Mi-T-M®
CORPORATION

OPERATORS MANUAL FOR Mi-T-M®

ECL-05-0M10

ELECTROCOAGULATION SYSTEM

CAUTION

RISK OF INJURY!

READ MANUAL BEFORE OPERATING!

This manual is an important part of the Electrocoagulation System and must remain with the unit when you sell it!

Form #37-0707-032802

Table of Contents

INTRODUCTION

Congratulations on the purchase of your new Mi-T-M Electrocoagulation System! You can be assured your Mi-T-M Electrocoagulation System was constructed and designed with quality and performance in mind. Each component has been rigorously tested to ensure the highest level of acceptance.

This operator's manual was compiled for your benefit. By reading and following the simple safety, installation, operation, maintenance and troubleshooting steps described in this manual, you will receive years of trouble free operation from your new Mi-T-M Electrocoagulation System. The contents of this manual are based on the latest product information available at the time of publication. Mi-T-M reserves the right to make changes in price, color, materials, equipment, specifications or models at any time without notice.

! IMPORTANT !

These paragraphs are surrounded by a "SAFETY ALERT BOX". This box is used to designate and emphasize Safety Warnings that must be followed when operating this Electrocoagulation System.
Accompanying the Safety Warnings are "signal words" which designate the degree or level of hazard seriousness. The "signal words" used in this manual are as follows:

***DANGER*: Indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.**

***WARNING*: Indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.**

***CAUTION*: Indicates a potentially hazardous situation which, if not avoided MAY result in minor or moderate injury.**

The symbols set to the left of this paragraph are "Safety Alert Symbols". These symbols are used to call attention to items or procedures that could be dangerous to you or other persons using this equipment.

ALWAYS PROVIDE A COPY OF THIS MANUAL TO ANYONE USING THIS EQUIPMENT. READ ALL INSTRUCTIONS BEFORE OPERATING THIS ELECTROCOAGULATION SYSTEM AND ESPECIALLY POINT OUT THE "SAFETY WARNINGS" TO PREVENT THE POSSIBILITY OF PERSONAL INJURY TO THE OPERATOR.

Once the unit has been uncrated, immediately write in the serial number of your unit in the space provided below.

SERIAL NUMBER_____

Inspect for signs of obvious or concealed freight damage. If damage does exist, file a claim with the transportation company immediately. Be sure that all damaged parts are replaced and that the mechanical and electrical problems are corrected prior to operation of the unit. If you require service, contact Mi-T-M Customer Service.

CUSTOMER SERVICE
CALL OUR TOLL-FREE NUMBER
for the Sales or Service Center nearest you!
800-553-9053

Please have the following information available for all service calls:

1. Model Number
2. Serial Number
3. Date and Place of Purchase

CONTENTS OF THE ELECTROCOAGULATION SYSTEM

Carefully unpack your new Mi-T-M Electrocoagulation System. Check the contents against the packing list. Contact the freight line if a damage claim is required on any component. The following items are the basic equipment sent with your Electrocoagulation System.

1. Pump
2. Cells
3. Tank
4. Transformer Box
5. Manual

SPECIFICATIONS

MODEL	**ECL-05-0M10**
Maximum Flow	5 GPM
Electrical	230 Volt 1 Phase 20Amps
Sump Pump	3/4 HP
Operating Capacity	200 gallons
Dimensions L x W x H	72 x 60 x 88

PURPOSE

What is Electrocoagulation? Electrocoagulation is the electrolytic addition of coagulating metal ions directly from sacrificial electrodes.

As electricity passes between the metal plates and through the water, charges are neutralized on charged particles in the water. This includes metal ions, colloids, and the soap micelles that make up emulsified oil.

Metal ions are also released from the anode of each electrode into the water. As the unit is running, the cells change polarity every minute to extend the life of the electrodes.

These metal ions coagulate with pollutants in the water, in a similar manner to the addition of coagulating chemicals such as alum and ferric chloride, and allow the easier removal of the pollutants.

The electrolytic addition of these ions has a number of advantages over the addition of coagulating chemicals. There is no addition of anions, meaning no increase in salinity of the treated water. The system produces half to one third of the sludge. Greater activity means less metal ions required and a wider range of pollutants can be removed.

In electroflocculation, the pollutants are removed by bubbles that are generated during electrocoagulation, capturing the coagulated pollutants and floating to the surface. This process is similar to Dissolved Air Flotation (DAF).

IMPORTANT SAFETY WARNINGS

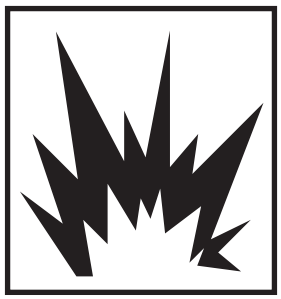
WARNING: **When using this product, basic precautions should always be observed, including the following:**

READ ALL SAFETY WARNINGS BEFORE USING ELECTROCOAGULATION SYSTEM

HAZARD	POTENTIAL CONSEQUENCE	PREVENTION
RISK OF ELECTRIC SHOCK OR ELECTROCUTION 	Serious injury or death could occur if the Electrocoagulation System is not properly grounded. Your Electrocoagulation System is powered by electricity and may cause electric shock or electrocution if not installed properly.	Installation of this unit, including all electrical connections, must comply with all local, state and national codes. This product must be grounded. Connect to a GFCI circuit breaker when available. If the unit should malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. Do not ground to a gas supply line. Improper connection of the equipment-grounding conductor can result in a risk of electrocution. Check with a qualified electrician or service personnel if you are in doubt as to whether the system is properly grounded. Always be certain the unit is receiving proper voltage (+/- 5% of the voltage listed on the nameplate). Before installing electrical connections, be certain the power switches are in the "OFF" position. Keep all connections dry and off the ground. Do not touch pump, pump motor, discharge piping or water when the unit is connected to the power supply; regardless of whether the unit is operating correctly or experiencing an operation failure.
	Electrical shock may occur if Electrocoagulation System is not operated properly.	DO NOT allow metal components of the Electrocoagulation System to come in contact with live electrical components. Never operate the Electrocoagulation System with safety guards/covers removed or damaged. Ensure all electrical covers are securely in place when unit is operating.
	Serious injury or death may occur if electrical repairs are attempted by unqualified persons.	Any electrical wiring or repairs performed on this Electrocoagulation System should be done by Authorized Service Personnel in accordance with National and Local electrical codes. Before opening any electrical enclosure, always shut off the Electrocoagulation System and drain the water. Disconnect the Electrocoagulation System from the power source. If the power disconnect is not in sight, lock it in the open position and tag it to prevent power usage. (Never assume the Electrocoagulation System is safe to work on just because it is not operating, it could restart at any time! Always disconnect from the power source.) Allow the Electrocoagulation System components to cool down.

IMPORTANT SAFETY WARNINGS

READ ALL SAFETY WARNINGS BEFORE USING ELECTROCOAGULATION SYSTEM

HAZARD	POTENTIAL CONSEQUENCE	PREVENTION
RISK OF EXPLOSION OR FIRE  	Serious injury or death could occur from an explosion or fire caused by a system electric spark.	This unit must be placed in an area that is well ventilated, free of flammable vapors, combustible dust, gases or other combustible materials.
RISK OF BURSTING 	Serious injury or death could occur from bursting caused by excessive pressure in the system.	Do not mistreat the pressure gauges on the system. Pressure gauges will malfunction if they are subjected to excessive pressure, vibration, pulsation or temperature or if they are placed in an environment which causes corrosion of parts. Incorrect readings on a pressure gauge could mislead the operator and place him in a dangerous working condition. Do not use a booster pump or any type of additional pumping system. Pressurizing the suction of the pump may cause the pump body to explode. Do not use this Electrocoagulation System to pump flammable material! An explosion could occur from a gas vapor buildup inside the system.
	Serious injury may occur if attempting to start the Electrocoagulation System when the pump is frozen.	In freezing temperatures, the unit must always be warm enough to ensure there is no ice formation in the pump. Do not start the Electrocoagulation System if it has been in a freezing environment without first allowing the pump to thaw.
RISK OF BURNS 	Serious injury may occur from touching the electrical motor. This area can remain hot for some time after the Electrocoagulation System is shutdown.	Never allow any part of your body to contact the electrical motor until cooled.

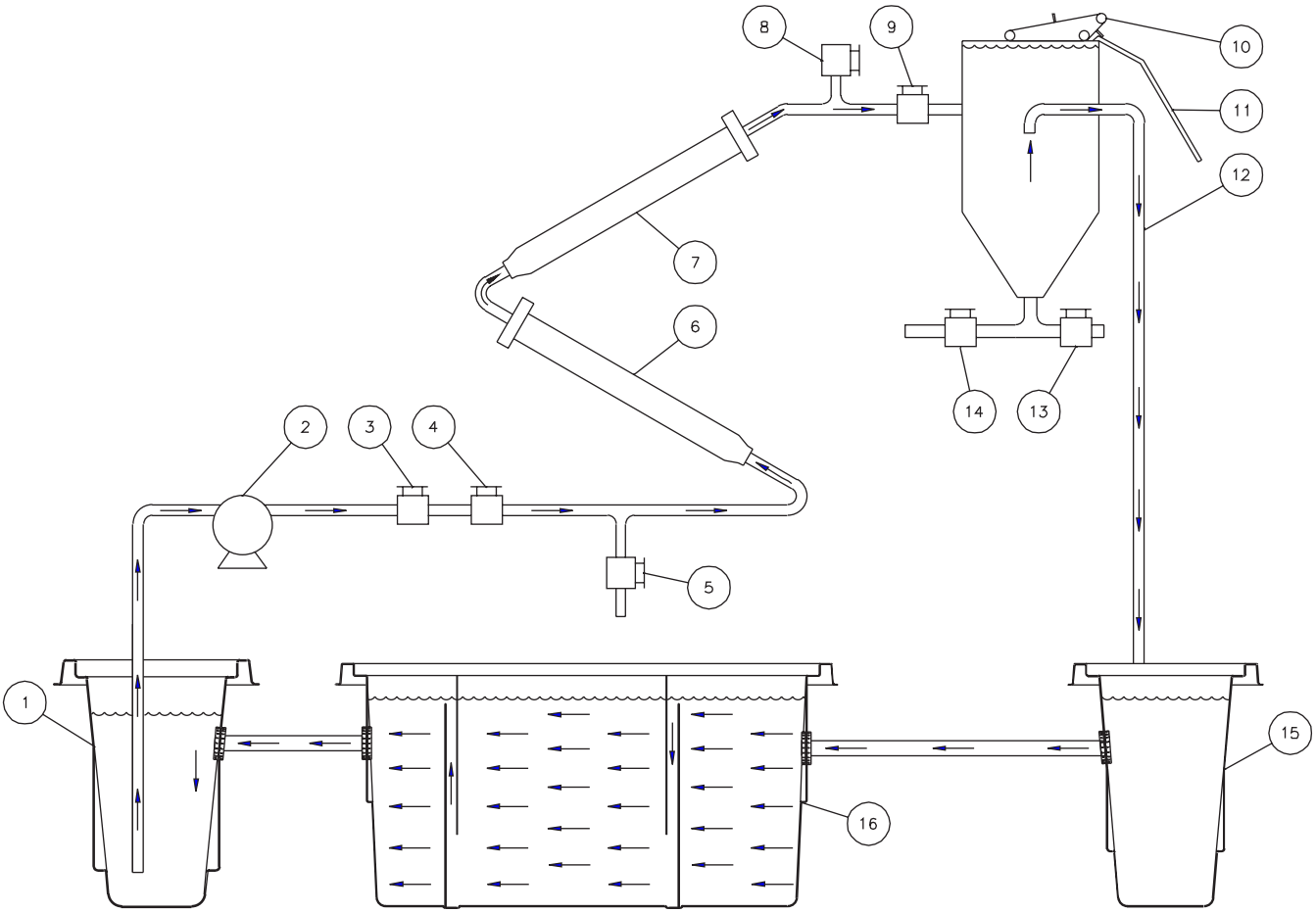
IMPORTANT SAFETY WARNINGS

READ ALL SAFETY WARNINGS BEFORE USING ELECTROCOAGULATION SYSTEM

HAZARD	POTENTIAL CONSEQUENCE	PREVENTION
RISK FROM MOVING PARTS 	Serious injury may occur to the operator from moving parts on the Electrocoagulation System.	Do not operate the unit without all protective covers in place. Follow the maintenance instructions specified in the manual.
RISK OF BODILY INJURY 	Injury may occur from the Electrocoagulation System.	DO NOT DRINK THE WATER IN THE ELECTROCOAGULATION SYSTEM!! This is non-potable water and is not suitable for consumption. DO NOT allow children to operate this unit. DO NOT overreach or stand on unstable support. Wet surfaces can be slippery, wear protective foot gear and keep good footing and balance at all times. Know how to stop the Electrocoagulation System. Be thoroughly familiar with controls. Before servicing components, ALWAYS shut off the Electrocoagulation System. Consult Material Safety Data Sheets (MSDS) for safe handling of system, especially oxidizers and acids.

!SAVE THESE INSTRUCTIONS!

ELECTROCOAGULATION SYSTEM FLOW CHART



FLOW DIAGRAM-ECL-05-032702-KS

The **PUMP (2)** draws water from the **SUMP PUMP (1)** into the unit. Water is sent through the **PUMP VALVE (3)** and **FLOW CONTROL VALVE (4)** to **CELL 1 (6)** and **CELL 2 (7)**. As water is pumped through the cells it passes between metal plates that have DC power running between them.

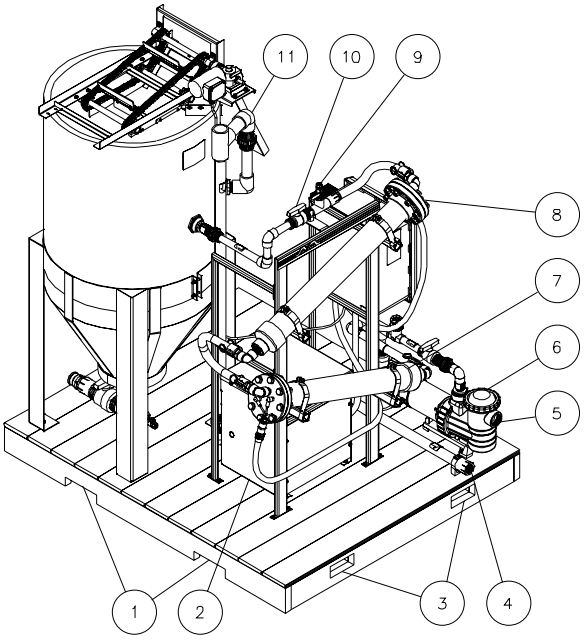
The treated water passes through the **TANK VALVE (9**) and into the tank.

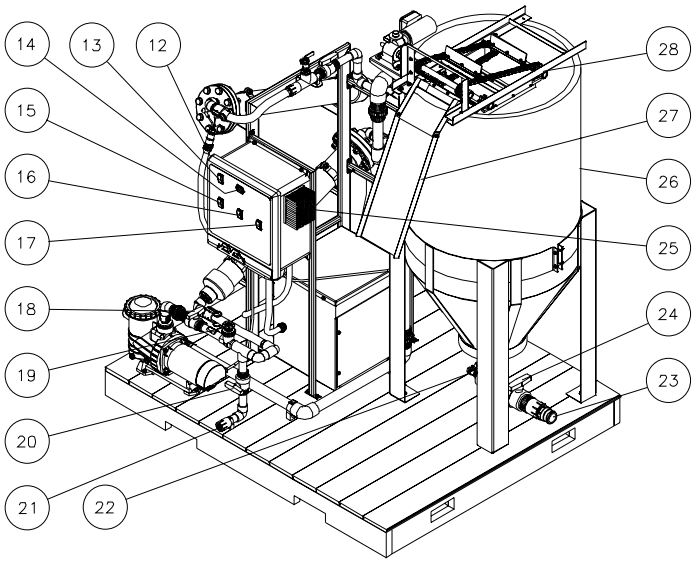
When it is time to clean the cells, the **PUMP VALVE (3)** and the **TANK VALVE (9)** are closed and the **CELL DRAIN VALVE (5)** and **AIR VENT VALVE (8)** are opened. When the cells are drained, they can be cleaned.

The treated water passes through the **TANK VALVE (9)** and into the tank. The water spirals around the tank allowing the foam to rise and the sludge to fall. Once the foam rises to the top of the tank, the **SKIMMER (10)** skims it over the edge of the tank and down the **CHUTE (11)**. The sludge that falls tot he bottom can be removed by opening the **TANK DRAIN VALVE (14)**. If the **TANK DRAIN VALVE (14)** is clogged, the **TANK DRAIN CLEAN OUT VALVE (13)** can be connected to a pressurized water supply to force the sludge through the tank drain.

Clean water exits the tank by spiraling to the center of the tank and out the **OVERFLOW (12)** and back to the **WASH WATER CATCH PIT (15)** and the **3-STAGE COLLECTION PIT (6)**.

ELECTROCOAGULATION SYSTEM FEATURES





ECL-05-0M10 FEATURES-032002-KS

ECL-05-0M10 FEATURES-032002-KS

ECL-05-0M10 FEATURES				
REF. #	**DESCRIPTION**		**REF. #**	**DESCRIPTION**
1	Side Forklift Holes		15	Pump Switch
2	Transformer Box		16	Cell Switch
3	End Forklift Holes		17	Skimmer Switch
4	Return		18	Pump Valve
5	Inlet		19	Flow Control Valve
6	Pump		20	Cell Drain Valve
7	Cell 1		21	Cell Drain
8	Cell 2		22	Tank Drain Clean-out Valve
9	Air Vent Valve		23	Tank Drain
10	Tank Valve		24	Tank Drain Valve
11	Overflow		25	Heat Sink
12	Control Panel		26	Tank
13	Master Switch		27	Chute
14	Hour Meter		28	Skimmer

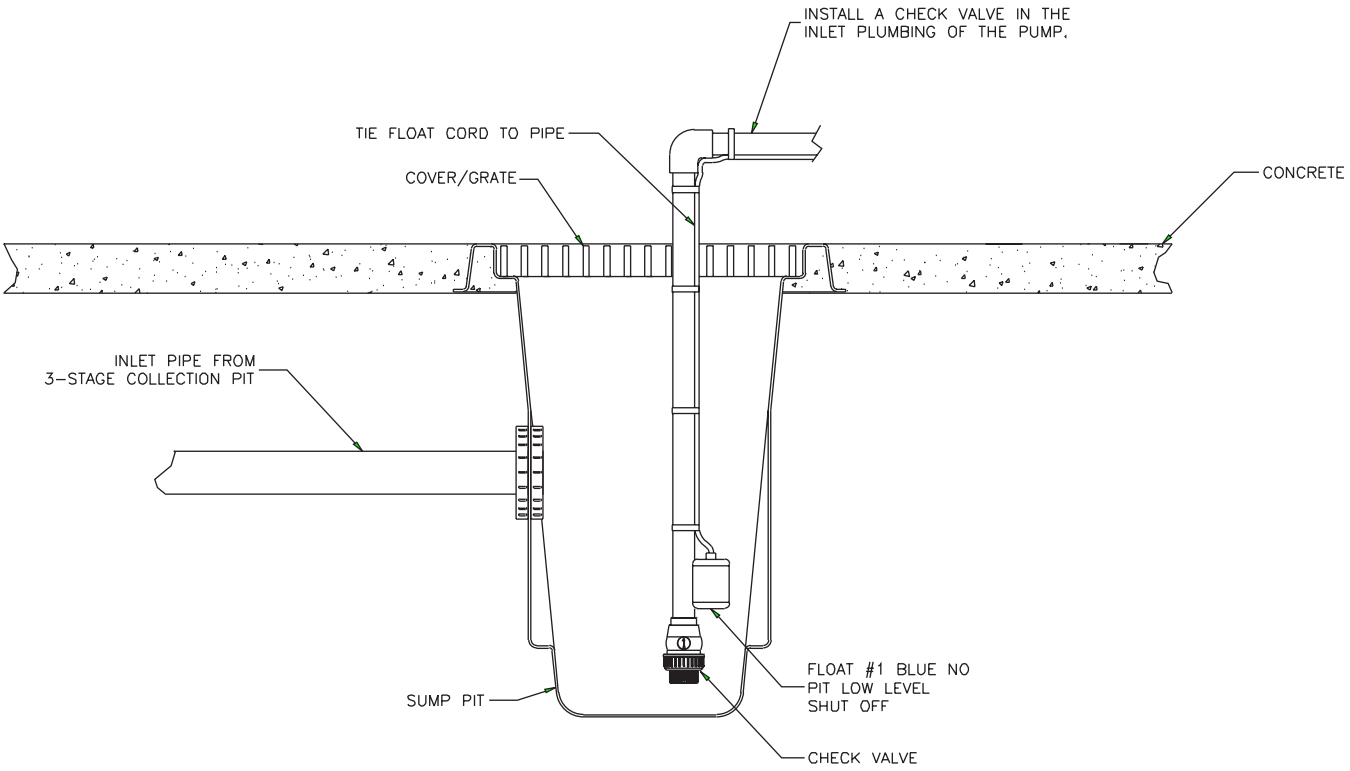
INSTALLATION

ATTIRE:

1. Proper attire is essential to your safety. It is advised to utilize whatever means necessary to protect eyes, ears, and skin.

INSTALLATION:

1. A Collection Pit System must already be an established structure before installing the Electrocoagulation System. A well designed pit system is critical for the proper operation of the recycle system. Consult your Mi-T-M dealer for installation requirements.
2. Place the Electrocoagulation System platform on a hard, level surface in an area free of flammable vapors, combustible dust, gases or other combustible materials.
3. Set the unit so you have access to the Control Panel and the plumbing connections.
4. Do not place unit in an area:
   a. with insufficient ventilation.
   b. where environmental hazards (i.e. rain and snow) can come in contact with the Electrocoagulation System.
   c. in a freezing environment.
5. Check all union connections for tightness.
6. Install plumbing from the Sump Pit using minimum 1 1/2" schedule 80 PVC.
7. Install the blue float in the Sump Pit. Attach the float 10" above the bottom of the plumbing. Allow a 2" tether and enough room for them to move freely without interfering with the plumbing.



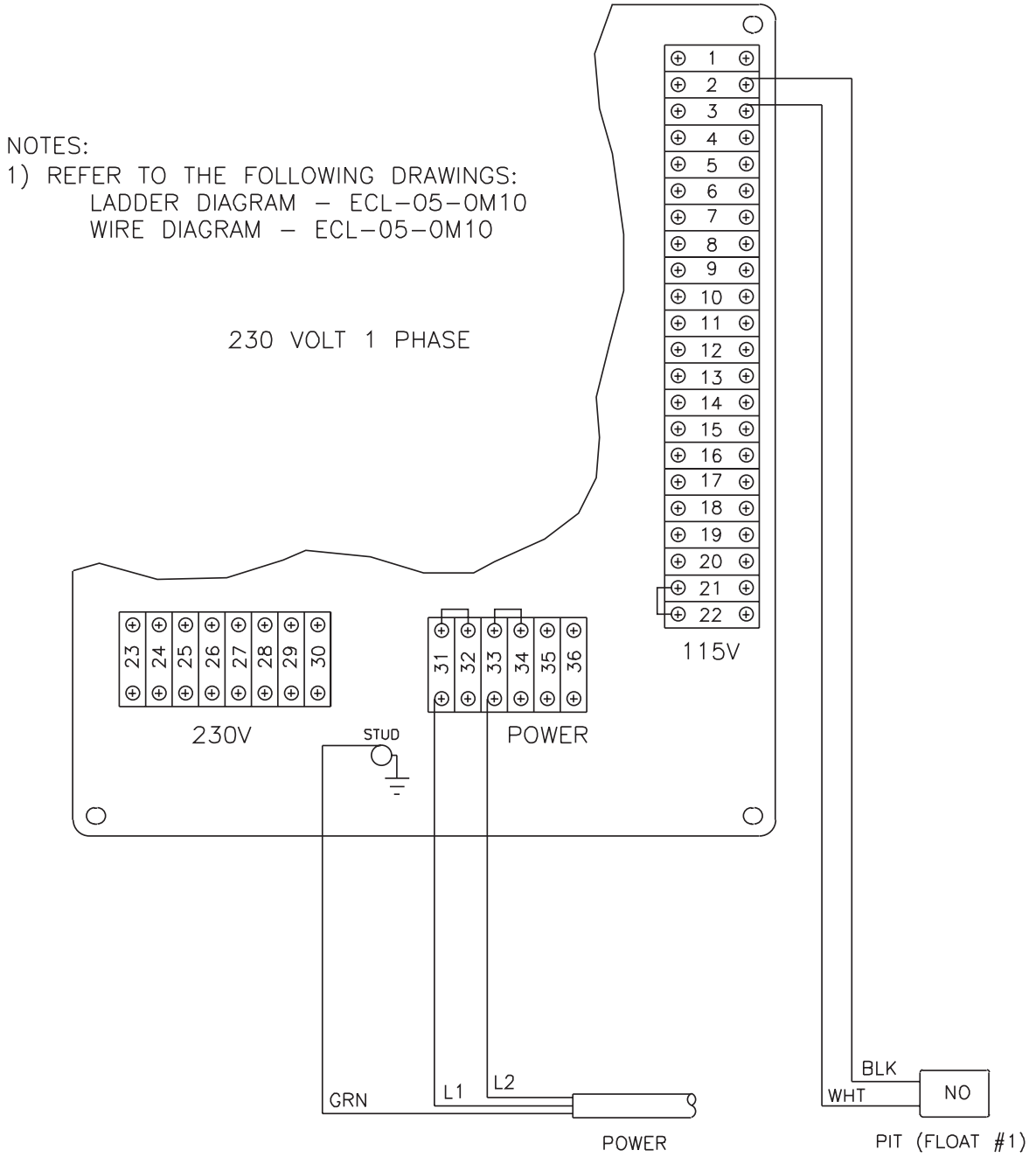
SUMP PIT LAYOUT-ECL-05-032602-KS

INSTALLATION

WARNING

RISK OF ELECTROCUTION! TO REDUCE THE RISK OF ELECTROCUTION, KEEP ALL CONNECTIONS DRY AND OFF THE GROUND.

10. A qualified electrician must hook up the electrical system.
    a. Verify the electrical supply at the power source is off.
    b. Be certain all switches on the Control Panel are in the "OFF" position.
    c. Run water tight conduit from the local disconnect to the Control Panel. The electrician will need to drill holes in the Control Panel for the conduit.
    d. Make connections to the terminal strips as shown in the wiring diagram below.



FEILD WIRING DIAGRAM-ECL-05-032602-KS

STOP

TO ENSURE YOUR WATER RECYCLE TREATMENT SYSTEM OPERATES SAFELY AND EFFICIENTLY, COMPLETE THE PRE-OPERATION CHECKLIST BEFORE PROCEEDING.

PRE-OPERATION CHECKLIST

Before proceeding, answer all the questions on this checklist.	YES	NO
CODES:		
1. Does the electrical wiring meet all codes?		
2. Does plumbing meet all codes?		
LOCATION:		
1. Is the unit located on a hard level surface free of flammable vapors, combustible dust, gases or other combustible materials?		
2. Is the unit located in a large ventilated area?		
ELECTRICAL:		
1. Is the unit properly grounded?		
2. Does the power supply, voltage and amperage match the data plate?		
PLUMBING:		
1. Is the plumbing sized correctly?		
2. Are all plumbing connections secure?		
GENERAL:		
1. Have all operators using this unit read and understood this entire manual?		
2. Has the unit been installed by qualified service people who followed the instructions listed in this manual?		

IF "NO" WAS MARKED TO ANY OF THESE QUESTIONS, CORRECT THE SITUATION BEFORE OPERATING.

PREPARATION

PRESTART PROCEDURES:

1. Position the valves on the Electrocoagulation System in the “Start-up Mode”.
   a. Pump Valve: Turn valve open.
   b. Flow Control Valve: Turn valve one rotation short of completely closed.
   c. Air Vent Valve: Turn valve closed.
   d. Tank Valve: Turn valve open.
   e. Tank Drain Valve; Turn valve closed.
   f. Tank Drain Clean-out Valve; Turn valve closed.
2. Be certain all plumbing and hoses are tight and properly connected.
3. Be certain all switches on the Control Panel are in the “OFF” position.

OPERATION

START-UP:

1. Ensure the pit is filled with water. Water will need to be added to the pit system as the unit is being filled.
2. Prime the pump by opening the lid to the basket strainer and filling with water.
3. Make sure the o-ring is properly positioned and retighten the lid.
4. Turn Pump Switch the "ON" position.
5. When the tank is full, water will flow through the overflow and back to the pit system.
6. Flow can be adjusted with the Flow Control Valve. Flow is at 5 GPM when the water level reaches the mark in the clear pipe of the overlow.
7. Turn the Cells Switch to the "ON" position.

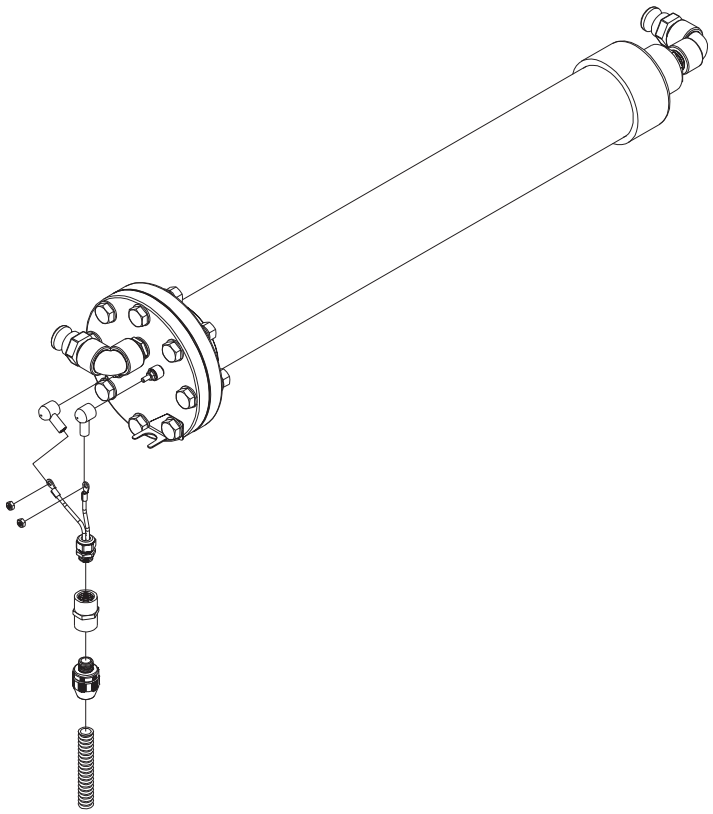
As foam accumulates on top of the Tank, the Skimmer will need to be operated.
1. Place an empty 55 gallon barrel under the Chute.
2. Turn the Skimmer Switch to the "ON" position.
3. When the barrel is full, the foam can be sprayed down and evaporated.

MAINTENANCE

Cell 1 and Cell 2 will need to be cleaned weekly. Cleaning can be accomplished by one of two methods.

METHOD 1 - CLEANING IN PLACE:

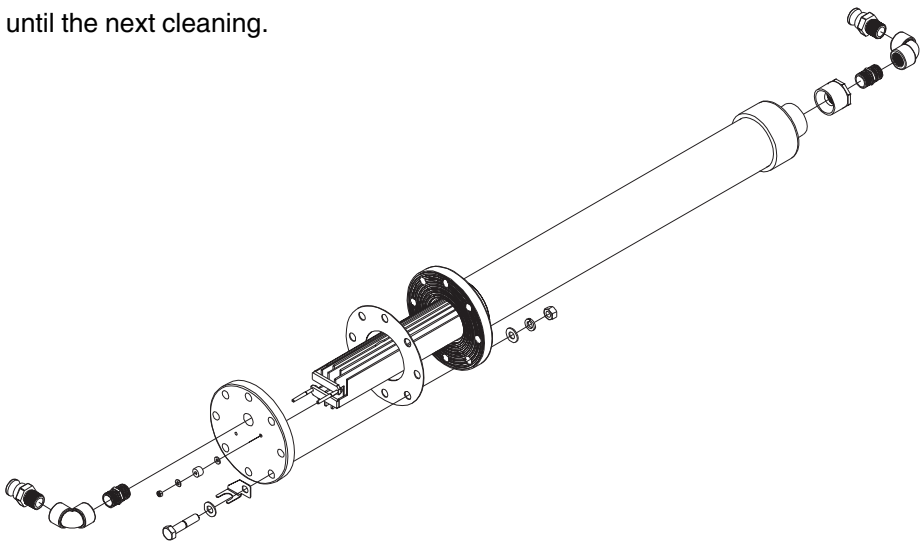
1. Close the Pump Valve and the Tank Valve.
2. Turn all of the switches on the Control Panel to the "OFF" position. Disconnect the power from the unit.
3. Connect a hose from the Cell Drain to the Pit System, then open the Air Vent Valve and the Cell Drain Valve to drain the cells.
4. Disconnect the cam and groove coupling on the upper end of each cell.
5. Pull back the protective boots on the upper end of each cell to expose the electrical connections.
6. Use two 7/16" wrenches to remove the outside nut of each connection.
7. Disconnect the cables from the cells and pull the flexible conduit away from the holding bracket.
8. Using 15/16" wrenches, remove the flange bolts of each cells.
9. Pull the flanges straight out to remove the electrodes. Do not tilt the flange on the electrodes so that the bolts do not get damaged. The bolts that connect the electrode to the flange also serve as the electrical connection.
10. Using a pressure washer, thoroughly clean the electrodes. You will notice pitting on the metal surfaces of the electrodes. When the pitting is so excessive that half of the original metal is remaining, see an authorized dealer to replace the electrodes with new ones. Always replace both electrodes at the same time.
11. Spray out the inside of the cells with a hose to remove any sludge that may have settled in the cells.
12. Replace the electrodes and flanges making sure the gasket is between the flange and the shell.
13. Replace the flange bolts and tighten.
14. Replace the cables and retighten the nuts on the electrical connection. DO NOT OVERTIGHTEN THE NUTS.
15. Replace the protective boots and reconnect the cam and groove couplings.
16. Close the Air Vent Valve and the Cell Drain Valve.
17. Reconnect power to the unit. Turn the Master Switch and the Pump Switch to the "ON" position.
18. Open the Pump Valve and the Tank Valve.
19. When the water is flowing through the Overflow, turn the Cell Switch to the "ON" position.



STEEL CELL ASSY-031502-KS

METHOD 2 - REPLACE CELLS:

1. Close the Pump Valve and the Tank Valve.
2. Turn all of the switches on the Control Panel to the "OFF" position. Disconnect the power from the unit.
3. Connect a hose from the Cell Drain to the Pit System, then open the Air Vent Valve and the Cell Drain Valve to drain the cells.
4. Disconnect the cam and groove coupling on the upper end of each cell.
5. Pull back the protective boots on the upper end of each cell to expose the electrical connections.
6. Use two 7/16" wrenches to remove the outside nut of each connection.
7. Disconnect the cables from the cells and pull the flexible conduit away from the holding bracket.
8. Using a flat screwdriver, loosen the clamps that hold the cells in place.
9. Remove the existing cells and replace with replacement cells.
10. Retighten the clamps that hold the cells in place, making sure the cam and groove couplings line up.
11. Replace the cables and retighten the nuts on the electrical connection. DO NOT OVERTIGHTEN THE NUTS.
12. Replace the protective boots and reconnect the cam and groove couplings.
13. Close the Air Vent Valve and the Cell Drain Valve.
14. Reconnect power to the unit. Turn the Master Switch and the Pump Switch to the "ON" position.
15. Open the Pump Valve and the Tank Valve.
16. When the water is flowing through the Overflow, turn the Cell Switch to the "ON" position.
17. Clean the cells as outlined in Method 1 - Cleaning in Place.
18. Set aside cleaned cells until the next cleaning.



855-0027-031402-KS

SOLIDS COLLECTION:

The Tank will need to be cleaned occasionally to prevent overflow of solids into the Pit System. The Tank is opaque so the sludge level can be seen. To clean, connect a 2" cam and groove fitting to the Tank Drain and run a 2" hose to a solids collections area. Open the Tank Drain Valve until the sludge is drained out of the Tank.

If the sludge accumulated at the bottom of the Tank is unable to drain, connect a pressurized water supply to the Tank Drain Clean-out Valve.

WINTERIZING:

1. Turn all switches on the Control Panel to the "OFF" position and disconnect power to the unit.
2. Follow the instructions in the Solids Collection section of the manual and drain all of the water out of the Tank.
3. Connect a hose from the Cell Drain to the Pit System and open Cell Drain Valve to drain the cells.
4. Remove the drain plug from the Pump.
5. Empty the plumbing from the Pit System to the Pump.
6. Clean Cell 1 and Cell 2 as outlined in the Maintenance section of the manual.

TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	REMEDY
ELECTRICAL		
No power at Control Panel.	Power failure to Control Panel.	Check circuit breaker at power source or contact your local distributor.
Power Indicator Light (34) is OFF.	Blown fuses inside Control Panel on step down transformer.	Check fuses, replace if necessary. If fuses are OK, contact your distributor.
PUMP		
Pump will not run.	Float is not adjusted correctly in the Sump Pit.	Readjust.
	Float 1 is defective.	Replace.
	Circuit overload/breaker has tripped.	Reset breaker or replace fuse at power source.
	Motor overload.	Allow motor to cool. Motor will automatically restart when cool.
	Motor is defective.	Replace motor.
Pump motor starts and stops frequently during operation.	This is a common occurrence.	Allow pits to fill.
	Pump impeller is clogged.	Disconnect power and unclog impeller.
	Motor overload.	Allow motor to cool. Motor will automatically restart when cool.
Pump runs, but there is little or no water discharge.	Water level is below pump inlet.	Ensure Float 1 is not caught in plumbing.
	There is an air lock in the pump.	Manually fill the inlet pipe with water. Turn the pump on and off several times.
	Low voltage.	Ensure wire size is capable of handling the rated amperage of the unit. If wire size is correct, contact your distributor.
	Pump impeller is clogged.	Disconnect power and unclog impeller.
	Worn pump parts.	Contact your distributor.
Pump will not turn off.	Defective switch inside Float 1.	Replace.
	Pump is air locked.	Cycle pump in one minute increments several times to clear air from pump.

REPLACEMENT PARTS

DESCRIPTION	REORDER #
Aluminum Cell Assembly	855-0026
Steel Cell Assembly	855-0027
Aluminum Electrode	56-0050
Steel Electrode	20-0648

NOTES

STATEMENT OF WARRANTY

Mi-T-M warrants all parts (except those referred to below) of your new Electrocoagulation System to be free from defects in materials and workmanship during the following periods:

For One (1) Year from the date of original purchase:
Defective parts not subject to normal wear and tear will be repaired or replaced at Mi-T-M's option during the warranty period. In any event, reimbursement is limited to the purchase price paid.

EXCLUSIONS

1. The motor is covered under separate warranty by its respective manufacturer and is subject to the terms set forth therein.
2. Normal wear parts:

Seals	Filters	Gaskets
O-rings	Packings	Valve Assembly
Brushes		

3. Parts damaged due to:

   -normal wear, misapplication, modifications/alterations, abuse,
   -operation at other than recommended speeds, pressures or temperature,
   -the use of caustic liquids,
   -chloride corrosion or chemical deterioration,
   -fluctuations in electrical or water supply,
   -operating unit in an abrasive, corrosive or freezing environment.

4. Parts damaged by failure to follow recommended:
   -installation, operating and maintenance procedures.

5. This warranty does not cover the cost of:
   -normal maintenance or adjustments,
   -labor charges,
   -transportation charges to Service Center,
   -freight damage.

6. The use of other than genuine Mi-T-M parts will void warranty.

Parts returned, prepaid to Mi-T-M's factory or to an Authorized Service Center will be inspected and replaced free of charge if found to be defective and subject to warranty. There are no warranties which extend beyond the description of the face hereof. Under no circumstances shall Mi-T-M bear any responsibility for loss of use of the unit, loss of time or rental, inconvenience, commercial loss or consequential damages.