



# MP-7H Operating Manual





# BVV Thanks You!

Dear Valued Customer,

BVV sincerely thanks you for your recent purchase with us! We take pride in our equipment and service! Giving our customers the best tools for the job is our uttermost goal. We strive to provide the highest level of service possible to accompany our great product line.

We hope that your experience with us was a pleasant one and hope that we can be of service to you again in the future as you continue to grow. As a valued customer, your comments and opinions are very important to us. If you have any concerns, questions or comments, we hope that you will bring them to our attention.

If there are any other ways that we can serve you better at this time or in the future, please let us know. Thank you once again for choosing BVV we look forward to serving you again in the future.

Sincerely,

BVV Team

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## Letter from the Manufacturer

Dear Customers:

Thank you for your support of our Instruments. The company specializes in providing high-performance laboratory equipment such as drying ovens, rotary evaporators, vacuum ovens, CO<sub>2</sub> incubators, cooling and heating incubators, temperature & humidity chambers, medicine stability testing chambers, shakers, shaking incubators, Xenon test chambers, and UV test chambers for our customers. The company is committed to providing users with intelligent, professional and intuitive laboratory equipment to meet the high-end application needs of modern laboratories.

The NRE series produced by our company is a new type of product developed from many years of design and production experience. The laboratory instrument rotary evaporator is mainly used to continuously distill large amounts of volatile solvents under decreased pressure. In particular, the concentration of the extract and the distillation of the receiving liquid at the time of chromatographic separation can be used to purify the reaction product. The basic principle of a rotary evaporator is vacuum distillation, that is, under decreased pressure, the distillation flask is continuously rotating as the solvent is distilled.

This product is researched, developed, produced and inspected according to the company's ISO9001 and ISO13485 quality management system certification standards. The company's customer service will accompany you from the date of purchase. Please refer to this instruction manual (operation manual) before using the unit. If you have any questions, please feel free to contact us, and we will do our best to serve you.

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## User Warning



**Failure to follow all warning and instructions could result in serious injury. Your safety is very important to us, we urge you to take the following precautions when using this product. We are not responsible for injury or damage caused by misuse.**

- This product must be reliably grounded and away from electromagnetic interference sources (The Neutral line should not be used as the grounded line).
- Please ensure the voltage and frequency of the power supply are compatible with the power requirements before use.
- This unit must use the included electrical cord with a dedicated electrical circuit with a confirmed electrical ground connection.
- The power switch must be in the “OFF” position when power is connected or disconnected from unit
- Do not arbitrarily lengthen or shorten the power supply connection wire.
- Unauthorized repair is not allowed, authorized repair should be carried out by specialized personnel.
- Make sure to read and understand thoroughly the Product’s Operating Instructions before the operation may be carried out.
- The power cord must be removed from receptacle when any of the following occur:
  - When replacing the fuse
  - When the product is waiting for overhaul due to faults
  - When the product goes out of service for a long time
  - When the product is being moved

**NOTE:** (This may affect the service life of the unit)

- The product should be located on the solid and hard surface to keep it horizontal
- Keep certain space around the product
- The product must be used in the specified conditions
- The product must be used in the correct setting mode

## Purpose and Features

The heated circulation bath consists of two parts, control head and bath. The control head consists of a thermostat, temperature sensor, heating element, water level controller and powerful pump. The tank is made of high quality sheet panel and its surface is plastic molded with a stainless inner layer.

The inlet and outlet connectors for the circulated liquid are on the right side of the control head, and they are provided for the connection of external application. The thermostat is controlled by intelligent Microcomputer, with the performances such as high precision and good stability. There is a built in alarm function for low fluid level.

## Technical Specifications

| Model                      | G50C            |
|----------------------------|-----------------|
| Heating Power (W)          | 1050            |
| Temperature Range          | RT – 135°C      |
| Resolution                 | 0.1°C           |
| Temperature Stability      | ±0.2°C          |
| Flow Rate (L/min)          | 8               |
| Bath Volume (L)            | 5               |
| Bath Dimensions LxWxH (mm) | 150 x 160 x 150 |

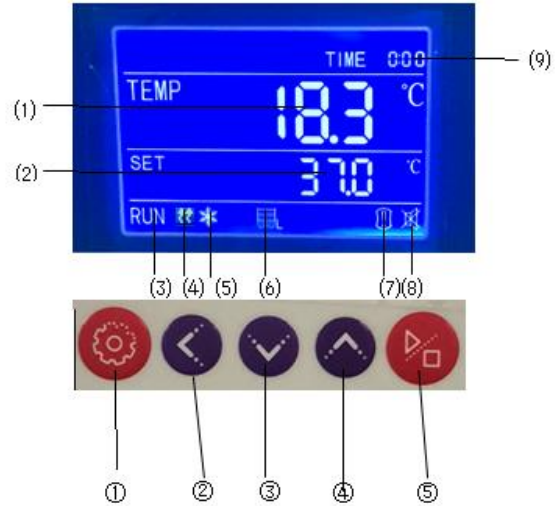
## Main Components Diagram






## Operating Panel Diagram

Screen:

1. TEMP: Displays the current temperature
2. SET: Displays the set temperature
3. RUN: Indicates the temperature control is on
4. Heating indicator: Lights up when the heating output is on
5. Cooling indicator: N/A
6. Water level indicator: Shows high and low water level
7. Alarm indicator: It lights up when alarm value triggers
8. Mute indicator: It lights up when the alarm has been silenced
9. TIME: Displays operation time or parameter value



BUTTONS:

- ① SET/PROG key: Used to modify setting value, cycle through parameters, and confirm the modification of the parameters.
- ②  SHIFT LEFT: In setting mode, press it could move the digits.
- ③  DOWN: In setting mode press to decrease by 1. Hold it to decrease rapidly.
- ④  UP: In setting mode press to increase by 1. Hold it to decrease rapidly.
- ⑤ START/STOP: Hold for more about 4 seconds to START or STOP the program

## Manual Calibration

After the product is used for some time, temperature control should be accurate within .5°C. If the error is in excess of ±0.5°C, correction should be made:

Go in the parameter settings and look for “PE”

$$PK = 4000 \times \frac{(\text{displayed value} - \text{measured mercury value})}{\text{measured mercury value}}$$

After calculation by the following formula, revision is made on the basis of PK value set in the factory

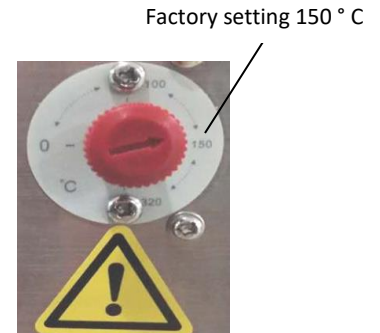
Note: If one revision is inaccurate, it should be repeated till requirement is met

## Using the Overtemperature Limit Controller

The independent temperature limit controller is an added protection system. When the temperature of the controller is out of control due to a damaged relay, the over temperature protector will automatically cut off the heating.

When the unit cools to the set value, the protection system is eliminated and the instrument resumes work.

The factory over temperature limit setting is 150 °C, do not adjust if not necessary.



## Operating Panel Instructions

Timing function:

1. NOTE: When time is setting as 0, timing function will be disabled. If time is not setting at 0, the controller will perform the timing function.
2. Press SET key one time, the "TIME" value will flash, indicating that the timer can be set as required. Using the UP, DOWN, and SHIFT LEFT keys, set the timer for the temperature control cycle.
3. When the set time is up, "END" will be displayed on TIME screen and the buzzer sounds. It can be silenced by pressing any key.

Temperature setting:

1. Press the SET key once again, "TEMP SET" value will be flashing. Using the UP, DOWN, and SHIFT LEFT key, set the required temperature.
2. Press MODE once more, the screen will return to the standard display.

Note: For each change of a parameter, it is necessary to press SET key for confirmation to validate the change.

After all the parameters are set, hold the START/STOP key for about 4 seconds to start running.

SET UPPER DEVIATION ALARM:

Setting the upper deviation alarm can protect the system from out-of-tolerance temperature control or lose control and must be put into use when the instrument works.

Example: If AL=3.0, this means the alarm temperature is (set temperature value +3)



## General Operating Guidelines

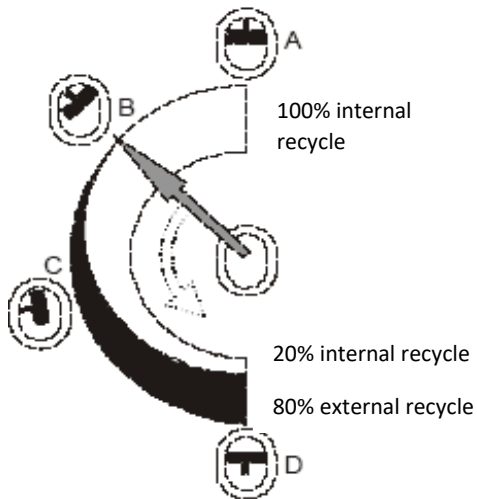
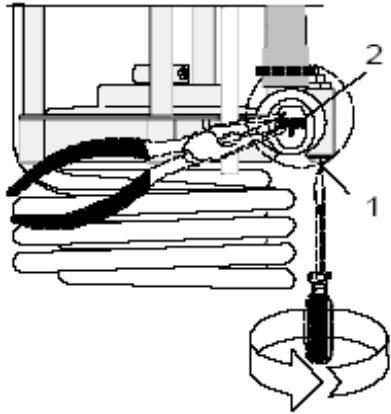
1. The products should be used work normally under these following conditions:
  - a. Ambient temperature: 5°C~35°C
  - b. Relative humidity: ≤85%
  - c. Atmospheric pressure: (86~106) KPa
  - d. Elevation not higher than 2000m
  - e. Power supply: 120±12V 60±1Hz
  - f. Keep away from heating sources
2. The base of the equipment should be placed in a flat, non-combustible area.
3. A distance of at least 300cm should be left around the product (front, behind, ventilated grid)
4. This item should only be used in well ventilated areas
5. The unit is equipped with a compressor. Do not operate the unit immediately after transport, it should be placed in the correct position for 1-2 days.
6. When filling the bath, please be careful not to pour the liquid above the indicator, it is recommended that the maximum level is 30mm below the edge of the bath or 2/3 total height
7. Based on desired temperature range, fill the bath with different liquid mediums:
  - a. When the operating temperature between 5°C to 80°C, the liquid medium should be purified water.
  - b. When the operating temperature is above 80 °C, the liquid medium should be mineral oil (Please note that the ignition of the oil to avoid a fire!)
  - c. When the operating temperature is below 5°C, please note the risk of ice! To recommend the liquid medium should be the ethanol or ethylene glycol.

## Approved Fluids

Using improper fluids can cause damage to the machine. Recommended fluids include:

- Distilled Water
- Propylene Glycol/ Di Water
- Ethylene Glycol/ Di Water
- Silicone Fluid
- Mineral Oil

## Pump Adjustment



The pump flow has been set up before leave factory, but it could be adjusted according to request.

1. Use a screwdriver to hold the screw (1) counterclockwise
2. Rotate 360 °
3. Use a flat plier to turn the valve (2) shown in the diagram to the desired position.
4. Tighten the screws

Recommended settings:

A. 100% Internal bath circulation

(used for larger baths)

B. 20% External circulation / 80% Internal circulation

(used for small stagnant applications)

C. 40% External circulation / 60% Internal circulation

(used for medium-large baths)

D. 80% External circulation / 20% Internal circulation

(used for smaller baths)

## Maintenance

- The equipment must be connected to a well-grounded electrical outlet!
- Using high temperature above 80 °C, observe the distance between the liquid level and bath along the top of the bath to prevent overflow due to thermal expansion.
- When the bath medium is water, do not use the unit at low temperatures. Freezing of the bath will damage the cooling coils and possibly burst lines.
- When filling the bath medium, be sure the liquid is rated for the set temperature.
- Be cautious with flammable liquids! Damage from improper use of bath medium is not covered by warranty.
- After connecting the hoses, use hose clamps to prevent the hose from falling off.
- Under continuous operation, the area of the bath cover and the hose connections to the circulating pump will become very hot or cold, so be careful when touch these places to prevent burns or frostbite.
- Please be careful when draining the hot baths medium! Check the bath medium temperature before draining (open the device up and cool it for a period of time)
- If the equipment works in low temperature for long time, evaporators and pipes may accumulate ice from air humidity. At this time please turn off the compressor to start defrosting the ice, and because of melting ice the bath body will have water seepage.
- After use turn off the cycle controller, power switch, and unplug the power cable. Unscrew the drain port and dry the cabinet (please pay attention to the bath medium temperature, be careful of burns or frostbite).
- Always turn off the cooling cycle first, then turn off the power of the controller.
- Before moving the equipment, do not forget to empty the bath medium.

## Parameters

Under normal conditions, if you press SET key and SHIFT LEFT key for over 3 seconds simultaneously, LK code will be displayed on the screen and setup of a password will allow entry into the parameter settings. Please do not change any values without further consulting.

- (1) When the output area on LCD screen displays LK, press add-subtract key or shift key to let LK=0000 and pressing SET key may allow you to enter into setting of user's parameter hierarchy;

| Prompting character | Name                  | Setup scope | Description   | Initial value |
|---------------------|-----------------------|-------------|---|---------------|
| dy                  | Selection of prestart | 0-1         | 0: no prestart; for other values, start after auto-delay for dy time by starting the run key. |               |

- (2) When the output area on LCD screen displays LK, make LK=0003. You can enter into setting of manufacturer's parameter hierarchy only by pressing SET key;

The menu of manufacturer's parameter hierarchy is as follows:

| Prompting character | Name  | Setup scope                               | Description   | Initial value |
|---------------------|---|---|---|---------------|
| tM                  | Setup of maxi temperature permissible by the instrument | To be set up within the measurement scope | Stop heating beyond maxi temperature and give alarm.  |               |
| PO                  | Boot mode   | 0~3                                       | ①when PO =0, after open the power, the controller in a stopped state, by long press star/stop key is up and running ②when PO =1, after open the power, the controller will be running ; ③when PO =2, running from last power began to run     |               |
| AL                  | Setup of alarm  | 0~full range                              | When temperature surpasses SP+AL value, alarm lamp will light up with alarm output (with function of HOLD)  |               |
| Pb                  | Zero adjustment (intercept)                             | -100.0~100.0                              | When the zero error of the instrument is greater and the full scale error is smaller, the value should be adjusted. As a rule with Pt100 the value is seldom adjusted   |               |
| PK                  | adjustment of full scale (slope)                        | -1000~1000 S                              | When the zero error of the instrument is smaller and the full scale error is greater, the value should be adjusted. PK=4000×(specified value—actual display value)/actual display value and as a rule with Pt100 the value is adjusted first. |               |

(3) When the output area on LCD screen displays LK, make LK=0088. You can enter into setting of manufacturer's parameter hierarchy only by pressing SET key;

The menu of manufacturer's parameter hierarchy is as follows:

| Prompting character | Name                                      | Setup scope    | Description  | Initial value |
|---------------------|---|----------------|--|---------------|
| CL                  | Setting of cooling control                | 0.0~full range | When temperature exceeds SV+CL and complies with time delay in cooling by the compressor, the cooling pilot lamp will light up and cooling junction will be switched on to start the compressor. |               |
| Ct                  | Delay in cooling control                  | 0~3600s        | Delay time required for start of the compressor for the two consecutive times Ct=0 function of the compressor is cancelled.  |               |
| Lt                  | Setup of lower limit of temperature       | -60.0-300.0    | Setup of lower limit of measured temp  |               |
| Ht                  | Setup of high limit of temperature        | -60.0-300.0    | Setup of high limit of measured temp   |               |
| dr                  | Selection of gate control                 | 0-2            | 0: no gate control 1: Gate is opened by closing 2: Gate is opened by disconnecting   |               |
| T                   | Heating cycle                             | 1~300s         | Relay output $\leq$ 20s, SSR and thyristor switch $\leq$ 2s, continuous output T is 1s, acting on the heating side only.   |               |
| P                   | Proportion belt                           | 1~full range   | Regulation of the proportion action. The bigger P, the weaker the action will be and the lower the system gain will become; P=0 for bit type control 0.4 for non-sensitive region                |               |
| I                   | Integral time (readjustment time)         | 0~3600s        | The greater the integral action time constant I, the weaker the integral action will become. I=0, d=0 for time proportion control.   |               |
| d                   | Rate time (pre-adjustment time)           | 0~3600s        | The bigger the differential action time constant d, the stronger the differential action will become and overshoot can be removed. I=0, d=0 for time proportion control.                         |               |
| Hp                  | Overshoot inhibition (resetting of ratio) | 0~100%         | When 2-bit PID is in operation, Hp is determined to 1.5~2 times the stable output space ratio. When time proportion works, Ar is determined to be (revised)/(proportion range P)                 |               |

## Troubleshooting

| Symptom   | Possible Causes  | Remedies  |
|---|--|---|
| 1. No power supply after starting (the indicator is not ON) | No voltage on the power supply socket or bad contact of plug or socket                 | Plug again or repair  |
|   | Incoming feeder broken or power switch damaged   | Replacement or repair   |
|   | Fuse blows up  | If the fuse blows up again after being replaced, it is necessary to check the instrument, pump, heater, refrigerating unit and lamps. Only after repair, then you can start the equipment |
| 2. The indicator no display                                 | Power supply transformer of temperature controller damaged or wiring terminal loosen   | Replace temperature controller or re-connect the incoming feeder again  |
| 3. Indicator PV screen displays----                         | Sensor Pt100 is damaged or something wrong with indicator input                        | Replace Pt100 or temperature controller   |
|   | Wrong setting of indicator full measuring range, the measured value out of range       | Set again   |
| 4. Temperature lose control                                 | Temperature controller or controlled silicon is damaged, temperature is out of control | Replace temperature controller or BTA16 controlled silicon  |
| 5. No heating   | heater is damaged  | Replace   |
|   | HEAT lamp on thermostat not ON with failure  | Replace the indicator   |
|   | HEAT lamp is ON, flip-flop or controlled silicon is damaged                            | Check optical-coupler 3041 or BTA16   |
|   | T1 (timing) $\neq$ 0, the setting is not after timing, heating is stopped              | Reset T1=T heating +T constant temperature or make T1=0   |
| 6. Water level alarm light up                               | Liquid medium in chamber is not enough   | Fill liquid medium  |
|   | indicator is damaged   | Replace indicator   |
|   | Float leaking  | Replace   |
| 7. Error of control temperature is too big                  | Pt100 is not connected correctly and the error is too big                              | Replace Pt100   |
|   | Correct parameters SL and HL (too big error)   | Refer to this manual  |
|   | Adjust parameters such as PID (steady-state error)                                     | Refer to this manual  |
|   | Cold, thermal power imbalance  | Adjust AL   |
| 8. Low temperature out of control or big error              | The heating or cooling system does not operate   | Replace the controller or repair refrigeration  |
| 9. Uniformity is poor in working chamber                    | Circulating pump flow is not enough or bad, liquid medium does not cycle               | Adjust or replace   |

### Packing List

| No. | Type       | Name                   | Unit | Quantity | Size                                  |
|-----|------------|------------------------|------|----------|---------------------------------------|
| 1   | Document   | Operation Manual       | set  | 1        |                                       |
| 2   | Document   | Packing list           | set  | 1        |                                       |
| 3   | Spare part | Fuse                   | pcs  | 2/each   | $\phi 5 \times 20 / \phi 6 \times 30$ |
| 4   | Spare part | Hose for external bath | pcs  | 2        |                                       |

### Notes: