

# **OPERATING INSTRUCTION MANUAL**

## **Waterpower EC-20 Electrocoagulation System**



**Model: EC-20**

**Shenzhen Waterpower Environment Protection Technology CO.,Ltd.**

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## TABLE OF CONTENTS

	Page
1.0 GENERAL	1
2.0 SYSTEM COMPONENTS	1
3.0 INSTALLATION	3
4.0 CONTROLS	3
5.0 SYSTEM START-UP AND OPERATION	4
6.0 MANUAL SYSTEM SHUTDOWN	5
7.0 ELECTRODE INSTALLATION / REMOVAL	5
8.0 SYSTEM MAINTENANCE	6
9.0 TROUBLE SHOOTING	6

### APPENDICES

1. EC20-L-000
2. EC20-E-001
3. EC20-E-004
4. EC20-M-002
5. EC20-M-003

Contact Details

## 1.0 GENERAL

The EC-20 electrocoagulation system comprised of one Model EC-20 electrocoagulation cell, , manual flow control valves, feed pump, flow meter ,Bag filter and one 110VDC 30 A control unit.

## 2.0 SYSTEM COMPONENTS

Prior to the operation of the EC-20 electrocoagulation system, the user should familiarise themselves with the equipment and system layout.

### 2.1 Flow Control Manifold

The FLOW CONTROL Valves is used to control the flow of water to the electrocoagulation cell.

### 2.2 Support Structure

SUS304

### 2.3 Electrocoagulation Cell

The Model EC-20 electrocoagulation cell is designed to treat water at a maximum flow rate of 1000 Litres per hour and is comprised of a lid, electrode housing, electrode retaining plate.

### 2.4 Electrodes

The electrodes have been designed to provide sufficient reaction surface area to effectively treat water up to the maximum design rate, under the specified system operating conditions. Each Model EC-20 electrocoagulation cell houses a combination of unipolar electrodes and bipolar electrodes, using a total of 28 electrodes. The electrodes are made from Aluminium and Steel, are shaped to fit into individual slots within the electrode housing. Electrodes are a un-consumable item .

The electrodes and electrical connections have been pre-configured by Waterpower personnel so that the voltage and current required to produce the electrocoagulation effect within the clients' water can be achieved.

The electrodes and electrical configurations must not be modified or altered in any way without prior consent being obtained from Waterpower .Electrodes are manufactured according to specifications retained by Waterpower.

### 2.5 Power Unit

The Model EC-20 electrocoagulation cell is powered by a 110VDC 30A(max) power unit. The lockable sheet metal cubicle is suitably painted and protected against splashing water whilst still providing adequate ventilation for the housed equipment.

The power unit provides an infinitely variable DC supply from zero to full rated voltage with either polarity selected by the user. Power is applied to the electrodes of each cell via suitably rated flexible cable.

### **Power Unit Technical Details:**

#### D.C. Output

Volts 110V max

Amps 30A max

#### A.C. Input

Volts 220V, 60Hz (single phase 220V, 60Hz)

Amps 20A

Ambient Temperature less than 45°C

## **2.6 Delivery Pump**

The EC-20 electrocoagulation system includes a feed pump to feed raw water to EC cell.

#### Pump Specifications:

Type: Pneumatic diaphragm pump

Outlet connection: 1" BSP (Male thread)

Control method: Control a electromagnetic valve to start or stop the pneumatic diaphragm pump.

## **3.0 INSTALLATION**

- Put Control unit, EC cell, to suitable situation and fix them first.
- Connect all Pipes&valve for inlet of feed pump and outlet of EC cell.
- Connect power for RCU and connect wire from RCU to electromagnetic valve, EC cell,level switch.
- Put electrodes to EC cell and connect them.

## **4.0 CONTROLS**

Refer to attached drawing EC20-E-004

Each control function indicator or component is clearly identified by labels attached to the front panel of the power unit enclosure.

### **1. OFF(Power )ON**

Turn switch to right – Connects the power unit (for the EC-20) to the mains power supply

Turn switch to left – Isolates the EC-20 electrocoagulation plant.

## **2. Manual /Stop/(Pump)/Auto**

Manual ----- Turn the switch to Manual , press start button, electromagnetic valve will open , press stop button , electromagnetic valve will close.

Auto----- Turn the switch to Auto and press start button ,electromagnetic valve will open, pneumatic diaphragm pump will start and D.C output will start after 5second delay ( the time can be setted). EC system will be controlled by Level switch.

Stop----- Turn the switch to Stop ,Electromagnetic valve and EC unit will stop.

## **3. START button**

Press the START button to start electromagnetic valve when Manual station, , then system will not be controlled by level switch.

## **4. STOP button**

Press the STOP button to closed electromagnetic valve when Manual station.

## **5. POWER AVAIL light (Power ON)**

An illuminated POWER AVAIL light indicates that the mains power is available to the power unit.

## **5. POLARITY FORWARD light**

An illuminated POLARITY FORWARD light indicates that the power unit is running in forward polarity.

## **6. POLARITY REVERSE light**

An illuminated POLARITY REVERSE light indicates that the power unit is running in reverse polarity.

## **7. Potentiometer**

Turning the potentiometer in a clockwise direction will increase the voltage and current applied across the electrodes of the electrocoagulation cell.

Turning the potentiometer in an anticlockwise direction will decrease the voltage and current applied across the electrodes of the electrocoagulation cell.

## **8. REVERSE POLARITY TIMERS**

The reverse polarity timers are housed behind the power unit enclosure door. The reverse polarity timers (forward and reverse) have been preset to one hour duration.

## 5.0 SYSTEM START-UP AND OPERATION

- Ensure that there is a constant and steady supply of water to be treated.
- Turn Power switch to “ON”
- Ensure that the delivery pump has been connected. Turn M(pump)A switch to Manual , press start button, electromagnetic valve will open, feed pump will start , check all pipes without leakage , adjust valves to get a suitable flow rate. Then turn the switch to Auto.
- Press start button , system will be controlled by level switch , when level is high , system will start to work, when level is low , system will stop to work.
- Adjust valves to get a suitable flow rate if the flow rate is not suitable. .
- Turn the potentiometer to get a suitable current (check treated water sample). .

**CAUTION:** Care must be taken to ensure that the flow through each of the cells is maintained between 500 - 1000 Litres per hour. Operation of the system at flow rates lower than 200 LPH for an extended period of time may cause a cell to overheat.

## 6.0 MANUAL SYSTEM SHUTDOWN

Shutdown the EC systems according to the following instructions:

- Press the stop button on the EC power unit system will stop running.
- Turn Power switch to left to stop power supply..

### **Electrode Removal / Inspection:**

- Drain the EC CELL by opening discharge valve.
- Remove the lid from the EC cell.
- Successful completion of this procedure will allow an operator to safely dismantle the electrical connections and remove the electrodes housed within an EC cell that has been shutdown.

**CAUTION:** Care must be taken to ensure that the power unit is isolated according to this procedure.

**Our use a Isolated transformer in the RCU , So the system is very safe.**

## **7.0 ELECTRODE INSTALLATION / REMOVAL**

1. Insert the electrodes into the electrode housing slots until they contact the electrode rests. Ensure that each electrode is inserted into opposite slots and that there is no contact between the electrode surfaces.
2. Place the electrode retaining plate over the electrodes, align the plate and screw it down onto the top of the electrocoagulation cell.
3. Install the brass, threaded rods into the slots of the unipolar electrodes and tighten a pair of washers and nuts against the opposite sides of each unipolar electrode. Ensure that the electrode surfaces and nut / washer surfaces are clean. Conductive grease (electrical jointing compound) should be applied to the contacting surfaces of the electrical connections to prevent oxidation and subsequent reduction in electrical conductivity.
4. Connect one flexible cable (lug end) to the end of one of the threaded rods by tightening a pair of washers and nuts against the opposite sides of the lug. Repeat this procedure with the remaining flexible cable.  
Electrode removal can be achieved by reversing the installation procedure.

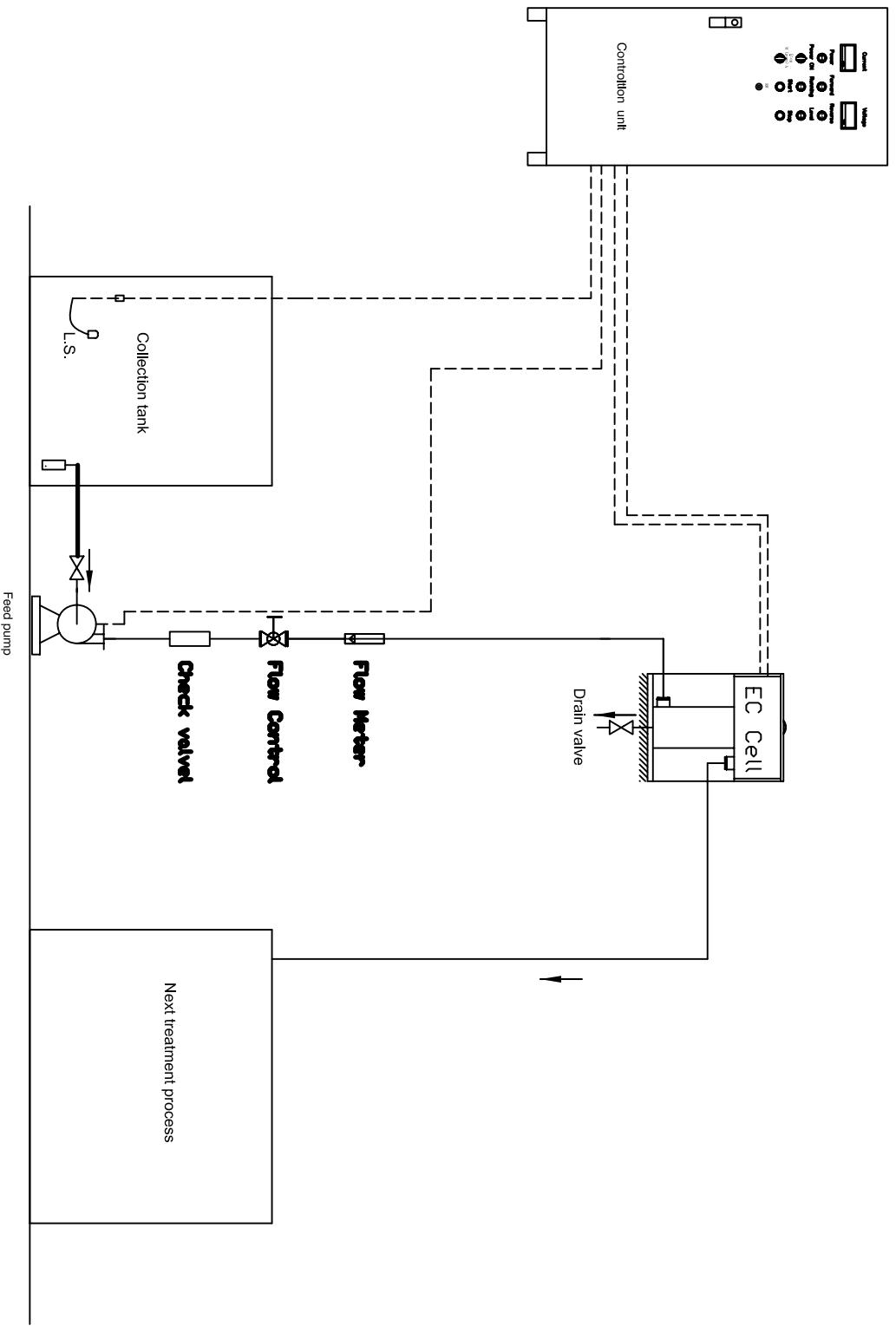
## **8.0 SYSTEM MAINTENANCE**

- The electrode surfaces can be cleaned using a high-pressure water jet, or a piece of wet & dry sandpaper.

## **9.0 TROUBLE SHOOTING**

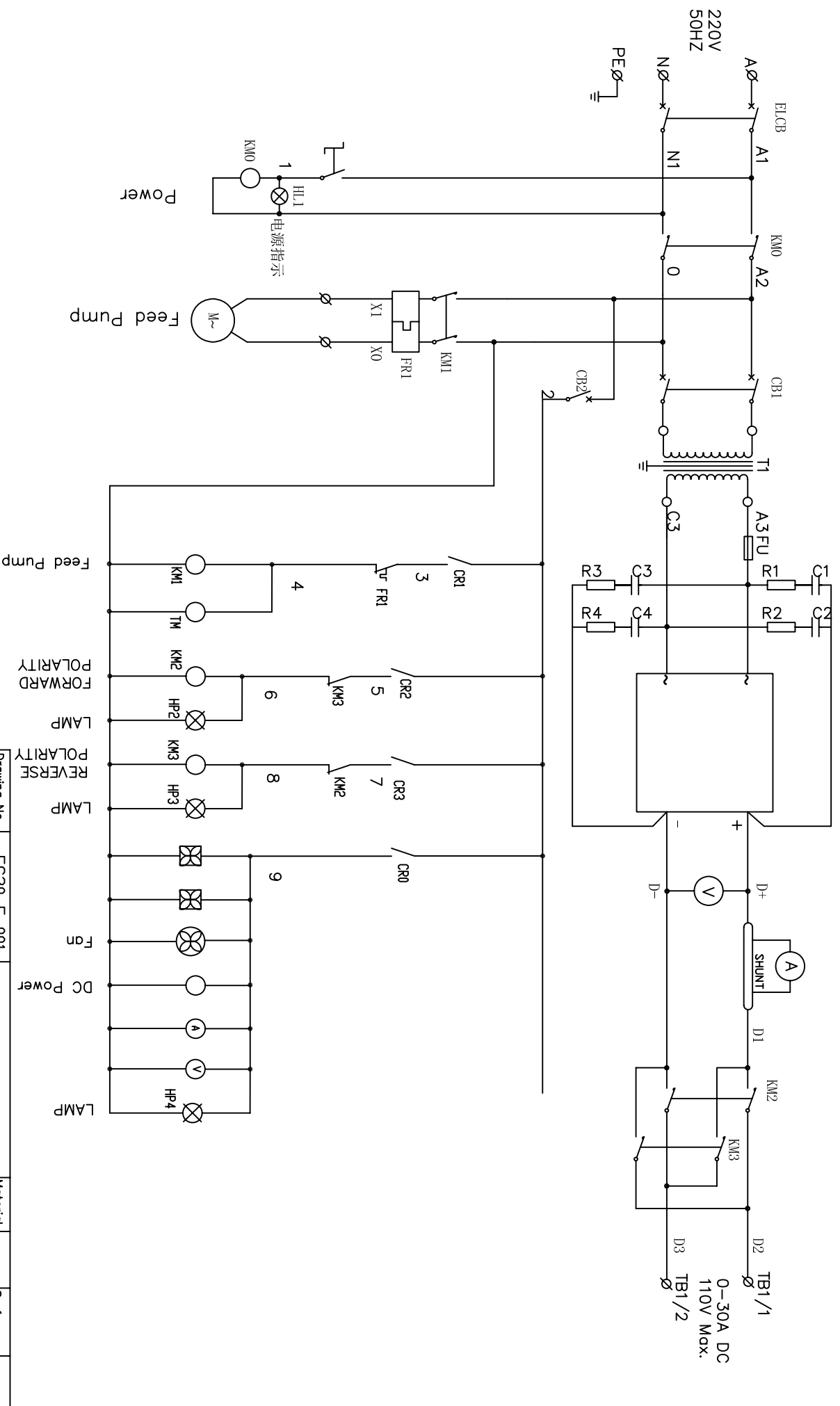
- Please contact Waterpower personnel if any problems are experienced with the operation of the electrocoagulation system.





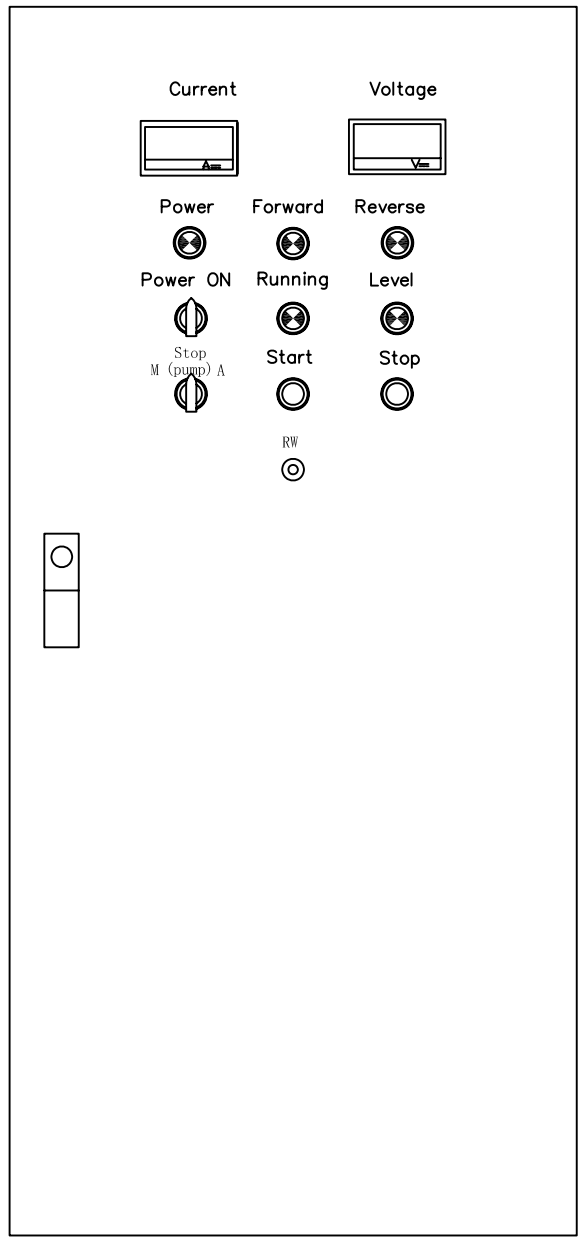
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Assemble No		Flow Process Diagram	Rev No	Qty	Scale
Designed	Wong		V1		
Design Appr	Ketten				
Checked					
Drawn	Wong				


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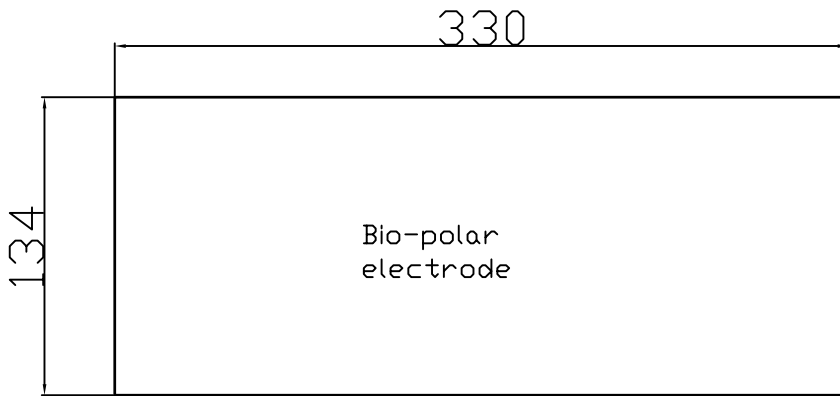
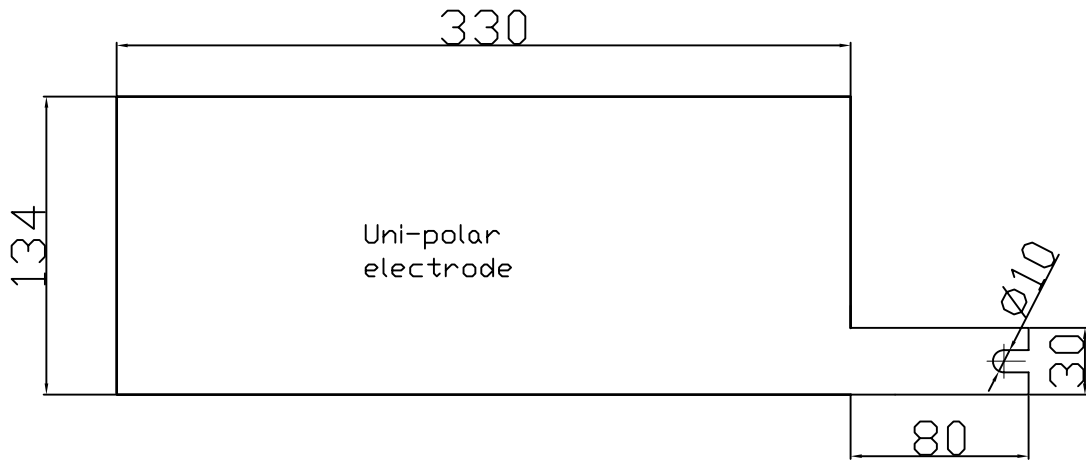



Drawing No	EC20-E-001	EC20 SYSTEM		Material		Surface	
Assemble No	Wong	POWER SUPPLY PROCESS DIAGRAM1		Rev No	V1	Weight	
Designed	13.12.05			Qty		Scale	
Design Appr	Ketten						
Checked							
Drawn	Wong			Total pge		Page	

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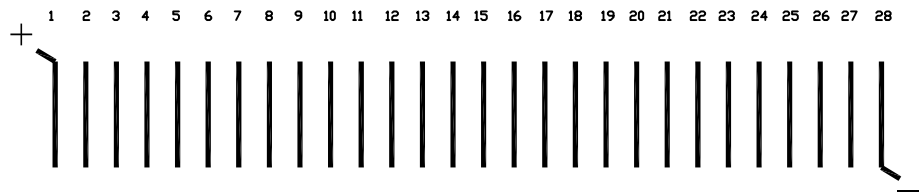


Drawing No	EC20-E-004		EC20 SYSTEM	Material		Surface	
Assemble No				Rev No	Qty	Weight	Scale
Designed	Wong	13.12.05	Panel Placement	V1			
Design Appr	Ketten	13.12.05					
Checked			 SHENZHEN WATERPOWER ENVIRONMENTAL PROTECTION TECHNOLOGY CO.,LTD	Total pge		Page	
Drawn	Wong	13.12.05					

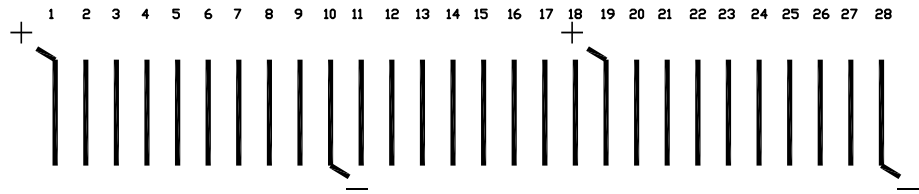


Drawing No	EC20-M-003		EC20 SYSTEM	Material		Surface	
Assemble No				Rev No	Qty	Weight	Scale
Designed	Wong	10.12.05	Electrodes	V1			
Design Appr	Ketten	10.12.05					
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Drawn	Wong	10.12.05					

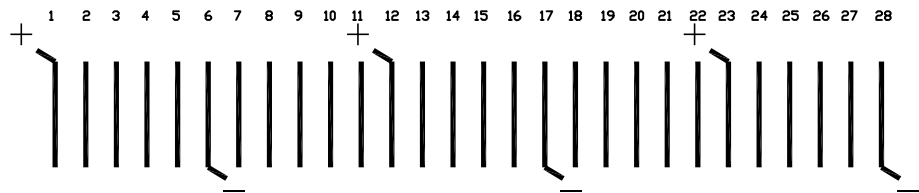
2PCS UNI-POLAR CONNECTION



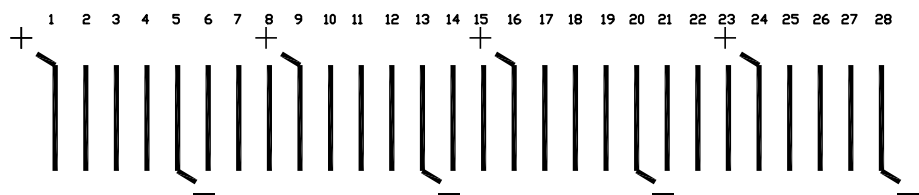
4PCS UNI-POLAR CONNECTION



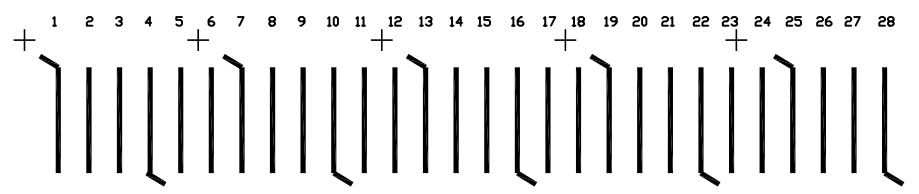
6PCS UNI-POLAR CONNECTION



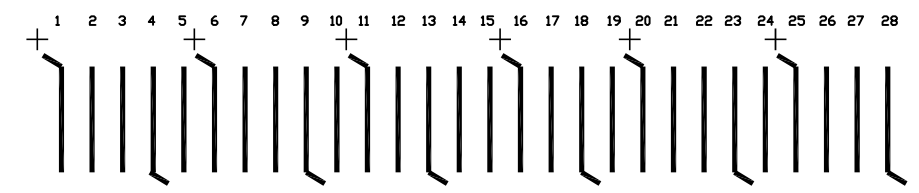
8PCS UNI-POLAR CONNECTION




10PCS UNI-POLAR CONNECTION



12PCS UNI-POLAR CONNECTION



Drawing No	EC20-M-002	EC20 SYSTEM	Material		Surface		
Assemble No			Rev No	Qty	Weight	Scale	
Designed	Wong	13.12.05	Electrode Connected	V1			
Design Appr	Ketten	13.12.05					
Checked							
Drawn	Wong	13.12.05	 SHENZHEN WATERPOWER ENVIRONMENTAL PROTECTION TECHNOLOGY CO.,LTD			Total pge	Page

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