

OPERATING INSTRUCTION MANUAL

Waterpower EC-200 Electrocoagulation Reactor



Model: EC-200

Shenzhen Waterpower Environment Protection Technology CO.,Ltd.

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Contact Details

1.0 GENERAL

The EC-200 electrocoagulation system be comprised of dosing unit 1/2/3/4, control unit , reaction unit , PH controller 1/2/3, mixer 1/2, pipes unit and bracket. Control unit can supply DC110V and 200A max output and control all components. reaction unit include one EC cell and electrodes . pipes unit include flow meter, adjust valves , discharge electromagnetic valves etc.

2.0 SYSTEM COMPONENTS

Prior to the operation of the EC-200 electrocoagulation system, the user should familiarise themselves with the equipment and system layout.

2.1 Control unit

Ambient Temperature less than 45°C

2.1.1 Power input

A.C. input , 3 Phase, 220V. Installed power max: 22KVA.

2.1.2 Power output of EC unit

D.C. output, 110V max, 200A max.

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

2.1.3 Control button explain

- | | |
|----------------------------|---|
| (1) PHASE A | 3 Phase power A phase indicator . |
| (2) PHASE B | 3 Phase power B phase indicator. |
| (3) PHASE C | 3 Phase power C phase indicator. |
| (4) EC CURRENT | DC Current display of EC output. |
| (5) EC VOLTAGE | DC Voltage display of EC output. |
| (6) CURRENT ADJUST | DC current adjust of EC output. |
| (7) LIFT PUMP 1 | Lift pump1 working indication lamp. |
| (8) STOP
M(L. PUMP 1)A | Lift pump1 choose switch. "M" mean manual operation, "A" mean auto operation, |
| (9) L. PUMP 1 START | Lift pump 1 start button when manual operation. |
| (10)L. PUMP 1 STOP | Lift pump 1 stop button when manual operation. |
| (11) L. PUMP 2 | Lift pump2 working indication lamp. |
| (12) STOP
M(L. PUMP 2)A | Lift pump2 choose switch. "M" mean manual operation, "A" mean auto operation, |
| (13) L.PUMP 2 START | Lift pump 2 start button when manual operation. |
| (14) L.PUMP 2 STOP | Lift pump 2 stop button when manual operation. |
| (15) C.PUMP 1 | Collection pump1 working indication lamp. |
| (16) STOP
M(C. PUMP 1)A | Collection pump1 choose switch. "M" mean manual operation, "A" mean auto operation, |
| (17) C. PUMP 1 START | Collection pump1 start button when manual operation. |
| (18)C. PUMP 1 STOP | Collection pump 1 stop button when manual operation. |
| (19) C.PUMP 2 | Collection pump2 working indication lamp. |

- | | |
|-----------------------------|--|
| (20) STOP
M(C. PUMP 2)A | Collection pump2 choose switch. "M" mean manual operation, "A" mean auto operation, |
| (21) C. PUMP 2 START | Collection pump2 start button when manual operation. |
| (22)C. PUMP 2 STOP | Collection pump 2 stop button when manual operation. |
| (23) MIXER 1 | Mixer1 working indication lamp.Note : it is a spare button. |
| (24) STOP
M(MIXER 1)A | Mixer 1select switch, "M" mean manual operation, "A" mean auto operation, "Stop" mean stop state. |
| (25) MIXER1 START | Mixer 1start button when manual operation |
| (26) MIXER 1STOP | Mixer1 stop button when manual operation. |
| (27) MIXER 2 | Mixer2 working indication lamp.Note : it is a spare button. |
| (28) STOP
M(MIXER 2)A | Mixer 2select switch, "M" mean manual operation, "A" mean auto operation, "Stop" mean stop state. |
| (29) MIXER2 START | Mixer 2start button when manual operation |
| (30) MIXER 2STOP | Mixer2 stop button when manual operation. |
| (31) DOSING PUMP 1 | Dosing pump1 working indication lamp |
| (32) STOP
M(D. PUMP 1)A | Dosing pump 1 switch, "M" mean manual operation, "A" mean auto operation, "Stop" mean stop state. |
| (33) DOSING MIXER 1 | Dosing mixer 1 working indication lamp |
| (34) STOP
M(D. MIXER 1)A | Dosing mixer 1 switch, "M" mean manual operation, "A" mean auto operation, "Stop" mean stop state. |
| (35) DOSING PUMP 2 | Dosing pump2 working indication lamp |
| (36) STOP
M(D. PUMP 2)A | Dosing pump 2 switch, "M" mean manual operation, "A" mean auto operation, "Stop" mean stop state. |
| (37) DOSING MIXER 2 | Dosing mixer 2 working indication lamp |
| (38) STOP
M(D. MIXER 2)A | Dosing mixer 2 switch, "M" mean manual operation, "A" mean auto operation, "Stop" mean stop state. |
| (39) DOSING PUMP 3 | Dosing pump3 working indication lamp |
| (40) STOP
M(D. PUMP 3)A | Dosing pump 3 switch, "M" mean manual operation, "A" mean auto operation, "Stop" mean stop state. |
| (41) DOSING MIXER 3 | Dosing mixer 3 working indication lamp |
| (42) STOP
M(D. MIXER 3)A | Dosing mixer 3 switch, "M" mean manual operation, "A" mean auto operation, "Stop" mean stop state. |
| (43) DOSING PUMP 4 | Dosing pump4 working indication lamp |
| (44) STOP
M(D. PUMP 4)A | Dosing pump 4 switch, "M" mean manual operation, "A" mean auto operation, "Stop" mean stop state. |
| (45) DOSING MIXER 4 | Dosing mixer 4 working indication lamp |
| (46) STOP
M(D. MIXER 4)A | Dosing mixer 4 switch, "M" mean manual |

	operation, "A" mean auto operation, "Stop" mean stop state.
(47) EC SYSTEM	System working indication lamp.
(48) EC FORWARD	DC. Forward output indication lamp.
(49) EC REVERSE	DC. Reverse output indication lamp.
(50) EC FAULT	EC System indication lamp when fault
(51) LOW LEVEL	Mean collection tank low level indication lamp
(52) EC START	EC System start button.
(53) EC STOP	EC System stop button.
(54) OFF (EC POWER) ON	ECR power switch.
(55) OFF (E.VALVE) ON	Discharge electromagnetic valves switch.
(56) EMERGENCY STOP	All components will stop when press the button.
(57) OFF (FILTER P.) ON	Filter press power switch
(58) OFF (AIR C.) ON	Air compressor power switch
(59) HIGH LEVEL	When level of collection tank more than the highest level , the buzzer will buzz, it mean lift pump damage or be blocked .

2.2 Reaction unit

The Model EC-200 reaction unit electrocoagulation cell is designed to treat water at a maximum flow rate of 12000Litres per hour and is comprised of electrocoagulation cell, electrode, pipes and support.

2.2.1 EC cell

- (1) Material: PVC
- (2) Rabbet Qty. of EC cell: 96.
- (3) Size of EC cell: L1600mm,W915, H1000mm

2.2.2 Electrode

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-200 electrocoagulation cell houses a combination of uni-polar electrodes and bi-polar electrodes, using a total of 96 electrodes for EC cell. The uni-polar electrodes are made from SUS304 ,the bi-polar electrodes are made from Alumium and are shaped to fit into individual slots within the electrode housing. Bi-polar electrodes are a consumable item and will require periodic cleaning and replacement.

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.

- (1) Electrode material:
Bio-polar: Aluminium.
Uni-polar: Stainless steel 304.

- (2) Qty. Of uni-polar electrode: 24pcs.
 2.2.3 Support
 Material: Stainless steel 304.

2.3 Pipes unit

- 2.3.4 Adjust Valves
 Adjust Valves can adjust flow rate that feed to EC cell.
 Type: Ball valve.
 Material: PVC.
 Inlet/outlet : 2"
 Qty. : 1 pcs.
 Inlet/outlet: 1.5"
 Qty.: 3pcs
- 2.3.5 Flow meter
 Measure range: 5-25M3/H
 Material: PVC.
 Inlet/outlet: 2"
 Qty. : 1pcs.

3.0 INSTALLATION

- Place the units (control unit , reaction unit, dosing units) to suitable site and fix them.

Pipes connection:

- Connect pipes from the output of lift pump to inlet of EC cell (2") .
- Connect pipes from the outlet of EC cell to mixer tank.
- Connect pipes from the outlet of electromagnetic valve to collection tank.

Circuit wire connection:

- Connect cable of electromagnetic valve to control unit .
- Connect cable of level switch to control unit (three pcs level switch)
- Connect cable of lift pumps to control unit.
- Connect cable of collection pumps to control unit .
- Connect cable of dosing pumps and dosing mixers to control unit (4pcs)
- Connect D.C. output of control unit to EC cell (50mm2)..
- Connect Power supply from control unit to filter press.
- Connect power supply from control unit to air compressor.
- Put electrodes to EC cell and connect them on drawing.

4.0 CONTROLS INSTRUCTION

Refer to attached drawing .

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

1. EC unit

“OFF (EC) ON” select switch control to supply or cut off power to EC unit.

“ EC START” button control to start whole system , and D.C. output to EC cell.

“ EC STOP” button control to stop whole system and stop D.C. output to EC cell.

2. Lift pump 1 (3 phase 220V,60HZ, 2.2KW)

When select switch “M STOP/(L. PUMP 1) A” turn to “M”, lift pump 1 will be manual operation , “L.PUMP 1 START” and “L. PUMP1 STOP” can be used by manual, and level switch can not control the feed pump.

When select switch turn to “stop” , no power supply to the lift pump 1.

When select switch turn to “A” , lift pump will be Auto operation , pump 1 will stop if low level of collection or clear water tank high level , pump 1 will start if high level of collection and no high level of clear water tank .

Lift pump 2 same to lift pump 1, lift pump 1 and 2 can be choosed to use.

3. Collection pump 1 (3 phase 220V,60HZ, 2.2KW)

The pump will pump waste water to collection tank.

When select switch “M STOP/(C. PUMP 1) A” turn to “M”, Collection pump 1 will be manual operation , “C.PUMP 1 START” and “C. PUMP1 STOP” can be used by manual, and level switch can not control the feed pump.

When select switch turn to “stop” , no power supply to the collection pump 1.

When select switch turn to “A” , collection pump1 will be Auto operation , collection pump 1 will stop if high level of collection tank , collection pump 1 will start if low level of collection tank .

Collection pump 2 same to collection pump 1, collection pump 1 and 2 can be choosed to use.

4. Mixer 1 (3phase 220V,60HZ , 2.2KW)

When select switch “M STOP/(MIXER 1) A” turn to “M” , mixer 1 will be manual operation, “MIXER 1 START” and “MiXER 1 STOP” can be used by manual .

When select switch turn to “stop” , no power supply to the mixer.

When select switch turn to “A” , mixer will be Auto operation , mixer will start or stop with lift pump .

5. Mixer 2 (3phase 220V,60HZ , 2.2KW)

When select switch “M STOP/(MIXER 2) A” turn to “M” , mixer 2 will be manual operation, “MIXER 2 START” and “MiXER 2 STOP” can be used by manual .

When select switch turn to “stop” , no power supply to the mixer 2.

When select switch turn to “A” , mixer will be Auto operation , mixer 2 will start or stop with lift pump . Mixer 2 is spare .

6. Dosing pump 1 (Single phase 220V,60HZ , 40W)

When select switch “M STOP/(D.PUMP 1) A” turn to “M” , dosing pump 1 will start . When select switch turn to “stop” , no power supply to the dosing pump 1. When select switch turn to “A” , dosing pump will be Auto operation with PH controller 1 . dosing pump 1 can be as NaOH dosing pump.

Dosing pump 2, 3 same to dosing pump 1, dosing pump 2,3 will be used as NaOH dosing pump and H2SO4 dosing pump. Dosing pump 4 will be used as PAM dosing pump , it will start /stop with lift pump.

. 6. Dosing Mixer 1 (3 phase 220V,60HZ , 0.55KW)

When select switch “M STOP/(D.MIXER 1) A” turn to “M” , dosing mixer 1 will be start,

When select switch turn to “stop” , no power supply to the dosing mixer 1.

When select switch turn to “A” , dosing mixer 1 will be Auto operation , dosing mixer will start or stop with dosing pump 1.

Dosing mixer 2,3,4 same to dosing mixer 1.

7. POLARITY TIMERS

The polarity timer is housed behind the power unit enclosure door.

The polarity timers (forward and reverse) have been preset to five minutes duration. Polarity of D.C. output will change each five minutes, the timer can be setted on any time.

5.0 SYSTEM START-UP AND OPERATION

- Ensure that there is a constant and steady supply of water to be treated.
- Ensure all pipes system and circuit wire have been connected.
- Turn all switch to “M” .
- Turn on power switch (in Control control cabinet). Test each control component by manual . and check all pipes system whether there are any leak. Adjust flow rate control valves to get a 10.5m³/h flow rate for flow meter.

- Turn all switch to “A” if all components test is OK.
- Turn “OFF (EC POWER) ON” to ON, then press “ EC START” button to start SYSTEM , adjust output current by “CURRENT ADJUST” knob slowly to a value of number. Check the sample of treated water and adjust “CURRENT ADJUST” knob slowly until sample is OK.

CAUTION: Care must be taken to ensure that the flow through each of the cells is maintained between 2000-12000 Litres per hour. Operation of the system at flow rates lower than 1000 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“ EC STOP” button , ECR unit will stop running.
- Turn “OFF (EC) ON” switch to OFF, EC unit will cut off power supply.
- Press “Emergency stop” button, System will stop.

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 threaded rods into the slots of the uni-polar electrodes and tighten a pair of washers and nuts against the opposite sides of each uni-polar 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 when bi-polar electrode be consumed about 90%.

5. Drain the EC CELL by turn “OFF (E.VALVE) ON” switch to ON.
6. Remove the lid from the EC cell.
7. Pull out bi-polar electrodes one by one .
8. Put new bi-polar electrodes on by one.

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

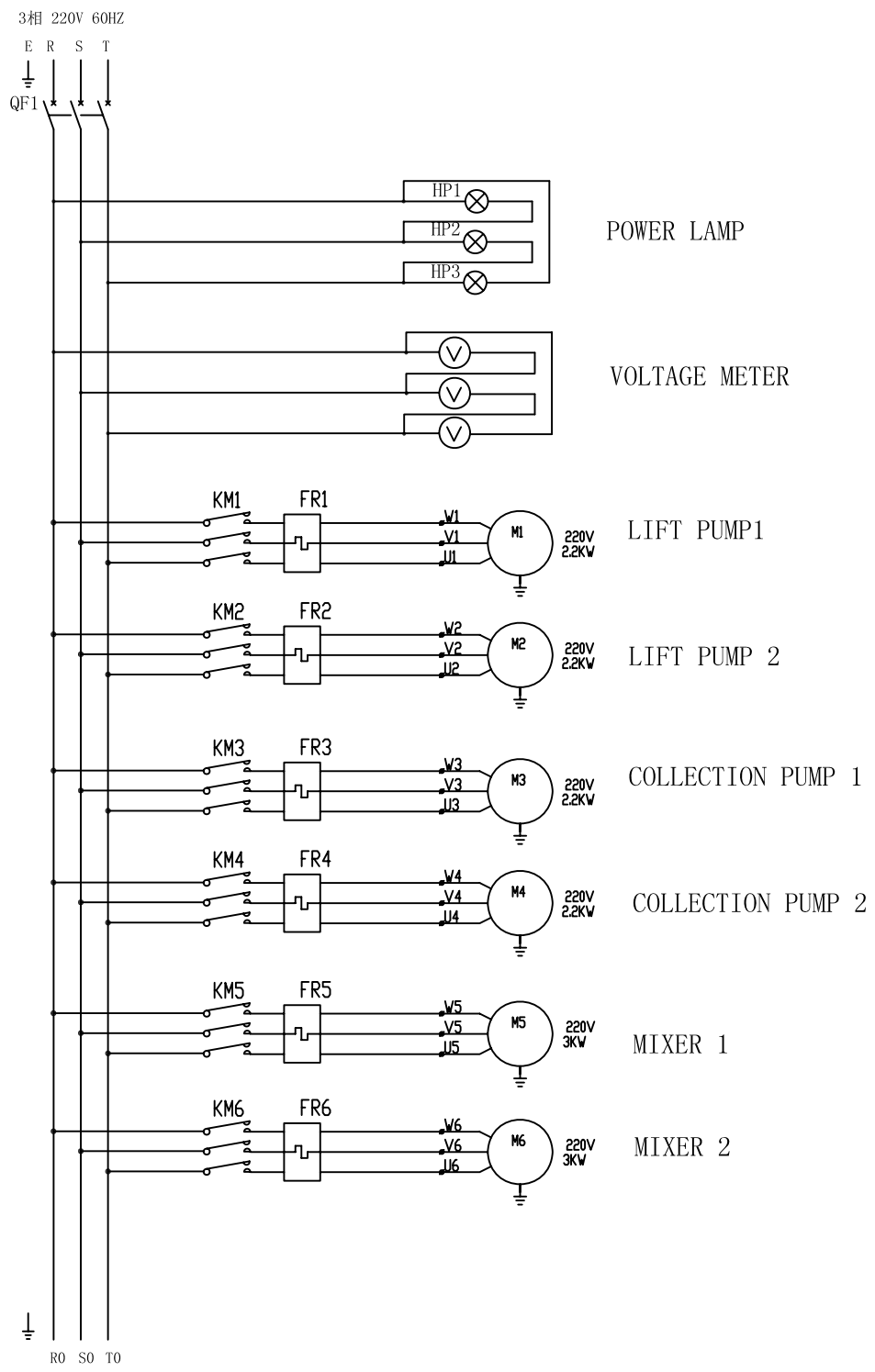
Our use a Isolated transformer in the RCU , So the system is very safe.


8.0 SYSTEM MAINTENANCE

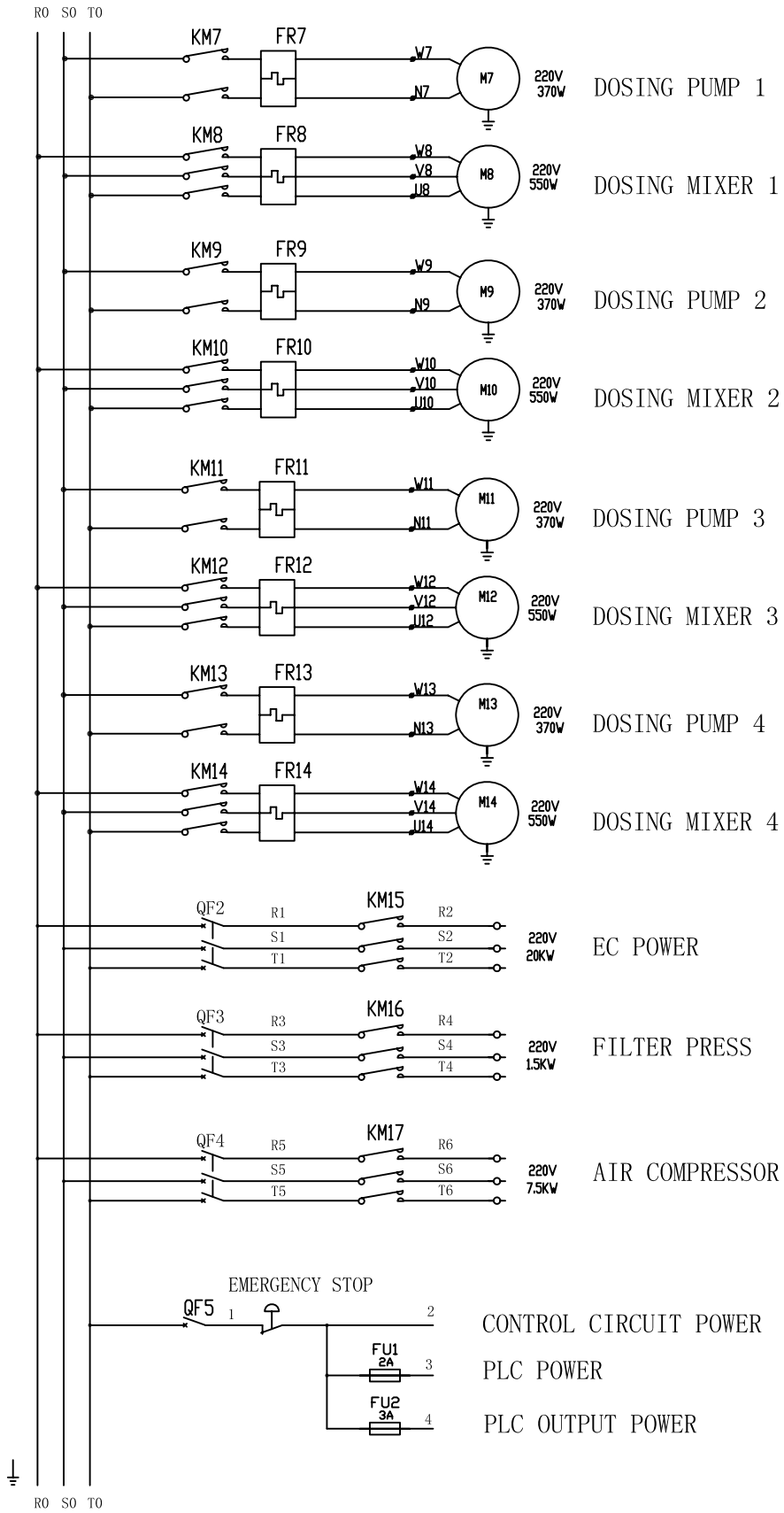
- The electrode surfaces can be cleaned using a high-pressure water jet, or a piece of wet & dry sandpaper if need.


9.0 TROUBLE SHOOTING

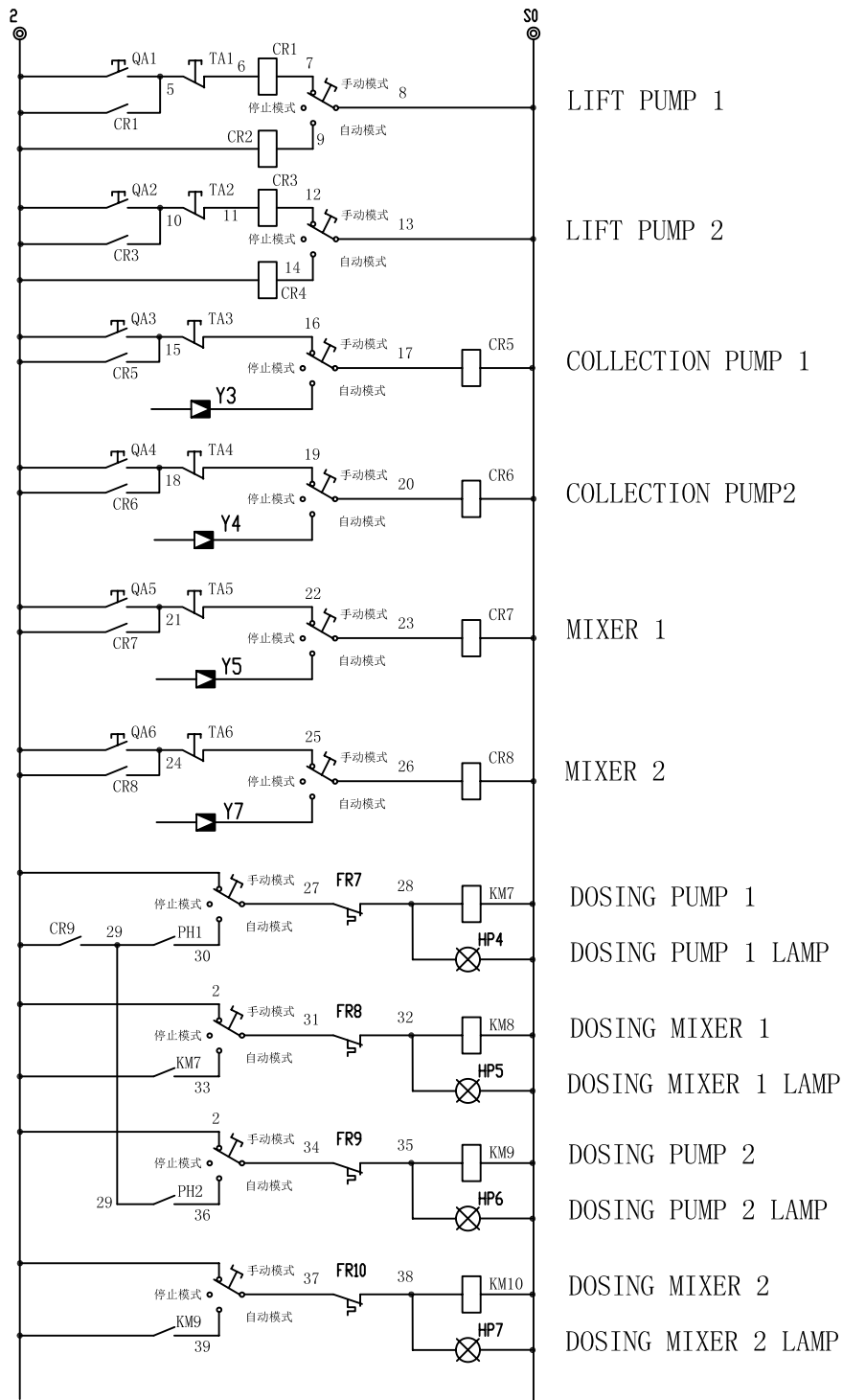
- Please contact Waterpower personnel if any problems are experienced with the operation of the electrocoagulation system.




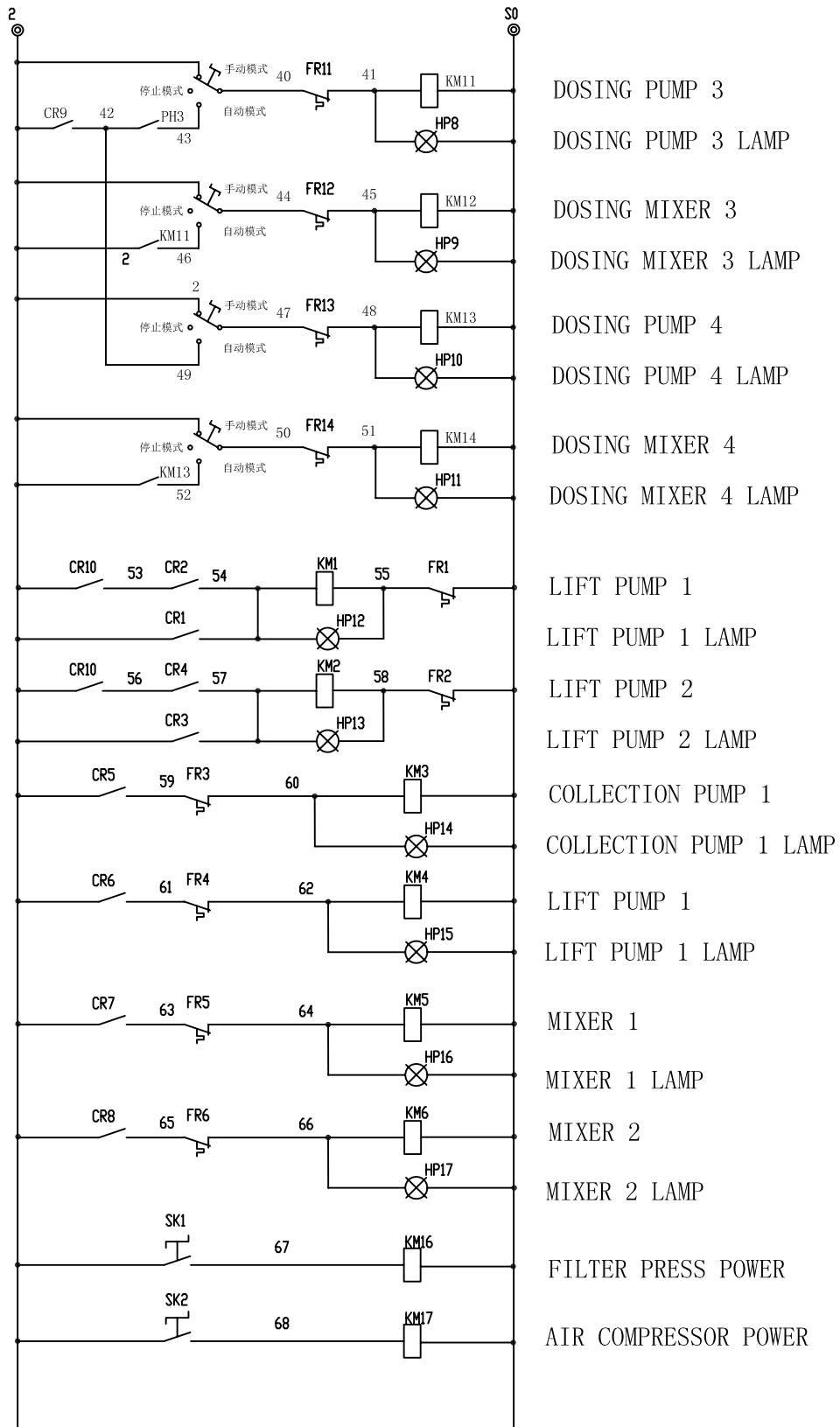
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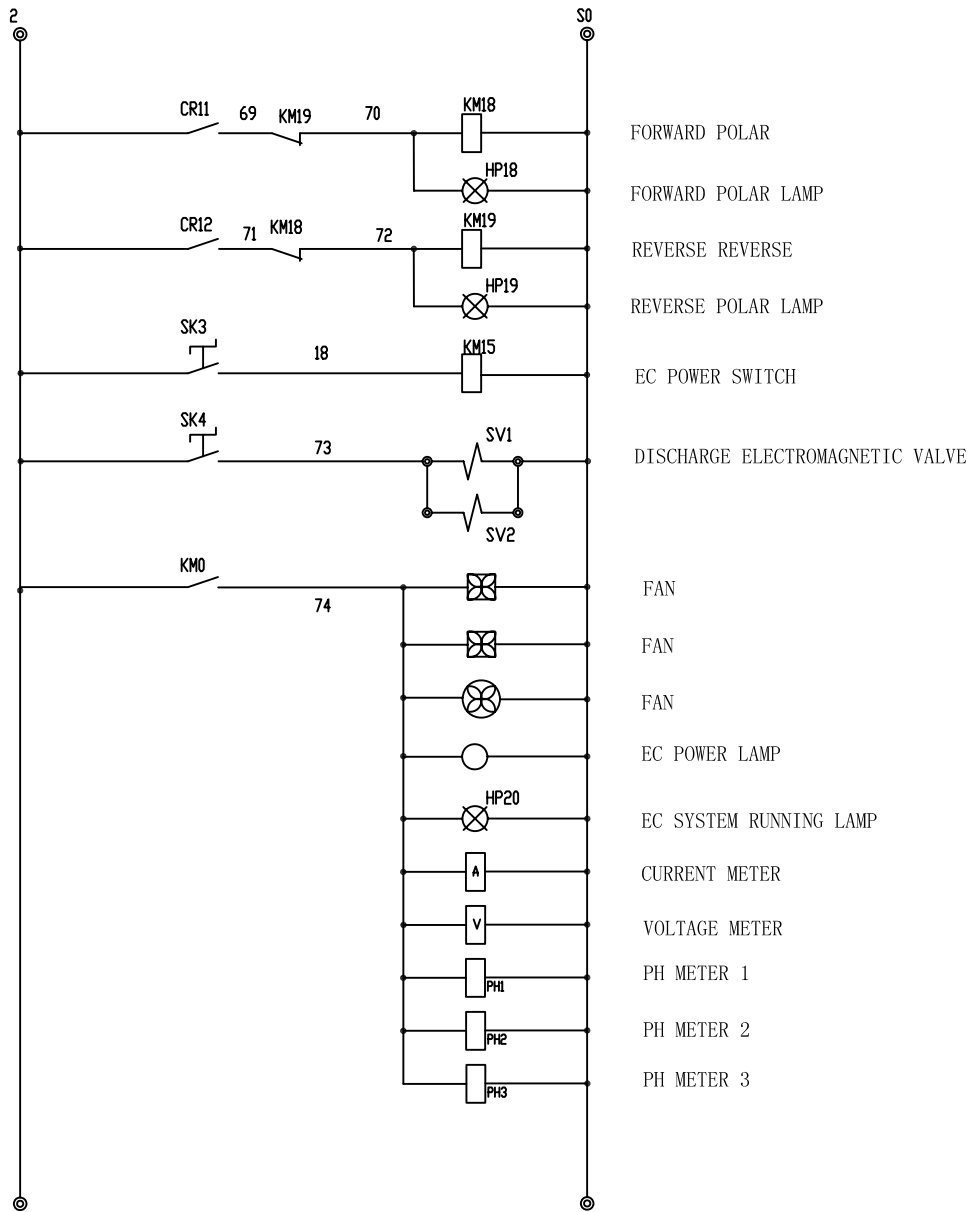
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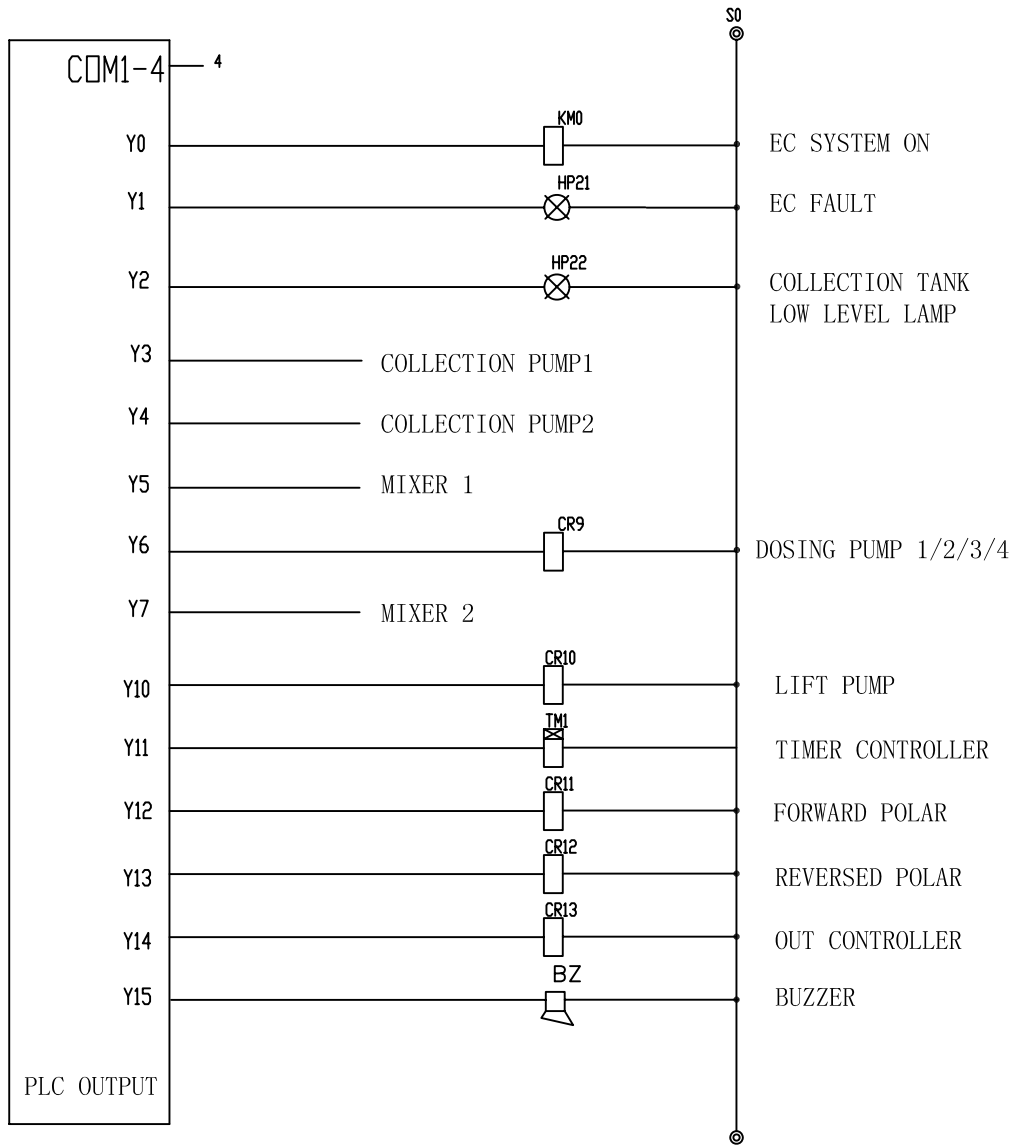
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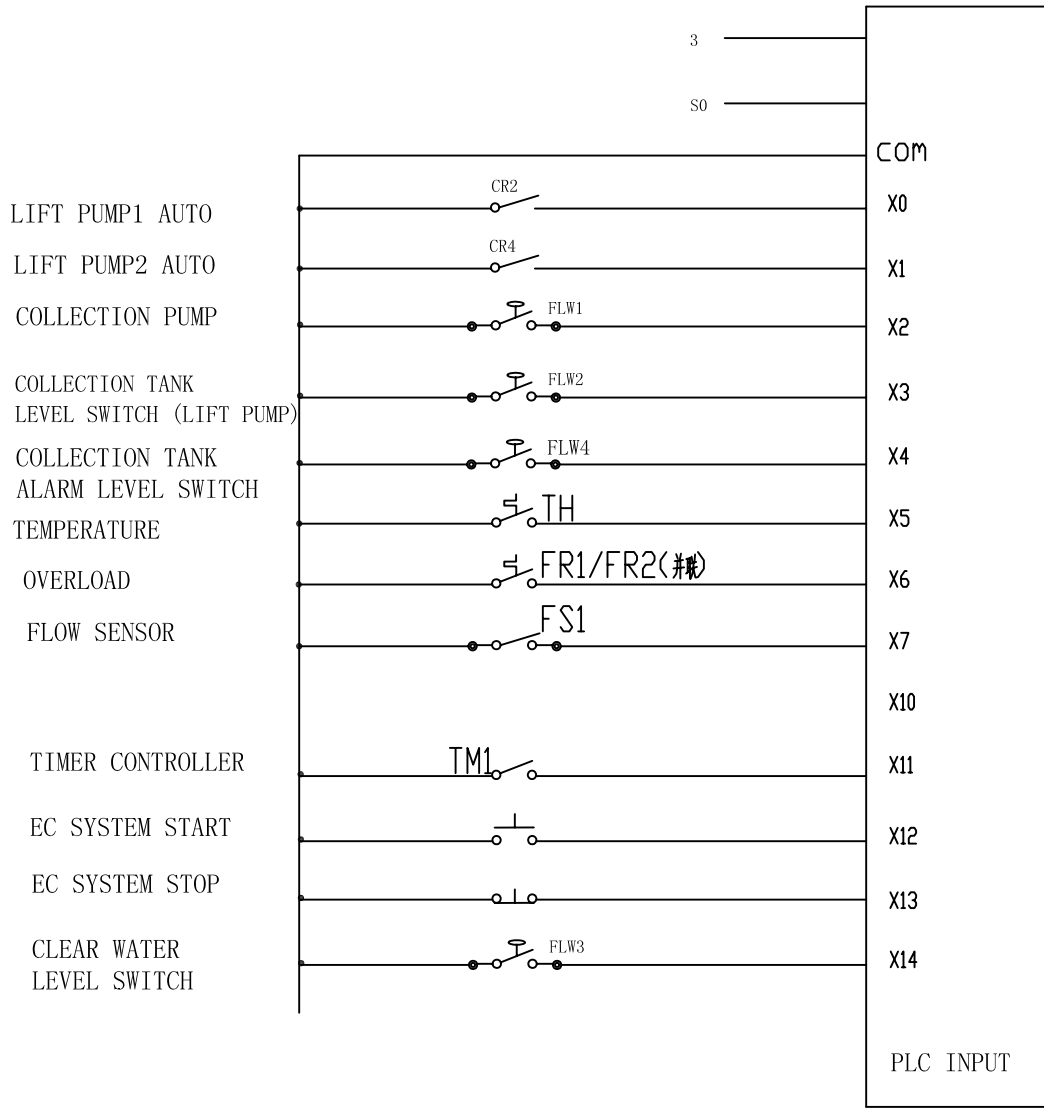
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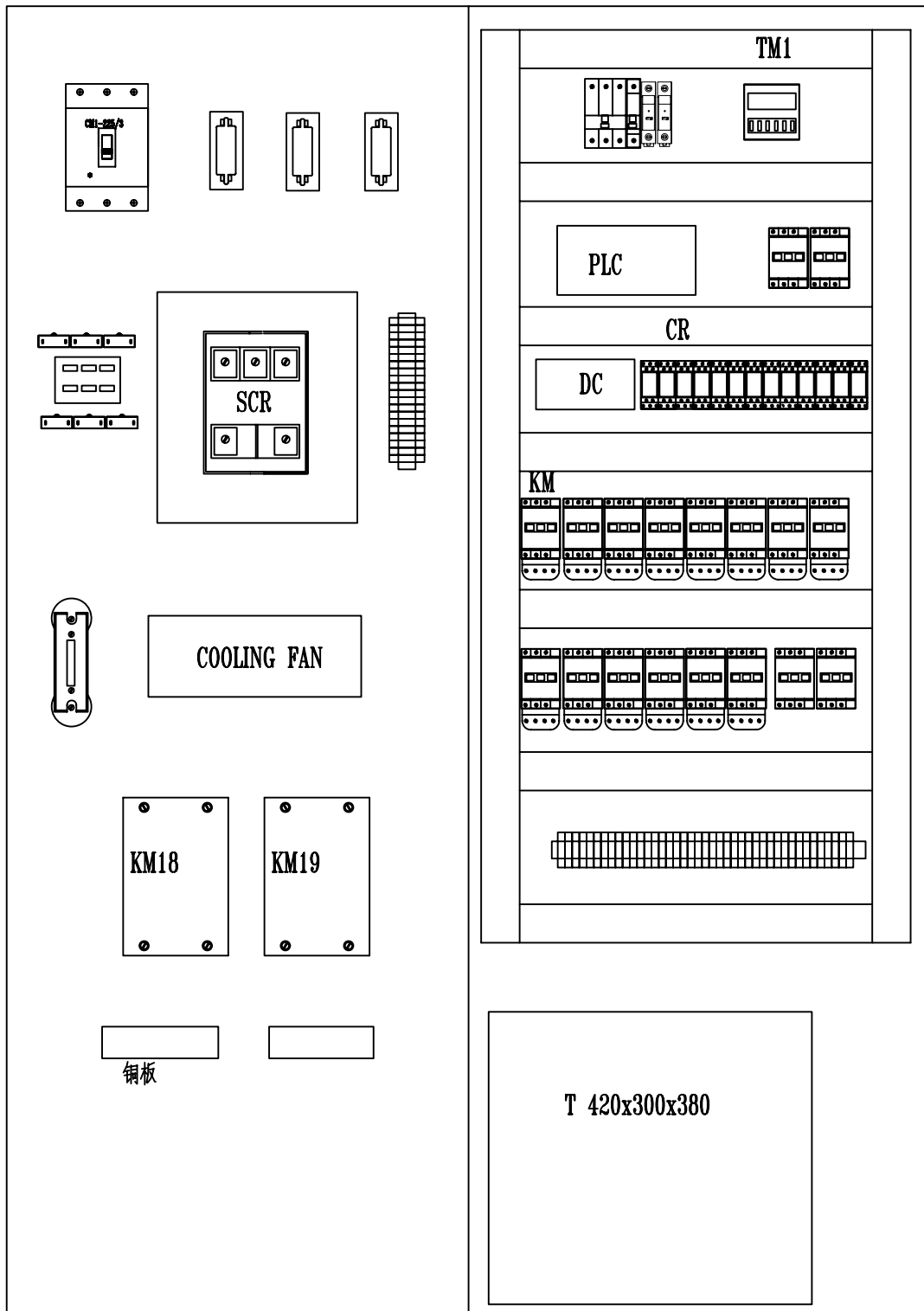
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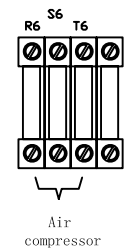
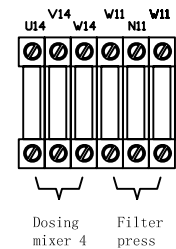
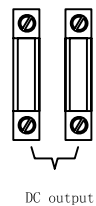
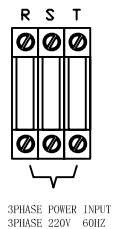
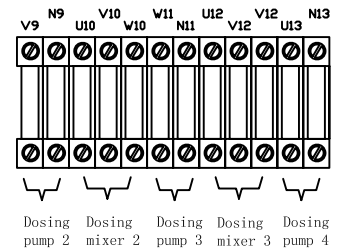
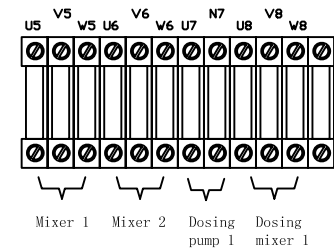
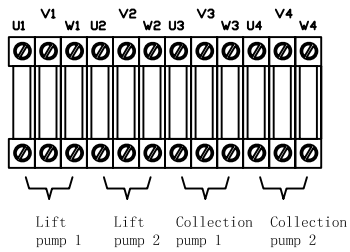
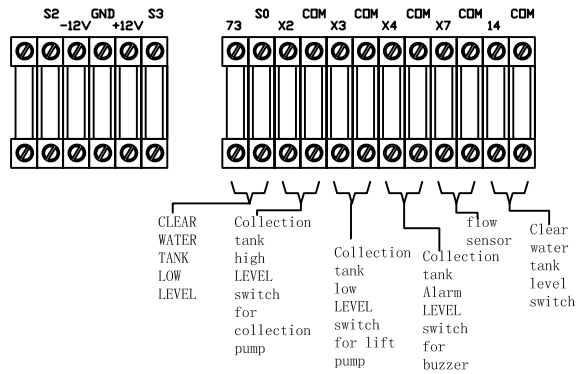
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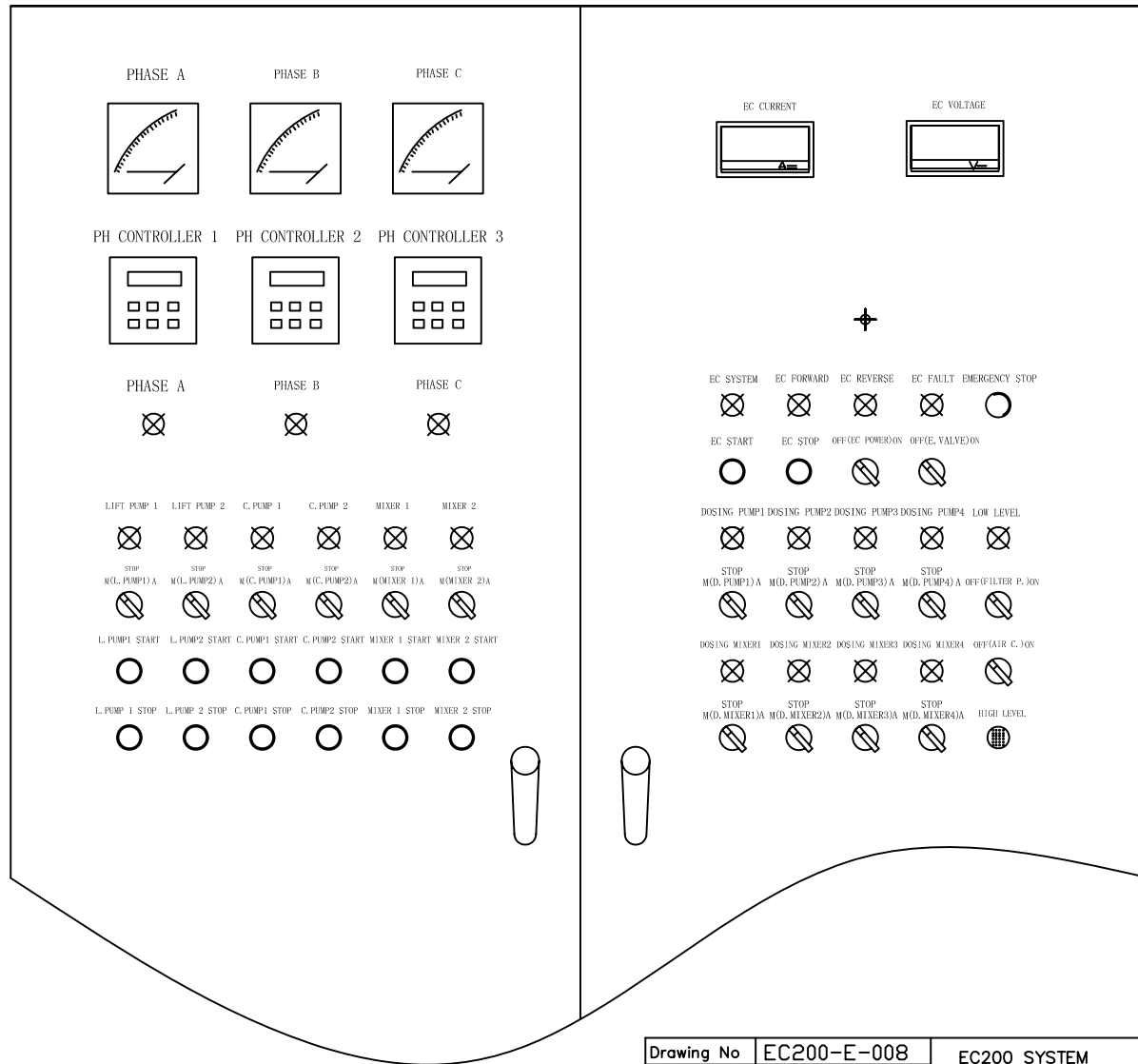
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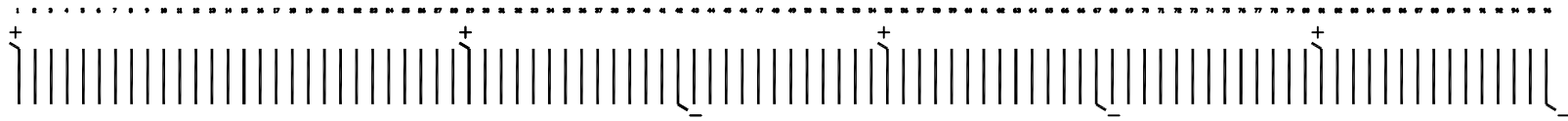


Drawing No	EC200-E-012	EC200 ECR SYSTEM	Material		Surface	
Assemble No			Rev No	Qty	Weight	Scale
Designed	Wong	14.11.08	Terminal wire diagram	V1		
Design Appr	Ketten	14.11.08				
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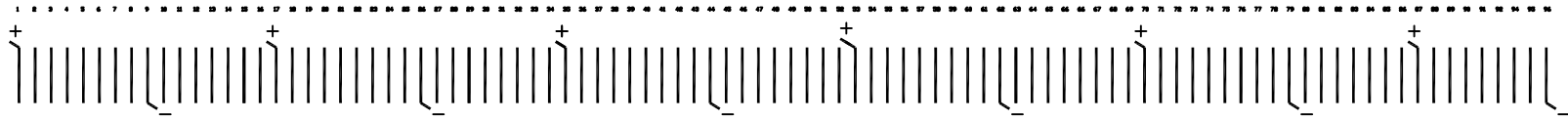


Drawing No	EC200-E-008		EC200 SYSTEM		Material		Surface	
Assemble No					Rev No	Qty	Weight	Scale
Designed	Wong	14.11.08	Panel placement		V1			
Design Appr	Ketten	14.11.08						
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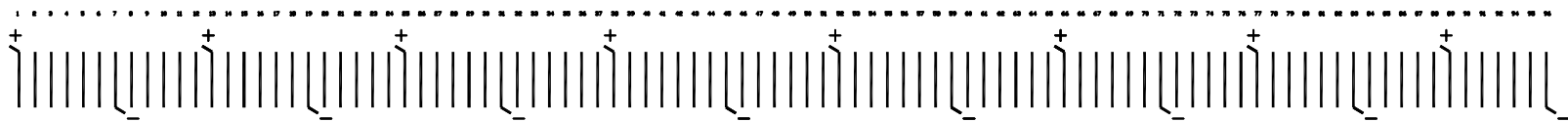
8 PCS UNI-POLAR CONNECTION



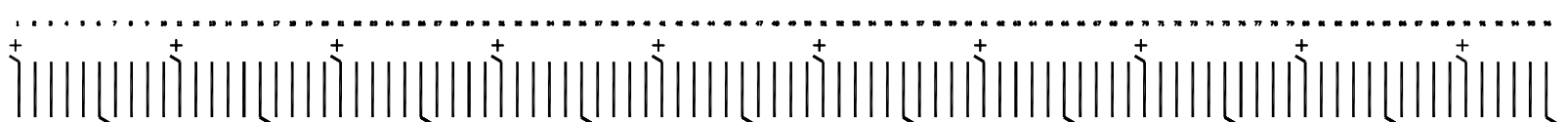
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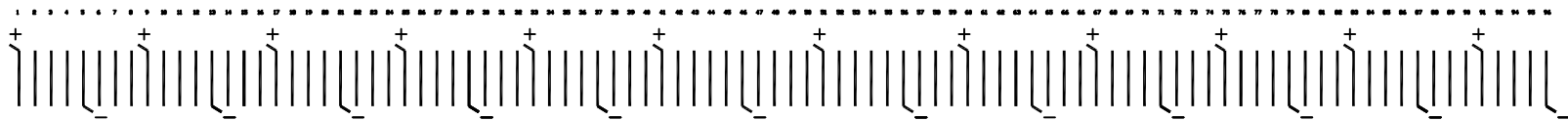
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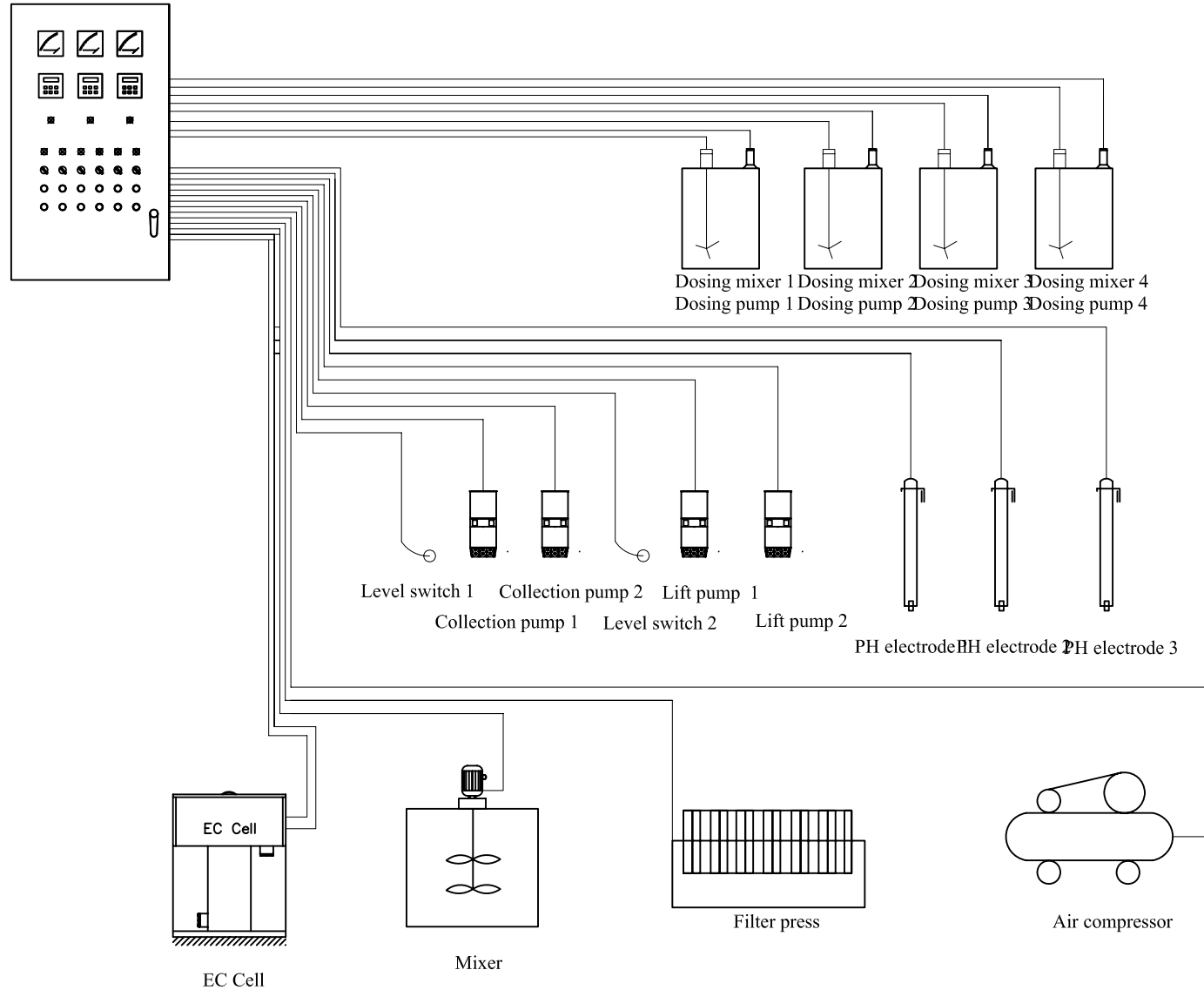
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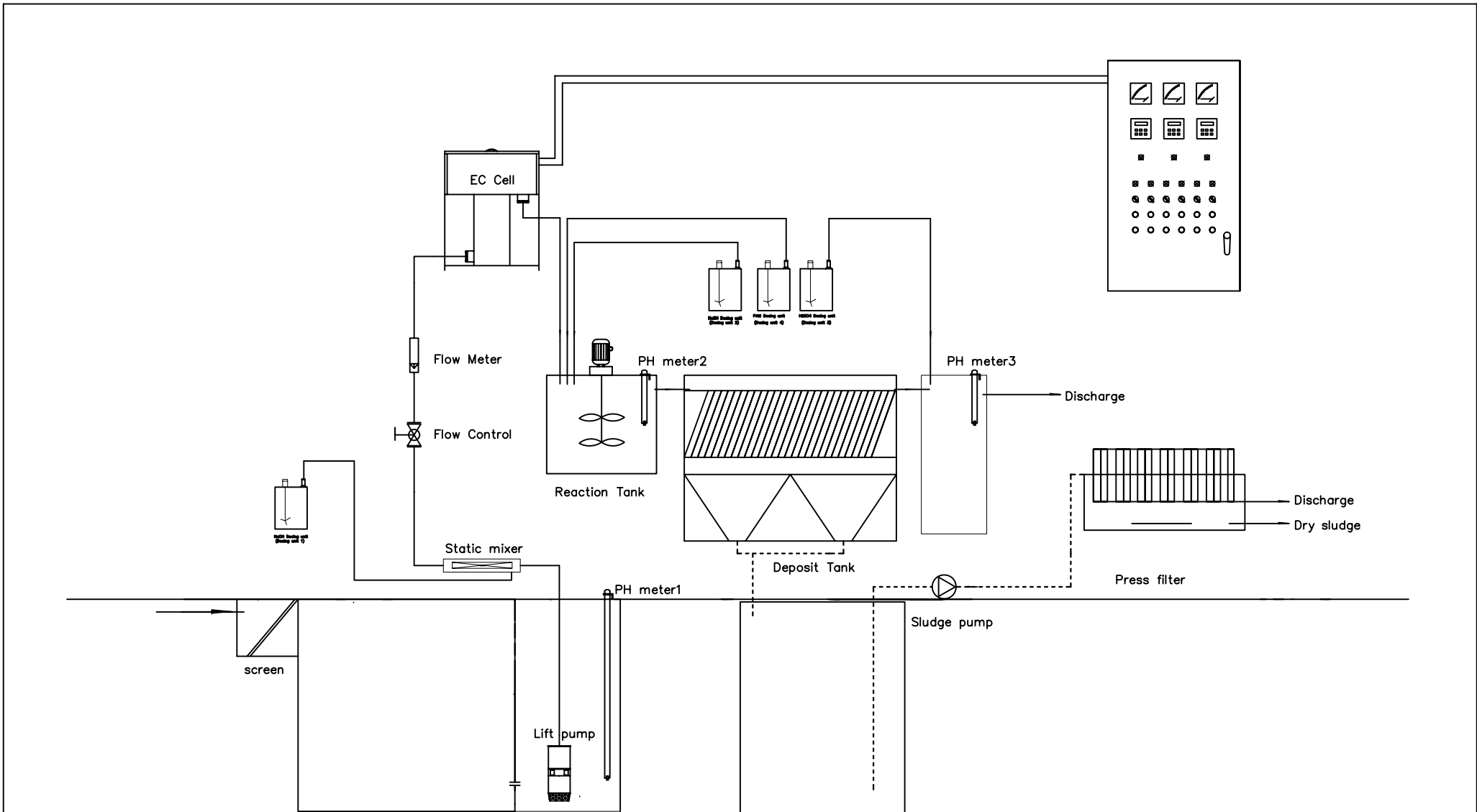
24 PCS UNI-POLAR CONNECTION



Drawing No	EC200-M-002		EC200 ECR SYSTEM	Material		Surface	
Assemble No				Rev No	Qty	Weight	Scale
Designed	Wong	14.11.08	ELECTRODE CONNECTION	V1			
Design Appr	Ketten	14.11.08					
Checked			 SHENZHEN WATERPOWER ENVIRONMENTAL PROTECTION TECHNOLOGY CO.,LTD	Total pge	Page		
Drawn	Wong	14.11.08					



Drawing No	EC200-E-011		EC200 ECR SYSTEM	Material		Surface	
Assemble No				Rev No	Qty	Weight	Scale
Designed	Wong	14.11.08	Components control Diagram	V1			
Design Appr	Ketten	14.11.08					
Checked			 SHENZHEN WATERPOWER ENVIRONMENTAL PROTECTION TECHNOLOGY CO.,LTD	Total pge	Page		
Drawn	Wong	14.11.08					




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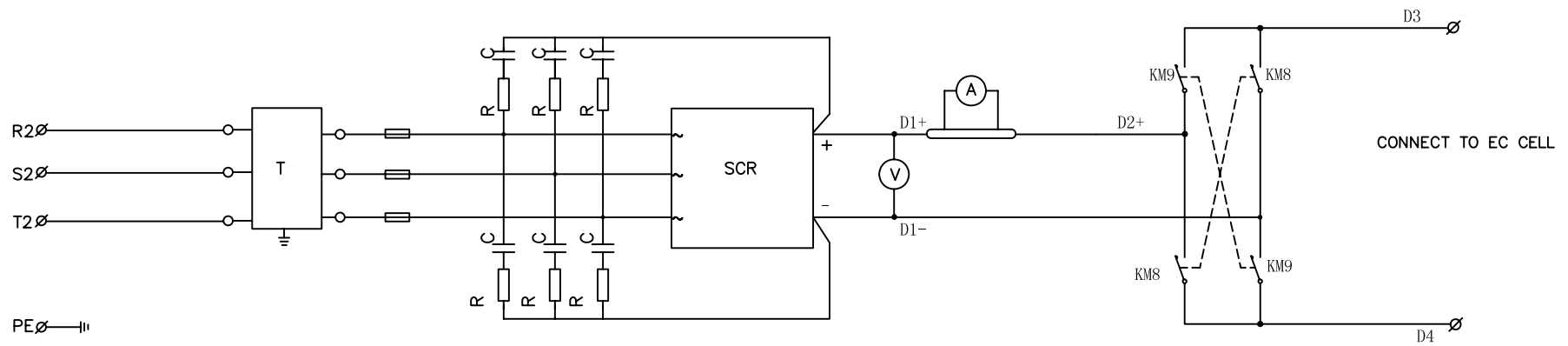
- Waste water pipes
- Slurry pipes
- Chemical pipe
- Wire


Collection tank

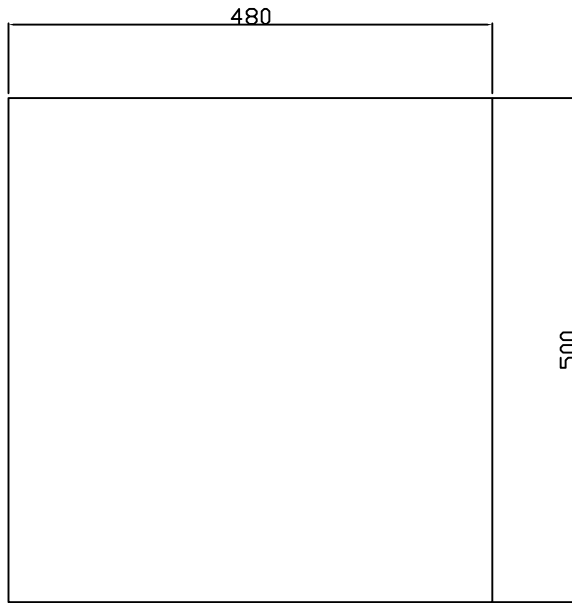
PH adjust tank 1

Sludge tank

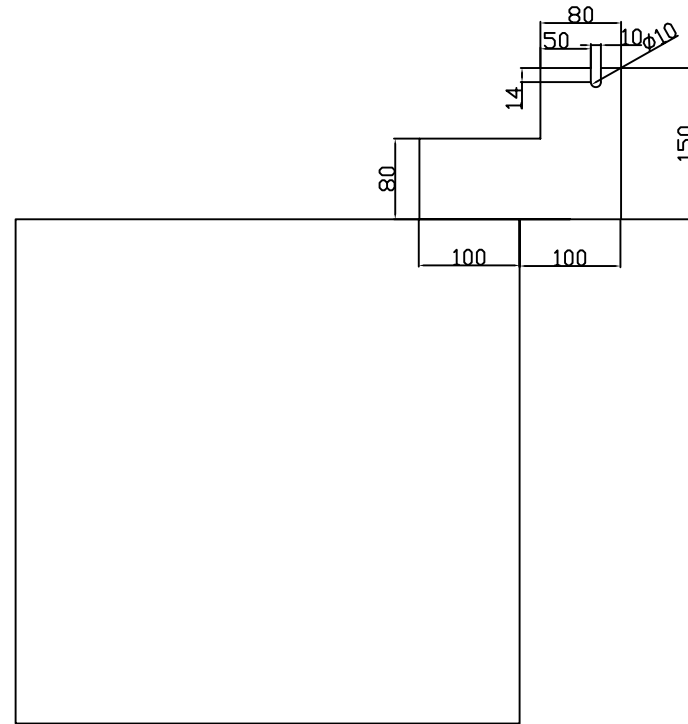
Drawing No	EC200-L-000		EC200 ECR SYSTEM	Material		Surface	
Assemble No				Rev No	Qty	Weight	Scale
Designed	Wong	14.11.08	Treatment Process Diagram	V1			
Design Appr	Ketten	14.11.08					
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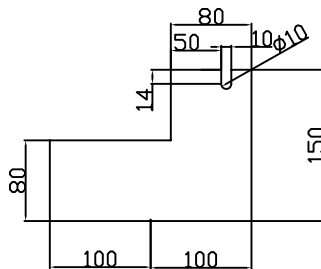
Drawing No	EC200-E-0010		EC200 ECR SYSTEM	Material		Surface	
Assemble No				Rev No	Qty	Weight	Scale
Designed	Wong	14.11.08	Power Supply Process Diagram 10	V1			
Design Appr	Ketten	14.11.08					
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Drawn	Wong	14.11.08					




Bi-POLAR Electrode



UNI-POLAR Electrode



Drawing No	EC200-M-001		EC150 ECR SYSTEM	Material		Surface	
Assemble No				Rev No	Qty	Weight	Scale
Designed	Wong	10.12.05	ELECTRODE	V1			
Design Appr	Ketten	10.12.05					
Checked			 SHENZHEN WATERPOWER ENVIRONMENTAL PROTECTION TECHNOLOGY CO.,LTD			Total pge	Page
Drawn	Wong	10.12.05					