Power Controller THV Series

THV

General Description

Single phase power controller has an LED display to show set values and input signals and front keys for easy setting and monitoring. Loaded with versatile standard functions, the THV operates at 100 up to 240V AC and automatically selects power supply frequency 50 or 60Hz.

Standards Functions

- Control type selection (Phase-angle/continuous zero-cross zero-cross)
- Ramp-up, Ramp-down
- Manual output
- Gradient setting
- Output Limiter High and Low

Three Types of Control Mode (Selectable)

- Phase control
  The waveform of the load power is switched at a desired phase angle $q$ to provide smooth control.

- Zero-cross control (Continuous proportion)
  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 and contact signals from a from a controller.

- Base-up Setting (output bias)
- Output mode selection (proportional electric power/voltage/phase angle)
- Digital input for Auto/manual
- Analog input for manual output setting
- Analog input for Gradient setting

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.

1. Auto setting input X Internal gradient setting X External gradient setting
2. Auto setting input X Internal gradient setting
3. Manual setting X Internal gradient setting X External gradient setting

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 (Start-up) and ramp down (Start-Down) time can be set in the range of 0.1 to 99.9 sec via front keys.

Ramp-up time
Ramp-down time
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Standards Functions

Output highest and lowest values can be set via front keys.

Base-up setting (Output bias)

Output when the setting input is zero can be set via front keys.

3 type of output modes

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

Optional Functions

- Heater break alarm
- Output voltmeter (Only phase control)
- Current limiter (Only phase control)

This is a function to control not to exceed the current limiter value which load current set. Because it is not held down rush current in the case of the load that rush current is big, please use it together with a soft start function.

Specifications

- Maximum Load Current
  20A AC, 30A AC, 45A AC, 65A AC, 80A AC, 100A AC
- Control Method
  Phase control, Zero-cross control (Selective)
- Applicable Load
  Linearity (R: Resistor) load
  Inductive load (When phase control: Control of primary side of a transformer, magnetic field density 1.25T or less)
- Input Signal
  a) Current input 4 to 20mA DC (Input impedance : 100Ω)
  b) Voltage input 1 to 5V DC (Input impedance : 30kΩ)
  c) Voltage input 0/12V DC (Input impedance : 30kΩ)
  d) Non-voltage contact input (Input impedance : 47MΩ)
  e) Voltage pulse input 0/12V DC (Input impedance : 30kΩ)
- Minimum Load Current
  0.6A (20A type), 1A (30A, 45A, 60A, 80A, 100A type)
- Output Voltage Range
  0 to 98% of rated voltage
- Power Supply Voltage
  90 to 264V AC (Including power supply voltage variation)
  [Rating : 100 to 240V DC]
- Power Frequency
  50/60Hz (Automatic discriminating)
- Allowable Power Frequency Variation
  ± 1Hz (Performance guarantee range) ±2Hz (Operating guarantee range)
- Output Setting Range
  Gradient setting : 0.0 to 100% [Front key or external setting unit]
  Output limiter (High) : 0.0 to 99.9% [Front key or external setting unit]
  Output limiter (Low) : 0.0 to 99.9% [Front key or external setting unit]
  Base-up setting (Bias) : 0.0 to 99.9% [Front key]
- Manual setting : 0.0 to 99.9% [Front key]
- Output Mode
  When phase control is selected for linearity load (R: resistor), output mode can be selected from Proportional phase angle to input, proportional voltage to input, and proportional square voltage (electric power) to input.
- Current Limiter (Optional - Only phase control type)
  Setting Range : 0 to 32A (20A, 30A type)
  : 0 to 55A (45A type)
  : 0 to 70A (65A type)
  : 0 to 96A (80A type)
  : 0 to 110A (100A type)

Other specifications:

- Heater Break Alarm (Optional)
  Accuracy : Less than ±2A (20A, 30A)
  : Less than ±10% of rated current (45A, 60A, 80A, 100A)
  Alarm decision delay frequency : 0 to 99
  Output : Open collector output, 24V DC, Maximum 100mA
- Cooling Method
  Natural convection
- Allowable Ambient Temperature
  Performance guarantee range: 0 to +40°C
  Operating guarantee range: 0 to +50°C
- Allowable Ambient Humidity
  5 to 95%RH (Non-condensing)
- Dielectric Voltage
  Between main circuit, power terminals and radiation fins : 2000V AC for one minute.
- Insulation Resistance
  Between main circuit, power terminals and radiation fins : 20M ohms or more (500V DC)
- Mounting Method
  Vertical mounting
- Weight
  Approx. 0.9kg (20A, 30A)
  Approx. 1.3kg (45A, 60A)
  Approx. 1.9kg (80A, 100A)
- Contents of Digital Display
  Input signal value, Phase angle ratio value, Frequency value, Control method, Soft up/soft down time, Gradient set value, Output limiter (High/Low), Base-up set value
- Compliance with Standards
  • UL Recognized
  • CSA Certified (Released soon)
- Temperature characteristics of load current

THV_02E
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Model and Suffix Code

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Model and Suffix Code</th>
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<tbody>
<tr>
<td><strong>Power Supply</strong></td>
<td>Single-phase 100 to 240V AC</td>
</tr>
<tr>
<td><strong>Control method</strong></td>
<td>Phase control/Zero-cross control (Default: Phase control)</td>
</tr>
<tr>
<td><strong>Max. load current</strong></td>
<td>20A AC</td>
</tr>
<tr>
<td></td>
<td>30A AC</td>
</tr>
<tr>
<td></td>
<td>45A AC</td>
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<tr>
<td></td>
<td>60A AC</td>
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<tr>
<td></td>
<td>80A AC</td>
</tr>
<tr>
<td></td>
<td>100A AC</td>
</tr>
<tr>
<td><strong>Input signal</strong></td>
<td>0 to 10V DC</td>
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<tr>
<td></td>
<td>1 to 5V DC</td>
</tr>
<tr>
<td></td>
<td>4 to 20mA DC</td>
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<tr>
<td><strong>Optional function 1</strong></td>
<td>No heater break alarm, No current limiter</td>
</tr>
<tr>
<td><strong>Optional function 2</strong></td>
<td>No option function 2</td>
</tr>
<tr>
<td><strong>Accessories</strong></td>
<td>1. Setters (Volume, Knob, Scale plate) 1 unit + Connector (Plug)</td>
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<tr>
<td></td>
<td>2. Fuse unit (Fast-blow fuse [1 piece] + Holder [3 circuit type])</td>
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<tr>
<td></td>
<td>3. Output voltmeter : 150V span (For phase control)</td>
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<td></td>
<td>4. Output voltmeter : 300V span (For phase control)</td>
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<tr>
<td></td>
<td>5. Fuse unit (Fast-blow fuse [1 piece] + Holder [1 circuit type])</td>
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<td></td>
<td>6. Connector</td>
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</table>

1 Input signals 1 to 5V DC, 4 to 20mA DC and voltage pulse input are switchable with short bars. For a contact input, specify the connector as an accessory as input comes via a connector.
2 Settings are for external gradient setter, external manual setter, high/low external setter for ON/OFF control.
3 Use two pieces of setter if gradient setting and manual setting are performed externally, or high/low setting for on/off control is performed, two setters are required.
4 Specify two or more types simultaneously with the exception of the following combinations: 1-3. Setter, with fuse unit and connector; 1-2, 1-6 and 3-6 cannot be specified simultaneously.

**Accessories**

<table>
<thead>
<tr>
<th>Name</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setter (Volume, Knob, Scale plate)</td>
<td>THVP-S01</td>
</tr>
<tr>
<td>Output Voltmeter (Plug)</td>
<td>Span : 150V AC</td>
</tr>
<tr>
<td>Connector (plug)</td>
<td>Span : 300V AC</td>
</tr>
<tr>
<td>Fuse unit (Fast-blow fuse [1 piece] + Holder [3 circuit type])</td>
<td>20A, THVP-F21</td>
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<tr>
<td>Fuse unit (Fast-blow fuse [1 piece] + Holder [1 circuit type])</td>
<td>20A, THVP-F23</td>
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<tr>
<td>Fuse Holder (3 circuit type)</td>
<td>20A, 30A, 45A, THVP-H01</td>
</tr>
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<tr>
<th>Name</th>
<th>Code</th>
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<tbody>
<tr>
<td>Fast-blow fuse for 3 circuit type (1 piece)</td>
<td>20A, THVP-F00</td>
</tr>
<tr>
<td>Fast-blow fuse for 1 circuit type (1 piece)</td>
<td>20A, THVP-F30</td>
</tr>
<tr>
<td>Fuse Holder (1 circuit type)</td>
<td>20A, THVP-H02</td>
</tr>
</tbody>
</table>

**External Dimensions**

- Gradient setter, Manual setter, High/Low setter
- Fuse unit (1 circuit type)
- Fuse unit (3 circuit type)
- Output voltmeter
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External Wiring

Main circuit

Input signal

4 to 20mA input

1 to 5V and voltage pulse input

Contact input

Controller

Pin No. Contents

1 +5V output
2 0V (GND)
3 Gradient setting input (0 to 5V input by gradient setter)
4 Manual setting input (0 to 5V input by manual setter)
5 Auto/manual setting selection (Open:Auto setting)
6 Open collector output (+): Heater break alarm output
7 Open collector output (-): Heater break alarm output
8 Unused

- Auto setting (With gradient setter)
- Manual setting (With manual setter)
- Auto/MANual setting selection

Output setting selection

There are three output settings: input signal from a controller, external manual setting, and internal manual setting. Selection can be made via front keys for external contact action selection and external contact (connector Nos. 2-5).

- Controller
- Manual setting
- Auto setting
- Gradient setter
- Heater break alarm output
- High limit
- Low limit
- Connector

* Gradient setting functions in both automatic and manual setting modes.
* External contact is open when a connector is not used.

Power lamp

* Make sure the wiring of the main circuit (L1, L2) and the power supply (4, 5) are in the same phase. If the wiring is out of phase, the instrument will not produce normal output.

Terminals size

D (mm) 4.3mm or more
L1, L2 1 to 5 9.5mm or less 5.5mm or less