

# FPS SERIES

AC/DC Front End



FPS

## ■ Features

- Compact, 1U high, and, high power density  
Size: 127(W)×41(H)×290(D) mm  
Power Density: 11W/inch<sup>3</sup>,  
Maximum Output Power: 1kW
- Universal Input: AC85-265V
- Up to 3000W (3 units) in 19"rack
- Hot swap / N+1 redundant parallel operation available
- I<sup>2</sup>C option available (/S, /PS model)
- Front IEC inlet model (AC input) available, (/P, /PS model)

## ■ Power Supply Identification

### FPS 1000 - 48 /PS

| Series  | O/P Power | O/P Voltage                              | Option |
|---------|-----------|------------------------------------------|--------|
| 1000(W) | 12(V)     | Blank: Standard Model                    |        |
| 3000(W) | 24(V)     | /P : IEC Inlet Type (on front panel)     |        |
|         | 48(V)     | /S : I <sup>2</sup> C Option built-in    |        |
|         |           | /PS : IEC inlet +I <sup>2</sup> C Option |        |

Note: FPS3000 is 3x FPS + FPS-S1U in one rack.  
FPS3000 can include 3x FPS with same ratings.

## ■ Applications



### FPS-S1U /PS

| Series                               | Option |
|--------------------------------------|--------|
| Blank: Standard Model                |        |
| (For FPS1000-*, FPS1000-*/S)         |        |
| /P : IEC Inlet Type (on front panel, |        |
| for FPS1000-*/P, FPS1000-*/PS)       |        |

Note: FPS-S1U does not have FPS1000. This is 1U rack only. Up to 3x FPS1000 (with same voltage rating) can be installed into FPS-S1U.

## ■ Product Line up

| Output Voltage | 1000W          |            |
|----------------|----------------|------------|
|                | Output Current | Model      |
| 12V            | 72A            | FPS1000-12 |
| 24V            | 40A            | FPS1000-24 |
| 48V            | 21A            | FPS1000-48 |

## ■ Conformity to RoHS Directive

This means that, in conformity with EU Directive 2002/95/EC, lead, cadmium, mercury, hexavalent chromium, and specific bromine-based flame retardants, PBB and PBDE, have not been used, except for exempted applications.



### FPS3000 - □

Shelf type: 3 units of FPS1000 mounting in a 19-inch shelf (FPS-S1U) with maximum 3kW  
Size: 440(W)×43.6(H)×351(D) mm

## FPS1000 Specifications

| ITEMS/UNITS |                                 | MODEL      | FPS1000-12                                                                                | FPS1000-24 | FPS1000-48 |
|-------------|---------------------------------|------------|-------------------------------------------------------------------------------------------|------------|------------|
| Input       | Voltage Range                   | (*1) V     | AC85 - 265 continuous (Universal input)                                                   |            |            |
|             | Frequency                       | (*1) Hz    | 47 - 63, single phase                                                                     |            |            |
|             | Power Factor (115/230VAC)(typ)  |            | More than 0.98 at maximum output power                                                    |            |            |
|             | Efficiency (typ)                | (*2) %     | 81 / 83                                                                                   | 84 / 86    | 85 / 88    |
|             | Current (100/200VAC) (max)      | A          | 12.0 / 6.0                                                                                |            |            |
|             | Inrush Current                  | (*3) A     | Less than 40                                                                              |            |            |
|             | Leakage Current (230VAC)        | mA         | Less than 1.1                                                                             |            |            |
| Output      | Nominal Voltage                 | VDC        | 12                                                                                        | 24         | 48         |
|             | Maximum Current                 | (*Fig.1) A | 72                                                                                        | 40         | 21         |
|             | Maximum Power                   | W          | 864                                                                                       | 960        | 1008       |
|             | Voltage Set Point               |            | 12V +/-1%                                                                                 | 24V +/-1%  | 48V +/-1%  |
|             | Maximum Line Regulation(*5)     |            | 0.40%                                                                                     |            |            |
|             | Maximum Load Regulation(*6)     |            | 0.80%                                                                                     |            |            |
|             | Temperature Coefficient         |            | 200PPM/°C                                                                                 |            |            |
|             | Warm Up Drift                   |            | 0.1% of rated Vout for 8hrs after 30min warm-up. Constant line, load and temperature.     |            |            |
|             | Maximum Ripple & Noise (*4)     | mVp-p      | 150                                                                                       | 200        | 300        |
|             | Hold-up Time (100VAC)(typ)      | ms         | 20 at rated output voltage and less than 80% of rated load.                               |            |            |
|             | Voltage Adjustable Range        | VDC        | 10.5 - 13.2                                                                               | 21.5 - 29  | 43 - 58    |
|             | Over Current Protection(*Fig.1) |            | 105 - 125% of maximum output current.                                                     |            |            |
|             | Over Voltage Protection (*8)    | VDC        | 14.3 - 15.7                                                                               | 31 - 34    | 62 - 66    |
| Function    | Over Temperature Protection     |            | Inverter shut down method, automatic reset.                                               |            |            |
|             | Remote Sensing (*7)             |            | Possible. Refer to instruction manual.                                                    |            |            |
|             | Remote ON/OFF Control           |            | By electrical signal or dry contact. ON: 0 - 0.6V or short. OFF: 2 - 15V or open.         |            |            |
|             | Parallel Operation (*9)         |            | Possible. Refer to instruction manual.                                                    |            |            |
|             | Series Operation (*10)          |            | Possible. Refer to instruction manual.                                                    |            |            |
|             | Over Temperature Alarm Signal   |            | Open collector signal. Normal: ON, Max.sink current: 10mA.                                |            |            |
|             | DC OK signal                    |            | Open collector signal. On when Vout>80+/-5% rated output. Max.sink current: 10mA          |            |            |
|             | AC Fail Signal                  |            | Open collector signal. On when Vin > 85VAC, Max.sink current: 10mA.                       |            |            |
|             | AUX-BIAS Power Supply           |            | 11.2 - 12.5VDC. 0.25A maximum output current.                                             |            |            |
|             | Output Voltage Trimming         |            | Possible, via Vout trim pin in the I/O connector. Refer to instruction manual.            |            |            |
|             | Front Panel Indicators          |            | AC OK, DC OK, DC FAIL                                                                     |            |            |
|             | I <sup>2</sup> C Interface      |            | Optional. Refer to instruction manual.                                                    |            |            |
|             | Operating Temperature           | °C         | 0 to 50: 100% load. Derate 2%/°C, 50 to 60                                                |            |            |
| Environment | Storage Temperature             | °C         | -30 to 85                                                                                 |            |            |
|             | Operating Humidity              | %RH        | 10 - 90, no condensation.                                                                 |            |            |
|             | Storage Humidity                | %RH        | 10 - 95, no condensation.                                                                 |            |            |
|             | Vibration                       |            | Built to meet ETS 300 019                                                                 |            |            |
|             | Shock                           |            | Built to meet ETS 300 019                                                                 |            |            |
|             | Cooling                         |            | By internal fans. Variable speed control.                                                 |            |            |
|             | Withstand Voltage               |            | Input-Output: 3000Vrms, 1min. Input-Ground: 2000Vrms, 1min. Output-Ground: 500Vrms, 1min. |            |            |
| Standards   | Isolation Resistance            |            | More than 100Mohm at 25°C and 70% RH. Output-Ground: 500VDC                               |            |            |
|             | Safety Standards                |            | Approved by UL60950-1, EN60950-1, CSA C22.2 No.60950-1                                    |            |            |
| Mechanical  | EMI                             | (*11)      | EN55022B, FCC part 15J-B, VCCI-B                                                          |            |            |
|             | Weight (typ)                    | g          | 2000                                                                                      |            |            |
|             | Size (W x H x D)                | mm         | 127 x 41 x 290 (Refer to outline drawing.)                                                |            |            |

(\*1) For cases where conformance to various safety standards (UL, EN etc.) is required, to be described as 100-240Vac (50/60Hz).

(\*2) At 100/200VAC, rated load and 25°C ambient temperature.

(\*3) Not applicable for the noise filter inrush current less than 0.2ms.

(\*4) Measured with JEITA RC-9131 1:1 probe, 20MHz B.W.

(\*5) From 85-132Vac or 170-265VAC, constant load.

(\*6) From no-load to rated load, constant input voltage.

Measured at the sensing point in remote sense.

(\*7) Remote sensing can compensate up to 1V drop on each load wire.

(\*8) Inverter shut down method. Reset by AC voltage recycle or by ON/OFF control.

(\*9) Derate maximum output power by 10% for input voltage less than 100V<sub>RMS</sub>.

(\*10) Series operation is not applicable for units with I<sup>2</sup>C bus option (/S, /PS model).

(\*11) For FPS 1000-12(P/S), when used not with FPS-S1U or FPS-T1U racks, an EMI suppressor clamp should be attached to the AC cable, as close as possible to the AC inlet, to meet class B.

| Model | FPS1000 | FPS1000 | FPS1000 |
|-------|---------|---------|---------|
| V1    | -12     | -24     | -48     |
| V1    | 12V     | 24V     | 48V     |
| V2    | 13.2V   | 29V     | 58V     |
| I1    | 66A     | 33A     | 17.25A  |
| I2    | 72A     | 40A     | 21A     |

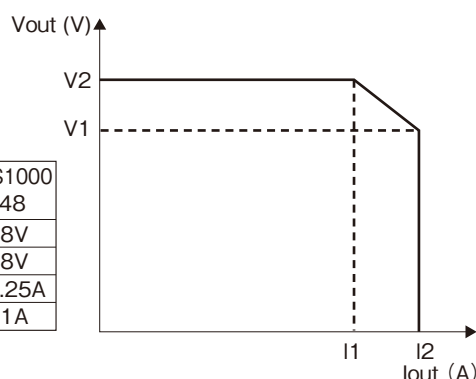
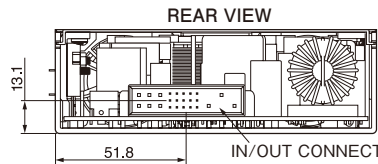
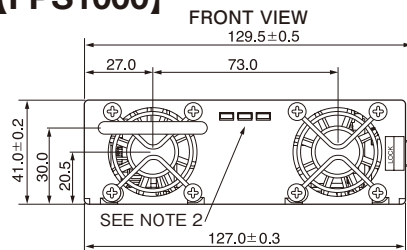


Fig.1 Rated output current vs rated output voltage

• All specifications are subject to change without notice.

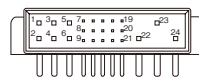
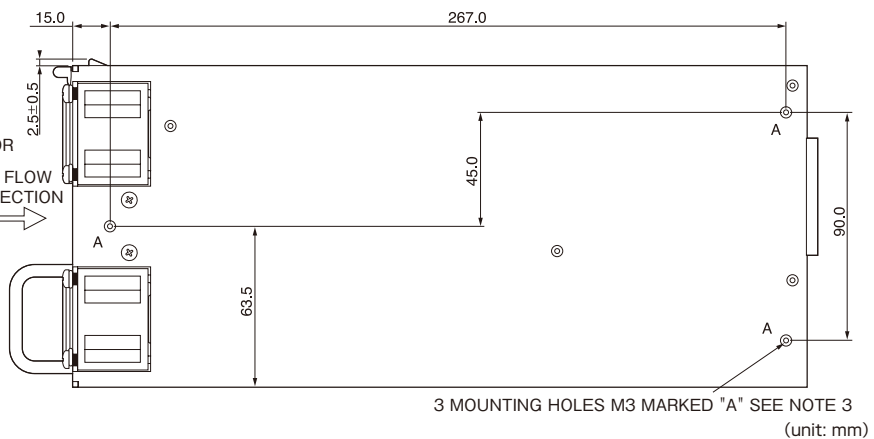
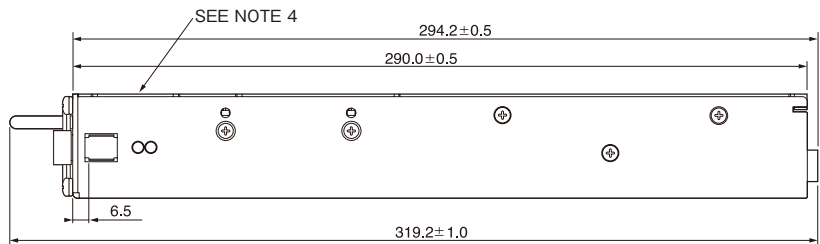
## Outline Drawing

## [FPS1000]



## NOTES

- CONNECTOR TYPE: PCIB24W9M400A1, POS-ITRONIC. FEMALE CONNECTOR TYPE: PCIB-24W9F400A1, -S1031(not attached with unit)
- LED INDICATORS. REFER TO INSTRUCTION MANUAL.
- MOUNTING SCREWS MUST NOT PENETRATE MORE THAN 3mm INTO THE UNIT.
- MODEL NAME, INPUT AND OUTPUT RATING AND SAFETY APPROVALS SYMBOLS ARE DESCRIBED ON TOP SURFACE LABEL.
- ALLOW MINIMUM 50mm OF UNRESTRICTED AIR SPACE AT THE REAR OF UNIT. DO NOT OBSTRUCT AIR FLOW TO THE UNIT FRONT PANEL.
- IN OUT CONNECTOR BACK VIEW AND PINS ASSIGNMENT:

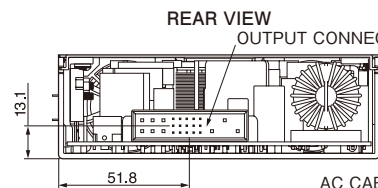
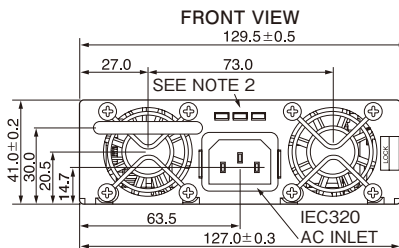


| PIN NUMBER | FUNCTION |
|------------|----------|
| 1          | +v       |
| 2          | +v       |
| 3          | -v       |
| 4          | +v       |
| 5          | -v       |
| 6          | -v       |
| 7          | ON/OFF   |
| 8          | +S       |

| PIN NUMBER | FUNCTION   |
|------------|------------|
| 9          | DC_OK      |
| 10         | SIGNAL_RTN |
| 11         | AC_FAIL    |
| 12         | TEMP_ALARM |
| 13         | -S         |
| 14         | V_TRIM     |
| 15         | CS         |
| 16         | +12V_AUX   |

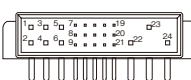
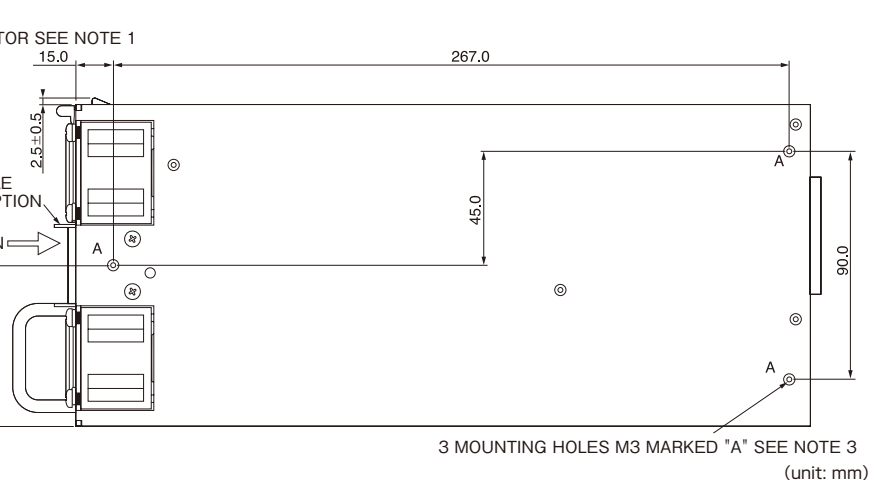
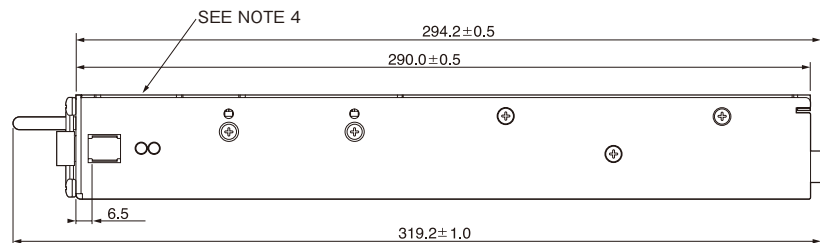
| PIN NUMBER | FUNCTION               |
|------------|------------------------|
| 17         | SDA (I <sup>2</sup> C) |
| 18         | SCL (I <sup>2</sup> C) |
| 19         | A0 (I <sup>2</sup> C)  |
| 20         | A1 (I <sup>2</sup> C)  |
| 21         | A2 (I <sup>2</sup> C)  |
| 22         | ACG                    |
| 23         | ACL                    |
| 24         | ACN                    |

## [FPS1000/P]



## NOTES

- CONNECTOR TYPE: PCIB24W9M400A1, POS-ITRONIC. FEMALE CONNECTOR TYPE: PCIB24W9F400A1, -S1031(not attached with unit)
- LED INDICATORS. REFER TO INSTRUCTION MANUAL.
- MOUNTING SCREWS MUST NOT PENETRATE MORE THAN 3mm INTO THE UNIT.
- MODEL NAME, INPUT AND OUTPUT RATING AND SAFETY APPROVALS SYMBOLS ARE DESCRIBED ON TOP SURFACE LABEL.
- ALLOW MINIMUM 50mm OF UNRESTRICTED AIR SPACE AT THE REAR OF UNIT. DO NOT OBSTRUCT AIR FLOW TO THE UNIT FRONT PANEL.
- IN OUT CONNECTOR BACK VIEW AND PINS ASSIGNMENT:



| PIN NUMBER | FUNCTION |
|------------|----------|
| 1          | +v       |
| 2          | +v       |
| 3          | -v       |
| 4          | +v       |
| 5          | -v       |
| 6          | -v       |
| 7          | ON/OFF   |
| 8          | +S       |

| PIN NUMBER | FUNCTION   |
|------------|------------|
| 9          | DC_OK      |
| 10         | SIGNAL_RTN |
| 11         | AC_FAIL    |
| 12         | TEMP_ALARM |
| 13         | -S         |
| 14         | V_TRIM     |
| 15         | CS         |
| 16         | +12V_AUX   |

| PIN NUMBER | FUNCTION               |
|------------|------------------------|
| 17         | SDA (I <sup>2</sup> C) |
| 18         | SCL (I <sup>2</sup> C) |
| 19         | A0 (I <sup>2</sup> C)  |
| 20         | A1 (I <sup>2</sup> C)  |
| 21         | A2 (I <sup>2</sup> C)  |
| 22         | NC                     |
| 23         | NC                     |
| 24         | NC                     |

## FPS-S1U Specifications

| ITEMS/UNITS |                                     | MODEL   | FPS-S1U                                                                                                                      |
|-------------|-------------------------------------|---------|------------------------------------------------------------------------------------------------------------------------------|
| Input       | Voltage Range                       | (*2) V  | AC85 - 265 continuous (Universal input)                                                                                      |
|             | Frequency                           | (*2) Hz | 47 - 63, Single phase                                                                                                        |
|             | Current (100/200VAC)(max)           | A       | 12.0 / 6.0 for each FPS1000 unit installed                                                                                   |
| Output      | Maximum Power                       | (*1) W  | 3000                                                                                                                         |
| Function    | Remote Sensing                      | (*3)    | Possible.                                                                                                                    |
|             | Remote ON/OFF Control               |         | Separate control for each FPS1000 unit, by electrical signal or dry contact.<br>On: 0 - 0.6V or short. OFF: 2 - 15V or open. |
|             | Parallel Operation                  | (*6)    | Possible.                                                                                                                    |
|             | Series Operation                    | (*4)    | Possible. Up to 2 racks of the same voltage and current rating.                                                              |
|             | Over Temperature Alarm Signal       |         | Separate control for each FPS1000 unit, open collector signal.<br>Normal: ON, max.sink current: 10mA                         |
|             | DC OK Signal                        |         | Separate control for each FPS1000 unit, open collector signal.<br>On when Vout>80%+/-5% max.sink current: 10mA               |
|             | AC Fail Signal                      |         | Separate control for each FPS1000 unit, open collector signal.<br>On when Vin > 85VAC, max.sink current: 10mA.               |
|             | AUX-BIAS Power Supply               |         | 11.2 - 12.5VDC. Maximum output current: 0.25A x Number of installed FPS1000 units.                                           |
|             | Output Voltage Trimming             |         | Possible. Refer to instruction manual.                                                                                       |
|             | AC Input Connector                  |         | FPS-S1U: IEC inlet for each power supply module. FPS-S1U/P: None                                                             |
|             | Output Terminals                    |         | Bus-bars. Refer to outline drawing.                                                                                          |
|             | Number of Power Supply Modules (*5) |         | Maximum 3 FPS1000 modules of the same output voltage rating.                                                                 |
| Environment | Operating Temperature               | °C      | 0 to 50: 100% load. Derate 2%/°C, 50 to 60.                                                                                  |
|             | Storage Temperature                 | °C      | -30 to 85                                                                                                                    |
|             | Operating Humidity                  | %RH     | 10 - 90, no condensation.                                                                                                    |
|             | Storage Humidity                    | %RH     | 10 - 95, no condensation.                                                                                                    |
|             | Vibration                           |         | Built to meet ETS 300 019                                                                                                    |
|             | Shock                               |         | Built to meet ETS 300 019                                                                                                    |
| Isolation   | Withstand Voltage                   |         | Input-Output: 3000Vrms, 1min. Input-Ground: 2000Vrms, 1min. Output-Ground: 500Vrms, 1min.                                    |
|             | Isolation Resistance                |         | More than 100MΩ at 25°C and 70% RH. Output-Ground: 500VDC                                                                    |
| Standards   | Safety Standards                    |         | UL60950-1, EN60950-1, CSA C22.2 No.60950-1                                                                                   |
| Mechanical  | Weight (typ)                        | g       | 3700                                                                                                                         |
|             | Size (W x H x D)                    | mm      | 440 x 44 x 351 (Refer to outline drawing.)                                                                                   |

(\*1) For input voltage lower than 100VAC, maximum output power is 2700W.

(\*2) For cases where conformance to various safety standards (UL, EN etc.) is required, to be described as 100-240VAC (50/60Hz).

(\*3) Remote sensing can compensate up to 1V drop on each load wire.

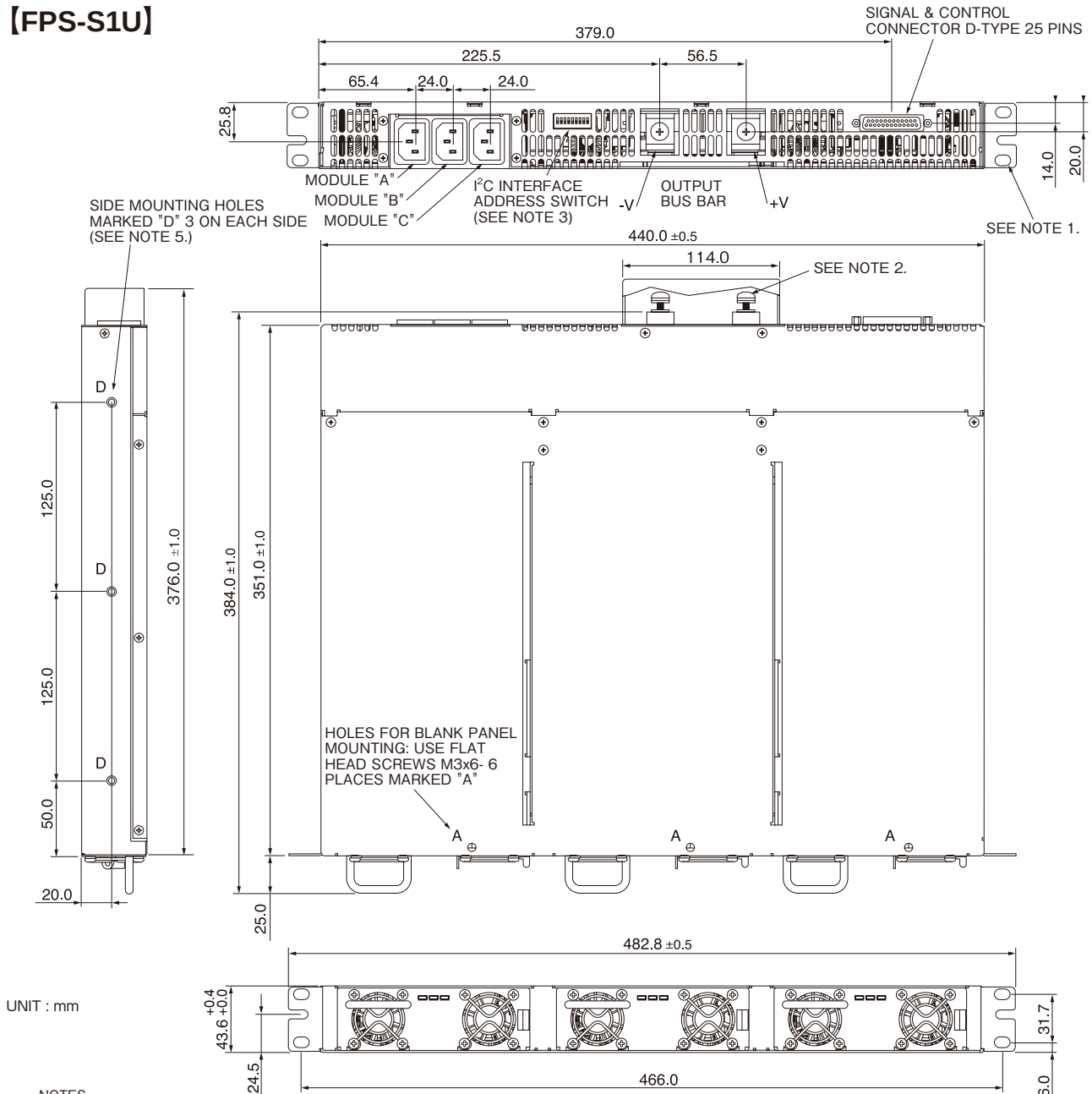
(\*4) Not applicable for units with I<sup>2</sup>C bus option.

(\*5) The output of all the FPS1000 modules are connected in parallel in the rack.

(\*6) Up to 3 racks with max.8 FPS1000 units of the same voltage and current rating.

## Outline Drawing

[FPS-S1U]



## NOTES

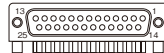
- (\*1) MOUNTING HOLES FOR 19" RACK, USE M6x12 TO FIX THE UNIT TO A RACK.  
 (\*2) M6x16 SCREWS FOR LOAD WIRES FIXING, USE M6 LUG FOR THE LOAD WIRES, RECOMMENDED TIGHTENING TORQUE 42 - 56 Kgf.cm  
 (\*3) REFER TO INSTRUCTION MANUAL FOR SETTING DETAILS.  
 (\*4) MODEL NAME, VOLTAGE AND CURRENT RATING AND SAFETY

APPROVALS SYMBOLS WILL BE SHOWN HERE ACCORDING TO THE SPECIFICATIONS.

- (\*5) MOUNTING HOLES M5 FOR MOUNTING BRACKETS. USE M5x8 SCREWS TO FIX THE BRACKETS TO THE CHASSIS. SCREWS MUST NOT PENETRATE THE CHASSIS MORE THAN 6 mm.  
 (\*6) THE FPS-S1U RACK IS SHOWN WITH 3 FPS1000 UNITS INSTALLED.

## SIGNALS &amp; CONTROL CONNECTOR PINS ASSIGNMENT

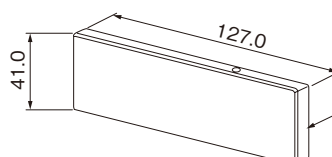
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 D-TYPE RIGHT ANGLE, 25 POSITIONS,  
 FRONT METAL SHELL,  
 AMP P/N: 747846-4



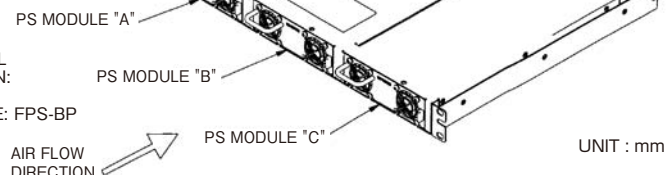
| PIN NUMBER | FUNCTION     | PIN NUMBER | FUNCTION   | PIN NUMBER | FUNCTION              |
|------------|--------------|------------|------------|------------|-----------------------|
| 1          | V_TRIM_B     | 9          | CS         | 17         | NC                    |
| 2          | TEMP_ALARM_B | 10         | V_TRIM_C   | 18         | NC                    |
| 3          | DC_OK_B      | 11         | SIGNAL_RTN | 19         | NC                    |
| 4          | TEMP_ALARM_A | 12         | DC_OK_C    | 20         | SCL(I <sup>2</sup> C) |
| 5          | ON/OFF_A     | 13         | +S         | 21         | SDA(I <sup>2</sup> C) |
| 6          | DC_OK_A      | 14         | AC_FAIL_B  | 22         | -S                    |
| 7          | V_TRIM_A     | 15         | ON/OFF_B   | 23         | TEMP_ALARM_C          |
| 8          | +12V_AUX     | 16         | AC_FAIL_A  | 24         | AC_FAIL_C             |
|            |              |            |            | 25         | ON/OFF_C              |

OUTPUT TERMINAL COVER.  
 INSTALL AFTER LOAD  
 CABLES CONNECTION.

FLAT HEAD  
 SCREW M3x6  
 -2 PLACES-

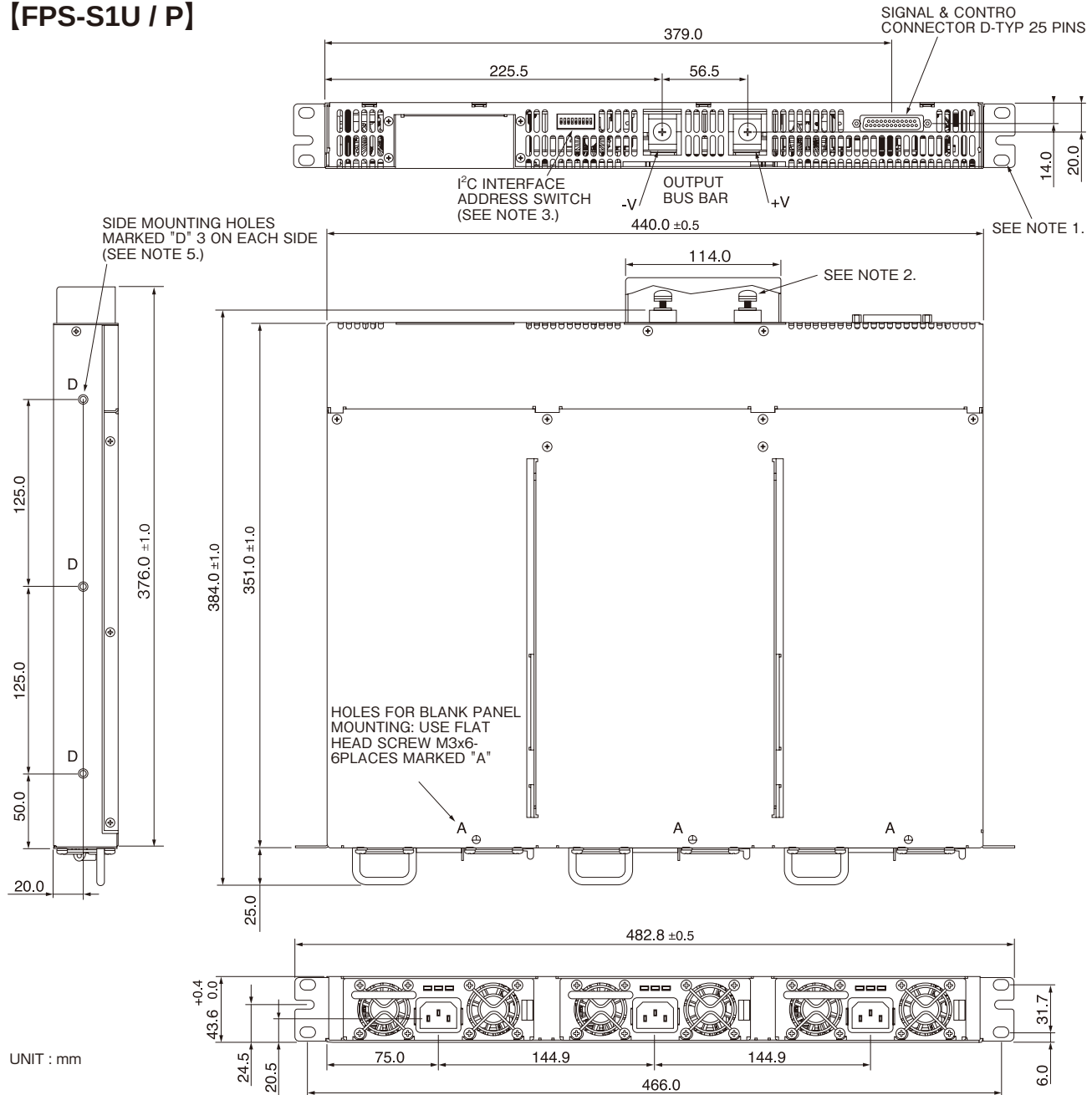


BLANK PANEL  
 INFORMATION:  
 (OPTIONAL)  
 ORDER NAME: FPS-BP



UNIT : mm

## [FPS-S1U / P]

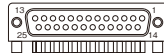


## NOTES

- (\*1) MOUNTING HOLES FOR 19" RACK, USE M6x12 TO FIX THE UNIT TO A RACK.
- (\*2) M6x16 SCREWS FOR LOAD WIRES FIXING. USE M6 LUG FOR THE LOAD WIRES. RECOMMENDED TIGHTENING TORQUE 42 - 56 Kgf.cm

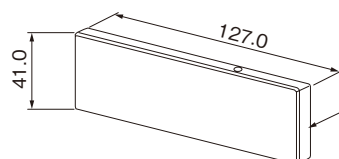
## SIGNALS &amp; CONTROL CONNECTOR PINS ASSIGNMENT

CONNECTOR DESCRIPTION:  
D-TYPE RIGHT ANGLE, 25 POSITIONS,  
FRONT METAL SHELL.  
AMP P/N: 747846-4

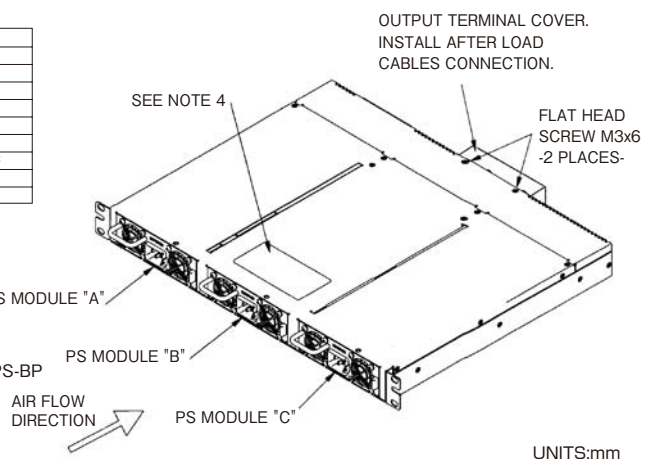


| PIN NUMBER | FUNCTION     | PIN NUMBER | FUNCTION   | PIN NUMBER | FUNCTION              |
|------------|--------------|------------|------------|------------|-----------------------|
| 1          | V_TRIM_B     | 9          | CS         | 17         | NC                    |
| 2          | TEMP_ALARM_B | 10         | V_TRIM_C   | 18         | NC                    |
| 3          | DC_OK_B      | 11         | SIGNAL RTN | 19         | NC                    |
| 4          | TEMP_ALARM_A | 12         | DC_OK_C    | 20         | SCL(I <sup>2</sup> C) |
| 5          | ON/OFF_A     | 13         | +SENSE     | 21         | SDA(I <sup>2</sup> C) |
| 6          | DC_OK_A      | 14         | AC_FAIL_B  | 22         | -SENSE                |
| 7          | V_TRIM_A     | 15         | ON/OFF_B   | 23         | TEMP_ALARM_C          |
| 8          | +12V_AUX     | 16         | AC_FAIL_A  | 24         | AC_FAIL_C             |
|            |              |            |            | 25         | ON/OFF_C              |

- (\*3) REFER TO INSTRUCTION MANUAL FOR SETTING DETAILS.
- (\*4) MODEL NAME, VOLTAGE AND CURRENT RATING AND SAFETY APPROVALS SYMBOLS WILL BE SHOWN HERE ACCORDING TO THE SPECIFICATIONS.
- (\*5) MOUNTING HOLES M5 FOR MOUNTING BRACKETS. USE M5x8 SCREWS TO FIX THE BRACKETS TO THE CHASSIS. SCREWS MUST NOT PENETRATE THE CHASSIS MORE THAN 6 mm.
- (\*6) THE FPS-S1U/P RACK IS SHOWN WITH 3 FPS1000/P UNITS INSTALLED.



BLANK PANEL INFORMATION:  
(OPTIONAL)  
ORDER NAME: FPS-BP



UNITS:mm