Industrial Laser Chiller Instruction manual

ATO-JL3000；ATO-JL5000；ATO-JL5200

Read this instruction manual in detail before installation and use!

Ⅰ. Installation Precautions:

1. Ensure that the working voltage is stable and normal and the power frequency match is correct. (Normal use of equipment voltage value for single-phase 200-240v, three-phase voltage of 380v, power supply frequency is divided into 50HZ and 60HZ.
2. Add water first, then take over, to discharge the air bubbles in the water circuit.
3. It is forbidden to turn on the machine without water, otherwise, the circulating water pump motor will be burnt.
4. Ensure that the equipment air outlet and air inlet are smooth and that the dust net and air outlet are regularly cleaned. (Inlet and outlet blockage, air does not convection, heat cannot be discharged, easy to produce high-temperature alarm and other machine failures.)

Ⅱ. The Installation Process:

1. Open the box to check whether the machine and accessories are complete.
2. (Random accessories: a power cord, a set of water pipe connectors, a manual)
3. Open the lid of the water injection port and add cooling water.
4. (Distilled and purified water is preferred, in case of cold weather in the north, the cooling water should add a certain proportion of non-corrosive antifreeze or industrial alcohol to prevent freezing and damage to components, and the water level should be
Freezing damage to parts, the water level should be in the green marking line part)
5. Connect the water pipe according to the indication mark, and turn on the power.
6. (The first time you start to use the machine pay attention to whether the water leakage. Quality problems immediately contact the manufacturer after-sales service; followed by the water level is still in the normal reasonable position)
(normal reasonable position)
7. Adjust the thermostat parameters required to connect the equipment.
(JL-5200 generally does not need to adjust the temperature value again, the factory value of 27 degrees constant temperature, according to customer demand whether to adjust again)

Ⅲ, The controller Overview:

This series of controllers is suitable for chiller control. By starting and stopping the refrigeration compressor and controlling the refrigerant solenoid valve and electric heating rod, it can realize the precise control of water temperature.

Controller Features:
1. Using refrigerant solenoid valve to control the compressor's cooling capacity.
2. With heating function to ensure that when the ambient temperature is low, it can still work stably.
Technical parameters:
—Temperature measurement range: -45℃～99.9℃   —Temperature control range: -30℃～90℃
—Expression error (measurement accuracy): -15 ℃ ～ 60 ℃ ± 1 ℃ ± 0.5 words, the rest ± 2 ℃ ± 0.5 words
—Resolution: 0.1℃
—Installation size: 92*43   Opening size is larger than 93*44   —1 way buzzer alarm output
—Relay contact output capacity: Compressor 16A/220VAC, solenoid valve 5A/220VAC, electric heating rod 16A/220VAC, alarm relay 3A/220VAC. (or compressor 30A/220VAC, no heating relay)
—Operating voltage: 220VAC±10%, 50/60Hz.   —Power consumption of the whole machine: ≤ 3W
—Operating ambient temperature: -5 ℃～55 ℃.   Working relative humidity: 10% ～ 90% non-condensing.
—Storage temperature: -25℃～75℃.
—Sensor NTC (10KΩ/25℃, B value 3435K)   —Two output sensor wire length: 0.8 meters

Configuration Diagram:

	Water Temperature Probe Sensor	Room Temperature Probe Sensor	Cooling	Heating
RY1001A	●	●	●	●

Note: "●" means there is this function item, "---" means there is no this function item.
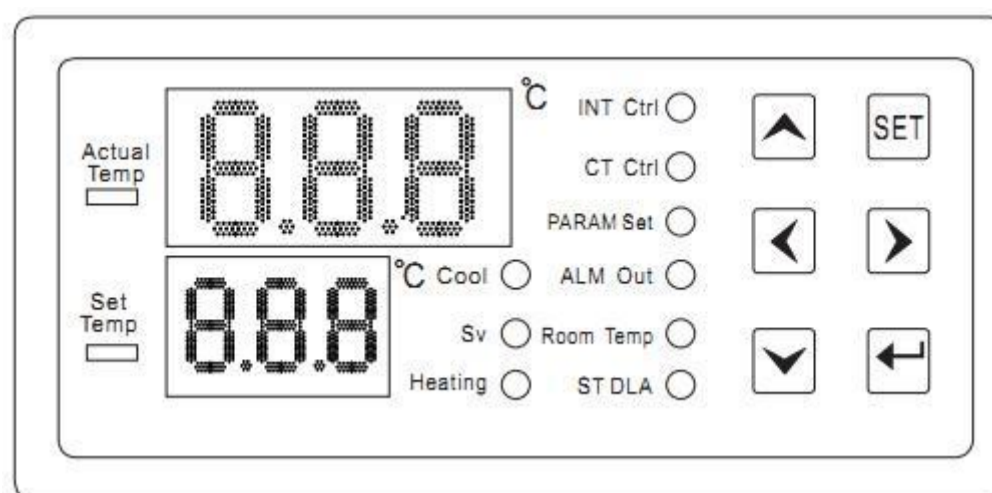
IV. Operation and Display Panel

1. Panel Display Operation

The display panel can show six digits, nine kinds of status indicators (compressor-comp, solenoid valve-solenoid valve, electric heating rod-heating, intelligent mode-**INT ctrl**, constant temperature mode-**CT ctrl**, parameter setting-**PARAM** set, alarm output-**ALM** output, display room temperature-**Room temp**, power-on delay (**ST** delay).

Under normal operation, the upper display window shows the normal water temperature and the lower display window shows the set water temperature.

2. Description of Work Indicator Status

Name	Notation	State	Express a Meaning
Compressor Indicator light	Comp	lights up	Compressor start up
		lights out	Compressor off
Refrigerant Solenoid Valve Indicator Light	Solenold Valve	lights up	Refrigerant solenoid valve start up
		lights out	Refrigerant solenoid valve off
Heating Rod Indicator Light	Heating	lights up	Heating rod start up
		lights out	Heater bar off
Intelligent Control Mode	INT ctrl	lights out	Controller operates in non-intelligent control mode
		lights up	Controller operates in intelligent control mode
Thermostatic Mode	CT ctrl	lights out	Controller operates in non-thermostatic control mode
		lights up	Controller operates in thermostatic control mode
Parameter Setting Mode	PARAM set	lights out	Controller operates in non-parameterized mode
		lights up	Controller working in parameter setting mode
Alarm Output Mode	ALM output	lights out	Non-alarm output state
		lights up	Alarm output state
Display Room Temperature Status	Room temp	lights out	Display non-room temperature status
		lights up	Display room temperature status
Power on Delay Status	ST delay	lights out	Non-power on delay state
		lights up	In power-on delay state

3. Description of Keys

There are six keys on the controller:

⬅ : Left shift key   ➡ : Right shift key   ↵ key

⬆ : Upward key   ⬇ : Downward key   SET Key

V. Operating Instructions:

1. Manufacturer Parameter Adjustment Method

Press and hold down ↵, **SET** power button, three seconds after the display **"99"**, press ▲▼ a key to modify the factory settings of the password **"XX"**, and press **SET** key to enter the menu settings, you can modify the factory settings. Key to enter the menu settings, you can modify the factory settings, and you can change (the **F0-A11**) parameters.

Any time to return to the ↵ key, then save the modified parameters to exit the parameter setting state, return to the temperature display, and run according to the new parameters. If no key is pressed within 20 seconds, the controller will also

automatically exit the parameter setting state and not save the modified parameters. If the password is wrong, press **SET** to return to the temperature display.

2. User Parameter Adjustment Method

First press and hold the ▲ key, then press the **SET** key at the same time for 5 seconds. The upper limit window displays **"00"** and the lower display window displays **"PAS"**. At this time, press the ▲▼ keys to select the set password.

After entering the code, press the **SET** key again. If the password is correct, the display in the lower display window changes to parameter item **F0**, and the upper display window displays the parameter value of **F0**, entering the setting state.

Indicates that the controller is currently in a parameter setting state. If the password is wrong, the temperature display will return. After entering the setting state, press the left and right keys to change the parameter items in sequence. Press the ▲ ▼ keys to change the parameter value of the parameter item.

Press the ↵ key at any time to save the modified parameters and exit the parameter setting state, returning to the temperature display and run with new parameters. If no button is pressed within 20 seconds, the controller will automatically exit the parameter setting state and will not save the modified parameters. In parameter setting, there is no response when pressing SET.

Order	Code	Set Project	Range	Factory Setting	Note
1	F0	Setting temperature	F9~F8(-30~50)	25	Intelligent Temperature Control Mode / Constant Temperature Mode
2	F1	Temperature difference	-15~5	-2	
3	F2	Refrigeration return difference	0.1~9.0	0.8	
4	F3	Control mode	0~1	1	0 Thermostat, 1 Intelligent
5	F4	Water temperature over high alarm	1~80	10	
6	F5	Water temperature over low alarm	1~40	15	
7	F6	Air temperature over high alarm	40~50	45	
8	F7	Password	00~99	6	
9	F8	Maximum set water temperature	(F9+1)~50	30	
10	F9	Minimum set water temperature	—30~(F8-1)	20	
11	A0	Heating Return Difference	0.1~5.0	0.5	
12	A1	Alarm delay time	0~30	5	Minutes
13	A2	Power on delay	10~300	15	Seconds
14	A3	State transition delay	00~99	5	Seconds
15	A4	Room temperature correction	-10.0~10.0	0	
16	A5	Water temperature correction	-10.0~10.0	0	
17	A6	System inertia coefficient	0~40	8	The smaller the value, the more accurate the precision
18	A7	Compressor start-up protection	0~300	30	seconds
19	A8	Electric heating rod control return	-5.0~20.0	0.2	Heater operates when water temperature <F0-A8 The heater stops working when the water temperature is >F0-A8
20	A9	Input signal alarm delay	00~99	2	Seconds
21	A10	Input signal normally open and closed setting	NO/NC	NC	NO is normally open NC is normally closed
22	A11	Solenoid valve open delay	0-0.4	0	F0-A11 solenoid valve
23	A12	Functions in case of E6 alarm	0/1	0	0 for normal operation, 1 for system stop
24	A13	External alarm output recovery delay	00~99	2	Seconds
25	A14	Compressor startup solenoid valve delay off	0~33	0	Seconds
26	A15	Er1-Er5 signal relay status in alarm	0/1	0	1 output 0 no output

3. **Rapid Restoration of Factory Settings**

In the case of power-on normal display, non-setting, press and hold ▲▼ key at the same time, the thermostat will be powered on, and **"rE"** will be displayed after 3 seconds, and all the set values will be restored to the factory values, and then resume normal working condition after another three seconds.

4. **Check the Room Temperature**

In a non-setting state, press ▼ a key to display the room temperature sensor detection value, after 6 seconds resume displaying the water temperature (at this time Room temperature light is on, indicating that the upper window is displaying room temperature).

5. **Quick Adjustment**

Press the **SET** key when the thermostat is working normally if the thermostat is working in constant temperature mode, the panel displays the parameter value of **F0** (set temperature) and the intelligent mode display **F1** (temperature difference value) parameter value (at this time the panel PARAM set light is on, indicating that the controller is now in parameter setting state). At this time, press ▲▼ a key to modify the set value, and then press SET key to exit If no key is pressed within 20 seconds, then it will not save the disk to exit. If you press ↵ key, it will save the disk and exit, and the new parameter will take effect.

Ⅵ. The Control Output Function
1 Refrigeration Control

Chiller Working Condition	Compressor Working Condition	Condition of Refrigerant Solenoid Valve	Condition of the Heating Rod	Note
Refrigeration	Operation	Stop	Stop	100% full power cooling
First-stage micro-refrigeration	Running	Conduction	Stop	40% power cooling
Second-stage micro-refrigeration	Running	Conduction	Start	20% power cooling Heating pad working
Heating	Stop	Conduction	Start	No cooling, only heating

The above are the four working states of the chiller controlled by the intelligent temperature controller. Refrigeration and micro-cooling state conversion time is the shortest, (about 5-10 seconds) and can be converted several times in one minute. If the thermal load is turned on, the chiller mainly works in these two working conditions, which can precisely control the temperature of the cooling water. (The actual test water temperature fluctuations of about 0.3 degrees or so). When the thermal load is off, the water temperature will overshoot downward, and the refrigeration compressor will stop working when it reaches the A0 set value.

Need to pay special attention to is; chiller condition conversion and water temperature changes between there will be a time difference, the parameter A6 is to describe the system inertia of the relevant parameters, according to this parameter, the controller can calculate the corresponding action in advance, reduce the water temperature overshoot.

Refrigeration Compressor: When the temperature rises to the water temperature set value + refrigeration return difference, and the compressor protection delay over the set time, the compressor starts to work. The compressor stops working when the temperature drops to the water temperature setting value - heating return difference.

Refrigerant Solenoid Valve:

(1). The compressor works, when the temperature drops to (equal to, below) the water temperature set value, and the refrigerant solenoid valve cut-off duration has been greater than the time set by the state transition delay (A3), the refrigerant solenoid valve on. When the temperature rises to (higher than) the water temperature setting value or above, and the duration of the refrigerant solenoid valve is greater than the time set by the state transition delay (A3), the refrigerant solenoid valve cuts off.

(2). When the compressor stops running, the refrigerant solenoid valve is on.

(3). When the compressor starts to work (startup), the refrigerant solenoid valve must be in the cut-off state (under normal circumstances, this condition is satisfied).

Electric Heating Rod: When the water temperature decreases to below the water temperature setting value－electric heating rod control return difference, the electric heating rod starts to work. When the water temperature rises above the water temperature setting value - electric heating rod control return difference, the electric heating rod stops working.

2 Water Temperature Setting Value

When the thermostat operates in the constant temperature mode, the water temperature setting value is constant at F0, just like an ordinary thermostat.

When the thermostat works in intelligent mode, the water temperature set value is variable as follows:

When the room temperature plus F1 is less than F9, the water temperature set value is equal to F9.

When the room temperature plus F1 is greater than F8, the water temperature setpoint is equal to F8.

When room temperature plus F1 is less than or equal to F8, or greater than or equal to F9, the water temperature set value is equal to room temperature + F1.

3 Alarm Output

(1) Alarm Display

Er1	Er2	Er3	Er4	Er5	Er6
Room temperature is	The water temperature	The water	Room	Water	External

extremely high	is extremely high	temperature is extremely low	temperature sensor failure	temperature sensor failure	input alarm

When alarming, all error codes and water temperature are displayed in turn.

(2) Alarm Conditions

See the setting code table:

Er1：Room temperature ﹥ Air temperature super high alarm value (F6 setting value);

Er2：Water temperature ﹥ setting temperature + refrigeration return difference F2+water temperature super high alarm F4

Er3：Water temperature ﹤ setting temperature-heating return difference A0-water temperature ultra-low alarm F5

Er4：Room temperature sensor short circuit or open circuit

Er5：Water temperature sensor short circuit or open circuit

Er2, Er3 to meet the power-on alarm delay (A1) or power-on forced cooling 30 seconds after the water temperature into the target temperature band (i.e., between the set temperature and the set temperature).

(i.e. between the set temperature and the set temperature + refrigeration return difference F2) before the alarm will be effective.

(3) Alarm Control Status

When there is an Er3 alarm, the cooling and heating relay will operate according to normal logic.

When the Er4 alarm occurs, the water temperature setting (F0) of the controller operates according to the factory setting. (If the controller works in constant temperature mode, E4 does not alarm)

When the Er5 alarm occurs, the system should turn to a shutdown state regardless of the operation in that state.

(4) Alarm Stop Sound

In the thermostat alarm state, pressing any key can stop the alarm buzzer sound, but the alarm display will not stop until the alarm conditions are eliminated.

(5) External Input Alarm: External input alarm signal, and meet the time delay setting A9 after the time, the display Er6, the system control is not affected, the alarm beeper
The alarm buzzer will sound.

(6) When **Er1-Er6** occurs, the alarm buzzer sounds, and when the mute alarm key is pressed, the buzzer stops sounding. The alarm output relay is automatically reset when the fault is removed.
reset automatically.

(7) Whenever an alarm occurs (except Er3), the electric heating rod will stop working. When the alarm is lifted, the electric heating pad will work according to logic.

4 Key Tone

There is a key tone when the controller key is pressed, and a short tone is prompted every time a key is pressed.

5) Power-up Display

After powering on the display flashes for 3 seconds while displaying the indicator and digital tube, and the buzzer sounds. After entering the normal logic operation state.

6) Temperature Correction

Room temperature correction and water temperature correction, when the display (room temperature and water temperature) temperature and the actual deviation can be adjusted A4, A5, for correction.
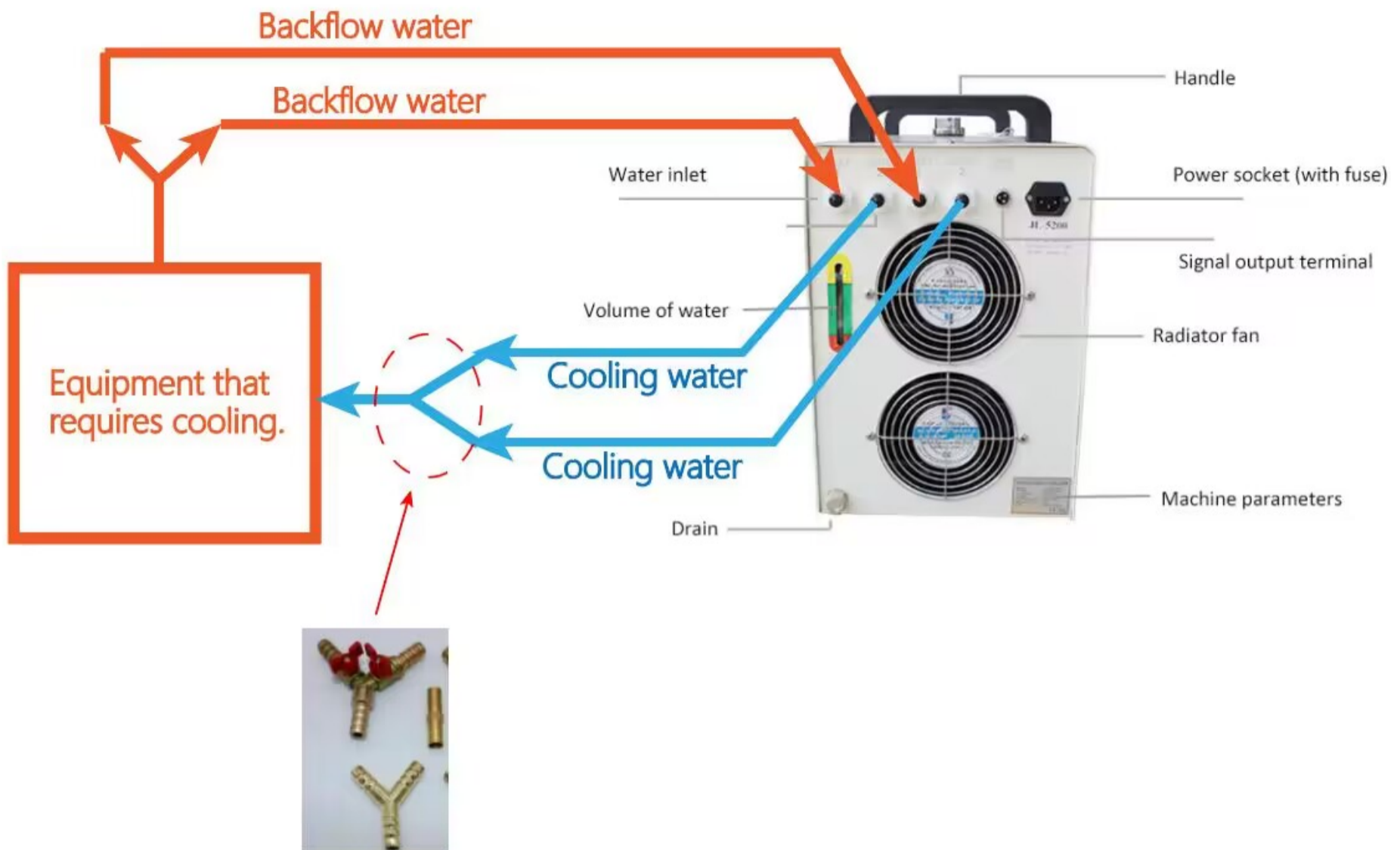
7) Power-on Processing

After the thermostat is powered on and after the power-on delay (A2) time, the thermostat enters the 100% full-power refrigeration state for 25 seconds. Then only according to the actual air temperature, water temperature control chiller work. (Note: This is the "power on forced cooling" function. If the water temperature is higher than the set value of the water temperature after the forced cooling, the compressor does not need to stop when the heating is back to the difference. (This function is designed to facilitate the maintenance work.)

4 Safety Rules

● Note:

1. Strict distinction between power supply, relay output, sensor wiring, and relay must not be overloaded.

2. All wiring changes must be made with the power supply disconnected.

3. This controller is prohibited to be used in water or excessively humid environments, and prohibited to be used in high temperatures, strong electromagnetic interference, and strong environments.

4. Ensure that the power supply voltage is the same as the voltage labeled on the controller, and ensure the stability of the power supply voltage.

When the equipment requiring cooling is single input and single output.

Backflow water

Backflow water

Handle

Water inlet

Power socket (with fuse)

JL-5200

Signal output terminal

Volume of water

Cooling water

Radiator fan

Equipment that requires cooling.

Cooling water

Machine parameters

Drain

When the equipment that needs to be cooled has dual input and dual output.

Handle

Backflow water

Backflow water Water inlet

Power socket (with fuse)

JL-5200

Signal output terminal

Volume of water

Cooling water

Radiator fan

Equipment that requires cooling.

Cooling water

Machine parameters

Drain