Operation Manual

Heating shaker

Model : CBS-350

Manual No. : J4013L002 Version : 2.1

JEIOtech

⚠WARNING

Please read this user manual carefully before using the product. Users should operate the product according to the operating instructions contained in this user manual. Users should be aware of cautions and warnings for your safety. Failure to follow these guidelines may result in serious injury or damage to your property.

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1.0 Safety

1.1 Operation Manual

This manual contains important safety and operation information. You must carefully read, understand, and follow all the instructions in this manual prior to operating this instrument. Keep this manual in a safe place nearby for reference and make it easily available to all users.

1.2 WARNING/CAUTION/NOTICE Alerts

(1) This manual highlights DANGER/WARNING/CAUTION/NOTICE alerts to prevent injury or property damage and also to achieve optimum performance of your instrument.

(2) These alerts are classified into four types in this manual depending on the importance and the risk levels as described below:

Symbols	Meaning
⚠ DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠WARNING	Ignoring this warning could cause serious injury or even death.
⚠ CAUTION	Ignoring this caution could cause injury or property damage.
NOTICE	Ignoring this notice could cause operational problems.

1.3 Exemption for Responsibility

(1) The claim which is out of the quality guarantee published by the Manufacturer is out of Manufacturer's responsibility.

(2) The damage which is from unexpected fault or damage of user by Acts of God is out of Manufacturer's responsibility.

1.4 Warning Statement

⚠WARNING

Ignoring the following warnings could cause serious injuries or even fatal accidents.

Case of explosive and flammable chemicals, you must use with sufficient safety countermeasure.
In accordance with experiment, you should install safety devices and should follow suitable regulations in your laboratory.

Do not install the product in the place that the gas could leak out. Do not use in the place that has the industrial oil smoke and the metallic dust. It causes fire or electric shock.
Do not use the machine near to places where explosion can be happened due to organic evaporating gases.
Explosive materials: Acid, Esther, Nitro compound
Inflammable materials: salt peroxides, inorganic peroxide, salt acids.

Do not use the machine at places where moisture is high and flooding can be happened.

Check electrical requirements described in this operation manual or on the ID plate of this instrument before use.
Connect this instrument to a dedicated power outlet nearby.

Make sure to connect this instrument only to properly grounded power outlets to protect you and your instrument.
Do not ground to gas pipes or water pipes.

Please unplug when there are strange sound, smell and smoke from the product. Stop operating and request a service.

Do not assemble, repair, modify on your own.
The product may not work well and electric shock in the efficiency of the product. Also you cannot get after service by warranty regulation.

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1.5 Caution Statement

⚠ CAUTION
Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

Do not touch block immediately, even power off. Because the block might be have Residual heat.
It may be cause burns from high temperature of block, seemingly invisible.

Do not forget plugging off, after product main switch off.
It is safety regulations for the next user.

Do not put heavy things on the power line. Do not put the machine on the line.
It may take off the wire coating and cause the electric shock or fire.

Do not touch the machine with wet hands.
It may cause electric shock or injuries.

Do not pour or insert any flammable materials into the product.

Do not pour water or put liquid on the top of the product when cleaning.
Please intercept the main power immediately and request the service when water may be in the product.

Do not let the product take any strong shock or vibration.
It causes abnormal operation or trouble. It may deteriorate the ability of the product and you may not obtain correct results.

Do not install the instrument near strong electric field exposed environment.

Please caution, the pace maker or magnetic recording instrument might be influenced by our instruments and magnetic stick

Do not sprinkle insecticide or flammable spray on the product. Use smooth cloths.
Cleaning with solvent can cause fire and deformity.

Please power off while product cleaning.
It may cause the electric shock or fire.

2.0 Functional Description

2.1 Introduction

CBS-350 is generally used in for mixing sample, homogenization process, separation of the DNA / Plasmid, gel elution, and DNA, RNA, Protein, Yeast denaturation.

General application follows that:

- Lipid extractions
- Denaturation of DNA, RNA and proteins
- DNA/plasmid isolation
- Yeast and bacteria cultivation

2.2 Feature

2.2.1 Excellent Performance

- Precision accuracy is ensured (0.1℃) by its PID controller.
- Operation temperature range is Amb.+5 ~ 100℃.
- Provide stable shaking performance (rpm: min.150 ~ max.1500 depending on the attached accessories).
- Users can conveniently set timer operation(1min ~ 99hour 59min). Two kinds of timers are provided for proper uses. Also, the timer can be check remaining time or re-set. [Refer to 4.3 Timer Modes]
- Provide program modes that users can schedule as their experiment protocols.
  - Up to 10 programs allowed for memory storage. (include 3 standard interval mix programs - continuously switching between shaking and phasing)
  - Up to 10 steps allowed for each program.
- Use of BLDC motor provides low noise and strong durability.
- Noise and vibration is minimized by low-profile design.

2.2.2 Safety

- Polypropylene (PP) material block covers, decrease the chance of accidental injuries.
- Smooth starting function to protect the split out of sample.
- Designed by Water-proof structure that minimizes influx of reagents or solution.
- Designed by threefold safety system to cut off main power ; overheating protection for heater, overheating protection for circuit, and over-current protection circuit structure.

2.2.3 Ease of Use

- Available to use 96-well, 0.5㎖, 1.5㎖, 50㎖ tube block. [Refer to 8.0 Accessories]
- Easy to check a set temperature value and operating conditions through VFD(Vacuum Fluorescent Display).
- Convenient to control the product by Touch Button and Dial Knob.
- The main body is made of polypropylene (PP). Polypropylene (PP) that is resistant to chemicals and is easy to clean.

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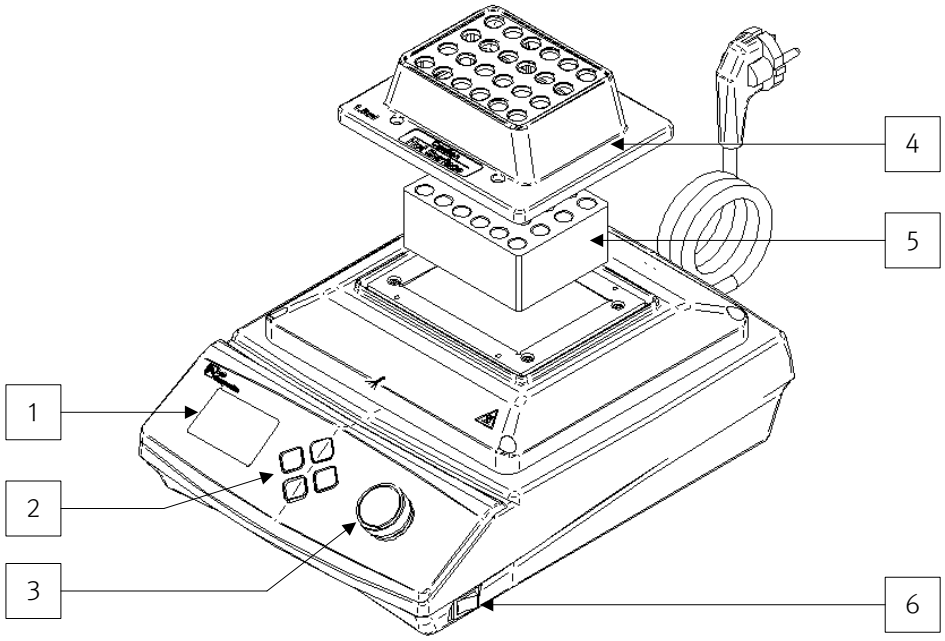
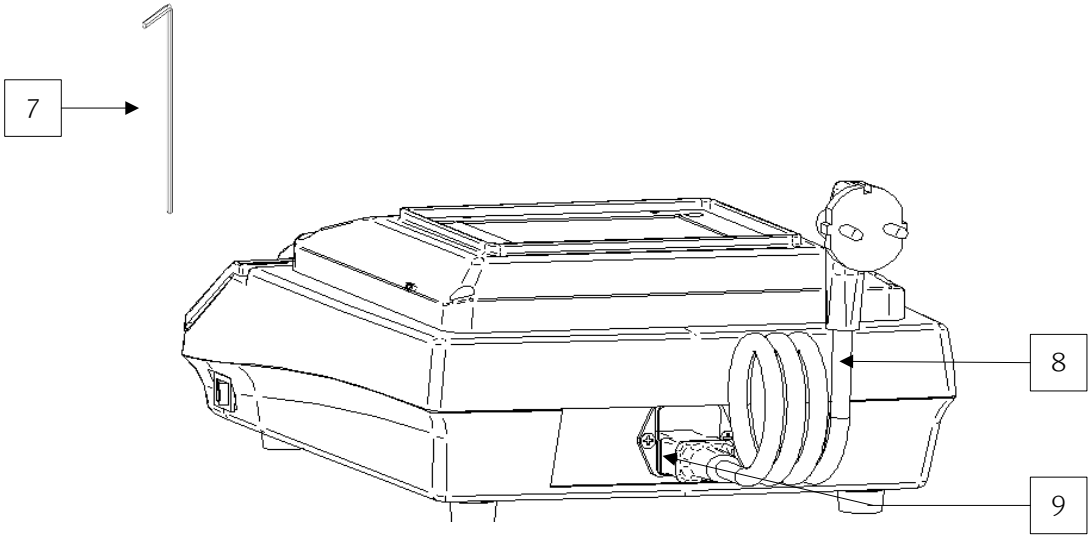
2.3 Construction



(1) VFD (Vacuum Fluorescent Display) : To display operating status.
(2) Touch Button : To choose temperature and time
(3) Dial Knob : To set a temperature value and time
(4) Block cover (Included in purchasing a block option)
(5) 1.5㎖ tube block (Optional): 0.5㎖, 50㎖, 96-well tube blocks can be used. [Refer to 8.0 Accessories]
(6) Power Switch: Power ON/OFF



(7) Hexagon Wrench: To assemble block cover to the main body (Included in purchasing a block option)
(8) Power Cord
(9) Socket: Connecting the power cable into the socket.

3.0 Installation

3.1 Unpacking Package

(1) Check to see if there is any damage in the instrument package before unpacking.

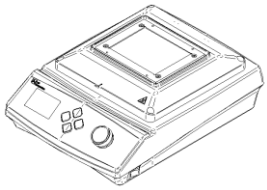
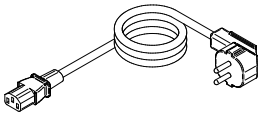
(2) Unpack the instrument carefully.

(3) Inspect to see that the instrument is not damaged during transportation.

3.2 Checking Instrument Components

(1) Please check the instrument components supplied in the package after unpacking.

(2) If a noticeable or an omission is found, immediately notify your local Jeio Tech dealer's Service Department.

Item	Figure	Quantity	Description
Main body		1	-
Power cord		1	
Operation Manual		1	-

3.3 Installing Environment

It should be installed in suitable environment as below.

Avoid direct sunlight.

Room temperature should be 5℃ ~ 30℃.

Relative Humidity (RH%) should be less 80%.

Altitude should be less than 2,000m.

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3.4 Location Conditions

Place the instrument far from the other instruments and keep the proper distance (normally more than 30 ㎝).

⚠WARNING

- Place and install the instrument on a stable fireproof surface with non-slip and non-moisture and avoid direct sunlight & heat.

3.5 Checking Points

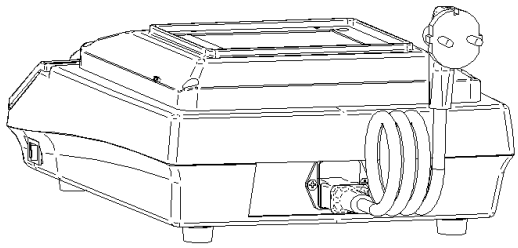
- It should be used on a flat working table with safety facility.
- It should not be used in the places where a combustible gas leak might occur.
- It should not be used in high electric field environments.
- It should not be used in places in danger of electric leakage, water leakage, and submersion.
- It should not be used where there are industrial harmful gases or metal dusts.

3.6 Connecting to Main Power Supply

Connect the electric power to the instrument according to the following process.

(1) Switch off the main power switch before connecting the power cable.

(2) Connect the power cable to the socket of the main body and to the power supply.



⚠WARNING

Electrical Shock Hazard

- Ensure that the instrument should be connected to an appropriate power supply in terms of voltage, phase and capacity.
- Should use a grounded power.
- Never use a forked socket, or a double-tapped socket.
- Failure to obey a safety warning will cause a drop in a line voltage, resulting in a loss of power and causing risk of fire by turning the cable.
- Do not handle or touch electric codes and devices with wet hands.
- Wrong power supply can cause serious damages to the instrument and body; even to death.

3.7 Instrument Plug-in

When you switch on, the instrument displays as below.

NOTICE

- Touch Buttons are displayed with green or red colored backlight. When a backlight color of a button is green, the button is valid so that it can sense user's touches to itself. When it is red, it cannot sense the touches.
- Before displaying the temperature, the instrument needs start-up latency time shortly.

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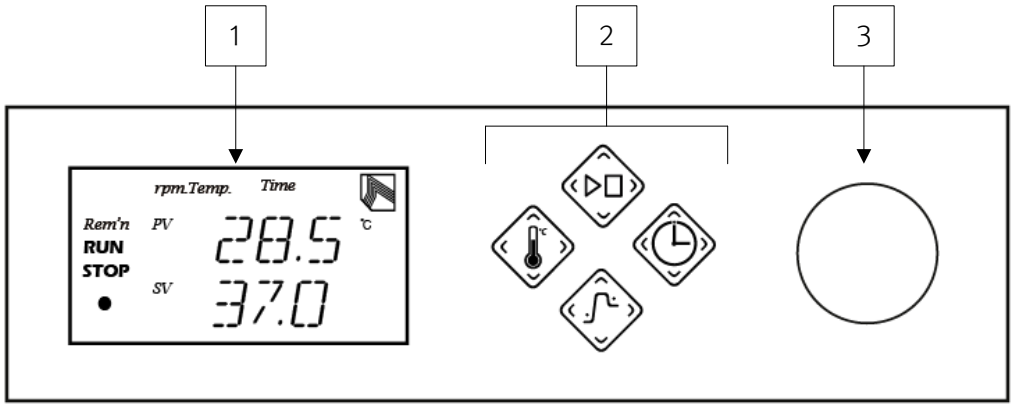
4.0 Operation

4.1 Control Panel and Function



(1) VFD(Vacuum Fluorescent Display) : You can check set value of temperature and shaking speed(RPM) and current state of operation. v

A	*Rem'n*	Remaining time during operation
B	**RUN**	Indicate heating control ON.
C	**STOP**	Indicate heating control OFF.
D	●	Indicate Heater is working.
F	*PV*	Process Value (Current value)
G	*SV*	Set Value (Target value)
H	*rpm*	Indicate shaking speed is now displayed.
I	*Temp.*	Indicate temperature is now displayed.
J	*Time*	Indicate time (elapsed time or remaining time) is now displayed or timer is operating.

(2) Touch Buttons

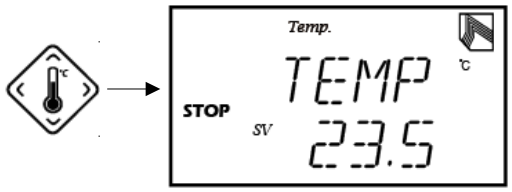
A		START/STOP	Start and stop the instrument. Go back one step when setting parameters for operation.
B		TEMP	Set temperature. Step into Offset setting.
C		PROGRAM	Step into the program mode.
D		TIMER	Set timer function. Check remaining time or elapsed time.

(3) Dial Knob : It can be used when setting temperature, shaking speed, timer and program parameters.

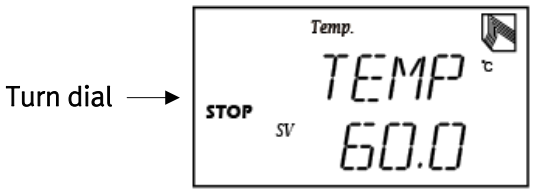
4.2 General Modes

4.2.1 Setting Temperature

(1) Press TEMP when the temperature control stops.

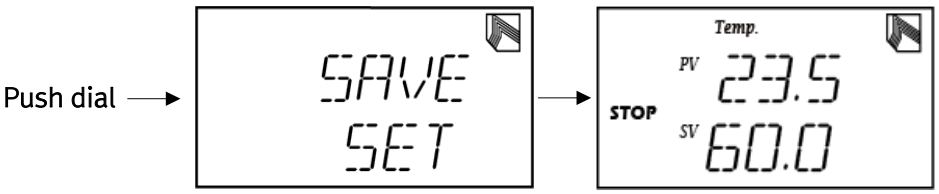


(2) You can set temperature by adjusting Dial Knob with 0.1℃ resolution(e.g., change the SV from 23.5℃ to 60.0℃).

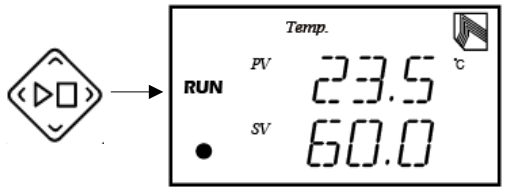


At any time, you can be out of temperature set mode by pressing START/STOP.

(3) Pushing Dial Knob, you can save the target temperature as a temperature SV(Set Value).



(4) Then you can operate it by pressing START/STOP.



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NOTICE

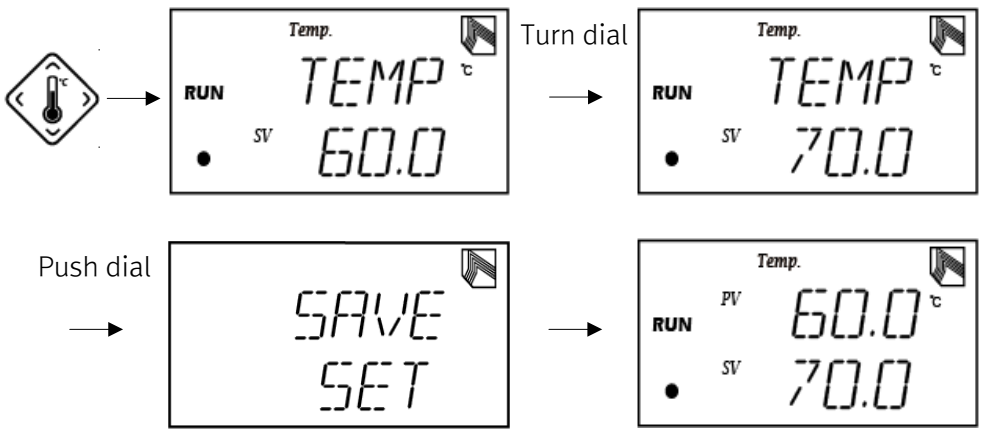
- To step back from temperature setting, press START/STOP. The instrument returns to standby.
- You can also change the temperature SV when the instrument is in operation.[Refer to 4.2.1-1 Changing Temperature in Operation]
- The instrument keeps the temperature after the temperature PV(Process Value) reaches to its SV by repeating Heater on and off.
- SV of temperature is updated to the last set value. This will not be initialized even after Power Switch off and on.
- You can check elapsed time by pressing TIMER (press one time) during operation.
- You can set Offset by pressing TEMP during operation.

⚠ CAUTION

- The instrument and its accessories can be hot even though the Power Switch is off.

4.2.1-1 Changing Temperature in Operation

It is possible to change a target temperature by pressing TEMP during operation.
Change the temperature SV by adjusting Dial Knob and you can start it by pushing Dial Knob.

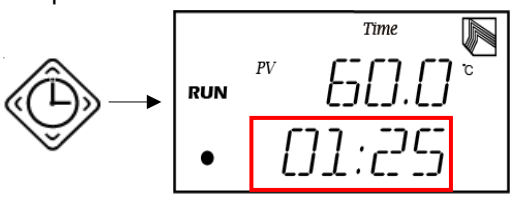


NOTICE

- You can escape from the temperature changing process by pressing START/STOP or leaving it without additional input for 10 seconds.

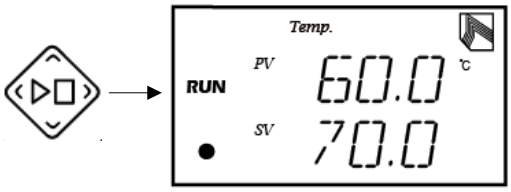
4.2.1-2 Checking Elapsed Time in Operation

Elapsed time for operation can be checked by pressing TIMER once when the instrument is in operation.



[Elapsed time]

To step back from the elapsed time check, press START/STOP or leave the instrument for 10 seconds.



4.2.1-3 Stopping Temperature Control Operation

Press START/STOP during General Mode operation. The instrument will stop operation.

⚠ CAUTION

- The instrument and its accessories can be hot even though the Power Switch is off.

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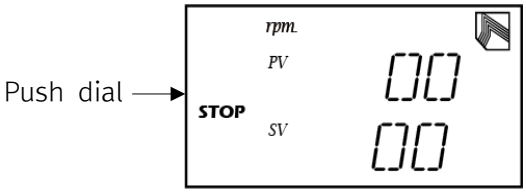
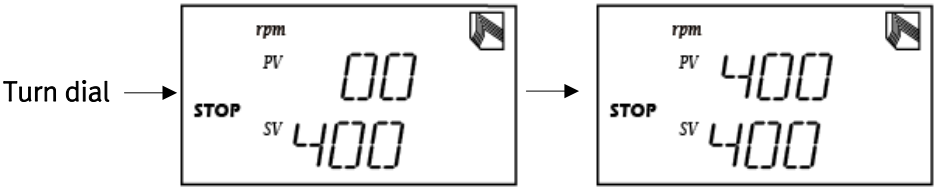
4.2.2 Setting Shaking Speed

In General Mode, shaking speed in RPM can be set by using Dial Knob.

(1) Push Dial Knob to set RPM value for shaking function of the instrument.

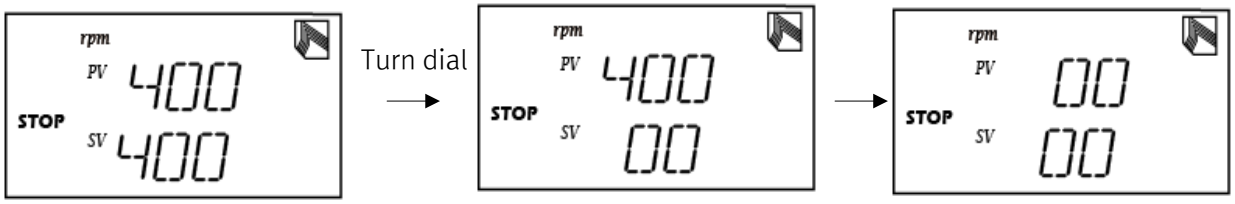


(2) Turn Dial Knob to set a target RPM as a RPM SV(Set Value). Shaking part of the instrument starts operating immediately after turning Dial Knob.
After setting the shaking RPM, push Dial Knob to be out of the RPM setting.



4.2.2-1 Stopping the Shaking Operation

You can stop the shaking operation by turning Dial Knob left side to make RPM SV 00. The instrument stops shortly after setting SV to 00.



4.3 Timer Modes

This instrument provides two types of timers (T1 and T2 timer). The timers are different in a operating condition and point of time countdown.

T1 timer	T2 timer
Set when heating control is not operating	Set when heating control is operating
Start counting down the timer just after it reaches temperature SV	Start counting down the timer immediately

NOTICE

- Timer can be set from 1min~99h 59min.
- You can be out of timer setting in Timer mode by pressing START/STOP repeatedly.
- T1 timer starts counting down when temperature reaches to SV and “Time” in VFD blinks.
- T2 timer starts counting down when set the timer, immediately and “Time” in VFD blinks.
- You can check elapsed time by pressing TIMER once and get into T2 timer setting by pressing TIMER twice during temperature control operation.

4.3.1 Setting T1 Timer

T1 timer can be set only when the instrument stops temperature control.
After setting T1 timer, the temperature control starts operating to make the temperature PV the same to the temperature SV.
When its temperature reaches to the temperature SV, the timer starts to count down.

（1）Press TIMER when the temperature control is not operating.

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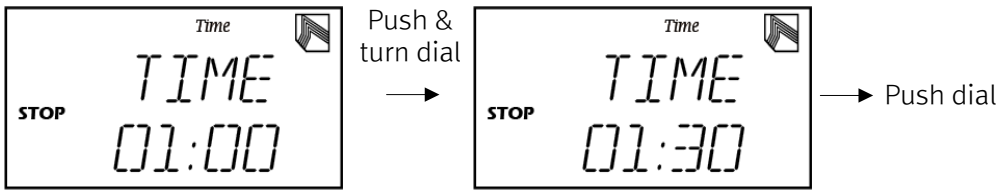
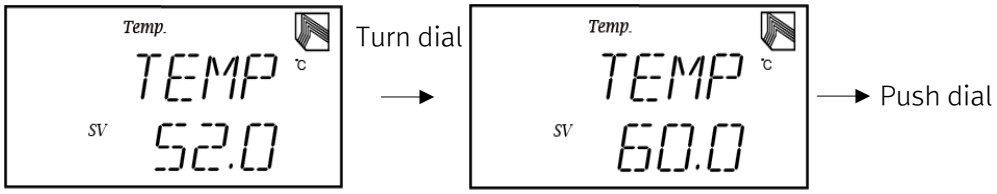
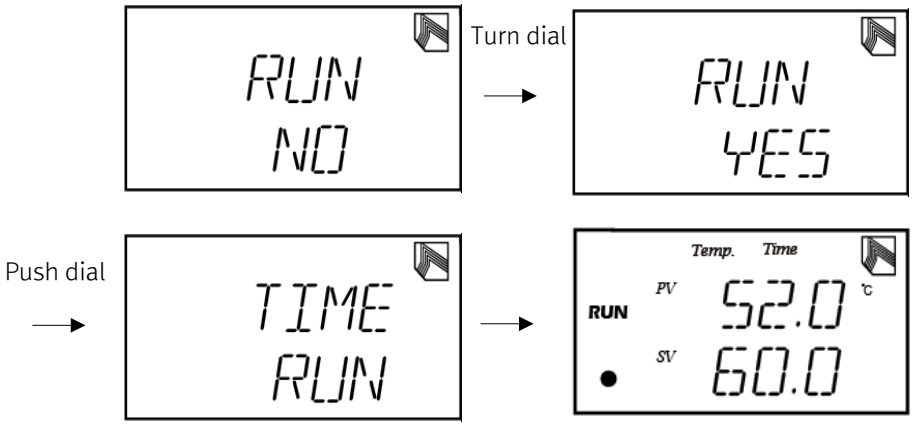
(2) Input Hour, Minutes by using Dial Knob.
(Timer range: 1min~ 99hour 59min)



(3) Input a target temperature by using Dial Knob and save it by pushing Dial Knob.
In case of that you do not changes the temperature SV, just push Dial Knob.

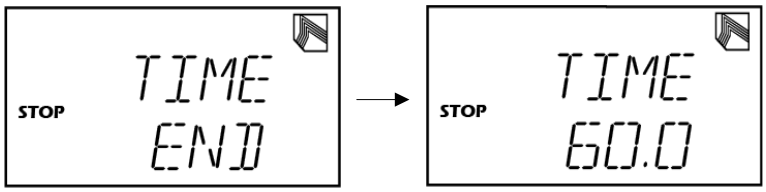


(4) Select whether start operating the instrument or not by using Dial Knob.



When it reaches to the set temperature, the timer starts with a sound alarm.

(5) When the timer operation ends, the instrument generate a sound alarm with a display as follows. Confirm the end of the timer operation by using Touch Buttons or Dial Knob.



[Current temperature]

NOTICE

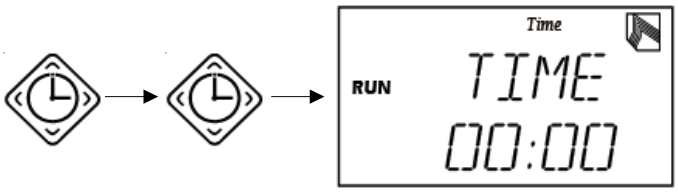
- If you press Dial Knob in “RUN NO”, all inputs for T1 timer are canceled and the instrument returns to the standby.
- Every set target time(time SV) is memorized as an initial value of T1 timer. You can see the last set time SV when setting a new time SV, as an initial value.
- During the timer operation, you can stop the instrument by pressing START/STOP. [Refer to 4.3.4 Stopping Timer during Operation]
- During timer setting, the instrument returns to standby if you leave it for about 10 seconds without saving the time value.

4.3.2 Setting T2 Timer

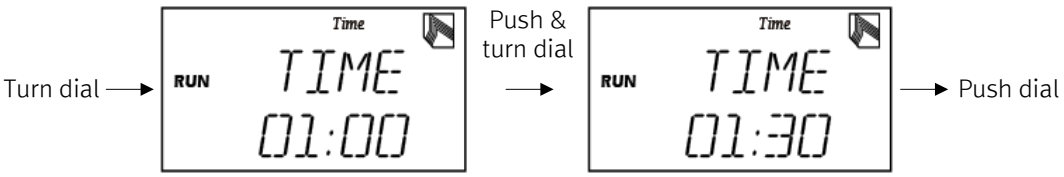
T2 timer is for setting a timer during temperature control operation. It also requires SVs for temperature and time.

In T2 timer mode, regardless of reaching the temperature SV, the timer starts to count down just after the timer setting.

(1) Press TIMER twice during temperature control operation.



(2) Select a desired time by using Dial Knob in the order of hour, minute.
You can set the timer from 1min to 99hour 59min.



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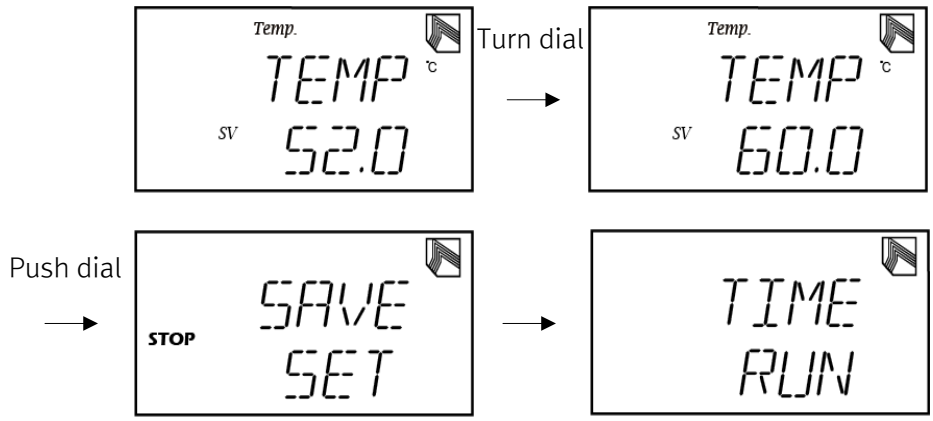
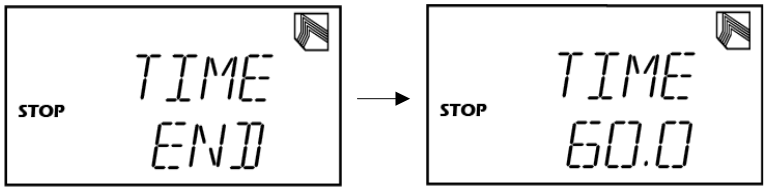
(3) Input a target temperature by using Dial Knob and save it by pushing Dial Knob.



(4) When the timer operation ends, the instrument generates a sound alarm with a display as follows. Confirm the end of the timer operation by using Touch Buttons or Dial Knob.



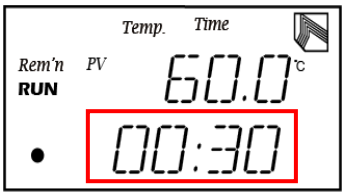
[Current temperature]

NOTICE

- In case of T2 timer, the timer starts to count down just after the timer setting, regardless of reaching the temperature SV.

4.3.3 Checking Remaining Time during Timer Operation

Remaining time for timer operation can be checked by pressing TIMER once when the instrument is in operation.

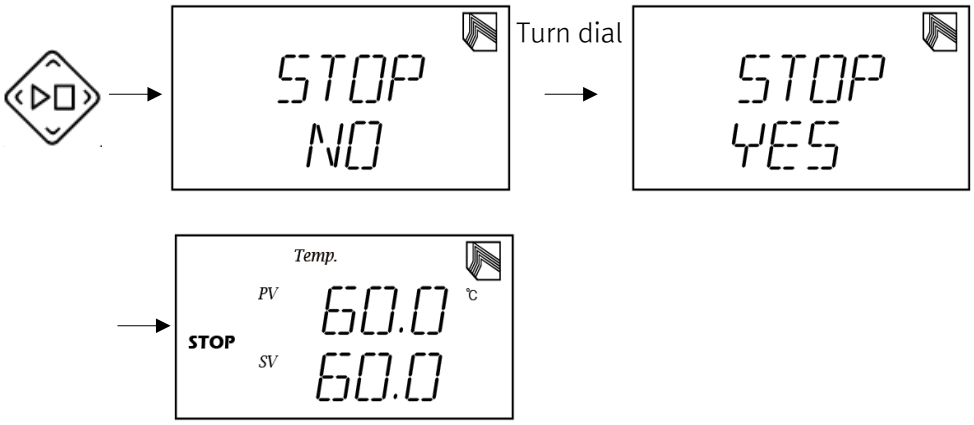


[Remaining time]

During the checking process, you can escape from the process if you press START/STOP or leave the instrument without additional input for 10 seconds.

4.3.4 Stopping Timer during Operation

You can stop the operation by pressing START/STOP.



Confirm the end of the timer operation by using Touch Buttons or Dial Knob.

⚠ CAUTION

- The instrument and its accessories can be hot even though the Power Switch is off.

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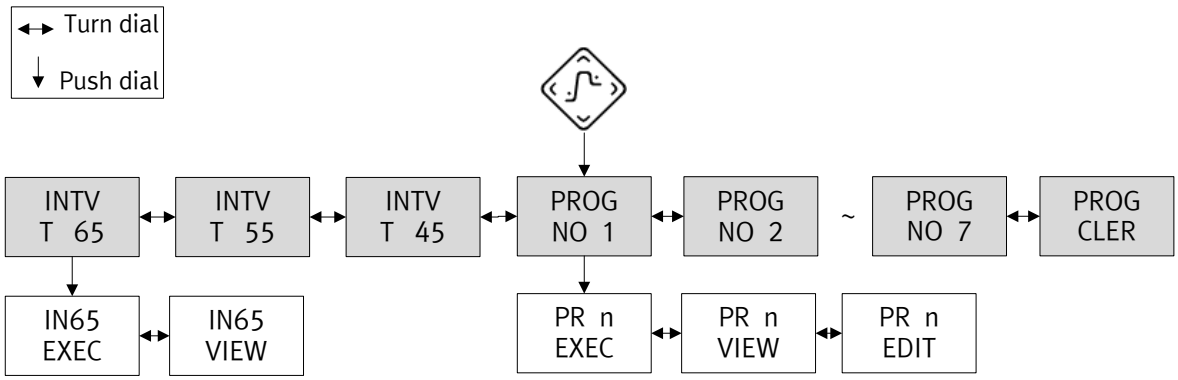
4.4 Program Mode

This instrument provides 10 programs. 3 programs are standard interval mixes and the other 7 programs are user editable programs. Each program consists of steps(max.10 steps) that have parameters including SVs for temperature, time, and shaking RPM.

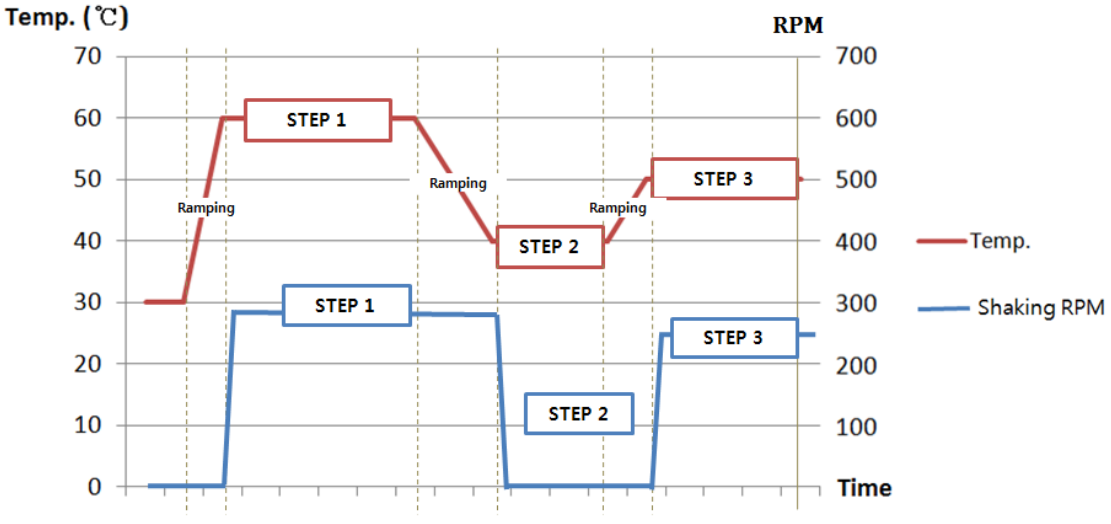
It also provides a looping function that repeats a program as many times as user selected(range : 1~99, infinity).

[Diagram of Program Mode]



ABBREVIATIONS	DESCRIPTIONS
PROG (PR)	User program
INTV T (IN)	Interval mix program
EXEC	Run a program
VIEW	View configurations of a program
EDIT	Edit configurations of a program
CLER	Clear all programs or a program.

[Temperature and shaking speed control in Program Mode]



Temp

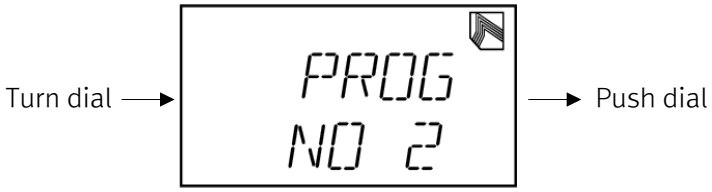
NOTICE

- A time SV for a step starts to be counted just after the instrument temperature reaches to the temperature SV of the step.
- If the time SV for a step is set as “00:00”, then the step will be skipped and the next step will proceed.
- It is possible to repeat a program from 1 to 99 times or infinitely. It depends on the user's choice.
- In program mode operation, after finishing a step, the instrument go through ramping process until it reaches the target temperature of the next step stably. Until starting the step, the shaking RPM of the previous step is maintained..
- User can repeat the saving program from 1 to 99 times or infinitely.
- You can stop the operation of a program mode by pressing START/STOP. [Refer to 4.4.5 Stopping Program]

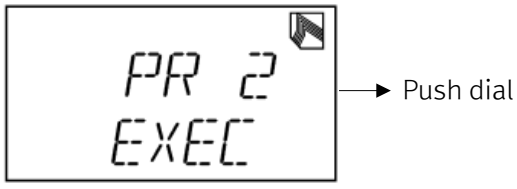
4.4.1 Starting User Program

(1) Press the PROGRAM when the instrument is on standby.

(2) Select one of user programs by turning Dial Knob to the right side.



(3) Select a program execution “PR *n* EXEC” by pushing Dial Knob (n:program number).



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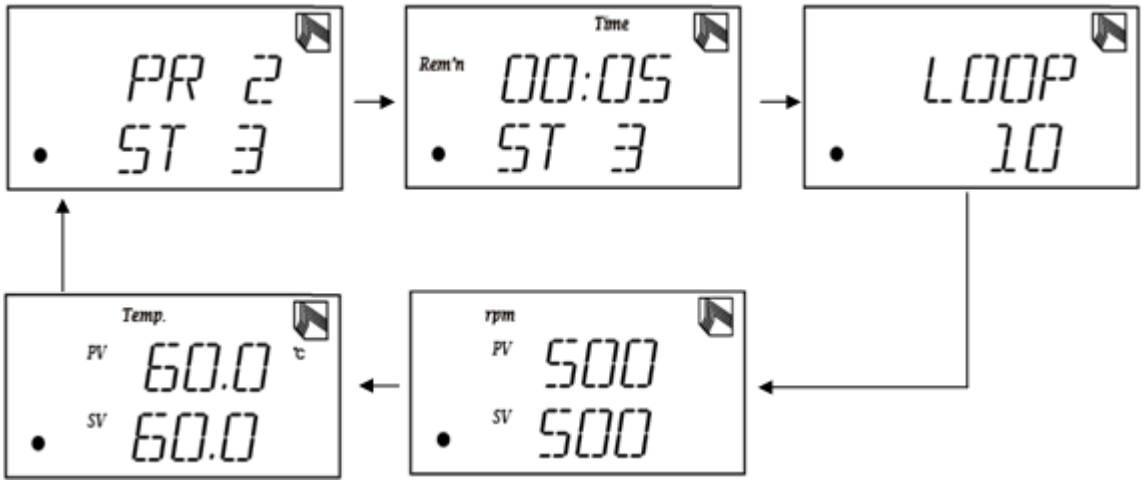
(4) Select the number of loops for program repeats by turning Dial Knob and operate it by pushing Dial Knob.
- Turn Dial Knob to the right : You can select the number of repeats from 1 to 99.
- Turn Dial Knob to the left : Repeat the program infinitely.

[In case of repeating 5 times]

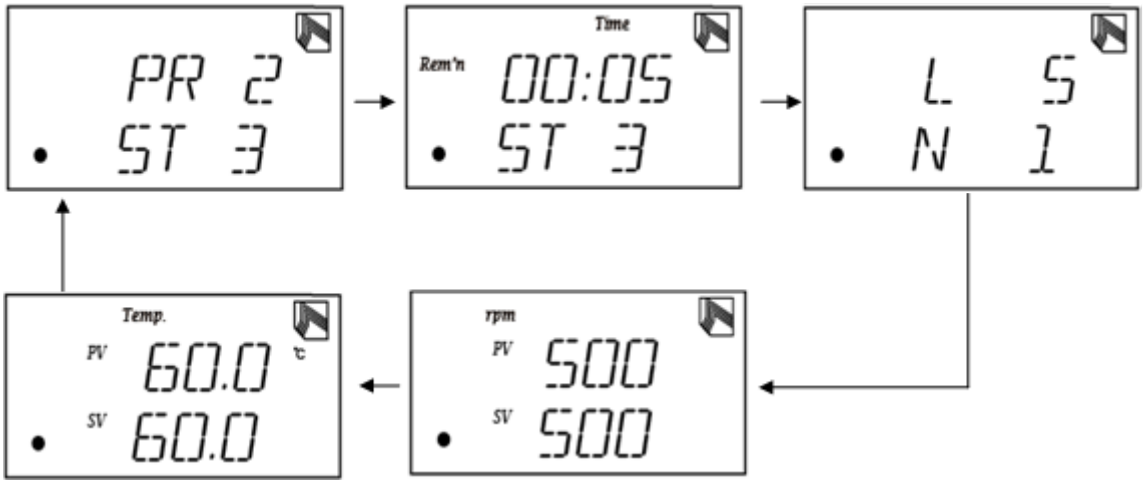
[In case of repeating infinitely]

4.4.2 Display during Program Operation

During program mode operation, the instrument displays its operating status, “program number and current step” → “remaining time of current step” → “the current number of repeats in infinite loop” or “the current of iterations and total number of iterations” → “process value and set value for RPM” → “process value and set value for temperature”.

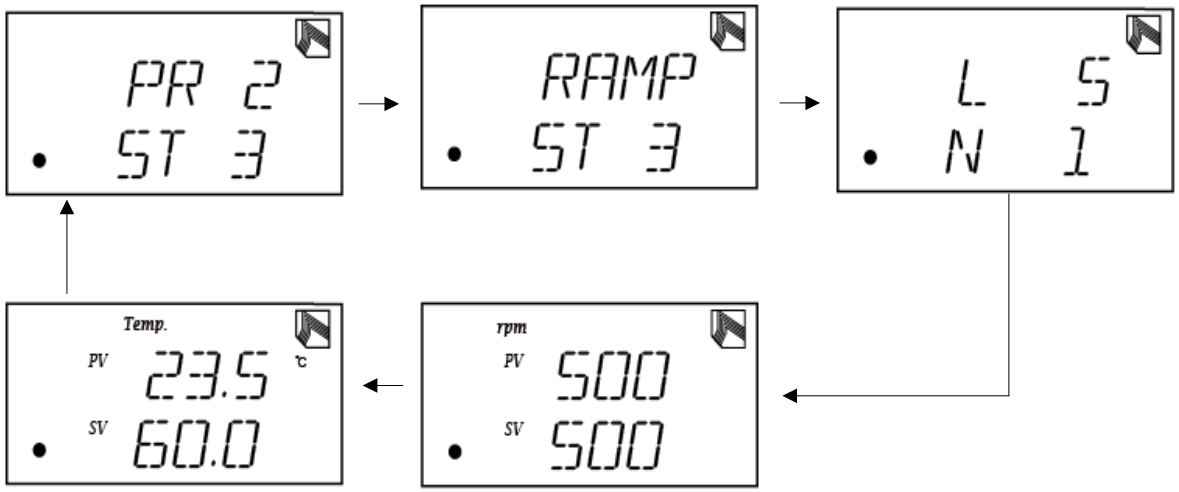


[Program 2 and step 3] → [remaining time : 5min and step 3] → [10th iteration of infinite loop] → [RPM – PV : 500, SV : 500] → [temperature – PV : 60℃, SV : 60℃]



[Program 2 and step 3] → [remaining time : 5min and step 3] → [1st iteration of 5 total repeats] → [RPM – PV : 500, SV : 500] → [temperature – PV : 60℃, SV : 60℃]

In case of ramping periods between two different steps, the display for remaining time is replaced to alternative displays indicating that the instrument is on temperature ramping.



[Program 2 and step 3] → [ramping to step 3 temperature] → [1st iteration of 5 total repeats] → [RPM-PV : 500, SV : 500] → [temperature-PV : 23.5℃, SV : 60℃]

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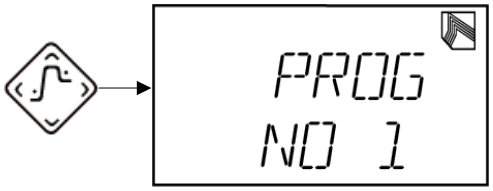
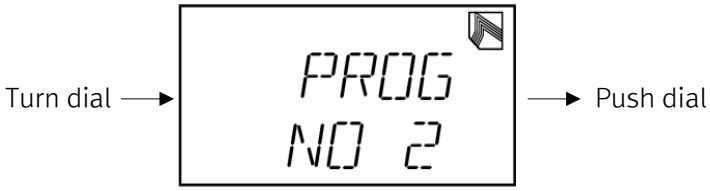
4.4.3 Editing User Program

(1) Press PROGRAM when the instrument is on standby.



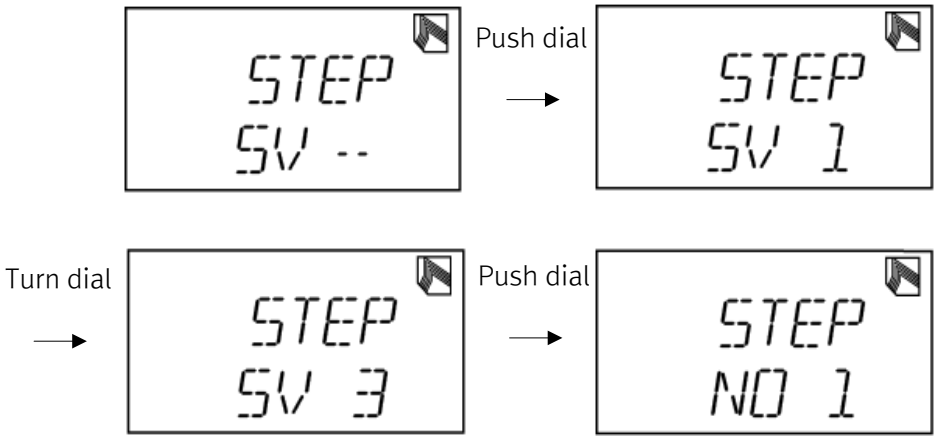
(2) Select a program you want to edit by turning and pushing Dial Knob.



[In case of editing program no.2]

(3) Select a program execution “PR *n* EDIT” by turning and pushing Dial Knob as below (*n*:program number).

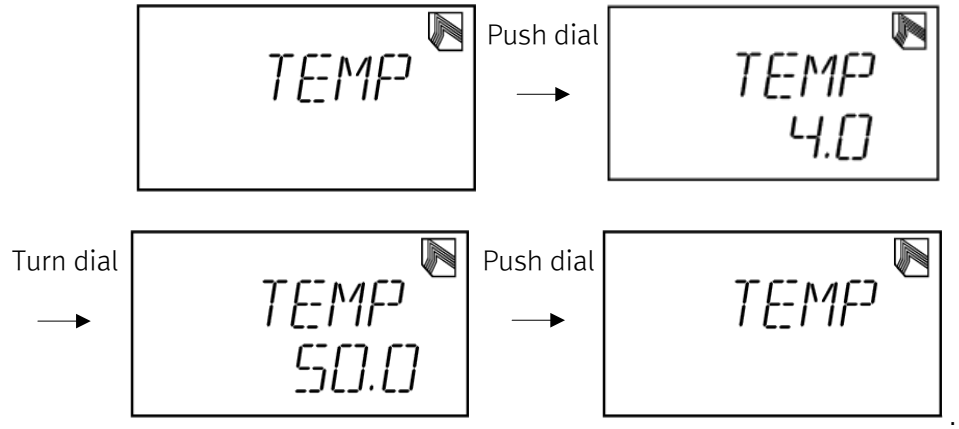
(4) Enter the number of steps for the program. You can set up 10 steps for a program.



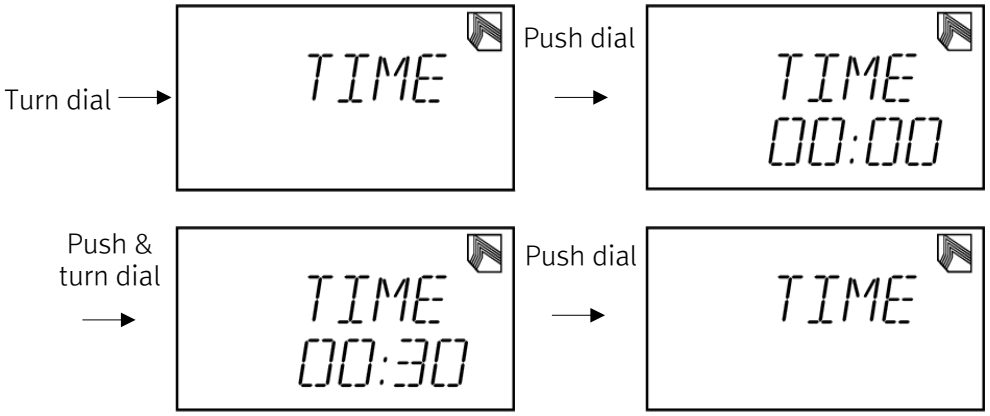
[In case of setting 3 steps for program 2]

(5) The program is reset and generates new steps as many as step SV. Then you can set SVs for temperature, time and shaking RPM for each step by using Dial Knob.

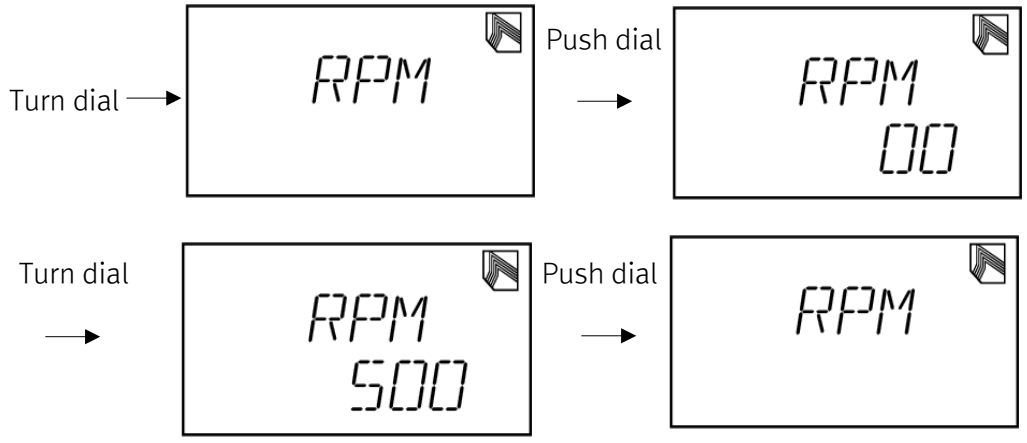
(6) Enter the target temperature and time for the step, and then save the entered value (SVs) as below.



[Enter temperature for the step]



[Enter time for the step]



[Enter shaking RPM for the step]

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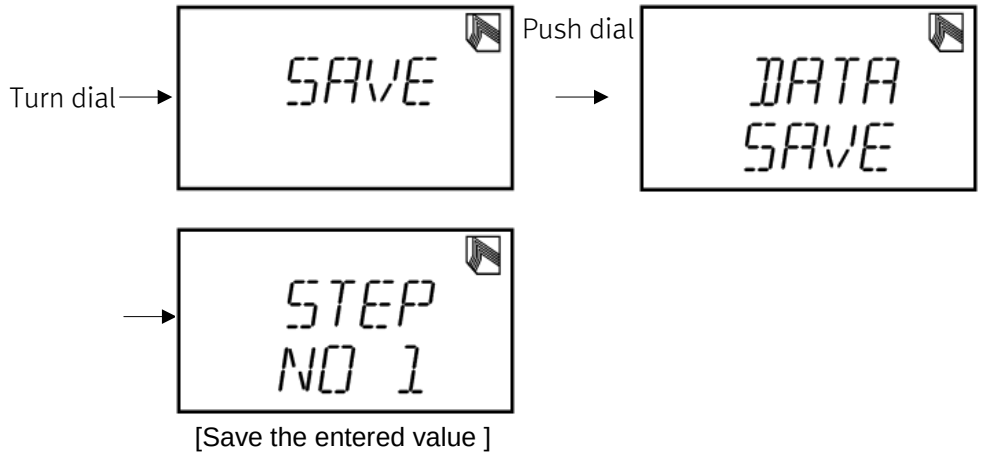
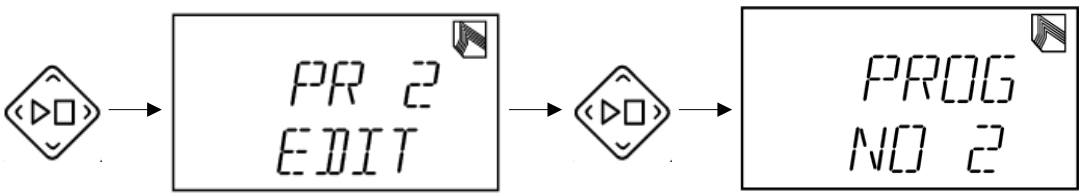


[Save the entered value]

If you skip the saving process, all entered inputs are not saved.

By applying (5) and (6) for every step, you can complete program editing.

(7) After saving all generated steps, push START/STOP to escape program editing.



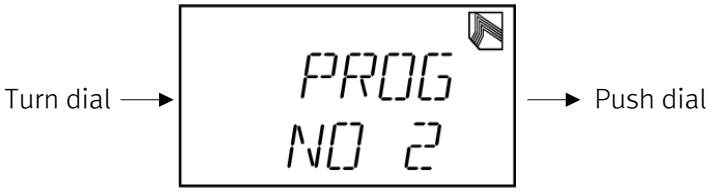
NOTICE

- If you want to write a new program on a program slot, set step size of the program slot. The step size setting includes clearing existing program and initializes a new program. [Refer to 4.4.7-2 Reset Individual User Program]
- Just after you set the step size for a program, every step generated is initialized (0℃ for temperature and 00:00 for time.) This instrument is supposed to skip steps that have 00:00 for time. So, non-edited steps will be skipped in program execution.

4.4.4 Viewing Program Setting

(1) Press PROGRAM when the instrument is on standby.

(2) Select a program you want to view by turning and pushing Dial Knob.



[In case of viewing program No.2]

(3) Select a program execution “PR *n* View” by turning and pushing Dial Knob as below (*n*:program number).

(4) Turn Dial Knob to find a specific step you want to view. Push Dial Knob to get into the step.

[In case of viewing step No.3]

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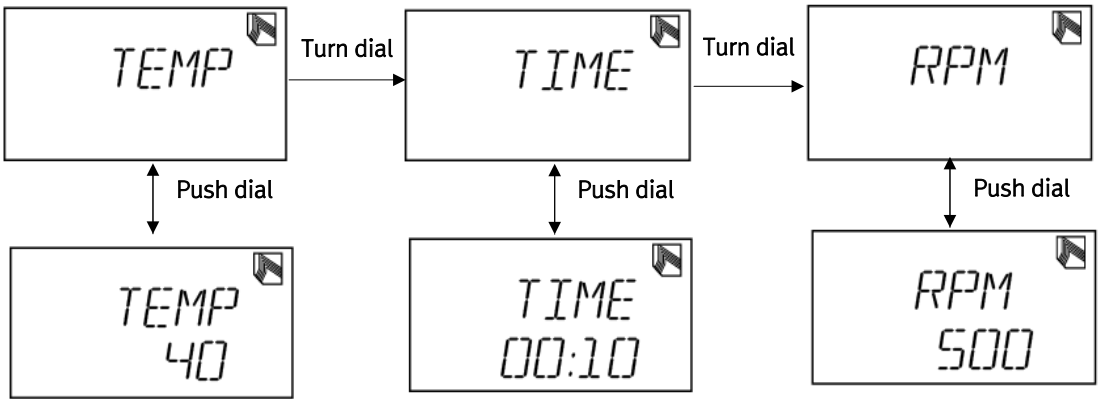
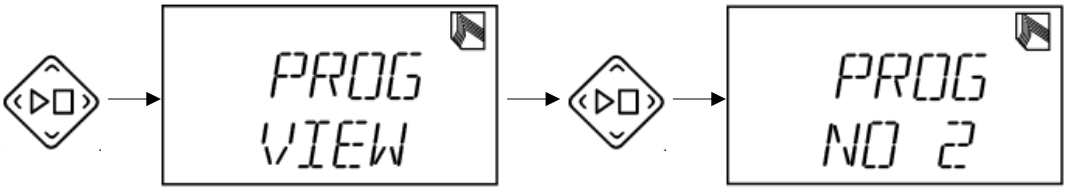
And then you can view the SVs of temperature, time and RPM for the step..

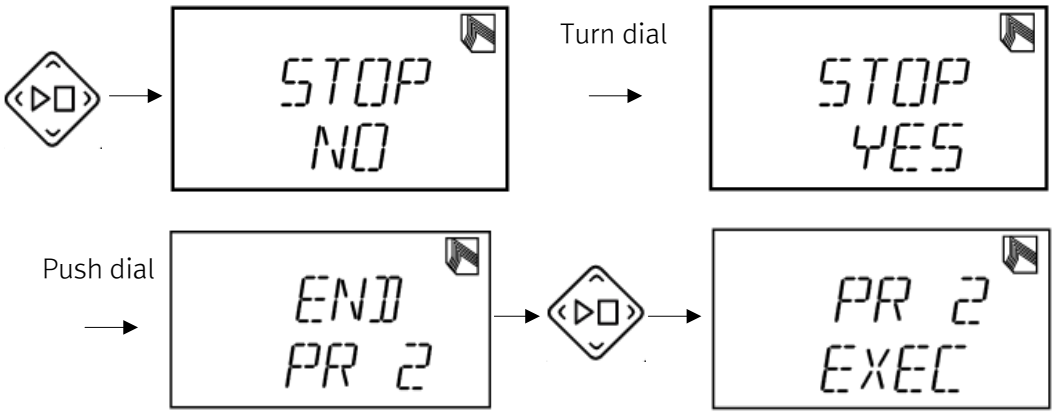


(5) After viewing the program setting, move out by using START/STOP.



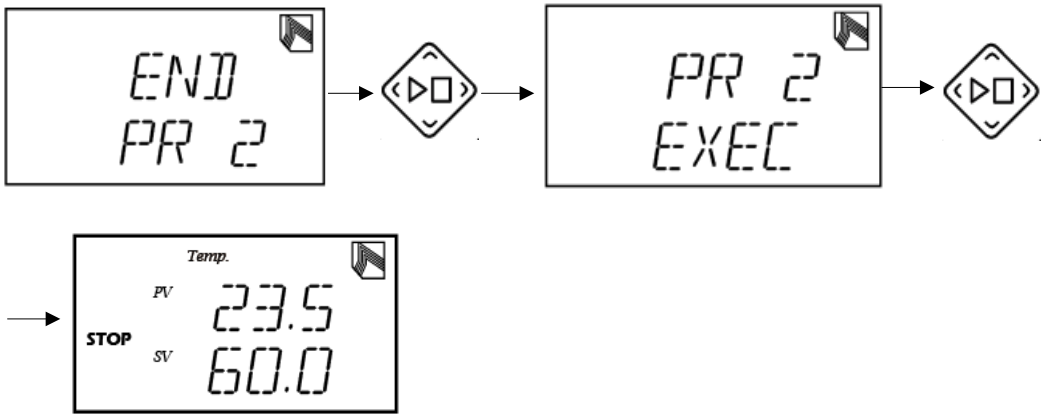
4.4.5 Stopping Program

By pressing START/STOP, you can stop program operation.



4.4.6 Confirming Program End

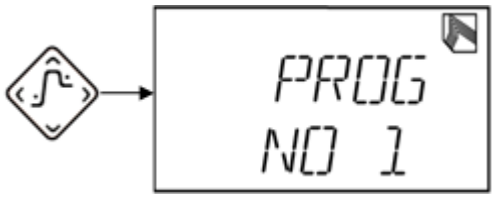
"END PR *n*" is displayed with sound alarm at the end of a program (*n*:program number). Please check the program end by pressing START/STOP.



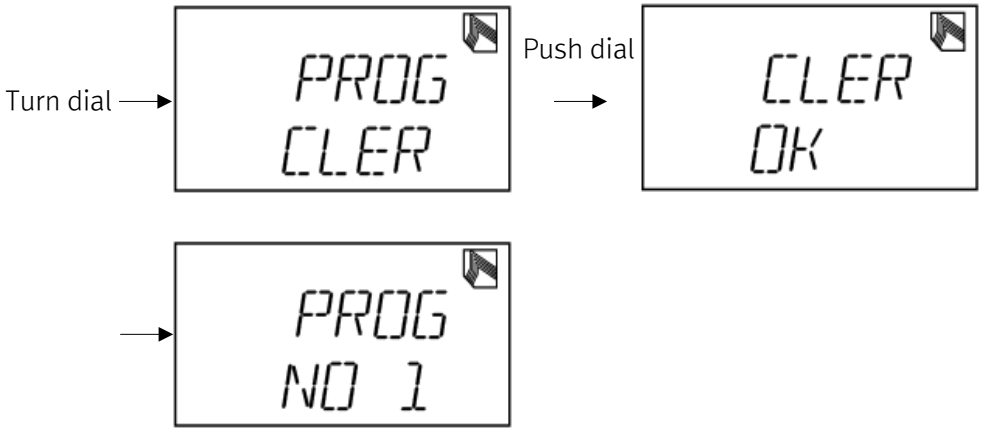
4.4.7 Resetting User Program

4.4.7-1 Reset All User Programs

(1) Press PROGRAM at standby.



(2) Turn Dial Knob to the right end and select "PROG CLER".



All User Programs are initialized. It takes some time for resetting all.
Note that Interval Mix is not affected by the reset. All parameters except the number of repeats for Interval Mix is fixed.

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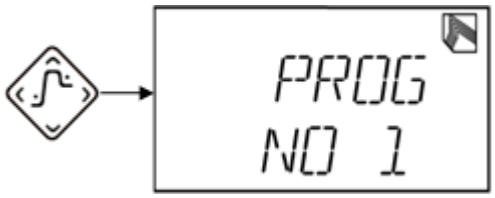
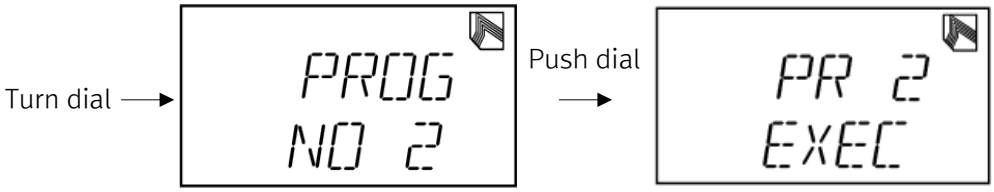
4.4.7-2 Reset Individual User Program

(1) Press PROGRAM at standby.



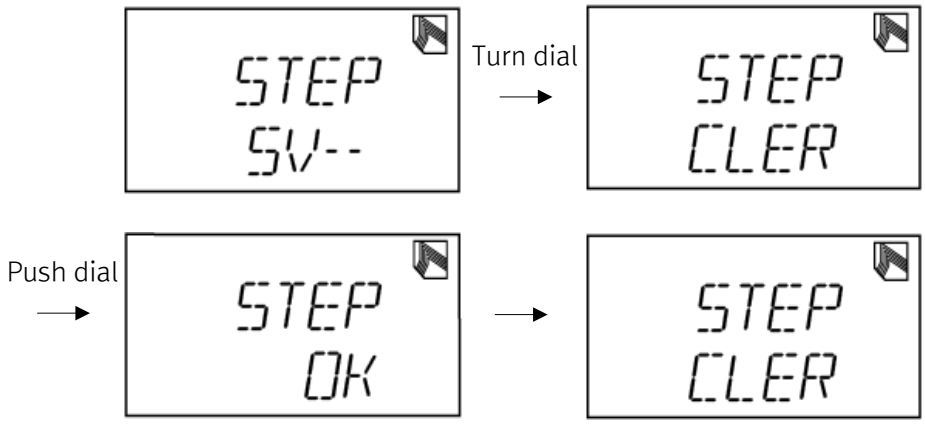
(2) Select a target program that needs to be deleted.



[In case of resetting program 2]

(3) Turn Dial Knob to the right and push “PR *n* EDIT” (*n*:program number).

(4) Turn Dial Knob to the right end and press Dial Knob at “STEP CLER”.



All previous steps of the program are deleted.

NOTICE

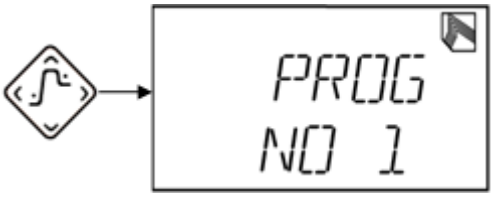
- Setting a step size (“STEP SV”) for a program includes resetting the previous program and generating new steps as many as the set step size.

4.4.8 Interval Mix Program

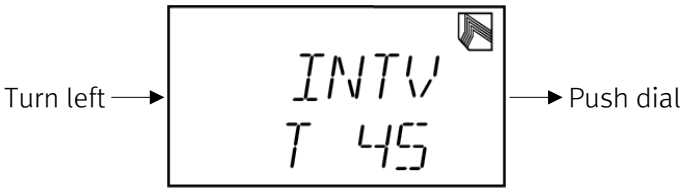
The CBS-350 provides 3 standard Interval Mixes that help enzyme reaction be more efficient. Interval Mixes are programmed in advance as follows.

Interval mix program			
SV (Set Value)	INTV T 45	INTV T 55	INTV T 65
Temperature(℃m	45	55	65
Shaking speed(rpm)	1000	1000	1000
Time pattern	1min operation, 1min pause	1min operation, 1min pause	1min operation, 1min pause

(1) Press PROGRAM at standby.



(2) Turn Dial Knob to the left and select a Interval Mix Program proper to your protocol.



[Interval Mix T45]

(3) Select “INTV EXEC” using Dial Knob.

(4) Select the number of repeats by turning Dial Knob and operate the program by pushing Dial Knob.
- Turn Dial Knob to the number of repeats from 1~99.
- Turn Dial Knob to the left - you can select the number of repeats to infinity.

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[In case of repeat 5 times]

[In case of repeat infinitely]

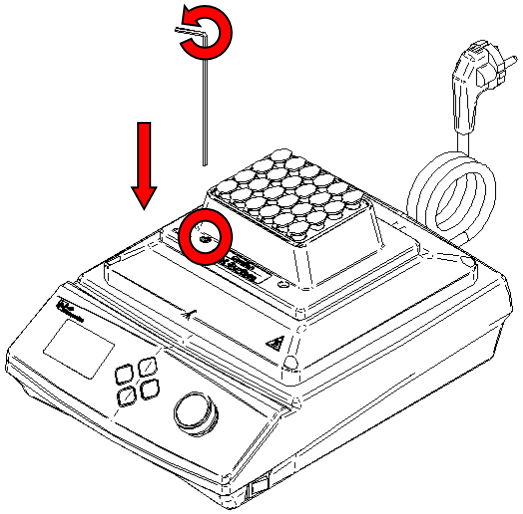
NOTICE

- Operating Interval Mix Program is almost the same to operating User Program.

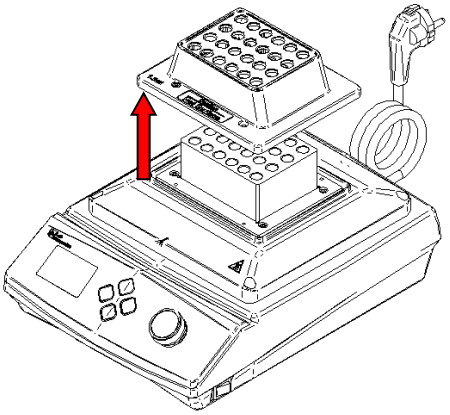
4.5 How to Replace a Block

(1) Take out of the plug.

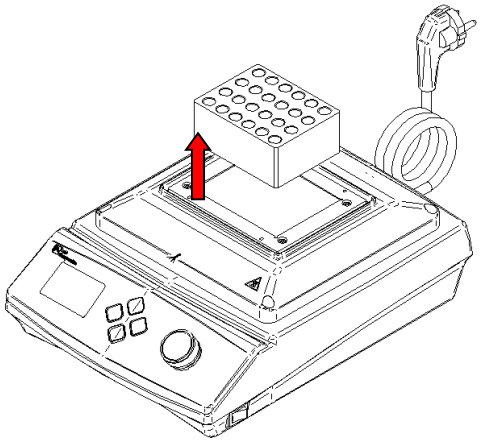
(2) Remove a PEEK wrench bolt by turning hexagon wrench counter-clockwise.



(3) Take the cover and block out from the main body in order.



[Cover Seperation]



[Block Seperation]

(4) Place another block and cover in order. Fix PEEK wrench bolt to the cover by turning hexagon wrench clockwise

.

⚠ CAUTION

- Before replacing a block, please detach tubes, vials, microplate etc. from the block.
- You should be careful in handling the instrument. The instrument and its accessories can be hot even though the Power Switch is off.
- Make sure that blocks and an PEEK wrench bolt are inserted correctly.

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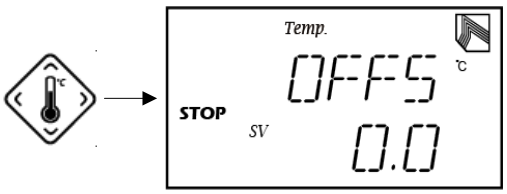
4.6 Offset

The temperature shown on the VFD is measured by a temperature sensor inside the instrument. However, this temperature can be different from the temperature of your own thermometer which you may use as a standard for your specific applications. If needed, you can offset such temperature differences within the range of ±50℃ at 0.1℃ interval.

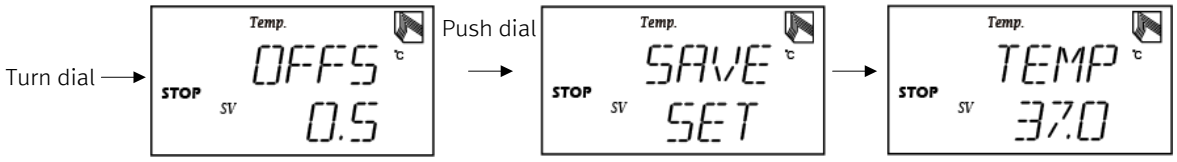
The temperature offset setting procedures are as follows:

(1) Turn the power on.

(2) Press TEMP until the following temperature offsetting screen appears with audible alarm.

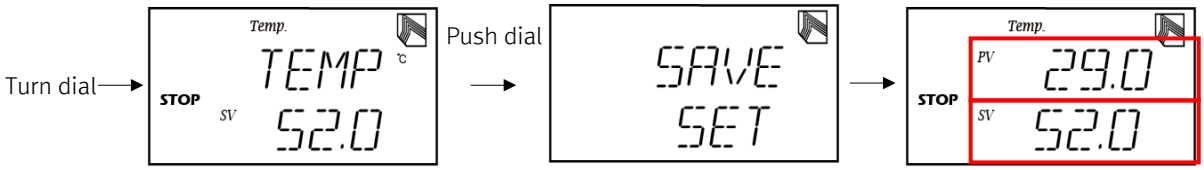


(3) Select the offset value by turning the Dial Knob appropriately and, when selected, save it by pushing Dial Knob. When properly saved, the save confirmation screen will appear as shown below:



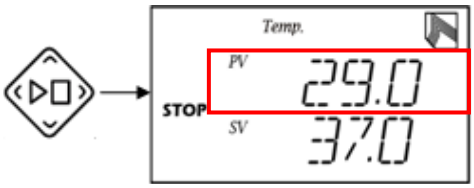
[Offset value selection 0.5℃]

(4) After confirm saving offset, setting a SV temperature is automatically displayed as below. Finally, it returns to standby state with PV that offset is applied to and the changed SV.



[Save setting temperature 52.0℃]

If you press START/STOP or leave the instrument for about 15 seconds in this step, then it returns to standby and you can see that PV is affected by the offset.



NOTICE

- You can except the offset by pressing the START/STOP during offset input.
- During operation, you can set offset by pressing TEMP.

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5.0 Safety Device

(1) The overheat protection device for Block.
The power of this instrument automatically cuts off when the block's temperature overheats more than 115℃ , to protect the instrument.

(2) The circuit protection device.
The power automatically switches off when the circuit's temperature overheats in a certain degree which will activate this device to protect the circuit inside of the instrument.

(3) The overcurrent protection device.
The power automatically switches off when the currency flows more than the given currency value which will activate this device to protect the instrument.

NOTICE

- The instrument should be used after fully cooling it down when the instrument is switched off by these kinds of the protection devices.

6.0 Maintenance

6.1 Periodic Maintenance

5tclassifications	A period of checking time	
	daily	weekly
Power cord		
- The conditions of connection for power supply and an adaptor	●	
- The presence of power supply and an adaptor contact wetting, and cable peeling off, and out of contact.	●	
Product surface cleaning		●
Block cleaning condition	●	
Controller function checking	●	
Check accessory attachments to the instrument are tight.	●	

6.2 Cleaning Product

6.2.1 Main Body

Remove a contaminant by cleaning the instrument frequently with a soft cloth before and after using, otherwise it cannot be readily wiped out for a long time Keep the instrument cleans always without any contaminant.

⚠ CAUTION

- Do not put under the water.
- Do not damage inside of accessories and system. Please caution.
- Do not touch to product from high concentration of nitric acid, sulfuric acid, sodium hydroxide, acetone, benzene, phenol, toluene, chloroform, cresol, acetic acid series, and chlorine series corrosive solvent.
- Please separate power cord from body, if do not use.
- Do not use chlorine bleach, ammonia-based cleaners, abrasives, ammonia, or metal scouring pads when cleaning.

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6.2.2 Accessories

Remove a contaminant by cleaning the instrument frequently with a soft cloth before and after using, otherwise it cannot be readily wiped out for a long time Keep the instrument cleans always without any contaminant.

6.3 Relocation

(1) Disconnect the power cord from the power outlet.

(2) Pack the instrument and its accessories into the original packaging or any other suitable container before moving.

⚠ CAUTION

- Pay attention to avoid mechanical shock or vibration while moving the instrument. Damages caused by mechanical shock or vibration may result in injury or fire.

6.4 Keeping Product

(1) Unplug the instrument from the main power.

(2) Clean the instrument with a soft cloth neatly.

(3) Store in a dry place after packing.

7.0 Troubleshooting

7.1 Electrical

Trouble	Causes	Solution
The instrument does not turn on.	Incorrect electric power	Compare power source and voltage on the ID plate and make sure they are the same. ID plate is found on the back of instrument.
	Power failure or circuit breaker shuts down	Find out the causes of power failure and recovery.
	Main plug not seated properly.	Check the electrical cord connection at the instrument to ensure it is fully seated.
	Check the electrical cord connection at the instrument to ensure it is fully seated.	If the socket / plug / main power line are cut, request service.
	PCB has damaged by reagent.	Request service.
Room circuit breaker trips often when the instrument is turned on or running.	Too many plugs connect at the same time.	1.Check the circuit breaker size along with the voltage and current supplied to it. 2.Check that several similar instruments are inserted together, if so you should not use overly.
	Product internal circuit problem	Request service.
No VFD	Power failure	Find out the causes of power failure and recovery.
	Main plug not seated properly.	Check the electrical cord connection at the instrument to ensure it is fully seated.
Button doesn’t operate well.	Power failure	Find out the causes of power failure and recovery.
	Button switch has damaged.	Request service.

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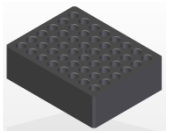
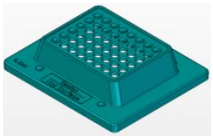
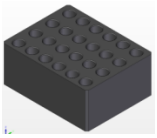
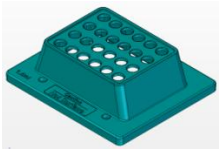
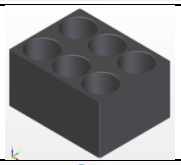
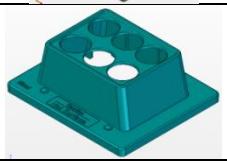
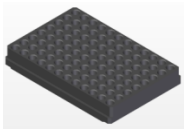
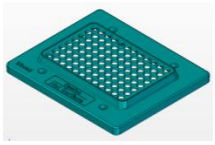
7.2 Trouble during Operation

Trouble	Cause	Solution
Block is not heating up.	START/STOP is not pressed.	Press START/STOP on the control panel.
	Set temperature is lower than present temperature.	Check set temperature and adjust it properly.
	Heater failure	Request service.
	Circuit protection device cut off the power.	Take off the cord for cooling down the instrument and re-operate it.
	Product internal circuit problem	Request service.
The Dial Knob isn't operation correctly.	Dial Knob or circuit problem	1. Pull out the knob from the instrument and replace it again. 2. Request service.
Error message on the display	Product internal circuit problem	Request service.
The VFD lamp is not operating.	Product internal circuit problem	Request service.
Vibration is detected during acceleration, deceleration, and constant velocity.	Unit is not in balance.	Fix the unit on the flat ground.
RPM is not operating well.	1. Too heavy load of samples 2. Rubber band inside of the body is broken down.	1. Remove some samples. 2. Request service.

8.0 Accessories

Designation			Order No.	Block dimension (W x D x H, mm)
0.5㎖tube block	Block		AAAJ4501	98 x 76.5 x 30
	Block cover			
1.5㎖tube block	Block		AAAJ4502	98 x 76.5 x 41
	Block cover			
50㎖ tube block	Block		AAAJ4503	98 x 76.5 x 51
	Block cover			
96-well tube block	Block		AAAJ4504	111 x 76.5 x 15
	Block cover			

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9.0 Appendix

9.1 Technical Specification

Heating shaker		CBS-350	
Temp.	Control range (℃/℉)	Ambient + 5 to 100 / 41 to 212	
	Display	up to 100℃, 0.1℃ resolution	
	Uniformity(±℃/℉)	0.5 / 0.9 at 80℃	
	Stability(±℃/℉)	0.15 / 0.27 at 80℃	
	Heater output, max. (W)	360	
	Control	PID feedback, 10Memories, 10steps/memory, Interval mix	
	Heating rate (℃/ min)	Approx. 5.0	
	Function	Offset	
Shaking	Speed range (guarantee)	96-well tube block	150 ~ 1500
		0.5㎖ tube block	150 ~ 1000
		1.5㎖ tube block	150 ~ 1000
		50㎖ tube block	150 ~ 800
	Speed display resolution (rpm)	0 ~ 1500	
	Orbital diameter (mm/Inch)	2/0.08	
	Motor type	BLDC	
Timer		1min to 99 hr 59 min	
Safety device		Over temperature protection Over current detection	
Control panel		VFD(Vacuum Fluorescent Display), 4 Touch keys, Dial knob	
Material	External	PP, PC, Powder coated steel	
	Block	Black anodized Aluminum	
Electrical requirements (120V/60Hz,A)		3.4	
Electrical requirements (230V/50/60Hz,A)		1.7	
Exchangeable blocks		96-well, 0.5㎖, 1.5㎖, 50㎖ tube block	
Overall dimension (W x D x H, (mm/inch))		276 x 334 x 170 / 10.9X13.1 X6.7	
Net weight (kg/lbs)		8.3 / 18.3	

※ Specifications can be changed without prior notice for quality upgrade.

※ Permissible ambient condition: 2~60℃, Relative humidity up to 80%.

9.2 Disposing of the Product

Before disposing of the shaker or any of its components:

1. The instrument should be cleaned and decontaminated to protect workers servicing the instrument, the environment or the public purchasing surplus instrument because the shaker can potentially be contaminated with biological material, chemicals or radioisotopes. Check with your institution or laboratory for individual policies and procedures for disposal of laboratory instrument.

2. Please contact your local governing body for regulations regarding disposal of electrical, electronic, metal (brass, aluminum, steel and stainless steel), refrigeration and rubber components. Jeio Tech recommends the user find a local scavenger or laboratory instrument recycler to properly dispose of the instrument and its components.

9.3 Warranty

9.3.1 Warranty period

(1) If the product fails during normal and proper use, the warranty period for manufacturing liability shall be two years from the date of delivery.

(2) If you request a repair, please check the items below and let us know so that you can get a quicker and more accurate repair.

- Date of purchase:
- Customer name / address / phone number / E-mail:
- Fault status
- Model
- Serial number

9.3.2 Technical Service Contact Points

Technical Services
Address : 153 (Youngsan-dong), Techno 2-ro Yuseong-gu, Daejeon-city, 34025, Republic of Korea
Tel : +82 (0)2 -2627-3824
Website : https://www.jeiotech.com/eng/
E-mail : overseas@jeiotech.com

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9.3.3 Certificate of Product Warranty

This is a guide to the product quality warranty and service terms provided by JEIOTECH Co., Ltd

All products are guaranteed to operate normally when installed under proper conditions, as specified in the user manual for each product, and used according to the intended purposes and permissible operating conditions.

The warranty period for product quality starts from the delivery date and is indicated in the catalog provided for each product or in the purchase order agreed upon with the customer. If a product malfunctions within the warranty period, JEIOTECH Co., Ltd. provides free repair services. However, among the transportation costs incurred during the repair process, any special costs resulting from the customer's site conditions (e.g., door or wall modifications, use of special handling equipment) are not covered under the warranty. Furthermore, JEIOTECH's liability under this warranty is limited to replacing the product or refunding the original purchase price at JEIOTECH's sole discretion if reasonable attempts to repair or replace the product fail.

Parts replaced during free repairs within the warranty period become the property of JEIOTECH Co., Ltd. Additionally, the warranty period is not extended due to free repairs. JEIOTECH is not responsible for any losses incurred by the customer due to delays in repairs caused by issues such as part shortages or shipping delays.

The following cases will be handled as paid repairs, even within the warranty period:

1. Non-defective cases
   * Requests to resolve issues arising from improper operating environments or abnormal installations.
   * Reinstallation requests or connections with external equipment other than the initial installation.
   * Requests for usage instructions or simple adjustments that do not require disassembly.
   * Inspections of non-defective products.
   * Cleaning or debris removal service requests.

2. Failures caused by user errors:
   * Malfunctions due to usage not in accordance with the user manual.
   * Issues resulting from improper operating environments or abnormal installations.
   * Malfunctions caused by incompatible chemical usage.
   * Malfunctions caused by irregular or improper electrical or utility supplies.
   * Damage due to product movement, storage, external impact, or dropping by the customer.
   * Malfunctions resulting from unauthorized modifications or repairs without prior written approval from JEIOTECH Co., Ltd.
   * Malfunctions caused by using consumables or optional components not specified by JEIOTECH Co., Ltd.
   * Repairs performed by personnel other than JEIOTECH or its authorized service agents.

3. Other cases
   * When the product model or serial number has been damaged, removed, manipulated, or altered.
   * Malfunctions caused by fire, flooding, or other natural disasters.
   * Failure due to consumable parts reaching the end of their lifespan (e.g., lamps, filters, fuses, gaskets, packings, hoses, heat transfer fluids).
   * Natural wear and tear (e.g., discoloration, screen printing degradation).
   * Damage or malfunction of product accessories (e.g., power cables, data cables, glass components) or options.
   * Malfunctions caused by errors in computers, computer components, or connected network systems.

- Before JEIOTECH performs free or paid repairs or accepts the return of a product, the customer must ensure the product has been decontaminated of chemical and biological hazards.
- Replacement parts used during repairs may differ from the original but will function correctly and be equivalent in performance.
- JEIOTECH does not bear any responsibility for damage to stored samples, data loss, or any other direct or indirect damages caused by product malfunctions, regardless of the warranty period.
- JEIOTECH does not guarantee issues related to computers, computer components, or network systems connected to the product, regardless of the warranty period.
- This warranty is the sole and exclusive warranty provided. Any implied warranties imposed by applicable laws are limited to the warranty period stated herein. This warranty cannot be modified by any verbal advice, statements, or documents on behalf of JEIOTECH unless explicitly labeled as a "Warranty Amendment" and signed by an authorized representative of JEIOTECH.

- This warranty applies only to products purchased for direct use by the customer. It does not cover products purchased for resale purposes without prior written approval from JEIOTECH.
- This warranty does not apply to consumables and is non-transferable.

- The contents of this manual can be changed or upgraded without prior notice.
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