

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

For super heater

Temperature control unit TCU series

《Compressor Spec》 MANUAL

● Please be sure to read before use.

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



- TCU8K (3200-3K-4K-6K-8K-C)
- TCU12K (3200-10K-12K-C)
- TCU20K (3200-15K-20K-C)

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KANSAI ELECTRIC HEAT CORP.

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.

1. Precautions for use * Please be sure to check before use.

To use the temperature control unit without any trouble

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

- Installation location of the temperature control unit If the atmosphere contains conductive suspended matter such as dust, dust, 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 AC power line, power line, and harmonic line to the service terminal wiring. 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 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》

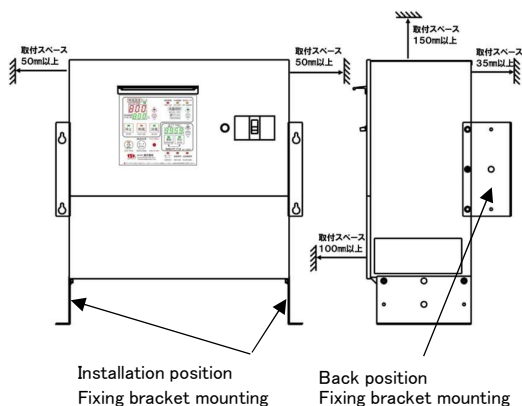
0 123456789A b c d E F G H I J k L ñ n o P q r 4 f U V W X Y
0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W Y

2. Installation

- ① This machine is for installation or rear mounting only. Be sure to install it in a horizontal position 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).

- ② 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.



- ③ Places that cannot be installed

- Place with vibration
- Near combustibles
- Ambient temperature other than -5°C to $+40^{\circ}\text{C}$
- Places with an ambient humidity over 85% R.H.
- In a closed room and case
- Places with conductive suspended matter (carbon fiber, etc.)
- Places where acid gas, corrosive gas, etc. are floating
- Places with an ambient humidity over 85% R.H.
- A place where the back side is in close contact with a wall,
- 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

- ① Ask an electrician for power connection and grounding work.
- ② 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 a distorted wave containing harmonics. Also, take sufficient measures to prevent surge voltage and noise from entering the power supply.
- ③ 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

- ④ To prevent electric shock accidents, perform grounding work (300V or less: D-class grounding, 600V or less: C-class grounding).

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

CAUTION 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.

CAUTION 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.

CAUTION The temperature control unit is a device mainly used in an industrial environment. When used in a residential environment, etc., there is a risk of radio interference. In doing so, users of this product may have to take appropriate steps to reduce the failure.

4. WIRING

- ① Ask an electrician for wiring.
- ② Please check the control capacity of the TCU series and the capacity of the super heater you purchased again.
- ③ 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.
- ④ 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.
- ⑤ 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.

注意 For wiring with the super heater, use only the attached heater cord and sensor cord. It may cause a malfunction.

注意 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.

注意 If hot air operation is performed without wiring the sensor connector, the heater will break.

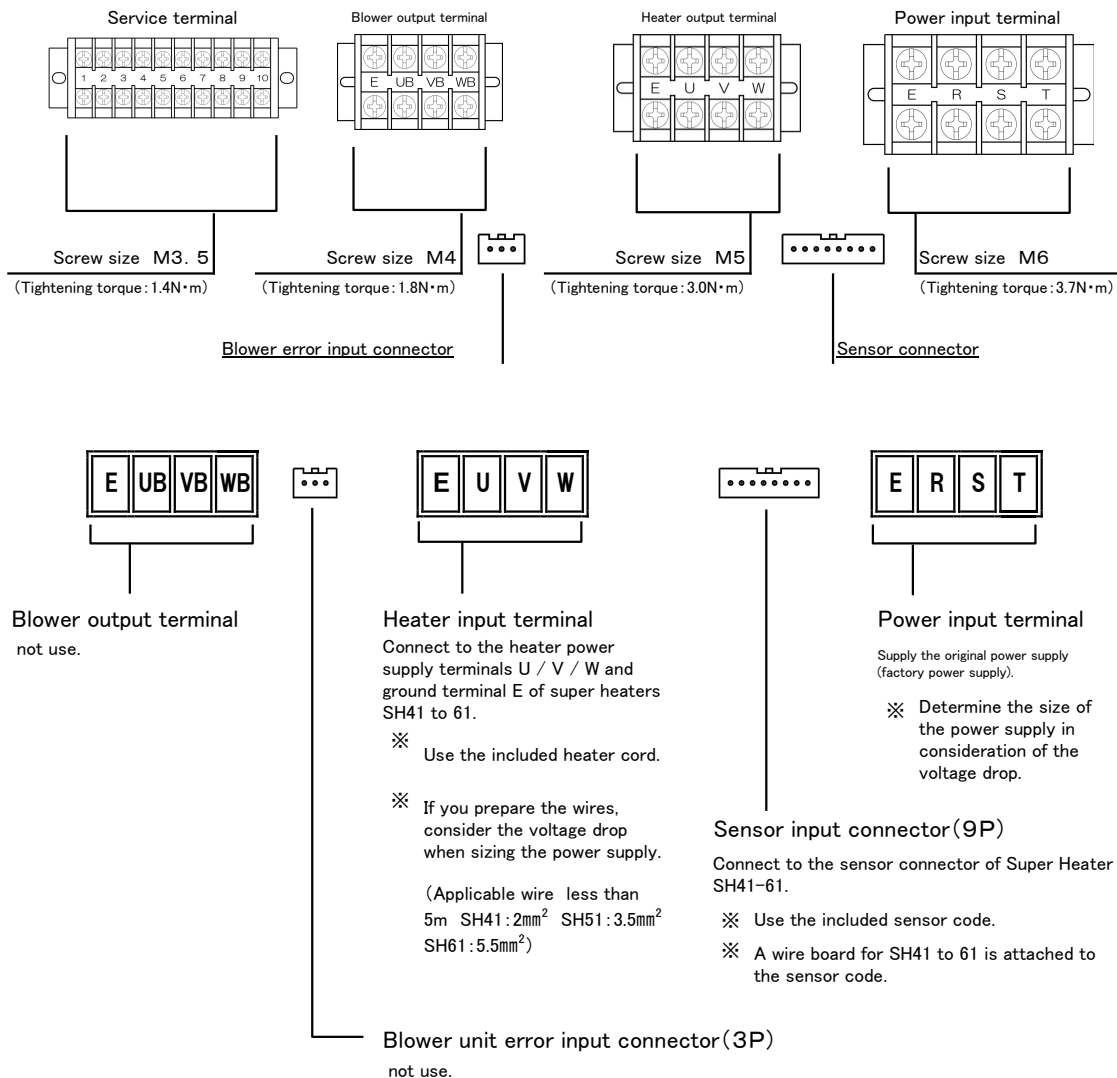
TCU8K・12K

《FOR SUPER HEATER : SH41・SH51・SH61》

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

TCU8K : 3 phase less than 8kW ・ 25A

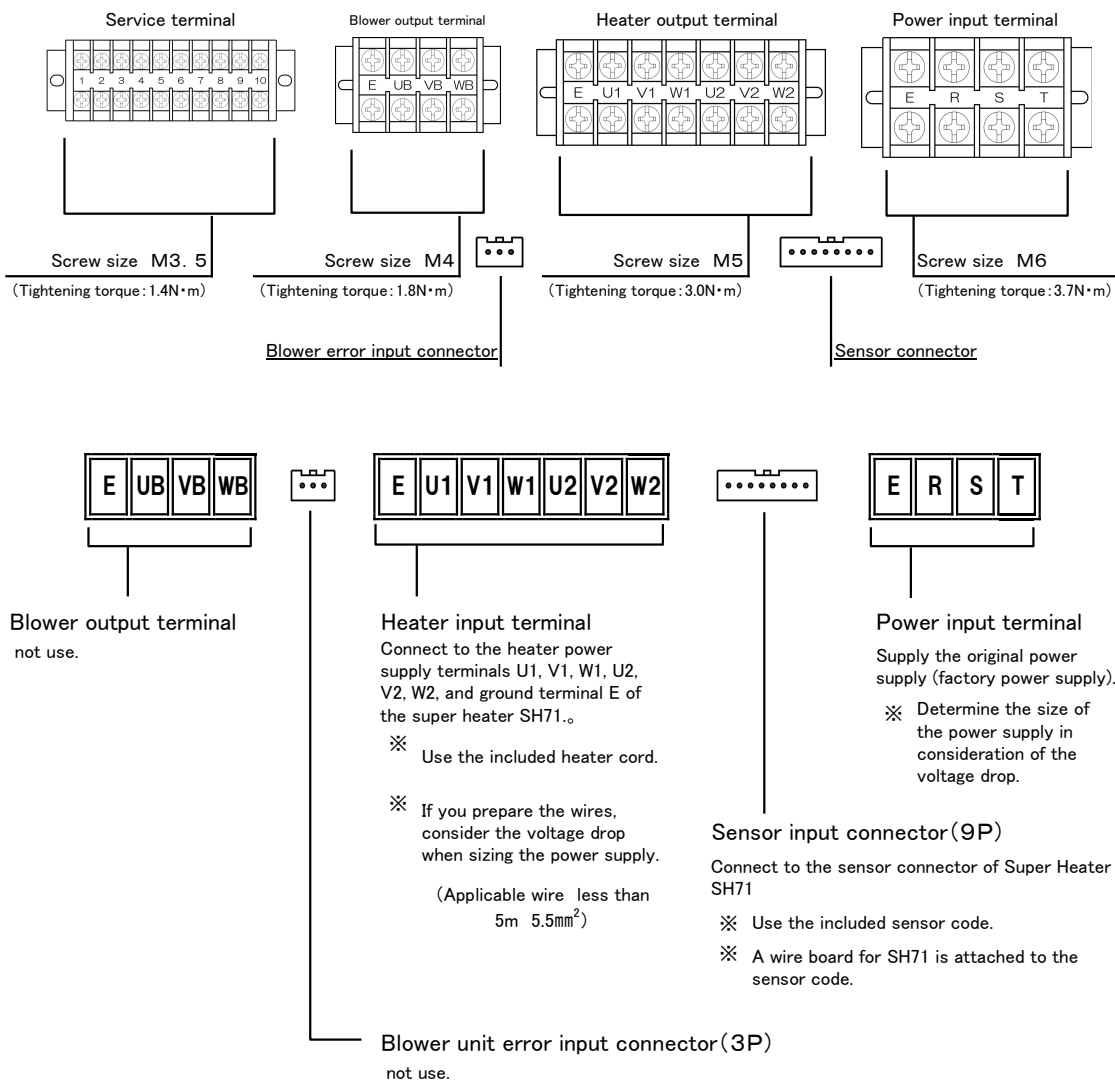
TCU12K : 3 phase less than 12kW ・ 35A



Be sure to wire the compressor operation signal to the service terminal (see page 8).
Operating without wiring 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. (shielding is recommended).

Heater control capacity • Maximum load current 3 phase less than 58A
(At 200V)



Be sure to wire the compressor operation signal to the service terminal (see page 8).
Operating without wiring may cause a heater disconnection or a fire.

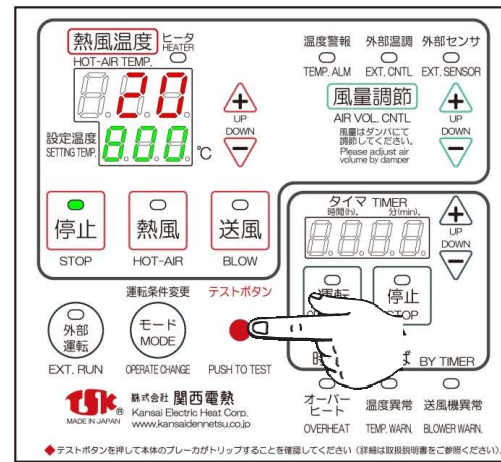
- Wire the sensor and input / output signal terminals separately from the AC power line, power line, and harmonic line to avoid malfunction due to noise, etc. (shielding is recommended).

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 (energized), and check the overheat lamp lighting, overheat operation display (see page 21), and trip operation of the breaker (NFB) of the main unit.

After checking, turn off the main power supply (factory power supply) and the main body 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 as 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
- Visual inspection

※ For self-inspection, ask the nearest electrician.

CAUTION : 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, but it is possible to set the temperature control unit side so that it will not restart operation after the power is restored.

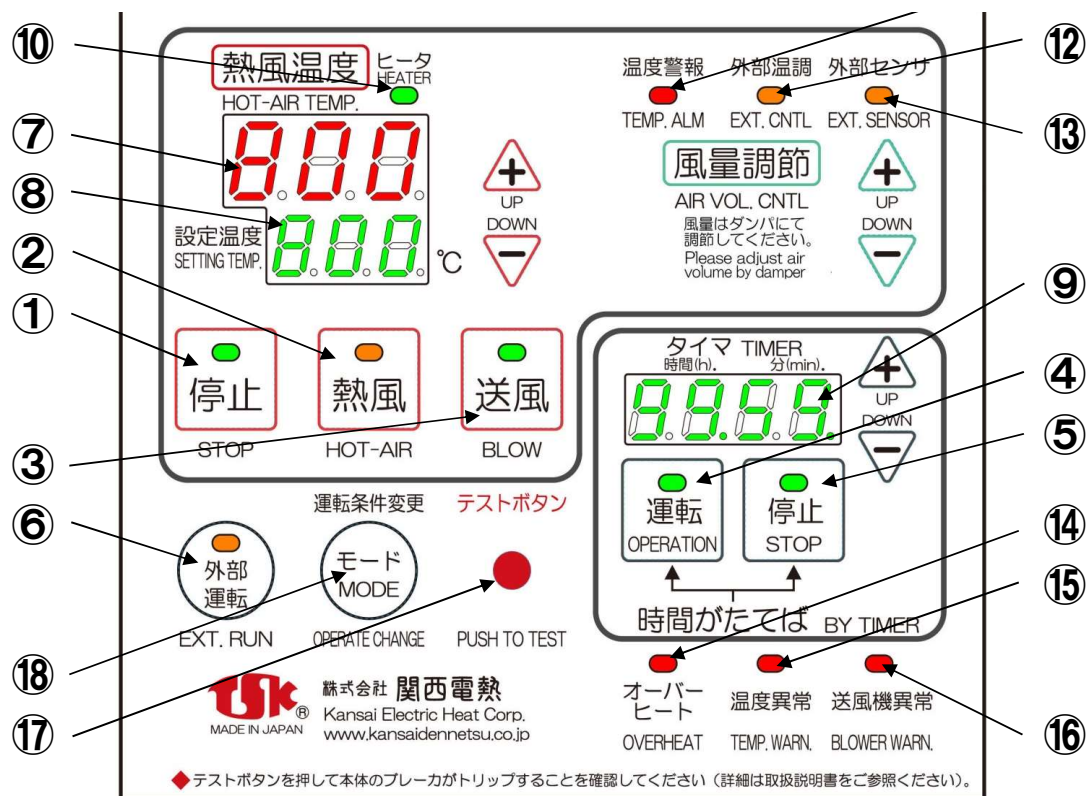
For the setting method, access our website <http://www.kansaidennetsu.co.jp>

↓
Technical data

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

7. Names and functions of each part

Operation panel (common
to all models)



① Stop switch

It is a 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 Blower switch

not use.

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

It is invalid (not used) in this machine.

⑦ Hot air temperature 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 temperature 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 lit and blinks.

⑪ Temperature alarm lamp

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

⑫ External temperature 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 Abnormal temperature lamp

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

⑯ Blower abnormality lamp

It is invalid (does not light) on this unit.

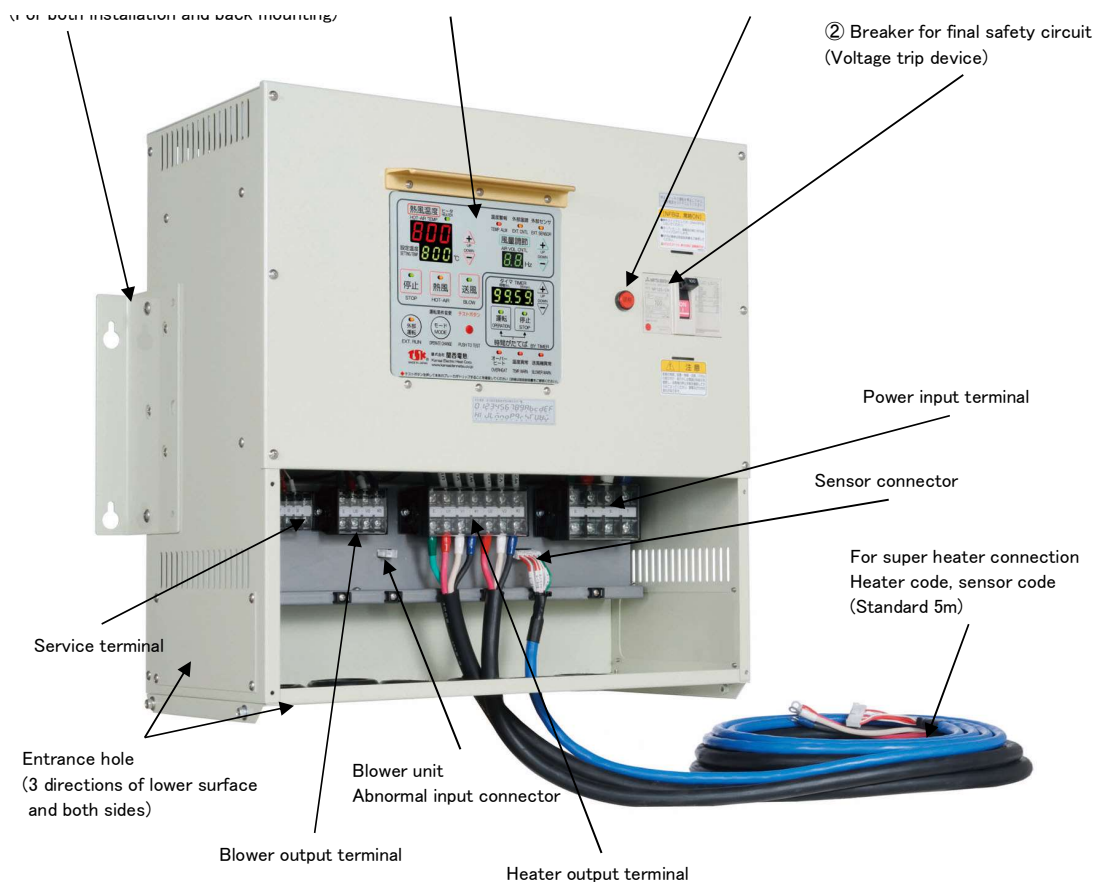
⑰ Test button

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 Breaker for final safety circuit

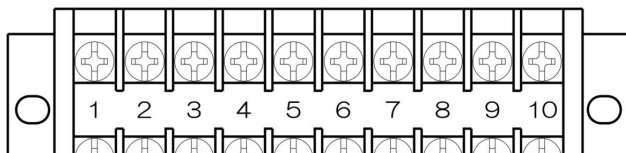
A breaker that trips when the safety circuit is activated and cuts off all circuits. This breaker should always be on, and should not be turned on / off as an operation switch.

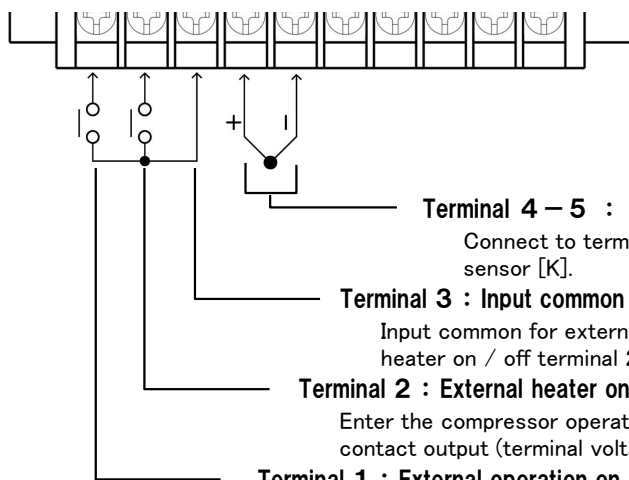
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8. Service terminal

- The temperature control unit TCU series is equipped with service terminals for external input and external output.
(M3.5 10P terminal block upper stage 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

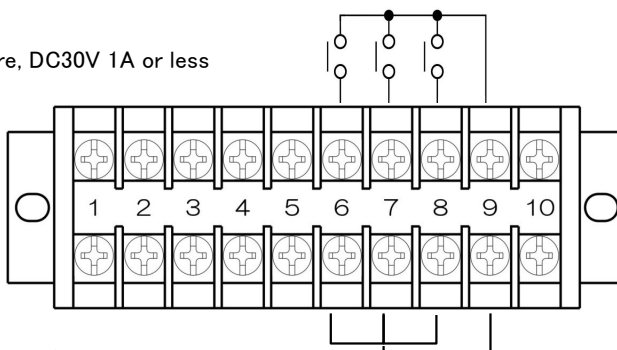
Enter the compressor operation signal. The input is compatible with contact output (terminal voltage DC24V 7mA or less).

Terminal 1 : External operation on / off terminal

Enter the compressor operation signal. The input is compatible with contact output (terminal voltage DC24V 7mA or less).

《Output terminal》

Contact capacity DC5V 10mA or more, DC30V 1A or less
(Non-voltage contact signal output)



Terminal 6 – 7 – 8 : Output terminal (selectable)

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 temperature alarm, heater, operation, and abnormality.)

※ 出力端子機能の設定は、P.19をご参照ください。

Terminal 9 : Output common terminal

Output common for output terminals 6, 7 and 8 (total output common is 3A or less).

caution : 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.

caution : For the wiring of the service terminal, avoid the AC power line, power line, harmonic line and adjacent wiring or binding.

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9. Normal operation (Hot air operation)

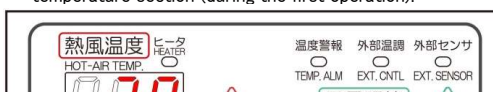
- This machine is a compressor specification. By turning on the external operation on / off terminal 1–3 of the service terminal and the external heater on / off terminal 2–3 with the operation signal of the compressor, the operation with the operation switch becomes effective.

External operation on / off and external heater on / off are external operation input terminals 1–3. Input the non-voltage contact output (terminal voltage DC24V 7mA or less) to the external heater input terminal 2–3 (never apply voltage).

- 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.

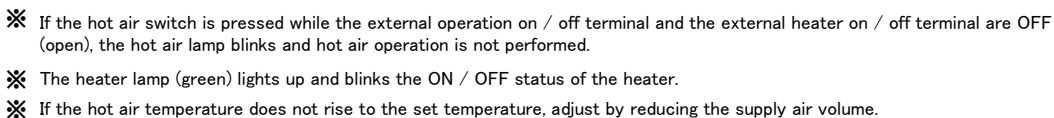


- ② Turn on the breaker (NFB) of the main unit.
The current temperature is displayed in the hot air temperature section, and "0" is displayed in the set temperature section (during the first operation).



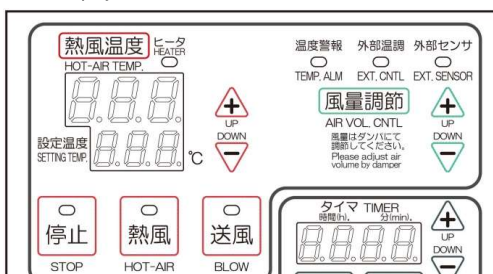


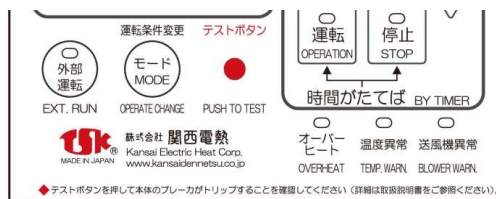
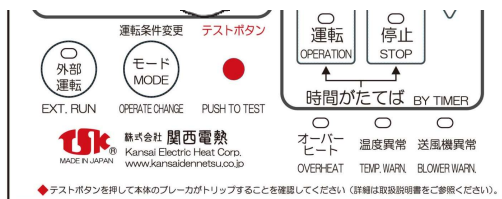
- It can be set in 1 ° C increments with the up and down keys.



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





※ The operation can also be stopped by turning off the external operation on / off terminal and the external heater on / off terminal.

※ 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 (necessary). Please use the cooling operation function on page 16 according to the above conditions).

※ 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 only the air supply is stopped without turning off the compressor operation signal, the super heater will be heated empty, which may cause a heater disconnection or a fire.

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

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.

● Operation during a momentary 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.

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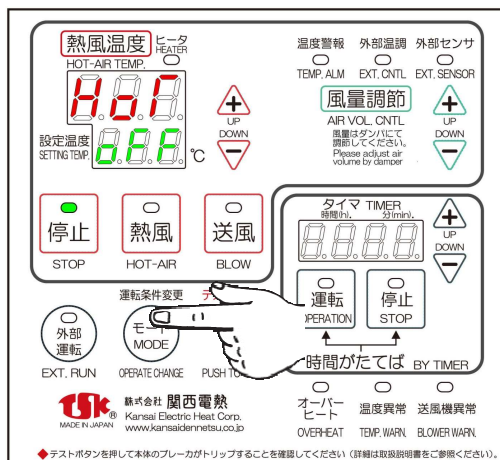
11. Hot start operation

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.

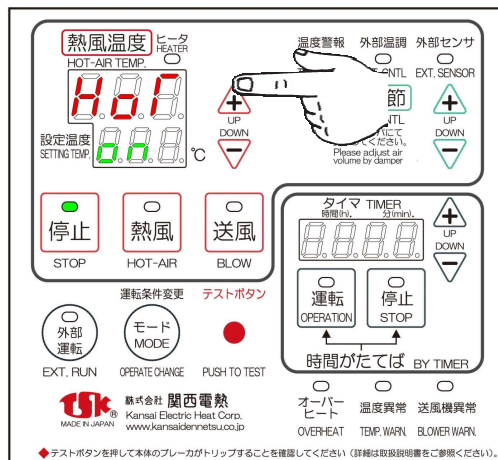
- Do not supply air during hot start operation. If even a small amount of air flows, the A sensor for hot air temperature detection of the super heater detects the temperature and controls it, so it may not be possible to obtain an arbitrary hot start temperature.
- During hot start operation, it is 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 is a limit to 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.

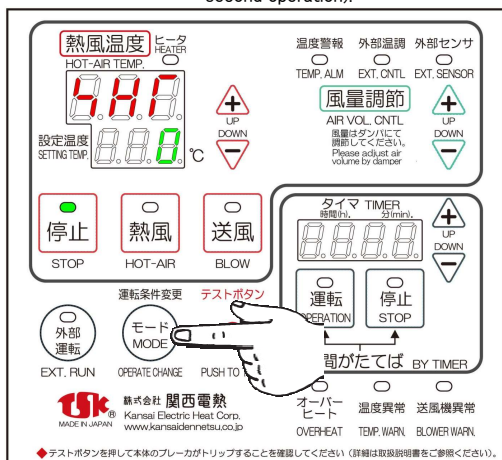


- ② Set the temperature section to "on" with the up key.

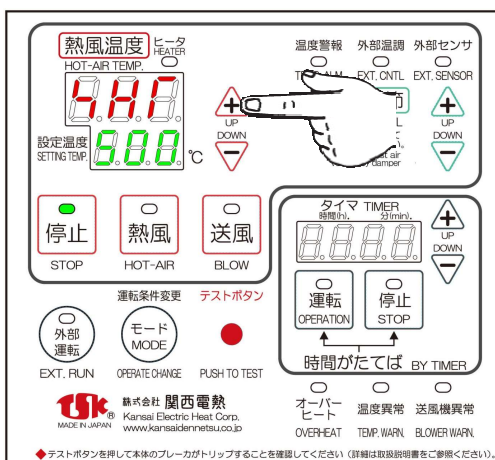


- ③ Press the mode switch again.

"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).



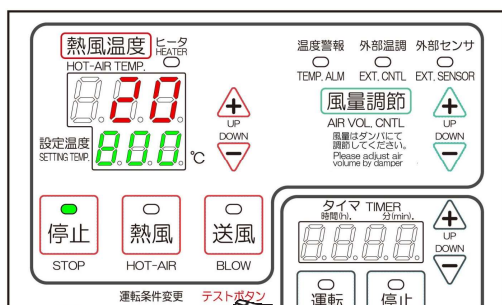
- ④ Set any hot start temperature (Max.500 °C) to the set temperature with the up / down keys.



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

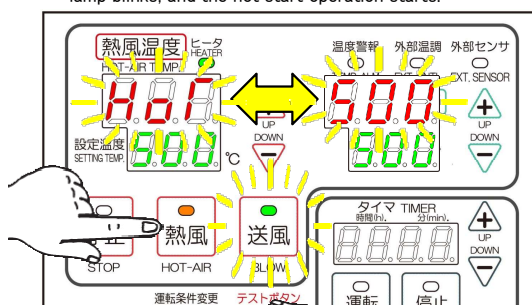
- 11 -

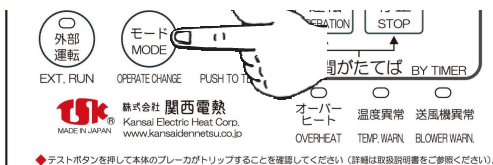
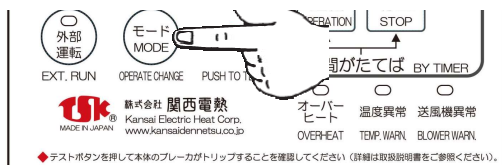
- ⑤ Press the mode switch twice to return to the stopped state.



- ⑥ Turn on the external heater on / off terminal 2-3 by the compressor operation signal, and press the hot air switch while pressing the mode 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.



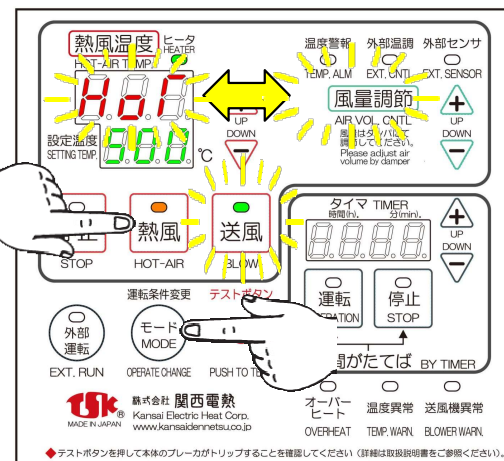
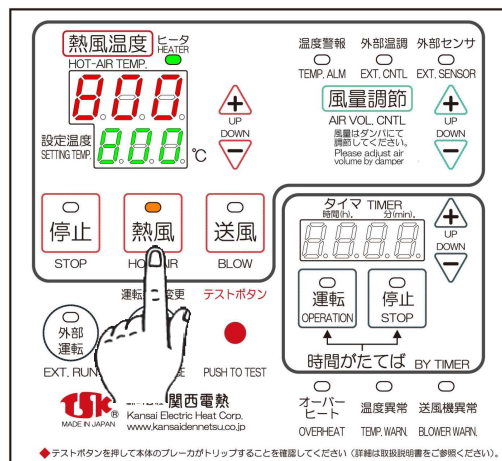


※ The heater lamp (green) lights up and blinks the ON / OFF status of the heater.

※ If you press the hot air switch while pressing the mode switch while the external heater on / off terminal is OFF (open), the blower lamp and hot air lamp will blink and hot start operation will not be performed.

- ⑦ Turn on the external operation on / off terminal 1-3 by the compressor operation signal, and press the hot air switch again to start the 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.



※ The hot air switch is disabled when the external operation on / off terminal is OFF (open).

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, in order to prevent damage to the heater due to a sudden temperature rise, the heater output upper limit is suppressed to 2/3 by a unique control function, and the hot start temperature indicated value is about 2.5 per second. The heater is controlled to raise the temperature at ° C.

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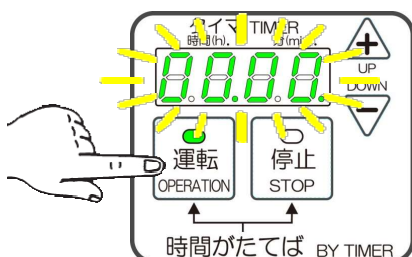
12. Timer operation / Timer stop

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 hot air operation).

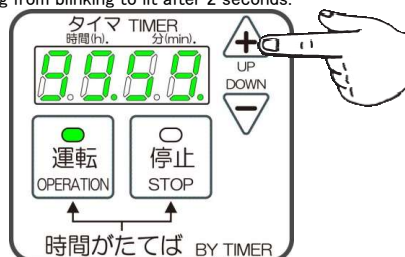
● Timer operation (operation over time)

- 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.

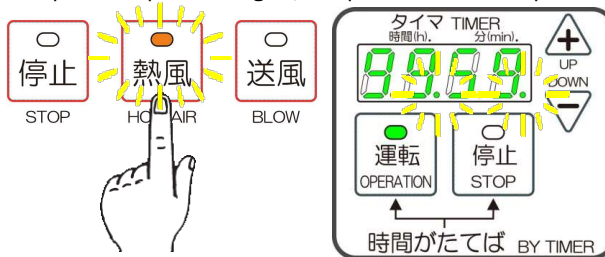


- ② Use the up and down keys to set time you desire. It can be set in 1 minute increments up to 99 hours 59 minutes. When you release the up / down key after completing the setting, the setting value will be registered by switching from blinking to lit after 2 seconds.



- ③ Turn on the external operation on / off terminal 1-3 and the external heater on / off terminal 2-3 by the

compressor operation signal, and press the hot air operation switch.



The time count (timer set time subtraction) is started (dot display blinks), and when the time count reaches "00.00", hot air operation starts. 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 ends, the timer display will be "00.00".

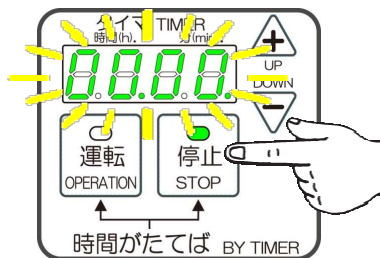
※ If you press the stop switch, the timer operation and time count will be stopped.

※ When the hot start operation mode is set to "on", the hot start operation state is set during the time count, but after the time count, the hot air operation is started ignoring the arrival at the hot start set temperature. Please be careful.

● Timer stop (stop after time)

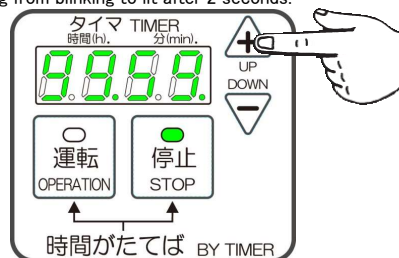
① Press the timer stop switch.

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

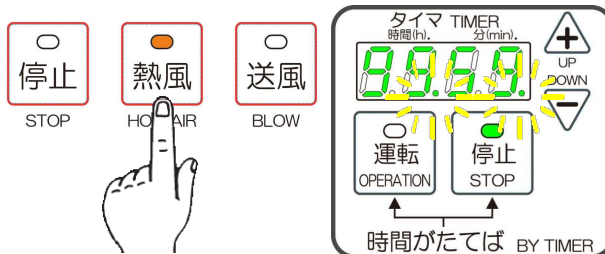


② Use the up and down keys to set time you desire

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, the setting value will be registered by switching from blinking to lit after 2 seconds.



③ Turn on the external operation on / off terminal 1-3 and the external heater on / off terminal 2-3 by the compressor operation signal, and press the hot air operation switch.



Time count (timer setting time subtraction) is started (dot display blinks), and hot air operation is performed. When the time count reaches "00.00", hot air operation is stopped. 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".

※ When the stop switch is pressed, the timer operation and time count are stopped.

※ 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.

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13. When using an external sensor

● You can control the temperature at a remote location with an external sensor. Make the settings after connecting the external sensor to the external sensor input service terminal.

● When an external sensor is used, 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.

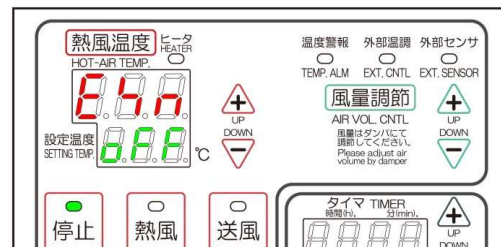
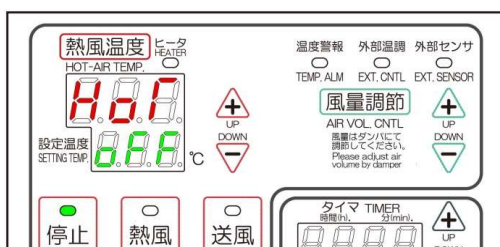
① Connect the external sensor to the external sensor input terminals 4 (+) and 5 (-) of the service terminal without mistakes for plus and minus.

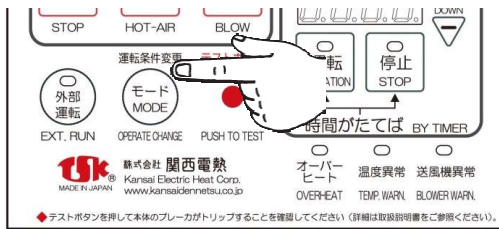
② Press and hold the mode switch (about 2 seconds).

"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.

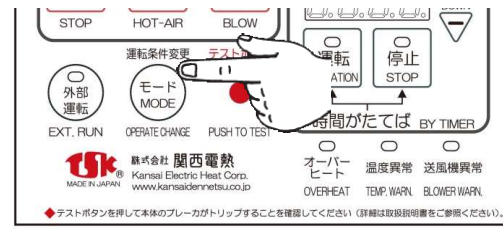
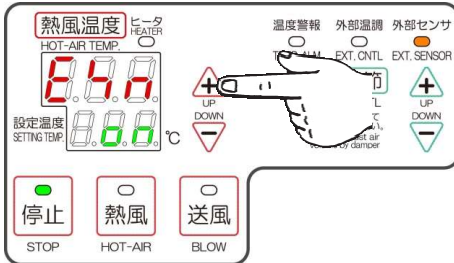
"ESn" is displayed in the hot air temperature section, and "oFF" is displayed in the set temperature section.





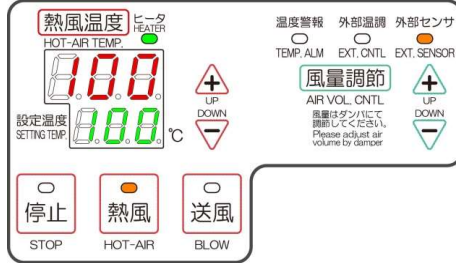
- ④ Set the temperature section to "on" with the up key.

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).
- ※ If the external sensor is no longer used, return the set temperature section to "oFF" in item (4) above.

14. When operating with a compressor operation signal

- The hot air operation of the super heater can be operated by the operation signal of the compressor.

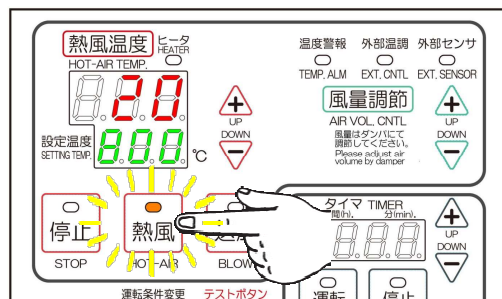
- ① Connect the compressor operation signal (non-voltage contact signal) to the external operation on / off terminal and external heater on / off terminal of the service terminal.

External operation on / off terminal : Input terminal 1-3
Terminal voltage DC24V 7mA or less

External heater on / off terminal : Input terminal 2-3

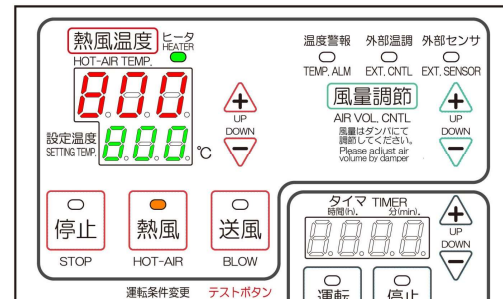
- ② After setting the desired temperature and air volume, press the hot air switch in the stopped state.

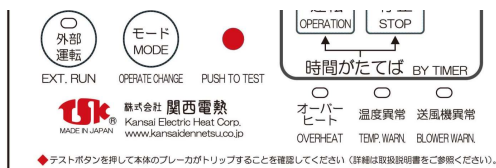
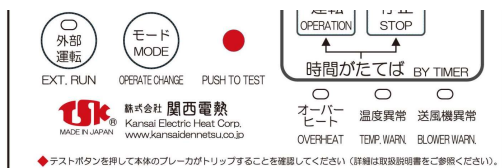
The hot air lamp (orange) flashes.



- ③ Turn on the external operation on / off terminal 1-3 and the external heater on / off terminal 2-3 according to the compressor operation signal.

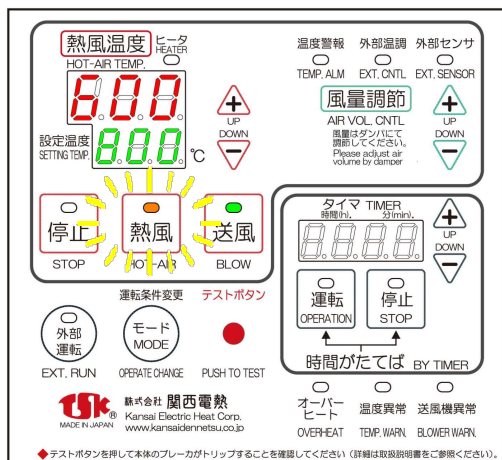
The hot air lamp (orange) lights up and hot air operation starts.



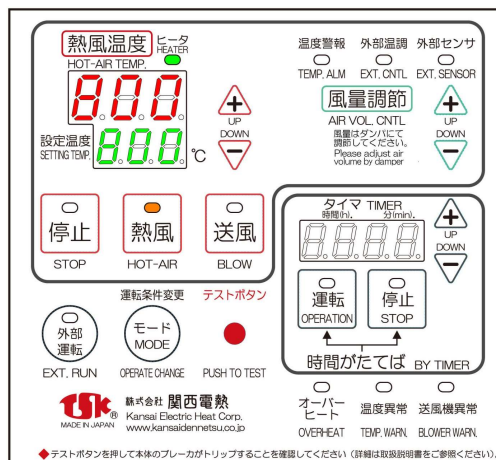


- ③ If only the external heater on / off terminal 2-3 is turned off, the heater circuit will be turned off (blower operation).

The blower lamp (green) lights up and the hot air lamp (orange) flashes.



- ④ When the external heater on / off terminal 2-3 is turned on again, hot air operation is performed again.



- ※ Turn the external operation on / off terminal 1-3 to the ON (short circuit) state. If only the external operation on / off terminal 1-3 is turned off and then turned on again, hot air operation will resume after 20 seconds.

- ※ Normal operation (hot air operation) is not possible from hot start operation using the compressor operation signal. In that case, it is necessary to return the machine to the standard specifications.

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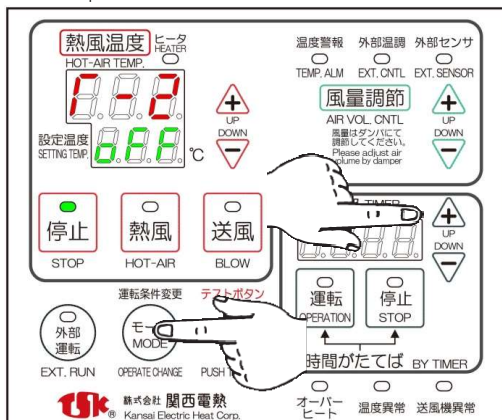
15. When using the cooling operation function

- 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, blow air 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 due to residual heat after the operation is stopped, and to cool dry and heated products after work.

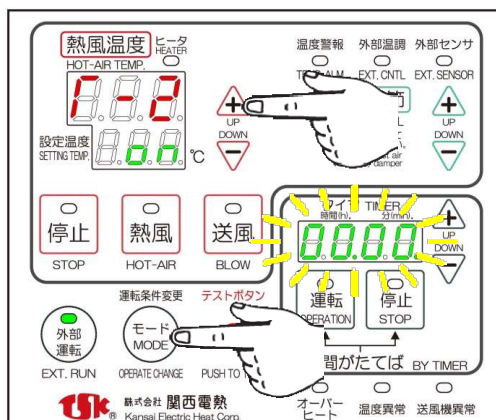
- ① While holding down the mode switch in the stopped state, keep pressing the up key of the timer.

"T-2" is displayed in the hot air temperature section, and "OFF" is displayed in the set temperature section.



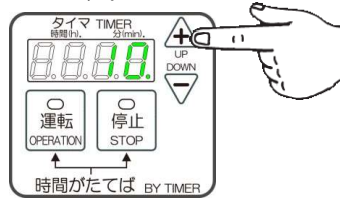
- ② Set the temperature section to "on" with the up key and press the mode switch once.

"00.00." Flashes on the timer display.

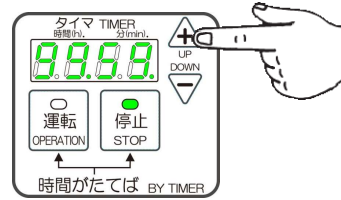


- ③ Use the up and down keys to set any cooling time.

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

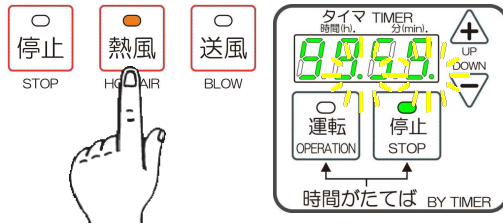


- ④ Press the timer stop switch to set the hot air operation time.

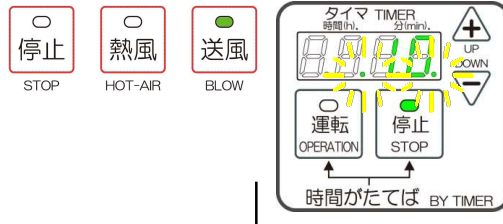


- ⑤ Turn on the external operation on / off terminal 1-3 and the external heater on / off terminal 2-3 by the compressor operation signal, and press the hot air operation switch.

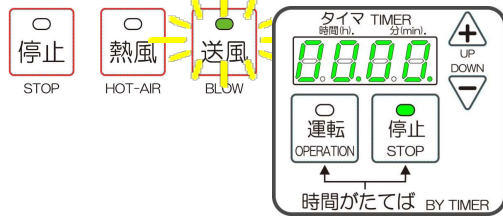
Time counting (dot display blinking) starts and hot air operation is performed. In addition, the hot air lamp (orange) lights up during hot air operation.



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 (timer setting time returns to the default setting).

※ 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).

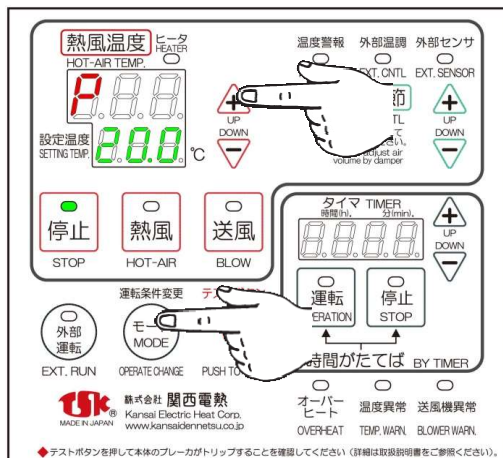
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16. Unlock

- 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 the hot air temperature up key.

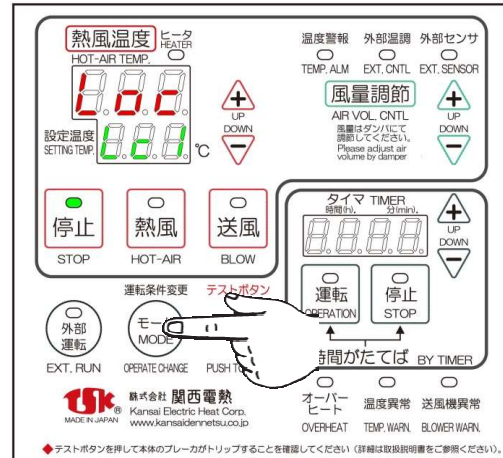
"P" is displayed in the hot air temperature section and "20.0" is displayed in the set temperature section.



- ③ Use the down key to change the set

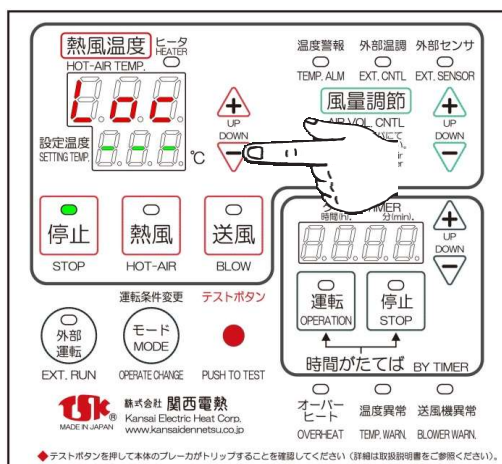
- ② Press the mode key 6 times.

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

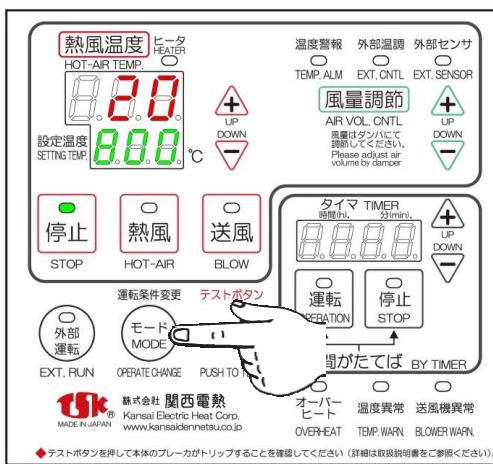


- ④ After the change, press the mode key once to

temperature section 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.

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17. When setting a temperature alarm

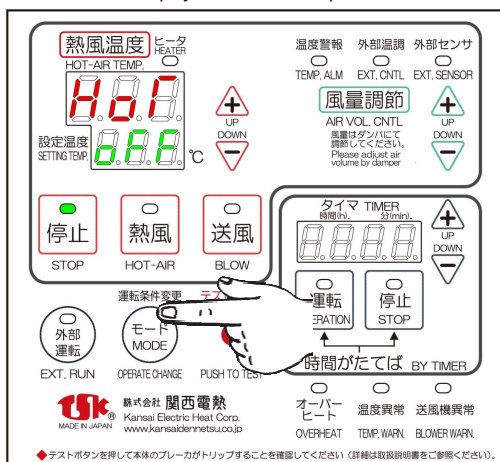
- An alarm signal can be output when the discharged hot air temperature exceeds an arbitrary fixed range with respect to the set temperature. Please use it as needed (it is disabled at the time of shipment).

- ① Select the temperature alarm output signal “A1” for any of the output terminal functions.

※ For details on how to select the output terminal function, see P.I. Please refer to 19-20.

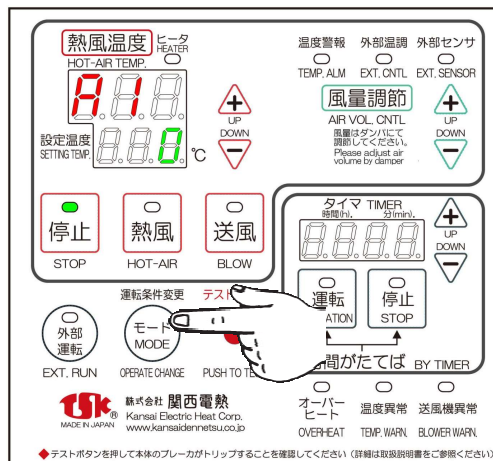
- ② After unlocking in the stopped state, press and hold the mode switch (about 2 seconds).

“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.

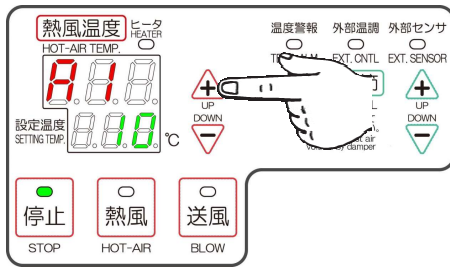


- ※ If you set the hot start mode to “on”, press the mode

switch twice.

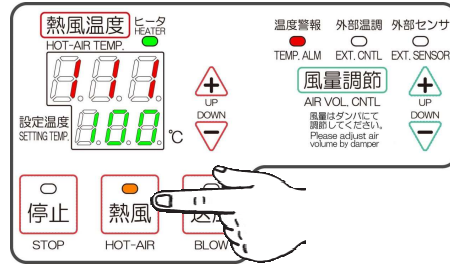
④ Use the up and down keys to set any temperature range.

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 at +10 °C or higher and -10 °C or lower of the set discharge temperature, 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 drive.

- ※ 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 from the output terminal 6 as a non-voltage contact signal (contact capacity AC250V 1A DC30V 1A) (factory setting).

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18. 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 Temperature alarm output signal "A1"
: It is output when the temperature alarm is activated.
 - Output terminal 7 Heater output signal "HET"
: Output during normal operation (hot air operation) and hot start operation (not output during blower operation, stop, or abnormality).
 - Output terminal 8 Abnormal output signal "ALM"
: It is output when an error occurs.
- ※ Output terminal 9 is a common common

《Changeable output settings》

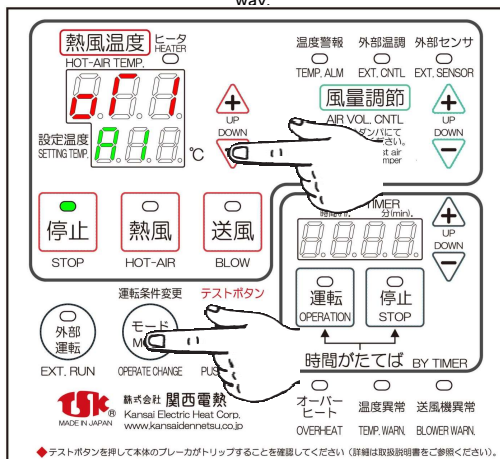
- Operation output signal "rUn"
: It is output during normal operation (hot air operation) and during blower operation (it is not output during hot start operation, stop, or abnormal condition).

- ※ 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.
- ※ 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)

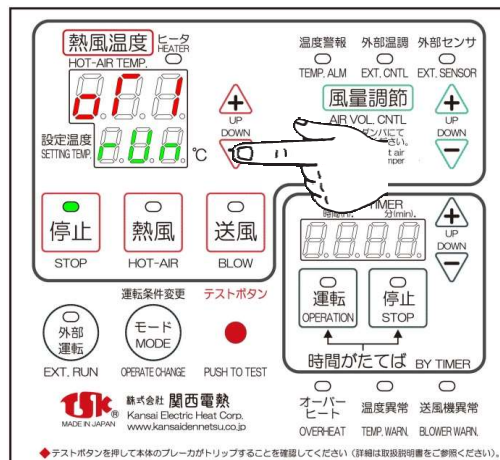
Before setting the output terminal function, unlock it in the stopped state.

【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.
"OT1" is displayed in the hot air temperature section, and "A1" 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.

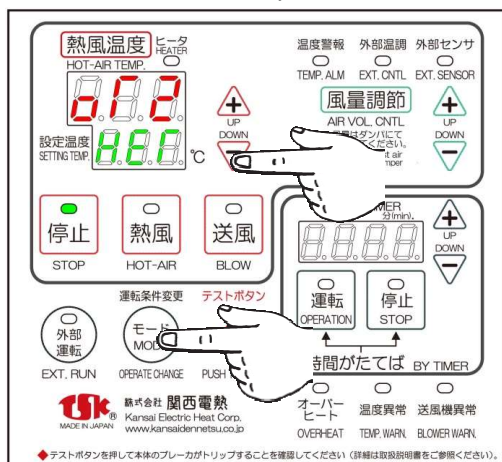


- ③ After setting, press the mode switch three times to return to the normal stopped state.

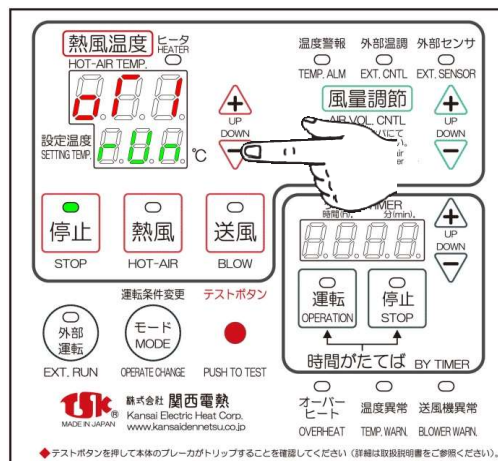
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【When changing the output terminal 7】

- 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.

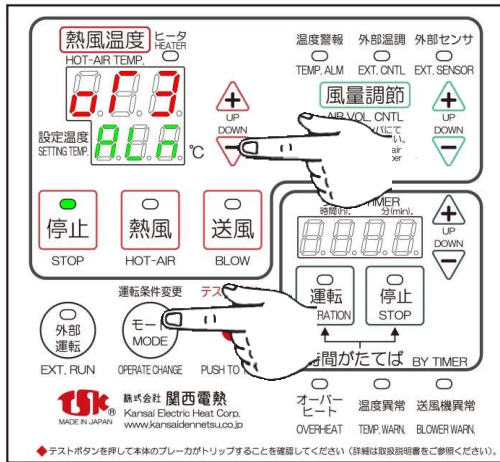


- ③ After setting, press the mode switch twice to return to the normal stopped state.

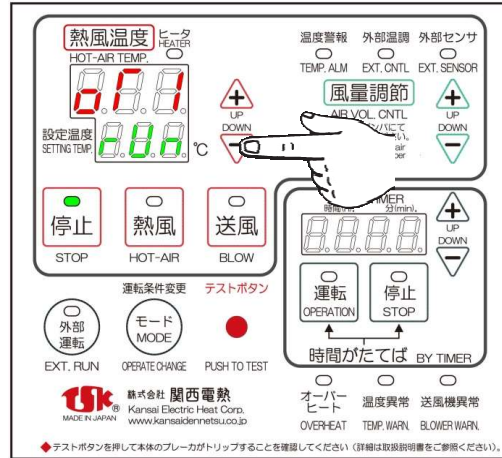
【When changing the output terminal 8】

- 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.

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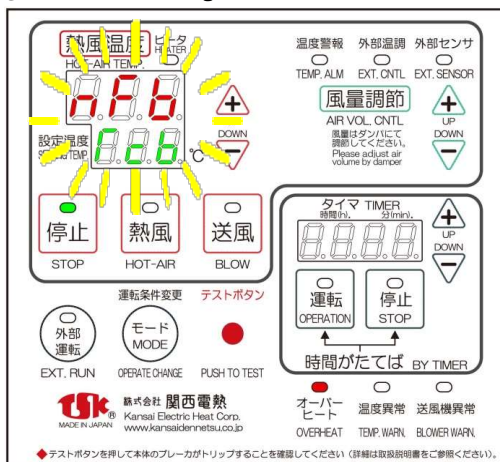
19. Abnormality detection

- ◆ When an abnormality is detected, the buzzer sounds at the same time as the abnormality is displayed. The buzzer sound also stops when the abnormality is cleared, depending on the recovery method for each abnormality.

19-1 Overheat (burnout)

If the inside of the heater case becomes abnormally high, it will be detected as overheating. Alternatively, if the B2 sensor for overheat prevention temperature detection is disconnected, it will be detected as burnout, the breaker (NFB) of the main unit will trip, and all operations will stop.

- 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 CAUSES》

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

《How to return》

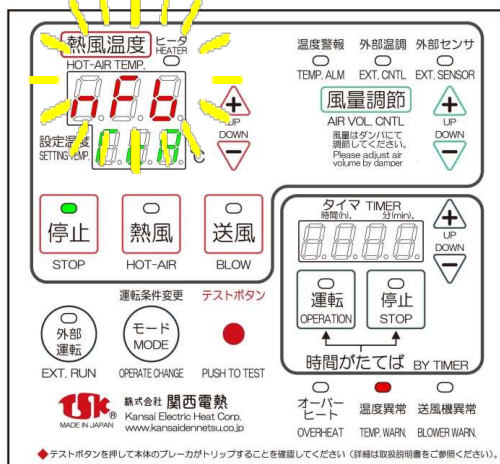
After removing the cause of overheating and cooling sufficiently, turn off the main power supply (factory power supply) and the main body breaker (NFB), and then turn them on again.

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 discharge port temperature upper limit is exceeded at the discharge port 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 CAUSES》

- Exceeding the upper limit of discharge temperature when using an external sensor
- Air volume reduction due to excessive pressure loss
- Air volume reduction due to clogging of super heater suction port wire net
- Air volume reduction due to clogging of air source filter
- Air volume reduction of the air source

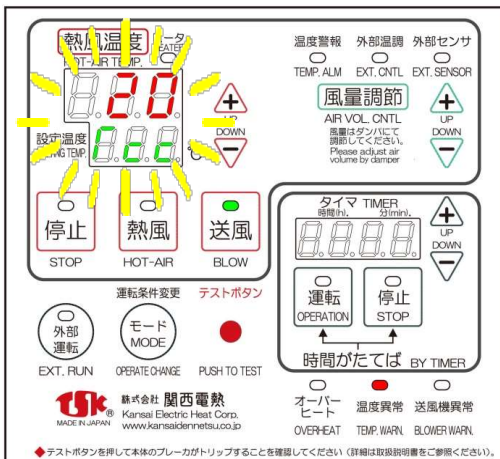
《How to return》

Eliminate the cause of the discharge port temperature upper limit exceeding, 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.

CAUTION: 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.

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- When the inlet temperature upper limit is exceeded



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

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.

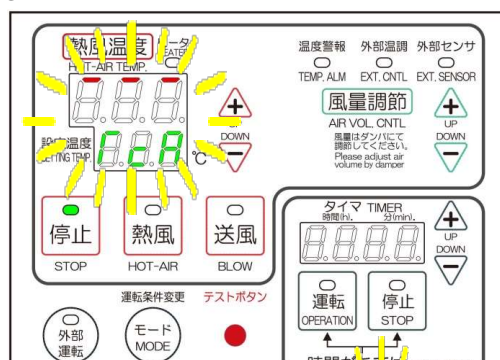
《MAIN CAUSES》

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

《How to return》

It can be released by pressing the stop switch after the temperature of the suction port has dropped.

- 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 CAUSES》

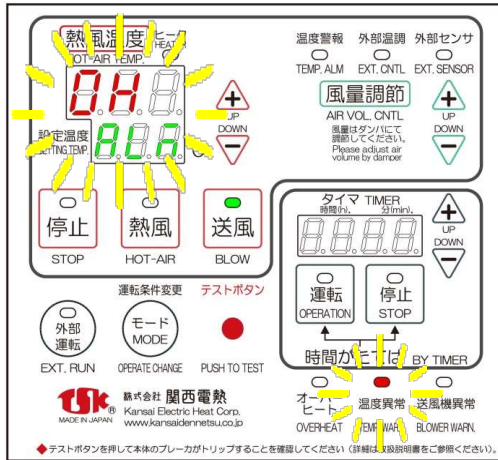
- outlet sensor disconnection
- Disconnection of outlet sensor wiring
- Disengagement of outlet sensor wiring

《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 CAUSES》

- 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》

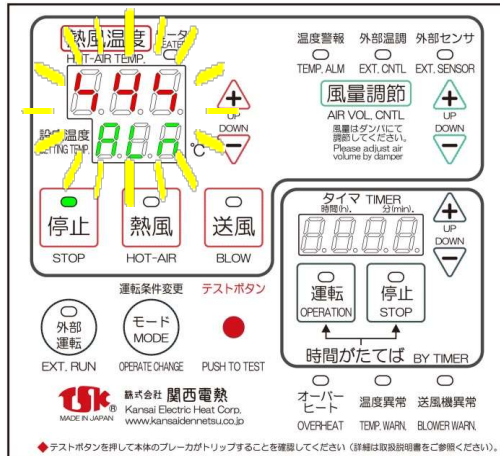
It can be released by stopping the operation with the stop switch, turning off the breaker (NFB) of the main body after the internal temperature of the temperature control unit has dropped.

CAUTION : 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.

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19-3 Frequency abnormality

● Frequency abnormality



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 CAUSES》

- Not supplied with rated frequency due to use of generator etc. for 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.

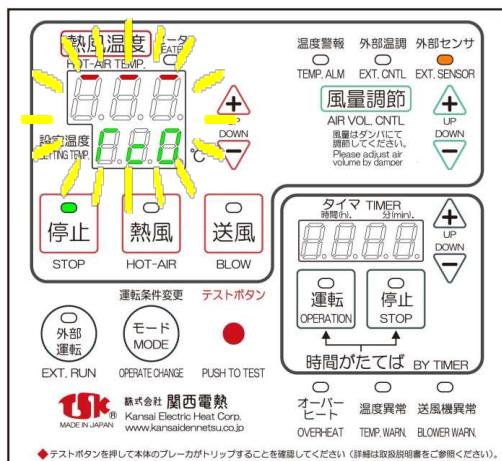
CAUTION: Be sure to shut off the main power supply (factory power supply) when checking the wiring or reworking the wiring in the event of an abnormality.

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8-4 Other abnormalities

● At the time of external sensor burnout

If the optional external sensor is used to control the temperature at a remote location, all operations will stop when the external sensor burns out such as a disconnection.



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

《MAIN CAUSES》

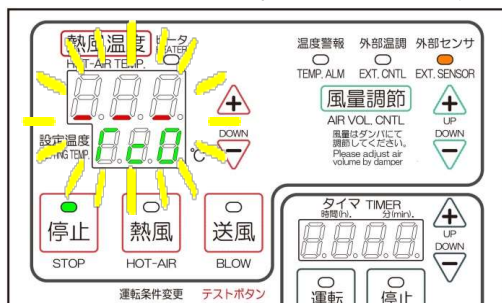
- External sensor disconnection
- Disconnection of external sensor compensation lead wire
- Detachment of external sensor terminal

《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°C or less (internal temperature sensor only -10°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 CAUSES》

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



- Atmosphere and suction temperature are negative

《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 CAUSES》

- Reverse connection of power line, disconnection of T phase

《How to return》

Replace any two of the power connection lines.

CAUTION : 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.

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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 (shipped at the bottom). Use the entry holes (knockouts) on each side to attach it to any position. Also, if you change the mounting position, attach the attached 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 temperature control unit with remote controller mounting specifications).

③ Start operation according to the instruction manual.

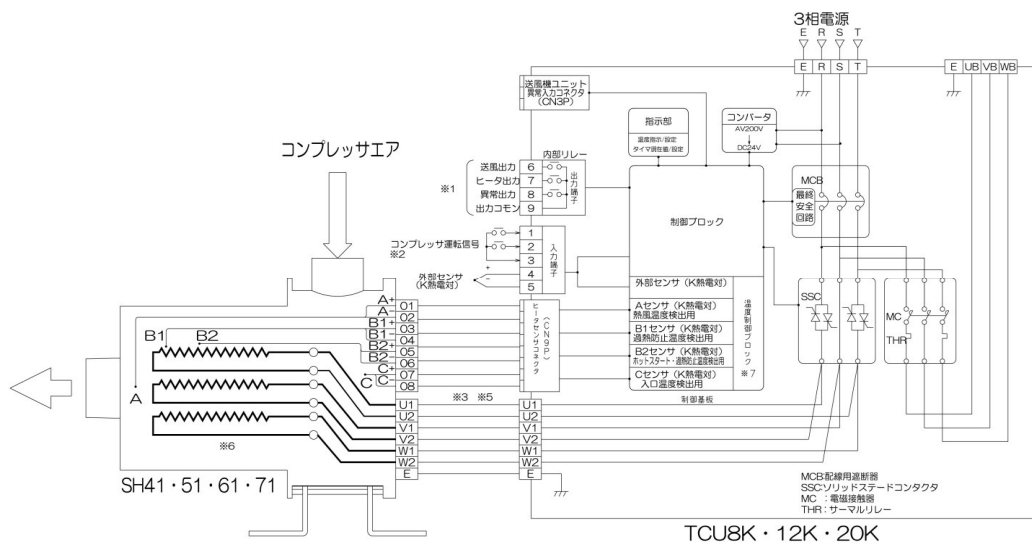
The operation panel of the temperature control unit and the remote controller work together (either can be operated).

CAUTION

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 disconnect the main power supply (factory power supply) when connecting the remote controller.

Electrical connection diagram

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 Contact capacity DC5V 10mA or more, DC30V 1A or less. Output common total 3A or less (output with non-voltage contact signal). Operation, "closed" when abnormal

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

※2 Enter the compressor operation signal (terminal voltage DC24V, 8mA or less: non-voltage microload contact). "On" when ON (closed).

※3 Use the cords that come with each sensor, heater, power supply, and temperature control unit.

※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.

《CAUTION》

- Wire the temperature sensor wiring and input / output signal wiring separately from the power line, power line, and high-voltage 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.



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