

LBWS-5K

USER MANUAL

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Introduction

This Manual was made for LBWS-5K model's installation, operation and User's convenience.

Please make sure read this manual from A-Z before operating the Electrolyzer and follow the manual so that it can work safely and correctly.

1. Specification



List	Contents	
Model name	LBWS-5K	
Electrolysis Type	Alkaline	
Size	L800 X W980 X H1,570 mm	
Input Voltage	380VAC 3phase	
Power consumption	<5kW	
OS	Window 10	
Adjustable Pressure	Max 5 barg	
Operating Temperature	10 ~ 65°C	
Max Flow rate	40SLM (H2), 20SLM (O2)	
Feed Water Type	Type I Distilled Water, KOH solution.	

2. Components

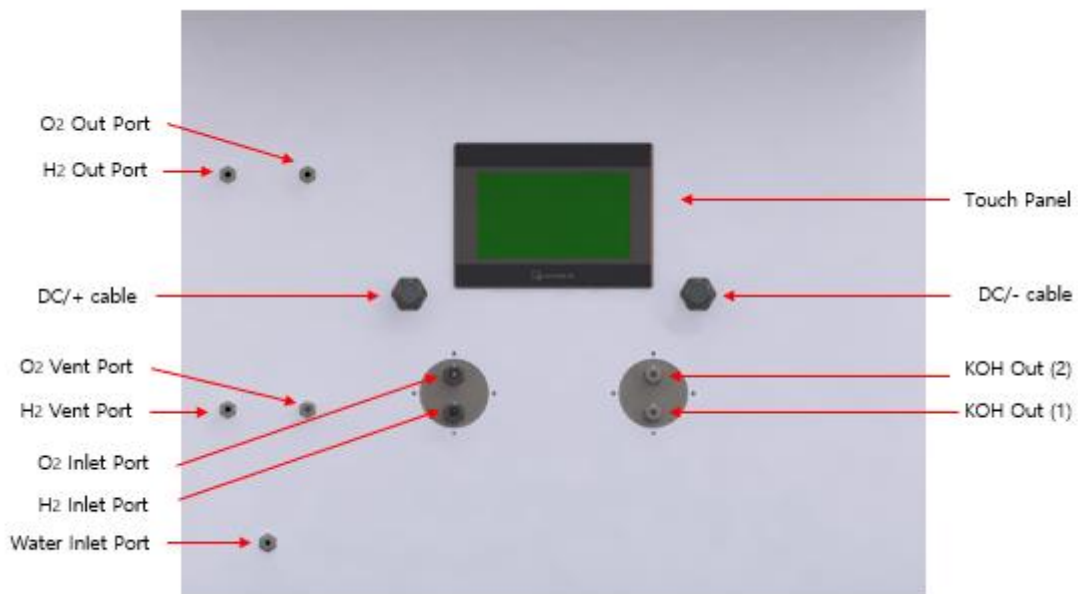
- ① Graphic panel – It controls a hydrogen and oxygen generator while monitoring the overall system status.
- ② H2 Vent, O2 Vent, H2 Cool_Vent, O2 Cool_Vent (Solenoid valve)– As an electric valve, the valve opens and closes due to ON and OFF of electricity.
- ③ Gas/liquid separator – Its function is to separate hydrogen and oxygen.
- ④ PLC Control board – Controls the system operation.
- ⑤ PSU(Power Supply Unit) – Provides DC power to the system.
- ⑥ Circulation Pump – It circulates the water into the stack and gas/liquid separators.
- ⑦ Water Pump – It compensates externally the water consumption due to electrolysis.
- ⑧ Water Out_Pump(water supply pump) – It supplies external water when there is not enough water in the water tank.
- ⑨ Peltier Fan(Peltier cooling system) – It cools the gas from water electrolysis.
- ⑩ Oxygen monitoring(option) – It measures the Concentration of oxygen contained in hydrogen gas in real time.
- ⑪ Computer and Monitor – Those for controlling the system and saving the data.

3. External Components

Front Side

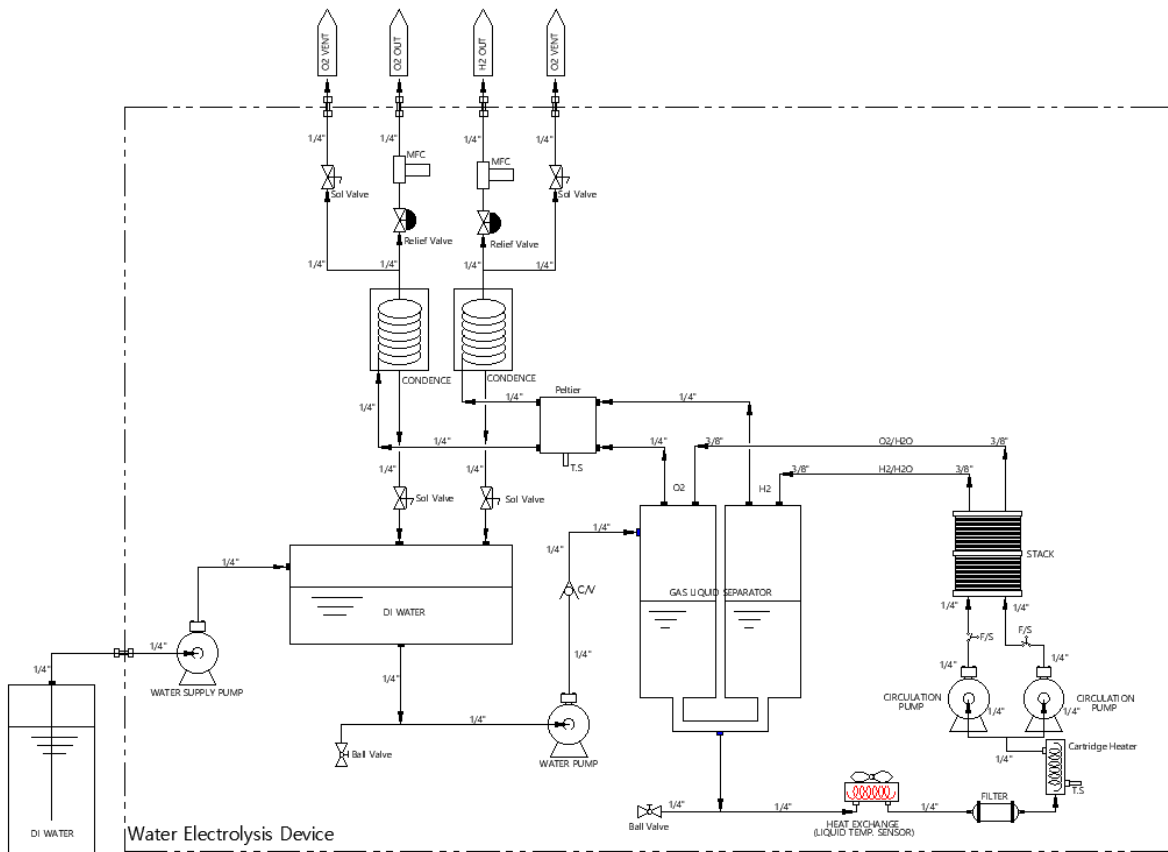


Front Panel





4. System Schematics



5. Initial Setup

- ① Power ON
Connect the 380V 3phase power cable.(over than 4SQ size cable, R S T N and PE)
- ② Turn on the power switch.
- ③ Turn the power and press the computer power.
- ④ When the computer turned on, Open the LB program.
(The date files save in the next folder.)
- ⑤ Connect distilled water to the water supply line. (6mm tube)
- ⑥ Enter the Option mode, and press the Water Out_Pump button to inject distilled water until the W-LOW lamp turns off.(Already the separator filled with KOH)
- ⑦ Go to option mode and press the Water Pump and check the Pump work correctly.
(Inside of the system, you can find a cleared tube it must be filled with water)
- ⑧ If H₂ or O₂ level is 0%, then go to the Option mode and press the Circulation Pump and Water Pump.
- ⑨ H₂ and O₂ level's difference should be less than 30%.
- ⑩ For controlling the level, go to option mode and press H₂ Vent and O₂ Vent and Circulation Pump for an hour.
- ⑪ Press the Water Pump to inject distilled water into the O₂ water separator until the O₂ Level reaches 30%. (It doesn't start when the sum of the levels of hydrogen and oxygen reaches 80% or W-Low turns on).

6. Operation Method

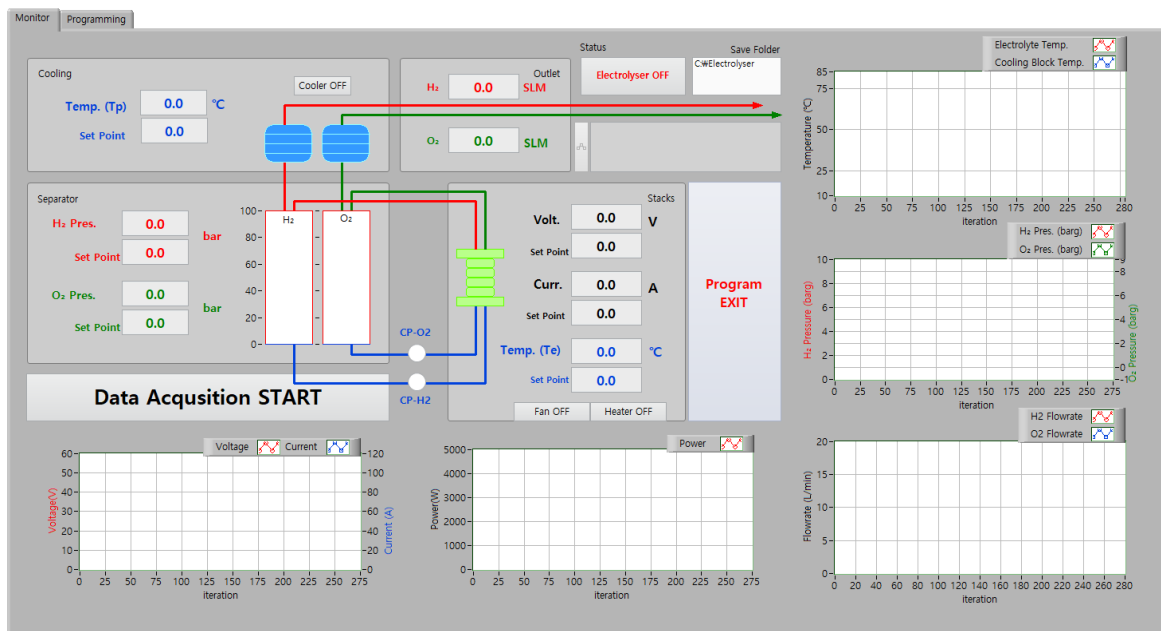
- ① Power ON

Connect the power cable.

- ② Turn the power and press the computer power.

- ③ When the computer turned on, Open the LB program.

(The date files save in the next folder.)



- ④ Computer program's screen.

This program provides status, data.

You can control the electrolyte's temperature, max pressure, apply voltages, currents, gas' cooling temperature (set point).

Data Acquisition Start : For recording the data to computer.

(Please Press the button after running the electrolyzer by touch panel or start button)

Monitor Programming

Programming mode START

Program No. 1	Program No. 2	Program No. 3	Program No. 4	Program No. 5	Program No. 6	Program No. 7	Program No. 8	Program No. 9	Program No. 10
duration (s) 1	duration (s) 1	duration (s) 1	duration (s) 1	duration (s) 1	duration (s) 1	duration (s) 1	duration (s) 1	duration (s) 1	duration (s) 1
Start Voltage (V) 0	Start Voltage (V) 0	Start Voltage (V) 0	Start Voltage (V) 0	Start Voltage (V) 0	Start Voltage (V) 0	Start Voltage (V) 0	Start Voltage (V) 0	Start Voltage (V) 0	Start Voltage (V) 0
End Voltage (V) 0	End Voltage (V) 0	End Voltage (V) 0	End Voltage (V) 0	End Voltage (V) 0	End Voltage (V) 0	End Voltage (V) 0	End Voltage (V) 0	End Voltage (V) 0	End Voltage (V) 0
Start Current (A) 0	Start Current (A) 0	Start Current (A) 0	Start Current (A) 0	Start Current (A) 0	Start Current (A) 0	Start Current (A) 0	Start Current (A) 0	Start Current (A) 0	Start Current (A) 0
End Current (A) 0	End Current (A) 0	End Current (A) 0	End Current (A) 0	End Current (A) 0	End Current (A) 0	End Current (A) 0	End Current (A) 0	End Current (A) 0	End Current (A) 0

Voltage: 0.00 Current: 0.00

⑤ Programming

This tab is for controlling the voltage and the current.

All programs proceed sequentially and operate up to the entered program.

Duration means how long will the program operate.

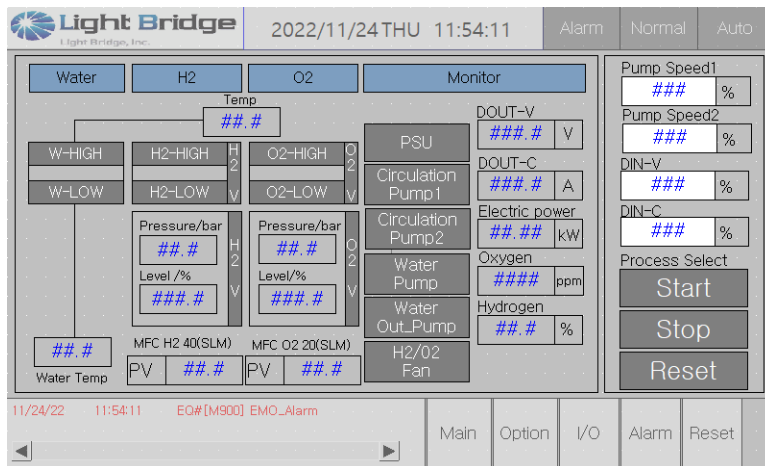
Start voltage, current and End voltage, current controls the power supply at start value and end value gradually.

⑥ Graphic panel activation

Turn the power button on the right of the instrument.

⑦ Main display

- This screen provides basic status.



H₂ : H₂ separator's status.

O₂ : O₂ separator's status.

Water : Level of the water tank.

W-LOW : Indicates the low water level.

W-HIGH : Indicates the high water level.

Monitor : Each part turns on when it is working.

Pump Speed : Setting the water flow rates each of circulation pump1, 2.

DIN-V : Setting the applying voltages.

DIN-C : Setting the applying currents(amps).

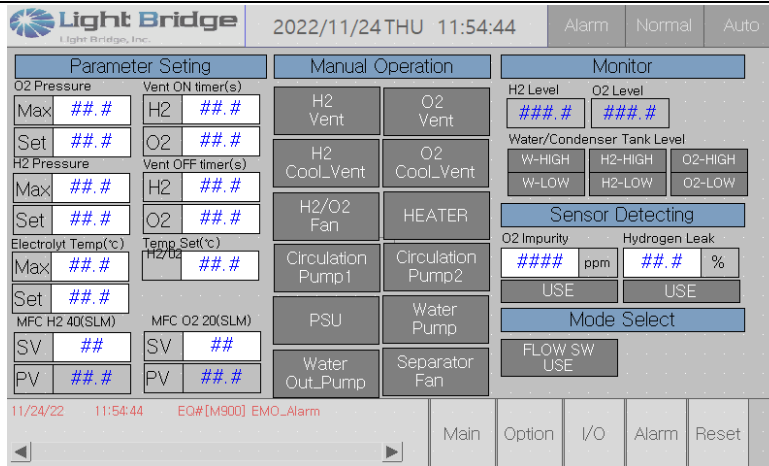
Process Select : Operating the Electrolyzer easily.

Water Temp : indicates the electrolyte's temperature.

MFC(H₂, O₂) : Indicates the flow rate of H₂ gas and O₂ gas

***Before start the system, please follow the initial setup.**

⑧ Option Display



To configure the Option mode, press 'Option' below the touch panel.

O₂ Pressure : Max means the system's maximum pressure and the set button can control the pressure of O₂ side. (If the pressure reach the set pressure, the system pause temporarily and reach the max, the system totally stop).

H₂ Pressure : Max means the system's maximum pressure and the set button can control the pressure of H₂ side. (If the pressure reach the set pressure, the system pause temporarily and reach the max, the system totally stop).

Electrolyte Temp : Max means the System's maximum temperature of the KOH Solution in Celsius deg and the set button can control the temperature when will be the Separator Fan working.

Vent On/Off Timer : For setting the Solenoid Valve's on, off time.

MFC H₂, O₂ : For controlling the output flow rate and indicates.

Manual Operation : You can operate each parts manually by pressing the button. (For repairing the Electrolyzer)

***(Don't operate only PSU, for operating the PSU,
Circulation pump must be on)**



Monitor : Shows the hydrogen, oxygen separator's and water tank's solution level and other's level status.

Vent on. Vent off Timer : Setting the each side of valve's open and close time(over than 0.1 recommended).

Sensor Detecting

Hydrogen : for detecting the hydrogen gas leakages inside of the system.

Flow SW USE : When the system be broken or operate manually, press this button.

-If the flow switch doesn't work, please check the error code and solution.

Trouble would be caused by flexible tube then, please stretch the tube and check the pump speed.

You can set the pressure by two relief valves.(External valve is H₂ side and internal valve is O₂ side.)



The pressure of H₂, O₂ side must be almost same.

⑨ I/O Display

Light Bridge 2022/11/24 THU 13:05:49 Alarm Normal Auto

P0000	Start_Bit	P0010	-
P0001	Stop_Bit	P0011	-
P0002	EMO_Bit	P0012	-
P0003	Flow_Sw_H2 Bit	P0013	-
P0004	O2_Tank_High_Bit	P0014	-
P0005	O2_Tank_Low_Bit	P0015	-
P0006	H2_Tank_High_Bit	P0016	-
P0007	H2_Tank_Low_Bit	P0017	-
P0008	Water_Tank_High_Bit	P0018	-
P0009	Water_Tank_Low_Bit	P0019	-
P000A	PSU_Alarm_Bit	P001A	-
P000B	-	P001B	-
P000C	Flow_Sw_O2 Bit	P001C	-
P000D	-	P001D	-
P000E	-	P001E	-
P000F	Water_Pump_Alarm_Bit	P001F	-

11/24/22 13:05:49 EQ#[M900] EMO_Alarm

Main Option I/O Alarm Reset

Light Bridge 2022/11/24 THU 13:06:14 Alarm Normal Auto

P0020	Start_Lamp	P0030	-
P0021	Stop_Lamp	P0031	-
P0022	Stack_PSU_ON	P0032	-
P0023	H2_Fan	P0033	-
P0024	(IN)Water_Pump	P0034	-
P0025	Separator_Fan	P0035	-
P0026	Circulation_Pump1	P0036	-
P0027	Circulation_Pump2	P0037	-
P0028	Separator_O2_Vent	P0038	-
P0029	Separator_H2_Vent	P0039	-
P002A	Buffer_O2_Cool_Vent	P003A	-
P002B	Buffer_H2_Cool_Vent	P003B	-
P002C	(OUT)Water_Pump	P003C	-
P002D	-	P003D	-
P002E	HEATER	P003E	-
P002F	-	P003F	-

11/24/22 13:06:14 EQ#[M900] EMO_Alarm

Main Option I/O Alarm Reset

I/O Monitor : For monitoring whole parts connected to I/O in the system for operating.

*If you want to add any parts, you can use the empty side.

Alarm List

Light Bridge 2022/11/24 THU 13:06:34 Alarm Normal Auto

Alarm List

11/24/22	13:06:34	EQ#[M900] EMO_Alarm
11/24/22	13:06:34	EQ#[M900] EMO_Alarm
11/24/22	13:06:34	EQ#[M900] EMO_Alarm

List Reset

11/24/22 13:06:34 EQ#[M900] EMO_Alarm

Main Option I/O Alarm Reset



It shows the list when the Alarm have occurred.

After troubleshooting, if you want to remove the list, press the List Reset.

⑩ Emergency Alarm List

No.	Alarm List	Condition	Solution
EQ#[M900]	EQ#[M900] EMO_Alarm	Emergency Button is on	Make the Emergency button off
EQ#[M901]	EQ#[M901] Water_Tank_Alarm	Not enough water in water tank	Put Distilled Water to Water Tank manually (Water Out_Pump)
EQ#[M902]	EQ#[M902] Water_Pump_Alarm	Water Pump is on but, Separator Level is consistent over 5 minutes.	Stop and press the Reset button
EQ#[M903]	EQ#[M903] Stack_PSU_Alarm	O2 side consenser's level is high but, Power Supply is on	Turn off the system and wait for 30 seconds and turn on the system
EQ#[M904]	EQ#[M904] PSU_Siganl_Alarm-	Power supply sent a signal.	Turn off the system and wait for 30 seconds and turn on the system
EQ#[M905]	EQ#[M905] Temp_Sensor_Alarm	Solution's temperature is below 4 °C	Increase the ambient temperature
EQ#[M906]	EQ#[M906] [M]S_Pump_FlowSW_Alarm	The circulation pump works but, the flow swich is off	Stop and increase the pump speed. If same trouble occur, check the flow line(make it stretch)
EQ#[M907]	EQ#[M907] Oxygen_Sensing_Alarm	O2 gas in H2 is over the set ppm	Stop and refresh the system
EQ#[M908]	EQ#[M908] Hydrogen_Sensing_Alarm	H2 detected over the set %	Stop and refresh the system
EQ#[M909]	EQ#[M909] PSU_Output_Alarm	Power supply doesn't work over 30 seconds	Turn off the system and wait for 30 seconds and turn on the system
EQ#[M90A]	EQ#[M90A] Water_Pump_Fault_Alarm	When the Water_Pump doesn't work	Stop and go to option mode and press the Water_Pump and check the pump works water tank to separator

EQ#[M90B]	EQ#[M90B] O2_MAX_Pressure_Alarm	O2 separator's pressure is over the Max	Stop and make the pressure below the max and press the reset button
EQ#[M90C]	EQ#[M90C] H2_MAX_Pressure_Alarm	H2 separator's pressure is over the Max	Stop and make the pressure below the max and press the reset button
EQ#[M90D]	EQ#[M90D] Separator MAX Temp Alarm	Separator's temperature is over the set	Stop and make the system cool down and press the reset button
EQ#[M90E]	EQ#[M90E] H2 Separator Level Max	It occurs When the H2 separator's level keep over 65% more than 30 seconds	Stop and press the Reset button
EQ#[M90F]	EQ#[M90F] H2 Separator Level LOW	It occurs When the H2 separator's level keep under 15% more than 30 seconds	Stop and press the Reset button
EQ#[M910]	EQ#[M910] O2 Separator Level MAX	-It occurs When the O2 separator's level keep over 65% more than 30 seconds	Stop and press the Reset button
EQ#[M911]	EQ#[M911] O2 Separator Level LOW	It occurs When the O2 separator's level keep under 15% more than 30 seconds	Stop and press the Reset button
EQ#[M912]	EQ#[M912] Separator level difference	It occurs When the each separator's level difference keep over 20% more than 30 seconds	Stop and press the Reset button
EQ#[M913]	EQ#[M913] Water Tank High_Manual	It occurs when Water Out_Pump works manually, and Water Tank's level is High.	Stop the Water Out_Pump and press the Reset button
EQ#[M914]	EQ#[M914] Auto Vent_Manual	Separator's difference is over than 20% and Auto Vent keep work more than 30 seconds manually.	Stop and press the Reset button
EQ#[M920]	EQ#[M920] AD_Card_Error	AD Card make error signal	Contact us
EQ#[M921]	EQ#[M921] TC_Card_Seting_Error	TC Card make sensor error signal	Contact us

EQ#[M922]	EQ#[M922] TC_Card_Solid_Wire_Error	TC Card make disconnection signal	Contact us
EQ#[M923]	EQ#[M923] DV_Card_Error	DV Card make error signal	Contact us
EQ#[M924]	EQ#[M924] PLC_Error	PLC make error signal	Contact us



*If the trouble occurs repeatedly, Please contact us.

⑪ Protection setup

The oxygen sensor measures the concentration of Oxygen gas. Oxygen Alarm Set will show when the concentration of Oxygen gas goes over the set. Hydrogen detection detects the sound of hydrogen in the water electrolysis device. In this screen, the oxygen concentration and the upper limit of the hydrogen volume are set to ensure the safety of electrolysis system.

⑫ System Power off

⑬ Front Panel Lights Mean

Status	Front Button Color
The Electrolyzer is on operating.	Green light on 
The Electrolyzer has stopped.	Red light on 
The Electrolyzer has interrupted with trouble. (Check the Electrolyzer's status through the panel and please follow the manual's Alarm List)	Red and Green light simultaneously blinking

7. Cautions

- If you want to completely shut down the system, keep the circulation pump and fan running until the water temperature drops to room temperature.
- Do not lay the electrolyzer by side or upside down.
- Do not disassemble or open the product.
- Please set the generation pressure of hydrogen and oxygen at least to 1 bar.
- Do not allow the setting of the water temperature to be above 65°C.
- If the water leaks, stop the operation and ask for customer support.
- Always keep the water supply port in the container filled with water.
- When the vent the gas, there could contain some water.
- Do not increase the pressure above 5 bar.
- We are not responsible if the above items are not observed or the equipment is modified arbitrarily.

8. Components List

- ① Condenser
- ② Gas/water separator
- ③ Circulation pump(Gear pump)
- ④ Diaphragm pump(Water pump)
- ⑤ Solenoid pump(water pump)
- ⑥ Level transmitter
- ⑦ Pressure transmitter
- ⑧ Temperature sensor
- ⑨ Heat exchanger
- ⑩ Hydrogen leak sensor
- ⑪ Oxygen monitoring sensor(optional)
- ⑫ Solenoid Valve
- ⑬ MFC

- * 1 Year Warranty (calculated from product received date)**
- * Warranty void if unauthorized modification, disassemble or repairs attempted.**
- * Buyer's failure to comply with Seller's repair or replacement directions shall terminate Seller's obligations under this Warranty and render this Warranty void.**