Refrigerated Thermostatic Bath and Heating Circulators DC-4015

User Manual

DRAWELL
Artist of Science

Please read operating manual before installation and operation.

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1. General

This product is automatic setting of PID algorithm without overshoot, complete function, easy to use, is the best product, analog temperature control is indispensable for medical apparatus and instruments, laboratory instruments commonly used temperature control equipment. Extensively used in Petrochemical industry, National Defense, Metallurgy, Chemical Industry, Physics, Biology Engineering, Chemistry, Pharmaceutical, life science, electronic instrument, quality inspection and measurement, plant laboratory, colleges, Research and Development Institutes and so on.

2. Characteristics

1) With complete enclosed air- cooling compressor for refrigeration, low temperature thermostatic bath has outstanding advantages such as quick refrigeration and low noise.
2) Refrigeration system is equipped with multi-purpose protection devices such as over heating, over current and so on.
3) Temperature can be controlled by microcomputer, which can be operated simply, has alarming device for temperature under low temperature limit and over high temperature limit, and is equipped with PID automatic control.
4) Use double windows in red and green, upper window displays measurement value in red, and lower window displays measurement value in green, both in LED.
5) Intelligent microcomputer can adjust temperature setting allowance so that digital display distinguish-ability reaches 0.1℃.
6) Special user PID can be adjusted.
7) It has internal and external cycles, external cycle will discharge thermostatic liquid inside the bath, and establish No. 2 thermostatic bath, also it can discharge liquid outside as cooling or heating source, to lower (raise)temperature of external experimental vessels, and enlarge use scope.

3. Technical Parameters

Model No.	**DC-3006**
Temperature scope（℃）	**-30~100**
Temperature stability（℃）	**±0.1**
Work bath volume（L×W×H）mm	**260×200×140**
Display Resolution （℃）	**0.1**

Open slot of work bath（L×W）mm	**180×140**
Bath Depth(mm)	**140**
Flow rate of Exterior cycling pump L /min	**0-15**
Heating power (KW)	**1.0KW**
Total power (KW/H)	**1.6**
Cooling power (25℃/KW)	**0.42**
Pump pressure	**0.45bar**
Voltage	**220V 50Hz**

4. Operational steps:

1) Add liquid media in bath, with liquid level no less than 30mm lower than work bench.

2) Selection of liquid media

A．When work temperature is below 5℃，liquid media shall be alcohol.

B．When work temperature is between 5℃-80℃，normally liquid media shall be pure water.

C．When work temperature is between 80℃-90℃，normally liquid media shall be 15%glycerin water solvent.

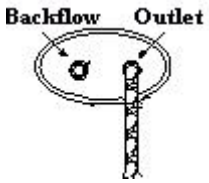
D．When work temperature is more than 90℃ ，normally liquid media shall be oil.

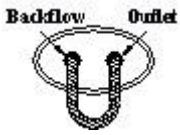
3) Connection of cycling pump：

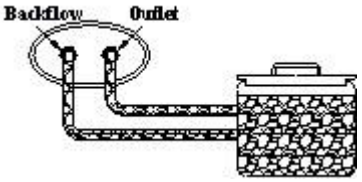
A．For connection of internal and external cycling pumps, the user only need to connect liquid outlet tube to liquid inlet tube with hose which will be provided with the machine).

B．Connect external cycle of external cycling pump, connect liquid outlet tube to inlet of vessel outside the bath, and connect liquid inlet tube to outlet vessel outside the bath.（Note：tube on the left side of front panel of instrument is liquid inlet tube, and the one on the rack panel of the instrument is liquid outlet tube）.

A. Line shows：







(Figure4.1) Internal Recycle (Figure 4.3）Outlet (Figure 4.2)Outside Recycle

① Internal Recycle : Use the tube to connect the outlet and backflow (Figure4.1)
②Outside Recycle: Make the outlet and backflow respectively connected to the outer container, set up the second temperature field (Figure 4.2)
③Outlet :Direct drainage outlet (Figure 4.3)

B. Interface specification:

Figure 1：Panel Figure

4) Function of each button:

(1) Refrigeration lights: when refrigeration output light on , when refrigeration delay the light is flickering, refrigeration closing the lights off.

（2）Circulating pump indicator light: when pump output the light on , pump closed the light off.

（3）Heating light: when heating output the light on, heating closed the light off

（4）Water level indicator light: when the water level alarm the light on

（5）Self-tuning indicator light: Self-tuning time the light flickering.

RUN：Start and stop the operation by long press

SET ： For the set value modifying, setting the parameters and modified confirmation

LEFT ：Used to set data, control parameter shift

UP ：Used to set data, control parameter to modify or inquire the running state ; Long-press, inquire the environment temperature

DOWN ：Used to set data, control parameter modification; Long press to view the rest of the standard state currently running cycle number.

5) Specific operation Settings

① Please put liquid medium to tank(such as silicone oil), if the instrument using higher than 80 ℃, charging with 2 cm space should be under the rabbet, in case of high temperature oil expansion of the overflow.
②Plug the power line,turn on the switch on the back of machine.

6) Process Control

1. When turn on the machine, the display as below:

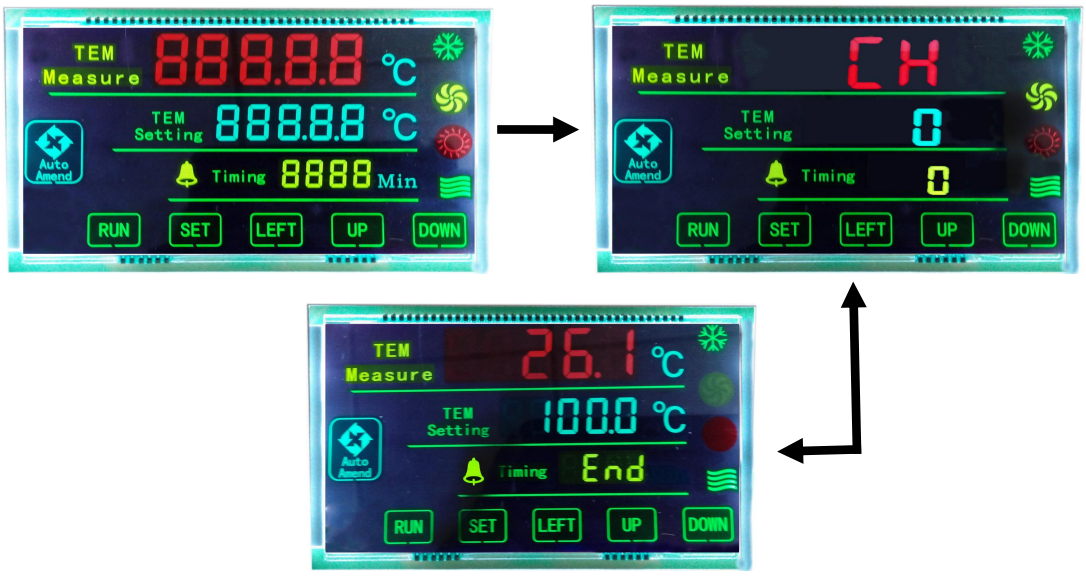


Figure 2: Program in standby

Set temperature and timing:

(1) Press”SET” button: TEM Measure area display segment number 0001,which the last number flicker. Through move, add and decrease button to setting segment number.(Range: 1-30)

(2) Press”SET” button，Into “TEM Setting”, Temperature value last number flicker, Through move, add and decrease button to setting temperature.

(3) Press”SET” button，Into “Timing” area, time setting value last number flicker,Through

move, add and decrease button to setting time. Press SET key to save and return to stand by mode. As shown in figure 2-1.

Note: ①If the first paragraph of time is directly set to 0, the program control into no timing of a single point control, the temperature setting of the first paragraph is for goal setting temperature.
②In addition to the first paragraph time to 0, the program is run at the end of the segment, then from the first paragraph to start another cycle.

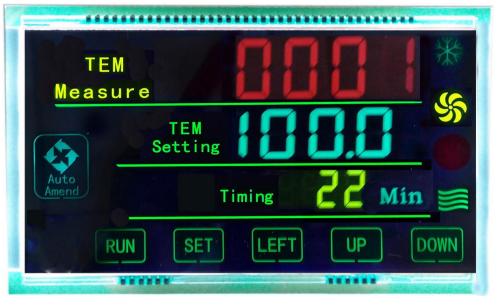


Figure 2－1: Temperature,Time setting

Set parameter modification program: Press “SET” button. TEM Measure area flicker, display need to modificate segment number, press add or decrease button to modification. Then press “SET” button to modification the temperature, time parameter.

- **Conversion between single point control and program control**

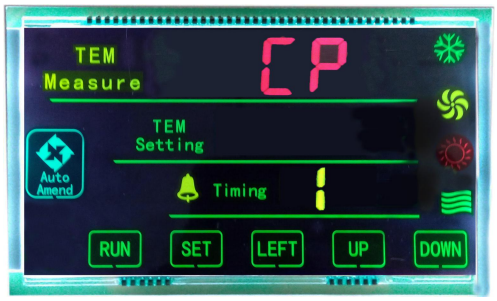


Figure 01:Conversion between single point and program

In standby mode, press SET button and the RUN button for long time, TEM Measure district display CP or CH switch back and forth, when shown as CP is the single point control, when displaying CK is the program control.

- **Single Point Control**

1. Turn on the machine, display CP (the first row CP is single point control, t he second row is empty, the third row display 1 is time-in), 3 times after the buzzer alarm, rang back to standby mode automatically.

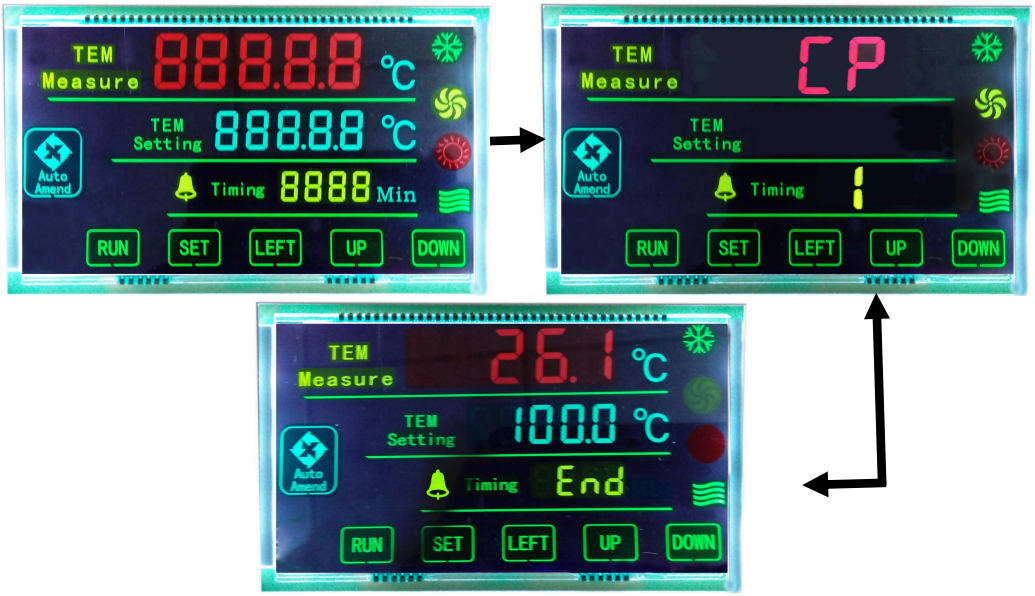


Figure 3: single point standby mode

● **Setting temperature and Time.**

(1) Press"SET" button，Into "TEM Setting", Temperature value last number flicker, Through move, add and decrease button to setting temperature.

(2) Press"SET" button，Into "Timing" area, time setting value last number flicker,Through move, add and decrease button to setting time. Press SET key to save and return to standby mode.

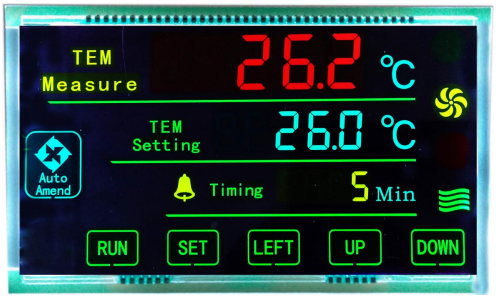


Figure 3－1:Single point temperature and time setting

● **Timing Function**

When Timming set to 0, instrument cancel the timing function, instrument has been running; When Timming set not to 0, the meter is timing function, when the meter running time, Tim ming show END, buzzer, instrument to stop working, and press any key can be muted.

● Start/ Stop：

1. Open the circulation pump switch,which on the left side of the machine. During working

the circulating pump need keep open. (open or closed circulating pump control button to start/stop the circulation pump)

2. Press the RUN button for long time, compressor, you can hear Buzzing that mean refrigeration and circulation pump start to work. If you want to stop working , to press the RUN button for long time will stop working, the buzzer alarm, press any key mute. (as shown in the figure below) :

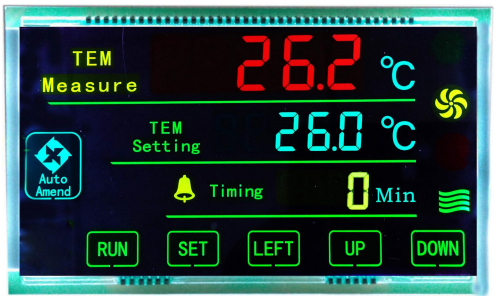


Figure 4: Working Status (standard)

●The customer parameters and PID parameter setting.

Press “SET” and “LEFT” for long time at the same time, Timing area will show LK parameter code, ①make LK=18,press setting button, The controller can enter the cust omer Parameters setting; ②make LK=28, press setting button, The controller can enter the PID Parameters setting

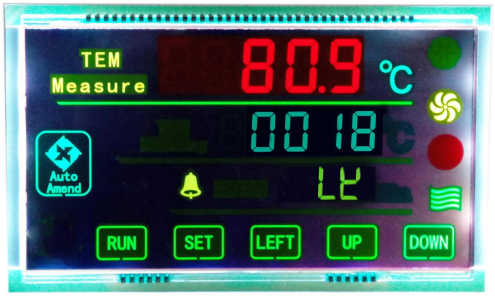


Figure 5: Customer Parameters Setting;

Customer parameter menu as shown below:

Prompt	Name	Setting range	Introductions	Initial Value
HT	Unit of time choose	0/1	0 mean minutes ; 1mean houe	0

SC	Environmenta l temperature measurements	-9.00--+9.00	When measuring the environment temperature and the current environment temperature deviation adjustment	0.00
AL	Alarm setting	0～∞	When measuring the temperature more than AL value, alarm relay output	3.0
CL	Refrigeration control Setting	0～∞	Compressor start-stop control available at the time, when the temperature more than set value + CL and conform to the compressor refrigeration control delay, the light cooling, refrigeration contact through, to start the compressor.	0.5
Ct	Refrigeration control delay	0～3600s	Two adjacent delay time required to start the compressor，Ct=0 V Cancel the function of compressor.	180
Pb	Zero Adjustment	-100.0～100.0	When the zero error of the controller is bigger, full error is small, adjust the value, generally Pt100 rarely adjust the value.	0.0
Pk	Full Adjustment	-1000～1000	When the zero error of the controller is lesser, full error is bigger, can adjust the value. Pk = 4000 x (mercury thermometer reading values - current temperature measuring points)/current temperature measuring points	0

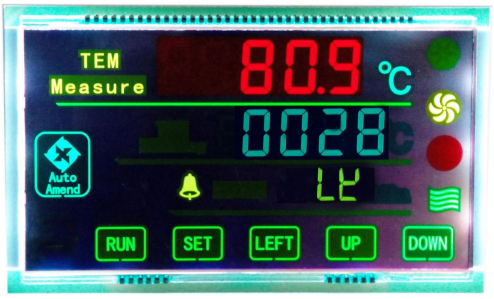


Figure 6: PID Setting

- **PID menu as shown below:**

P	Proportion	2～100	Proportion function adjustment, P ratio effect is smaller, the greater the system gain lower heating only ACTS on the side.	5. 0
I	Integral time	20～3600S	Integral action time constant, the I bigger, the weaker the integral action.	400
d	Derivative time	0～3600S	Differential time constant, d is larger, the differential function is stronger , and can overcome the overshoot.	400

Ar	Overshoot inhibition	0～100%	Used to suppress overshoot (Ar identified as: 1.5 to 2 times the steady-state output duty cycle)	100
t	Control cycle	1～100S	Silicon controlled rectifier output is commonly 2 ~ 3 seconds, the remaining power of the larger equipment dispatch T can reduce the static error of PID control.	3

Each parameter changes can have control effect. One minute not press the button automatically return to the standard model, may have the change of each parameter are likely to change the control effect. (one minute not press X key automatically return to the standard model. May be some function parameters are not changed.

5. Precautions：

1)Add liquid media into bath before using, Liquid is lower than the workbench face 30 mm can't boot, in case of burn out the heater

2) Use 220V/50Hz power supply ,power shall be no less than total power of instrument, and power supply receptacle shall be earthed properly.

3) Pump switch: machine on the left side of the circulation pump forced switch please don't press, unless you have special needs.

----If switch according to the forced circulation pump, circulating pump will be shut down.This fluid position in the tank temperature will be uneven, constant temperature effect.

At this point to switch according to the forced circulation pump circulating pump

4)Instrument shall be put on a place that is dry and has good ventilation, rack panel and two sides shall be 300mm away from obstruction.

5) In the process of temperature rising, there will be a frying, please get ventilation treatment. And in the process should pay attention to, because of the high temperature will evaporate some oil, but also pay attention to safety at this time not to touch the tank of the oil and outside circular tube, to prevent burns.

6)After using, all switches shall be turned off, and power plug shall be pulled out.

6. Packing list：

1. main machine 1set
2. power supply wire 1pc
3. Rubber tube 1pc
4. Cover 1pc
5. Operation Manual 1copy

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