°C%
RH
SHIMADEN

SHIMADEN
SINGLE-PHASE THYRISTOR POWER REGULATOR
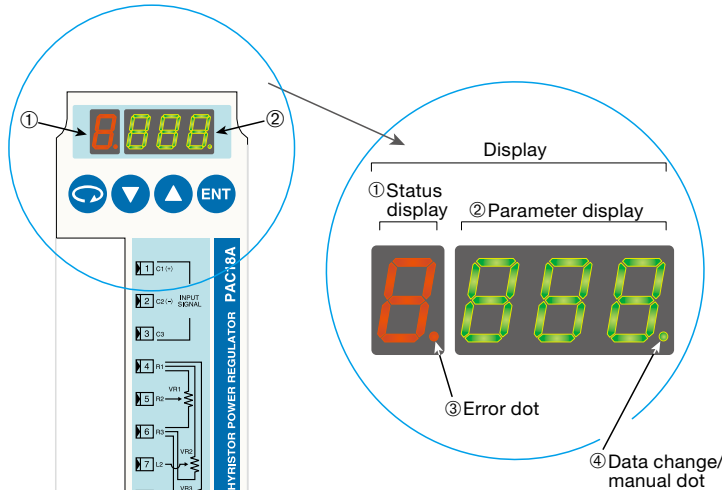
Series **PAC18A**

C E approved

RoHS compliance

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)*

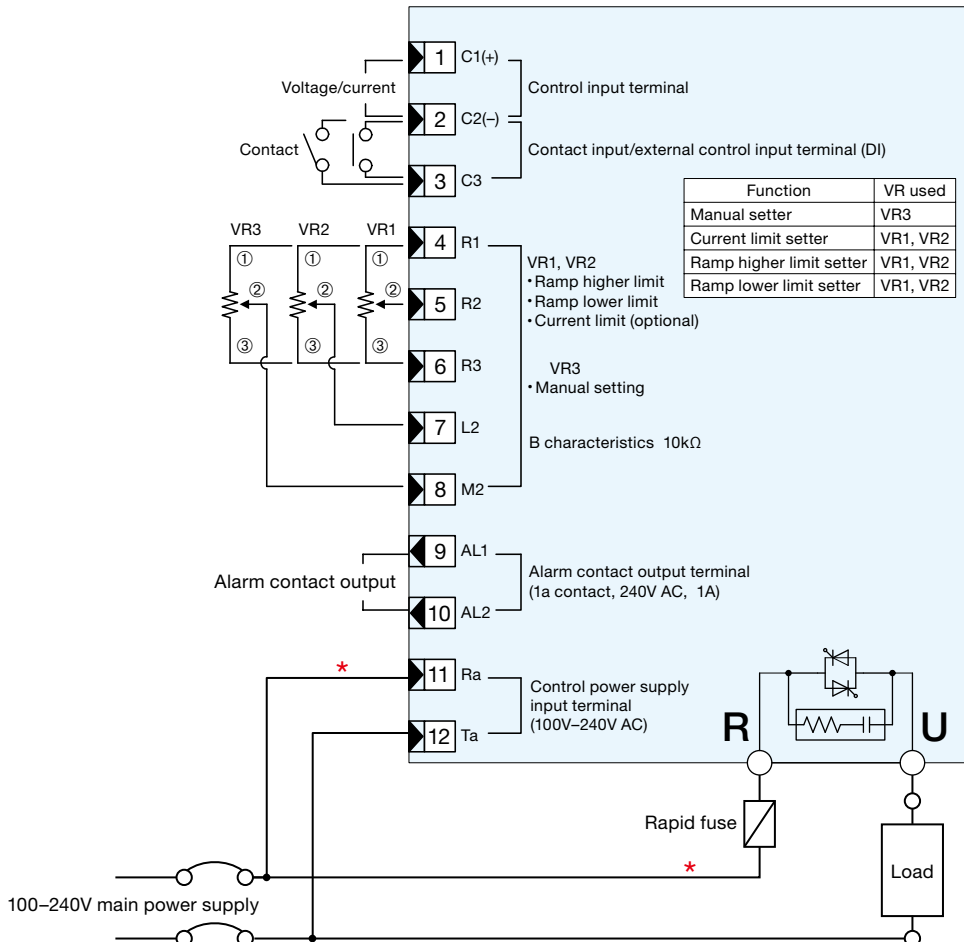☐ *Automatic Frequency Discerning Function (50/60Hz)*

■ 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.
		Pressing for two seconds will switch from initial setting screen group/ manual output screen group to monitor screen group.
▼	**Down key**	For changing modes and values in each parameter setting screen
▲	**Up key**	For changing modes and values in each parameter setting screen
		Pressing for five seconds will change from monitor screen group to initial setting screen group.
ENT	**Enter key**	For setting of each parameter screen
		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
② Parameter display
③ Error dot
④ Data change/ manual dot

■ Display

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

EXTERNAL CONNECTION DIAGRAM

Function	VR used
Manual setter	VR3
Current limit setter	VR1, VR2
Ramp higher limit setter	VR1, VR2
Ramp lower limit setter	VR1, VR2

1 C1(+) — Control input terminal
2 C2(−)
Voltage/current
Contact
3 C3 — Contact input/external control input terminal (DI)

VR3 VR2 VR1
① ① ①
② ② ②
③ ③ ③

4 R1
5 R2
6 R3

VR1, VR2
· Ramp higher limit
· Ramp lower limit
· Current limit (optional)

VR3
· Manual setting

7 L2
8 M2

B characteristics 10kΩ

9 AL1
10 AL2
Alarm contact output

Alarm contact output terminal (1a contact, 240V AC, 1A)

11 Ra
12 Ta

Control power supply input terminal (100V–240V AC)

R U
Rapid fuse
Load

100–240V main power supply

*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
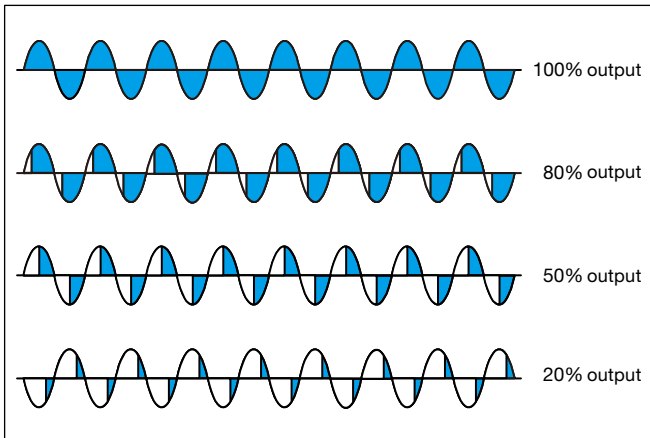
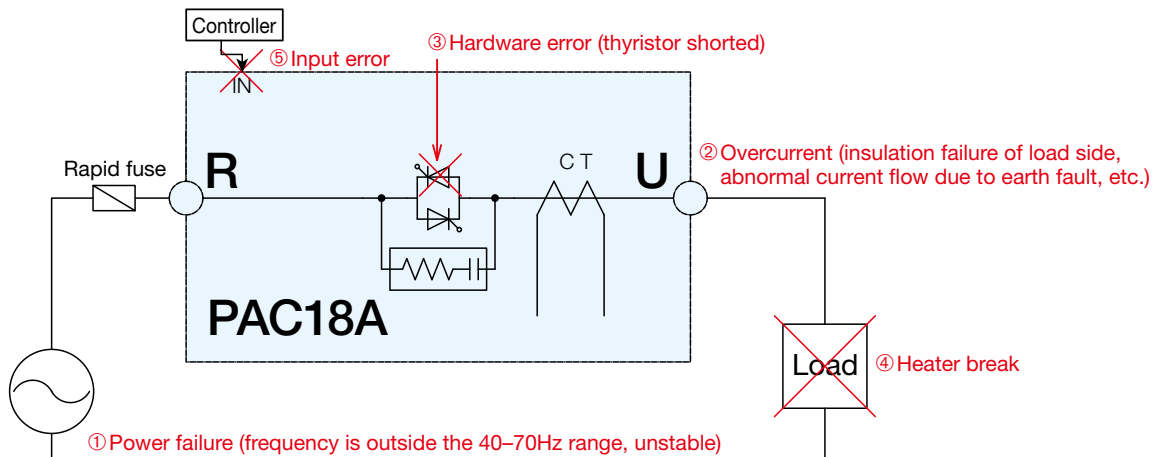Cycle calculation zero voltage switching control system
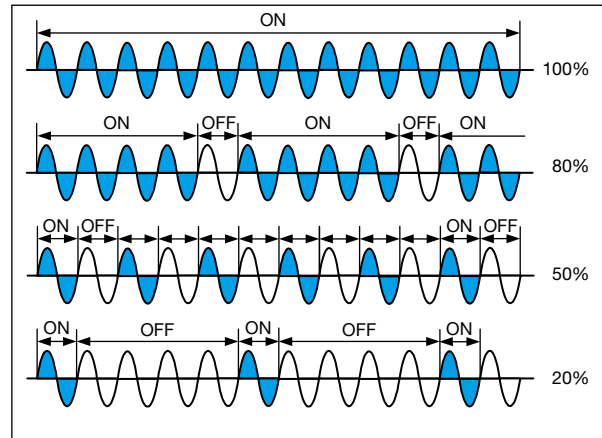
Output \ Control system	Phase control system	Cycle calculation zero voltage switching control system
Applicable load	Resistive load, inductive load, etc.	Resistive load
Transformer primary control	Available	Not available
Feedback control	Available	Not available
High harmonic disturbance	Possibility of 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)	"C"	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
PA	Phase control system/phase angle proportional output
$PA-H$	Phase control system/voltage proportional output
CFb	Phase control system/current feedback *When current detection/alarm output function (optional) is attached.
$PA-\bar{u}$	Phase control system/square of voltage (power) proportional output
EC	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.
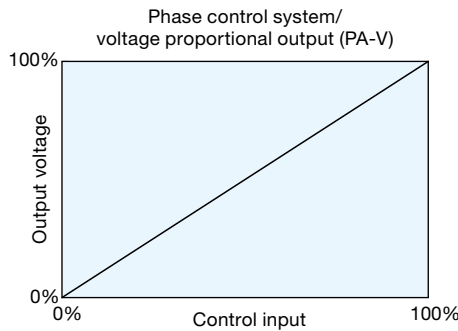
(1) Phase control system/phase angle proportional output PA
(same system as used for the conventional product PAC15P)

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.
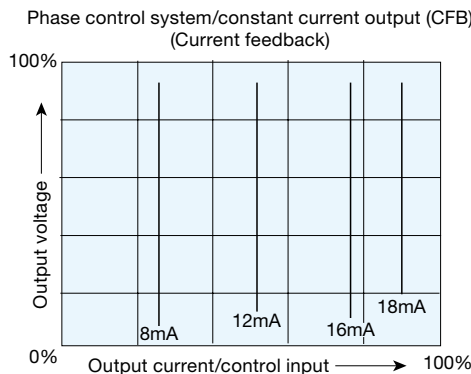

Phase control system/
phase angle proportional output (PA)

Phase control system/
phase angle proportional output (PA)

(2) Phase control system/voltage proportional output $PA-H$
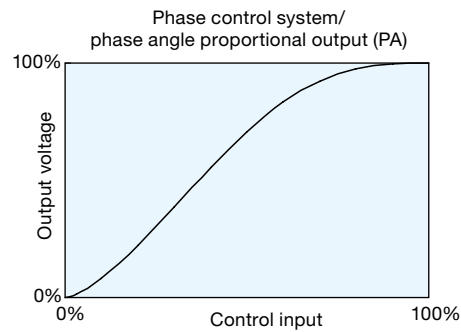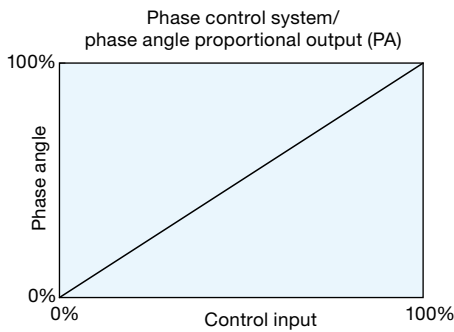
Output voltage proportional to control input signal can be obtained.
Please use the current limit function and the variation limit function concurrently when inrush current load is large.

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

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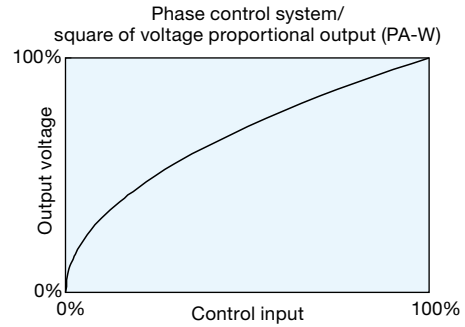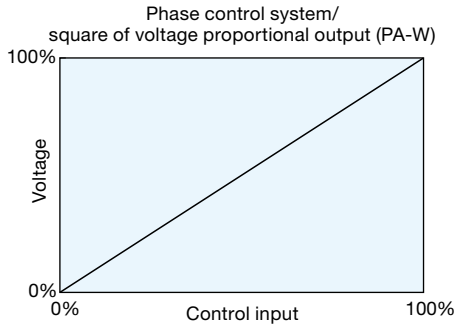
Output current proportional to control input signal can be obtained. If control input is set constant, even when load fluctuation and power supply fluctuation occur, output current will be constantly controlled. Please use the current limit function and the variation limit function concurrently when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

Phase control system/constant current output (CFB)
(Current feedback)

(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.

Phase control system/
square of voltage proportional output (PA-W)

Phase control system/
square of voltage proportional output (PA-W)

(5) Cycle calculation zero voltage switching control system $\bar{z}C$
(same system as used for the conventional product PAC15C)

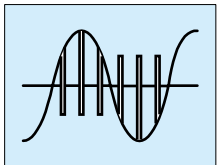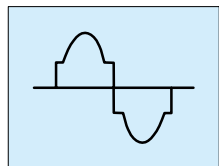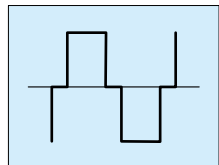Cycle output proportional to control input can be obtained.
There is less noise occurrence compared to phase angle control. Current limit function will be disabled.

Cycle calculation zero voltage
switching control system (ZC)
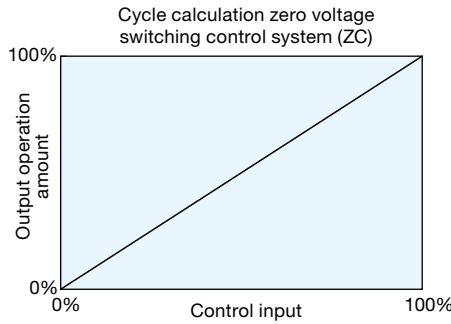
EXCELLENT RESISTANCE TO POWER-SUPPLY NOISE

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
Sine wave with notched noise	Stably performs against the notched noise superposed to sine wave power supply.
Sine wave	Stably performs against the distortion in the vicinity of zero cross of sine wave power supply.
Quasi sine wave	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 output characteristics diagram
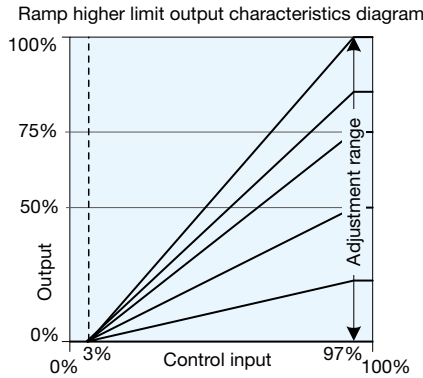
Ramp higher limit setting range: 0.1–100%

(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 output characteristics diagram
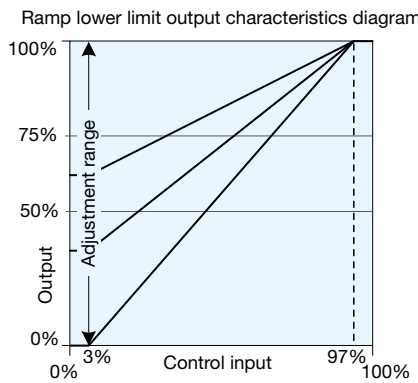
Ramp lower limit setting range: 0.0–99.9%

## (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%.

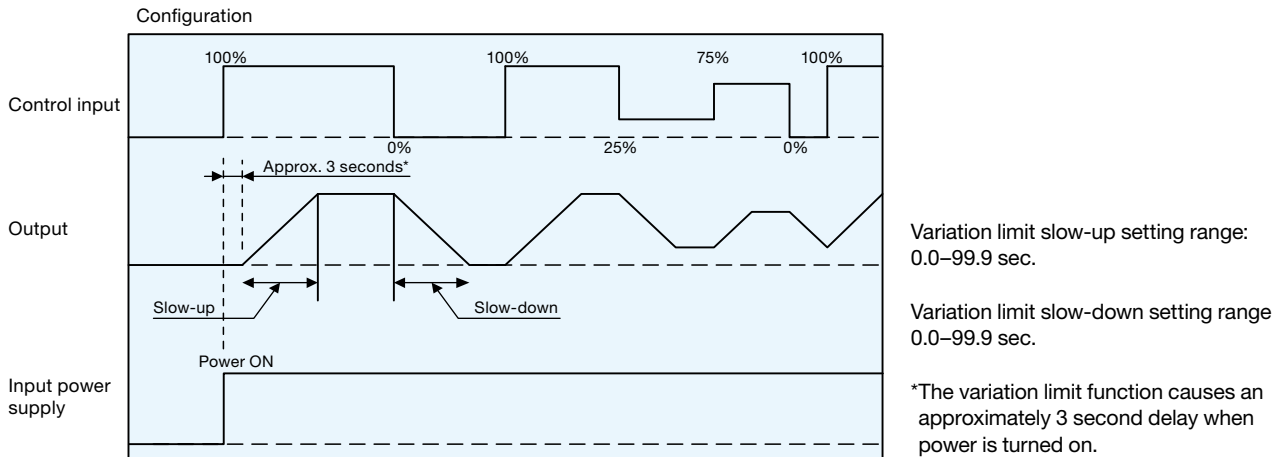Example) Input/output characteristics diagram of scale lower limit setting

Input scale lower limit range
0.0–20.0%
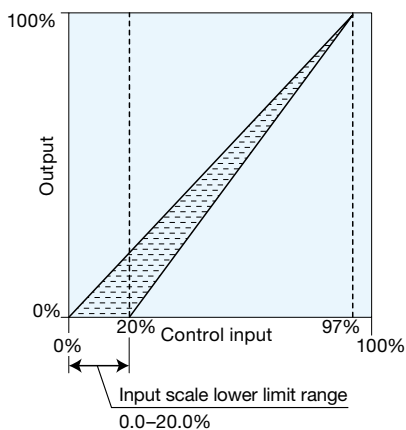
Example) Input/output characteristics diagram of scale higher limit setting

Input scale higher limit range
80.0–100%
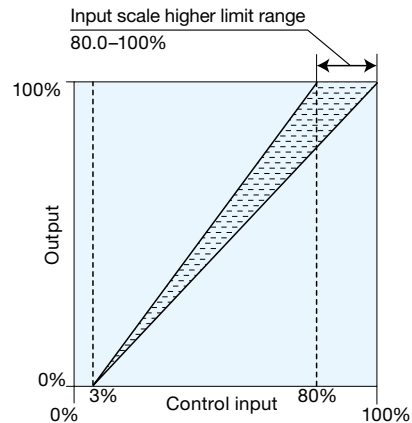
(4) Variation limit (slow-up time/slow-down time)

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.

Variation limit slow-up setting range:
0.0–99.9 sec.

Variation limit slow-down setting range
0.0–99.9 sec.

*The variation limit function causes an approximately 3 second delay when power is turned on.

## (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.
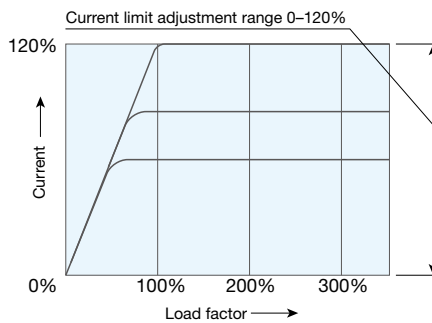

(6) Heater break alarm (optional)

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%.
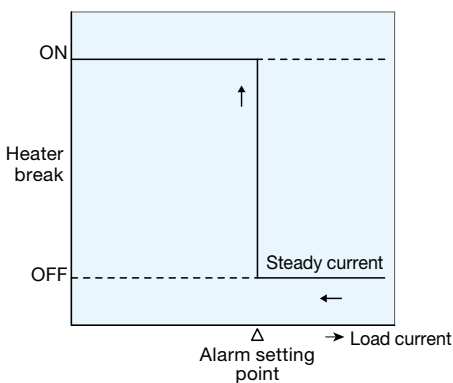
■ When thyristor rating is 100A and the heat source uses five heaters of the same rating:
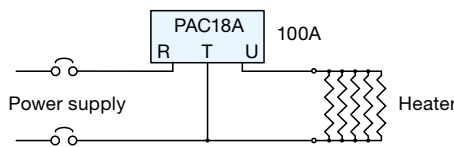
Heater rating (per heater)
Voltage: 200V
Current: 20A
Power: 4kW
Type: nichrome

□ Setting for alarm in case one heater breaks among the five heaters
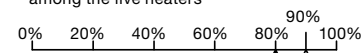
The current value resulting from a single heater break will be 80% of the rating. When considering variation in heater resistance, in order to alarm securely, it is recommended to establish setting at 50% higher than the current value per heater. In this case, the current value per heater becomes 20% 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 × 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 : Parameter setting function
  (optional) 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, 10kΩ, 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

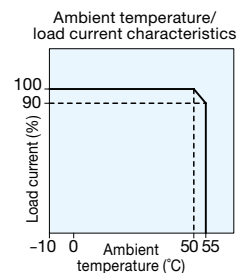• Applicable standard   : Safety: IEC61010-1
                                 EMC: EN61326
                                 However, the specified noise filter (sold separately) must be used.

• Insulation resistance
  Between control power supply terminals : 500V DC, 20MΩ or higher
  and control input terminals
  Between main power supply terminals : 500V DC, 20MΩ 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, approx. 0.8kg
                                 45A/60A, W68 × D152 × H188, approx. 1.8kg
                                 80A/100A, W113 × D152 × H204, 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

Ambient temperature/load current characteristics

Item	Code				Specifications		Pattern 1	Pattern 2
Series	PAC18A				Single-Phase Thyristor Power Regulator		○ Can be changed after purchase	Can be changed after purchase
Control system		P0–			Phase control/phase angle proportional output			
		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

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

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)
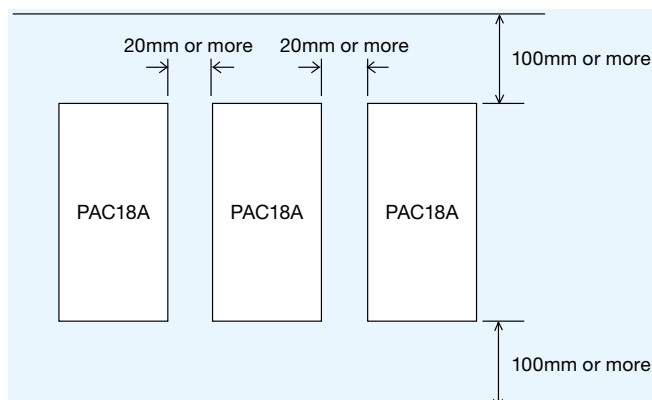(B10k, knob, and scale plate lead (1m) are attached)
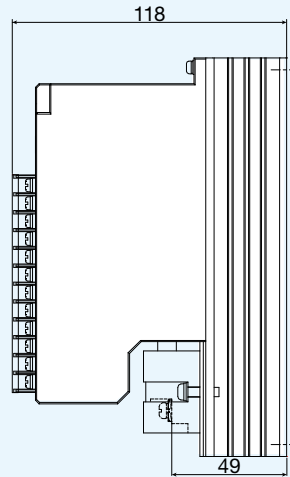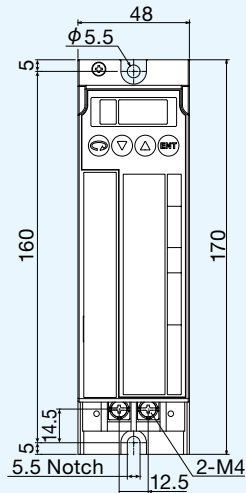
Type
QSV003

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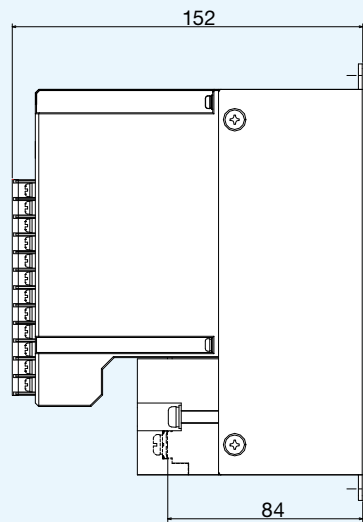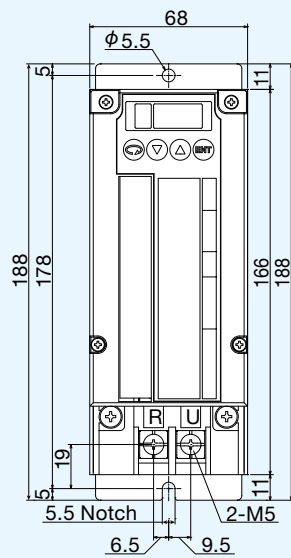
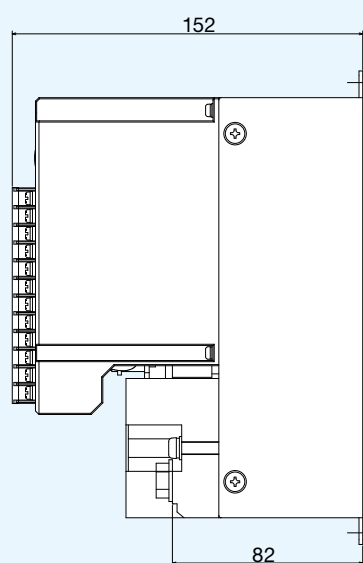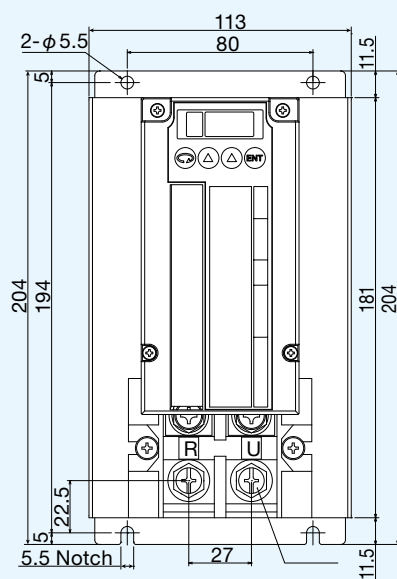# MOUNTING DIMENSIONS

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

48

φ5.5

5

160

170

14.5

5

5.5 Notch

12.5

2-M4

118

49

Unit: mm

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

68

φ5.5

5

11

188
178

166
188

19

5

11

5.5 Notch

R U

2-M5

6.5 9.5

152

84

Unit: mm

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

113

80

2-φ5.5

11.5

5

204
194

181
204

22.5

5

5.5 Notch

R U

27

11.5

152

82

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
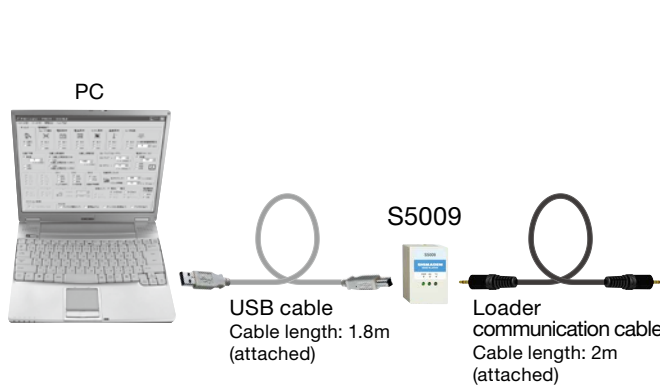
PAC18A

Loader communication connector connection diagram
When connecting PAC18 series (100A)

PC

S5009

USB cable
Cable length: 1.8m
(attached)

Loader communication cable
Cable length: 2m
(attached)
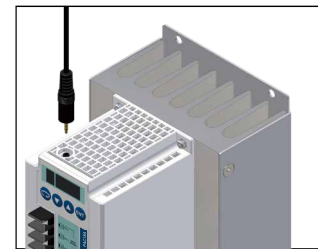
Note: S5009 Ver. 1.20 or earlier is not compatible with PAC18A.

■ 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.
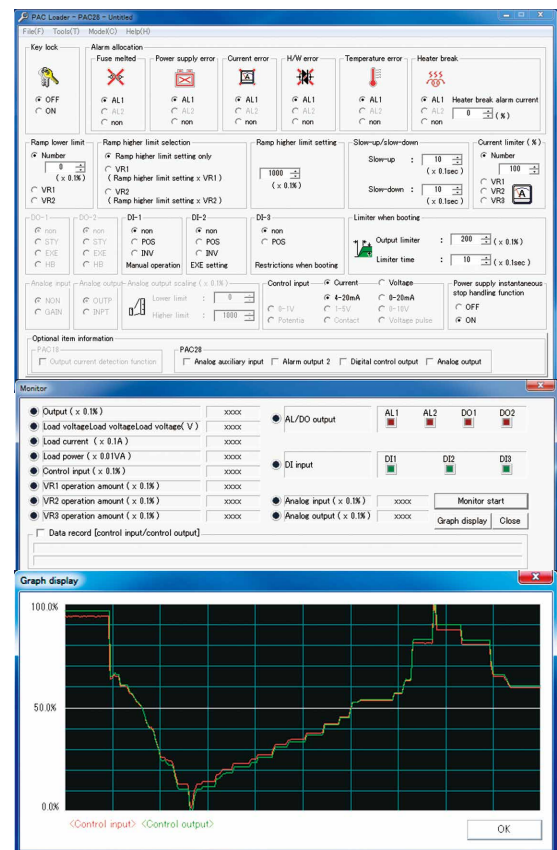
■ Specifications

• 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)

S5009

SHIMADEN
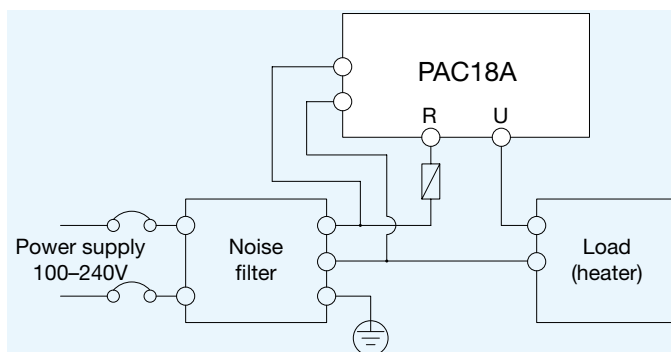MADE IN JAPAN

PWR   RX   TX

40

20

(1.2)

55
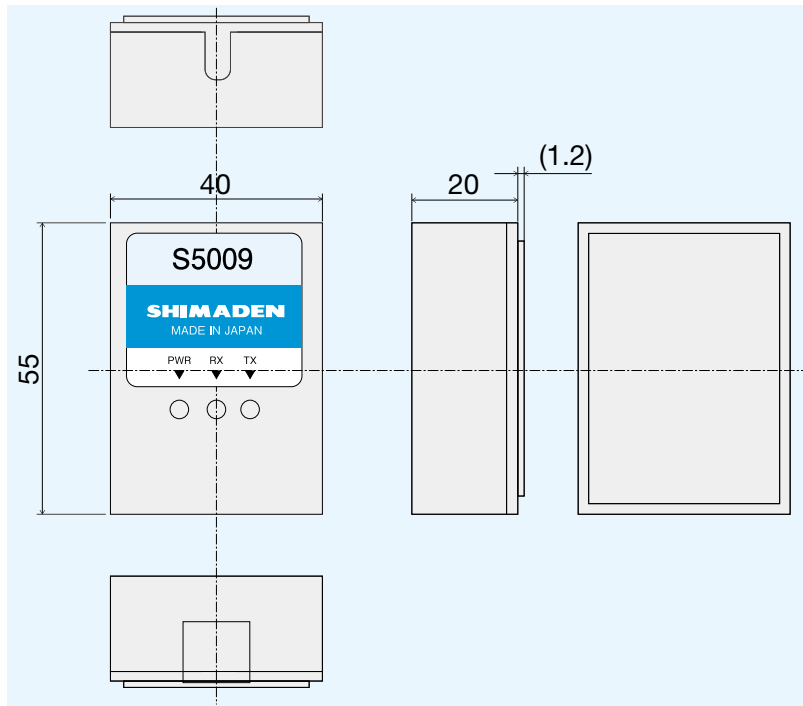
Unit: mm

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.

PAC18A

R   U

Power supply
100–240V

Noise
filter

Load
(heater)

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

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

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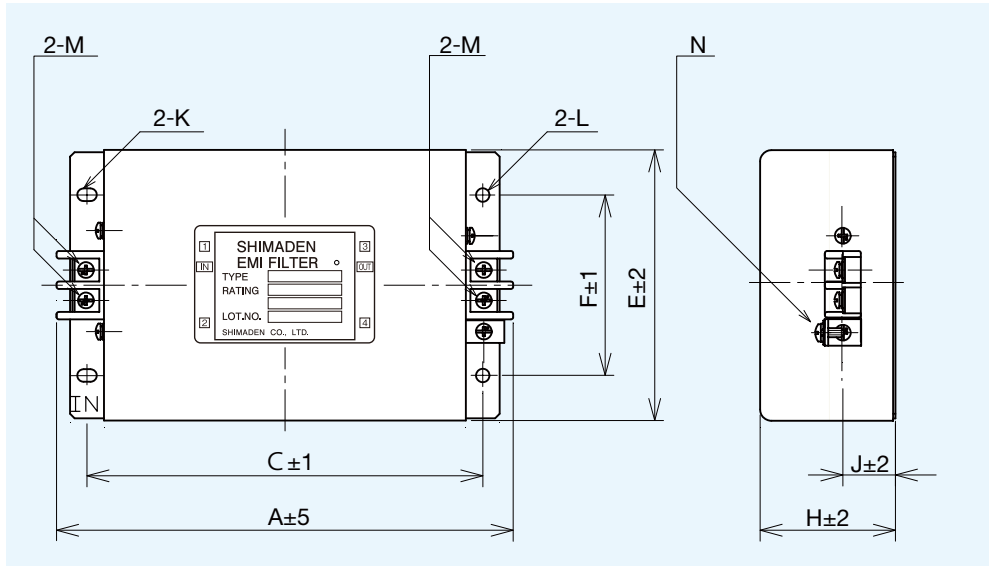
| Type	Current capacity	Dimensions (unit: mm)											Weight (kg)	Case material	
		A	C	E	F	H	J	K	L	M	N	P		Body	Bottom cover
NF2080C-SDG	80A	205	165	120	90	90	20	63	R2.75 length 7	φ5.5	M8	M6	2.4	SGCC or SECC	SUS304
NF2100C-SDG	100A	205	165	120	90	90	20	63	R2.75 length 7	φ5.5	M8	M6	2.6		
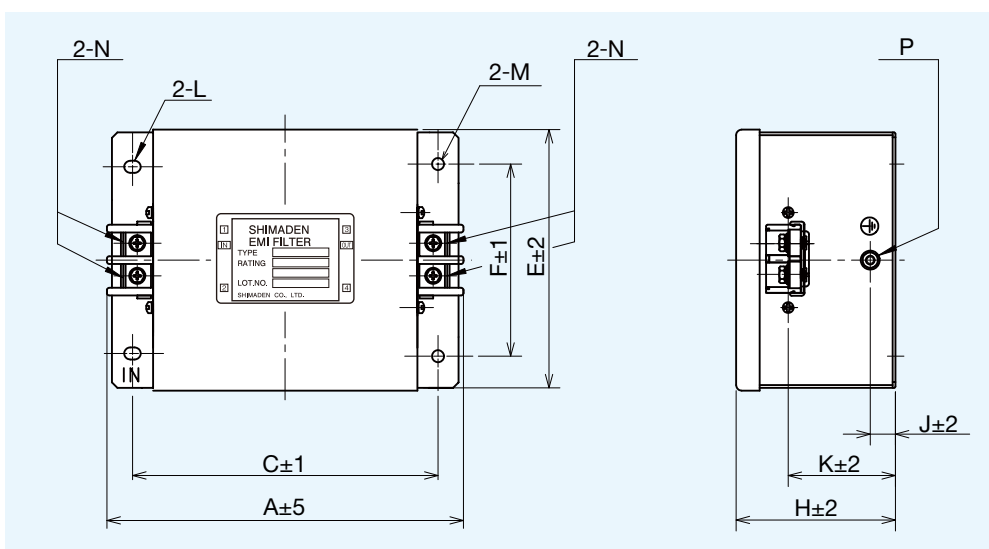
■ Improving power waveform distortions by using phase advancing capacitor

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 1μF 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.
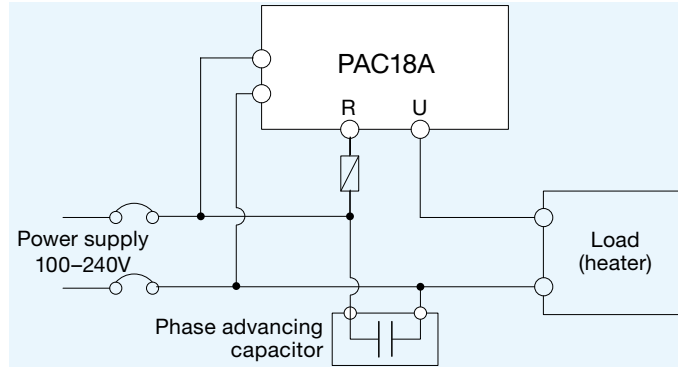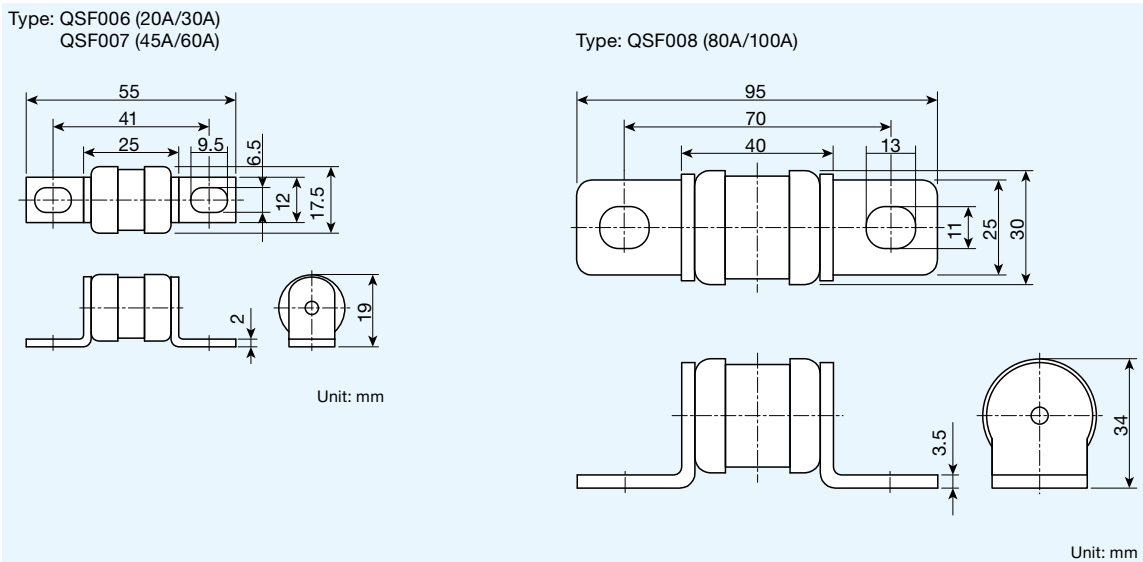

RAPID FUSE (SOLD SEPARATELY)

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

Type: QSF006 (20A/30A)
QSF007 (45A/60A)

Type: QSF008 (80A/100A)

Unit: mm

■ External diagram of external rapid fuse

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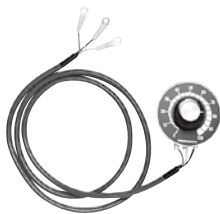HT4017

Insulation board: HP40 × 2
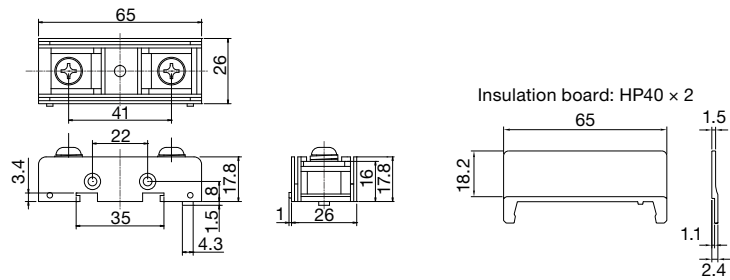
Type: QSH003 (80A–100A)
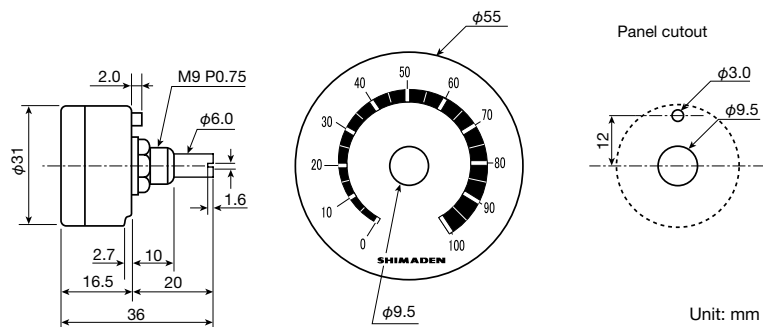FUJI ELECTRIC CO., LTD.
CMS-5

Insulation cover
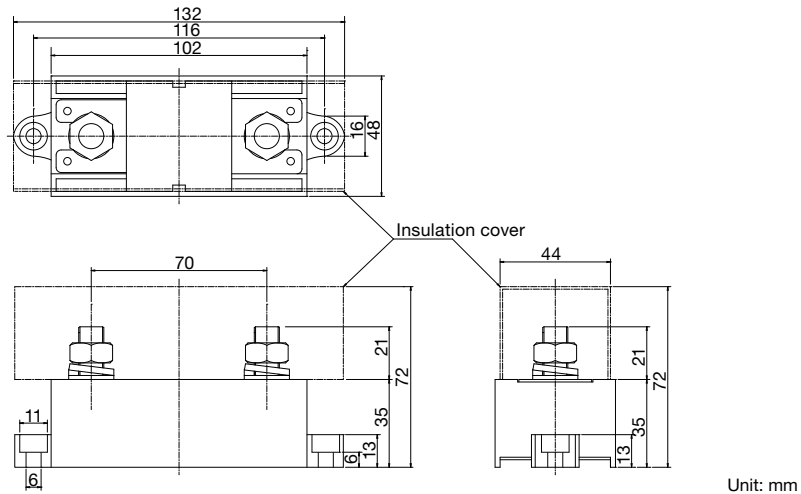
Unit: mm

EXTERNAL ADJUSTER (SOLD SEPARATELY)

Type: QSV003

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

External diagram of external adjuster

Panel cutout

Unit: mm

⚠ **Warning**

• The PAC18 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.

ISO9001/ISO14001

ISO9001 • ISO14001   001

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

Temperature and Humidity Control Specialists

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