

Please be sure to hand this instruction manual to the final user.

# For SUPER HEATER Temperature Control Unit TCU series

## MANUAL

● Please be sure to read before use.

- ◆ Thank you for purchasing the TCU series temperature control unit.
- ◆ Check the name plate of the main unit to see if the model, product number, and voltage are the same as the product you ordered.



Temperature control unit TCU series

- TCU8K
- TCU12K
- TCU20K

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The contents of this instruction manual are subject to change without notice. In addition, the figures and indications in the instruction manual do not guarantee the actual specifications. It is prohibited to modify or copy this instruction manual without the permission of the manufacturer.



**KANSAI ELECTRIC HEAT CORP.**

# 1. Precautions for use ※Please be sure to check before use.

## To use the temperature control unit without any trouble

- ◆ Describes important precautions that have caused failures that have occurred in the past. Please check it with your company's usage.

- Installation location of the temperature control unit If the atmosphere contains dust, dust, conductive suspended matter such as carbon fiber, oil, oil smoke, oil mist, moisture, and water vapor, if they adhere to or mix inside the temperature control unit. It may lead to the failure of the temperature control unit.

- It cannot be used in flammable gas, flammable gas, plating or corrosive atmosphere environment. Please contact us in advance.

- Input terminals 1 to 5 will break down when voltage is applied. In addition, output terminals 6 to 9 will break down if a voltage higher than the rating is applied.

- Do not connect or bind the service terminal wiring to the AC power line, power line, or harmonic line. Noise will damage internal electronic devices.

- Do not stop the operation of the temperature control unit with an electromagnetic contactor provided on the primary side of the temperature control unit. The surge voltage damages internal electronic devices.

- Induced lightning surges caused by lightning strikes can lead to accidents such as damage to the temperature control unit, malfunction, or fire. When using the temperature control unit in a place that may be affected by lightning strikes, be sure to take measures against lightning strikes by installing an arrester (lightning arrester).

- Be sure to use a commercial power supply (50 / 60Hz) with a sinusoidal waveform as the power supply for the temperature control unit. Never use a power supply from a frequency converter, etc. that has a distorted wave containing harmonics. Internal electronic devices may be damaged by harmonics, noise, etc.

- Periodically clean the cooling fins and exhaust fan (TCU20K only) of the SSC (heater control element) inside the temperature control unit. If dust collects on the cooling fins and exhaust fan of the SSC, the cooling efficiency of the SSC will decrease and it may cause a malfunction.

- Keep the breaker (NFB) of this machine ON at all times, and do not turn it ON / OFF as an operation switch. The surge voltage damages internal electronic devices.

《熱風温度、設定温度、風量調節、タイマ表示部の表示文字一覧》

0 123456789AbcdEFGHI JkLñnoPqr4rUvWY  
0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W Y

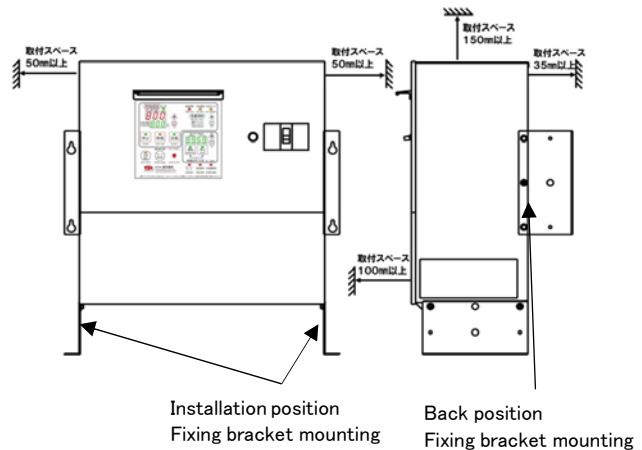
## 2. Installation

- This unit is for installation or rear mounting only. Be sure to install it horizontally with the operation surface vertical. The main body fixing brackets (2 pieces) are enclosed in the instruction manual bag at the time of shipment. If necessary, install it at the installation position and back position (4 mounting screws are installed at the main unit installation position).

Also, attach the breaker cover (red: enclosed in the instruction manual) to the long holes on the top and bottom of the main body breaker (be sure to attach the breaker cover to prevent ON / OFF of the main body breaker as an operation switch).

- For installation, refer to the figure on the right and secure a sufficient mounting space.

In particular, the space on the back of the machine (35 mm or more) is an important space for cooling the inside of the machine regardless of whether it is installed or mounted on the back. Also, do not install this unit in a place such as the upper part of the heat generating part that may cause the temperature to rise.



- Places that cannot be installed Place with...

- Place with vibration
- Near combustibles
- Ambient temp other than  $-5$  to  $+40^{\circ}\text{C}$
- ambient humidity of 85% R.H. or higher
- In a closed room and in a case
- Places with conductive suspended matter (carbon fiber etc.)
- acid gas, corrosive gas, etc. are floating
- ambient humidity of 85% R.H. or higher
- back side is in close contact with a wall, etc.
- Places exposed to wind and rain outdoors
- Places above 1000m above sea level
- Places with low atmospheric pressure
- Upper part of heat generating part
- Places with a lot of dust, dust, etc.

## 3. POWER SUPPLY

- Ask an electrician for power connection and grounding work
- Be sure to use a commercial power supply (50 / 60Hz) with a sine wave waveform as the power supply for this unit. Never use a power supply that has distorted waves containing harmonics. Also, take sufficient measures to prevent surge voltage and noise from entering the power supply.
- Please provide a dedicated circuit. When installing an earth leakage breaker, determine the capacity of the sensitivity current according to the table below (generally, the sensitivity current of the earth leakage breaker is about 10 times the initial leakage current).

| MODEL     | Earth Leakage Circuit Breaker (ELB) Sensitivity Current Guide |
|-----------|---|
| TCU8K・12K | 50mA  |
| TCU20K    | 100mA   |

- To prevent electric shock accidents, perform grounding work (300V or less: D-class grounding, 600V or less: C-class grounding).

**注意** Please note that wiring that is too long will cause a voltage drop.

**注意** Be sure to shut off the power supply during wiring and inspection. Even if the breaker (NFB) of the main body of the temperature control unit is turned off, the operation circuit is still energized, so be sure to turn off the factory power supply (primary power supply). If you work with the power turned on, you will get an electric shock.

**注意** If you provide an outlet for the connection, ensure sufficient capacity. Please refrain from using the outlet as much as possible because the outlet may generate heat or break down due to poor contact due to deterioration over time, phase loss, etc.

**注意** The temperature control unit is a device mainly used in the industrial environment. When used in a residential environment, etc., there is a risk of radio interference. At that time, the user of this product may have to take appropriate measures to reduce the obstacle.

## 4 WIRING

- Ask an electrician for wiring.
- Please reconfirm the control capacity of the TCU series and the capacity of the super heater you purchased.
- Since the terminal structure, terminal arrangement, etc. of the TCU series differ depending on the model, check the model you purchased and make sure to wire according to this manual and the instruction manual of the super heater and blower unit.
- For wiring, use the three entry holes on the underside and both sides of the machine. When entering from both sides, replace the entry plate on the bottom surface and the side panels on both sides.
- Be sure to use the attached heater cord and sensor cord for wiring with the super heater. The sensor cord comes with a wire board for the super heater, so replace it with the wire board for the super heater.

**Atten** Only use the attached heater cord and sensor cord for wiring with the super heater. It may cause a malfunction.

**Atten** Do not pass the sensor cord through the same duct as the AC power line, power line, and harmonic line, and do not connect adjacent wiring or bundling. If it is affected by noise, it may cause a malfunction.

**Atten** If hot air operation is performed without wiring the sensor connector and blower unit error input connector, the heater will break.

# 5. Terminal structure / Terminal arrangement

TCU8K・12K

《SUPER HEATER : SH41・SH51・SH61》

Heater control capacity ・ Maximum load current  
(at 200V)

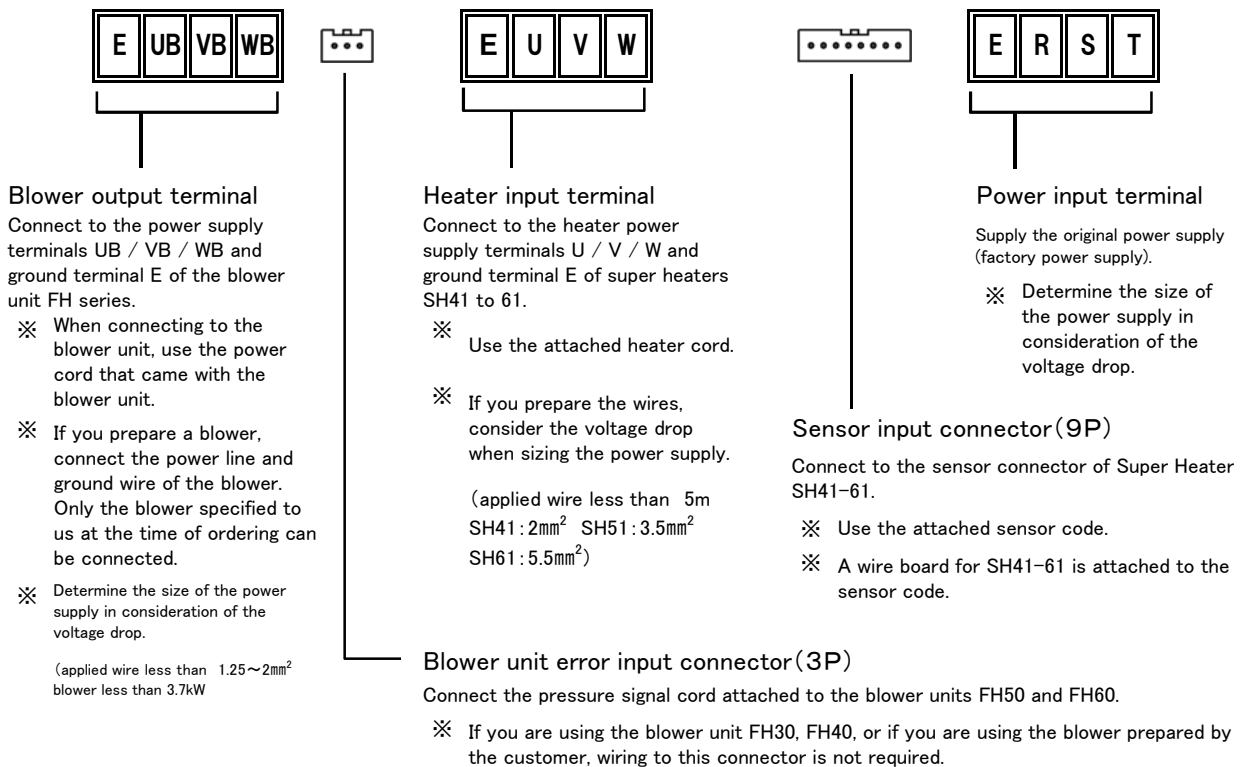
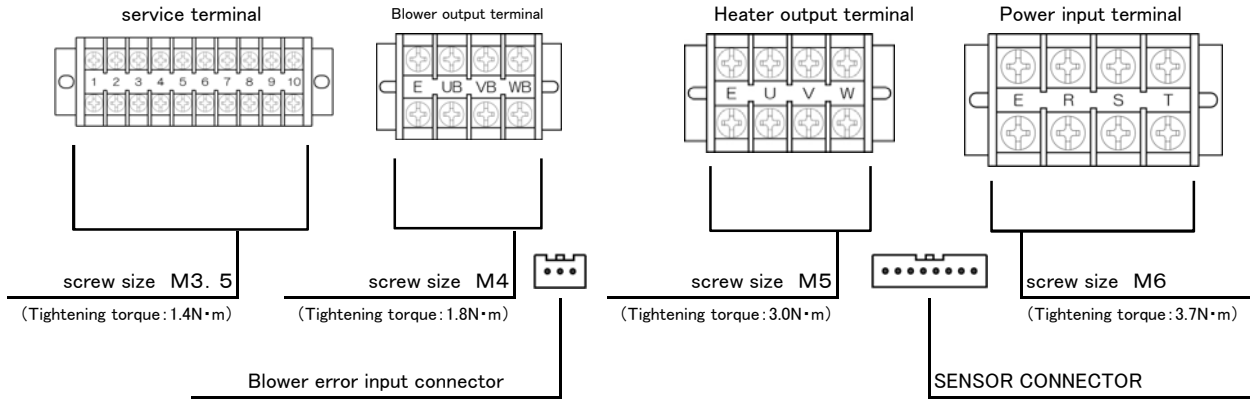
Blower (Max controllable motor capacity)

TCU8K : 3 phase Less than 8kW・ 25A

TCU12K : 3 phase Less than 12kW・ 35A

Blower vol. Less than 3.7kW

(It is set to the blower specifications that we instructed when ordering.)



Be sure to connect the blower unit FH series or the blower prepared by the customer to the blower output terminal. Operating without connection may cause a heater disconnection or a fire.

- Wire the sensor and input / output signal terminals separately from the AC power line, power line, and harmonic line to avoid malfunction due to noise, etc. (shield processing is recommended).

Please refer to the wiring electrical diagram at the end of the book for wiring examples.

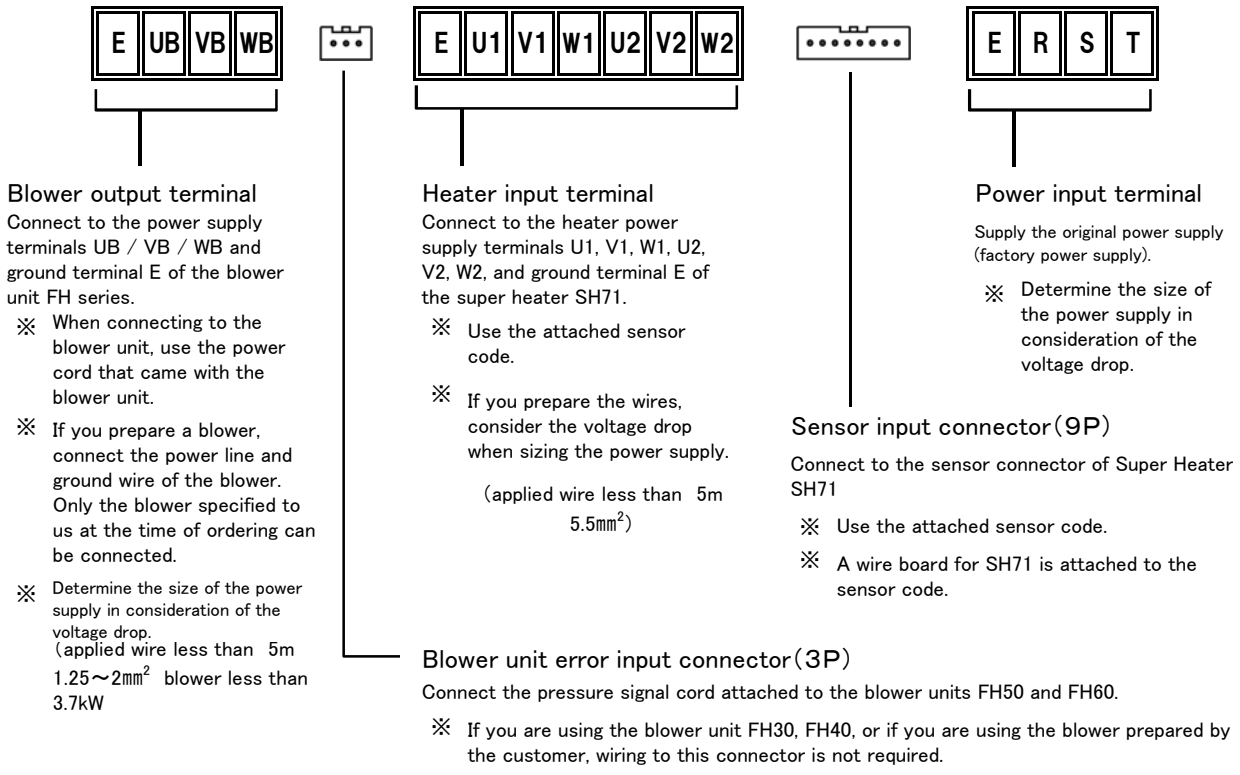
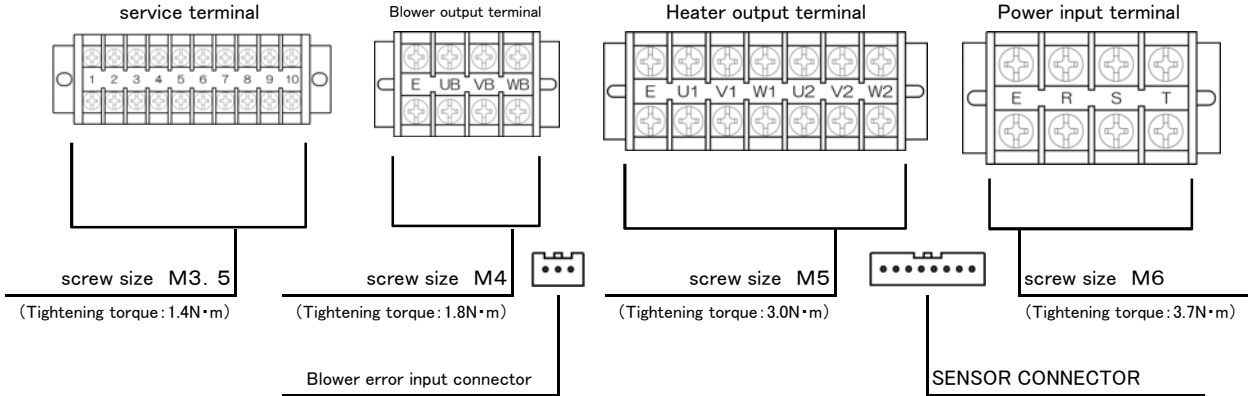
# TCU20K

# 《SUPER HEATER : SH71》

Heater control capacity · Maximum load current (at 200V)  
 lower (Max controllable motor capacity)

3 PHASE LESS THAN 20kW · 58A  
 Blower vol. Less than 3.7kW

(It is set to the blower specifications that we instructed when ordering.)



Be sure to connect the blower unit FH series or the blower prepared by the customer to the blower output terminal. Operating without connection may cause a heater disconnection or a fire.

- Wire the sensor and input / output signal terminals separately from the AC power line, power line, and harmonic line to avoid malfunction due to noise, etc. (shield processing is recommended).

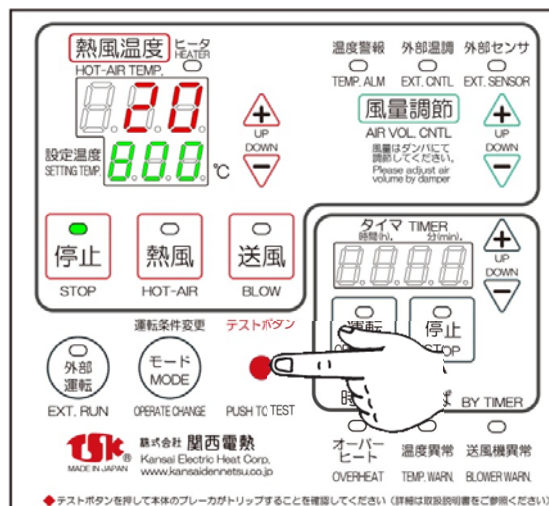
Please refer to the wiring electrical diagram at the end of the book for wiring examples.

## 6. Maintenance and inspection

### TEST BUTTON

This is a test button to check if the breaker (NFB) of the main unit trips normally when overheating. Once a month, press the test button for a few seconds while the operation is stopped (while the power is on), and check the overheat lamp lighting, overheat operation display (see page 22), and the trip operation of the circuit breaker (NFB) of the main unit.

After checking, turn off the main power supply (factory power supply) and the main circuit breaker (NFB), and then turn them on again.



### Inspection and cleaning

Regularly clean the cooling fins and exhaust fan (TCU20K only) of the SSC (heater control element) inside the TCU series. If dust collects on the cooling fins and exhaust fan (TCU20K only) of the SSC, the cooling effect of the SSC will be reduced and it may cause a malfunction.

### Storage

When storing the temperature control unit for a long period of time, be careful of condensation and freezing. Especially in winter, condensation occurs when the temperature of the storage atmosphere drops. If it is stored at a low temperature with dew condensation, it will freeze and cause malfunction of electrical parts.

### Voluntary inspection

In order to use this machine more safely, we recommend that you carry out a self-inspection if the usage period exceeds 10 years.

#### 【Self-inspection items】

- Measurement of insulation resistance value
- Inspection and cleaning of foreign matter inside the operation panel
- Tightening inspection of each terminal block
- Operation of electrical parts and heat generation inspection
- Other visual inspection

※ For self-inspection, ask the nearest electrician.

ATTEN: : Never perform the insulation withstand voltage test of this machine (already performed at the time of shipment). It may cause a malfunction.

#### ◆ About energized fire

The temperature control unit automatically resumes operation before the momentary power failure by turning on the main power again within 1 second after a momentary power failure such as a power failure. Therefore, in order to prevent energizing fires, it is recommended to install a device that shuts off the primary power supply in the event of a disaster such as an earthquake.

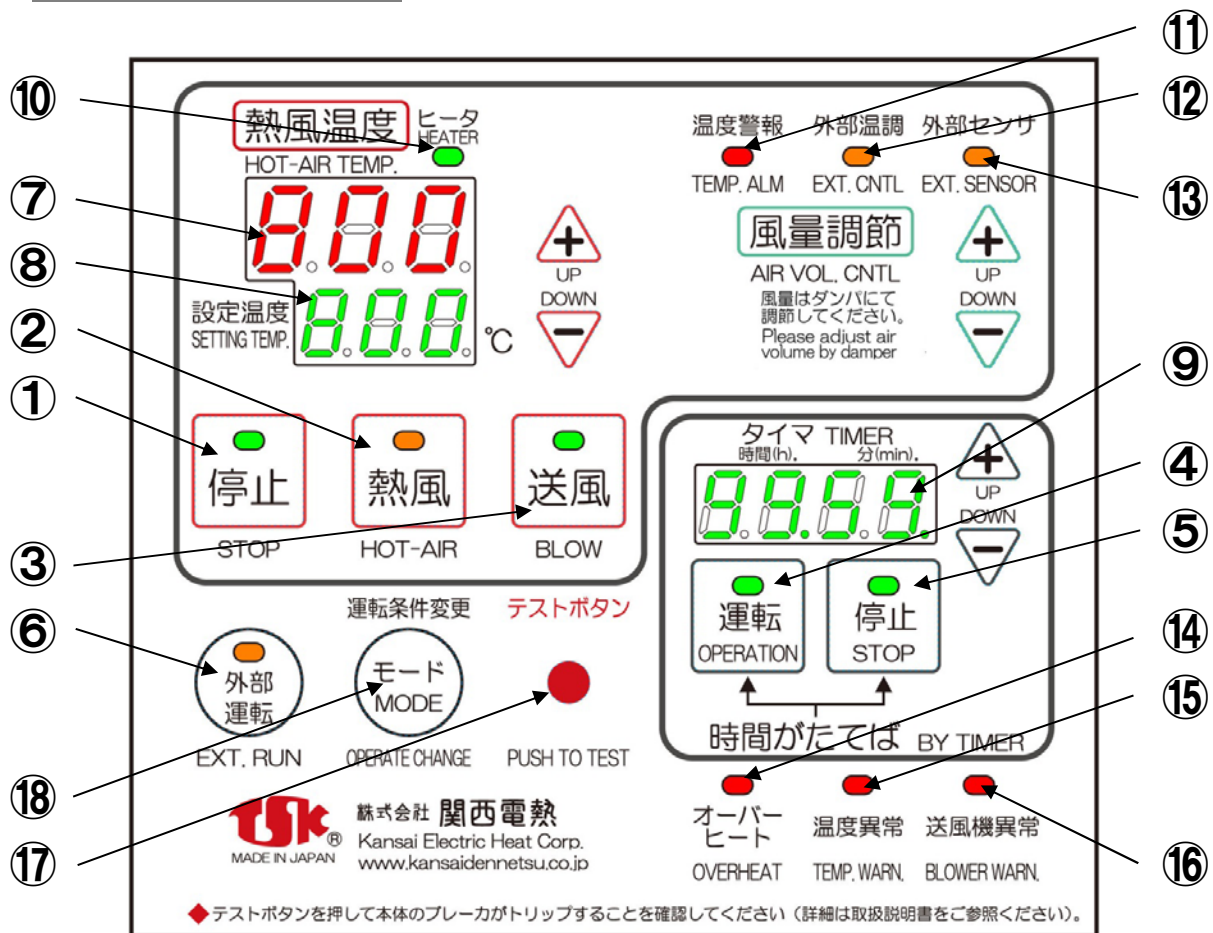
For the setting method, access our website <http://www.kansaidennetsu.co.jp>

↓  
Technical data

↓  
See "How to deal with energized fires" in the technical data.

# 7. Names and functions of each part

## CONTROL PANEL



### ① STOP SWITCH

for stopping the blower operation and hot air operation, and for canceling the timer operation.

### ② HOT-AIR SWITCH

Press the switch to start hot air operation. When the operating condition is switched to hot start operation, hot start operation is started by pressing the mode switch at the same time.

### ③ BLOW SWITCH

Press the switch to start the blower operation.

### ④ TIMER OPERATION SWITCH

When you press the switch, you can set the time to start operation after a while. After setting, press the hot air switch.

### ⑤ TIMER STOP SWITCH

When you press the switch, you can set the time to stop the operation after a while. After setting, press the hot air switch.

### ⑥ EXTERNAL OPERATION SWITCH

By pressing and holding the switch (2 seconds), it can be operated by the external operation signal and the external heater on / off signal.

### ⑦ HOT-AIR TEMP DISPLAY

Displays the outlet temperature. When the operating condition is switched to the external sensor, the temperature of the external sensor is displayed.

### ⑧ SET TEMP DISPLAY

Displays the set temperature of the discharge port temperature. When the operating condition is switched to the external sensor, the set temperature of the external sensor is displayed.

### ⑨ TIMER SETTING DISPLAY

Displays the set time of the timer. It will be subtracted by the time count.

### ⑩ HEATER LAMP

The ON / OFF status of the heater is displayed by lighting and blinking.

### ⑪ TEMP ALARM LAMP

If the temperature alarm setting is entered, it lights up when the temperature alarm setting value is reached.

### ⑫ EXTERNAL TEMP CONTROL LAMP

Not used in this machine.

### ⑬ EXTERNAL SENSOR LAMP

Lights when the operating conditions are switched to an external sensor.

### ⑭ OVERHEAT LAMP

It lights up when the inside of the heater case becomes abnormally high temperature, and the breaker (NFB) trips.

### ⑮ TEMP WARNING LAMP

Lights up when the discharge temperature is high or the suction temperature exceeds the allowable temperature of the blower, and the circuit breaker (NFB) trips or blower operation is performed.

### ⑯ BLOWER WARNING LAMP

When the blower is overloaded, it lights up and the operation stops.

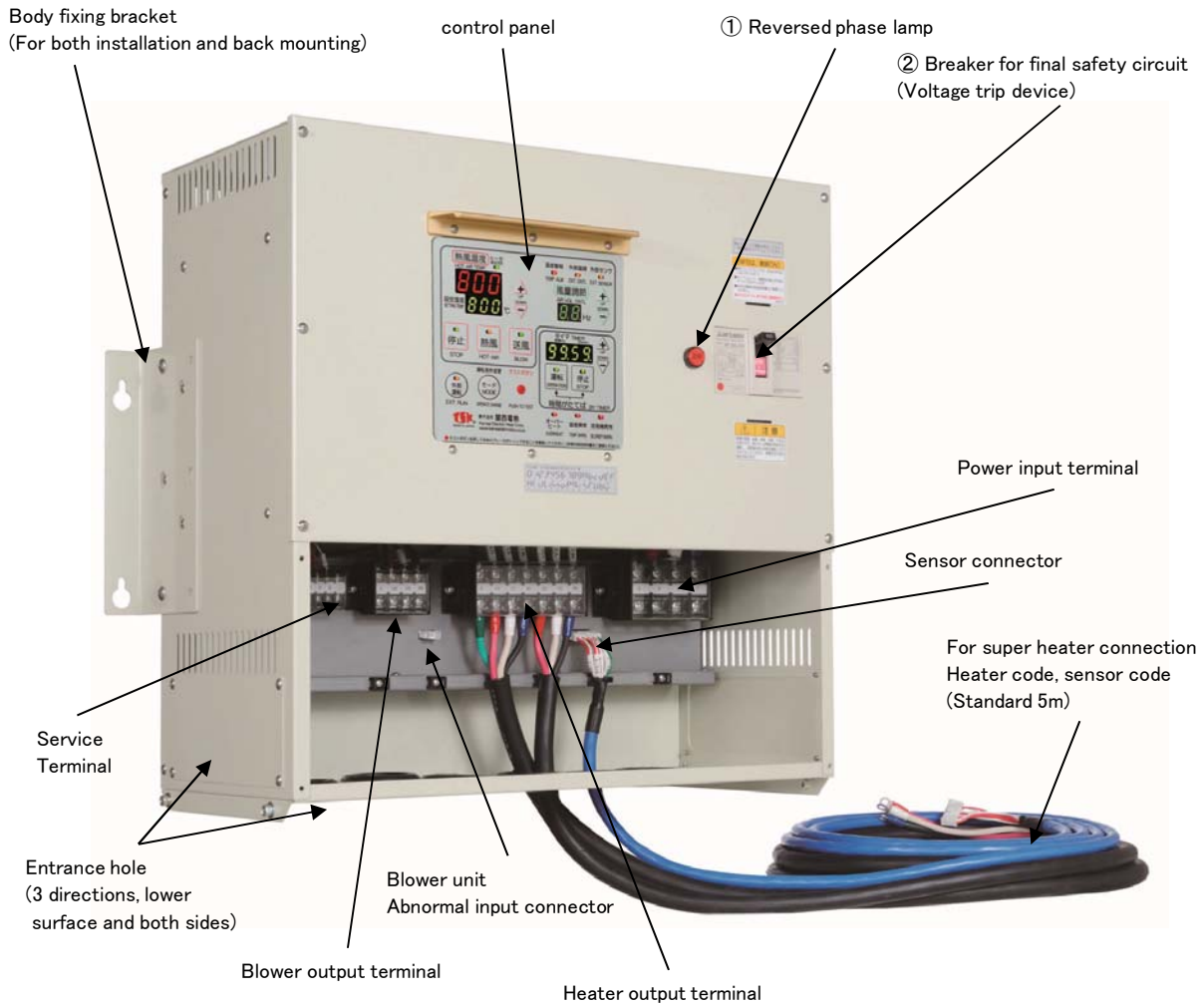
### ⑰ TEST BUTTON

The breaker (NFB) trips by pressing the button.

### ⑱ MODE SWITCH

It is used when changing the operating conditions.

## MODEL : TCU20K



### ① Reversed phase lamp

This lamp lights up when the primary power supply is out of phase or the T phase of the primary power supply is out of phase. If it lights up, replace the two wires of the primary power supply or check for interruption due to T-phase disconnection.

### ② Circuit breaker for final safety circuit

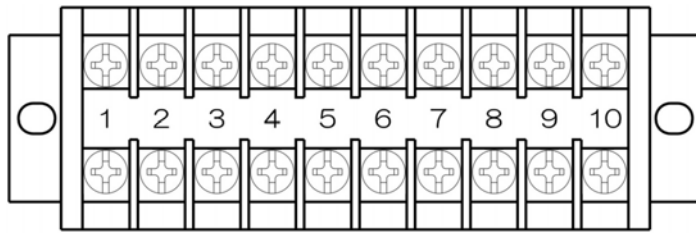
A breaker that trips when the safety circuit is activated and cuts off all circuits. This breaker should always be on and should not be turned on / off as an operation switch.



## 8. Service Terminal

- The temperature control unit TCU series is equipped with service terminals for external input and external output. (M3. 5 10P terminal Upper tightening torque: 1. 4N·m)

### 《Input Terminal》



#### Terminal 4 – 5 : External Sensor Input terminal

Connect to terminal K + → 4 and K- → 5 of the external sensor [K].

#### Terminal 3 : Input Common Terminal

Input common for external operation on / off terminal 1 and external heater on / off terminal 2.

#### Terminal 2 : External heater on / off terminal

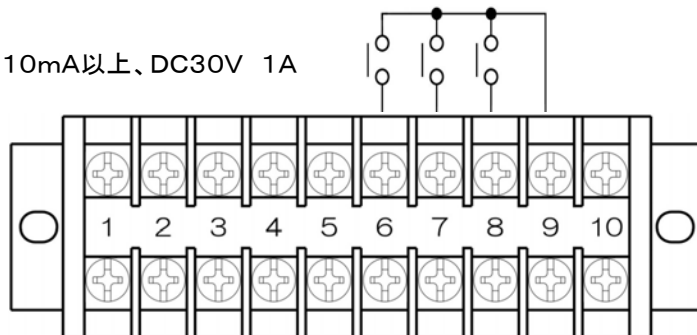
It is used when turning on / off the heater (normal operation, hot start) with an external signal. The input is compatible with contact output (terminal voltage DC24V 7mA or less).

#### Terminal 1 : External operation on / off terminal

It is used when starting / stopping with an external signal. The input is compatible with contact output (terminal voltage DC24V 7mA or less).

### 《Output Terminal》

Contact Capacity more than DC5V 10mA以上、DC30V 1A  
(non-voltage contact signal output)



#### Terminal 6 – 7 – 8 : Output Terminal

Contact Output (Internal Relay)

It is a terminal that turns on when the output function set by the output terminal function is activated.

(Select one of the three output functions from blow, heater, operation, abnormality, and temperature alarm.)

※ 出力端子機能の設定は、P.20をご参照ください。

#### Terminal 9 : Output Common Terminal

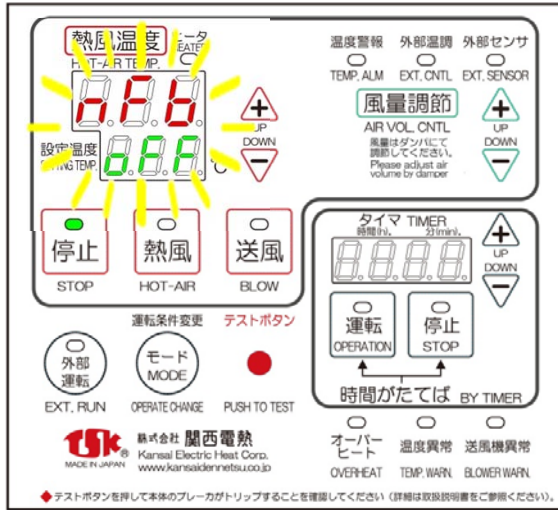
for Output Terminal 6, 7, 8 output common (Output common total less than 3A)。

Attn : When using the service terminal, be sure to shut off the main power supply before wiring. You will get an electric shock if you wire while the power is on. Also, be sure to attach the terminal cover after wiring.

Attn : When wiring the service terminal, avoid wiring and binding adjacent to the AC power line, power line, and harmonic line.

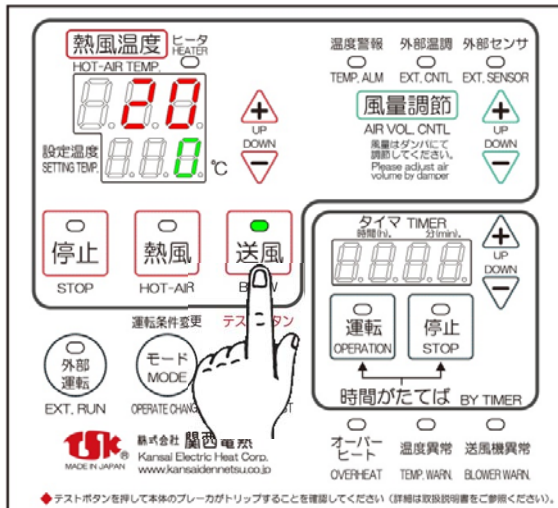
# 9. Normal Operation (Hot-Air Operation)

- ① Turn on the factory power supply (primary power supply).  
The stop lamp (green) lights up, and "nFb" flashes in the hot air temperature section and "oFF" flashes in the set temperature section.

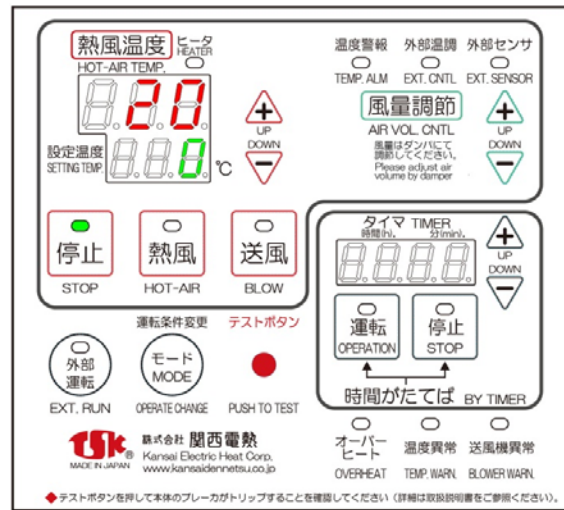


※ It cannot be operated in this state.

- ③ When you press the blower switch, the blower lamp (green) lights up and the blower operation starts.

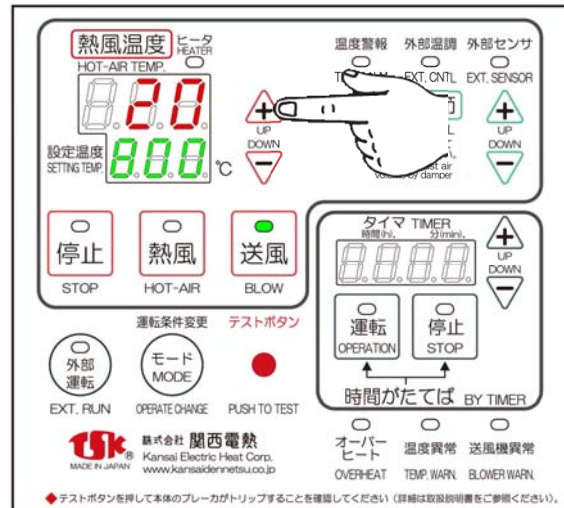


- ② Turn on the breaker (NFB) of the main unit.  
The current temperature is displayed in the hot air temperature section, and "0" is displayed in the set temperature section (during the first operation).



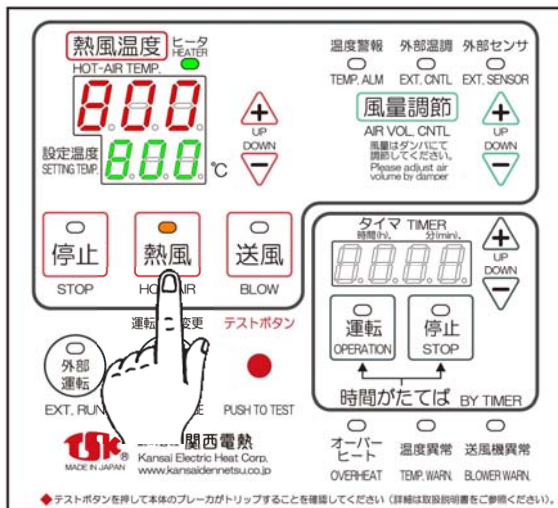
※ From the second time, the previously set value will be displayed in the set temperature section.

- ④ Use the up and down keys to set any hot air temperature.



※ It can be set in minutes with the up and down keys.

- ⑤ When you press the hot air switch, the hot air lamp (orange) lights up and hot air operation starts.



The heater lamp (green) lights up and blinks the ON / OFF status of the heater.

If the hot air temperature does not rise to the set temperature, adjust by reducing the supply air volume.

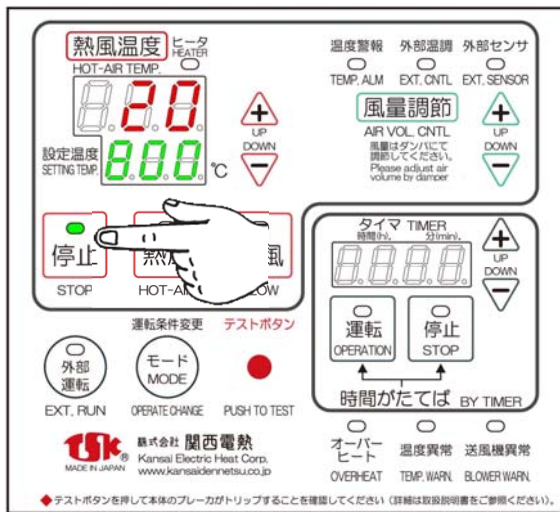
If normal operation is performed when the blower unit FH series is not used or when the blower circuit is not connected to the temperature control unit TCU series, the super heater will be heated empty and may cause a heater disconnection or fire.

# 10. Shut down

- To stop the super heater during normal operation, press the stop switch.  
Also, if you do not use the super heater for a long time, turn off the factory power supply side as well.

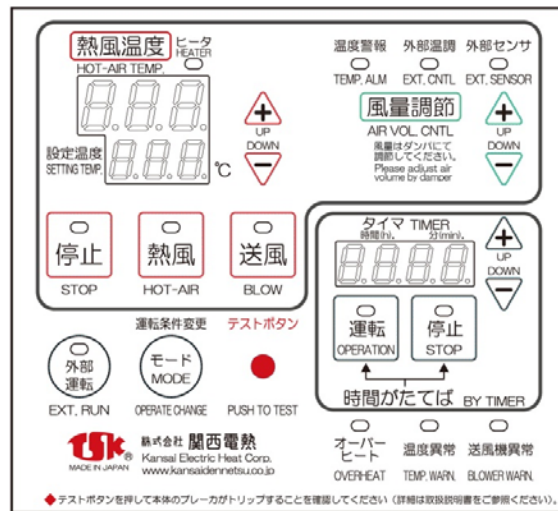
① Press the stop switch.

The stop lamp (green) lights up and all operations are stopped.



② If you do not use the super heater for a long time, turn off the power supply on the factory side.

All displays turn off.



- ※ It is not necessary to turn off the breaker (NFB) of the main body.

If the residual heat of the main unit flows back when the operation is stopped, be sure to perform the cooling operation until the temperature of the A sensor for hot air detection of the super heater becomes about 70 ° C or less, and then press the stop switch to stop the operation.  
\* Use the cooling operation function on page 17 if necessary.

- ※ Be sure to stop with the stop switch before turning off the factory power supply or the breaker of the main unit. If the factory power supply or the breaker of the main unit is turned off without stopping with the stop switch while the super heater is operating, it may cause a malfunction.
- ※ If the breaker of the main unit is turned off and then turned on again while the super heater is being operated or stopped by external operation, the external operation mode will be canceled. If the power is cut off while using in the external operation mode, be sure to turn it off with the factory power supply (primary power supply) (the external operation mode is maintained when the factory power supply is turned on again).

Do not stop the operation of the super heater with an electromagnetic contactor provided on the primary side of the temperature control unit. The surge voltage damages internal electronic devices.

Always turn on the breaker (NFB) of the temperature control unit, and do not turn it on / off as an operation switch. The surge voltage damages internal electronic devices.

- About operation at the time of momentary power failure at the time of power failure

In the case of a momentary power failure on the factory side due to a power outage, etc., the operation state before the power failure is automatically restored after the power is turned on again (return) regardless of the power turn-on time.

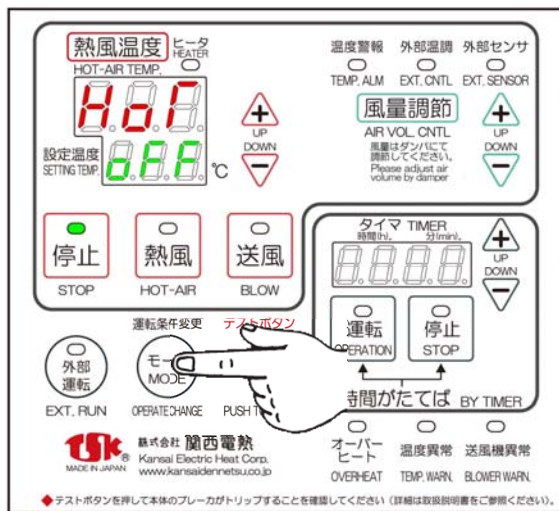
# 1.1. Hot Start operation

Hot start operation is an operation method in which the super heater is energized when there is no wind to perform preheating operation, and the required hot air discharge temperature (Max.500 ° C) is discharged within a few seconds at the same time as the air is blown.

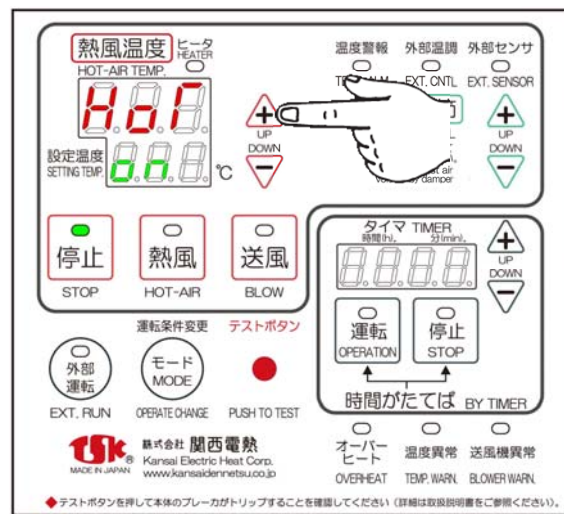
- Do not supply air during hot start operation. If even a small amount of air flows, the A sensor for hot air temperature detection of the super heater detects the temperature and controls it, so it may not be possible to obtain an arbitrary hot start temperature.
- During hot start operation, it is managed by either the A sensor for hot air temperature detection of the super heater and the B2 sensor for hot start temperature detection. If the hot air temperature detection A sensor setting is extremely low, control may start before the set temperature of the hot start temperature detection B2 sensor is reached due to radiant heat or updraft.
- There are restrictions on the mounting posture of the super heater during hot start operation. Please also check the instruction manual for the super heater.

- ① Press and hold the mode switch in the stopped state (about 2 seconds).

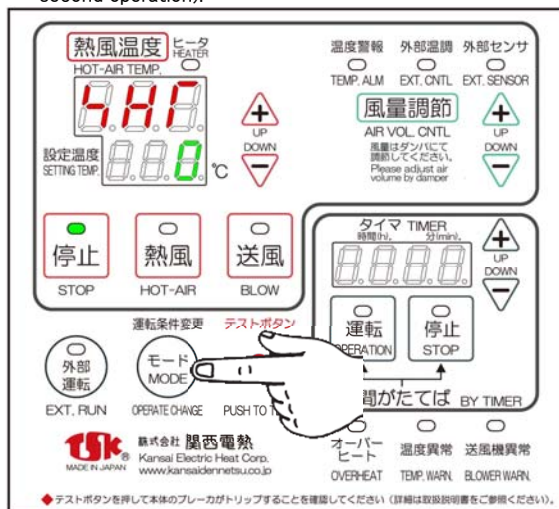
"HoT" is displayed in the hot air temperature section, and "oFF" is displayed in the set temperature section.



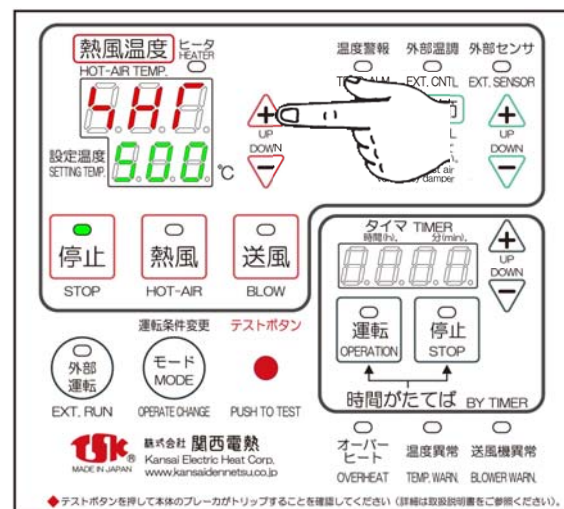
- ② Set the temperature section to "on" with the up key.



- ③ Press the mode switch again. "SHT" is displayed in the hot air temperature section, and "0" is displayed in the set temperature section (at the first operation: the previous set value is displayed after the second operation).

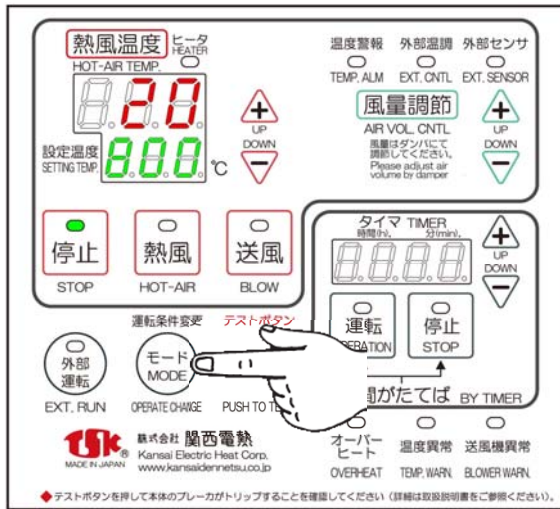


- ④ Set any hot start temperature (Max.500 ° C) to the set temperature with the up / down keys.



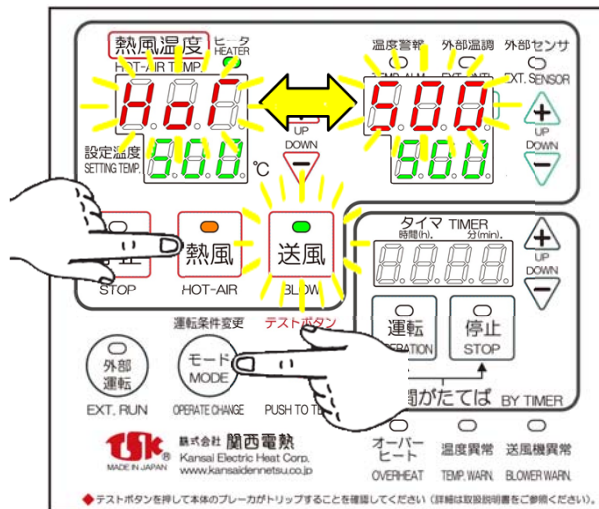
※ It can be set in 1°C increments with the up and down keys.

- ⑤ Press the mode switch twice to return to the stopped state.



- ⑥ Hold down the mode switch and press the hot air switch.

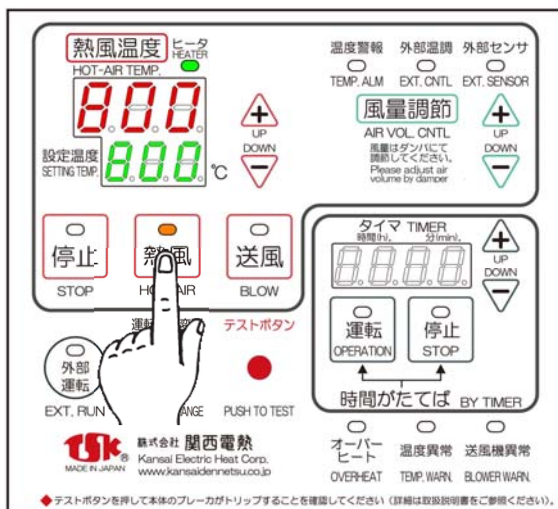
"Hot" and hot start temperature (B2 sensor temperature for hot start detection) are displayed alternately in the hot air temperature section, the hot air lamp lights up, the blower lamp blinks, and the hot start operation starts.



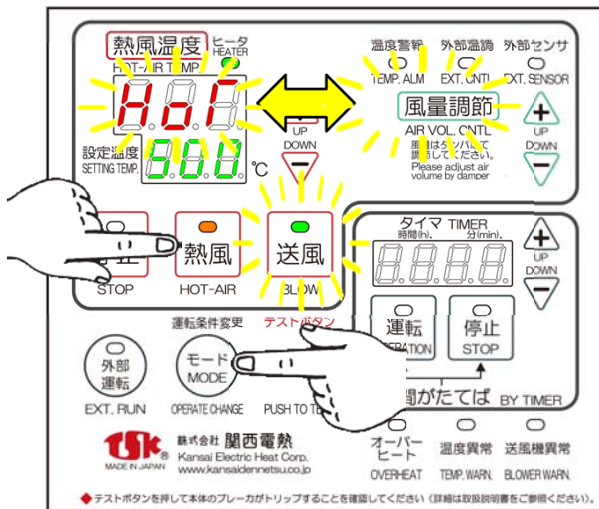
- ※ The heater lamp (green) lights up and blinks the ON / OFF status of the heater.

- ⑦ Press the hot air switch again to start hot air operation.

The A sensor temperature for hot air temperature detection is displayed in the hot air temperature section, and the set temperature for normal operation (hot air operation) is displayed in the set temperature section.



- ⑧ To switch to hot start operation again, perform step (6) above.



By pressing the stop switch, the hot start operation is stopped.

- ※ If you want to perform hot start operation again under the same temperature conditions after pressing the stop switch, only the operations after ⑥ above are required.

During hot start operation, a unique control function is provided to prevent damage to the heater due to a sudden temperature rise. The upper limit of the heater output is suppressed to 2/3, and the heater is controlled so that the hot start temperature indicated value rises at about 2.5 ° C per second.

## 12. Timer operation / Stop

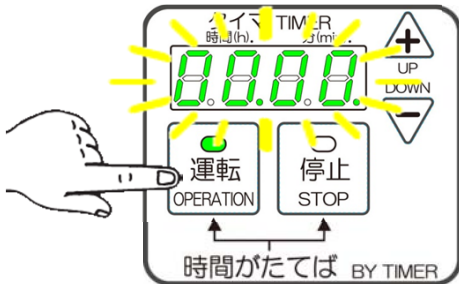
Before operating the timer and stopping the timer, set the hot air temperature and air volume adjustment as desired.  
Set the timer while the operation is stopped (the timer cannot be set during the blowing operation or hot air operation).

※Timer operation and timer stop cannot be performed in the external operation mode.

### ● Timer operation (operation over time)

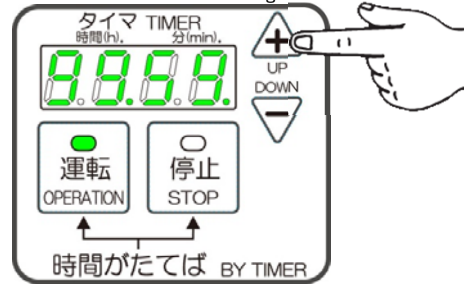
#### ① Press the timer operation switch.

The timer operation lamp (green) lights up, "00.00." Flashes on the timer display, or the previously set time lights up.

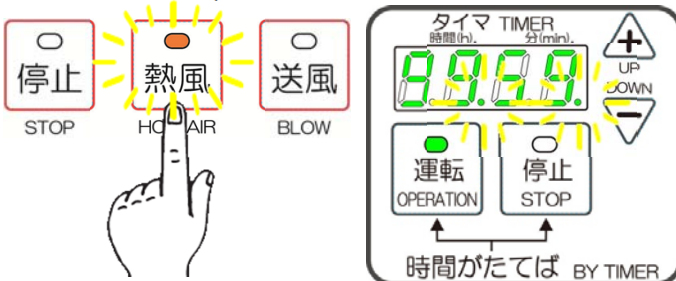


#### ② Use the up and down keys to set any time.

It can be set in 1 minute increments up to 99 hours 59 minutes. When you release the up / down key after completing the setting, it will switch from blinking to lit after 2 seconds and the set value will be registered.



#### ③ Press the hot air operation switch.



Time count (timer set time subtraction) starts (dot display blinks), and hot air operation starts when the time count reaches "00.00". In addition, the hot air lamp (orange) blinks during the time count, and switches to lighting after the hot air operation starts.

※ After the time count is completed, the timer display will be "00.00."

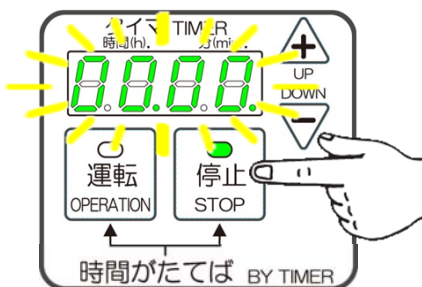
※ Press the stop switch to stop the timer operation and time count.

※ When the hot start operation mode is set to "on", it will be in the hot start operation state during the time count. Please note that after the time count, the hot air operation will start ignoring the arrival of the hot start set temperature.

### ● Timer stop (stop after time)

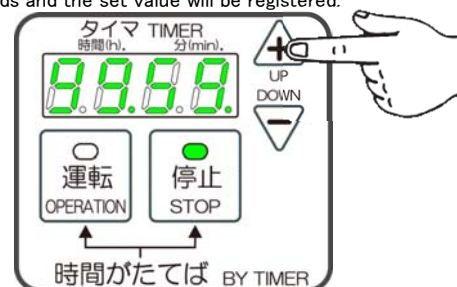
#### ① Press the timer stop switch.

The timer stop lamp (green) lights up, "00.00." Flashes on the timer display, or the previously set time lights up.



#### ② Use the up and down keys to set any time.

It can be set in 1 minute increments up to 99 hours 59 minutes. When you release the up / down key after completing the setting, it will switch from blinking to lit after 2 seconds and the set value will be registered.



#### ③ Press the hot air operation switch.



Time counting (timer setting time subtraction) is started (dot display blinks), and hot air operation is performed. Hot air operation is stopped when the time count reaches "00.00". In addition, the hot air lamp (orange) lights up during hot air operation, and switches to blinking after the hot air operation ends.

※ After the time count is completed, the timer display will be "00.00."

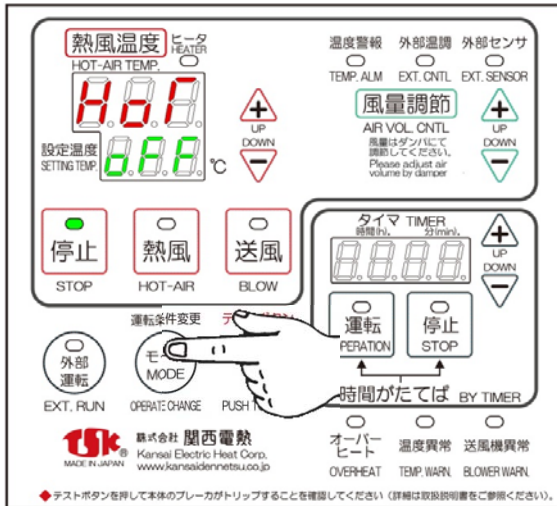
※ Press the stop switch to stop the timer operation and time count.

※ When the hot start operation mode is set to "on", the hot start operation state is entered after the time count ends, and control continues at the hot start temperature.

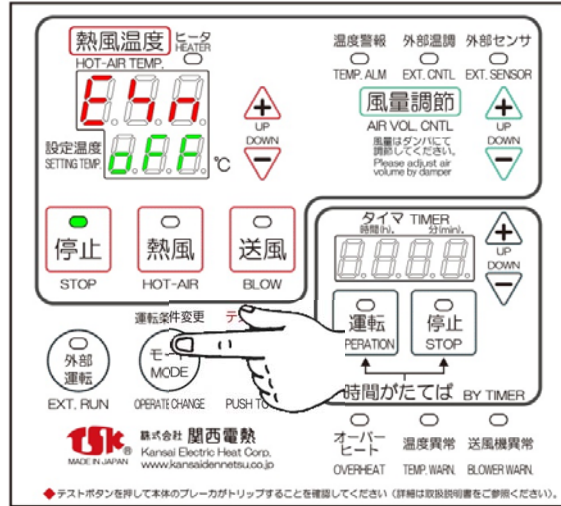
# 1.3. When using an external sensor

- The temperature at a remote location can be controlled by an external sensor. Make the settings after connecting the external sensor to the external sensor input terminal block of the service terminal.
  - When using an external sensor, the hot air temperature setting of the set temperature value is the setting of the external temperature sensor position, and the hot air temperature indication of the hot air temperature value is the temperature of the external sensor position.
- ① Connect the external sensor to the external sensor input terminals 4 (+) and 5 (-) of the service terminal without mistakes for plus and minus.

- ② Press and hold the mode switch (about 2 seconds).  
 "HoT" is displayed in the hot air temperature section, and  
 "oFF" is displayed in the set temperature section.

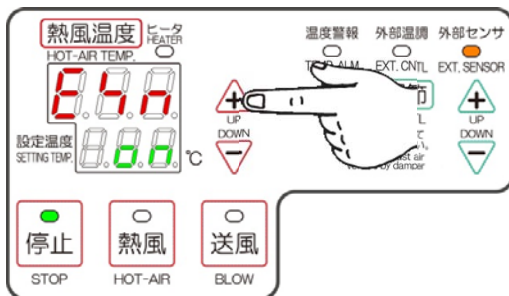


- ③ Press the mode switch once again.  
 "ESn" is displayed in the hot air temperature section, and  
 "oFF" is displayed in the set temperature section.



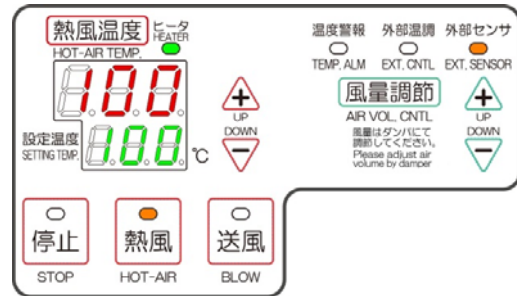
- ④ Set the temperature section to "on" with the up key.

After setting, press the mode switch once to return to the normal operation status display.



- ⑤ After setting the desired temperature and air volume, start hot air operation.

When the external sensor setting is turned on, the external sensor lamp (orange) lights up.



- ※ If the discharge port temperature of the super heater reaches the maximum discharge temperature before reaching the set temperature of the external sensor, the control is performed at the maximum discharge temperature of the super heater, so the temperature set by the external sensor may not be reached. If the upper limit of the maximum discharge temperature of the super heater is exceeded, a temperature abnormality (see page 24) will occur and the operation will stop. When setting the temperature of the external sensor, consider the mounting position of the super heater and the external sensor.
- ※ If the external sensor is set while the external sensor is not connected, burnout will be activated and operation will not be possible (see page 25).
- ※ When the external sensor is no longer used, return the set temperature section to "oFF" in item (4) above.

# 1.4. When using external operation

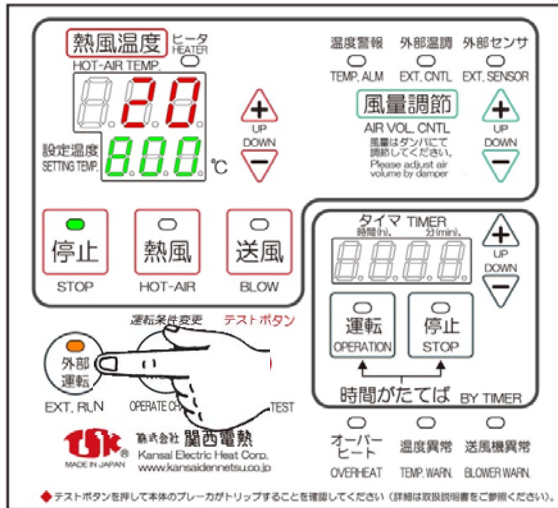
- Super heater operation stop and hot start operation can be operated by an external signal.

## Normal operation by external signal (hot air operation)

- 1 Connect an external signal (non-voltage contact signal) to the external operation on / off terminal and external heater on / off terminal of the service terminal.
  - External operation on / off terminal : **Input terminal 1 - 3**  
Terminal voltage DC24V 7mA or less
  - External heater on / off terminal : **Input terminal 2 - 3**

- 2 After setting the desired temperature and air volume, press and hold the external operation switch in the stopped state (about 2 seconds).

The external operation lamp (orange) lights up.



- 3 Operate with an external operation signal.

In the case of ventilation operation by turning on the external operation on / off signal and turning off the external heater on / off signal, the ventilation lamp (green) lights up.



In the case of hot air operation with external operation on / off signal ON and external heater on / off signal ON, the hot air lamp (orange) lights up.



※ After the super heater is stopped by external operation, it cannot be restarted for about 20 seconds (in the standby state for restart, the air blow or hot air lamp blinks and starts 20 seconds after the stop). Also, if the external heater is turned on / off frequently, the internal relay will have a short life, so do not turn the heater on / off frequently.

- ※ In the external operation mode, the blower switch and hot air switch are disabled (cannot be operated).
- ※ To reset the external operation, press the stop switch. In addition, timer operation and timer stop cannot be performed by external operation.
- ※ The external operation mode is canceled when the NFB of the main unit is turned off. It is not released when the factory power supply (primary power supply) is turned off.



From hot start operation by external signal to normal operation (hot air operation)

- Connect an external signal (non-voltage contact signal) to the external operation on / off terminal and external heater on / off terminal of the service terminal.

- External operation on / off terminal : Input terminal 1 - 3

Terminal voltage DC24V 7mA or less

- External heater on / off terminal

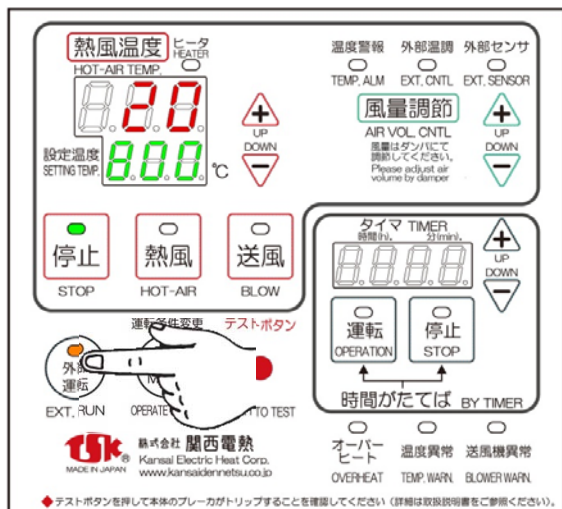
- : Input terminal 2 - 3

- Enable the hot start operation mode and set the hot start temperature.

Refer to P11-12 for how to set the hot start operation mode.

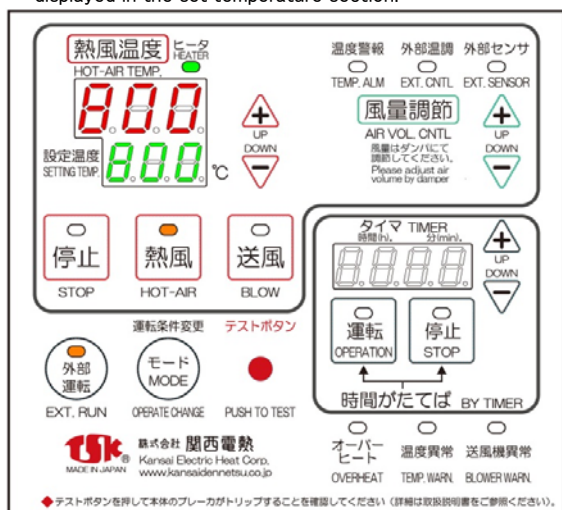
- After setting the desired hot air temperature and air volume, press and hold the external operation switch in the stopped state (about 2 seconds).

The external operation lamp (orange) lights up.



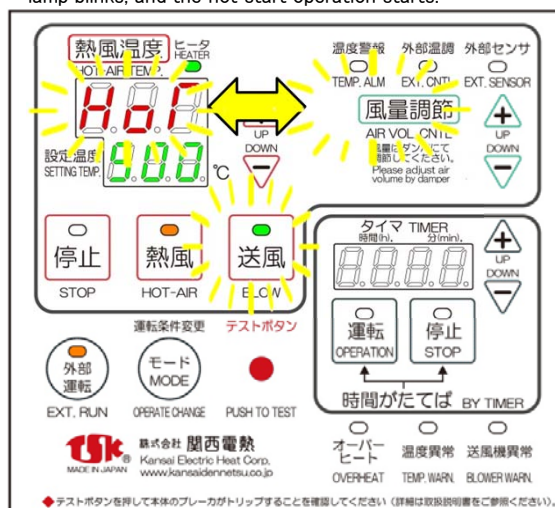
- Turn on the external operation on / off terminal by an external signal.

The A sensor temperature for hot air temperature detection is displayed in the hot air temperature section, and the set temperature for normal operation (hot air operation) is displayed in the set temperature section.

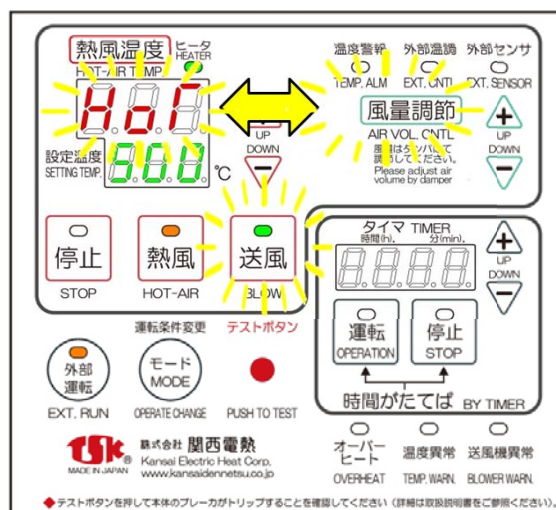


- Turn on the external heater on / off terminal by an external signal.

"Hot" and hot start temperature (B2 sensor temperature for hot start detection) are displayed alternately in the hot air temperature section, the hot air lamp lights up, the blower lamp blinks, and the hot start operation starts.



- When switching to hot start operation again, turn off the external operation on / off terminal by an external signal.



※ After the super heater is stopped by external operation, it cannot be restarted for about 20 seconds (in the standby state for restart, the air blow or hot air lamp blinks and starts 20 seconds after the stop). Also, if the external heater is turned on / off frequently, the internal relay will have a short life, so do not turn the heater on / off frequently.

※ In the external operation mode, the blower switch and hot air switch are disabled (cannot be operated).

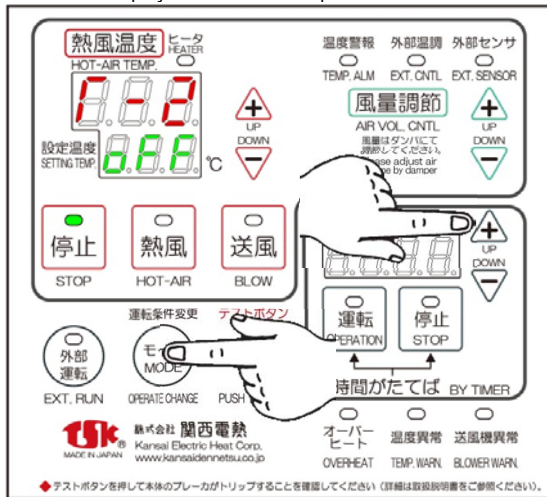
※ To reset the external operation, press the stop switch. In addition, timer operation and timer stop cannot be performed by external operation.

※ The external operation mode is canceled when the NFB of the main unit is turned off. It is not released when the factory power supply (primary power supply) is turned off.

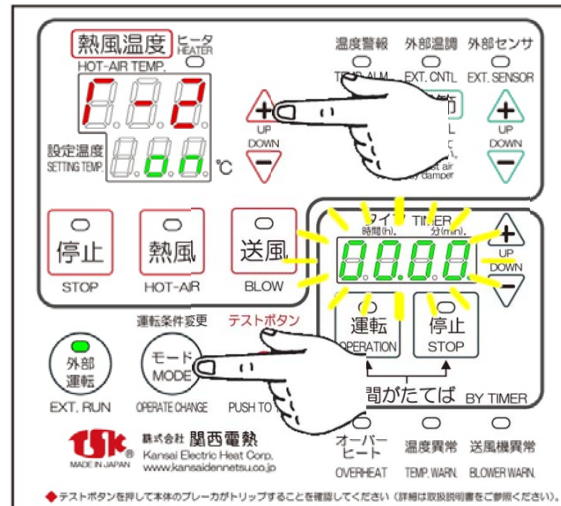
# 15. When using the cooling operation function

- The cooling operation function can be used only when the operation stop by the timer is selected. After performing hot air operation with a timer, perform air blowing operation for an arbitrary time and stop the operation.
- ※ Since our super heater has a low watt density of the heater, it does not require cooling operation to prevent disconnection of the heater. Therefore, please use this cooling operation function to prevent burns to pipes, etc. due to residual heat after the operation is stopped, and to cool dry and heated products after work.

- ① While holding down the mode switch in the stopped state, keep pressing the up key of the timer. "T-2" is displayed in the hot air temperature section, and "oFF" is displayed in the set temperature section.

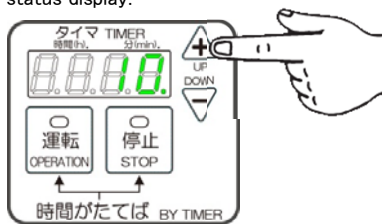


- ② Set the temperature section to "on" with the up key and press the mode switch once. "00.00." Flashes on the timer display.

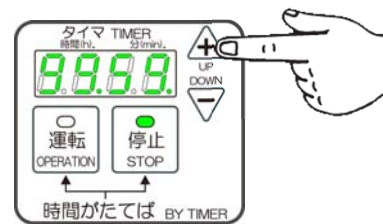


- ③ Use the up and down keys to set any cooling time.

After setting, press the mode switch once to return to the normal operation status display.



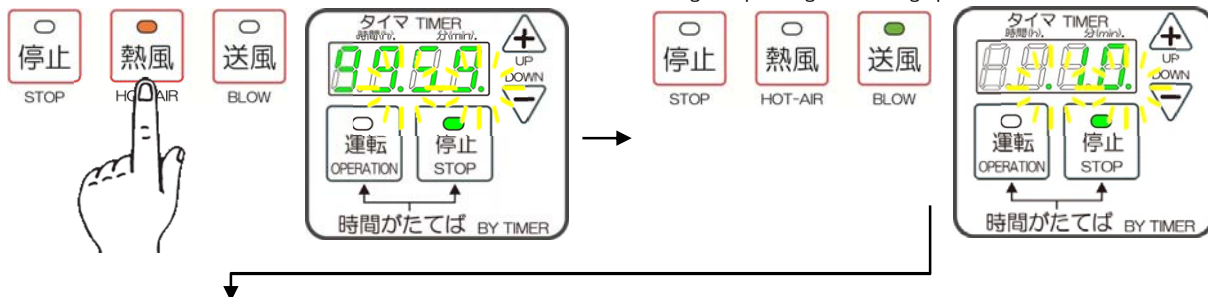
- ④ Press the timer stop switch to set the hot air operation time.



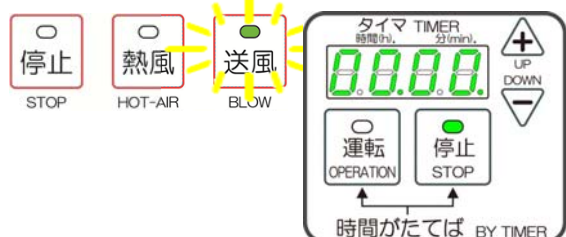
- ⑤ Press the hot air operation switch.

Time counting (dot display blinking) starts and hot air operation is performed. In addition, the hot air lamp (orange) lights up during hot air operation.

After the hot air operation by the timer operation is completed, the cooling operation (blower operation) by the timer is started. In addition, the ventilation lamp (green) lights up during the cooling operation.



When the time count reaches "00.00.", The cooling operation (blower operation) stops and the blow lamp (green) blinks.



- ※ Press the stop switch to stop the timer operation (the timer setting time returns to the default value).

- ※ Even if the timer stop is selected with the hot start mode set to "on", if the cooling operation is set, it will be stopped after the cooling operation is completed (it will not return to the hot start state).

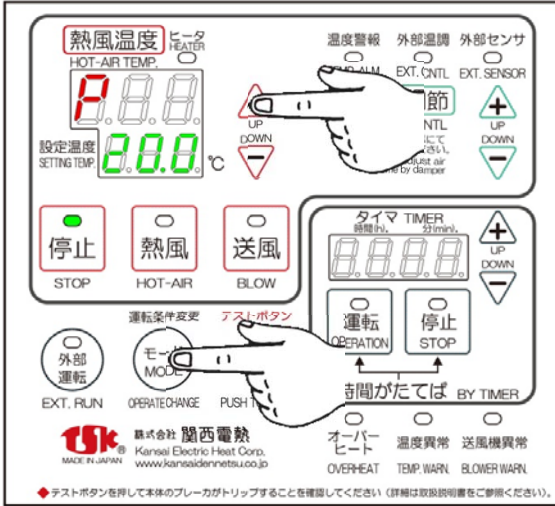
# 16. Unlock

If the device is locked, you cannot operate it with the external operation function. Please refer to the external operation function manual.

- In order to use the temperature alarm and output terminal function settings, it is necessary to change each parameter. Before changing each parameter, first unlock the parameter.

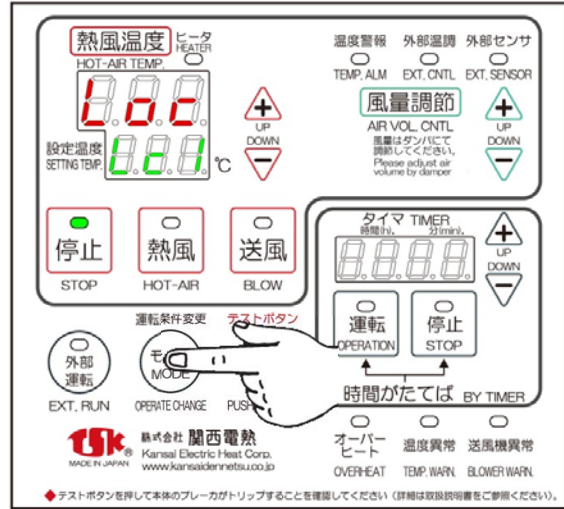
- ① Hold down the mode key and hold down the hot air temperature up key.

"P" is displayed in the hot air temperature section and "20.0" is displayed in the set temperature section.

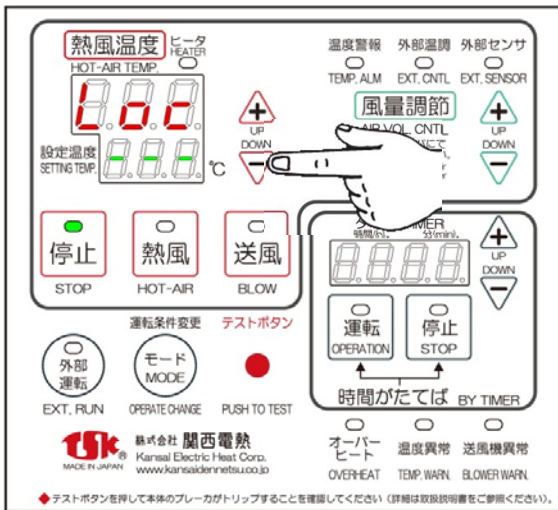


- ② Press the mode key 6 times.

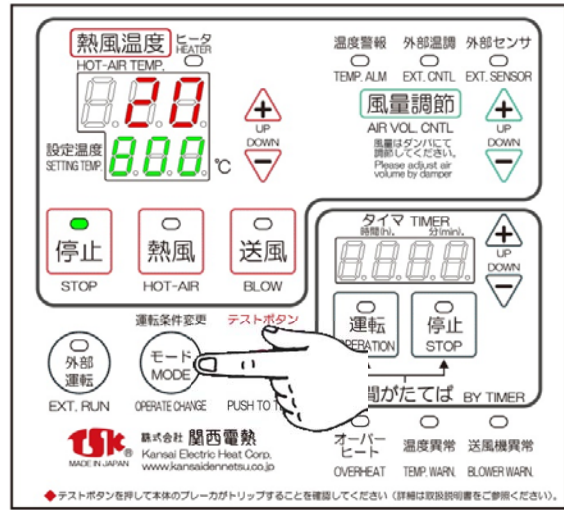
"Loc" is displayed in the hot air temperature section, and "Lc1" is displayed in the set temperature section.



- ③ Use the down key to change the set temperature section to "----".



- ④ After changing, press the mode key once to return to the normal operation status display. This completes unlocking.



※ The factory lock mode is "Lc1". "----" unlocks, "Lc2" locks only temperature setting, air volume setting, timer setting, and other settings. If you want to fix the temperature setting, air volume setting, and timer setting and prevent erroneous setting, you can change it to "Lc2" and use it.

To re-lock after unlocking, change the "----" display of the set temperature section to "Lc1" by the same operation as above.

**You can change each parameter by unlocking it, but never change any parameters other than those described in this manual. Changing it may cause dangerous driving conditions and malfunctions. Also, please note that we do not guarantee any changes.**

# 1.7. When setting a temperature alarm

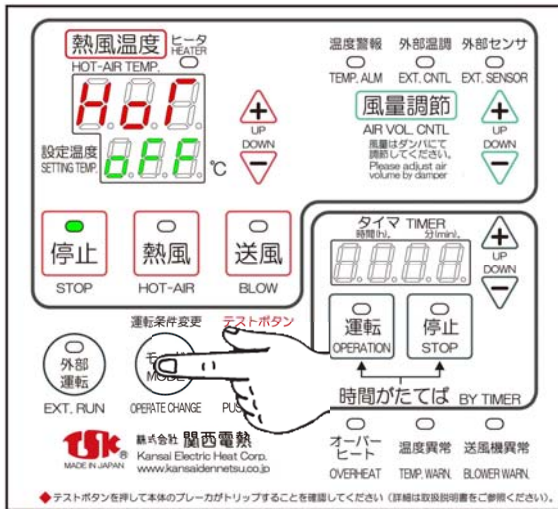
● An alarm signal can be output when the discharged hot air temperature exceeds an arbitrary fixed range with respect to the set temperature. Please use it as needed (it is disabled at the time of shipment).

① Select the temperature alarm output signal "A1" for any of the output terminal functions.

※ Refer to P.20-21 for how to select the output terminal function.

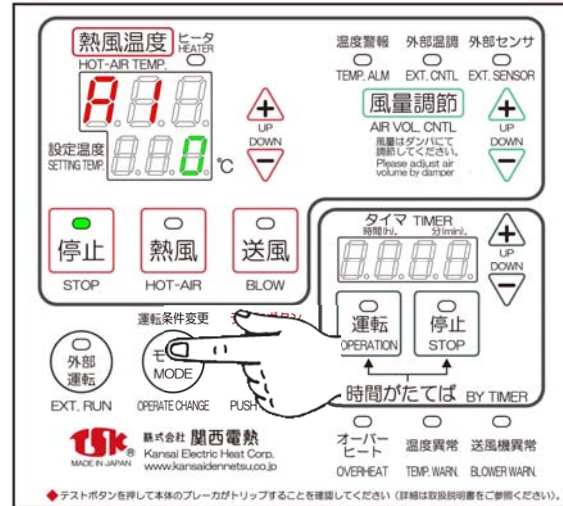
② After unlocking in the stopped state, press and hold the mode switch (about 2 seconds).

"HoT" is displayed in the hot air temperature section, and "oFF" is displayed in the set temperature section.



③ Press the mode switch once.

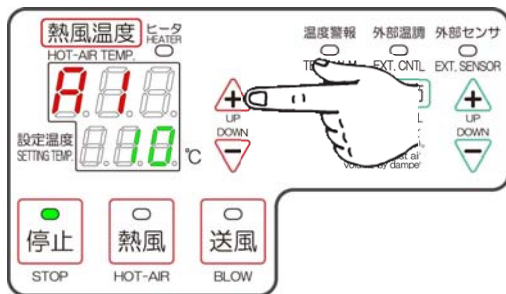
"A1" is displayed in the hot air temperature section, and "0" is displayed in the set temperature section.



※ If you set the hot start mode to "on", press the mode switch twice.

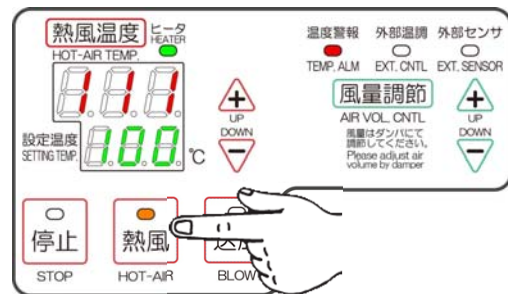
④ Use the up and down keys to set any temperature range.

After setting, press the mode switch twice to return to the normal operation state.



⑤ Start hot air operation.

If it is set to "10", the alarm lamp (red) lights up when the set outlet temperature is + 10°C or higher and -10 °C or lower, and an alarm is output from the service terminal (except when the temperature rises when hot air operation starts).






※After making the change, lock it again and operate.

- ※ The temperature alarm does not stop the operation of this machine.
- ※ When the temperature alarm setting is 0, the temperature alarm output is disabled.
- ※ The temperature alarm is output as a non-voltage contact signal (contact capacity AC250V 1A DC30V 1A) from the terminal for which the temperature alarm output is selected by the output terminal function.


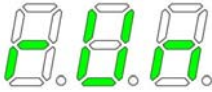
# 1.8. Output terminal function setting

At the time of shipment, the output terminals (service terminals: 6-7-8-9) are set to blower output, heater output, and abnormal output. You can change these output settings as you like.

## 《Factory settings》

- Output terminal **6**  Blower output signal "Fan"  
: It is output during blower operation.
  - Output terminal **7**  Heater output signal "HET"  
: It is output during normal operation (hot air operation) and during hot start operation (it is not output during blower operation, stop, or abnormality).
  - Output terminal **8**  Abnormal output signal "ALM"  
: Output when an error occurs.
- ※ Output terminal 9 is a common common.

## 《Changeable output settings》

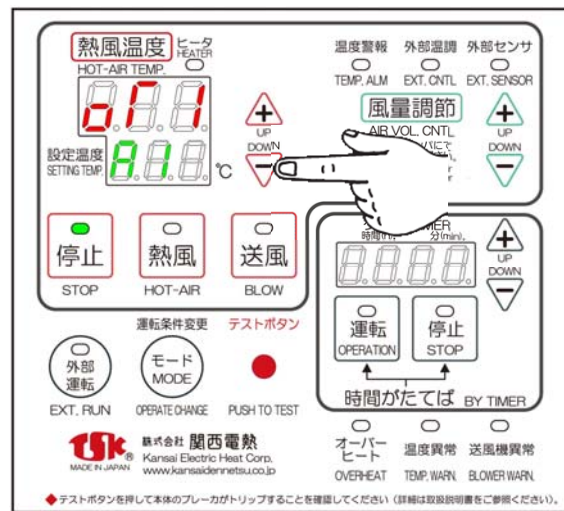
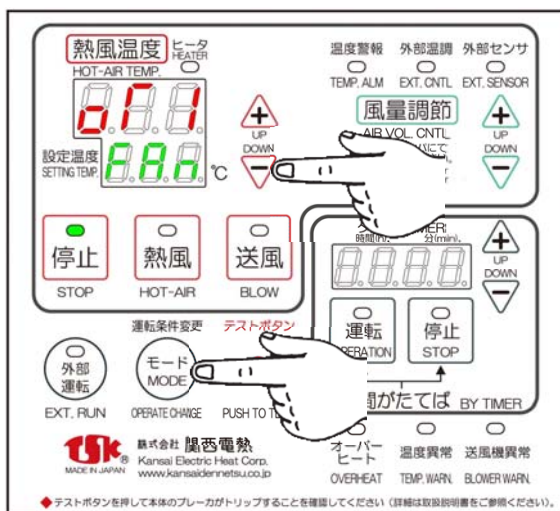
-  Temperature alarm output signal "A1"  
: Output when the temperature alarm is activated.
  -  Operation output signal "rUn"  
: It is output during normal operation (hot air operation) and during blower operation (it is not output during hot start operation, stop, or abnormal condition).
- ※ The abnormal output signal is output when each temperature sensor is connected in reverse, or when all abnormalities are detected except for negative temperature detection and reverse phase abnormality (when pressure is abnormal, all operations are output when stopped).
- ※ For each output signal, the internal relay contact terminals 6-9, 7-9, and 8-9 are turned on when the selected function is activated.  
(Non-voltage contact signal, contact capacity DC30V, 1A)

Before setting the output terminal function, unlock it in the stopped state.

## 【When changing the output terminal 6】

- ① Hold down the mode switch and press and hold the hot air temperature down key at the same time for 10 seconds.
- ② Use the up and down keys to change the set temperature section to any output function.

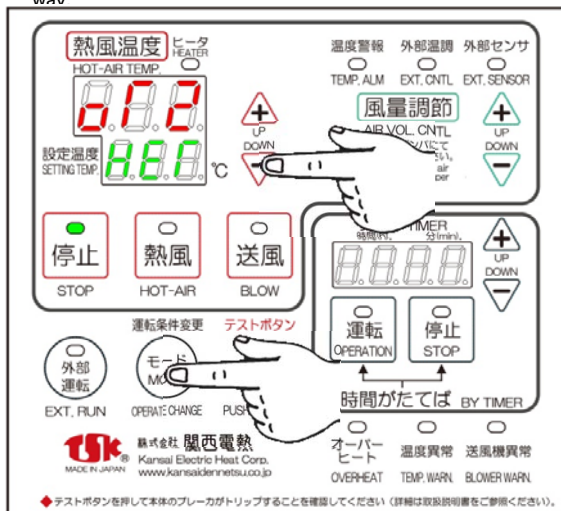
"OT1" is displayed in the hot air temperature section, and "Fan" is displayed in the set temperature section. Ignore the "AIF" display on the hot air temperature section on the way.



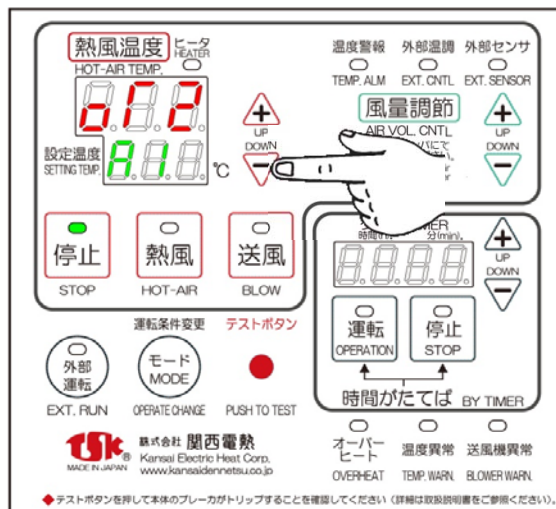
- ③ After setting, press the mode switch three times to return to the normal stopped state.

## 【When changing the output terminal 7】

- ① While holding down the mode switch, press and hold the hot air temperature down key at the same time for 10 seconds, and after "oT1" is displayed on the hot air temperature section, press the mode switch once. "OT2" is displayed in the hot air temperature section, and "HET" is displayed in the set temperature section. Ignore the "A1F" display on the hot air temperature section on the way.



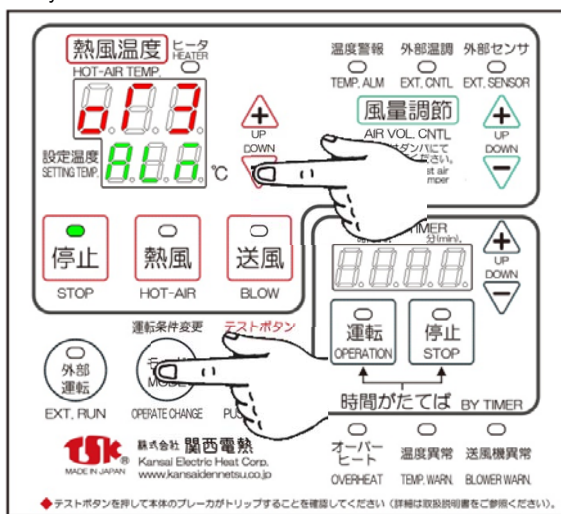
- ② Use the up and down keys to change the set temperature section to any output function.



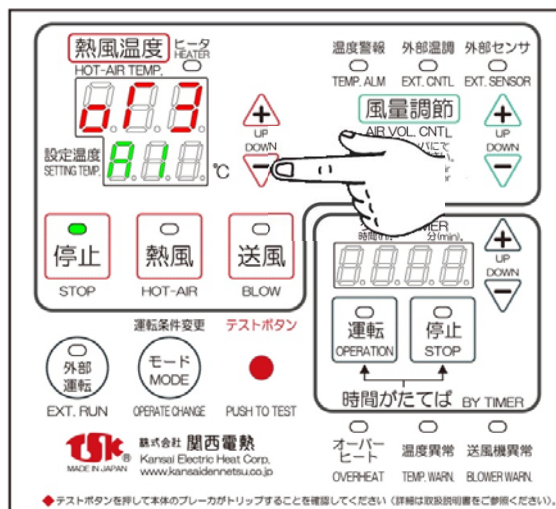
- ③ After setting, press the mode switch twice to return to the normal stopped state.

## 【When changing the output terminal 8】

- ① While holding down the mode switch, press and hold the hot air temperature down key at the same time for 10 seconds, display "oT1" on the hot air temperature section, and then press the mode switch twice. "OT3" is displayed in the hot air temperature section, and "ALM" is displayed in the set temperature section. Ignore the "A1F" display on the hot air temperature section on the way.



- ② Use the up and down keys to change the set temperature section to any output function.



- ③ After setting, press the mode switch once to return to the normal stopped state.

After setting, be sure to lock it before starting operation.

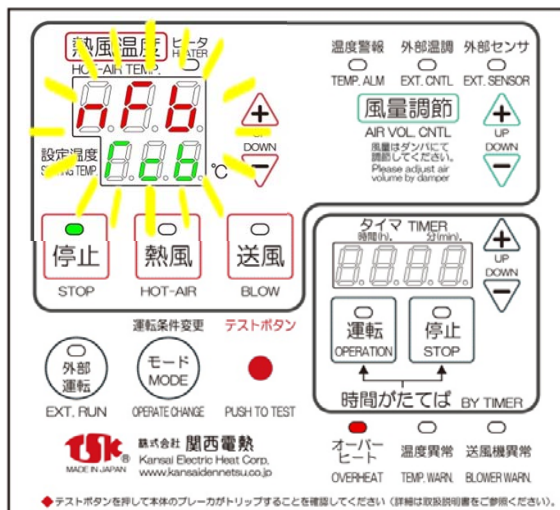
# 19. Anomaly detection

- ◆ When an abnormality is detected, the buzzer sounds at the same time as the abnormality is displayed. Depending on the recovery method of each abnormality, the buzzer sound will also stop when the abnormality is cleared.

## 19-1 Overheat (burnout)

If the temperature inside the heater case becomes abnormally high, it will be detected as overheating. Or, if the B2 sensor for overheat prevention temperature detection is broken, it will be detected as burnout. Then, the breaker (NFB) of the main body trips and all operations are stopped.

- When overheating



The overheat lamp (red) lights up, and "nFb" flashes in the hot air temperature section and "Tcb" flashes in the set temperature section.

### 《Main cause》

- No air is supplied
- Clogged super heater inlet wire net
- Clogged air source filter
- Blower motor lock due to foreign matter
- Sufficient exhaust port for furnace body etc. cannot be secured
- The resistance (pressure loss) of the discharge port is large due to the proximity of the target work, etc.

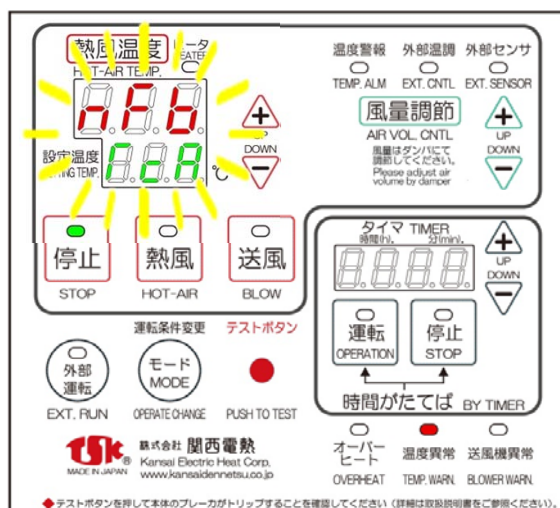
### 《How to return》

After removing the cause of overheating and cooling sufficiently, turn off the main power supply (factory power supply) and the main body breaker (NFB), and then turn them on again.

## 19-2 Abnormal temperature

If the outlet temperature exceeds the upper limit, or if the suction temperature exceeds the upper limit, it will stop or enter the ventilation operation state. The operation is also stopped in the event of burnout such as disconnection of each sensor or abnormal temperature inside the temperature control unit.

- When the outlet temperature upper limit is exceeded at the outlet sensor



The abnormal temperature lamp (red) lights up, "nFb" flashes in the hot air temperature section, "TcA" flashes in the set temperature section, and the breaker (NFB) of the main unit trips and all operations stop.

### 《Main cause》

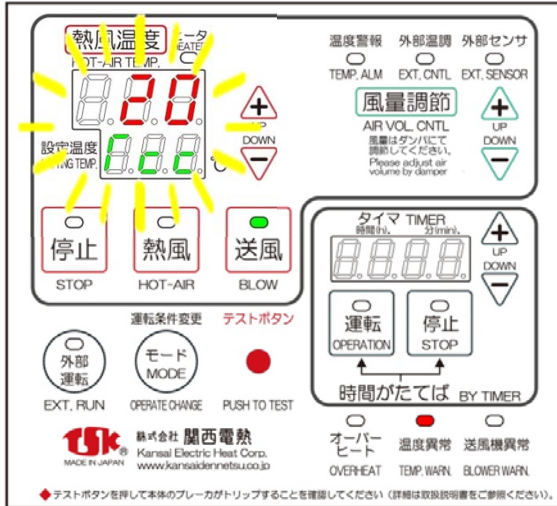
- Exceeding the upper limit of outlet temp when using an external sensor
- Air volume reduction due to excessive pressure loss
- Super heater inlet Reduced air volume due to clogging of wire mesh
- Air volume reduction due to clogging of air source filter
- Air volume reduction of the air source

### 《How to return》

Eliminate the cause of the discharge port temperature upper limit being exceeded, and after cooling sufficiently, turn off the main power supply (factory power supply) and the main body breaker (NFB), and then turn them on again.

Note: Be sure to shut off the main power supply (factory power supply) when checking the wiring or rewiring in the event of an abnormality.

● When the inlet temperature upper limit is exceeded



The abnormal temperature lamp (red) lights up, the current discharge temperature is displayed in the hot air temperature section, and "Tcc" is blinking in the set temperature section, and the system is in the blowing operation state.

《Main cause》

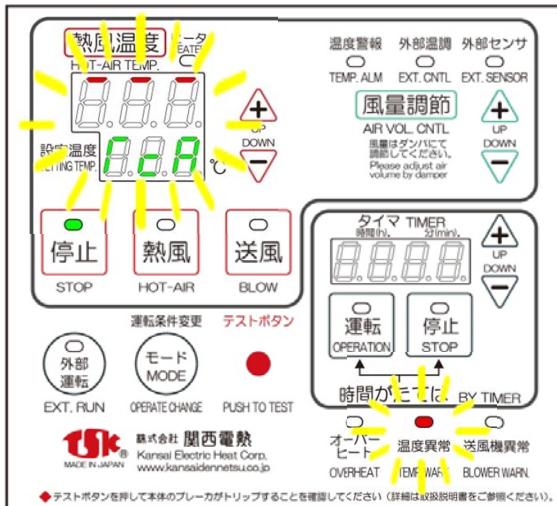
- When the upper limit (100 ° C) of the intake gas temperature of the heater is exceeded

《How to return》

After the temperature of the suction port has dropped, it can be released by pressing the stop switch.

※ In this case, the upper limit of the inlet temperature will be an abnormality in the inlet temperature detection sensor installed inside the heater.

● Outlet sensor burnout



The abnormal temperature lamp (red) flashes, "----" flashes in the hot air temperature section, "TcA" flashes in the set temperature section, and the main body breaker (NFB) trips and all operations stop.

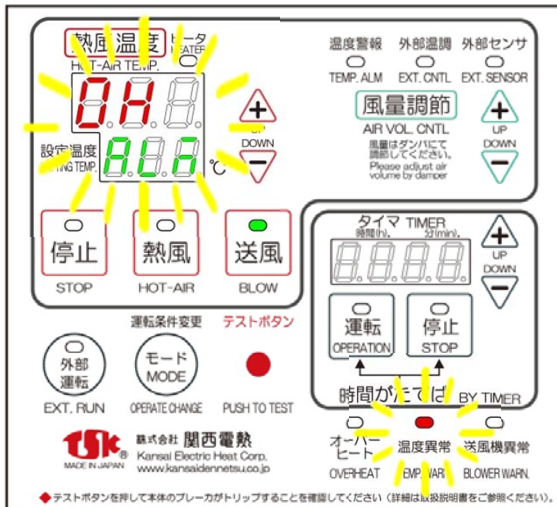
《Main cause》

- Disconnect sensor disconnection
- Disconnection of outlet sensor wiring

《How to return》

Please turn off the power supply on the primary side and request repair.

● When the internal temperature of the temperature control unit is abnormal



The abnormal temperature lamp (red) flashes, "OH" flashes in the hot air temperature section, and "ALM" flashes in the set temperature section, and the system is in the blowing operation state.

《Main cause》

- Temperature control unit installation Atmosphere temperature is high
- Effect of heat dissipation temperature of the furnace body when installed on the upper part of the furnace body

《How to return》

It can be released by stopping the operation with the stop switch, turning off the breaker (NFB) of the main body after the internal temperature of the temperature control unit has dropped.

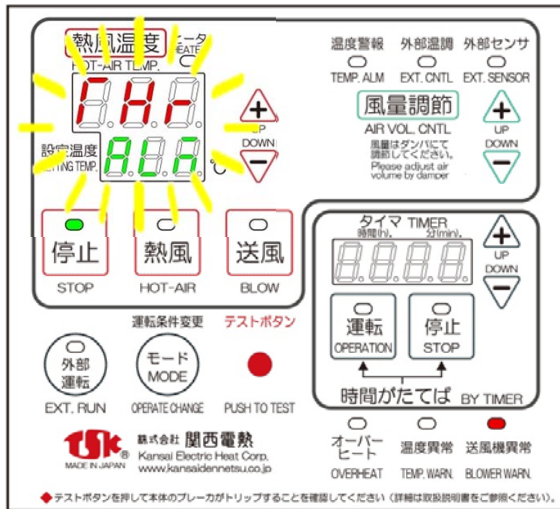
Note: Be sure to shut off the main power supply (factory power supply) when checking the wiring or rewiring in the event of an abnormality.



### 19-3 Blower abnormality

When the blower becomes overloaded, overcurrented or locked, all operations will stop.

#### ● When the blower is abnormal



The blower abnormality lamp (red) lights up, and "THR" flashes in the hot air temperature section and "ALM" flashes in the set temperature section.

#### 《Main cause》

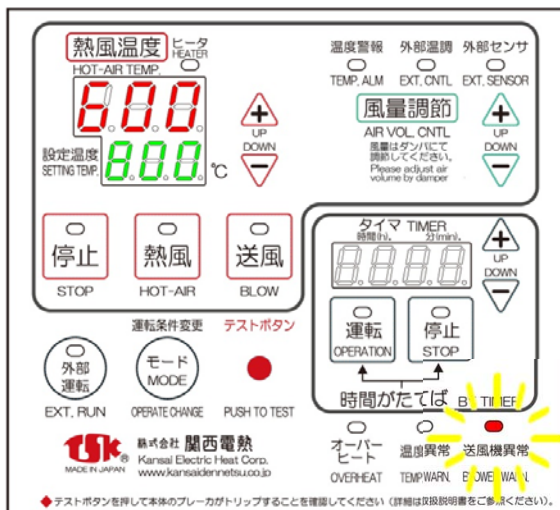
- Blower bearing wear
- Abnormal voltage (voltage other than rated)
- Piping with large pressure loss
- Use of nozzles with extremely narrow openings, etc.

#### 《How to return》

After confirming the cause of the abnormality and removing it, turn off the breaker (NFB) of the main unit and then turn it on again.

#### ● When pressure is abnormal (only when using blower unit FH50, FH60)

When the air pressure on the discharge side of the blower units FH50 and FH60 exceeds the maximum discharge pressure that can be used continuously, an alarm sounds.



Continuous use of discharge side air pressure When the maximum discharge pressure is exceeded for 10 minutes, the blower abnormality lamp (red) blinks and all operations are stopped.

The hot air temperature section and the set temperature section display the discharge temperature and set temperature at that time.

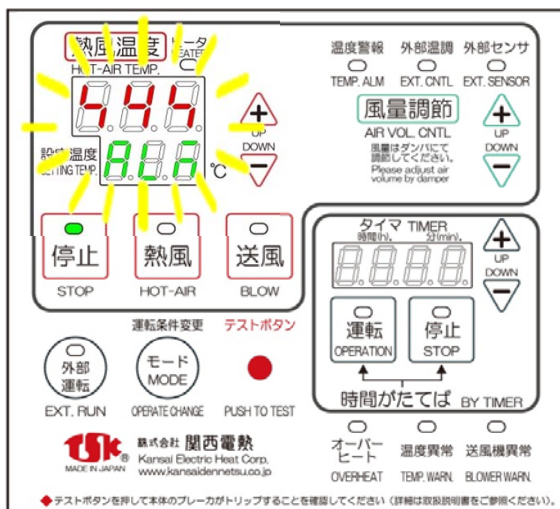
#### 《Main cause》

- Piping with large pressure loss
- Use of nozzles with extremely narrow openings, etc.
- Too much air volume is throttled by valves, etc.

#### 《How to return》

After removing the cause and operating below the maximum discharge pressure that can be used continuously, it can be released by pressing the stop switch.

#### ● Frequency anomaly



When the supply frequency from the primary power supply exceeds the rated frequency (50 / 60Hz) of  $\pm 3\text{Hz}$ , "SYS" flashes in the hot air temperature section and "ALM" flashes in the set temperature section, and all operations stop. ..

#### 《Main cause》

- Not supplied with rated frequency by using a generator etc. for the primary power supply

#### 《How to return》

After checking the supply of the rated frequency, turn off the main power supply (factory power supply) and the breaker (NFB) of the main unit, and then turn it on again.

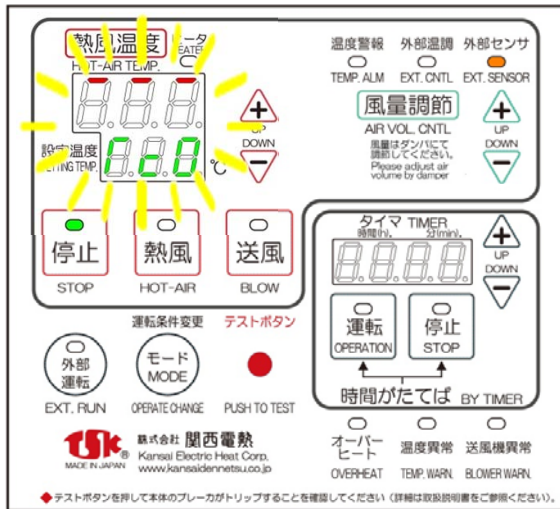
- ※ Please refer to the technical data on our website, what to do when a frequency abnormality occurs.

Note: Be sure to shut off the main power supply (factory power supply) when checking the wiring or rewiring in the event of an abnormality.

## 8-4 Other abnormalities

### ● At the time of external sensor burnout

If the temperature of a remote location is controlled using an optional external sensor, all operations will stop when the external sensor burns out such as a disconnection.



“----” flashes in the hot air temperature section and “Tc0” flashes in the set temperature section (the external sensor lamp is lit).

#### 《Main cause》

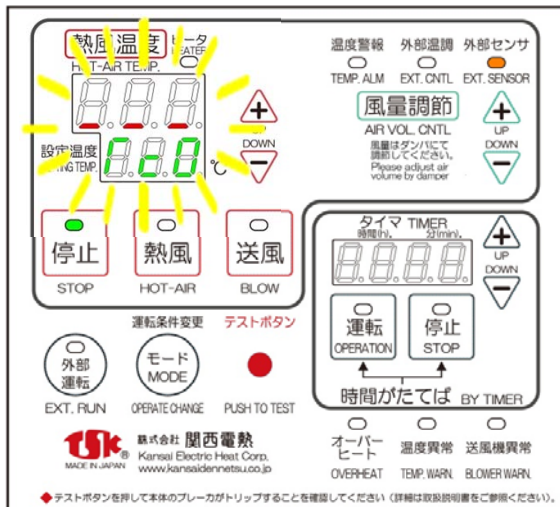
- External sensor disconnection
- Disconnection of external sensor compensation conductor
- Detachment of external sensor terminal

#### 《How to return》

After checking the external sensor, you can release it by pressing the stop switch.

### ● Reverse connection of each temperature sensor or negative temperature detection

If each temperature sensor (including the external sensor) is connected in reverse, or if it senses  $-15^{\circ}\text{C}$  or less (internal temperature sensor  $-10^{\circ}\text{C}$ ), all operations will stop.



The display of each sensor blinks in the hot air temperature section and in the set temperature section.

- External sensor : Tc0
- Outlet sensor : TcA
- B1 sensor for overheat prevention : TcM
- Inlet sensor : Tcc
- B2 sensor for overheat prevention : Tcb

#### 《Main cause》

- Reverse connection of external sensor
- Reverse connection by rewiring each sensor (other than external sensor)
- Reverse connection by rewiring each sensor (other than external sensor)

#### 《How to return》

After checking the external sensor or improving the negative condition, it can be released by pressing the stop switch. For reverse connection other than the external sensor, please contact us for repair.

### ● When reverse phase is abnormal

If the power line connection is out of phase or the T phase is out of phase, the operation will be disabled.



Each display will be the same as when the breaker (NFB) of the main unit is turned on, and the reverse phase lamp (red) will blink separately.

#### 《Main cause》

- Reverse connection of power line, disconnection of T phase

#### 《How to return》

- Replace any two of the power connection lines.

Note: Be sure to shut off the main power supply (factory power supply) when checking the wiring or reworking the wiring in the event of an abnormality.

## 20. When using a remote controller (optional)

- The optional remote controller RCT-10MC requires a dedicated connector for the temperature control unit. Therefore, please note that the remote controller cannot be retrofitted after purchasing the temperature control unit TCU series.

- ① Install the remote controller by the following method and fix it firmly.

Deferred or suspended using fixing brackets



Wall-mounted mounting using fixing brackets



- ※ The remote cable can be attached to all of the top, bottom, left, and right of the remote controller. Use the entry holes (knockouts) on each side to attach it to any position. Also, if you change the mounting position, attach the rubber bushing to the entry hole at the bottom to protect it.

- ② Securely connect the connector (6P) of the remote cable terminal attached to the remote controller to the remote controller connector (6P) of the temperature control unit TCU series terminal block.

- ※ The remote controller connector (6P) is the lower left connector of the blower output terminal (only for the temp control unit with remote controller mounting specifications).

- ③ Start operation according to the instruction manual.

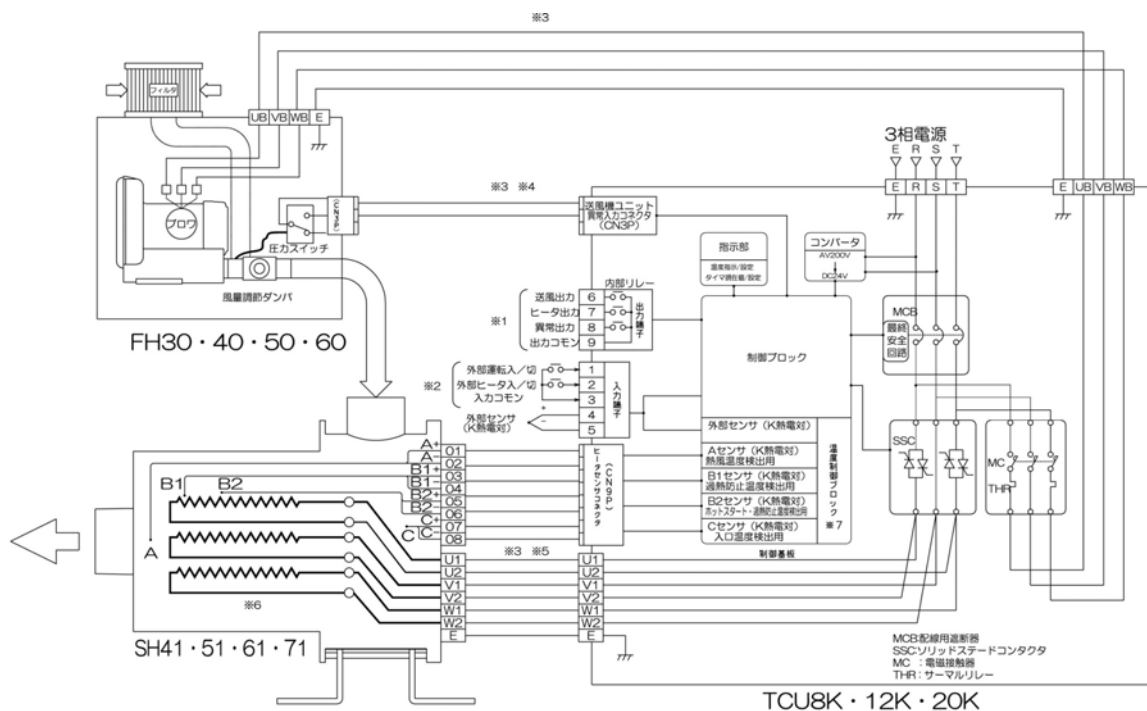
The operation panel of the temperature control unit and the remote controller work together (either can be operated).

**note** : Do not wire or bind the remote cable adjacent to the AC power line, power line, or harmonic line. Noise will damage internal electronic devices. Also, be careful that the remote cable is not affected by heat. Shorts due to fusing. Also, be sure to shut off the main power supply (factory power supply) when connecting the remote controller.

# Electrical connection diagram

## ● Example of combining genuine manufacturer functions

Perfect temperature control, safety circuit can be secured, and various high-performance functions such as energy-saving operation in hot start operation can be used.



※1 Wire the temperature sensor wiring and input / output signal wiring separately from the power line, power line, and high-week broken line to avoid malfunction due to noise.

It will be the factory setting. You can select one of the three output signals: blower, heater, operation, abnormality, and temperature alarm output.

※2 Terminal voltage DC24V 7mA or less (contact for non-voltage microload). "On" when ON (closed).

※3 For each sensor, heater, power supply, and pressure signal code, use the code attached to the temperature control unit and blower unit.

※4 The pressure switch and pressure signal code are attached to FH50 and FH60.

※5 The heater power supplies for SH41 to SH61 are U, V, and W phases only.

※6 SH41 to SH61 are delta circuits, and SH71 is an open delta circuit (200V).

※7 Each sensor setting value changes depending on the super heater model and voltage.

### 《NOTE》

- Wire the temperature sensor wiring and input / output signal wiring separately from the power line, power line, and high-week broken line to avoid malfunction due to noise.
- Provide a dedicated circuit for the power supply and secure sufficient capacity.
- Determine the power line in consideration of the required capacity and length.
- Ask an electrician for wiring work and grounding work.



HOT-AIR GENERATOR.

Manufacturer



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