

JW SERIES

Three Phase Thyristor Regulator



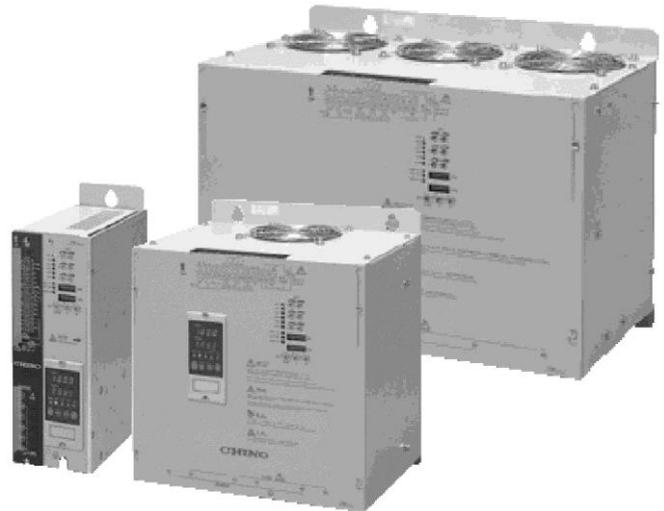
JW series is a three-phase control thyristor regulators having compact size and lighter in weight.

There are two control systems, the phase control system and the zero-cross control system.

In the phase control systems, a type with the voltage, current and power feedback control systems and a type without those feedbacks are available according to the characteristics of a heater used.

JW series is also capable of advanced three-phase control based on 6-arm control and fine control setting by the setting communications unit.

Furthermore, remote control and data monitoring is available by communicating to a host unit.



■ FEATURES

● Compact all-in-one configuration

Narrow width unit enables a closed mounting. As they are using the same pitch of old JT series, a replacement by an old version is easy.

● Setting communications unit is prepared

Displaying measured values of real time power voltage, current, electric power and also settings of each parameter, switching operation are available. Each parameter enables fine control.

A unit having communications enable to monitor a data and to set up a parameter by the PC through RS422A / RS485.

● Disconnection alarm and current limit are provided as a standard

Heater disconnection alarm function and current control function.

(Heater disconnection alarm function is not applicable for SiC heater. If the model is not built-in type, requires 3 CT per each unit separately.)

● 6-arm control employed as standard

6-arm control is employed to all models to improve controllability.

6-arm control particularly in the transformer loading is the best for improving controllability, handling imbalance load and reducing harmonic noise.

● Various protective functions

Thyristor elements are protected by gating off for over-current, melting of the rapid fuse for short circuit and gating off for over-heating of heat sink.

Phase-sequence abnormalities alarm and open-phase alarm, which are suitable for three phase control, are included.

● External transformer specification

Damage by abnormal voltage such as surge is reduced by dividing synchronized signal input (control circuit power input) from main circuit and connecting external terminals.

■ MODELS

JW□□□□□□ 6

Power voltage *1

20: 200V AC (200V/220V/240V)
40: 400V AC (380V/400V/440V)
4X: 400V AC External transformer spec.
46: 460V AC
48: 480V AC
99: Others

Rated Current *2

010: 10A 150: 150A
020: 20A 200: 200A
030: 30A 250: 250A
050: 50A 300: 300A
075: 75A 400: 400A
100: 100A 500: 500A

Control system

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/ Zero-cross firing
Z: Zero-cross firing

Rapid fuse *3

N: None

A: Built-in

Setting communication unit *4

0: None

1: Built-in setting unit

2: Panel-mount setting unit

3: Built-in setting communications unit

4: Panel-mount setting communications unit

CT (current transformer) *5

0: Mounted externally (or none)

1: Built-in

*1 In case the external transformer spec 4x is selected, an exclusive external transformer kit "SH-JWT40" is required.

Please ask for available power voltage "99".

*2 Less than 50A can not be selected when a power voltage is the external transformer spec. Please ask for a rated current 750A and 1000A.

*3 Built-in rapid fuse is not available to the rated current 10A or 20A.

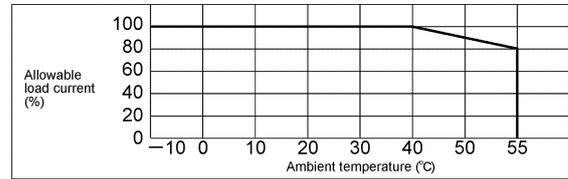
*4 For panel-mount setting unit, an exclusive cable "SH-JUK3" (3m) or "SH-JUK5" (5m) is required.

*5 Built-in CT function is not available to the rated current 100A or more. When installing CT externally please select 0.

■ GENERAL SPECIFICATIONS

Phase: Three-phases
 Rated voltage: 200V AC (200V/ 220V/ 240V selectable by switch)
 400V AC (380V/ 400V/ 440V selectable by switch)
 460V AC
 480V AC
 to be specified (main circuit power supply and control circuit power supply are common)
 Rated current: *External transformer spec is available for 400V
 10A, 20A, 30A, 50A, 75A, 100A, 150A, 200A, 250A, 300A, 400A, 500A to be specified
 *Please contact for the rated current 750 and 1000A.
 Rated frequencies: 50/60 Hz (automatic change)
 Allowable voltage fluctuation: ±10% of rated voltage
 Allowable frequency fluctuation: ±2Hz of rated frequency
 Control system: Phase angle firing system and zero-crossing firing system
 Arms: 6 arms
 Feedback types: Voltage, current, power feedback
 Control input signal: 4 to 20 mA DC (input resistance is approx. 100Ω)
 1 to 5V DC (input resistance is approx. 50kΩ)
 External setting input: Volume signal (10kΩ is recommended)
 External contact input: External signal no-voltage contact or open collector (external contact capacity 1mA 5V DC or more)
 External CT input: 0 to 5A AC of rated current (3pcs of CT are required)
 Output range: 0 to 98% of rated voltage, 0 to 100% of rated current (Depending on load resistance)
 Output accuracy: No-feedback --- Within ±10% of rated voltage
 Voltage feedback --- Within ±3% of rated voltage (Rated voltage is ±10%, at 1 to 10 times variation of load resistance)
 Current feedback --- Within ±3% of rated current (Rated voltage is ±10%, at 1 to 10 times variation of load resistance)
 Power feedback --- Within ±3% of rated voltage (Rated voltage is ±10%, at 1 to 3 times variation of load resistance)
 Note: this is not including the accuracy in the rating from 10 to 90% and CT error. (at reference operating condition)
 Ramp: 0 to 100% of output range
 Elevation: 0 to 100% of output range
 Soft-start: 1 to 20 seconds
 Current limit: 0 to 100% of output range
 Imbalance adjustment: Imbalance of approx. 10% output range can be adjusted
 Applicable load: Resistive load, inductive load, (Inductive load --- phase-angle firing system, primary side control of transformer, and flux density 1.2T or lower are recommended)
 Minimum load current: 0.5A or more (at 98% output of rated voltage)
 Alarm types: Over-current alarm (alarm output AL1)
 Rapid fuse meltdown alarm (alarm output AL1)
 Heat sink over heating alarm (alarm output AL1)
 Heater disconnection alarm (alarm output AL2)
 Thyristor elements abnormal alarm (alarm output AL2)
 Imbalance alarm (alarm output AL2)
 Abnormal phase sequence alarm (alarm output AL3)
 Open-phase alarm (alarm output AL3)
 Frequency abnormality alarm (alarm output AL3)
 Abnormal operation alarm
 Alarm contact output: 3 points (AL1, AL2, AL3)
 Alarm output AL1, AL2 --- ON for alarm activation
 AL3 --- OFF for alarm activation
 Alarm output: Mechanical relay output a contact
 Maximum load 240V AC 1A, 30V DC 1A
 Minimum load 5V DC 10mA or more
 Electricity life 100,000 times or more
 Contact protection elements not included (sold separately)
 Over current protection: Melting of the rapid fuse for short-circuit
 0% output at 120% of rated current (thyristor gate-off)
 With current limit function high limit output value is configurable
 External setting: Ramp setting (AI1), elevation (AI2), Current limit (AI3)
 External contact: Operational status (DI1 --- run/stop)
 Control system (DI2 --- phase angle firing/ zero-cross firing)
 Setting system (DI3 --- front display setting/ external setting)

Cooling system: Natural air cooling for 75A or less of rated current
 Forced air cooling for 100A or more of rated current
 Working temperature: -10°C to 55°C
 In case of more than 40°C it depends on the following derating performance.



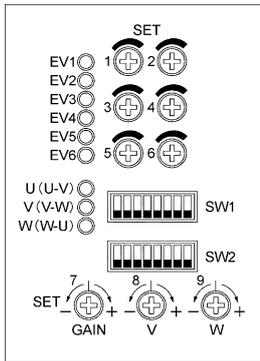
Working humidity: 30 to 90%RH, No dew-condensation
 Insulation resistance: Between power supply terminals and protection conductor terminal 500V DC, 50MΩ or more
 Dielectric weight: Between power supply terminals and protection conductor terminal
 2000V AC, 1min (200V system)
 2500V AC, 1min (400V system)
 Dielectric strength of cooling fan is 2000V AC
 Weight: 10A and 20A --- Approx 5kg
 30A and 50A --- Approx 8kg
 75A and 100A --- Approx 13kg
 150A to 250A --- Approx 22kg
 300A to 500A --- Approx 36kg
 Case: Steel
 Color: Gray
 Installation: Panel-mounting
 Working condition: Reference operating condition
 --- Ambient temperature 23°C ±2°C
 Ambient humidity 55% ±5%RH
 (No dew-condensation)
 Power supply voltage rated voltage ±1%
 Power supply frequency rated supply frequency
 Normal operating condition
 --- Ambient temperature -10 to 55°C
 Ambient humidity 30 to 90%RH
 (No dew-condensation)
 Power supply voltage rated voltage ±10%
 Power supply frequency rated supply frequency ±2Hz
 Do not use under the environment where there are dust and extraneous material (metallic powder, facet, carbon fiber, carbon dust)
 Please prevent dust with control panel when using carbon heater.

■ SETTING COMMUNICATIONS UNIT

Main setting: Operational status (active/ stop)
 Control system (Zero-cross/ phase angle)
 Output system (automatic/ manual)
 Alarm output (ON/OFF)
 Manual output value, Feedback control system
 Ramp setting, Elevation, Soft start
 SV high/ SV low limit, Heater disconnection alarm (ON/OFF)
 Heater disconnection alarm rating,
 Heater disconnection alarm detect time
 Current limit (ON/OFF), Current limit value
 Imbalance alarm (ON/OFF)
 Imbalance alarm imbalance rate
 Communications protocol, Communications address
 Communications transmission rate
 Communications character, Pulse cycle, Scaling
 Measuring value display: Current value, voltage value, power value, load resistance value, etc
 Error display: Error display, alarm display, etc
 Communications interface: RS422A, RS485
 Communications type: Half-duplex asynchronous type
 Communications protocol: MODBUS (RTU/ASCII)
 Transmission rate: 19200bps, 9600bps
 Working temperature: -10 to 55°C
 Working humidity: 30 to 90%RH (no dew-condensation)
 Power supply: Supplied from thyristor unit
 Weight: About 50g
 Case: Fire retardant polycarbonate
 Color: Gray
 Mounting: Mount to the thyristor unit or the panel (exclusive cable sold separately is required for panel mounting)

FRONT PANEL

Front setup part



Function of trimmers

Trimmer No.	Setting function
SET1	Ramp (0 to 100%)
SET2	Elevation (0 to 100%)
SET3	Soft start (Approx 1 to 20 sec.)
SET4	Current limit (0 to 100%)
SET5	Ratio of heater disconnection (0 to 100%)
SET6	Imbalance ratio (1 to 40%)
SET7	Output gain of imbalance adjustment*1: Approx ±40% of firing
SET8	V phase output of imbalance adjustment*1: Approx ±40% of firing against gain
SET9	W phase output of imbalance adjustment*1: Approx ±40% of firing against gain

*1 It is not output adjustment range. Output adjustment range is approx 10%.

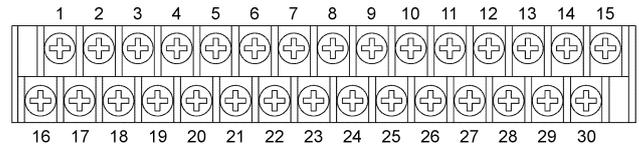
Function of dipswitch SW1

Bit No.	Setting function
1	Current limit ON/OFF. ON to activate.
2	Heater disconnection alarm ON/OFF. ON to activate.
3	Storage of the initial resistance value for heater disconnection alarm. ON to activate.
4	Imbalance alarm ON/OFF. ON to activate.
5	Alarm output ON/OFF. ON to make the function OFF.
6	Feedback control ON/OFF. OFF to make the FB function OFF.
7	Imbalance adjustment ON/OFF. ON to activate.
8	Unused

Function of dipswitch SW2

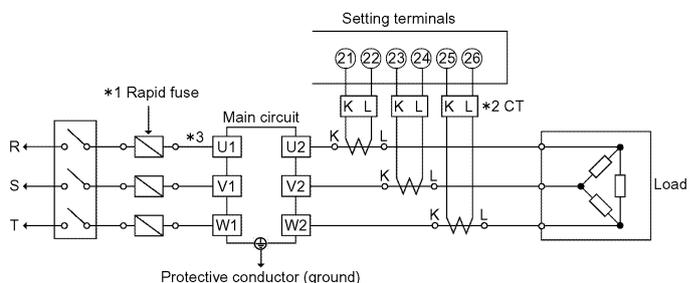
Bit No.	Setting function					
1	Logical switching of remote contact input 1 (Run/ Stop)					
2	Logical switching of remote contact input 2 (Phase/Zero-cross)					
3	Logical switching of remote contact input 3 (Front panel/ Remote setting input)					
4	Individual selection of remote setting input: Ramp					
5	Individual selection of remote setting input: Elevation					
6	Individual selection of remote setting input: Current limit					
7	Selection of power supply voltage	ON	ON	OFF	OFF	
8		ON	OFF	ON	OFF	
	Power supply voltage	200V	240V	220V	200V	(unused)
		400V	(unused)	440V	400V	380V

TERMINAL ARRANGEMENT



Bit No.	Terminal function
1	Remote setting input common (AI com)
2	Remote setting input ref. voltage(AI V-ref)
3	Remote setting input1 (AI1)
4	Remote setting input2 (AI2)
5	Remote setting input3 (AI3)
6	Remote contact input common (DI com)
7	Remote contact input1 (DI1)
8	Remote contact input2 (DI2)
9	Remote contact input3 (DI3)
10	N, C (unused)
11	N, C (unused)
12	N, C (unused)
13	Alarm output1 (AL1)
14	Alarm output2 (AL2)
15	Alarm output3 (AL3)
16	Control input signal (+)
17	Control input signal selection (mA/V)
18	Control input signal (-)
19	Control signal output (OUT)
20	Control signal input (IN)
21	CT, U (K)
22	CT, U (L)
23	CT, V (K)
24	CT, V (L)
25	CT, W (K)
26	CT, W (L)
27	N, C (unused)
28	Alarm output1 (AL1)
29	Alarm output2 (AL2)
30	Alarm output3 (AL3)

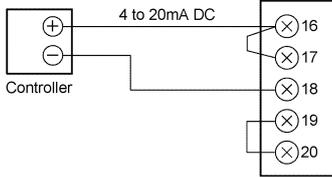
MAIN CIRCUIT CONNECTIONS



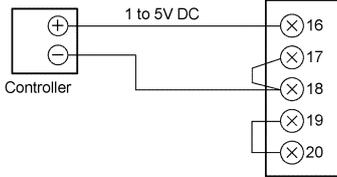
- *1 For models without the rapid-break fuse, make sure to connect a rapid fuse externally to protect a system.
- *2 When the CT is not built in, connect a CT externally as required.
- *3 Connect an arrester or a spark killer to protect from abnormal voltage such as surge super-imposed on the power supply.
- *4 Connect a dummy resistance for transformer loading.
Connect a load to have power supply of more than 0.5A for each phase.
- *5 Connect a magnet conductor and make a fail-safe design to separate power supply from the system at abnormal activation.
- *6 There is no power switch. Connect an over-current protection device such as rated breaker to power supply.

CONNECTION OF SETTING TERMINALS

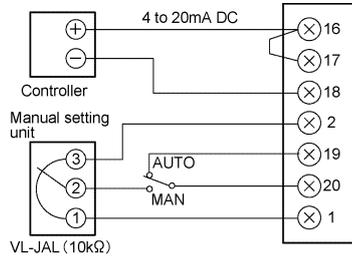
Control input signal only Current signal (4 to 20mA DC)



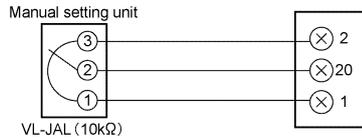
Voltage signal (1 to 5V DC)



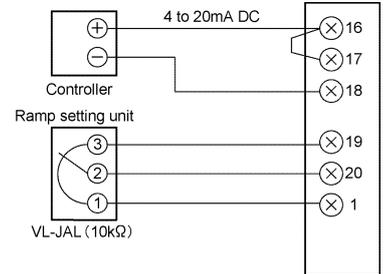
Manual setting unit and with auto/man switching Current signal (4 to 20mA DC)



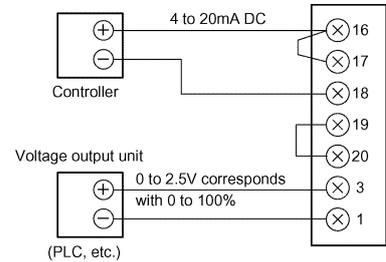
Manual setting unit only



With ramp setting unit (Ramp using control input signal) Current signal (4 to 20mA DC)

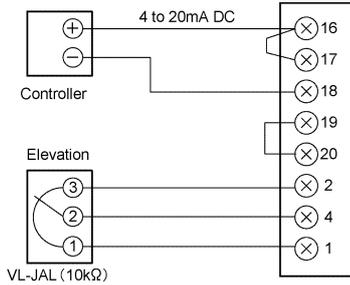


With ramp setting unit (Ramp using remote setting input) Current signal (4 to 20mA DC)

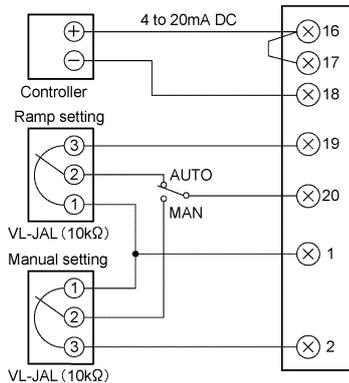


* Output of voltage output unit needs to be insulated if connecting multiple units (JW). Output of single voltage output unit cannot be connected in parallel to multiple units.

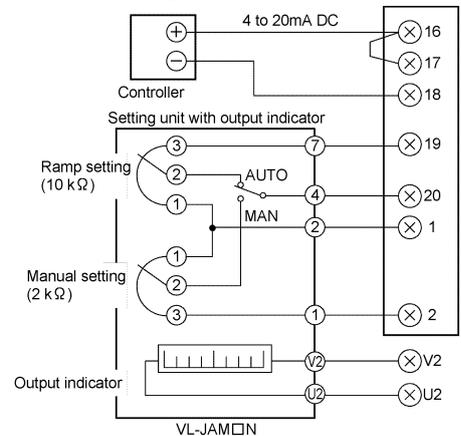
With elevation setting unit Current signal (4 to 20mA DC)



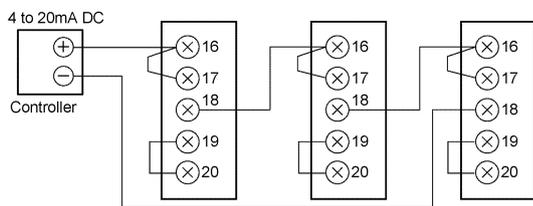
Manual setting unit, ramp setting unit with auto/man switching Current signal (4 to 20mA DC)



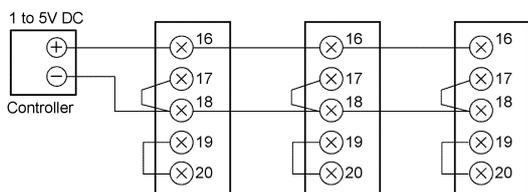
Setting unit with output indicator (*Cannot be used in zero-cross control) Current signal (4 to 20mA DC)



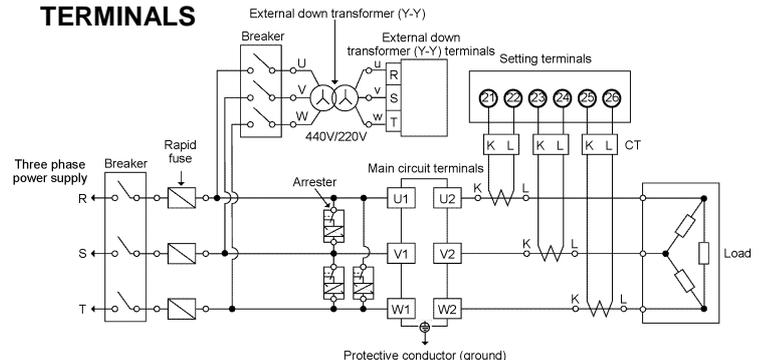
Operation of multiple instruments Current signal (4 to 20mA DC)



Voltage signal (1 to 5V DC)



CONNECTION OF EXTERNAL TRANSFORMER TERMINALS



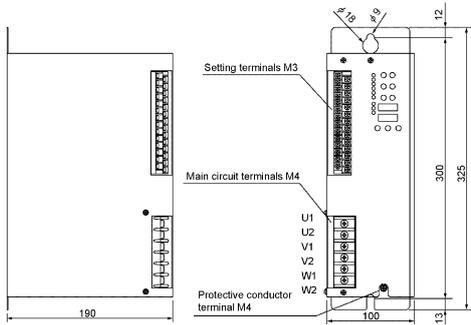
*1 External down transformer (Y-Y) is sold separately.

*2 Make sure to connect an arrester among power supply wires of main circuit to protect main circuit from surge. Arrester is sold separately.

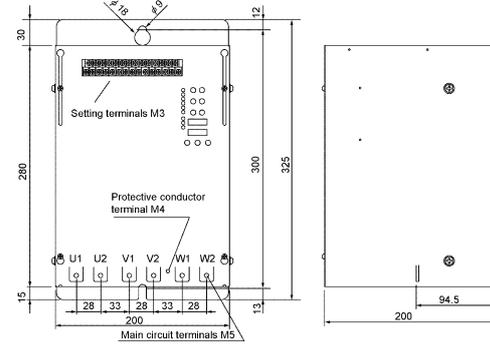
*3 Connect an over-current protection device such as rated breaker to power supply to protect external down transformer (Y-Y).

EXTERNAL DIMENTIONS

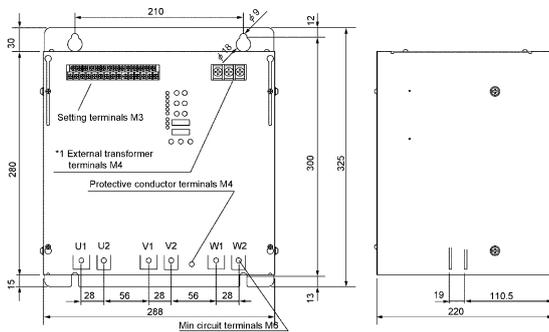
●10A, 20A



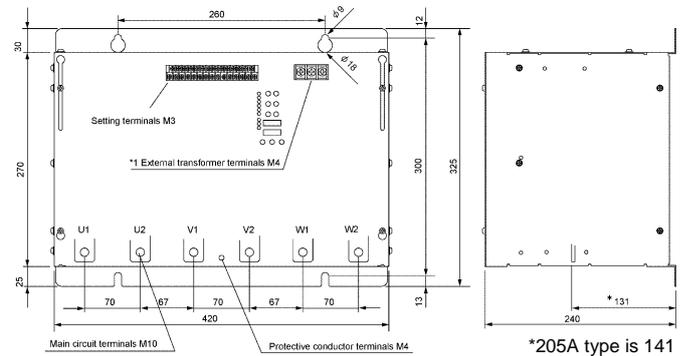
●30A, 50A



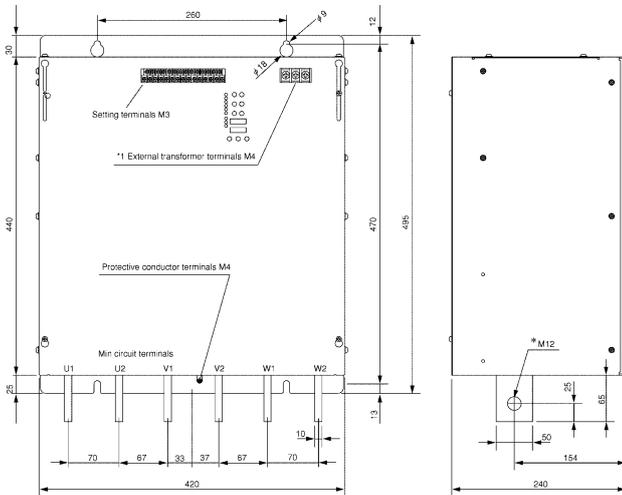
●75A, 100A



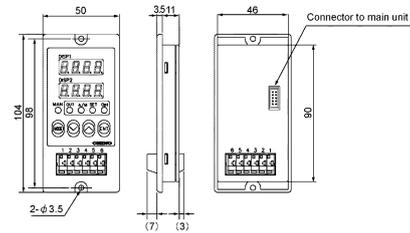
●150A, 200A, 250A



●300A, 400A, 500A



●Setting Communication unit



Unit: mm

- *1 External transformer terminals (synchronized signal terminals) is provided as an option for external transformer spec
- *2 Setting terminals and external transformer terminals are installed inside cover

HEATING VALUE

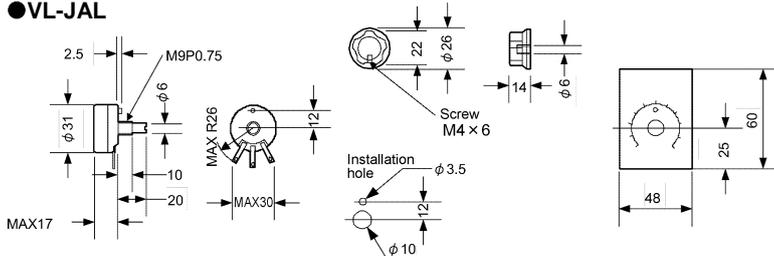
Rated current	Maximum heating value	Rated current	Maximum heating value
10A	40W	150A	500W
20A	90W	200A	790W
30A	140W	250A	920W
50A	180W	300A	1100W
75A	260W	400A	1530W
100A	380W	500A	1980W

ACCESSORIES

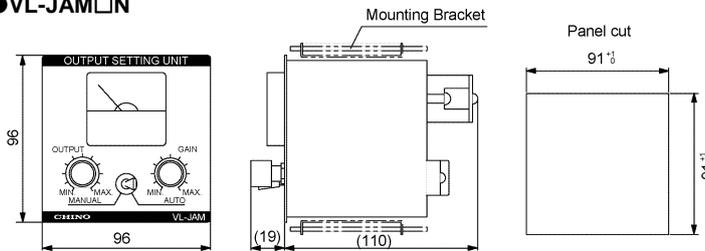
Manual setting unit

Model	Specifications
VL-JAL	Simple function type for ramp setting Variable resistance value: 10kΩ
VL-JAM□N └─ 1: Voltage indicator (0 to 150V) └─ 2: Voltage indicator (0 to 250V) └─ 4: Voltage indicator (0 to 500V)	All-in-one function combined with indicator, ramp setting, manual setting and selector switch Variable resistance value: 10kΩ (Ramp setting) 2kΩ (Manual setting)

VL-JAL



VL-JAM□N



Built-in rapid fuse (for replacement)

Rated current	Models	
	200V system	400V system
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

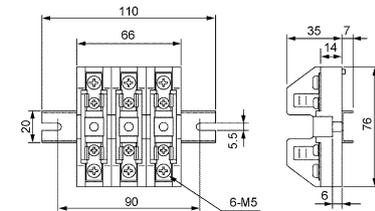
*Manufactured by HINODE ELECTRIC CO., LTD

External mounted rapid fuse unit

Rated current	Models
10A	FU-J015T
20A	FU-J030T

*Available for 200V and 400V.

FU-J015T, FU-030T



External transformer kit for 4X

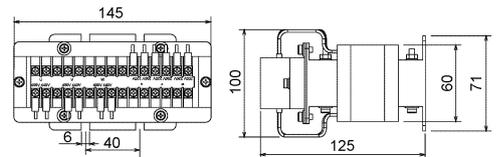
Models	Specification
SH-JWT40	External down transformer (Y-Y) Arrester (3pcs)

* 1set/unit is necessary for 400VAC external transformer

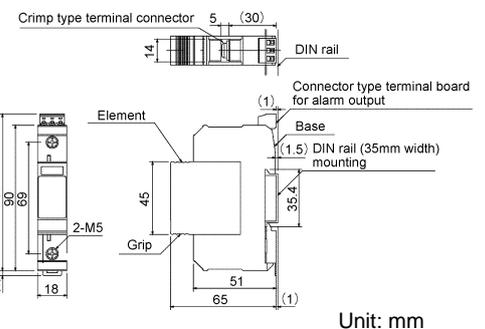
* Transformer: Kitagawa Electric CO., LTD

* Arrester: M-System Co., Ltd

External transformer



Arrester



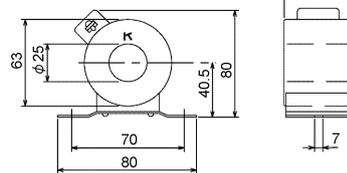
Unit: mm

CT (external current transformer)

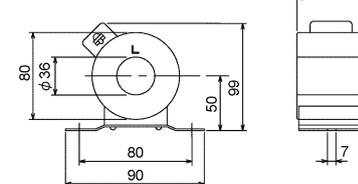
Rated current	Models	Number of through-holes
10A	CW-5L-100/5A	10
20A	CW-5L-100/5A	5
30A	CW-5L-150/5A	5
50A	CW-5L-100/5A	5
75A	CW-5L-150/5A	2
100A	CW-5L-100/5A	2
150A	CW-5L-150/5A	1
200A	CW-5L-200/5A	1
250A	CW-5L-250/5A	1
300A	CW-5L-300/5A	1
400A	CW-5L-400/5A	1
500A	CW-5L-500/5A	1

*secondary output current 5A
3pcs/unit is required

For 100 to 300A



For 400 to 500A



Unit: mm

Contact Protection element for relay

Object	Models
For light load	CX-CR1
For heavy load	CX-CR2

Exclusive cable for setting communication unit (panel mounting type)

Cable Length	Models
3m	SH-JUK3
5m	SH-JUK5

Fuse for power input board

Models	Specification
500SF-04	75-500A (3pcs)

* (HINODE ELECTRIC CO., LTD)

* Fuse to protect PCB

* Not installed to 10 to 50A spec

Specifications subject to change without notice. Printed in Japan (I) 2017.8 Recycled Paper

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