

PRECIOUS METALS PROCESSING CONSULTANTS, INC.
(PMPC)

**IONNET CELL ASSEMBLY AND OPERATION
INSTRUCTION MANUAL**

U.S. Patent# 4960500

IONNET CELL ASSEMBLY INSTRUCTIONS

I. UPON RECEIPT OF YOUR CELL

A. The Ionnet cell will be delivered in three separate boxes. Upon receipt open immediately and check for concealed damage.

B. A packing list will be attached to your shipment. Before beginning to assemble cell, cross reference the packing list to components received. Notify PMPC of any missing items immediately.

II. PLACEMENT

The Ionnet cell is designed to have solution to be treated pumped into the cell through the inlet and have gravity return it. The most common and easiest placement is to mount the unit directly over the tank that contains the solution. If that" is impossible, the cell can be mounted alongside the tank about three feet above the level of the solution. MAKE SURE THERE IS FREE WORK ACCESS TO CELL. ALSO MAKE SURE THERE IS ADEQUATE VENTILATION AS HYDROGEN AND OXYGEN ARE BYPRODUCTS OF ELECTROLYSIS. AN EXHAUST HOOD IS RECOMMENDED.

When unit is placed, begin assembly.

III. ASSEMBLY

A. There are a total of 15 cathode retainers (three per cell chamber) made out of white PVC tubes. These pieces fit into cutouts on the cell floor. Install the retainers noting that the slant on the bottom matches the slope of the cell floor. (UNIT MAY COME WITH THIS STEP COMPLETED.) Push down until the tube stops moving.

B. A total of six anode plates are included and shipped in one box. These plates should be slid into place in the vertical slots apparent on the inside of the Ionnet cell. The plates should be fitted in such a way that the two-inch wide tab on the top of each plate is on the left side of the unit when looking at the cell discharge end.

C. Attach anode buss bar assembly and cathode buss bar assembly to unit using 3/8-16x1" stainless bolts taped in place on the buss bars. The anode assembly should be attached to the left side of the unit when looking at the cell discharge end; the cathode assembly should be attached to the right side. In both cases, the 3/8" hole at the end of each bar should face towards the rear of the unit with the cables pointed obliquely up. (The front is the cell discharge side.)

D. Slip cathode sheets into cathode retainers and connect cathode connector fork by slipping the fork carefully over cathode as far as it will go. Preferably this should be done inside the middle retainer tube.

E. Two valve assemblies were supplied with the system. The one-inch assembly gets screwed into the inlet hole on the right side of the unit. The two-inch assembly gets screwed onto the two-inch exhaust hole on the front of the unit. USE TEFLON TAPE.

IV. INSTALLATION

A. Whatever pump is used should be mounted on the inside of the tank. This way any leaks are always contained. We suggest initially using hose instead of pipe. Accordingly, a hose barb is supplied with each valve assembly. Connect a one-inch hose from the pump to the hose barb on the intake valve assembly. Connect a two-inch hose to the exhaust hole valve assembly directing flow to the mother tank.

B. The bussing of the Ionnet cell will handle 500 amps. Attach suitable cable or buss bar from the rectifier to the appropriate anode/cathode buss bar on the unit. The bar on the left will receive the positive (+) and the bar on the right, the negative (-) lead.

IONNET CELL OPERATING INSTRUCTIONS

I. CELL START-UP

A. Turn on rectifier before any solution is added. Rectifier meters should show only voltage, no amperage. If any amperage is present, shut off and determine where short circuit exists.

B. Close 2" ball valve on discharge end of cell, and make sure 1" drain valve on discharge end of cell is plugged.

C. Open all flow equalizers in the cell. Flow equalizers are found on one side of each anode and are open when the handle is parallel to the side of the cell.

D. Begin to fill cell with effluent by starting pump and ensuring that 1" ball valve of inlet is open.

E. Allow cell to fill until effluent level is covering all but the top two inches of cathodes. The level will not be equal in all compartments; this will be adjusted later. Open ball valve on discharge end and adjust to maintain constant level in the cell. Monitor closely during first hours of use to avoid overflows. Once equilibrium is established it is usually unnecessary to change setting on the discharge ball valve.

F. Bring rectifier up to full desired power.

G. Inspect cell for any leaks, sparks at connections or heat. If any of these are found, stop power drain cell and investigate.

H. Equalize level in cell by adjusting flow equalizers next to each anode. Turning the handle clockwise closes an internal weir and raises level in the cell compartment before the valve. To adjust, start from the inlet end, closing the valve completely (handle perpendicular to cell wall). Allow level to rise to within 2" of the top of the cathode and slowly turn the handle back counter-clockwise to reach equilibrium. Go to next equalizer and repeat procedure. Eventually we are looking for an equilibrium where about 90-95 % of the solution follows the serpentine pattern of the cell and the rest of the solution cascades over the top to each following compartment.

I. The Ionnet cell is now operational. Monitor closely for the first 24 hours to note any occurrences of heat build-up, sparks, leaks, odors.

II. CELL SHUT-DOWN

- A. Stop pump and close inlet ball valve.
- B. Close 2" ball valve on discharge end, turn off rectifier, open 1" drain plug and empty cell.
- C. Remove cathodes as desired. Note any solids on bottom of cell, wash cell if required before start-up.

III. CELL MAINTENANCE

A. Daily actions

- 1. Check all connections, including cathode fork connections.
- 2. Check buss bars for heat build-up.
- 3. Check for obstructions to exhaust.

B. Weekly actions

Check cathode loading. Cathodes will not require changing until no evidence of honeycomb mesh can be seen. If any cathode has depleted, replace with new one and check connection.

C. Monthly actions

- 1. Drain and wash cell.
- 2. Check anodes for wear.

D. As-needed actions

Replace cathodes when filled up. They should hold 20-30 lbs. of metal. To change cathodes, drain tank, shut off power, remove cathode connector forks, and slide sheet out of retainer.

IONNET CELL TROUBLESHOOTING

The following is a guide to some problems you may encounter over the years with the Ionnet cell. Corrective actions are listed for the different items.

I PROBLEM - Poor Metal Removal Rate

<u>Possible Cause</u>	<u>Action</u>
Loose connection on cathode(s)	Reposition cathode connector forks
Transformer/Rectifier set too low	Increase amps
Cathodes full or damaged	Inspect cathodes, replace if necessary
Stream constituents	Check influent for strong oxidizers
Pump failure or flow blockage	Evaluate and correct

II. PROBLEM - Poor Cathode Plate

<u>Possible Cause</u>	<u>Action</u>
Current density too high	Reduce amperage
Cathodes damaged by standing effluent with no power	Inspect cathodes

III. PROBLEM - Low Amperage / High Voltage

<u>Possible Cause</u>	<u>Action</u>
Loose connections to cathodes	Reposition cathode connector forks
Effluent not conductive	Adjust conductivity with salts
Buss connection loose	Inspect and tighten
Anodes damaged or worn	Inspect anodes, clean or replace

IV. PROBLEM - High Amperage/ Low Voltage

<u>Possible Cause</u>	<u>Action</u>
Shorting between anodes & cathodes	Check cell bottom for solids or dendrite bridging, clean if necessary

IONNET CELL PARTS LIST

QUANTITY	DESCRIPTION
1	Ionnet Tank Unit
15	Cathode Retainers (already installed)
5	Valve Rods (already installed)
6	Anode Plates
1	Cathode Buss Bar assembly (with 5 forks and screws attached)
1	Anode Buss Bar assembly (with six cables, lugs and screws attached)
5	Cathode sheets
1	2" Outlet ball valve assembly
1	1" Inlet ball valve assembly
1	1" Drain Plug (already installed)

WARNING: HYDROGEN AND OXYGEN ARE BYPRODUCTS OF ELECTROLYTIC RECOVERY. ENSURE THAT THIS EQUIPMENT HAS **PROPER** VENTILATION AND USE CHEMICAL SAFETY GOGGLES WHEN WORKING ON OR NEAR THE CELL. DO NOT CHANGE OR REMOVE CATHODES WITH POWER ON. AN EXHAUST HOOD IS RECOMMENDED.

WARNING: THE POWER SUPPLY MUST HAVE A DC OVERLOAD RELAY CIRCUIT IN ORDER TO INSURE THAT IN THE EVENT OF A SHORT CIRCUIT, THE RECTIFIER WILL BE SHUT DOWN. THIS IS ESSENTIAL. A FIRE COULD POSSIBLY RESULT IF THE DC OVERLOAD RELAY CIRCUIT IS LACKING.

Caution: Cathodes may be damaged if left in an effluent-filled cell with the **power** off.

IONNET DISCLAIMER

All information, recommendations, and suggestions made in this literature which concern the use of Ionnet cells are based on test data deemed to be reliable. However, each user has the responsibility to determine suitability for their own use of Ionnet products. Since the actual use of the Ionnet cell by others is beyond the control of PMPC, Inc., PMPC makes no guarantee. The information in this literature is not to be considered complete since additional literature or information may be required when unusual conditions or circumstances exist.

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IONNET - ASSEMBLE INSTRUCTION SHEET.

