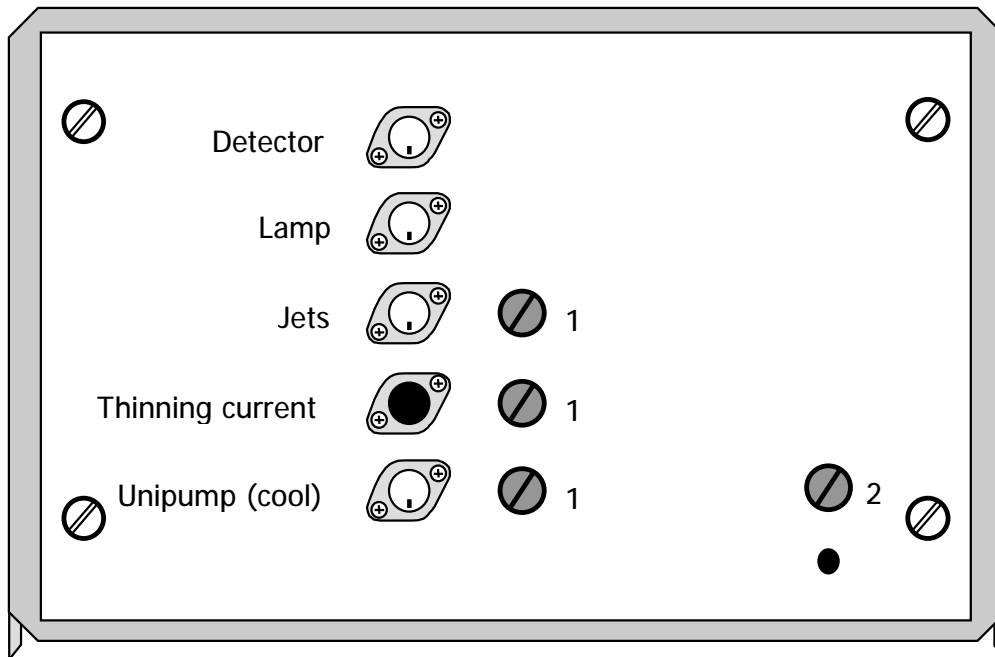
The various leads from the power supply to the thinning cell are gathered together to form a multi-cable contained in a flexible spiral wrap. The gaps between the spirals are sufficiently wide to allow accidental spills of electrolyte to be washed away.

The length of the standard connecting cable is approximately 1.5m. Different lengths up to 5m will be supplied on request at no extra charge so that the thinning cell may be placed in a fume cupboard/glove box remote from the power supply. The individual leads are standard items that can be easily replaced.

Push-on fittings connect the dc supply to stainless steel spade terminals on the Cell top.

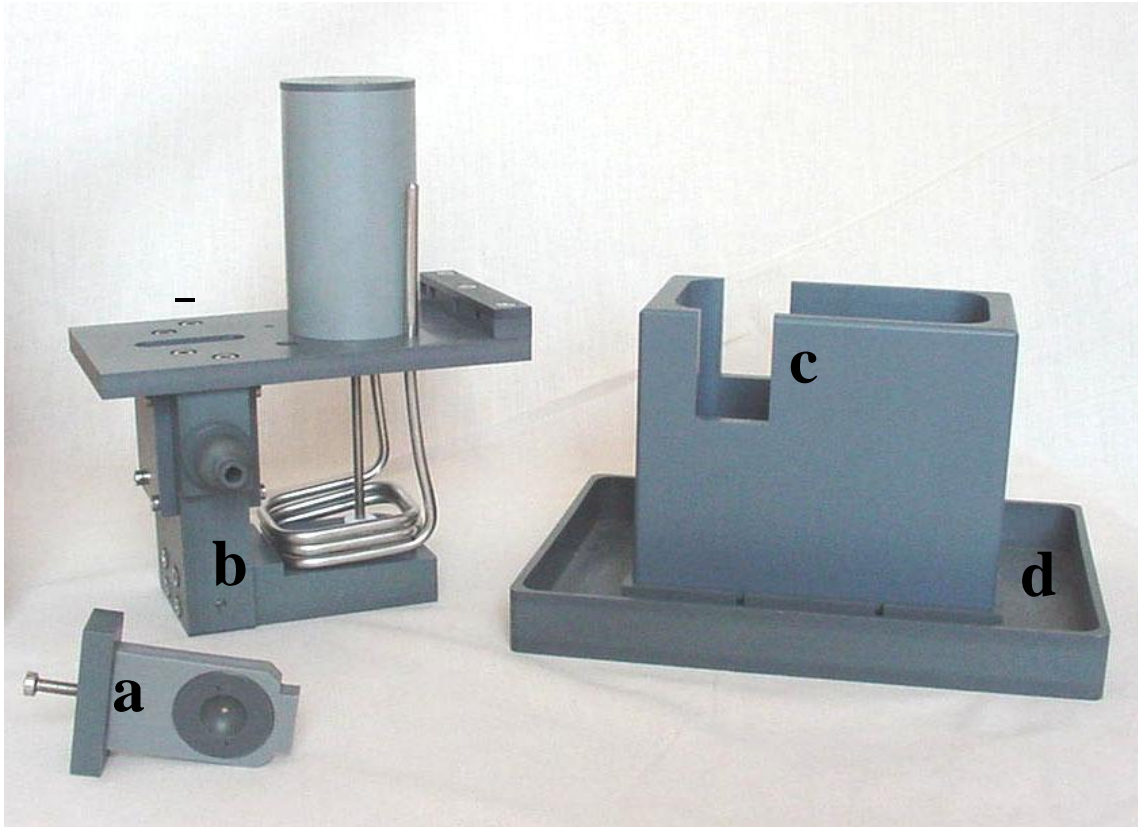


Metalthin Mk 4 Control /Power Supply – front



Metalthin Mk 4 Control /Power Supply – rear

THINNING CELL DISASSEMBLED



The specimen holder **a** fits into the slot, see -, in the top of the thinning cell **b**.

The thinning cell **b** is placed in the electrolyte tank **c** that push fits into the base **d**.

The base **d** holds the tank securely and catches any drips or spills of electrolyte.

An extra tank is supplied for washing out the thinning cell when changing electrolyte.

REASONS FOR PURCHASING A METALTHIN Mk 4

The basic METALTHIN, developed in the early 1970s, is a fully tried and tested product that produces good quality foils.

The construction of the Thinning Cell and Specimen Holder is very robust. The only replacement parts that a user is likely to need are stainless steel screws, platinum foils and the screwed inserts for the specimen holder.

We believe that no other twinjet polisher has all the functions included in the Mk4 control/power supply. Feedback from our users in University, Industrial and Nuclear Research Centres has enabled us to continually improve the basic design.

The initial price of the METALTHIN is competitive.

The maintenance costs are low.

The small electrolyte volume results in substantial savings in running costs over the years and increased safety.

The key controlled mains switch prevents unauthorised use.

Changes in the design of the specimen holder have improved the holding of thin discs at low temperatures.

The thinning current can be controlled automatically.

The push switches have transparent flexible covers that protect them from electrolytes.

All the cables linking the power supply to the thinning cell connect via the rear panel. The cables are standard type, each one may be replaced easily at minimum cost