

THYRISTOR UNIT

# THV-10 SERIES

**Power Controller**  
Single Phase Thyristor Unit

**AC150A, AC200A**



• CE marking : A specified noise filter must be used.

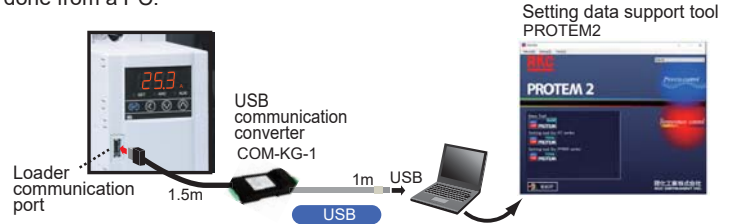
# Supports high capacity load currents of 150A and 200A.

## Easy and accurate setting

Single phase power controller THV-10 has an LED display to show set values and input signals, and front keys for easy setting and monitoring. Setting can also be made with an external setting unit (variable resistor).

## Communication with a PC via USB port (Loader communication)

The THV-10 has a standard loader port to connect a PC USB port via COM-KG (USB communication converter). Using PROTEM2 software on the PC, parameter setting can be easily done from a PC.



## Three types of control modes are selectable

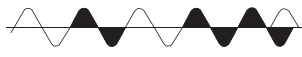
### ○ Phase control

The wave form of the load power is switched at a desired phase angle  $\theta$  to provide smooth control.



### ○ Zero-cross control (Continuous proportional)

Power is switched on and off when the supply voltage is at 0V. This system suppresses high frequency noise inherent to phase control.



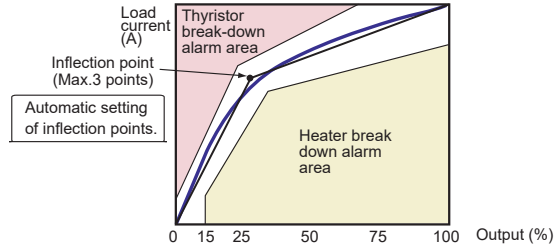
### ○ Zero-cross control (Input synchronization system)

Supply voltage is switched on and off according to the voltage pulse or contact signals from a controller.



## Detects heater break of non-linear load

Heater break alarm can be used at up to three inflection points in accordance with heater characteristics. The unit can be used with a load with large resistance changes by temperature (e.g. lamp heaters). There is no need of calculation for inflection points as automatic setting is possible.

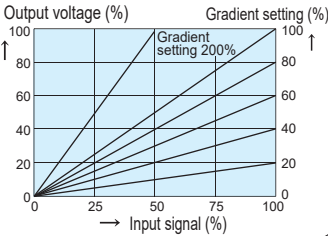


## Standard Functions

### Gradient setting

The relation between the setting input and the output voltage can be set. Gradient setting is possible via front keys or an external setter. Control characteristics may vary with the setting as follows.

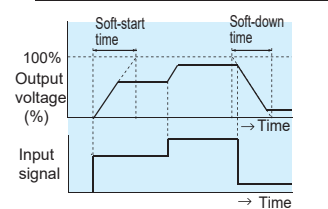
Gradient setting output characteristic diagram



### Ramp function (Soft-start & Soft-down)

Even if setting input changes abruptly, output changes slowly to suppress inrush current. Ramp-up (Soft-start) and ramp-down (Soft-down) time can be set in the range of 0.1 to 100.0 sec via front keys.

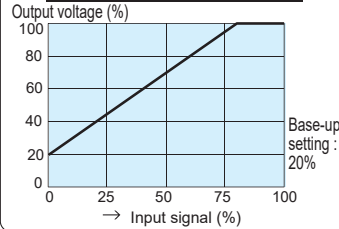
Soft-start & Soft-down action diagram



### Base-up setting (Output bias)

Output bias can be set via front keys. (Base-up setting is valid when lower output limiter is set to 0.0)

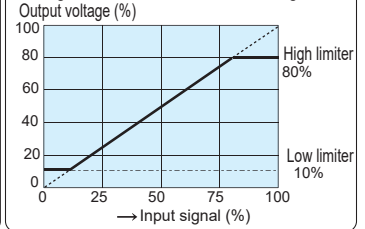
Base-up output characteristic diagram



### Output limiter (High & Low)

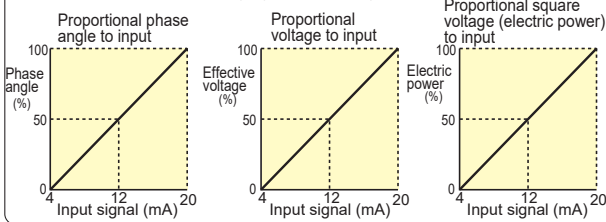
Highest and lowest output values can be set via front keys.

High & Low limiter characteristic diagram



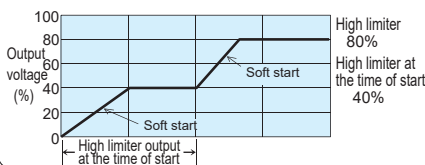
### Output modes

When phase control is selected for linear load (R: resistor), output mode can be selected among Proportional phase angle to input, proportional voltage to input and proportional square voltage (electric power) to input.



### Output limiter High at start-up

This function limits the highest output for the period of a preset time after power-ON and control mode change from Stop to Run. It makes the THV-10 Series suitable for heaters which cause rush current flow, such as Halogen lamp, Tungsten, Platinum, and Molybdenum heaters.



### Event input

Can assign a function (see below) to the external contact input. Function switching can be made from external contact input.

#### In use/Unused

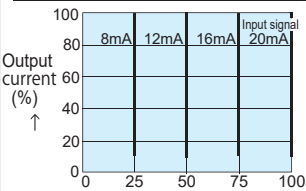
Phase control/Zero-cross control (Continuous proportional)	
RUN/STOP	
Auto/Manual	
External manual/Internal Manual	
Heater break alarm : Use/Unuse	
Soft-up/Soft/down : Use/Unuse	
Setting data lock : Use/Unuse	
Over current alarm : Use/Unuse	

## Optional Functions

### Constant current control (For phase control only)

This function maintains the output current constant when a load or a power supply fluctuates. It makes the THV Series suitable for heaters of which resistance greatly changes by temperature change, such as Platinum, Molybdenum, Tungsten, and Kanthal heaters.

Constant current control characteristic diagram

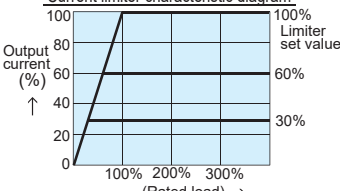


### Load current limiter (For phase control only)

This function limits the load current value to the heater. The setting range is 30 to 100% of the rated current.

(Note)  
If the load has a large inrush current, use soft-start function along with this function to suppress the inrush current. This function alone can not prevent the inrush current.

Current limiter characteristic diagram



### Alarm output

The alarm types are Power frequency abnormal, Thyristor break alarm, Heater break alarm and FAIL. Alarm output will go on, when any of them goes in alarm status.  
(Alarm output : 1 points, Energized/De-energized is selectable. FAIL is De-energized (Fixed).)

### Heater break alarm

This function measures load current and compares it with a heater break alarm set value. Alarm will be activated if the load current goes into alarm ranges. Maximum two alarm set points can be set for the heater break alarm, which could be used for heater-deterioration alarm and heater-break alarm.

(Note)  
For phase control, heater break alarm does not work when the load current is less than 15% of maximum load current.

### Over-current alarm (For phase control only)

The alarm goes on when the load current exceeds 120% of the rated current.

### Protection function for control of primary side of a transformer (For phase control only)

If momentary power failure occurs during execution of the control of primary side of a transformer, inrush current is generated. Protection function for control of primary side of a transformer is to protect the thyristor from the inrush current.

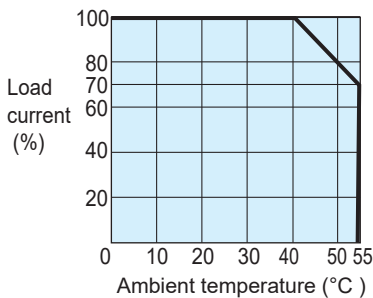
To control the primary side of the transformer, it is recommended to use the THV-10 with a protection function for control of primary side of a transformer.

# Specifications

Rated current : 150A, 200A AC  
 Control method : Phase control/ Zero-cross control (Selectable)  
 Applicable load : Phase control : Linearity (R:Resistor) load, Control of primary side of a transformer \*1  
 Zero-cross control : Linearity (R:Resistor) load  
 Input signal : Current input 4 to 20mA DC (Input impedance : 50Ω)  
 Voltage input 1 to 5V DC (Input impedance : 30kΩ)  
 Voltage input 0 to 10V DC (Input impedance : 30kΩ)  
 Voltage pulse input 0/12V DC (Input impedance : 30kΩ)  
 Input sampling cycle : 0.5 cycle of power cycle  
 Min. load current : 1A (at 98% output of rated voltage)  
 Output voltage range : 0 to 98% of rated voltage  
 Power OFF leakage current : Approx. 27mA AC (load voltage 200V rms, 60Hz, Ta=25°C)  
 Power supply voltage for Load : 85 to 264V AC (Including power supply voltage variation)  
 Rating : 100 to 240V AC  
 Power supply voltage for Control : 85 to 264V AC (Including power supply voltage variation)  
 Rating : 100 to 240V AC  
 Power frequency : 50/60Hz (Automatic detection)  
 Allowable power frequency variation : Power supply voltage for load 50±1Hz, 60±1Hz  
 Power supply voltage for control 50±2Hz, 60±2Hz  
 Power consumption : Less than 12.5VA (at 100V AC), Rush current 21A or less  
 Less than 22.0VA (at 240V AC), Rush current 55A or less  
 Output setting range : Gradient setting : 0.0 to 200.0% [Front key]  
 0 to 100% [External setting unit]  
 Output limiter (High) : 0.0 to 100.0% [Front key]  
 Output limiter (Low) : 0.0 to 100.0% [Front key]  
 Output limiter at start-up (High) : 0.0 to 100.0% [Front key]  
 Output limiter time at start-up : 0.0 to 600.0 sec [Front key]  
 Base-up setting (Output bias) : -9.9 to 100.0% [Front key]  
 Manual setting : 0.0 to 100.0% [Front key]  
 0 to 100% [External setting unit]  
 Output mode : a) Proportional phase angle • Proportional voltage • Proportional square voltage  
 b) Constant current control  
 • a) : Standard function, b) : Optional function  
 Cooling method : Natural convection  
 Ambient temperature : -15 to +55°C (Guaranteed operation range)  
 Ambient humidity : 5 to 95%RH (Non-condensing)  
 Absolute humidity : MAX.W.C 29g/m<sup>3</sup> dry air at 101.3kPa  
 Dielectric voltage : Between main circuit terminals/power terminals for control and heat sink : 2500V AC for one minute.  
 Between main circuit terminals/heat sink and input terminals : 2500V AC for one minute.  
 Between power terminals for control and input terminals : 2300V AC for one minute.

Insulation resistance : Between main circuit terminals/power terminals for control and heat sink : 20MΩ or more (500V DC)  
 Between main circuit terminals/heat sink and input terminals : 20MΩ or more (500V DC)  
 Between power terminals for control and input terminals : 20MΩ or more (500V DC)  
 Self-diagnostic function : a) Data check, Back-up check, A/D converter check, Watch dog-timer, Power supply voltage check  
 b) Action at abnormality : Thyristor output OFF, FAIL output open  
 Mounting method : Vertical mounting  
 Weight : Approx. 3.7kg (150A, 200A)  
 Standard functions : • Auto/Manual selection (External manual setting unit is optional)  
 • Gradient setting (External setting unit is optional)  
 • Soft-up/Soft-down : 0.0 to 100.0sec  
 • Digital input (DI) : 1 points, Non-voltage contact input (Phase control/Zero-cross control (Continuous proportional), RUN/STOP, Auto/Manual, Heater break alarm : Use/Unuse, Soft-up/Soft/down : Use/Unuse Setting data lock : Use/Unuse, Over current alarm : Use/Unuse (Selectable)  
 • Heat sink temperature abnormality : THV-10 output OFF when the heat sink temperature exceeds approx. 120°C.  
 • ON/OFF control (External setting units are optional)  
 • Loader communication : ANSI/RKC standard protocol  
 Optional functions : • Alarm output : 1 point  
 Open collector output, Sink type  
 Maximum load current : 100mA,  
 Load voltage : Less than 30V DC  
 Energized/De-energized is selectable.  
 (FAIL is de-energized only)  
 (Heater break alarm, Thyristor break alarm, Power frequency abnormal, Over current alarm, FAIL) \* Selectable  
 • Heater break alarm  
 Current measuring accuracy : ±5% of rated load current or ±2A (Whichever is larger)  
 • Load current limiter  
 Setting range : 0.0 to 165.0A (150A type)  
 0.0 to 220.0A (200A type)  
 Compliance with Standards : UL : UL60947-4-1 [POLLUTION DEGREE 2]  
 cUL : C22.2 No.60947-4-1 [POLLUTION DEGREE 2]  
 CE marking : LVD : EN60947-4-3 POLLUTION DEGREE 2, EMC : EN60947-4-3  
 • A specified noise filter must be used  
 SOSHIN ELECTRIC CO., LTD  
 HF3150C-SZC (150A) Leak current 7mA  
 NF3200C-VZ (200A) Leak current 10mA

## • Temperature characteristics of load current



\*1 : If momentary power failure occurs during execution of the control of primary side of a transformer, inrush current is generated. Protection function for control of primary side of a transformer is to protect the thyristor from the inrush current.

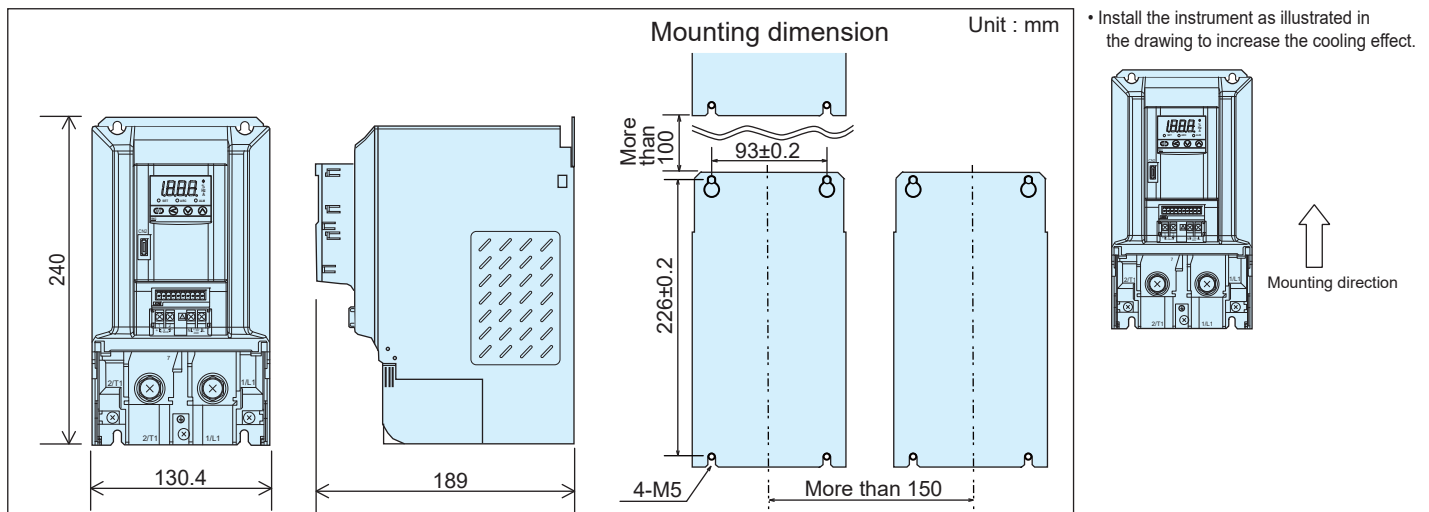
## Table of Stability

Function	Operating condition	Stability
Constant current variation	Power supply variation : Within ±10% Load variation : 2 times	Within ±10% of rated current

## Table of internal calorific value

Rated load current (A)	150	200
Internal calorific value (W)	200	250

# External Dimensions



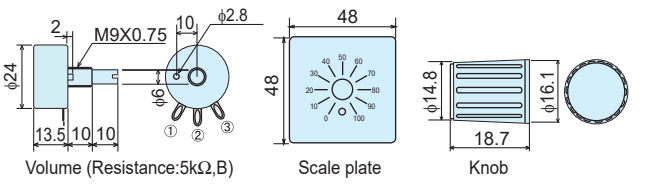
# Model and Suffix Code

Specifications	Model and Suffix Code	
Type	Single phase 100 to 240V AC	THV-10
Control method	Phase control/Zero-cross control (programmable, default: phase control)	PZ <input type="checkbox"/> - <input type="checkbox"/> * <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Rated load current	AC150A AC200A	..... 150 ..... 200
Input signal *1	0 to 10V DC 1 to 5V DC 4 to 20mA DC Voltage pulse input 0/12V DC	..... 5 ..... 6 ..... 8 ..... V
• Heater break alarm • Current limiter • Constant current control	No function Heater break alarm, Current limiter, Constant current control, Protection function for control of primary side of a transformer Non-linear resistance heater break alarm, Current limiter, Constant current control, Protection function for control of primary side of a transformer	..... N ..... H ..... B
Alarm output	No alarm output Alarm output 1 point * Connector for Input/Output (Plug) is necessary, Specify accessories code (-9).	..... N ..... A
*2,*3 Accessories	Setter (Volume, knob, Scale plate) 1 unit + Connector for Input/Output (Plug) Setter (Volume, knob, Scale plate) 2 units + Connector for Input/Output (Plug) Output voltmeter (150 V span) [For Phase control] Output voltmeter (300 V span) [For Phase control] UL/CE Marking type Fuse unit (Fast-blow fuse + Holder [1 circuit type]) Connector for Input/Output (Plug)	..... - 1 ..... - 2 ..... - 4 ..... - 5 ..... - 7 ..... - 9

- \*1 : Input signal is programmable. When contact input is required, specify the connector for input as an accessory (Either of -1, -2, or -9).
- \*2 : Setters are for external gradient setting, external manual setting, and external high/low setting for on/off control. Use two units of setter in the following cases;
  - When external gradient setting and external manual setting are required.
  - High/low setting for on/off control is used.
- \*3 : It is possible to specify more than one accessories by adding suffix code at the end.  
 Example: -1-7 : Setter (Volume, knob, Scale plate) 1 unit + UL/CE Marking type Fuse unit (Fast-blow fuse + Holder [1 circuit type])  
 Connector for Input/Output (Plug) -1-2-9 cannot be specified simultaneously.

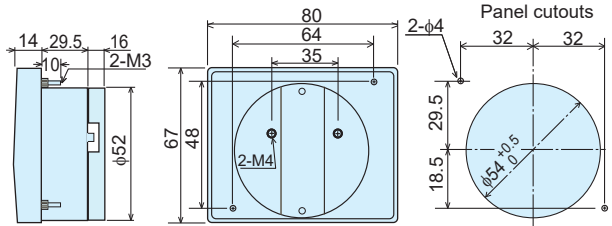
## Accessories

- External setter (knob) used for gradient setting, manual input setting, Output limiter (High&Low) : THV1P-S01



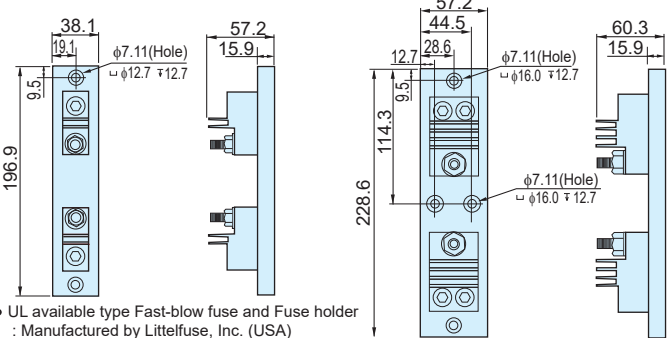
• Fuse Holder

- Output voltmeter : THV4P-V01/V02



Holder for THV4P-FBB/FCB (UL available) Screw Mounting or DIN rail mounting

For THV4P-FBB (150A type)		For THV4P-FCB(200A type)	
Model Code	Name	Model Code	Name
THVP-H06	UL available Holder	THV4P-H07	UL available Holder



### Model Code

- Please refer to the following codes to order accessories.
- The rating of the fast-blow fuse may be different from the current rating of the THV-10 main unit.

Name	Code	Note
Setter	THV1P-S01	
Output voltmeter	THVP-V01 THVP-V02	• Manufactured by Daiichi Electronics Co., Ltd. : LSK-8CH 150V • Manufactured by Daiichi Electronics Co., Ltd. : LSK-8CH 300V
Connector for Input/Output (Plug)	THV4P-C01	
UL available *1	150A THV4P-FBB	JLLS200X (200A)
Fast-blow fuse	200A THV4P-FCB	JLLS250X (250A)
UL available	150A THV4P-H06	LFT602001CS
Fuse holder	200A THV4P-H07	LFT604001CS

• UL available type Fast-blow fuse and Fuse holder : Manufactured by Littelfuse, Inc. (USA)



- Before operating this product, read the instruction manual carefully to avoid incorrect operation.
- This product is intended for use with industrial machines, test and measuring equipment. It is not designed for use with medical equipment.
- If it is possible that an accident may occur as a result of the failure of the product or some other abnormality, an appropriate independent protection device must be installed.
- When installing this product, avoid the following:
  - Direct exposure to sunlight. Direct contact with water.
  - Corrosive environments. Hazardous areas containing explosive or flammable gases.
  - Vibration or shock.
  - Areas subject to electrical noise caused by inductive interference, static electricity or magnetic fields.

### Caution for imitated products

As products imitating our product now appear on the market, be careful that you don't purchase these imitated products. We will not warrant such products nor bear the responsibility for any damage and/or accident caused by their use.

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