Single Phase Thyristor Regulator
JM series

Best for heater control
All-in-one type with built in setting display provided as standard.

JM is a single phase thyristor regulator that receives signal from controller, PLC and manual setting unit and regulates power provided to the electric furnace heater. 7 types of rated current are prepared from 10A to 500A so capacity according to the heater ratings can be selected.

FEATURES

○Ease of settings and checking operations
You can check the parameter settings and load status (voltage, current*1, power*1 and resistance value*1)

○Built in setting display unit and panel mounting types are provided
Thyristor model that matches with place of installation can be selected.

○Improvement in safety features
(1) Load current is measured*1 and gate off alarm is output in case of over current is flown.
(2) Built in rapid fuse*2 protects from over current.*3
(3) The models with rated current of 200A or more monitor heat sink temperature and turns the gate off and output alarm in case of abnormal heating. Further, predicts failure by monitoring cooling fan rotations, and notifies to replace the fan before it breaks down.

○Heater disconnection alarm*1 *4
Output alarm when load resistance value goes above set disconnection rate. In case of Phase-angle firing, disconnection of 1 wire out of 7 wires, and in case of zero cross firing disconnection of 1 wire out of 5 wires can be detected.*5

○RS485 (MODBUS) communication function provided as standard
Integrated management of power monitoring, parameters and alarm detection by high order devices (like PC and PLC) is possible.

○International Standards*12
CE and RoHS Compliant

*1 Built in or external CT is required.
*2 Corresponds to the main circuit rated current 30A to 500A.
*3 For 10A and 20A external fuse (No Alarm) is required.
*4 Control input is less than 30%. In case of Silicon Carbide heater.
Cannot be used in case of applicable to any of these.
*5 Heater should be of same material and same capacity.

MODELS

Main circuit rated voltage

- 20 : 200V (200V/220V/240V)*6
- 10 : 100V (100V/110V/120V)*7
- 40 : 400V (380V/400V/440V)*7
100V and 400V series requires additional step up/down transformer (accessory) for control power supply

Main circuit 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

Feedback type*8
V : Voltage feedback (Phase angle firing) A : Current feedback (Phase angle firing) W : Power feedback (Phase angle firing)

Rapid fuse
- A : Built-in*2
- N : None

Setting display unit / communication*9
3 : Built-in with communication #12
4 : Panel mounting with communication

CT (current transformer)
- 0 : Mounted externally*10
- 1 : Built-in

Heater disconnection alarm / current limit
- 3 : Heater disconnection alarm + current limit*11

Main circuit rated voltage and control power supply

200V Series

100V Series / 400V series

*6 Set by the setting display unit on the main unit (at the initial power on)
*7 Note that the control power supply voltage is 220V to 240V.
*8 Control system (Phase-angle firing / Zero-cross firing) and feedback type (only Phase-angle firing) are switchable on setting display unit on the main unit
*9 Cannot be changed after the Thyristor is delivered.
*10 Use the CT with rated current of 5A at secondary side, if necessary.
*11 CT is required for heater disconnection alarm / current limit.
*12 Items marked with does not conform to CE.

1
Control system and feedback system switchable

2 kinds of control system (phase-angle firing/zero-cross firing) and 3 kinds of feedback system (voltage, power, current) are selectable/swichable depending on the control target.

**Control system**
- **Phase-angle firing (when output is 50 percent)**
  - Voltage vs. Time graph: Control system in which output is done by changing control angle (ON timing) depending on each cycle of power (180 degrees).
- **Zero-cross firing (when output is 50 percent)**
  - Voltage vs. Time graph: Control system that decides on/off for each cycle of power supply and outputs it. Corresponds to nickel-chrome heater only.

**Feedback method (phase-angle firing)**
- **Voltage feedback**
  - Resistance value vs. Temperature graph: For heating element which has small resistance change.
  - Nichrome heater
- **Current feedback**
  - Resistance value vs. Temperature graph: For heating element with small electric resistance at low temperature and which changes up to 6 to 12 times at heating.
  - Molybdenum disilicide heater
- **Power feedback**
  - Resistance value vs. Aging graph: For heating elements for which electrical resistance changes from minus to plus when temperature increases or becomes 4 times more due to aging.
  - Ex. S/C heater

**Ramp setting**
- It changes gradient of input/output characteristics and controls maximum output in the range of 0 to 100% even if input is 100%.

**Elevation setting**
- Keeps the gradient of input/output characteristics as it is and output adding value that is set to it.

**Soft start**
- Increases or decreases the output gradually up to specified value when power is turned ON or when there is sudden change in the input.
- Time of output from 0% to 100% can be set finely from 0.1 to 20.0 sec.
- **Phase-angle firing**
- **Zero-cross firing**

**Current limit**
- Controls upper limit of output current (load current) at any value.
**GENERAL SPECIFICATIONS**

Phase: Single-phase  
Control power supply:  
Rated voltage: 200 to 240V AC  
Rated frequency: 50 / 60 Hz (±2Hz)  
Power consumption:

<table>
<thead>
<tr>
<th>Rated current (A)</th>
<th>Power consumption (VA)</th>
<th>Setting display (Built-in)</th>
<th>Setting display (Panel mounting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 to 150</td>
<td>7</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>200 to 500</td>
<td>25</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

Main circuit power supply:
- Rated voltage: 100V (100/110/120V AC) *1 *2  
- Rated current: 10,20,30,50,75,100,150,200,250,300,400,500A (to be specified)
- Measured for power failure: Setting are stored in non-volatile memory.  
- Insulation resistance: Between primary terminal and protective conductor terminals: 50MO or larger at 500VDC  
- Between secondary terminal and protective conductor terminals: 50MO or larger at 500VDC  
- Withstand voltage: Between primary terminal and protective conductor terminals: 1 minute at 2000VAC (rated voltage 100 series / 200V series)
  1 minute at 2500V AC (rated voltage 400V series)

Casing:
- Front: Fire resistant polycarbonate (UL94V-0)  
- Case: Steel sheet / Aluminum heat sink  
- Colour: Gray (Main body), Black (Power unit & Control unit)  

Installation:
- Panel mount type
- External dimensions:
  - Width: 102.6 (H) X 48 (W) X 163 (D)
  - 30,50,75,270 (H) X 60 (W) X 239 (D)
  - 100,150,270 (H) X 120 (W) X 274 (D)
  - 200,250,320 (H) X 120 (W) X 274 (D)
  - 300,400,500,440 (H) X 120 (W) X 310 (D)

Weight:
- 10,20A: Approx 0.9Kg  
- 30,50,75A: Approx 2.4Kg  
- 100,150A: Approx 4.5Kg  
- 200,250A: Approx 6.0Kg  
- 300,400,500A: Approx 10.5Kg

Terminal screw:
- Rated current (A): 10,20,30,50,75,100,150,200,250,300,400,500A  
- Main circuit terminal  
- Protective conductor terminal  
- V terminal

- M4  
- M5  
- M6  
- M8  
- M10  
- M12  
- M16

**INPUT SPECIFICATIONS**

- Input signal: 4 to 20mA, 0 to 10V DC, 0 to 5V DC, 1 to 5V DC, Logic input (L.0V DC input ≤ ±1V DC, H.4.0V DC input ≤ ±0.1V DC)
- Sampling rate: 10ms  
- Input resistance: Current input: 1000Ω  
- Voltage input: 150kΩ  
- Allowable signal source resistance: Voltage input: 1000 or less  
- Allowable current: Current input: ±40mA  
- Voltage input: ±20V AC

**OUTPUT SPECIFICATIONS**

- Control type: Phase-angle firing Zero-cross firing  
- Feed back type: Voltage, current, power or no feedback (switchable)
- Output range: 0 to 98% of rated voltage  
- Output accuracy: ±1% FS of rated voltage  
- Voltage feedback: ±1% FS of rated voltage (At ±1% fluctuation of rated voltage)
- Current feedback: ±3% FS of rated current (At ±1% fluctuation of rated current and to 1 to 3 times variation of load resistance)
- Power feedback: ±3% FS of rated voltage (At ±1% fluctuation of rated current and to 1 to 3 times variation of load resistance)
- Accuracy: To be considered under reference operation conditions, and in the 10 to 99% range of rated voltage (At the time of voltage feedback specifications / rated current at the time of current feedback specifications / rated power at the time of power feedback specifications)
- CT error is not included. Display value is not in the scope of accuracy guaranteed.
- Resistance load: SiC, Nichrome, iron chrome, molybdenum disilicide, Platinum, Tungsten, Molybdenum etc.
- Inductive load: Transformer load (Applicable for phase-angle firing and primary control. Magnetic flux density below 1.2T is recommended).
- Allowable voltage fluctuation range: ±10% of rated voltage

**ALARM FUNCTION**

- Alarm types: Over current, Blown rapid fuse, Abnormal frequency, Operation failure, Heat sink excessive temperature rise (Above rated current 200A)
- Operation stop
- Operation continue

**ALARM OUTPUT**

- Output points: Mechanical relay 2 points  
- Output capacity (Mechanical relay output):
  - Resistance load 240V AC 1A  
  - 30V DC 1A  
  - Inductive load 240V AC 1A  
  - 30V DC 1A  
  - Smallest load 5V DC 10mA

**EXTERNAL SIGNAL INPUT (DI)**

- Input points: 2 points  
- Input signal: Non-voltage contact  
- External contact capacity: 5V DC 2mA  
- Function: Switching of start / stop, auto / manual, phase-angle / zero-cross

*1 Set by the setting display unit on the main unit (at initial power on)  
*2 Note that the control power supply voltage is 220 V  
*3 Accuracy in reference operating conditions and within the rated range of 10 to 90%.
EXTERNAL SETTING INPUT (AI)
Input point: 2 points
External variable resistance: 10KΩ recommended (within 2 to 20 KΩ)
Function: Ramp, current limit, elevation, manual output, soft-start

CT
External CT: 5A output for full scale of thyristor rated current model

SUPPORTING FUNCTION
Ramp: 0 to 100% of output range
Elevation: 0 to 100% of output range
Soft-start: 0.1 to 20.0 seconds
Current limit: 0 to 100% of output range

PROTECTIVE FUNCTION
Over current: Operation stops at 120% or over of rated current
Instantaneous power failure detection: Voltage reduction of control power supply (about 70% or lower of rated voltage)

COMMUNICATION INTERFACE
Type: RS485
Protocol: MODBUS-RTU, MODBUS-A-ASCII
Function: High order communication
Communication specification

<table>
<thead>
<tr>
<th>Item</th>
<th>RTU mode</th>
<th>ASCII mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication method</td>
<td>Half duplex start-stop synchronization method</td>
<td></td>
</tr>
<tr>
<td>Communication speed</td>
<td>9600, 19200 bps</td>
<td></td>
</tr>
<tr>
<td>Transmission code</td>
<td>Binary</td>
<td>ASCII</td>
</tr>
<tr>
<td>Error check</td>
<td>Vertical direction</td>
<td>Parity</td>
</tr>
<tr>
<td></td>
<td>Horizontal direction</td>
<td>CRC-16, LRC</td>
</tr>
<tr>
<td>Start bit</td>
<td>1 bit</td>
<td></td>
</tr>
<tr>
<td>Data length</td>
<td>8 bit</td>
<td>7 bit / 8 bit</td>
</tr>
<tr>
<td>Parity bit</td>
<td>None/Even Number/Odd Number</td>
<td></td>
</tr>
<tr>
<td>Stop bit</td>
<td>1 bit / 2 bit</td>
<td></td>
</tr>
</tbody>
</table>

*Not supported when data length is 7 bit (No parity bit)

REFERENCE OPERATING CONDITIONS
Ambient temperature: 23°C ± 2°C
Ambient humidity: 55%RH ± 5% (no condensation)
Power voltage: 220 VAC ± 1%
Main circuit power supply and voltage: Rated voltage ± 1%
Power supply frequency: 50 / 60Hz ± 1Hz
Mounting angle: Forward and backward —— within ±1°
Altitude: 1000m or less
Vibration: 0.5g
Shock: 0.5g
Installation condition: Single panel mounting

NORMAL OPERATING CONDITIONS
Ambient temperature: -10°C to 50°C (50°C to 55°C in case rated current are 90%)
Ambient humidity: 20 to 90%RH (no condensation)
Power voltage: 200 to 240VAC
Main circuit power supply and voltage: Rated voltage ± 10%
Power supply frequency: 50 / 60Hz ± 2Hz
Mounting angle: With vertical direction, within ±2° in forward and backward, within ± 2° in lateral
Installation height: 1000m or below
Vibration: 0.5g
Shock: 0.5g
Installation condition: Single panel mounting
External noise: None
Rate of change of temperature: Less than 1°C / hour

TRANSPORT CONDITIONS
Ambient temperature: -20 to 60°C
Ambient humidity: 5 to 95%RH (no condensation)
Vibration: 4.9m/s² or less (10 to 60Hz)
Shock: 3.9gms² or less
(under factory packing condition)

STORAGE CONDITIONS
Ambient temperature: 20 to 60°C
Ambient humidity: +10 to 30°C for long-term storage
Ambient humidity: 5 to 95%RH (no condensation)
Vibration: 0.5g
Shock: 0.5g (under factory packing condition)

SETTING DISPLAY (Panel mount type)
Installation: Panel mount type
Between main body and setting display are exclusive cable SH-JMK9(3m), SH-JMK9(5m), SH-JMK9(8m)
Power supply: supply from main body
Ambient temperature: -10 to 55°C
Ambient humidity: 20 to 90%RH (no condensation)
Weight: 50 g

INTERNATIONAL STANDARD
CE marking: Make sure to use specified filter to comply with low voltage directive and EMC directive.
Low Voltage directive: EN60947-4-3 (For4) Pollution degree 2
EMC directive: EN60947-4-3 (For4)
EMC test standard

<table>
<thead>
<tr>
<th>Emission type</th>
<th>Test standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducted interference</td>
<td>CISP11 Class A Groupe 2</td>
</tr>
<tr>
<td>Radiation electromagnetic field</td>
<td>CISP11 Class A</td>
</tr>
</tbody>
</table>

Immunity standard: according to EN60947-4-3 below

<table>
<thead>
<tr>
<th>Test type</th>
<th>Test standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrostatic discharge</td>
<td>EN61000-4-2</td>
</tr>
<tr>
<td>Radio frequency radiation electromagnetic field</td>
<td>EN61000-4-3</td>
</tr>
<tr>
<td>First transient / Burst</td>
<td>EN61000-4-4</td>
</tr>
<tr>
<td>Surge</td>
<td>EN61000-4-5</td>
</tr>
<tr>
<td>Conducted disturbances induced by radio-frequency and voltage</td>
<td>EN61000-4-6</td>
</tr>
<tr>
<td>Voltage dip</td>
<td>EN61000-4-11</td>
</tr>
</tbody>
</table>

This product is a target device for harmonic control measures guidelines that receive high voltage or extra high voltage. (Harmonic generator)

| Circuit classification | 7 |
| Circuit type | 71 AC power regulator (Resistance load) |
| Conversion factor | 1.6 |
### NAMES AND FUNCTIONS OF PARTS

<table>
<thead>
<tr>
<th>10.20A</th>
<th>100.150A</th>
<th>300.400, 500A</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Diagram" /></td>
<td><img src="image2.png" alt="Diagram" /></td>
<td><img src="image3.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

1. Setting display unit  
2. Setting terminal  
3. Control power terminal  
4. Main circuit terminal (U1: Power supply side)  
5. Main circuit terminal (U2: Load side)  
6. Feedback terminal (V terminal)  
7. Protective conductor (ground) terminal  
8. Power supply / control unit  
9. Engineering port  
*Maintenance use only (Cannot be used)*  
10. Shield connection terminal  
*For panel mounting setting display unit*

### NAMES AND FUNCTIONS OF SETTING DISPLAY UNIT

<table>
<thead>
<tr>
<th>Main body</th>
<th>Panel mounting type</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4.png" alt="Diagram" /></td>
<td><img src="image5.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

1. DISP1  
2. DISP2  
3. Status lamp  
4. Elevation / lamp display  
5. Analog bar indication display  
6. Alarm output indication display  
7. Busy lamp  
8. Communication error lamp  
9. Power lamp  
10. Operation keys
**CONNECTION OF POWER SUPPLY, SETTING INPUT AND COMMUNICATION**

To prevent the risk of getting electric shock, make sure to turn OFF the power supply before doing wiring.

***Control power supply terminal***

- L: It is necessary to match main circuit power supply and the phase. Step-up transformer is required if main circuit rated voltage is lower than 100V line. Step-down transformer is required if main circuit rated voltage is 400V line.

***Main circuit terminal***

- U1 terminal power supply side (L, N): Position of main circuit terminals differs depending on the rated current. Refer to P6 'Names and functions of parts.'

***Protection conductor (grounding) terminal***

- Make sure to connect protective conductor (ground) terminal of the instrument to the protective conductor (ground) terminal of power supply facility. Position of protective conductor (ground) terminal differs depending on the rated current. Put crimp type terminal with insulation sleeves to the ground cable first and then connect. Refer to P6 'Names and functions of parts.'

***Feedback terminal***

- Location of feedback terminal varies depending on rated current of the instrument. Refer to P6 Names and Functions of Parts'. For wiring of the feedback terminal, put crimp type terminal as shown below.

---

**CONNECTION OF SETTING INPUT TERMINALS**

- DC voltage / DC current / Logic input terminal

<table>
<thead>
<tr>
<th>Input range</th>
<th>Allowable input voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 to 20mA</td>
<td>±20VDC</td>
</tr>
<tr>
<td>0 to 5V</td>
<td>±10VDC</td>
</tr>
<tr>
<td>1 to 5V</td>
<td>±4VDC</td>
</tr>
</tbody>
</table>

- Voltage / logic input

- Current input: ±20mA or ±4VDC

***External signal input (DI) terminal***

- Wiring to relay and switch

- Wiring to open collector output

- At the purchase, short-circuit bar is placed between DI2 and COM (between 11-12 terminals). Take it out if using external signal input (DI).

***External signal input (AI) terminal***

- At the purchase, short-circuit bar is placed between Vref.4V and A1 (between 13-14 terminals). Take it out if using external setting input (AI).

- Use 10kΩ for external variable resistor.

***External current transformer (CT) terminal***

- CT specification: 5A output to rated current full scale.

---

**Wiring of alarm output terminals**

- An order to prevent electric shocks, shut down the power supply and buffer relay power supply before wiring.

- Connect cables via buffer relay if the load capacity exceeds the built in relay capacity of the instrument.

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**Alarm relay output (2 points 'a' contact)**

- AL1: Over current • Blown rapid fuse
- AL2: Abnormal frequency • Operation failure
- AL3: Heat sink excessive temperature rise • Heater disconnection • Loop failure
- \( AL3: \) Power supply failure • Cooling fan failure

---

Set to RSK15 using selector switch.

Please do not connect the SG line to the FG terminal of the instrument or a grounding terminal.

---

Cable for RS232C (length 15m)

- RZ-CRS8
  - Protocol converter SC8-10
  - Set to RS485 using selector switch.

---

CT specification: 5A output to rated current full scale.

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Z: Contact protective element. (It is recommended to mount this element on the 'a' side)
JM SERIES

Basic wiring

Main circuit rated voltage 200V series

![Diagram of JM body]

Main circuit power supply in case rated voltage 220V AC

Main circuit rated voltage 100V series

The step-up transformer

CH1-H381-014

Main circuit power supply in case rated voltage 100V AC

Main circuit rated voltage 400V series

The step-down transformer

CH1-H381-013

Control power supply terminal (200 to 240V AC)

Main circuit terminal (Load side)

Heat terminal

Types of terminals and terminal process

For control power terminals, use type O terminals without fail to ensure safety. It is recommended to use O type terminals for other terminals also as far as possible.

<table>
<thead>
<tr>
<th>Terminal base</th>
<th>Screw diameter</th>
<th>Tightening torque (Unit : mm)</th>
<th>Terminal base</th>
<th>Screw diameter</th>
<th>Tightening torque (Unit : mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main circuit terminal (500A)</td>
<td>M16</td>
<td>O-type 12 or less</td>
<td>Protective conductor terminal</td>
<td>M5</td>
<td>O-type 12 or less</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 or less</td>
<td>(10A, 20A)</td>
<td></td>
<td>12 or less</td>
</tr>
<tr>
<td>Main circuit terminal (300A, 400A)</td>
<td>M12</td>
<td>O-type 13 or more</td>
<td>Main circuit terminal (10A, 20A)</td>
<td>M4</td>
<td>O-type 13 or more</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17 or more</td>
<td>Feedback terminal (30 to 500A)</td>
<td></td>
<td>17 or more</td>
</tr>
<tr>
<td>Main circuit terminal (200A, 250A)</td>
<td>M10</td>
<td>O-type 10.5 or more</td>
<td>Control power supply terminal</td>
<td>M3</td>
<td>O-type 10.5 or more</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13 or more</td>
<td>Communication terminal</td>
<td></td>
<td>13 or more</td>
</tr>
<tr>
<td>Main circuit terminal (100A, 150A) Protective conductor terminal (100A to 500A)</td>
<td>M8</td>
<td>O-type 6 or more</td>
<td>Setting input terminal</td>
<td></td>
<td>O-type 6 or more</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18 or more</td>
<td>Feedback terminal (10A, 20A)</td>
<td></td>
<td>18 or more</td>
</tr>
<tr>
<td>Main circuit terminal (ground) terminal (30A, 50A, 75A)</td>
<td>M6</td>
<td>O-type 15.6 or more</td>
<td></td>
<td></td>
<td>O-type 15.6 or more</td>
</tr>
</tbody>
</table>

*To fasten two terminal together, use type O terminal 5.8 mm or more.
Wiring of CE marking conformity

It complies with CE marking by connecting to a specific noise filter. This is applicable if rated current of the instrument is 10 to 150A.

Main circuit rated voltage 200V series

Main circuit power supply in case rated voltage 200V AC

Main circuit rated voltage 100V series

*If main circuit power supply is 100 to 120 V, use step-up transformer (CH1-4H381-014)"

Main circuit rated voltage 400V series

*If main circuit power supply is 380 to 440 V, use step-down transformer (CH1-4H381-013)

Noise filter (Please arrange by yourself)

<table>
<thead>
<tr>
<th>Main circuit power supply voltage (V)</th>
<th>Rated current (A)</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 to 240</td>
<td>10</td>
<td>HF2010A-UP</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>HF2020A-UP</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>HF2030A-UP</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>HF2050A-UP</td>
</tr>
<tr>
<td></td>
<td>75</td>
<td>HF2075A-UP</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>HF2100A-UP</td>
</tr>
<tr>
<td></td>
<td>150</td>
<td>HF2150A-UP</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main circuit power supply voltage (V)</th>
<th>Rated current (A)</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>380 to 440</td>
<td>10</td>
<td>NF3010C-SVB</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>NF3020C-SVB</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>NF3030C-SVB</td>
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<td>50</td>
<td>NF3050C-SVB</td>
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<td>75</td>
<td>NF3075C-SVB</td>
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<tr>
<td></td>
<td>100</td>
<td>NF3100C-SVB</td>
</tr>
<tr>
<td></td>
<td>150</td>
<td>NF3150C-SVB</td>
</tr>
</tbody>
</table>

Accessories

External setting unit (VL-JAL)

<table>
<thead>
<tr>
<th>Model</th>
<th>Purpose of use</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>VL-JAL</td>
<td>Ramp setting, current limit, elevation, manual output, soft start.</td>
<td>Variable resistance 10 kΩ</td>
</tr>
</tbody>
</table>

Exclusive cable for connected between main body and setting display (Corresponds to panel installation specs)

Cooling fan unit SH-JMFAN
Rapid fuse

<table>
<thead>
<tr>
<th>Rated current (A)</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>660CF-20ULTC*</td>
</tr>
<tr>
<td>20</td>
<td>660CF-30ULTC*</td>
</tr>
<tr>
<td>30</td>
<td>660GH-50SULTC</td>
</tr>
<tr>
<td>50</td>
<td>660GH-80SULTC</td>
</tr>
<tr>
<td>75</td>
<td>660GH-100SULTC</td>
</tr>
<tr>
<td>100</td>
<td>660GH-160SULTC</td>
</tr>
<tr>
<td>150</td>
<td>660GH-200SULTC</td>
</tr>
<tr>
<td>200</td>
<td>660GH-315S</td>
</tr>
<tr>
<td>250</td>
<td>660GH-350S</td>
</tr>
<tr>
<td>300</td>
<td>250GH-450S</td>
</tr>
<tr>
<td></td>
<td>660GH-450S</td>
</tr>
<tr>
<td>400</td>
<td>250GHW630S</td>
</tr>
<tr>
<td></td>
<td>660GH-630S</td>
</tr>
<tr>
<td>500</td>
<td>250GHW710S</td>
</tr>
<tr>
<td></td>
<td>660GH-710S</td>
</tr>
</tbody>
</table>

*This rapid fuse is for external attachment. Fuse holder is required separately. Alarm is not activated for blown fuse.

External fuse unit

Fuse holder (HK1038UL) / Fuse holder cover (HC-10)

<table>
<thead>
<tr>
<th>Applicable fuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>10A : 660CF-20ULTC</td>
</tr>
<tr>
<td>20A : 660CF-30ULTC</td>
</tr>
</tbody>
</table>

CT (Current transformer)

<table>
<thead>
<tr>
<th>Rated current (A)</th>
<th>Models</th>
<th>Number of turns</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>CW-5L-1005A</td>
<td>10</td>
<td>TYPE1</td>
</tr>
<tr>
<td>20</td>
<td>CW-5L-1005A</td>
<td>5</td>
<td>TYPE1</td>
</tr>
<tr>
<td>30</td>
<td>CW-5L-1505A</td>
<td>5</td>
<td>TYPE1</td>
</tr>
<tr>
<td>50</td>
<td>CW-5L-1005A</td>
<td>2</td>
<td>TYPE2</td>
</tr>
<tr>
<td>75</td>
<td>CW-5L-1505A</td>
<td>2</td>
<td>TYPE2</td>
</tr>
<tr>
<td>100</td>
<td>CW-5L-1005A</td>
<td>1</td>
<td>TYPE2</td>
</tr>
<tr>
<td>150</td>
<td>CW-5L-1505A</td>
<td>1</td>
<td>TYPE2</td>
</tr>
<tr>
<td>200</td>
<td>CW-5L-2005A</td>
<td>1</td>
<td>TYPE2</td>
</tr>
<tr>
<td>250</td>
<td>CW-5L-2505A</td>
<td>1</td>
<td>TYPE2</td>
</tr>
<tr>
<td>300</td>
<td>CW-5L-3005A</td>
<td>1</td>
<td>TYPE2</td>
</tr>
<tr>
<td>400</td>
<td>CW-5L-4005A</td>
<td>1</td>
<td>TYPE2</td>
</tr>
<tr>
<td>500</td>
<td>CW-5L-5005A</td>
<td>1</td>
<td>TYPE3</td>
</tr>
</tbody>
</table>

Transformer for control power supply

- **The step-up transformer**
  - CH1-4H381-014
  - Main circuit rated voltage 100V series
  - Capacity 50VA
  - Weight approx. 1.8kg

- **The step-down transformer**
  - CH1-4H381-013
  - Main circuit rated voltage 400V series
  - Capacity 50VA
  - Weight approx. 2.2kg

Specifications subject to change without notice. Printed in Japan (1) 2020. 7