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SHIMADEN

Series **PAC18A**

RH

SINGLE-PHASE THYRISTOR POWER REGULATOR

SHIMADEN



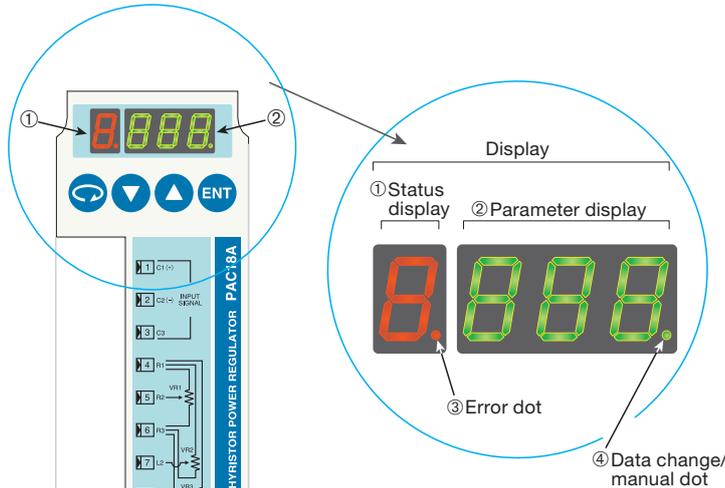
BASIC FEATURES

- **Easy Front Key Setting**
- **A 7-segment LED Displays Input and Output Values and Various Parameters.**
- **Slow-Up, Slow-Down Function**
- **Current Detection/Alarm Output Function (Optional)**
- **Data Communication Function (Optional)**
- **Universal Power Supply (100–240V AC)**
- **Automatic Frequency Discerning Function (50/60Hz)**
- **6 toxic substances, which are subject to RoHS Directive, are contained. However, the amount of toxic substances contained does not exceed standardized values.**

RoHS: EN50581

■ Key Operation

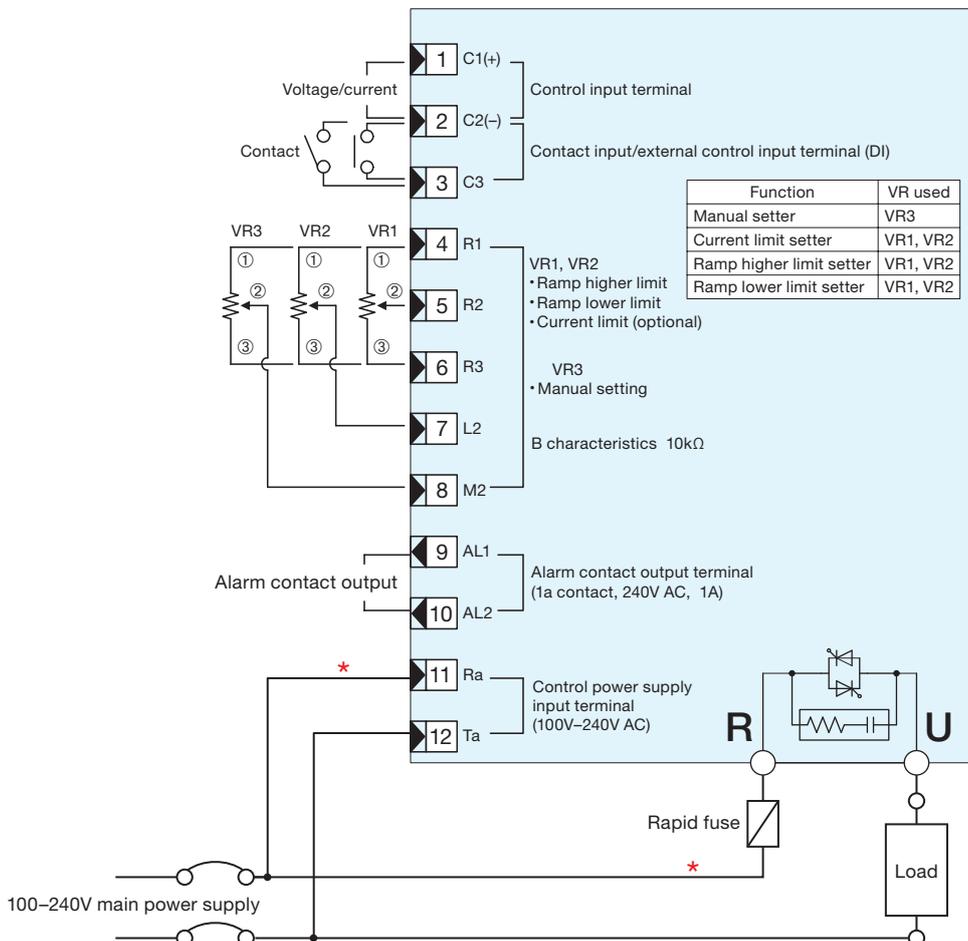
| | |
|---------------|---|
| Parameter key | For switching screens within each screen group |
| | Pressing for two seconds will switch between monitor screen group and user parameter screen group. |
| Down key | Pressing for two seconds will switch from initial setting screen group/ manual output screen group to monitor screen group. |
| | For changing modes and values in each parameter setting screen |
| Up key | Pressing for five seconds will change from monitor screen group to initial setting screen group. |
| | For setting of each parameter screen |
| Enter key | For registration of set data on each parameter setting screen |
| | Pressing for two seconds will switch from monitor screen group to manual output screen group. |



■ Display

| | |
|---|---|
| ① Status display (single digit in red) | Displays status symbols indicating each parameter. |
| ② Parameter display (triple digits in green) | Displays an alarm code in response to an occurrence of abnormality in the case of "output monitor." |
| ③ Error dot (red dot on status display) | Displays parameter symbols and related information (data). |
| ④ Data change/manual dot (green dot on parameter display) | Blinks when unable to display an alarm code on the display in response to an occurrence of abnormality (except using "output monitor"). |
| | Blinks when changing data and selecting manual operation. |

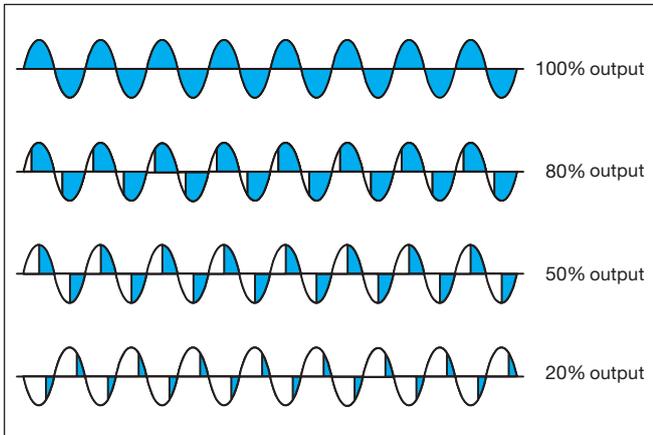
EXTERNAL CONNECTION DIAGRAM



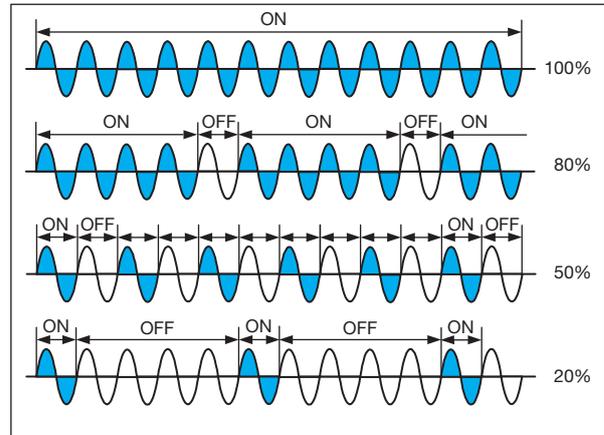
*Note: Main circuit (power supply for loading) R terminal and the control circuit Ra terminal should be used in the same phase.

This device has the phase control system and the cycle calculation zero voltage switching control system. When ordering, please specify either control system to be initially set. However, the control system can be changed manually. Either system can be set in the key sequence. A comparison table of characteristics is shown below.

Phase control system



Cycle calculation zero voltage switching control system

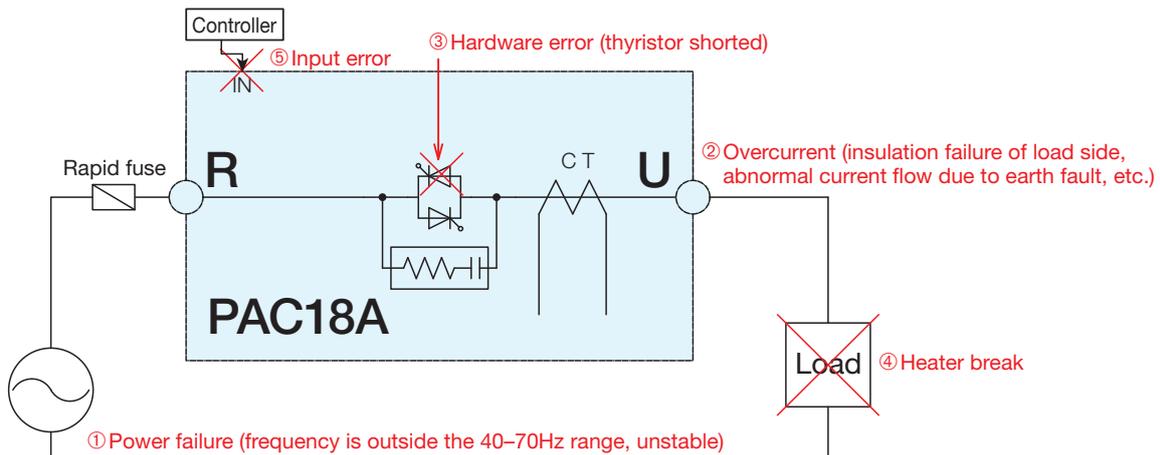


| Control system | Phase control system | Cycle calculation zero voltage switching control system |
|-----------------------------|--------------------------------------|---|
| Applicable load | Resistive load, inductive load, etc. | Resistive load |
| Transformer primary control | Available | Not available |
| Feedback control | Available | Not available |
| High harmonic disturbance | Possibility of occurrence | None |
| Flickering occurrence | None | Possibility of occurrence |
| Response time | Fast | Slow |
| Power factor | Low | High |

ALARM DETECTION

When abnormality occurs, an alarm output will be sent externally. In addition, the state of the device will be displayed on the front display (status display) using an alarm code/error dot.

| Alarm type | Display | Conditions | Alarm output | Corresponding action |
|-----------------------------|---------|--|--|---|
| ① Power failure | "P" | Power supply frequency is outside the 40-70Hz range, or when power supply frequency is unstable. | Available | Stops output. Output is automatically reset if alarm conditions are eliminated. |
| ② Overcurrent (optional) | "L" | Output current exceeds 130% of rating. | Available | Stops output. Turn off the power, remove the cause, and then turn the power back on. |
| ③ Hardware error (optional) | "H" | Output current flows when output is 0%. | Available | Stops output. If a hardware error alarm occurs even if a load is connected, repair is required. |
| ④ Heater break (optional) | "H" | Heater break is detected. | Available (This can be disabled by DI function.) | Control continues. |
| ⑤ Input error | "I" | Control input is below -10% or over 110%. | Not available | |



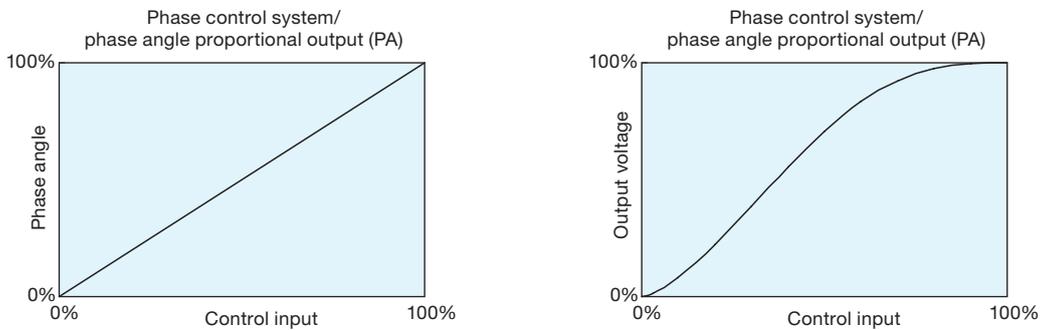
Selection and switching of control systems, based on load characteristics, between the following two kinds of systems by using a digital display and front panel key operation are available: Phase control system (phase angle proportional output, voltage proportional output, square of voltage (power) proportional output, current feedback) (switchable among four modes) and cycle calculation zero voltage switching control system (single mode). You can specify the control system when ordering.

| Parameter symbol | Control system |
|------------------|--|
| <i>PA</i> | Phase control system/phase angle proportional output |
| <i>PA-V</i> | Phase control system/voltage proportional output |
| <i>CFb</i> | Phase control system/current feedback *When current detection/alarm output function (optional) is attached. |
| <i>PA-U</i> | Phase control system/square of voltage (power) proportional output |
| <i>CC</i> | Cycle calculation zero voltage switching control system |

*Remark: When power is applied (when setting control system), parameter symbols will be displayed on the parameter display based on the selected control system. Current feedback system is optional.

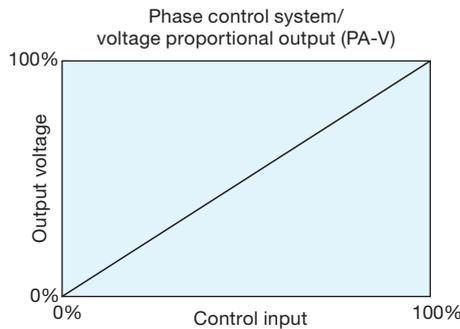
(1) Phase control system/phase angle proportional output *PA*
(same system as used for the conventional product PAC15P)

Phase angle output proportional to control input signal can be obtained.
 Please use the current limit function and the variation limit function concurrently when inrush current load is large.



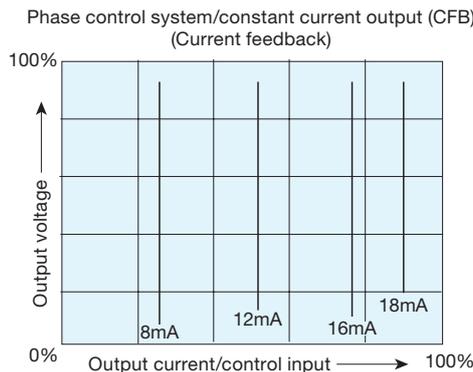
(2) Phase control system/voltage proportional output *PA-V*

Output voltage proportional to control input signal can be obtained.
 Please use the current limit function and the variation limit function concurrently when inrush current load is large.



(3) Phase control system/current feedback output *CFb* (optional)

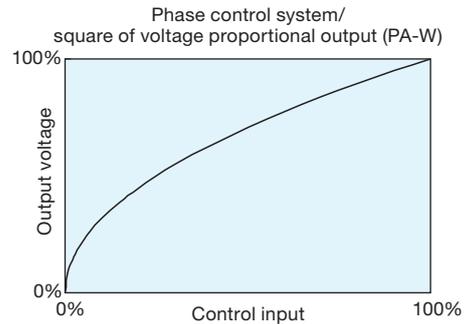
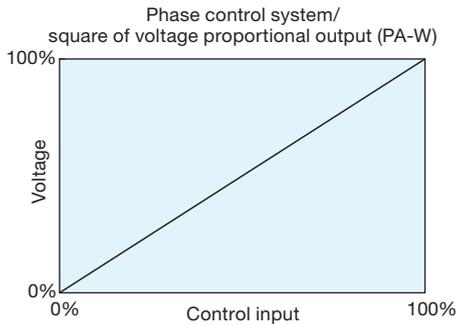
Output current proportional to control input signal can be obtained. If control input is set constant, even when load fluctuation and power supply fluctuation occur, output current will be constantly controlled. Please use the current limit function and the variation limit function concurrently when inrush current load is large.



(4) Phase control system/square of voltage (power) proportional output $PA-\bar{U}$

Square of voltage output proportional to the control input signal can be obtained.

Since power against fixed resistance is proportional to square of voltage, power corresponding to control signal can be obtained by applying to fixed resistance heaters (nichrome, iron-chromium, etc.). Please use the current limit function and the variation limit function concurrently when inrush current load is large.

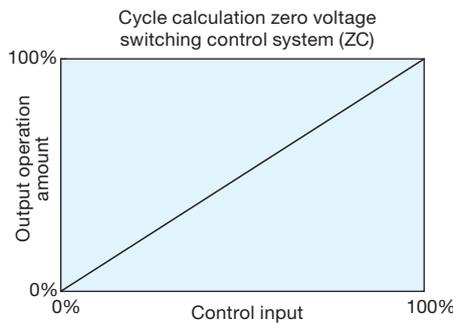


(5) Cycle calculation zero voltage switching control system $\Xi\bar{U}$

(same system as used for the conventional product PAC15C)

Cycle output proportional to control input can be obtained.

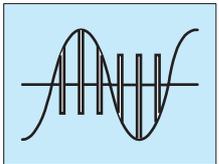
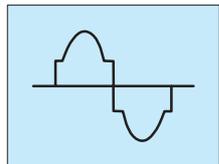
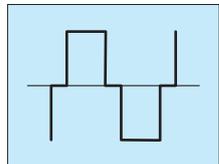
There is less noise occurrence compared to phase angle control. Current limit function will be disabled.



EXCELLENT RESISTANCE TO POWER-SUPPLY NOISE

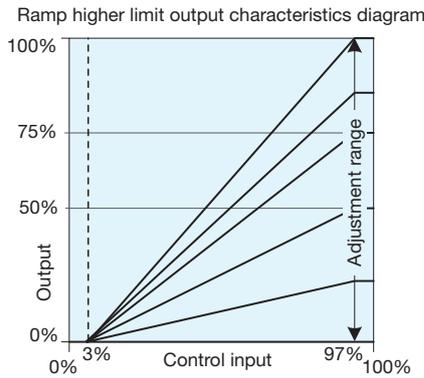
PAC18A provides stable performance against various power-supply noise by automatically corresponding itself to the power supply condition used.

Please use power supply within the 50–60Hz range.

| Various power-supply noise | Performance of PAC18A |
|---|---|
|  <p>Sine wave with notched noise</p> | Stably performs against the notched noise superposed to sine wave power supply. |
|  <p>Sine wave</p> | Stably performs against the distortion in the vicinity of zero cross of sine wave power supply. |
|  <p>Quasi sine wave</p> | Stably performs against the quasi sine wave environment of an inverter, etc. |

(1) Ramp higher limit (high power)

The output value for ramp higher limit can be adjusted from 0.1 to 100.0% when the control input is 100%. Because maximum output is turned down, output ramp of the device relative to the control input signal is changed. This can be also set by using the external adjuster (sold separately).

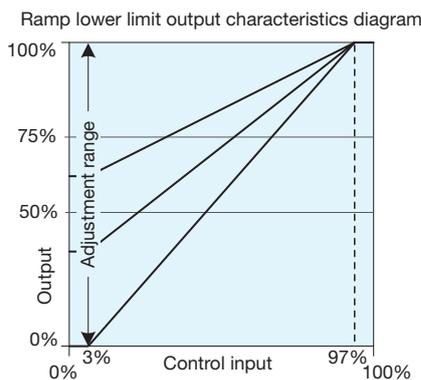


Ramp higher limit setting range: 0.1–100%

(2) Ramp lower limit (low power)

The output value for ramp lower limit can be adjusted from 0.0 to 99.9% when the control input is 0%. It is used when you want to output even when control input is 0%. Because minimum output is adjusted, output ramp of the device relative to the control input signal is changed.

Adjustment can also be conducted by using the external adjuster (sold separately).

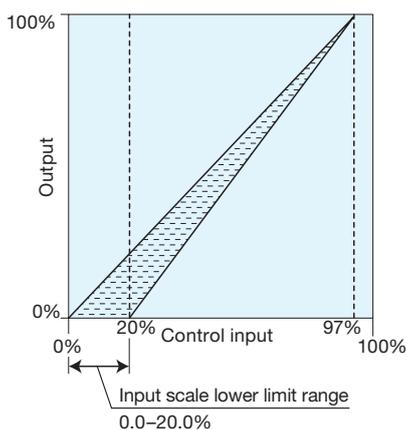


Ramp lower limit setting range: 0.0–99.9%

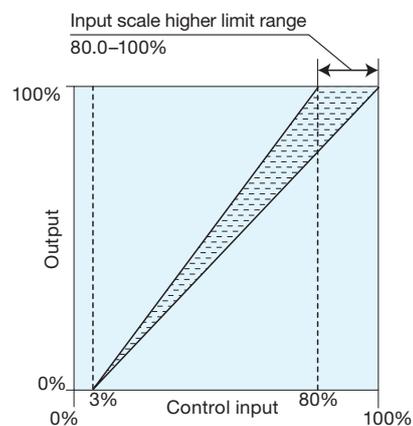
(3) Input scaling

Settings the key sequences for the “control input scale lower limit” and the “control input scale higher limit” can be conducted. This sets the output for below the setting lower limit value to 0% and above the setting higher limit to 100%.

Example) Input/output characteristics diagram of scale lower limit setting

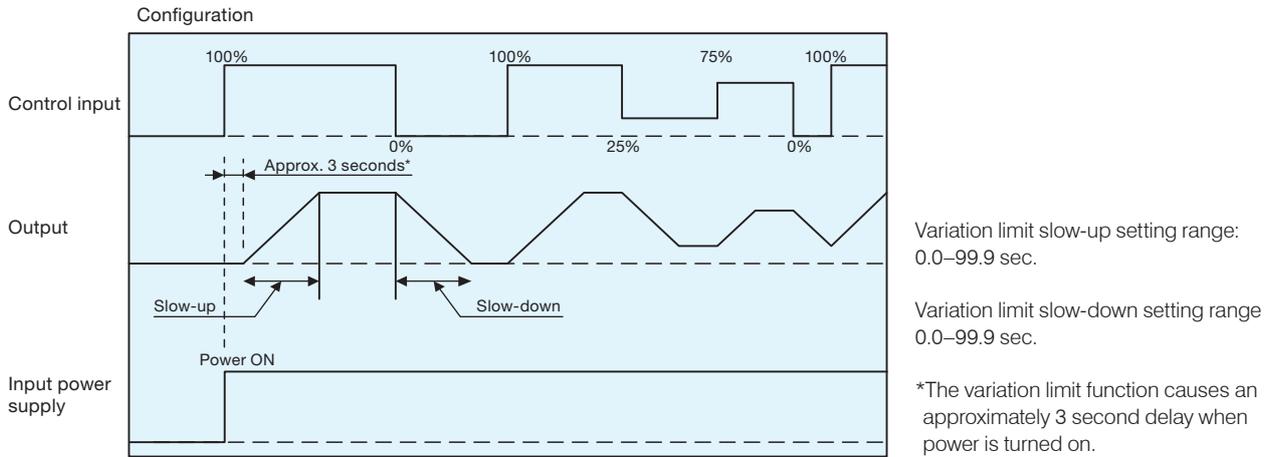


Example) Input/output characteristics diagram of scale higher limit setting



(4) Variation limit (slow-up time/slow-down time)

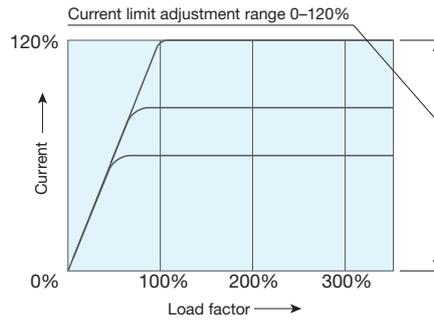
The variation limit function delays the output response of PAC18A against rapid changes in the control input signals and settings. This function prevents the excessive change in load current, thus lowering the burden on load equipment and power equipment.



(5) Current limit: only for phase control system (optional)

This is a function for limiting the current to the set current value (within 0–120% of the rated current) and used when controlling platinum/molybdenum/tungsten heaters which generate an initial inrush current, and SiC heaters.

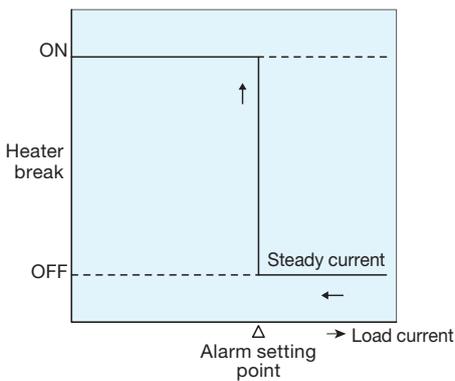
Caution: Do not apply a continuous load which exceeds the current limit value. This may cause hunting of output current.



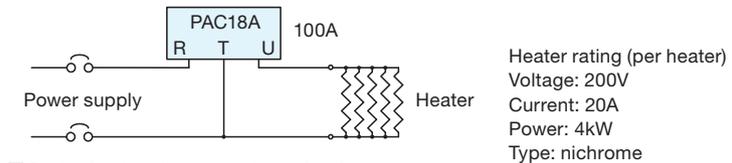
(6) Heater break alarm (optional)

This function detects load current, comparing the load current value and alarm setting value: An alarm is created when the load current is below the set value.

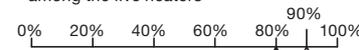
Note: Changing resistance of SiC heaters can be controlled as they are standard heaters. However, a heater break may be falsely detected since resistance variation is significant. In addition, to prevent malfunctions, the heater break alarm is disabled when phase angle of output is less than 15%.



■ When thyristor rating is 100A and the heat source uses five heaters of the same rating:



□ Setting for alarm in case one heater breaks among the five heaters



The current value resulting from a single heater break will be 80% of the rating. When considering variation in heater resistance, in order to alarm securely, it is recommended to establish setting at 50% higher than the current value per heater. In this case, the current value per heater becomes 20% of the rating, thus the setting for a single heater break alarm will be as follows: Current value (80%) when single heater break + current value (20%) of a single heater $\times 0.5 = 90\%$.

- Model : PAC18A
- Control element configuration : Thyristor × 2, inverse-parallel connection
- Main/control power supply : 100–240V AC, 7VA (main power supply and control power supply to be used in the same phase)
- Power waveform : Sine wave
- Voltage fluctuation tolerance range : Max. ±10% of rated voltage
- Rated frequency : 50/60Hz, automatic recognition (operating range: 40–70Hz)
- Current capacity : Any one of 6 types (20, 30, 45, 60, 80, 100A)
- Minimum load current : 0.6A
- Control output range : 0–97% or more (when power supply voltage is 200V/50Hz)
- Applicable load : Resistive load/inductive load (transformer primary control: Phase control only)
- Control system : The following control systems can be set:
 - Px–: Phase control system: Phase angle proportional output (P0–)
 - Voltage proportional output (P1–)
 - Current feedback (current detection/alarm output function option) (P2–)
 - Square of voltage (power) proportional output (P3–)
 - C1–: Cycle calculation zero voltage switching control system
- Cooling : Self cooling
- Protection : 1) Overcurrent protection function (current detection option):
 - Stops output when detecting approx. 130% of rated current.
 - 2) External rapid fuse (sold separately)
- Control input : Current: 4–20mA DC (receiving impedance 100Ω) or
Voltage: 1–5V, 0–10V DC (input resistance 200kΩ) (select either one from three types.)
Contact two-position control (ON-OFF control)
- Standard functions
- Output adjuster function : Ramp setting (higher limit: 0.1–100%, lower limit: 0.0–99.9%)
Slow-up time/slow-down time (0.0–99.9 sec.)
Input scaling (lower limit: 0.0–20.0%, higher limit: 80.0–100%)
Manual operation (0.0–100%)
- External adjustment function : Ramp setting (higher limit/lower limit) and manual operation adjustment are possible by connecting external adjuster (sold separately) (up to 3 external adjusters can be used).
- Additional functions (optional)
- Output current detection : Built-in current transformer [CT]
- Current limit function : Phase control system is only supported.
 - Limits load current (initial value: 100% of rated current)
 - Current limit value can be set within the rated current range of 0–100% by external adjuster (current limit adjuster), or it can be set within the rated current range of 0–120% by front panel operation.
- Overcurrent alarm : Overcurrent protection function (stops output at approx. 130% of rated current.)
- Hardware error alarm : Alarm is output when thyristor elements error is detected.
- Heater break alarm : Alarm is output when heater break is detected.
 - Heater break judgment: 0–100%
 - *When using changing resistance heater, judgment accuracy of heater break alarm may decrease.
- Alarm output : 1 point, 1a contact, 240V AC, 1A, insulate from system.
 - Select from power failure, overcurrent, hardware error, or heater break.
 - Alarm contact output in response to occurrence of error: duplicate setting is possible.
- Data communication function (optional) : Parameter setting function
Writing/reading of various parameters
- Parameter setting function : Communication protocol: Shimaden protocol
Number of connected units: 1 unit
Connection: Mini jack plug
Communication speed: 9600bps
Number of bits: 7
Parity: EVEN
Stop bit: 1 (fixed)
Writing of each setting parameter, reading of control input value, output value, and alarm
- External control input function : Manual operation
Standby (output OFF)
HB alarm output disabled

- Accessories sold separately
- Data communication adapter : Type: Data communication adapter S5009 (for PAC series): Various settings and displaying of various setting values, control input/output value, and trend graph are possible by connecting PC with USB connection.
- External adjuster : Type: QSV003, B characteristic, 10k Ω , 3 lines
- External rapid fuse, fuse holder : Protects thyristors and power facilities from load shorting, etc. (please refer to page 14 “Rapid fuse (sold separately)” for applicable type.)

- Noise filter

| PAC18A current capacity | Noise filter type |
|-------------------------|-------------------|
| 20A | NF2020C-SDG |
| 30A | NF2030C-SDG |
| 45A | NF2050C-SDG |
| 60A | NF2060C-SDG |
| 80A | NF2080C-SDG |
| 100A | NF2100C-SDG |

- General specifications

• Operating ambient temperature range : -10–55 °C (current must be reduced when 50°C or higher.)

• Operating ambient humidity range : 90% RH or lower (no dew condensation)

• Storage temperature : -20–65 °C

- Internal heat generating temperature

| Current capacity | 20A | 30A | 45A | 60A | 80A | 100A |
|------------------|-----|-----|-----|-----|-----|------|
| Heat value | 22W | 36W | 47W | 65W | 77W | 96W |

- Applicable standard

: Safety: IEC61010-1

EMC: EN61326

However, the specified noise filter (sold separately) must be used.

RoHS: EN50581

- Insulation resistance

Between control power supply terminals : 500V DC, 20M Ω or higher
and control input terminals

Between main power supply terminals : 500V DC, 20M Ω or higher
and chassis

- Dielectric strength

Between control power supply terminal : 2000V AC, 1 minute
and control input terminal

Between main power terminal : 2000V AC, 1 minute
and chassis

- Plastic case material

: Polycarbonate

- External dimensions and weight

20A/30A, W48 × D118 × H170 mm, approx. 0.8kg

45A/60A, W68 × D152 × H188 mm, approx. 1.8kg

80A/100A, W113 × D152 × H204 mm, approx. 3.0kg

- Terminal cover

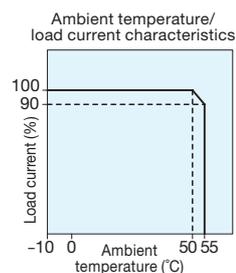
: Attached as standard

CURRENT CAPACITY AND HEAT VALUE

Voltage (0.9–1.3V) is produced between terminals by current flowing to the thyristor. Voltage between terminals and accumulation of current (W) turn into Joule heat resulting in a rise in temperature of the thyristor elements. Take radiation and ventilation into account.

- PAC18A internal heat value (conversion of heat value: 860kcal=1000W)

| Current capacity | 20A | 30A | 45A | 60A | 80A | 100A |
|------------------|-----|-----|-----|-----|-----|------|
| Heat value | 22W | 36W | 47W | 65W | 77W | 96W |



| Item | Code | | Specifications | | Pattern 1 | Pattern 2 |
|--|--------|--|---|--|------------------------------------|-------------------------------|
| Series | PAC18A | | Single-Phase Thyristor Power Regulator | | | |
| Control system | P0- | | Phase control/phase angle proportional output | | ○ Can be changed after purchase | Can be changed after purchase |
| | P1- | | Phase control/voltage proportional output | | | |
| | P3- | | Phase control/voltage square (electric power) proportional output | | | |
| | C1- | | Cycle calculation zero voltage switching control | | | |
| | P2- | | Phase control/current feedback *Output current detection/alarm output function (optional) | | - | |
| Control input | 3 | | Voltage: 1-5V DC, input resistance: 200kΩ, contact: Common | | ○ | ○ |
| | 4 | | Current: 4-20mA DC, receiving impedance: 100kΩ, contact: Common | | | |
| | 6 | | Voltage: 0-10V DC, input resistance: 200kΩ, contact: Common | | | |
| Current capacity | 020- | | 20A | | ○ | ○ |
| | 030- | | 30A | | | |
| | 045- | | 45A | | | |
| | 060- | | 60A | | | |
| | 080- | | 80A | | | |
| | 100- | | 100A | | | |
| Current detection/alarm output function (optional) *Phase control/current feedback may be selected in some cases. | 0 | | Without | | ○ | - |
| | 1 | | With Overcurrent protection, current limit function, alarm output function (power failure/overcurrent/heater break/hardware error) | | | Required |
| Data communication function (optional) | 0 | | Without | | ○ | ○ |
| | 1 | | *Data communication adapter (Data communication adapter (sold separately) can be connected.) | | | |
| Remarks | 0 | | Without | | ○ | ○ |
| | 9 | | With | | | |

Precautions concerning pattern 2

If the control type P2 (phase control/current feedback) is selected in the above item 2 (Control type) for PAC18A, the current detection/alarm output function for item 5 is automatically selected and, therefore, 1 ("With" the function) becomes the only selection.

Pattern 1: No current feedback

Pattern 2: Current feedback

○: Can be selected when purchasing

-: Cannot be selected when purchasing

Rapid fuse and fuse holder (sold separately)

| Name | PAC18A current capacity | Fuse type | Type |
|-----------------------------|-------------------------|--------------------------------------|--------|
| Rapid fuse | 20A/30A | 350GH-50UL | QSF006 |
| | 45A/60A | 350GH-100UL | QSF007 |
| | 80A/100A | CR6L-150 | QSF008 |
| Fuse holder | 20A-60A | HT4017+HP40×2 pcs. | QSH002 |
| | 80A/100A | CMS-5 | QSH003 |
| Rapid fuse with fuse holder | 20A/30A | 350GH-50UL+HT4017+HP40×2 pcs. 1 set | QSF01F |
| | 45A/60A | 350GH-100UL+HT4017+HP40×2 pcs. 1 set | QSF01G |
| | 80A/100A | CR6L-150+CMS-5 1 set | QSF01H |

Data communication adapter S5009 (for PAC series) (sold separately) (USB cable (1.8m) and loader communication cable (2m) are attached.)

| Type |
|-------|
| S5009 |

External adjuster QSV003 (sold separately) (B10k, knob, and scale plate lead (1m) are attached)

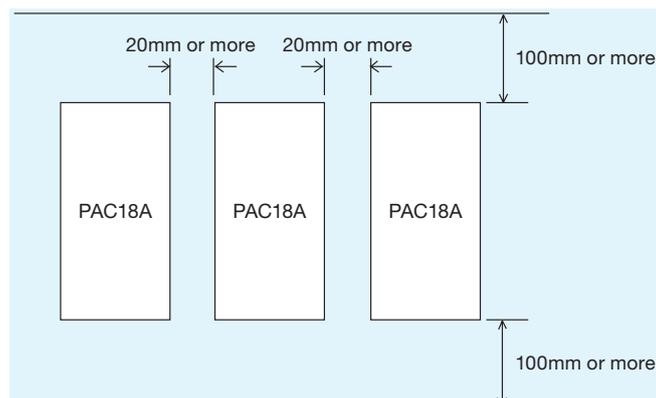
| Type |
|--------|
| QSV003 |

Noise filter (sold separately)

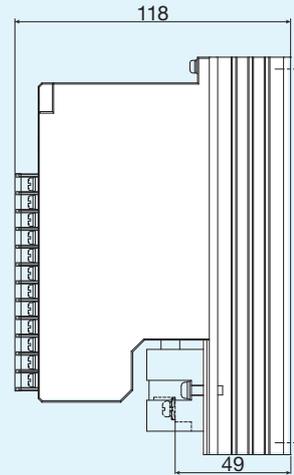
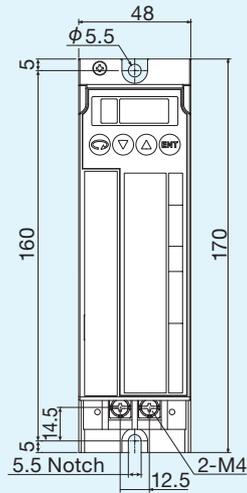
| PAC18A current capacity | Type | Rated capacity |
|-------------------------|-------------|----------------|
| 20A | NF2020C-SDG | 20A |
| 30A | NF2030C-SDG | 30A |
| 45A | NF2050C-SDG | 50A |
| 60A | NF2060C-SDG | 60A |
| 80A | NF2080C-SDG | 80A |
| 100A | NF2100C-SDG | 100A |

Please refer to page 11 and the subsequent pages for details of accessories sold separately.

MOUNTING DIMENSIONS

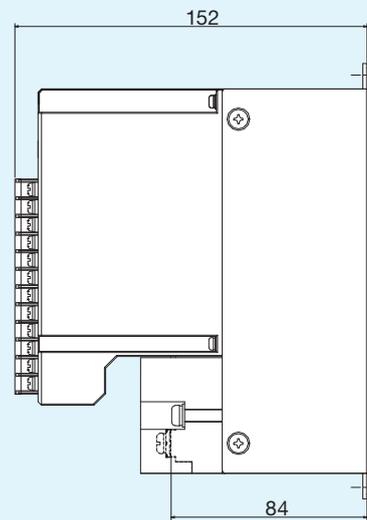
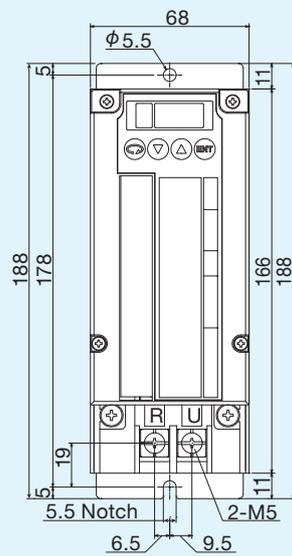


■ 20A/30A
48 × 170 × 118
Approx. 0.8kg



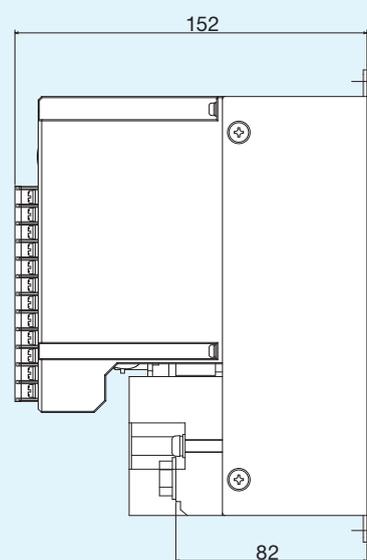
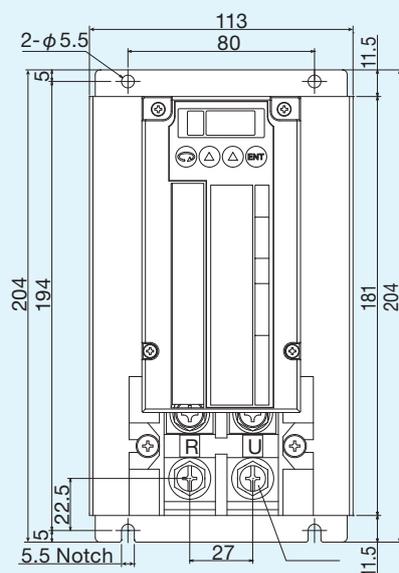
Unit: mm

■ 45A/60A
68 × 188 × 152
Approx. 1.8kg



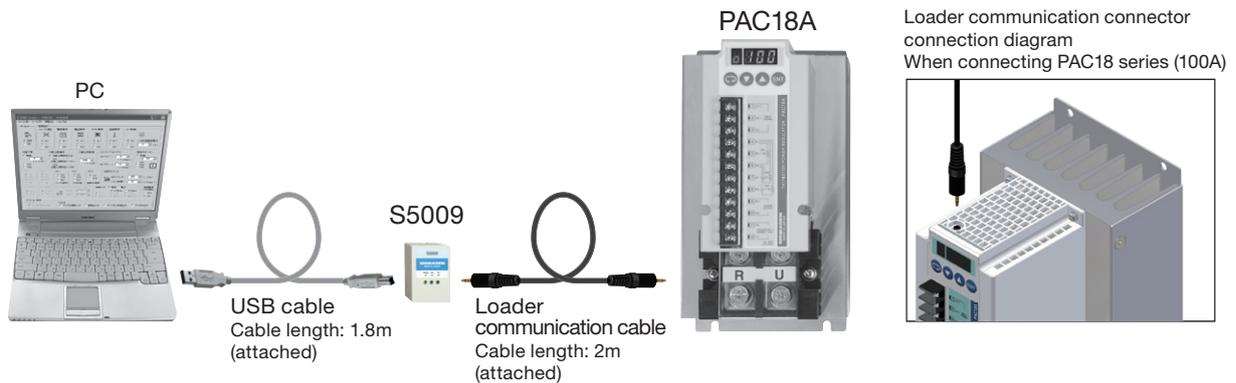
Unit: mm

■ 80A/100A
113 × 204 × 152
Approx. 3.0kg



Unit: mm

- Connect the S5009 and a PC by using the attached USB cable.
- Connect the power regulator PAC18A (when selecting the parameter setting function) and the S5009 by using the attached loader communication cable.
- Operating environment of data communication adapter: OS: Windows XP, Vista, and Windows 7



Note: S5009 Ver. 1.20 or earlier is not compatible with PAC18A.

■ Operation screen

• Parameter settings

The parameter setting for the PAC Loader dialog (figure on the right) will be displayed when activating the setting tool from the start menu. From the model menu, selection of the device and change for the necessary parameter can be conducted.

Parameter setting procedure

1. Select the “model” menu.
2. Select the PAC18A.
3. Set each parameter.

• Monitor functions

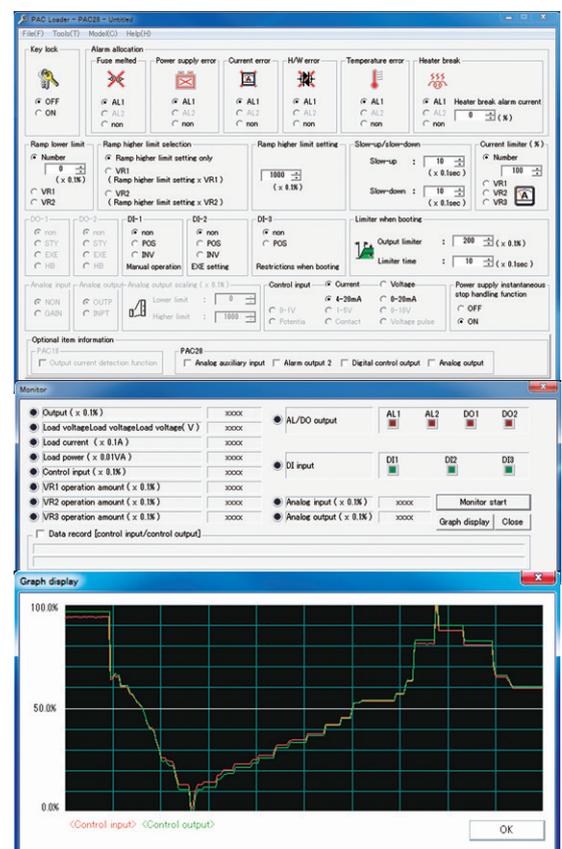
State of the power regulator can be monitored. The following items can be monitored.

1. Output
2. Load current*
3. Control input
4. Operation amount (VR1-VR3)
5. AL output state*

*Effective when the output current detection option is selected.

• Trend graph

Two items, control input (red) and control output (green), can be displayed in a trend graph.



■ Specifications

• Indicator (LED)

Communication status : RX (green when receiving)
TX (green when sending)

Energization confirmation : PWR (green)

• Communication specifications (related to USB)

Approved standard : USB 2.0

Number of connected units : 1 unit (multiple connections to a PC is not available.)

Communication speed : 9600bps (fixed)

Data format : Data length: 7 bits

Parity: EVEN

Stop bit: 1

Communication protocol : Shimaden standard protocol

Communication address : 1

• Cable length

: USB cable: 1.8m
Loader communication cable: 2.0m

• General specifications

Operating environmental conditions : Temperature: 0 – +40°C
Humidity: 90% RH or lower (no dew condensation)

Elevation: Altitude 2000m or below

Storage temperature : -20 – +60°C

Supply voltage : 5V DC (USB bus power system)

Current consumption: 30mA (max.)

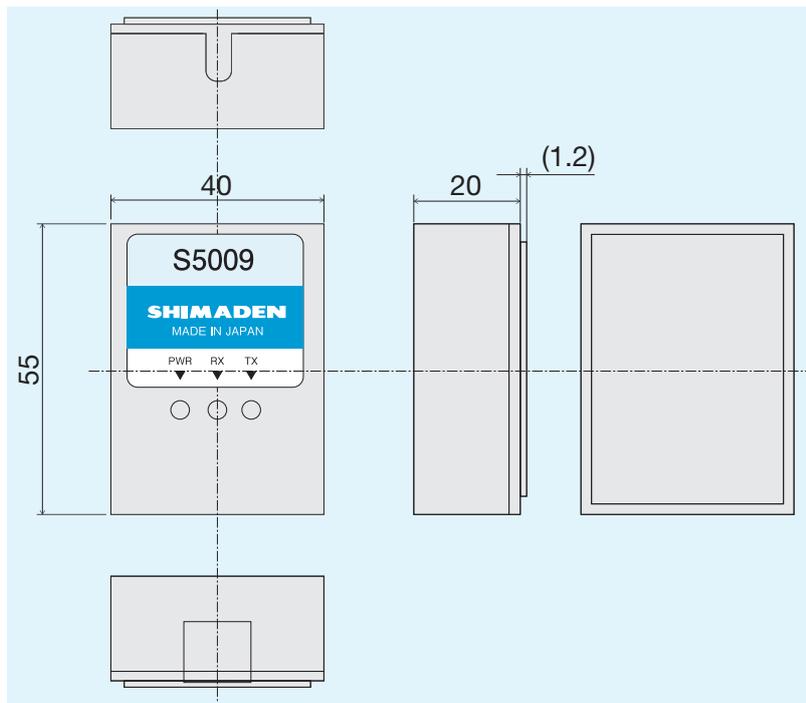
Case material : ABS plastic (comparable to UL94HB)

Case color : Grey

External dimensions : 20.0 × 40.0 × 55.0mm (H × W × D)

Mounting method : Magnet type

Weight : Approx. 35g (only the body and excluding cables)



Unit: mm

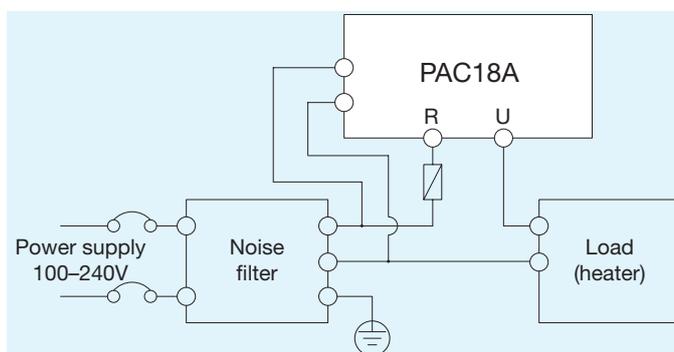
NOISE COUNTERMEASURES

With phase control, part of the power supply sine wave is dropped. This produces distortion in the sine wave if the power supply impedance is high. Also, because the power supply is switched each half cycle, a switching noise is produced. The power supply distortion and noise may affect other equipment.

In the case of cycle calculation zero voltage switching, an extremely small amount of noise is produced in comparison with phase control due to switching near the zero cross point of the power supply. However, because some noise is produced by switching to a large current, you should use a noise filter if necessary. Also, if power supply impedance is high, the power supply may flicker in synch with the ON/OFF status of the thyristor.

■ Noise filter

The frequency of noise produced by the thyristor is distributed in a place below several megahertz, and the noise dampening effect of commonly available commercial noise filters is insufficient. Using noise filters specified by Shimaden can dampen this noise.



Make sure that the wiring between noise filter and PAC18A is as short as possible.

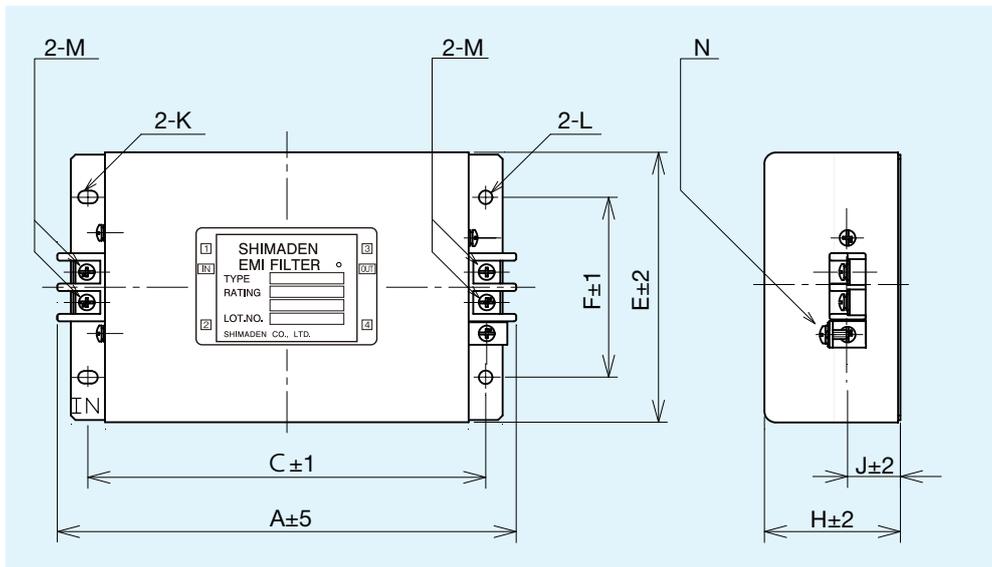
Noise filter (sold separately)

| Type | Rated capacity |
|-------------|----------------|
| NF2020C-SDG | 20A |
| NF2030C-SDG | 30A |
| NF2050C-SDG | 50A |
| NF2060C-SDG | 60A |
| NF2080C-SDG | 80A |
| NF2100C-SDG | 100A |

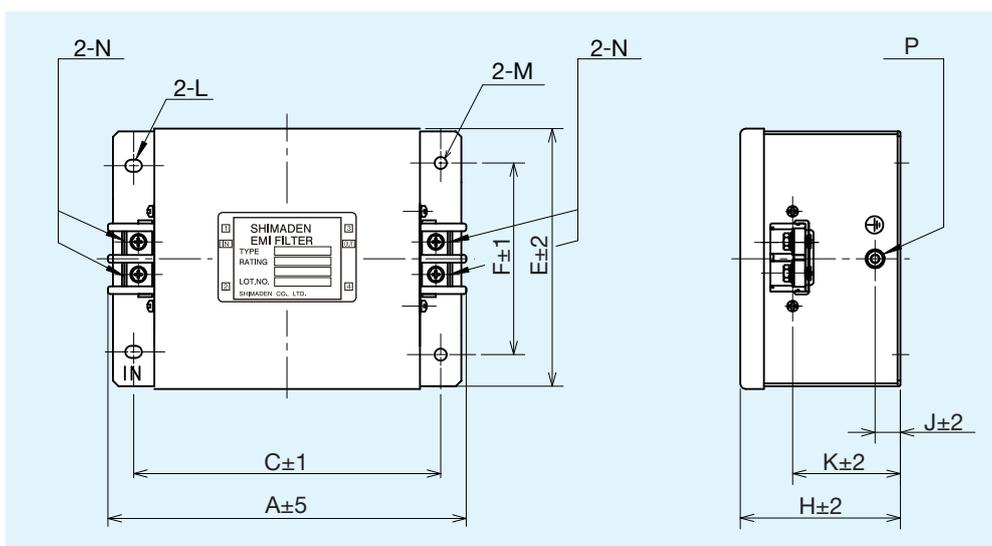
Please contact the nearest Shimaden dealer for details of noise filters.

■ External configuration/dimensions of noise filter (sold separately)

| Type | Current capacity | Dimensions (unit: mm) | | | | | | | | | | Weight (kg) | Case material | |
|-------------|------------------|-----------------------|-----|-----|----|----|----|----------------|------|----|----|-------------|-----------------|--------------|
| | | A | C | E | F | H | J | K | L | M | N | | Body | Bottom cover |
| NF2020C-SDG | 20A | 154 | 125 | 95 | 70 | 50 | 20 | R2.25 length 6 | φ4.5 | M4 | M4 | 0.8 | SPCC Ni coating | SUS304 |
| NF2030C-SDG | 30A | 154 | 125 | 95 | 70 | 50 | 20 | R2.25 length 6 | φ4.5 | M4 | M4 | 0.8 | | |
| NF2050C-SDG | 50A | 180 | 145 | 110 | 80 | 70 | 25 | R2.75 length 7 | φ5.5 | M6 | M4 | 1.5 | SPCC Ni coating | SUS304 |
| NF2060C-SDG | 60A | 180 | 145 | 110 | 80 | 70 | 25 | R2.75 length 7 | φ5.5 | M6 | M4 | 1.6 | | |



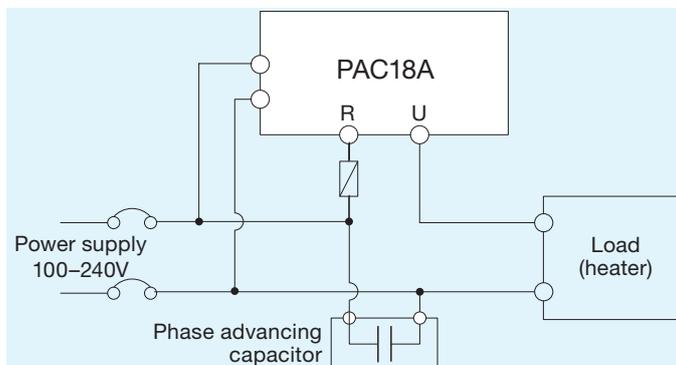
| Type | Current capacity | Dimensions (unit: mm) | | | | | | | | | | | Weight (kg) | Case material | |
|-------------|------------------|-----------------------|-----|-----|----|----|----|----|----------------|------|----|----|-------------|---------------|--------------|
| | | A | C | E | F | H | J | K | L | M | N | P | | Body | Bottom cover |
| NF2080C-SDG | 80A | 205 | 165 | 120 | 90 | 90 | 20 | 63 | R2.75 length 7 | φ5.5 | M8 | M6 | 2.4 | SGCC or SECC | SUS304 |
| NF2100C-SDG | 100A | 205 | 165 | 120 | 90 | 90 | 20 | 63 | R2.75 length 7 | φ5.5 | M8 | M6 | 2.6 | | |



■ Improving power waveform distortions by using phase advancing capacitor

To improve power supply distortions (high harmonic wave) generated by thyristor phase control, connecting a phase advancing capacitor for power factor improvement to the power supply side for the device and load is effective. Improvement in power waveform distortion can be expected with 1 μ F capacitor capacity for 1A of current capacity. This is a simple method, however, please note the following cautions.

1. Please pay attention to the capacitor rated current and the temperature increase due to the inflow of the high harmonic wave current to the capacitor.
2. Make sure to check power waveforms since the capacitor may cause resonance with a power-supply line inductance resulting in generation of high harmonic wave voltage.



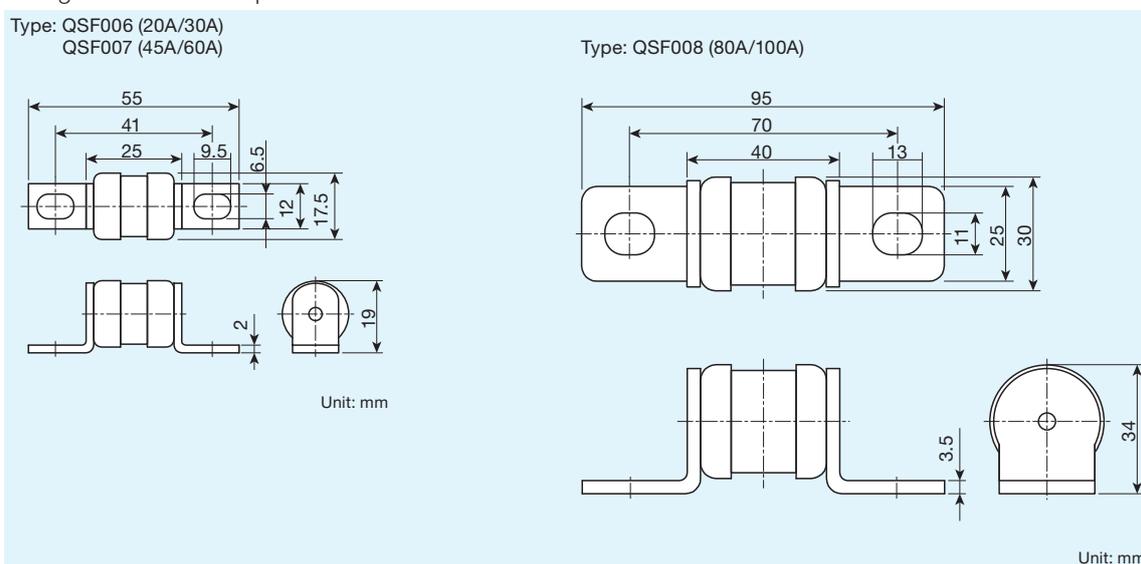
RAPID FUSE (SOLD SEPARATELY)

A rapid fuse can be externally attached for the protection of thyristor elements. Although an electric protective circuit cannot protect thyristor elements from load shorting when applying current or malfunctions when using a transformer, utilizing a rapid fuse enables the protection of thyristor elements.

■ A list of recommended rapid fuse product names

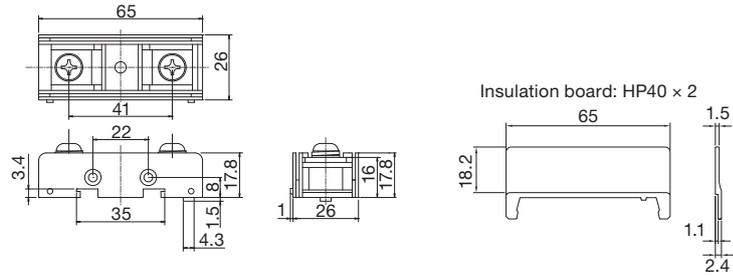
| Names | | Type |
|-----------------------------|--|--------|
| Rapid fuse | 20A/30A (350GH-50UL Hinode Electric Co., Ltd.) | QSF006 |
| | 45A/60A (350GH-100UL Hinode Electric Co., Ltd.) | QSF007 |
| | 80A/100A (CR6L-150 FUJI ELECTRIC CO., LTD.) | QSF008 |
| Fuse holder | 20A-60A (HT4017+HP40×2 pcs. Hinode Electric Co., Ltd.) | QSH002 |
| | 80A/100A (CMS-5 FUJI ELECTRIC CO., LTD.) | QSH003 |
| Rapid fuse with fuse holder | 20A/30A 350GH-50UL+HT4017+HP40×2 pcs. 1 set | QSF01F |
| | 45A/60A 350GH-100UL+HT4017+HP40×2 pcs. 1 set | QSF01G |
| | 80A/100A CR6L-150+CMS-5 1 set | QSF01H |

■ External diagram of external rapid fuse

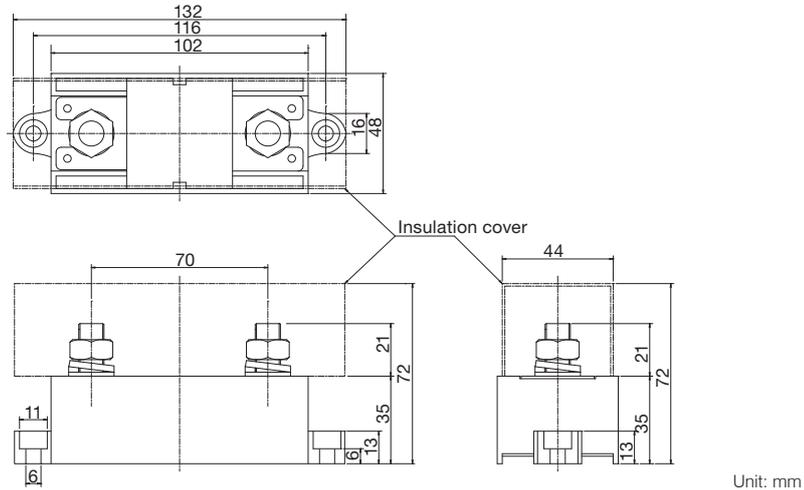


■ External diagram of external rapid fuse

Type: QSH002 (20A-60A)
Hinode Electric Co., Ltd.
HT4017



Type: QSH003 (80A-100A)
FUJI ELECTRIC CO., LTD.
CMS-5



Unit: mm

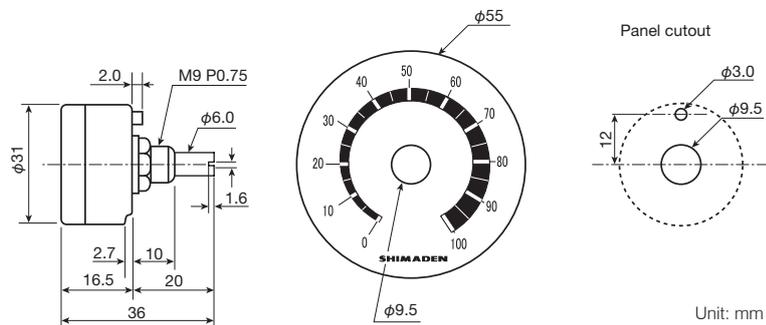
EXTERNAL ADJUSTER (SOLD SEPARATELY)

Type: QSV003



- Resistance value: B10kΩ
 - Lead wire length: 1m
- With crimping terminal for M3

External diagram of external adjuster



Unit: mm

Warning

- The PAC18A series is designed for the control of temperature, humidity and other physical values of general industrial equipment. (It is not to be used for any purpose which regulates the prevention of serious effects on human life or safety.)

Caution

- If the possibility of loss or damage to your system or property as a result of failure of any part of the process exists, proper safety measures must be made before the instrument is put into use so as to prevent the occurrence of trouble.

Head Office & Saitama Factory
ISO 9001/ISO 14001 Certification Obtained

(The contents of this brochure are subject to change without notice.)

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