21C HOT-FILM

INSTALLATION GUIDANCE

Korea HEATING

KOREA HEATING CO., LTD.

CONTENTS

We highly appreciate your purchasing HOT-FILM

We wish this HOT-FILM Installation guidance help your safe installation and solve any problems of installation process.

Installation Tools & Material (I)

Tools

NAME	STANDARD	USAGE
Electric Tester	4.2V to 500 V AC 50 ohm to 42 M-ohm	Voltage Measurement Resistance Measurement
Electric Leakage Tester		Electric Leakage Measurement
Infrared Ray Thermometer	-30~300℃	Heating Film Temperature Measurement
Terminal Presser		Eyelet Terminal Combination
Eyelet Punch		To Make Hole On Heating Film For Eyelet Terminal
Stripper	0.75~5.5mm	Electric Wire Connection
Wire Presser	0.75~5.5mm	Electric Wire Connection
Scissors	Middle Size	Heating Film Cutting
Cutting Knife	Middle Size	Insulation Pad Cutting
Calculator		Electricity Consumption Calculation
Driver	Middle Size(+/-)	Inlet Plug, Thermostat Combination
Electric Motion Drill	220V Using Product	Thermostat Fixating
Measure Tapeline	7.5M Length	To Measure Installation Space

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① Electric Testor ② Infrared Ray Thermometer ③ Terminal Presser
④ Eyelet Punch ⑤ Stripper ⑥ Wire Presser ⑦ Electirc Motion Drill

Installation Tools & Material (II)

Materials

NAME	STANDARD	USAGE
Heating Film	30cm / 50cm / 60cm / 80cm / 100cm width	Heating Material
Insulation Pad	3mm / 5mm / 7mm / 10mm Thickness	Prevention Of Floor Coldness and Humidity
Electric Wire	1.5mm~2.5mm	Copper Wire
Eyelet Terminal		Combination of Pressed Terminal and Heating Film
Pressed Terminal	Tin Plated Copper Terminal	Electricity Supply To Heating Film
Y Shape Terminal		Inlet Plug Connection With Eletric Wire
Electric Wire Sleeve	2.5mm~3.5mm	Connection Between Electric Wire and Electric Wire
Inlet Plug		To Supply Electricity To Thermostat
Special Insulation Tape		Insulation Treatment and Protection From Humidity Penetration
Electric Insulation Tape	10mm ~ 19mm width	Insulation Treatment Regarding Electric Wire Connection Spot
Paper Tape		Insulation Pad, Heating Film and Electric Wire Fixating
Thermostat	3Kw ~ 6Kw Capacity	Temperature Control of Heating Film
Screw Nail	Middle Size	To Fixate Wire Mold and Thermostat On The Wall
Screw Nail Anchors		To Fixate Wire Mold and Thermostat On The Wall
Wire Mold		Electric Wire Arrangement

Installation Tools & Material (III)

Images Of Materials

① Heating FIlm

② Insulation Pad

③ Electric Wire

④ Eyelet Terminal

⑤ Pressed Terminal

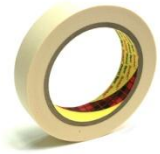
⑥ Y-Shape Terminal

⑦ Electric Wire Sleeve

⑧ Inlet Plug

⑨ Special Insulation Tape

⑩ Electric Insulation Tape



⑪ Paper Tape

⑫ Thermostat

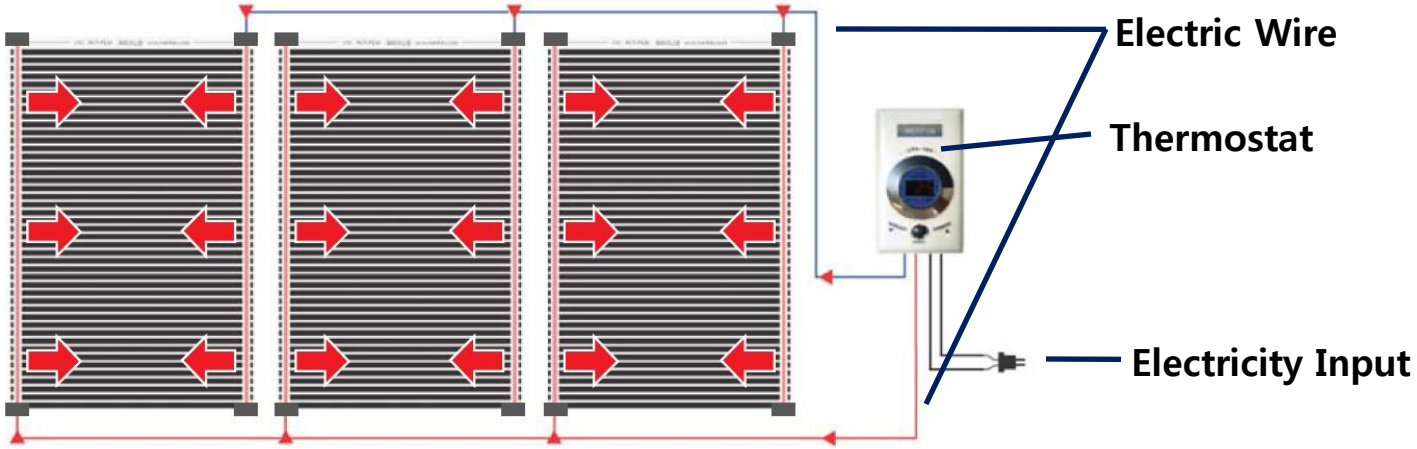
⑬ Screw Nail

⑭ Screw Nail Anchor

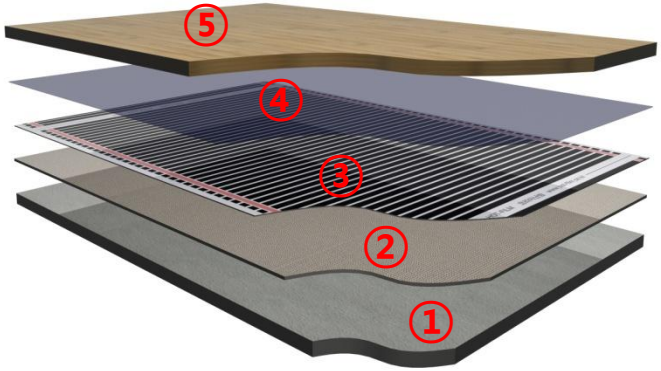
⑮ Wire Mold

Structure Drawing Of Installation

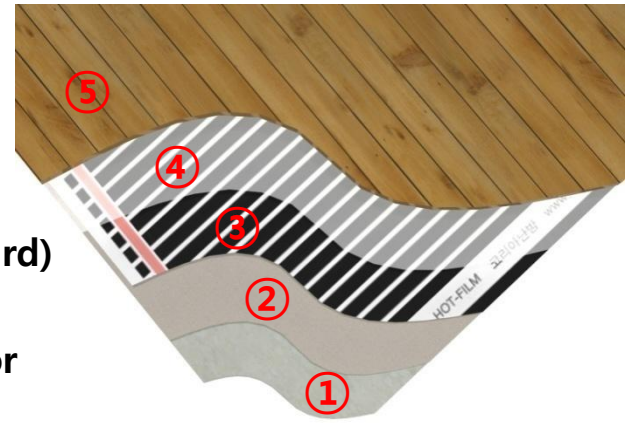
Plane Figure Of HOT-FILM Installation



Structural Drawing Of Installation

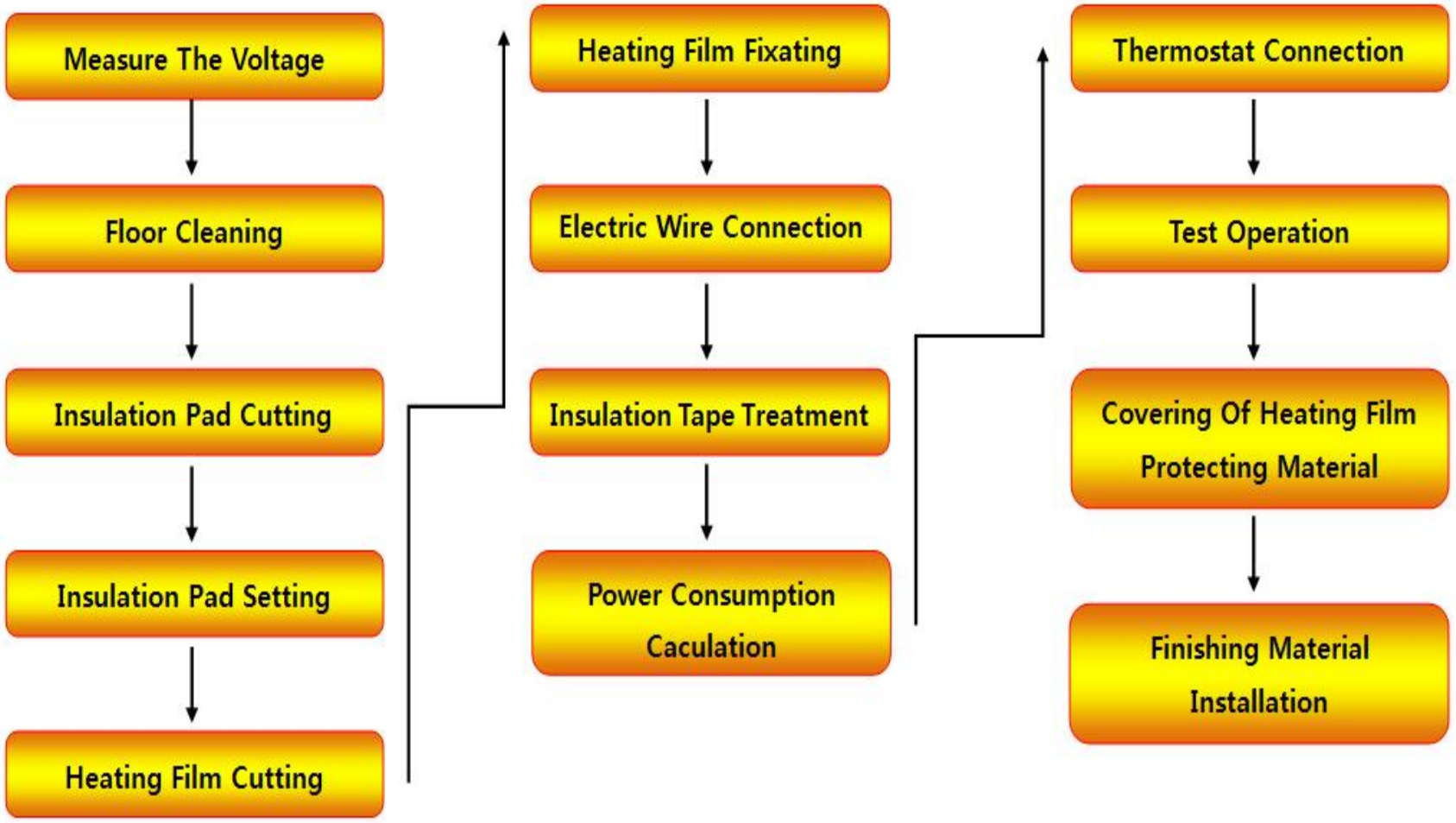


① Base Floor (Cement)
② Insulation Pad
③ HOT-FILM
④ Film Protector
(Non-Woven Fabric / Board)
⑤ Finishing Materials
(Reinforced Wooden Floor
/ Carpet / Linoleum)



HOT-FILM Installation Process

Process of HOT-FILM Installation



HOT-FILM Installation Preparation

Preparation Before HOT-FILM Installation

1) Check materials and tools once again before installation

2) Check the total electrical power of the building to prevent any problem using HOT-FILM and other device at the same time.
When electric capacity is not enough, you must increase the capacity.

3) Measure where the electric voltage of installation place.

4) Measure the size of room where HOT-FILM will be installed and Confirm the electricity consumption of HOT-FILM box label.
Finally, Calculate the approximate total electricity consumption.

5) Check the wire thickness of the back side of outlet.
If the electric wire is thin, change electric wire to suitable thickness.

6) Check the base cement floor whether it uses Styrofoam as a insulator.
Never use Styrofoam (Polystyrene) on the floor. It could cause a fire.

7) Check the lowest temperature and thermal insulation of the building to decide how much portion of floor you will install.
Arrange the thickness of insulation pad which will be installed.

8) If the place where will be installed HOT-FILM is first floor or basement, or there is the moisture and humidity on the base cement,
Cover the floor with plastic or tarpaulin.

Electric Wire Thickness (㎟)	Maximum Permission Electric Current (Ampere)	Electricity Consumption (Watt)
1.5㎟	19 Ampere	4.18㎾
2.5㎟	26 Ampere	5.72㎾
4㎟	35 Ampere	7.70㎾
6㎟	45 Ampere	9.90㎾
10㎟	61 Ampere	13.42㎾
16㎟	81 Ampere	17.82㎾
25㎟	106 Ampere	23.32㎾
35㎟	131 Ampere	28.82㎾
50㎟	158 Ampere	34.76㎾
70㎟	200 Ampere	44.00㎾
95㎟	241 Ampere	53.02㎾
120㎟	278 Ampere	61.16㎾
150㎟	318 Ampere	69.96㎾
185㎟	362 Ampere	79.64㎾

Maximum Permission Current Following Electric Wire Thickness

HOT-FILM Installation Process(I)

9) Arrange the direction of HOT-FILM installation considering maximum linear length for HOT-FILM installation.

Maximum Length For HOT-FILM Installation Following Product Width
50cm Width : 12~13meter **80cm Width : 7~8meter**
100cm Width : 5~6meter

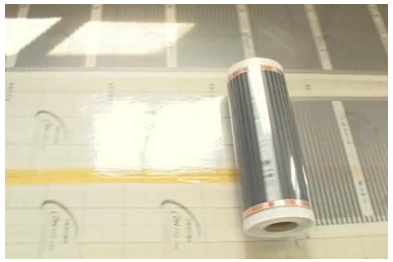
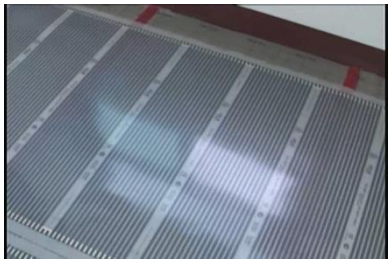
10) All conditions of the site must be 2 times checked before deciding installation

HOT-FILM Installation Process(I)




1) Clean up base floor and remove minute dust from base floor. Make even flatness of base floor.
2) If floor is wet, put something to prevent the humidity such as plastic or tarpaulin.
3) Cover the base floor with Insulation Pad. Fixate insulation pads each other using OPP tape, paper tape or electrical tape. If want higher heating efficiency, use thicker insulation pad.
4) Fit the insulation pad according to the floor size, mend the corners.
Leave 5~10cm space from the wall to pass electric wire. If electric wires have to pass between each insulation pad leave 2~5cm space.

HOT-FILM Installation Process(II)

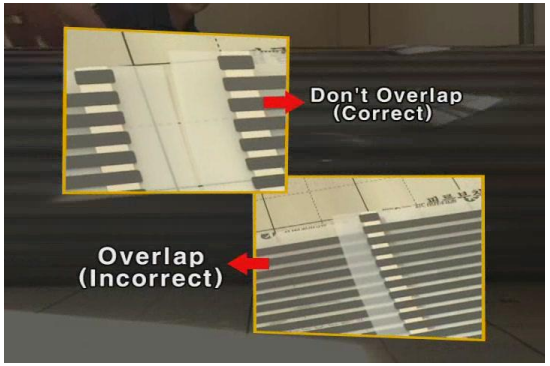



5) Place the HOT-FILM to cover insulation pad.
Leave 10 to 20cm of space from the wall and minimum 1cm between each HOT-FILMS.
6) Cut HOT-FILM according to the floor size with scissors.

※ When cutting HOT-FILM, apply cutting to the places where there no carbon heating materials

7) Pay attention no to exceed maximum linear length for HOT-FILM installation

Maximum Length For HOT-FILM Installation Following Product Width
50cm Width : 12~13meter **80cm Width : 7~8meter**
100cm Width : 5~6meter

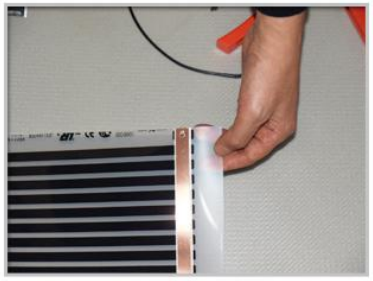


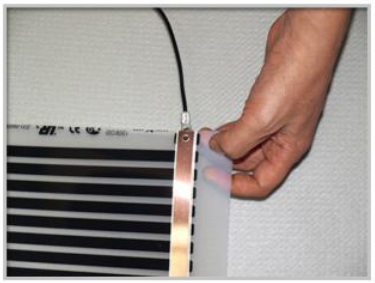
8) Fixate HOT-FILM on the insulation pad using OPP tape, paper tape or electrical tape.

※ Do not place HOT-FILM on top of each other to Prevent over-heating

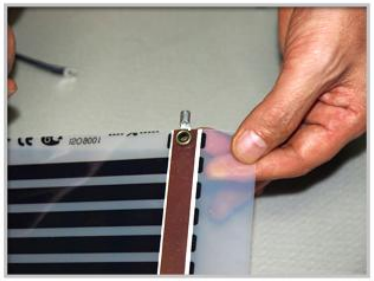
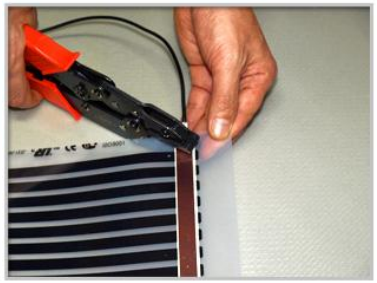
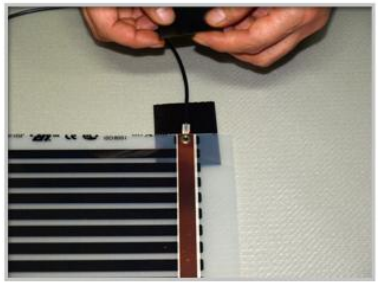
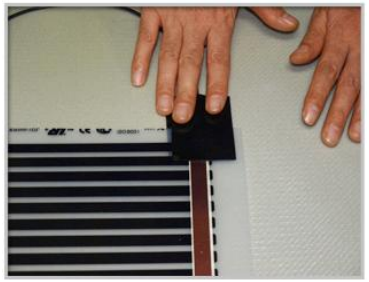
Electric Wire Connection Method(I)

Electric Wire Connection Method



1) Make a hole to the copper foil of HOT-FILM with puncher
2) The image of after making a hole
3) Push electric terminal towards between the silver plate and copper foil of HOT-FILM
4) Combine eyelet terminal to electric terminal through hole

5) Combine the cap of eyelet terminal
6) Press all terminals with presser
7) Apply special insulation tape where the wire and film is connected not to penetrate humidity.
8) Finish electric wire connection

※ When Connecting a wire to HOT-FILM use parallel connection, also diagonal connection brings out maximum heating effect

HOT-FILM Installation Process(III)



9) Insulation tape should be attached onto the copper foil of HOT-FILM cut part to prevent from penetration of humidity .

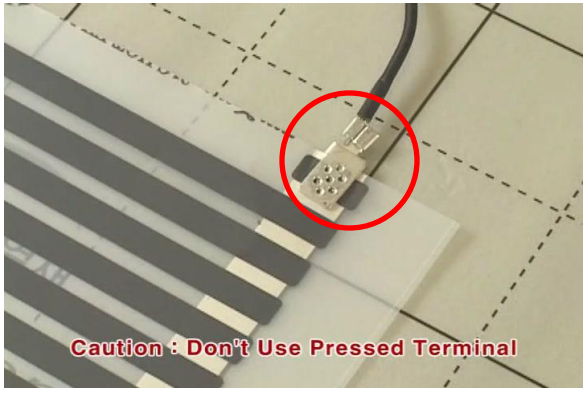
10) Measure total electric resistance of installed heating film with resistance tester.

11) Calculate the electricity consumption. The formula of electricity consumption calculation is same as below.

Electricity Consumption(Watt) = (Voltage)² / Electric Resistance(Ω)

12) Combine eyelet terminal to electric terminal through hole

※ The pressure terminal is sometimes used for connection terminal however, the pressure terminal causes sparks due to loose space between HOT-FILM and pressure terminal by the outside impact. Don't use pressure terminal as a connection terminal

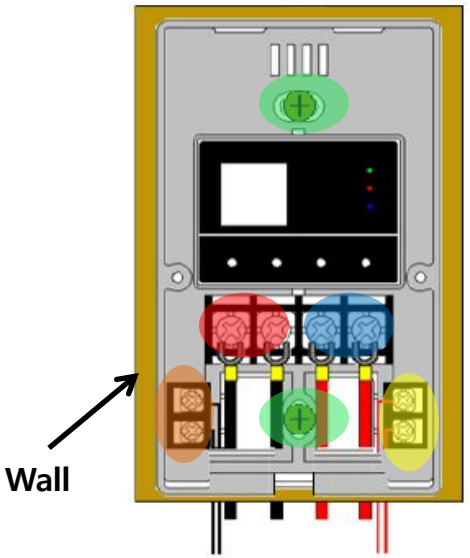


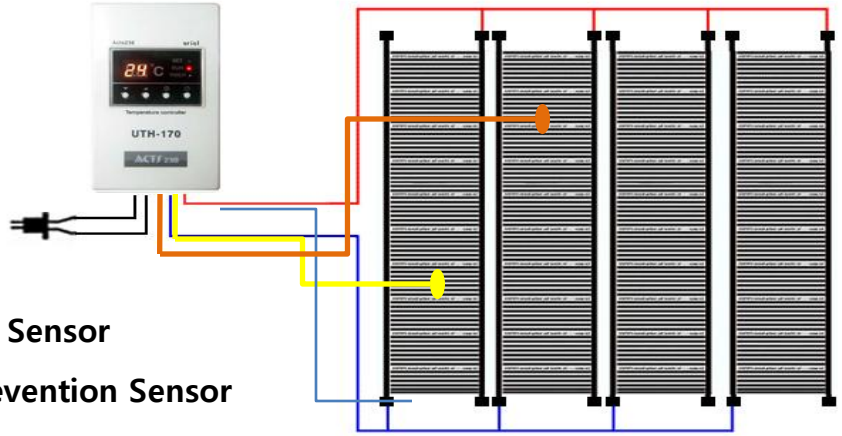
Connection to Thermostat

How to Connect to Thermostat

Thermostat UTH-170

- IN : Electricity Input
- OUT : HOT-FILM
- SEN : Temperature Sensor
- OHT : Overheat Prevention Sensor
- Joint Bolts





- Temperature Sensor
- Overheat Prevention Sensor

For exact temperature control, connect the thermostat with thermal sensor and overheating sensor after fix each sensors with insulation tape on the center of carbon heating element of HOT-FILM

※ Regarding Inlet plug, Use thicker electricity wire or at least same hickness with HOT-FILM connection wire.

Sensor Mode Of Thermostat

How To Set Sensor Mode Of Thermostat

1) Sensor lines connect to thermostat, The sensor mode of thermostats work automatically.

2) Sensor Mode controls the power on/off by comparing the present and target temperature setting through thermostat.

3) Set up the target heating temperature, use ▲ (raising) ▼ (decreasing) button of thermostat.
If temperature set up finishs, the blue lamp (SET) of thermostat flickers for 3 times and target heating temperature will be saved.

Terms Of Display Window (Sensor Mode)

Roles Display	Basic	Set	Scope Of Setting	EXPLAINATION OF MOTIONS
Function Class	tn	SEN	SEN , TIMER , RESET	SEN-Sensor Method Timer – Timer Method RESET- Initialization
Air Cooling / Heating	-C	HH	HH , CC	HH- Heating Display CC-Air Cooling Display
Min. Temperature Setting	-L	0℃	20℃~Max.Temperature	Set The Lowest Temperature Value In The Temperature Zone.
Min. Temperature Setting	-H	60℃	Min.Temperature~80℃	Set The Highest Temperature Value In The Temperature Zone
Temperature Deviation Setting	IF	2℃	0℃ ~5℃	ON/OFF in the deviation of set present temperature
Output Delay Time	Ly	20SEC	1 Sec~60 Sec	In case output is ON, Output delays as much as the time.
Overheating Change Function	Ht	60℃	Max.Temperature~80℃	In case of exceeding set value, Output is broken(OHT Flickers)
Basic Resistance Value	ES	00℃	-10℃ ~ 10℃	Basic Resistance Value For Improving the accuracy of Temperature zone.

Timer Mode Of Thermostat

How To Set Timer Mode Of Thermostat

1) Remove the Temperature sensor from thermostat for using timer function.

2) How to Set-up timer function

① Push ▼▲ buttons simultaneously for 3 seconds, "TN" appears on display of thermostat.
② Push ▲ button one more "In" appears on display of thermostat.
③ Push ▼▲ buttons simultaneously for 3 seconds, The present cycle value is displayed.
④ Set up target cycle value using ▼▲ buttons.
⑤ Finally, Push ▼▲ buttons simultaneously for 3 seconds. "AU" flickers and set-up is completed.

Thermostat Working Following Timer Mode Step

STEP	OUTPUT(ON)	OUTPUT(OFF)	REMARKS
1	15SEC * S	45SEC * S	※ S: SLECTED CYCLE VALUE IF 1MIN, S=1 IF 3MIN, S=3 IF 4MIN, S=4 IF 5MIN, S=5 IF 6MIN, S=6 IF 7MIN, S=7 ※ (IF 20MIN, S = 20 , VALUE MULTIPLYING 20) ※ (IF 60 MIN, S = 60 , MULTIPLYING 60) IT BECOMES THE LENGTH OF ON AND OFF.
2	20SEC * S	40SEC * S	
3	25SEC * S	35SEC * S	
4	30SEC * S	30SEC * S	
5	35SEC * S	25SEC * S	
6	40SEC * S	20SEC * S	
7	45SEC * S	15SEC * S	
8	50SEC * S	10SEC * S	
9	55SEC * S	5SEC * S	
10	60SEC * S	0SEC * S	

Finish Of HOT-FILM Installation

Finish Of HOT-FILM Installation




1) Place the electric wire mold on the wall and arrange electric wires from heating film.

2) Place the thermostat on a wall near the power cord extention with screw nail anchor and screw nail.

3) Confirm electric wire connections and electric circuit of installed heating film thoroughly before turning on thermostat.

4) If there is electric leakage tester, check the electric leakage.

5) Check the surface temperature of heating film with infrared ray thermometer.

6) If the finishing material is reinforced floor use non-woven fabric as film protection.

7) If the finishing is monorium use a board on top of the film for protection.

8) Cover reinforce floor or monorium for completion of installation.

Film Protector (Board)

Matters that Require Attention

Matters that Require Attention Of HOT-FILM Installation

1) Keep the place of installation clean and its floor flat in order to prevent scratch, bending, or other damages to HOT-FILM.

2) The place to install HOT-FILM needs be free of wetness / moisture, and precautions needed not to have HOT-FILM directly exposed to wetness / moisture.

3) Insulation pad coated with conductive materials, such as rough insulation or silver foil, not to be used as it may damage the surface of HOT-FILM during installation.

4) Caution should be taken not to damage the surface of HOT-FILM or step on it during installation. In case of surface damaged, it has to be installed with a thin insulation tape.

5) Finishing material not to be used with paint, coloring agent, or hardening adhesive that can cause transformation, discoloration, or cracks while heat transmits to finishing material.

6) When cutting HOT-FILM and connecting it to thermostat, electricity consumption not to be above 75~80% of allowed capacity of the thermostat.

Electricity Consumption(Watt) = (Voltage)² / Electric Resistance(Ω)

7) The cut part of HOT-FILM has to be insulated with insulation tape.

8) Avoid installation under the heavy furniture and home devices such as ; Piano, Refrigerator, etc..