

Three Phase Thyristor Regulator JW series



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

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

In the phase control, a type with the voltage, current and power feedback 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.)

● 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, fast-acting fuse melting for short circuit and gating off for heat sink overheat.

Phase-sequence abnormality 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.
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 control
Voltage feedback/ Zero-cross control
A: Phase control
Current feedback/ Zero-cross control
W: Phase control
Power feedback/ Zero-cross control
N: Phase control
No-feedback/ Zero-cross control
Z: Zero-cross
- Fast-acting 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

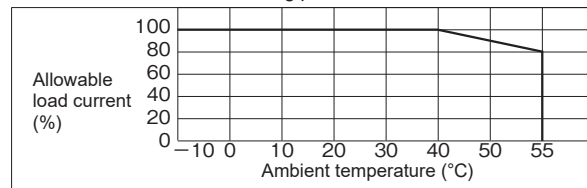
- * 1 In case the external transformer spec 4x is selected, an exclusive external transformer kit "SH-JWT40" is required. Please ask for available power voltage "99".
- * 2 Less than 50A can not be selected when a power voltage is the external transformer spec.
- * 3 Please ask for a rated current 750A and 1000A.
Built-in fast-acting 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) |
| 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 ask 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 control and zero-cross control |
| 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) |
| Slope: | 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 control, 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) Fast-acting fuse melting alarm (alarm output AL1) Heat sink overheat alarm (alarm output AL1) Heater disconnection alarm (alarm output AL2) Thyristor element abnormality alarm (alarm output AL2) Imbalance alarm (alarm output AL2) Phase sequence abnormality alarm (alarm output AL3) Open-phase alarm (alarm output AL3) Frequency abnormality alarm (alarm output AL3) Operation abnormality 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: | Fast-acting fuse melting 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: | Slope setting (AI1), elevation (AI2), Current limit (AI3) |
| External contact: | Operational status (DI1 --- run/stop) Control system (DI2 --- phase control/ zero-cross control) 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.



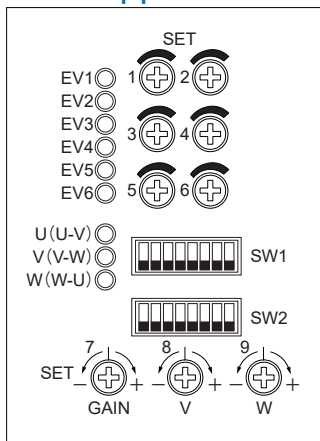
| | |
|------------------------|---|
| Working humidity: | 30 to 90%rh, No dew-condensation |
| Insulation resistance: | Between power supply terminals and protection conductor terminal 500V DC, 50MΩ or more |
| Dielectric weight: | Between power supply terminals and protection conductor terminal 2000V 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 type Slope 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, Address Communications speed 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) |
| Communication speed: | 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 | Slope (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 |

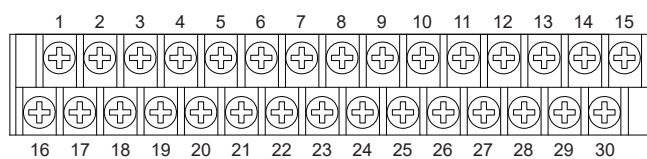
●Function of dipswitch SW1

| 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. ON to make the FB function OFF. |
| 7 | Imbalance adjustment ON/OFF. ON to activate. |
| 8 | Initiaization, ON to activate |

●Function of dipswitch SW2

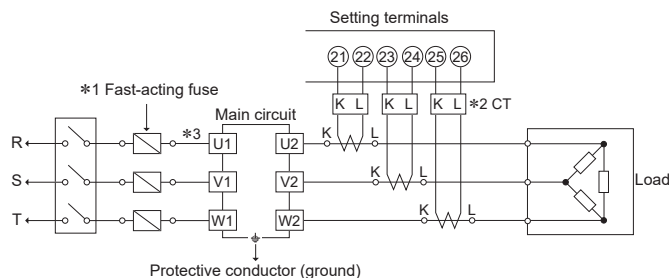
| Bit No. | Setting function | | | | |
|---------|---|------|----------|----------|------------------|
| 1 | Logical switching of remote contact input 1 (Run/ Stop) | | | | |
| 2 | Logical switching of remote contact input 2 (Phase/Zero-cross) | | | | |
| 3 | Logical switching of remote contact input 3 (Front panel/ Remote setting input) | | | | |
| 4 | Individual selection of remote setting input: Slope | | | | |
| 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 |
| | | 460V | (unused) | (unused) | (unused) |
| | | 480V | (unused) | (unused) | (unused) |

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) |

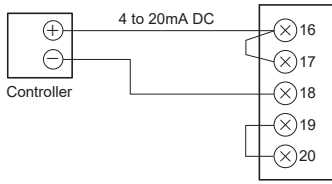
MAIN CIRCUIT CONNECTIONS



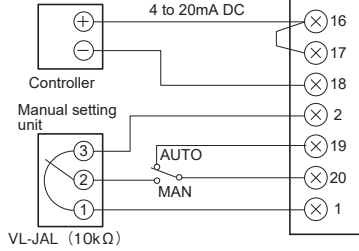
- *1 For models without the fast-acting fuse, make sure to connect a fast-acting fuse externally to protect a system.
- *2 When the CT is not built in, connect a CT externally as required.
- *3 Connect an arrester or a spark killer to protect from abnormal voltage such as surge super-imposed on the power 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

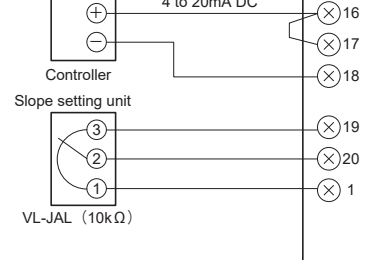
● Control input signal only
Current signal (4 to 20mA DC)



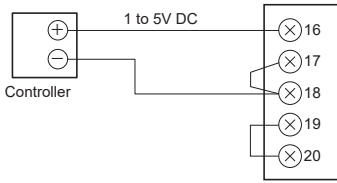
● Manual setting unit and with auto/man switching
Current signal (4 to 20mA DC)



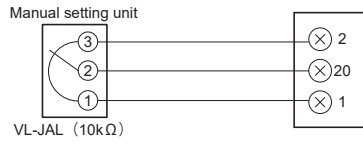
● With slope setting unit (Slope using control input signal)
Current signal (4 to 20mA DC)



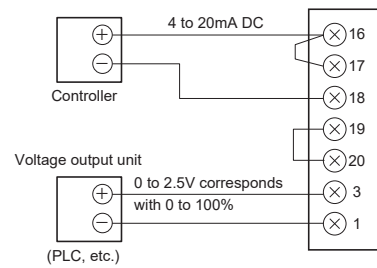
Voltage signal (1 to 5V DC)



● Manual setting unit only

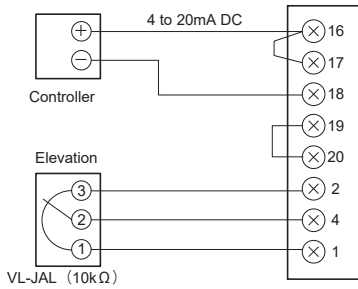


● With slope setting unit (Slope using remote setting input)
Current signal (4 to 20mA DC)

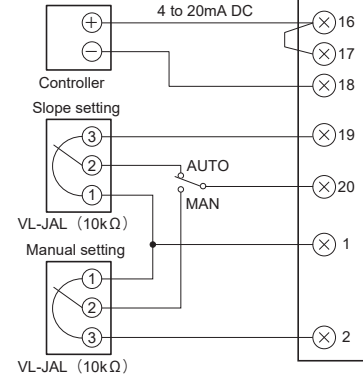


*Output of voltage output unit needs to be insulated to connect multiple units (JW). A voltage output unit can not be connected in parallel to multiple units.

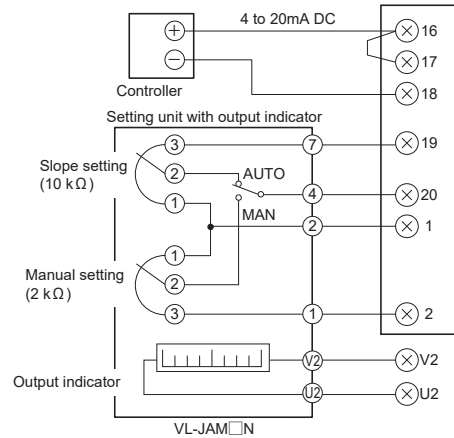
● With elevation setting unit
Current signal (4 to 20mA DC)



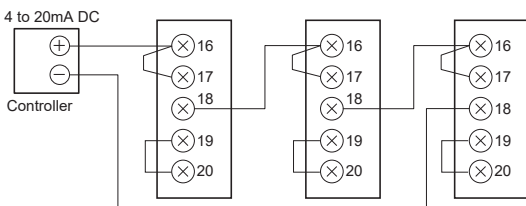
● Manual setting unit, slope setting unit with auto/man switching
Current signal (4 to 20mA DC)



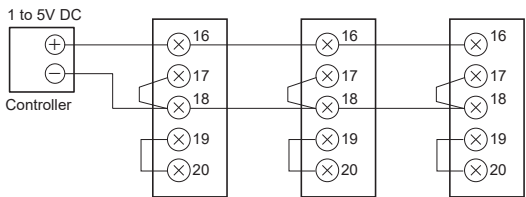
● Setting unit with output indicator
(*Cannot be used in zero-cross control)
Current signal (4 to 20mA DC)



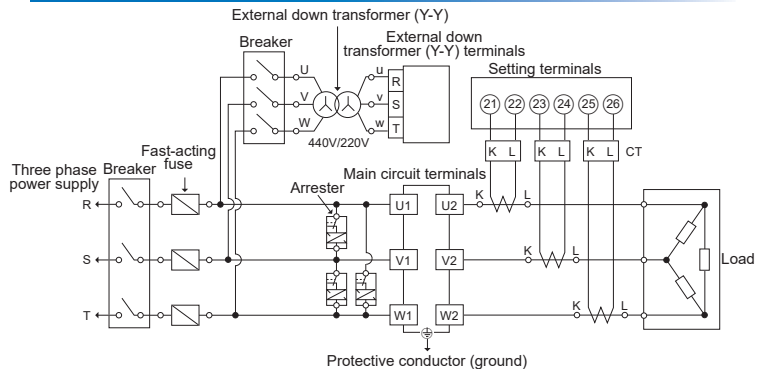
● Operation of multiple instruments
Current signal (4 to 20mA DC)



Voltage signal (1 to 5V DC)



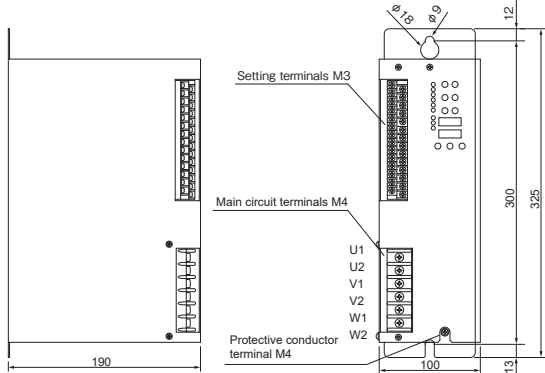
CONNECTION OF EXTERNAL TRANSFORMER TERMINALS



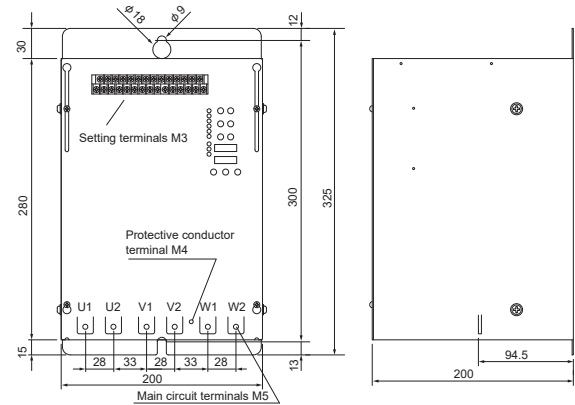
- *1 External down transformer (Y-Y) is sold separately.
- *2 Make sure to connect an arrester among power supply wires of main circuit to protect main circuit from surge. Arrester is sold separately.
- *3 Connect an over-current protection device such as rated breaker to power supply to protect external down transformer (Y-Y).

EXTERNAL DIMENSIONS

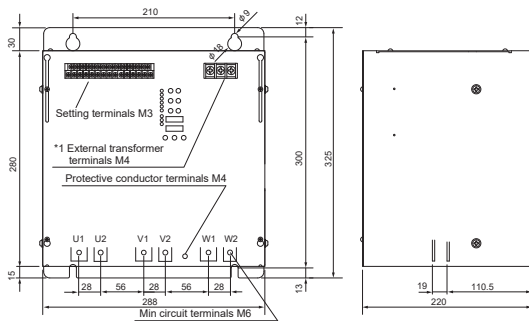
●10A, 20A



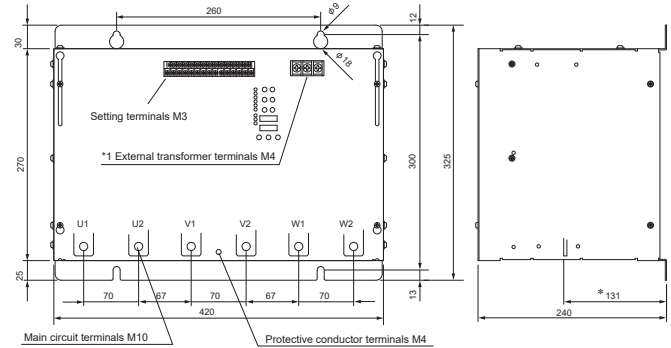
●30A, 50A



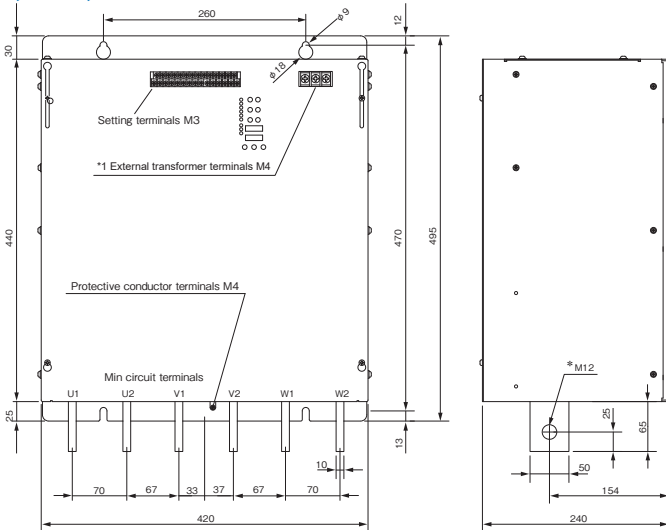
●75A, 100A



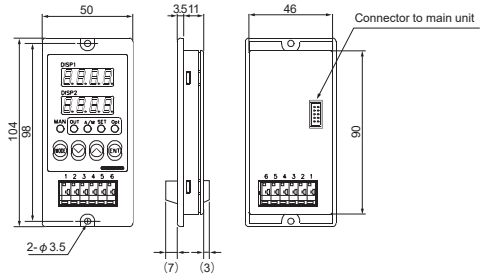
●150A, 200A, 250A



●300A, 400A, 500A



●Setting Communication unit



*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

Unit: mm

HEATING VALUE

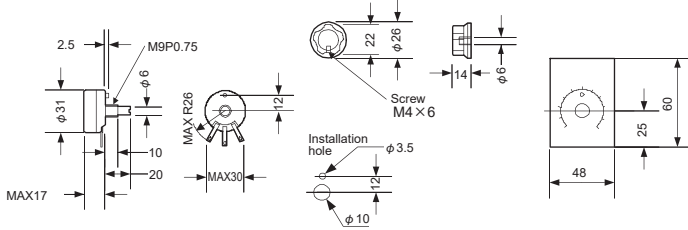
| Rated current | Maximum heating value | Rated current | Maximum heating value |
|---------------|-----------------------|---------------|-----------------------|
| 10A | 40W | 150A | 500W |
| 20A | 90W | 200A | 790W |
| 30A | 140W | 250A | 920W |
| 50A | 180W | 300A | 1100W |
| 75A | 260W | 400A |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

ACCESSORIES

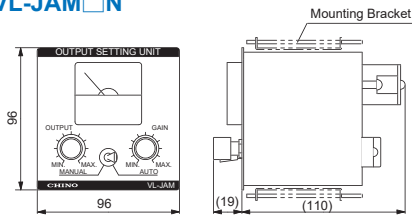
● Manual setting unit

| Model | Specifications |
|----------|---|
| VL-JAL | Simple function type for slope setting Variable resistance value: 10k Ω |
| VL-JAM□N | All-in-one function combined with indicator, slope setting, manual setting and selector switch Variable resistance value: 10k Ω (Slope setting) 2k Ω (Manual setting) For phase control |

● VL-JAL



● VL-JAM□N



● CT (external current transformer)

| Rated current | Models | Number of through-holes |
|---------------|---------------|-------------------------|
| 10A | CPI-1TR 100AT | 10 |
| 20A | CPI-1TR 100AT | 5 |
| 30A | CPI-1TR 150AT | 5 |
| 50A | CPI-1TR 100AT | 5 |
| 75A | CPI-1TR 150AT | 2 |
| 100A | CPI-1TR 100AT | 2 |
| 150A | CPI-1TR 150AT | 1 |
| 200A | CPI-1TR 200AT | 1 |
| 250A | CPI-1TR 250AT | 1 |
| 300A | CPI-1TR 300AT | 1 |
| 400A | CPI-1TR 400AT | 1 |
| 500A | CPI-1TR 500AT | 1 |

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

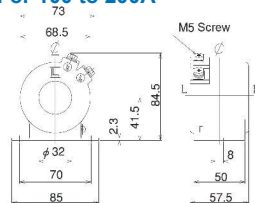
● Contact Protection element for relay

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

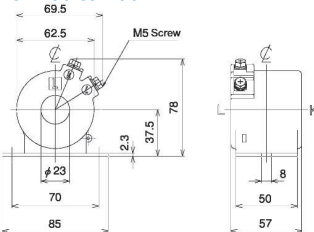
● Exclusive cable for setting communication unit (panel mounting type)

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

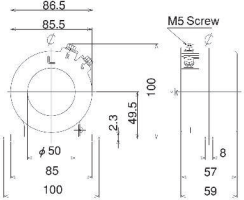
For 100 to 200A



For 250 to 400A



For 500A



● 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

● Built-in fast-acting fuse (for replacement)

| Rated current | Models | |
|---------------|-------------|-------------|
| | 200V system | 400V system |
| 30A | 250GH-050S | 660GH-050S |
| 50A | 250GH-075S | 660GH-080S |
| 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 | 250GHW630S | 660GH-630S |
| 500A | 250GHW710S | 660GH-710S |

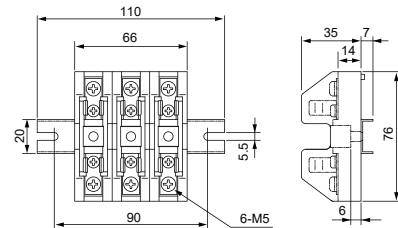
*Manufactured by HINODE ELECTRIC CO., LTD

● External mounted fast-acting fuse unit

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

*Available for 200V and 400V.

● FU-J015T, FU-030T

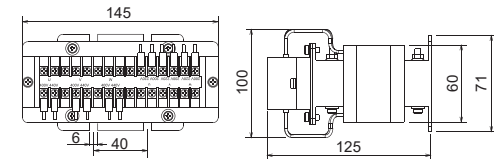


● External transformer kit for 4X

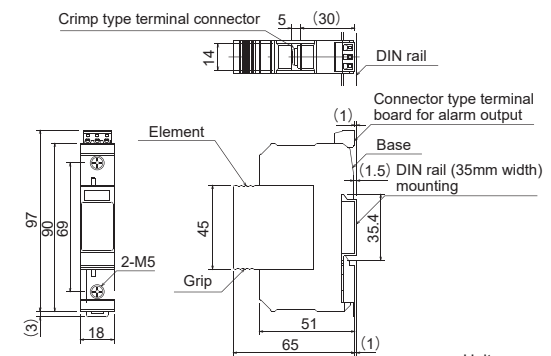
| Models | Specification |
|----------|--|
| SH-JWT40 | External down transformer (Y-Y) Arrester (3pcs) |

* 1set/unit is necessary for 400VAC external transformer
* Transformer: Kitagawa Electric Co., LTD
* Arrester: M-System Co., Ltd

● External transformer



● Arrester



Unit: mm

Specifications subject to change without notice. Printed in Japan (I) 2024. 9

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