

# THYRISTOR REGULATOR JU SERIES



JU series small and lightweight thyristor regulators for single-phase loads are characterized with high panel installation density.

Two control systems, a phase-angle firing system and a zero-cross firing system, are built in and can be changed by remote contacts signal.

In the phase-angle firing system, feedback types of voltage, current and power, and no-feedback type are selectable depending on heating characteristics of heaters.

Three kinds of input signals, 4 to 20mADC, 1 to 5VDC and ON-OFF contact signal, can be changed by terminal connections. Options of heater disconnection alarm function and current limit function are available.

The rapid fuse is built in all models and the current transformer built-in type is also available.

By the option setting unit (with communication function), it can be connected to the higher instruments such as PC and PLC (signal converter may be required) and centralize control the setting value and data up to 31 units.

## ■ FEATURES

- **Compact structure**  
Compact, lightweight and high panel installation density.
- **Options**  
The options of heater disconnection alarm function and current limit function are available.
- **Phase-angle firing/zero-cross firing**  
The phase-angle firing system and the zero-cross firing system are switchable.\*<sup>1</sup> The running by the phase-angle firing system at the initial stage and by the zero-cross firing system at the normal stage is possible.
- **Zero-cross firing system**  
With the delta-sigma modulation, which controls every 1 cycle, the fine control like the phase-angle firing system is possible.



- **Setting unit (option)**  
Display of various parameters, voltage/current/power and change of the feedback system are possible. By using communication function, various settings value can be changed from the higher side instruments or send various data to the higher side.
- **Various protections functions built-in**  
The thyristor element is protected by melting of the rapid fuse for short-circuit of load, and by gate-off for over-current. For models with a cooling fan built-in, alarm is activated and output is stopped for abnormal heat-sink temperature.
- **Self-diagnosis function built-in**  
The self-diagnosis function is built in for abnormal operation, abnormal thyristor element and abnormal power supply.

\*<sup>1</sup> If the model is without setting unit and with heater disconnection alarm or the heater is SiC heater then it is not applicable.

## MODELS

JU□□□□□□□□

Power supply	10: 100V	11: 110V	12: 120V	20: 200V	22: 220V	24: 240V	38: 380V
	40: 400V	44: 440V	99: Others				
Rated current	010: 10A	020: 20A	030: 30A	050: 50A	075: 75A	100: 100A	150: 150A
	200: 200A	250: 250A	300: 300A	400: 400A	500: 500A	750: 750A <sup>*5</sup>	X00: 1000A <sup>*5</sup>
Control system/feedback type	V: Phase-angle firing • voltage feedback / Zero-cross firing						
	A: Phase-angle firing • current feedback / Zero-cross firing						
	W: Phase-angle firing • power feedback / Zero-cross firing						
	N: Phase-angle firing • no-feedback <sup>*1</sup> / Zero-cross firing						
	C: Zero-cross firing						
Rapid fuse	A: Built-in N: Not provided						
Setting unit (option)	0: Not provided 1: Provided (installed to unit) 2: Provided (panel installation) <sup>*2</sup>						
	3: Provided (with communications, installed to unit),						
	4: Provided (with communications, panel installation) <sup>*2</sup>						
CT (current transformer) function (option)	0: Mounted externally (rated current 10 to 1000A, standard)						
	1: Built-in (rated current 10 to 75A only)						
Other functions (option)	0: Not provided 1: Heater disconnection alarm <sup>*3</sup>						
	2: Current limit <sup>*4</sup> 3: Heater disconnection alarm + current limit (with setting unit only)						

\*1: For no-feedback types, then the heater disconnection alarm, current limit and setting unit cannot be added.

\*2: For the panel installation type setting unit, the exclusive cable SH-JUK3 (3m) or SH-JUK5 (5m) is required separately.

\*3: For models without setting unit and with heater disconnection alarm, or if the heater is SiC heater then the phase-angle firing system and the zero-cross firing system cannot be switched.

\*4: For models with current limit, the zero-cross firing system cannot be combined.

\*5: 750A and 1000A is built to order product.

## SPECIFICATIONS

Phase: Single-phase

Rated voltage: 100, 110, 120, 200, 220, 240, 380, 400, 440VAC (to be specified)

Rated current: 10, 20, 30, 50, 75, 100, 150, 200, 250, 300, 400, 500, 750, 1000A (to be specified)

Allowable voltage fluctuation range:  $\pm 10\%$  of rated voltage

Rated frequency: 50/60Hz (automatic change)

Allowable frequency fluctuation:  $\pm 2\text{Hz}$  of rated frequency ( $\pm 1\text{Hz}$  for performance guarantee)

Working temperature range:  $-10$  to  $55^\circ\text{C}$  (load current will decrease if  $50^\circ\text{C}$  or higher)

Working humidity range: 30 to 90%RH (no dew condensation)

Insulation resistance:  $50\text{M}\Omega$  or larger at 500VDC (between power terminals and ground terminal)

Dielectric strength:

1 minute at 2000VAC (rated voltage 100 to 240V)

1 minute at 2500VAC (rated voltage 380V or higher)

Output control system: Phase-angle firing system and zero-cross firing system (selectable on models)

Feedback type: Voltage, current, power or no-feedback

Input signal: Selectable on terminals of 4 to 20mA DC (internal resistance  $100\Omega$ ), 1 to 5VDC (internal resistance  $25\text{k}\Omega$ ), ON-OFF contact signal, and Resistance signal ( $10\text{k}\Omega$ , manual)

Ramp setting: By built-in variable resistor (0 to 100% of output range) or external variable resistor ( $10\text{k}\Omega$ )

Elevation setting: By built-in variable resistor (0 to 100% of output range) or external variable resistor ( $10\text{k}\Omega$ )

Built-in variable resistor cannot be used for models without the setting unit and with optional heater disconnection alarm.

Soft-start time setting: 1 to 20 seconds

Running/stop selection: By contact signal

Phase-angle firing system/zero-cross firing system selection: By contact signal

External CT input: 0 to 5A for full scale of rated current

Models with built-in CT are available in 75A or lower.

Output range:

No feedback.....0 to 98% of rated voltage

Voltage feedback...0 to 98% of rated voltage

Current feedback...0 to 100% of rated voltage

Power feedback.... 0 to 98% of rated voltage x

0 to 100% of rated voltage

Output accuracy:

No-feedback ... Within  $\pm 10\%$  of rated voltage

Voltage feedback ... Within  $\pm 3\%$  of rated voltage (at  $\pm 10\%$  fluctuation of rated voltage)

Current feedback ... Within  $\pm 3\%$  of rated current (at 1 to 10 times variation of load resistance)

Power feedback ... Within  $\pm 3\%$  of rated voltage (at 1 to 3 times variation of load resistance, at  $\pm 10\%$  fluctuation of rated voltage)

\* Performance guarantee is 0 to  $50^\circ\text{C}$

Applicable load:

Resistive load, inductive load (primary side control of transformer, flux density 1.2T or lower, phase-angle firing system only)

Minimum load current:

0.5A or more (at 98% output of rated voltage)

Alarm:

Over-current (on built-in or external CT), rapid fuse melting (30A or more),

Heat sink abnormal over-heating (200A or more) ...

LED lights and alarm contact output 1 is ON.

Abnormal thyristor element, abnormal operation, heater disconnection ...

LED blinks and alarm contact output 2 is ON.

\* No-feedback types ... Only abnormal operation and abnormal power supply, no alarm contact

Alarm contact output: 2 points, maximum 250VAC, 1A

Over-current protection: Thyristor gate-off (120% or more of rated current, on built-in or external CT)

Heater disconnection is protected by melting of built-in rapid fuse (built-in type only).

Cooling system:

Natural cooling for 150A or less of rated current

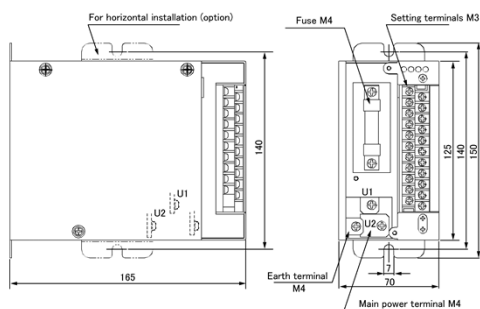
Built-in cooling fan for 200A or more

Other functions: Soft-start, soft-up/down (1 to 20 seconds), soft-start at power failure recovery

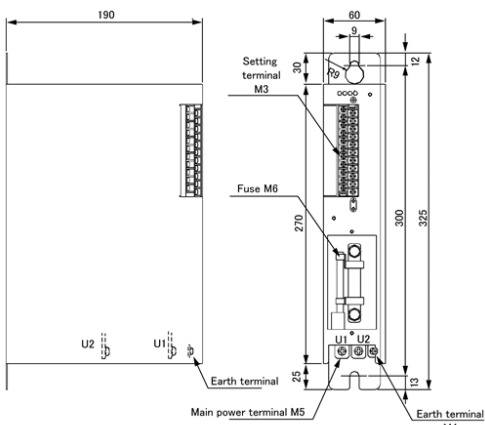
Weight: About 2kg for 10A, 20A, about 3kg for 30 to 75A, about 6kg for 100 to 150A, about 7kg for 200 to 250A, about 12kg for 300 to 500A, about 35kg for 750A, about 37kg for 1000A

## DIMENSIONS

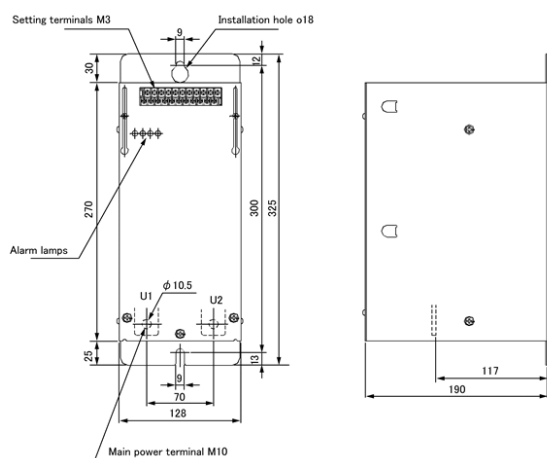
### • 10A, 20A



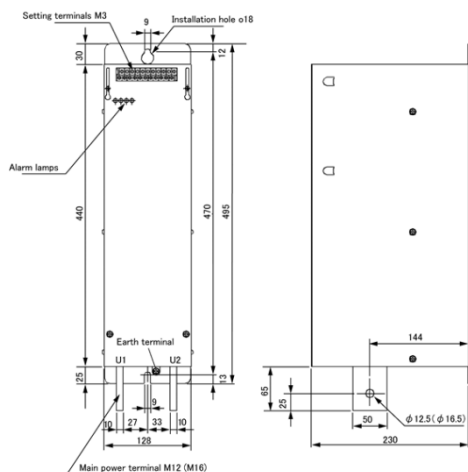
### • 30A to 75A



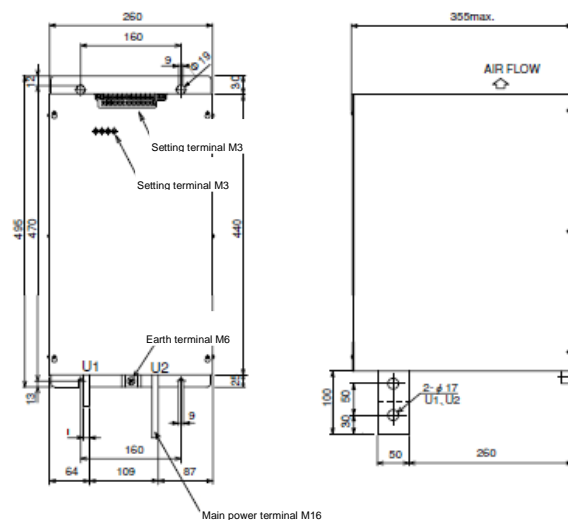
### • 100A to 250A



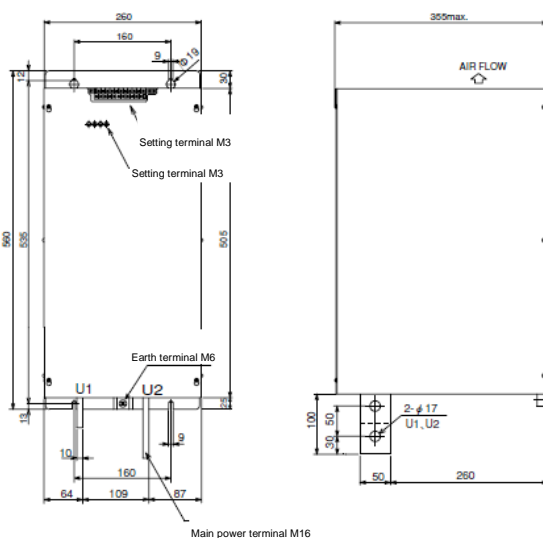
### • 300A to 500A



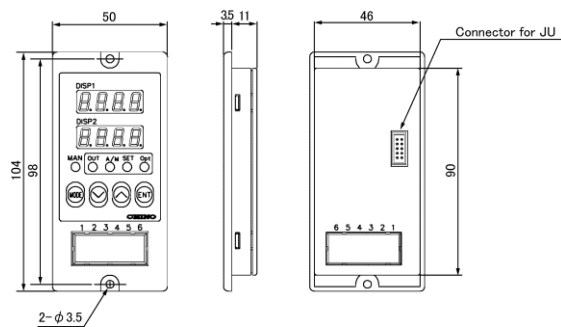
### • 750A



### • 1000A



### • Setting unit



Unit: mm

## ■ OPTIONS (not applicable for no feedback type)

### • Setting unit

Setting: Output (0 to 100%), high/low limits (0 to 100%), ramp setting (0 to 100%), soft-start time setting (1 to 20 seconds), heater disconnection alarm setting (load resistance 0 to 100%, available in models with heater disconnection alarm only), phase-angle firing system/zero-cross firing system selection, feedback system selection, current limit)

Display: Output value (voltage, current, power), heater resistance value, alarm, parameters

Communication: RS422A/RS485 MODBUS protocol (various setting, output display, alarm display, heater disconnection alarm setting is available)

Installation: Installed to thyristor unit or panel [by exclusive cable of SH-JUK3 (3m) or SH-JUK5 (5m) between thyristor unit and setting unit]

Power supply: Supplied from thyristor unit

Working temperature: -10 to 55°C

Working humidity: 30 to 90%RH (no dew condensation)

Weight: About 50g

### • Heater disconnection alarm

Detects the heater disconnection by built-in or external CT. When disconnection is detected, LED blinks and alarm contact output becomes ON. The switching of phase-angle firing system/zero-cross firing system is not possible without setting unit. Also not applicable for SiC heater.

### • Current limit

Sets the maximum limit of the load current (detected by built-in or external CT. The combination with zero-cross firing system is not possible.

## ■ ACCESSORIES

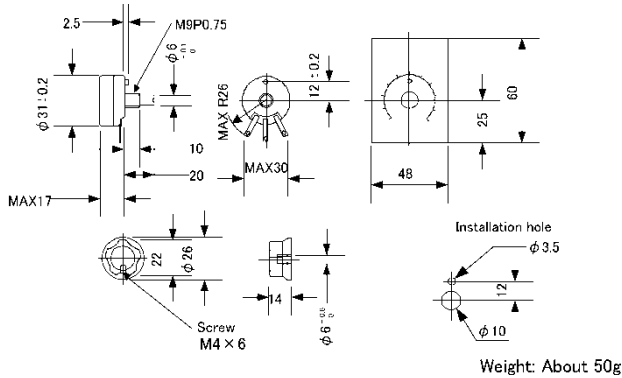
### • Setting unit

Model	Purpose	Specifications
VL-JAL	Ramp setting Manual setting High/low limits setting Elevation setting Current limit setting	Variable resistor 10kΩ
VL-JAM1N: 0 to 150V	Output indicator Ramp/manual setting Combined with selector switch	1: Voltage indicator 0 to 150V
VL-JAM2N: 0 to 250V		2: Voltage indicator 0 to 250V
VL-JAM4N: 0 to 500V		4: Voltage indicator 0 to 500V Variable resistor 10kΩ, 2kΩ

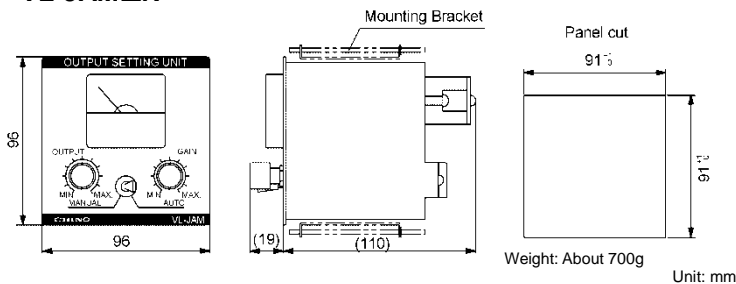
VL-JAL is consisted of variable resistor, scale and knob.

VL-JAM series output indicator can be used for phase angle firing only.

### • VL-JAL



### • VL-JAM□N



## ■ RAPID FUSE

Rated current	Model	
	100/200V line	400V line
10A	350KH-15	600KH-15
20A	350KH-30	600KH-30
30A	250GH-50S	660GH-50S
50A	250GH-75S	660GH-80S
75A	250GH-100S	660GH-100S
100A	250GH-160S	660GH-160S
150A	250GH-200S	660GH-200S
200A	250GH-315S	660GH-315S
250A	250GH-350S	660GH-350S
300A	250GH-450S	660GH-450S
400A	250GHW-630S	660GH-630S
500A	250GHW-710S	660GH-710S
750A	50SRF1000S	50SRF1000S
1000A	50SRF1250S	50SRF1250S

## ■ EXCLUSIVE CABLE

(between thyristor unit and setting unit)

Model	Specification
SH-JUK3	Length: 3m
SH-JUK5	Length: 5m

## ■ TERMINAL COVER

(for main circuit)

Model	Specification
SH-JUR500	For 300 to 500A
SH-JUR1000	For 750A, 1000A

Note:

The terminal cover is attached for 10 to 75A.

The thyristor unit cover serves as the terminal cover concurrently for 100 to 250A.

The thyristor unit cover serves as the setting terminal cover concurrently for 300 to 500A.

The setting terminal cover is attached for 750A and 1000A.

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