FORTEC
ELEKTRONIK AG

Instruction Manual

PMA-Series

Cosel

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Basic Characteristics Data

Model	Circuit method	Switching frequency [kHz]	Input current [A]*1	Inrush current protection	PCB/Pattern			Series/Parallel operation availability *2	
					Material	Single sided	Double sided	Series operation	Parallel operation
PMA15F	Flyback converter	100	0.4	Thermistor	CEM-3	Yes		Yes	No
PMA30F	Flyback converter	100	0.7	Thermistor	CEM-3	Yes		Yes	No
PMA60F	Active filter	60 - 550	0.8	Thermistor	CEM-3	Yes		Yes	No
	Forward converter	120							
PMA100F	Active filter	60 - 550	1.3	Thermistor	CEM-3	Yes		Yes	No
	Forward converter	120							

*1 The value of input current is at ACIN 100V and rated load.
*2 Refer to Instruction Manual 2.

1 Function

1.1 Input voltage range

■Input voltage range of the power supplies is from AC85V to AC264V (please see SPECIFICATIONS for details).
■In cases that conform with safety standard, input voltage range is AC100-AC240V (50/60Hz).
■If input value doesn't fall within above range, a unit may not operate in accordance with specifications and/or start hunting or fail.
If you need to apply a square waveform input voltage, which is commonly used in UPS and inverters, please contact us.
■When the input voltage changes suddenly, the output voltage accuracy might exceed the specification. Please contact us.

● PMA15F, PMA30F

■A power factor improvement circuit (active filter) is not built-in. If you use multiple units for a single system, standards for input harmonic current may not be satisfied. Please contact us for details.

1.2 Inrush current limiting

■An inrush current limiting circuit is built-in.
■If you need to use a switch on the input side, please select one that can withstand an input inrush current.
■Thermistor is used in the inrush current limiting circuit. When you turn the power ON/OFF repeatedly within a short period of time, please have enough intervals so that a power supply cools down before being turned on.

1.3 Overcurrent protection

■An overcurrent protection circuit is built-in and activated at 105% of the rated current. A unit automatically recovers when a fault condition is removed.
Please do not use a unit in short circuit and/or under an overcurrent condition.
■Intermittent Operation Mode
When the overcurrent protection circuit is activated and the output voltage drops to a certain extent, the output becomes intermittent so that the average current will also decrease.

1.4 Overvoltage protection

■An overvoltage protection circuit is built-in. If the overvoltage protection circuit is activated, shut down the input voltage, wait more than 3 minutes and turn on the AC input again to recover the output voltage. Recovery time varies depending on such factors as input voltage value at the time of the operation.

Remarks :
Please avoid applying a voltage exceeding the rated voltage to an output terminal. Doing so may cause a power supply to malfunction or fail. If you cannot avoid doing so, for example, if you need to operate a motor, etc., please install an external diode on the output terminal to protect the unit.

1.5 Output voltage adjustment

■To increase an output voltage, turn a built-in potentiometer clockwise. To decrease the output voltage, turn it counterclockwise.

1.6 Isolation

■For a receiving inspection, such as Hi-Pot test, gradually increase (decrease) the voltage for the start (shut down). Avoid using Hi-Pot tester with the timer because it may generate voltage a few times higher than the applied voltage, at ON/OFF of a timer.

1.7 Remote ON/OFF

● PMA15F, PMA30F

■These models do not have a remote ON/OFF function.

● PMA60F, PMA100F

■Option -R is available to provide a remote ON/OFF function. Please see "4 Option and Others" for details.

2 Series Operation and Parallel Operation

■You can use a power supply in series operation. The output current in series operation should be lower than the rated current of a power supply with the lowest rated current among power supplies that are serially connected. Please make sure that no current exceeding the rated current flows into a power supply.

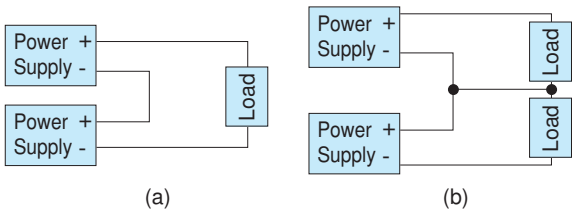

Fig.2.1 Examples of connecting in series operation

■Parallel operation is not possible.
■Redundancy operation is available by wiring as shown below.

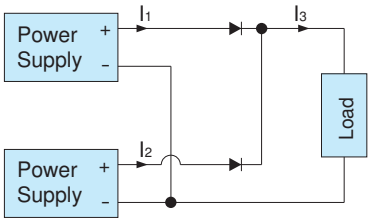

Fig.2.2 Example of redundancy operation

■Even a slight difference in output voltage can affect the balance between the values of I_1 and I_2.
Please make sure that the value of I_3 does not exceed the rated current of a power supply.

$I_3 \leqq$ the rated current value

3 Assembling and Installation Method

3.1 Installation method

■Do not insert a screw more than 6mm from the outside of a power supply to keep enough insulation distance between the screw and internal components.

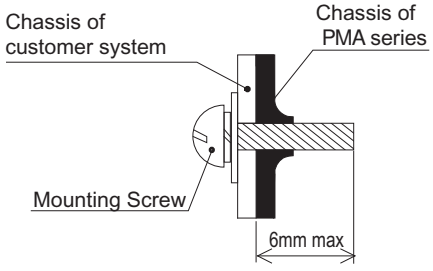

Fig.3.1 Mounting screw

■If you use two or more power supplies side by side, please keep a sufficient distance between them to allow enough air ventilation. Ambient temperature around each power supply should not exceed the temperature range shown in the derating curve.

3.2 Derating

■Mounting Method

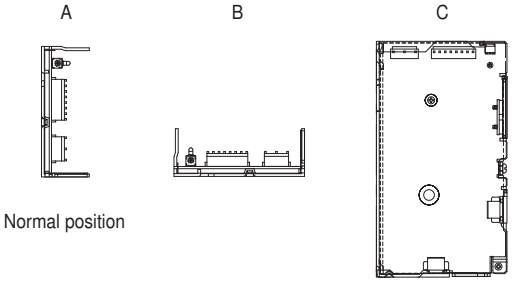

Fig.3.2 Mounting method

■Environment to use it and Installation environment
When using it,it is necessary to radiate heat by the heat of the power supply.
Table 3.1 - 3.4 shows the relation between the upper limit temperature (Point A and Point B) and load factors.
Please consider the ventilation so that the convection which is enough for the whole power supply is provided.
And temperature of Point A and Point B please become lower than upper limit temperature.
The expectancy life in the upper bound temperature (Point A and Point B) is three years or more.
Please refer to External View for the position of Point A and Point B.

Remarks:
＊Please be careful of electric shock or earth leakage in case of temperature measurement, because Point A and Point B is live potential.

Table 3.1 Temperatures of Point A, Point B PMA15F-□

Mounting Method	Load factor	Max temperature	
		Point A[℃]	Point B[℃]
A	70%<Io≦100%	72	75
	20%<Io≦70%	75	77
	Io≦20%	77	77
B	70%<Io≦100%	62	62
	20%<Io≦70%	64	66
	Io≦20%	66	67
C	70%<Io≦100%	55	62
	20%<Io≦70%	58	64
	Io≦20%	61	63

Table 3.2 Temperatures of Point A, Point B PMA30F-□

Mounting Method	Load factor	Max temperature	
		Point A[℃]	Point B[℃]
A	70%<Io≦100%	77	83
	20%<Io≦70%	79	83
	Io≦20%	80	84
B	70%<Io≦100%	72	74
	20%<Io≦70%	70	74
	Io≦20%	71	74
C	70%<Io≦100%	66	76
	20%<Io≦70%	67	75
	Io≦20%	68	73

Table 3.3 Temperatures of Point A, Point B PMA60F-□

Mounting Method	Load factor	Max temperature	
		Point A[℃]	Point B[℃]
A	70%<Io≦100%	82	76
	20%<Io≦70%	88	81
	Io≦20%	88	83
B	70%<Io≦100%	66	68
	20%<Io≦70%	75	73
	Io≦20%	77	75
C	70%<Io≦100%	64	65
	20%<Io≦70%	71	72
	Io≦20%	73	72

Table 3.4 Temperatures of Point A, Point B PMA100F-□

Mounting Method	Load factor	Max temperature	
		Point A[℃]	Point B[℃]
A	70%<Io≦100%	78	80
	20%<Io≦70%	83	82
	Io≦20%	84	84
B	70%<Io≦100%	64	73
	20%<Io≦70%	70	73
	Io≦20%	73	75
C	70%<Io≦100%	59	76
	20%<Io≦70%	65	76
	Io≦20%	67	74

■The operative ambient temperature is different by with / without case cover or mounting position. Derating curve is shown below.
Note: In the hatched area, the specification of Ripple, Ripple Noise is different from other area.

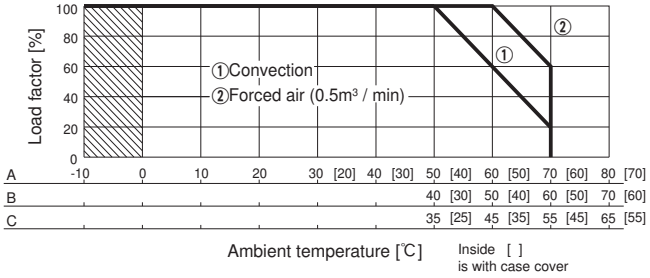

Fig.3.3 Ambient temperature derating curve (refer to Table 3.1-3.4)

● PMA15F, PMA30F

■Input Voltage Derating Curve

Input voltage derating curve is shown in Fig.3.4.

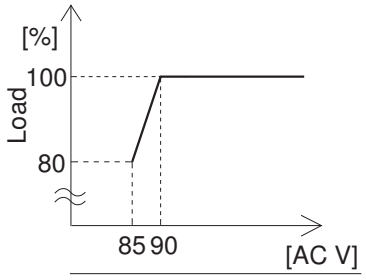

Fig.3.4 Input voltage derating curve

3.3 Expectancy life and warranty

■Expectancy Life.

Please see the following tables for expectancy life.

Table 3.5 Expectancy Life

Mounting Method	Annual Average of Ambient Temperatures	Load Factor	
		50%	100%
A	Ta = 30℃ or less	10 years or more	10 years or more
	Ta = 40℃	10 years or more	6 years
	Ta = 50℃	5 years	3 years
B and C	Ta = 20℃ or less	10 years or more	10 years or more
	Ta = 30℃	10 years or more	6 years
	Ta = 40℃	5 years	3 years

■Warranty

Table 3.6 Warranty

Mounting Method	Annual Average of Ambient Temperatures	Load Factor	
		50%	100%
A	Ta = 40℃ or less	5 years	5 years
	Ta = 50℃	5 years	3 years
B and C	Ta = 30℃ or less	5 years	5 years
	Ta = 40℃	5 years	3 years

4 Option and Others

4.1 Outline of options

✻Please inquire us for details of specifications and delivery timing.
✻You can combine multiple options. Some options, however, cannot be combined with other options. Please contact us for details.

● -T

・Option -T units have vertically positioned screws on a terminal block.
・Please contact us for details about appearance.

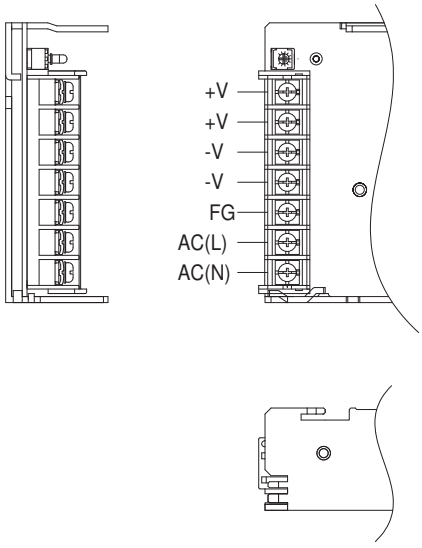

Fig.4.1 Example of option -T (PMA100F)

● -T1

・Option -T1 units have horizontally positioned screws on a terminal block.
・Please contact us for details about appearance.

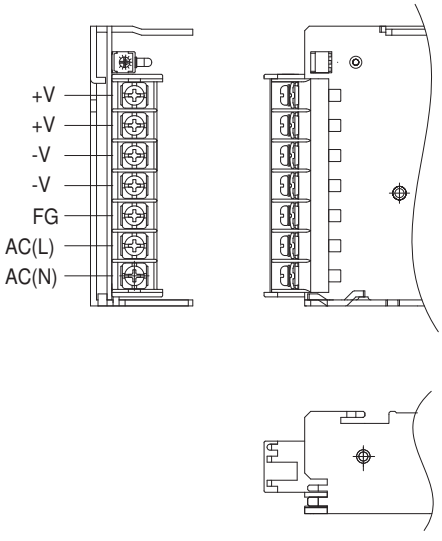

Fig.4.2 Example of option -T1 (PMA100F)

● -N

・Option -N units come with a cover.
・Appearance of Option -N units is different from that of standard units. Please see External View for details.
・Derating curve for Option -N units is different from that for standard units. Please see 3.2 Derating Curve for details.

✻Safety agency approvals will be void if the cover is attached after the unit is ex-factoried.

● -J1

・Option -J1 units, the Input and Output connector is VH connectors (Mfr. J.S.T.).

● -R (PMA60F, PMA100F)

・You can control output ON/OFF remotely in Option -R units. To do so, connect an external DC power supply and apply a voltage to a remote ON/OFF connector, which is available as option.

Model Name	Built-in Resistor Ri [Ω]	Voltage between RC (+) and RC (-) [V]		Input Current [mA]
		Output ON	Output OFF	
PMA60F PMA100F	780	4.5 - 12.5	0 - 0.5	(20max)

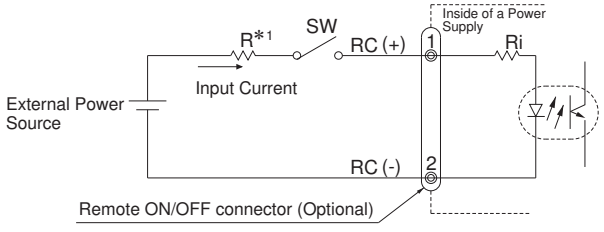

Fig.4.3 Example of using a remote ON/OFF circuit

・Dedicated harnesses are available for your purchase. Please see Optional Parts for details.

✻1 If the output of an external power supply is within the range of 4.5 - 12.5V, you do not need a current limiting resistor R. If the output exceeds 12.5V, however, please connect the current limiting resistor R.

To calculate a current limiting resistance value, please use the following equation.

$$R[\Omega]=\frac{Vcc-(1.1+Ri\times 0.005)}{0.005}$$

✻Please wire carefully. If you wire wrongly, the internal components of a unit may be damaged.
■Remote ON/OFF circuits (RC+ and RC-) are isolated from input, output and FG.

4.2 Others

■While turning on the electricity, and for a while after turning off, please don't touch the inside of a power supply because there are some hot parts in that.

● PMA15F, PMA30F

■When a mass capacitor is connected with the output terminal (load side), the output might become the stop or an unstable operation. Please contact us for details when you connect the capacitor.

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