

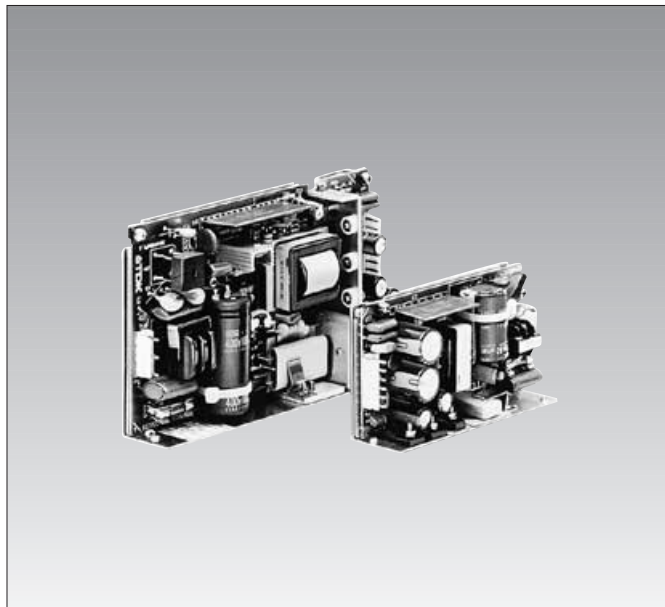
F SERIES FMW

[FEATURES]

- Wide input voltage (AC.100V/200V switching not required) thin-type 3-output power supply.
- Compact open-frame device built-in type.
- Low price.
- Low-noise (FCC class B compliant).

[SUMMARY]

The F series FMW products are thin-type multi-output power supplies available for 100V and 200V systems without any switching operation for AC.85 to 264V input voltages. These power supplies have high performance with the noise terminal voltage FCC class B compliant as a result of pursuing easiness of use, in spite of low prices.



PART NUMBERS AND RATINGS

Part No.	Maximum output power(W)	Output current(A)				
		+5V	+12V	-12V	-15V	-15V
FMW-011	8.6	0.1 to 1	0 to 0.2	0 to 0.1	—	—
FMW-021	16	0.4 to 2	0 to 0.3	0 to 0.2	—	—
FMW-022	17.5	0.4 to 2	—	—	0 to 0.3	0 to 0.2
FMW-031	35	1 to 5	0.5 to 1.2	0 to 0.3	—	—
FMW-051	50	1 to 5	0.5 to 2	0 to 0.3	—	—

* The total sum of the output voltage multiplied by the output current cannot exceed the maximum output power.

• The above products are only produced upon receipt of order. Please check a delivery date.

F SERIES FMW8W TYPE

SPECIFICATIONS AND STANDARDS

PART NO.		FMW-011
Rated output voltage and current ^{*1}	V ₁	5V • 1A
	V ₂	−12V • 0.1A
	V ₃	+12V • 0.2A
Maximum output power	W	8.6

INPUT CONDITIONS

Input voltage Eac	V	85 to 264[Rating: 100 to 120/200 to 240]
Input frequency	Hz	47 to 66[Rating: 50 to 60](Single phase)
Input current	A	0.4max./0.2max.[AC.100 to 120/200 to 240V]
Fuse rating	A	1[Built-in]
Surge current	A	10max./20max.[AC.100 to 120/200 to 240V, cold start]
Leakage current	mA	0.5max./0.75max.[AC.100 to 120/200 to 240V]
Efficiency	%	66typ.

OUTPUT CHARACTERISTICS

Output voltage Edc	V	5(V ₁)	−12(V ₂)	+12(V ₃)
Voltage variable range Edc	V	Fixed		
Maximum output current	A	1	0.1	0.2
Minimum output current ^{*3}	A	0.1	0	0
Output setting conditions	[Voltage]	V	5±0.05	—
	[Current]	A	1	0.1
Voltage stability	Input variation	%	5V(V ₁): 1.5max., V ₂ • V ₃ : 1max.[Within the input voltage range]	
	Load variation ^{*2}	%	5V(V ₁): 1.5max., V ₂ • V ₃ : 1max.[Maximum to rated load]	
	Temperature variation	%	2max.[Ambient temperature: 0 to +50°C]	
	Total variation	%	±4max.	±6max.
	Drift	%	0.5max.[After input voltage ON for 30min to 8h]	
	Dynamic load	%/ms	±4max./1max.[50 to 100% sudden load change]	
Ripple Ep-p	mV	100max.	60max.	60max.
Ripple noise Ep-p	mV	150max.	290max.	290max.
Start up time	ms	300max.		
Hold up time	ms	20typ.		

AUXILIARY FUNCTIONS

Indicator display	No
Overvoltage protection	Only 5V built-in protection, voltage shut-down type(Overvoltage threshold: 6 to 6.9V).
Overcurrent protection	9.1W min., total power type
Remote ON-OFF	No
Remote sensing	No
Current balance	No
Output voltage external variable function	No

STANDARDS

Safety standards	—
Noise terminal voltage	FCC class B compliant.

CONSTRUCTIONS

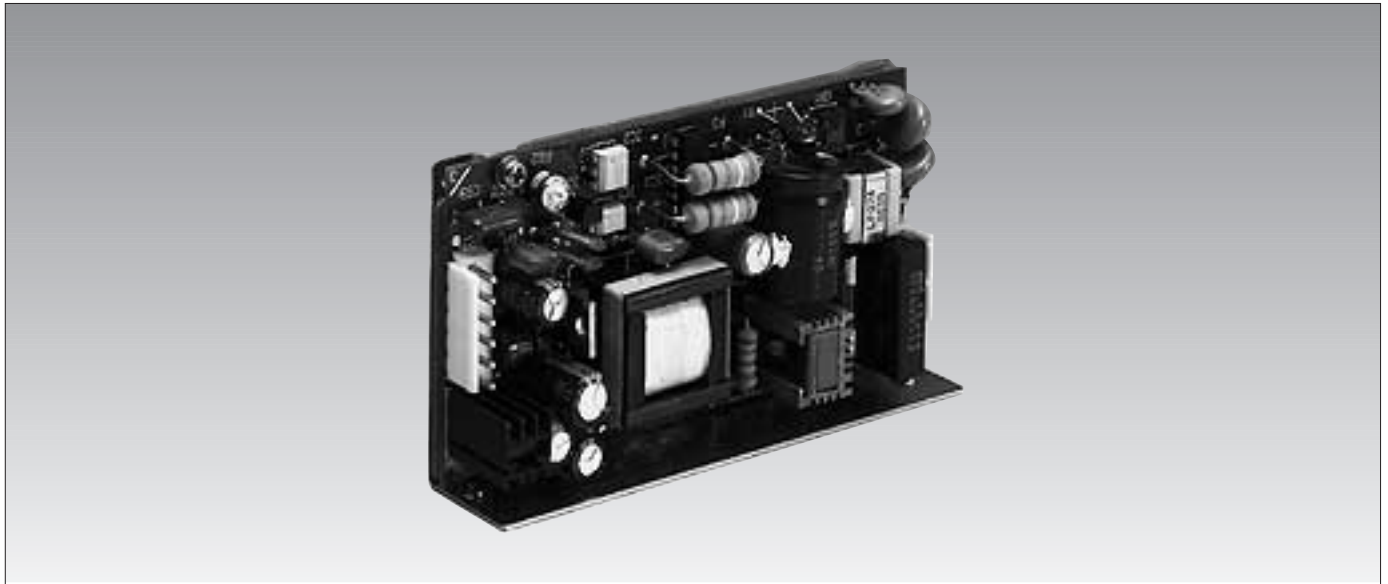
External dimensions	mm	25×60×110[H×W×L]
Weight	g	220max.
Mounting method		Can be attached to 2 sides.
Case and cover		No(Open frame)
Input and output cables		Sold separately, for input: 4EU10B074/for output: 4EU20B074(Wire material: UL1015/1007, AWG18/20, 0.5m length)

^{*1} Current rating(maximum output current) is determined for 0 to +50°C. Derating is required when used outside this temperature range.

^{*2} Only the load being measured was varied(from minimum output current to maximum output current). Other outputs currents were at their maximum values.

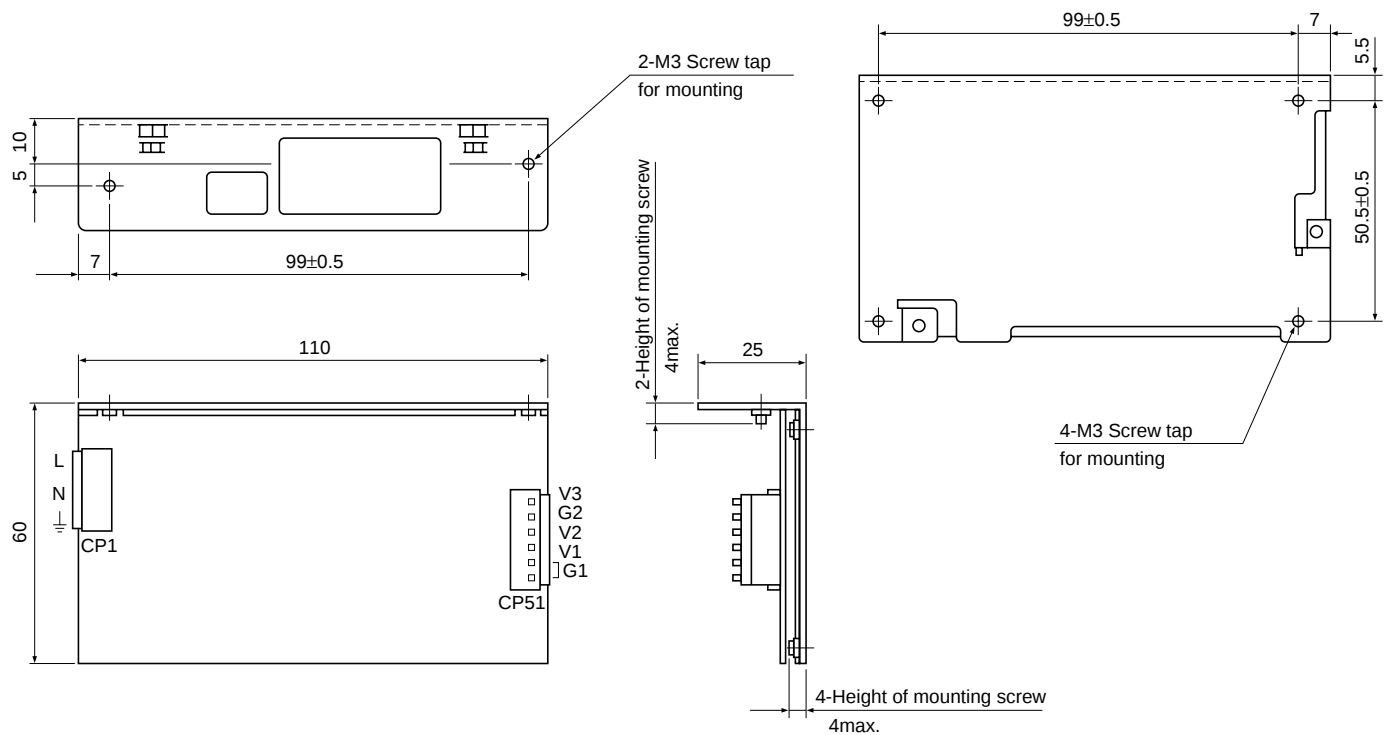
^{*3} Normal output voltages might possibly not be maintained if outputs V₂, V₃ fall below V₁ minimum current values.

F SERIES FMW8W TYPE



SHAPES AND DIMENSIONS FMW8W TYPE

Dimensions in mm
±0.7mm : without specified dimensions



Both of input/output compatibility connector

	Housing	Pin	Manufacturer
Input	VHR-5N	SVH-21T-P1.1 or SVH-21T-1.1	JST
Output	VHR-6N	SVH-21T-P1.1 or SVH-21T-1.1	JST

F SERIES FMW15W TYPE

SPECIFICATIONS AND STANDARDS

PART NO.		FMW-021	FMW-022
Rated output voltage and current*1	V ₁	5V • 2A	5V • 2A
	V ₃	+12V • 0.3A	+15V • 0.3A
	V ₂	−12V • 0.2A	−15V • 0.2A
Maximum output power	W	16	17.5

INPUT CONDITIONS

Input voltage Eac	V	85 to 264[Rating: 100, 115, 200, 230]
Input frequency	Hz	47 to 66(Single phase)
Input current	A	0.5max./0.3max.[AC.100/200V input, maximum output rated power](Built-in fuse rating: 1A)
Surge current	A	20max.[25°C, AC.100V input, output rating, cold start]
Leakage current	mA	0.5max.[25°C, AC.100 input, output ratings]
Efficiency	%	67typ.[25°C, input and output ratings]

OUTPUT CHARACTERISTICS

LIST OF CHARACTERISTICS								
Output voltage Edc		V	5(V ₁)	+12(V ₃)	−12(V ₂)	5(V ₁)	+15(V ₃)	−15(V ₂)
Voltage variable range Edc		V	Fixed					
Maximum output current		A	2	0.3	0.2	2	0.3	0.2
Minimum output current* ²		A	0.4	0	0	0.4	0	0
Output setting [Voltage]		V	5±0.02			5±0.02		
conditions [Current]		A	2	0.3	0.2	2	0.3	0.2
Voltage stability	Input variation	%	5V(V ₁): 1max., V ₂ • V ₃ : ±5max.				[Within the input voltage range]	
	Load variation* ²	%					[Minimum output current to maximum output current]	
	Temperature variation	%	5V(V ₁): ±1max., V ₂ • V ₃ : 2max.[Ambient temperature: 0 to +50°C]					
	Drift	%	0.5max.[25°C, input and output ratings, after input voltage ON for 30min to 8h]					
	Dynamic load	%/ms	4max./2max.[50 to 100% sudden load change]					
Ripple Ep-p		mV	100	60		100	60	
Ripple noise Ep-p		mV	150	290		150	350	
Start up time		ms	100max.					
Hold up time		ms	20typ.					

AUXILIARY FUNCTIONS

Indicator display	No
Overvoltage protection	Only 5V built-in protection, output voltage shut-down type, recovers upon reset.
Overcurrent protection	Fixed current and voltage threshold type, automatic recovery.
Remote ON-OFF	No
Remote sensing	No
Output voltage external variable function	No

STANDARDS

Safety standards	—
Noise terminal voltage	FCC class B, VDE0871 class B compliant.

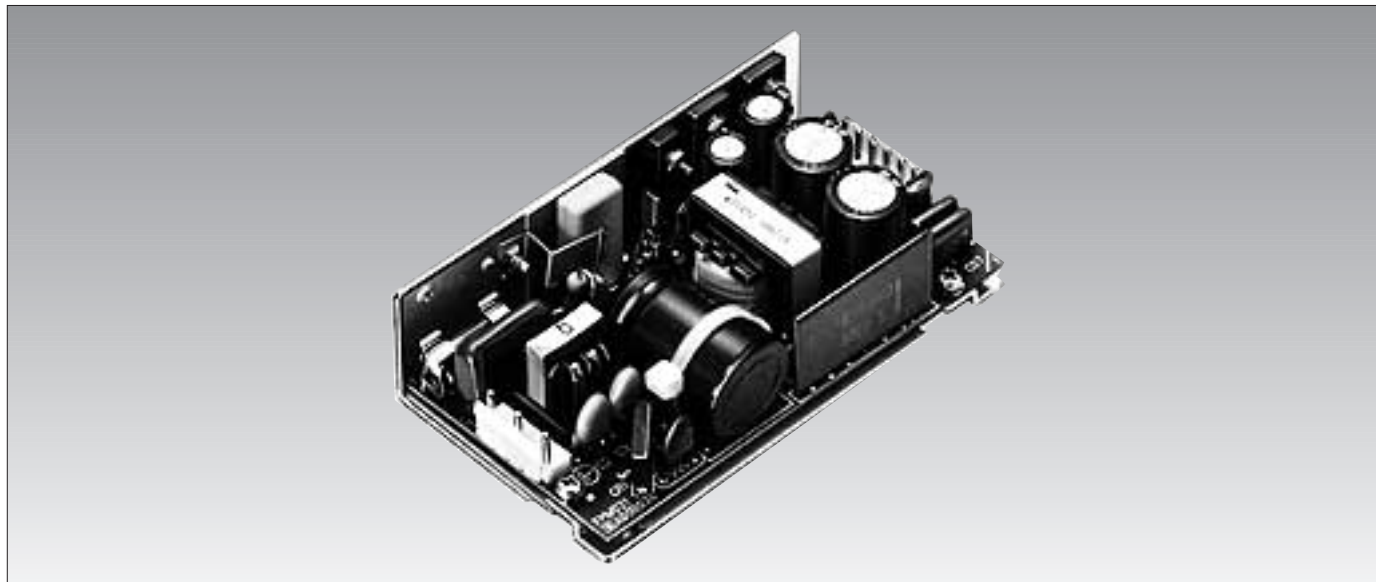
CONSTRUCTIONS

External dimensions	mm	30×60×110[H×W×L]
Weight	g	240max.
Mounting method	Can be attached to 2 sides.	
Case and cover	No(Open frame)	
Input and output cables	Sold separately, for input: 4EU10B074/for output: 4EU20B074(Wire material: UL1015/1007, AWG18/20, 0.5m length)	

*1 Current rating(maximum output current) is determined for 0 to +50°C. Derating is required when used outside this temperature range.

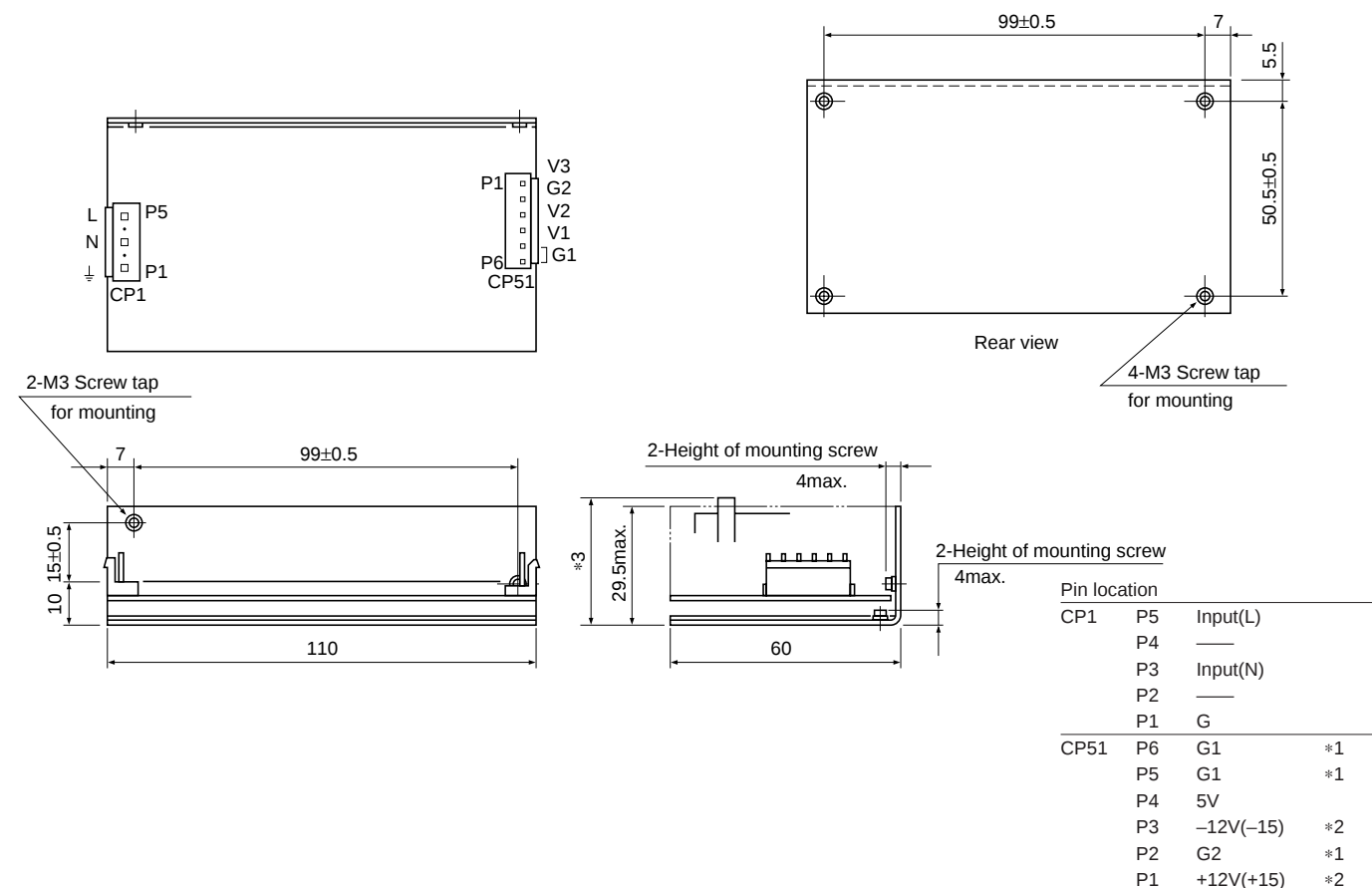
*2 Normal output voltages might possibly not be maintained if outputs V₂, V₃ fall below V₁ minimum current values.

F SERIES FMW15W TYPE



SHAPES AND DIMENSIONS FMW15W TYPE

Dimensions in mm
±0.7mm : without specified dimensions



Input/Output connector		Compatible connector	
		Housing	Terminal
CP1(Input)	B3P5-VH(Japan Solderless Terminal Mfg. Co., Ltd.)	VHR-5N	SVH21T-P1.1 or SVH-21T-1.1
CP51(Output)	B6P-VH	VHR-6N	SVH21T-P1.1 or SVH-21T-1.1

*1 G1 and G2 are floating circuit. But connected 50V rating capacitor.

(G1: return of V₁
G2: return of ±NV)

*2 (): for FMW-022

*3 Fixed plastic band for capacitor(30.5max.).

F SERIES FMW35W TYPE

SPECIFICATIONS AND STANDARDS

PART NO.		FMW-031
Rated output voltage and current*1	V ₁	+5V • 5A
	V ₂	+12V • 1.2A
	V ₃	−12V • 0.3A
Maximum output power	W	35

INPUT CONDITIONS

Input voltage Eac	V	85 to 264[Rating: 100, 115, 200, 230]
Input frequency	Hz	47 to 66[Rating: 50 to 60](Single phase)
Input current	A	0.9max./0.5max.[AC.100/200V input, maximum output rated power](Built-in fuse rating: 3A)
Surge current	A	45max.[25°C, AC.100V input, output rating, cold start]
Leakage current	mA	0.5max.[25°C, AC.100V input, output ratings]
Efficiency	%	72typ.[25°C, input and output ratings]

OUTPUT CHARACTERISTICS

Output voltage Edc		V	+5(V ₁)	+12(V ₂)	−12(V ₃)	
Voltage variable range Edc		V	Fixed			
Maximum output current		A	5	1.2	0.3	
Minimum output current* ²		A	1	0.5	0	
Output setting conditions	[Voltage]	V	5.06±0.02	—		
	[Current]	A	3.4	1.2	0.3	
Voltage stability	Input variation	%	+5V(V ₁): ±4max., V ₂ • V ₃ : ±5max.			[Within the input voltage range]
	Load variation* ²	%				[Minimum output current to maximum output current]
	Temperature variation	%	3max.[Ambient temperature: 0 to +50°C]			
	Drift	%	0.5max.[25°C, input and output ratings, after input voltage ON for 30min to 8h]			
	Dynamic load	%/ms	4max./2max.[50 to 100% sudden load change]			
Ripple Ep-p		mV	100	200		
Ripple noise Ep-p		mV	150	290		
Start up time		ms	100max.			
Hold up time		ms	20typ.			

AUXILIARY FUNCTIONS

Indicator display	No
Overvoltage protection	Only 5V built-in protection, output voltage shut-down type, recovers upon reset.
Overcurrent protection	Fixed current and voltage threshold type, automatic recovery.
Remote ON-OFF	No
Remote sensing	No
Output voltage external variable function	No

STANDARDS

Safety standards	—
Noise terminal voltage	FCC class B, VDE0871 class B compliant.

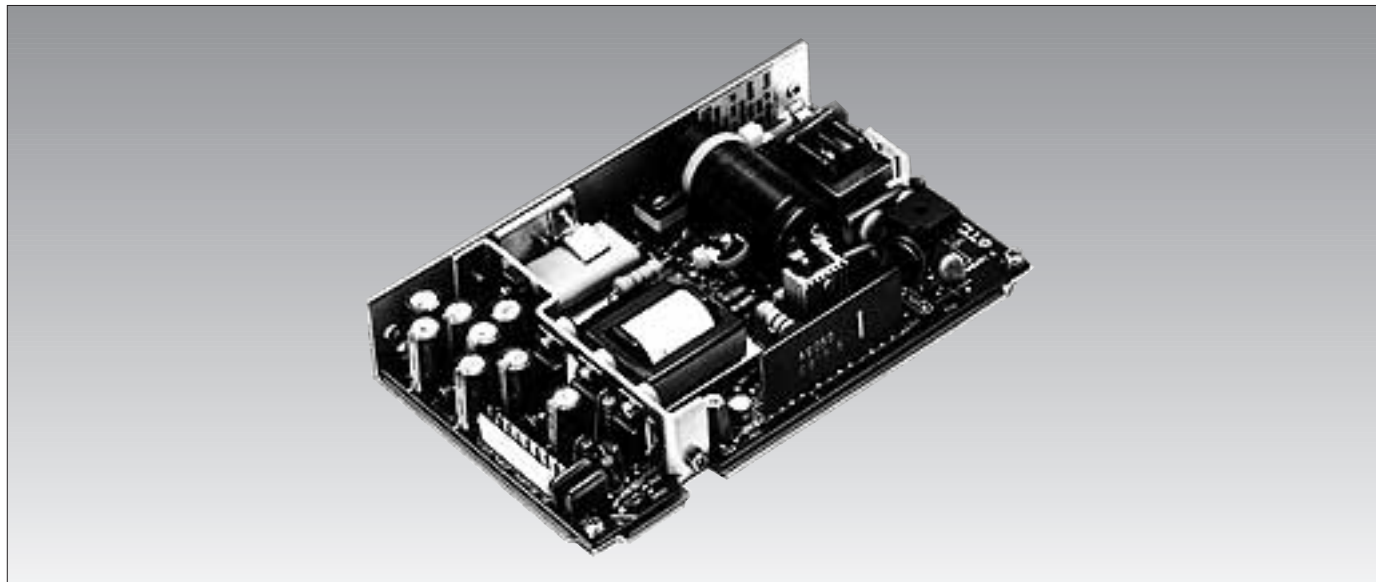
CONSTRUCTIONS

External dimensions	mm	30×95×158[H×W×L]
Weight	g	400max.
Mounting method	Can be attached to 2 sides.	
Case and cover	No(Open frame)	
Input and output cables	Sold separately, for input: 4EU10B070/for output: 4EU20B070(Wire material: UL1015/1007, AWG18/20, 0.5m length)	

*1 Current rating(maximum output current) is determined for 0 to +50°C. Derating is required when used outside this temperature range.

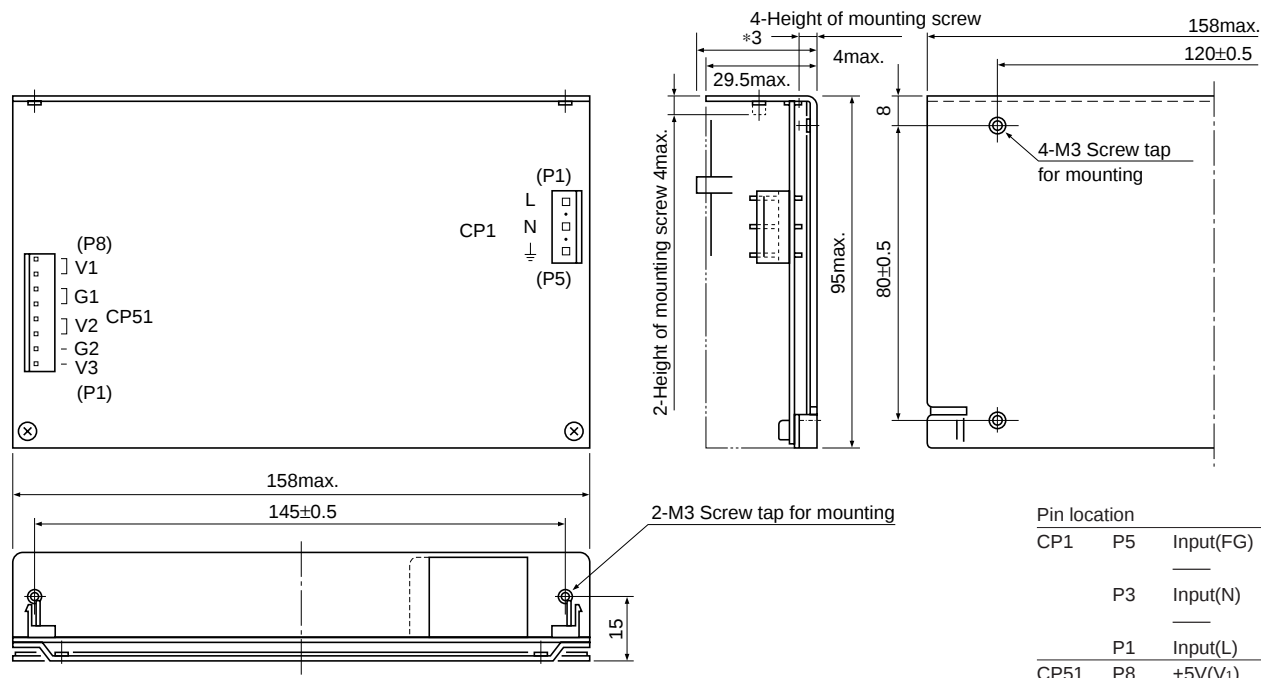
*2 Normal output voltages might possibly not be maintained if outputs V₂, V₃ fall below V₁ minimum current values.

F SERIES FMW35W TYPE



SHAPES AND DIMENSIONS FMW35W TYPE

Dimensions in mm
±0.7mm : without specified dimensions



Pin location		
CP1	P5	Input(FG)
	P3	Input(N)
	P1	Input(L)
CP51	P8	+5V(V ₁)
	P7	+5V(V ₁)
	P6	GND(G ₁) *1
	P5	GND(G ₁) *1
	P4	+12V(V ₂)
	P3	+12V(V ₂)
	P2	GND(G ₂) *2
	P1	-12V(V ₃)

Input/Output connector		Compatible connector	
		Housing	Pin
CP1(Input)	B3P5-VH(Japan Solderless Terminal Mfg. Co., Ltd.)	VHR-5N	SVH21T-P1.1 or SVH-21T-1.1
CP51(Output)	B8P-VH(Japan Solderless Terminal Mfg. Co., Ltd.)	VHR-8N	SVH21T-P1.1 or SVH-21T-1.1

*1 G₁ is 5V return voltage of +12V.

*2 G₂ is return voltage of -12V.

*3 Fixed plastic band for capacitor (30.5max.).

F SERIES FMW50W TYPE

SPECIFICATIONS AND STANDARDS

PART NO.		FMW-051
Rated output voltage and current*1	V ₁	+5V • 5A
	V ₂	+12V • 2A
	V ₃	−12V • 0.3A
Maximum output power	W	50

INPUT CONDITIONS

Input voltage Eac	V	85 to 264[Rating: 100, 115, 200, 230]
Input frequency	Hz	47 to 66[Rating: 50 to 60](Single phase)
Input current	A	1.5max./0.9max.[AC.100/200V input, maximum output rated power](Built-in fuse rating: 4A)
Surge current	A	45max.[25°C, AC.100V input, output rating, cold start]
Leakage current	mA	0.5max.[25°C, AC.100V input, output ratings]
Efficiency	%	73typ.[25°C, input and output ratings]

OUTPUT CHARACTERISTICS

Output voltage Edc						V	+5(V ₁)	+12(V ₂)	−12(V ₃)	
Voltage variable range Edc						V	Fixed			
Maximum output current						A	5	2	0.3	
Minimum output current* ²						A	1	0.5	0	
Output setting [Voltage]						V	5±0.02	—		
conditions [Current]						A	4.5	2	0.3	
Voltage stability	Input variation					%	5V(V ₁): ±4max., V ₂ • V ₃ : ±5max.			[Within the input voltage range]
	Load variation* ²					%				[Minimum output current to maximum output current]
	Temperature variation					%	3max.[Ambient temperature: 0 to +50°C]			
	Drift					%	0.5max.[25°C, input and output ratings, after input voltage ON for 30min to 8h]			
	Dynamic load					%/ms	4max./2max.[50 to 100% sudden load change]			
Ripple Ep-p						mV	100	200		
Ripple noise Ep-p						mV	150	290		
Start up time						ms	100max.			
Hold up time						ms	20typ.			

AUXILIARY FUNCTIONS

Indicator display	No
Overvoltage protection	Only 5V built-in protection, output voltage shut-down type, recovers upon reset.
Overcurrent protection	Fixed current and voltage threshold type, automatic recovery.
Remote ON-OFF	No
Remote sensing	No
Output voltage external variable function	No

STANDARDS

Safety standards	—
Noise terminal voltage	FCC class B, VDE0871 class B compliant.

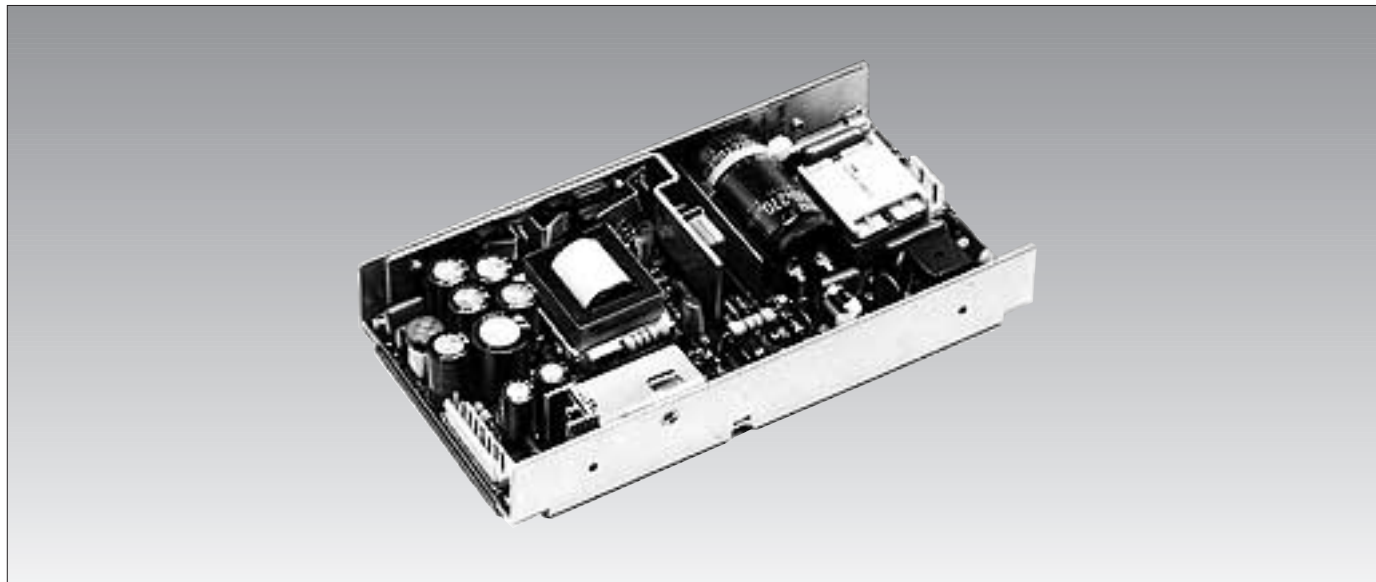
CONSTRUCTIONS

External dimensions	mm	30×95×180[H×W×L]
Weight	g	500max.
Mounting method	Can be attached to 3 sides.	
Case and cover	No(Open frame)	
Input and output cables	Sold separately, for input: 4EU10B070/for output: 4EU20B070(Wire material: UL1015/1007, AWG18/20, 0.5m length)	

*1 Current rating(maximum output current) is determined for 0 to +50°C. Derating is required when used outside this temperature range.

*2 Normal output voltages might possibly not be maintained if outputs V₂, V₃ fall below V₁ minimum current values.

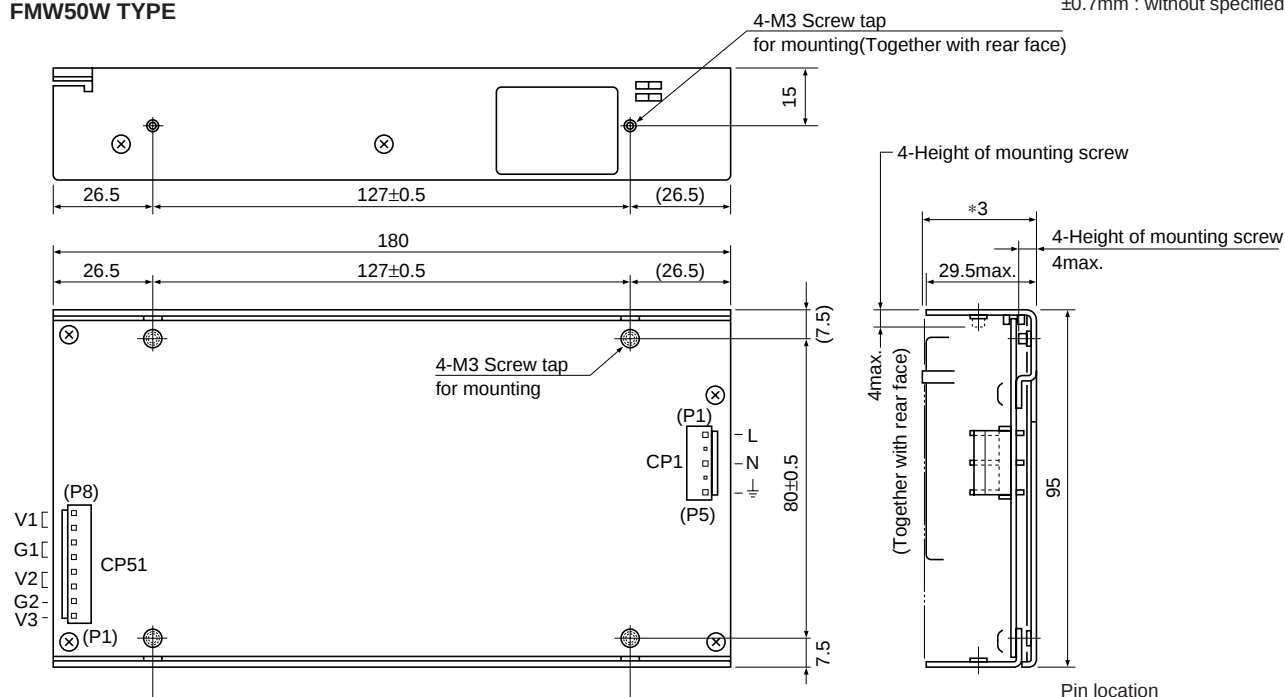
F SERIES FMW50W TYPE



SHAPES AND DIMENSIONS FMW50W TYPE

Dimensions in mm

±0.7mm : without specified dimensions



Pin location

CP1	P5	Input(FG)
	P3	Input(N)
	P1	Input(L)
CP51	P8	+5V(V ₁)
	P7	+5V(V ₁)
	P6	GND(G ₁)
	P5	GND(G ₁)
	P4	+12V(V ₂)
	P3	+12V(V ₂)
	P2	GND(G ₂)
	P1	-12V(V ₃)

Input/Output connector		Compatible connector	
		Housing	Pin
CP1(Input)	B3P5-VH(Japan Solderless Terminal Mfg. Co., Ltd.)	VHR-5N	SVH21T-P1.1 or SVH-21T-1.1
CP51(Output)	B8P-VH(Japan Solderless Terminal Mfg. Co., Ltd.)	VHR-8N	SVH21T-P1.1 or SVH-21T-1.1

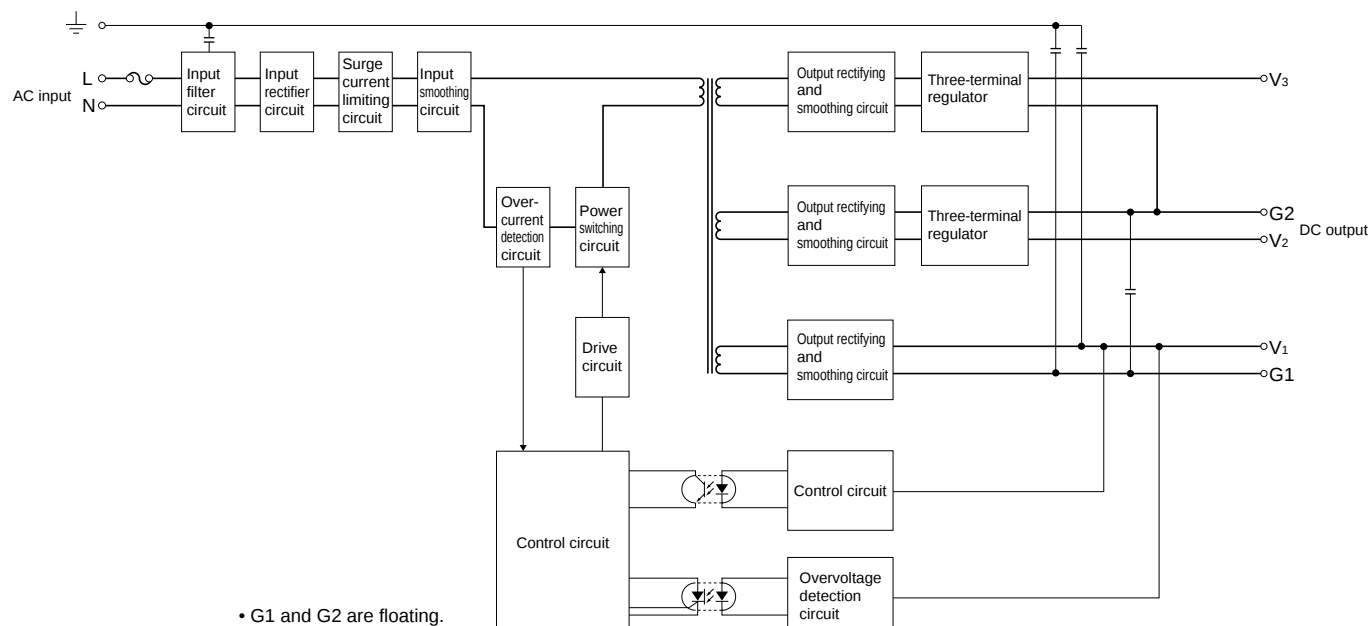
*1 G₁ is 5V return voltage of +12V.*2 G₂ is return voltage of -12V.

*3 Fixed plastic band for capacitor.

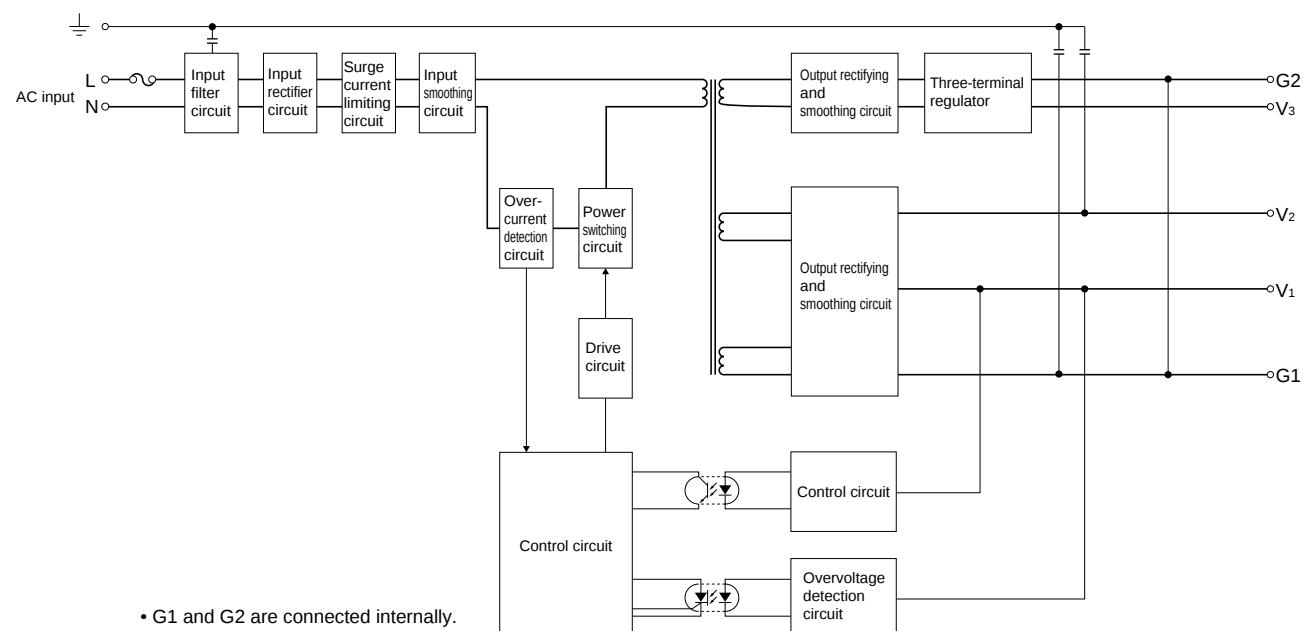
Characteristics, Functions, and Applications

BLOCK DIAGRAM

FMW01/02



FMW03/05



Characteristics, Functions, and Applications

COMMON SPECIFICATIONS

Temperature and humidity

Temperature range	Operating(°C)	0 to +60 Derating is necessary when operating environment temperature exceed 50°C.
	Storage(°C)	–25 to +75
Humidity range	Operating(%)RH	20 to 95[Maximum wet-bulb temperature: 35°C, without dewing]
	Storage(%)RH	

Amplitude and vibration

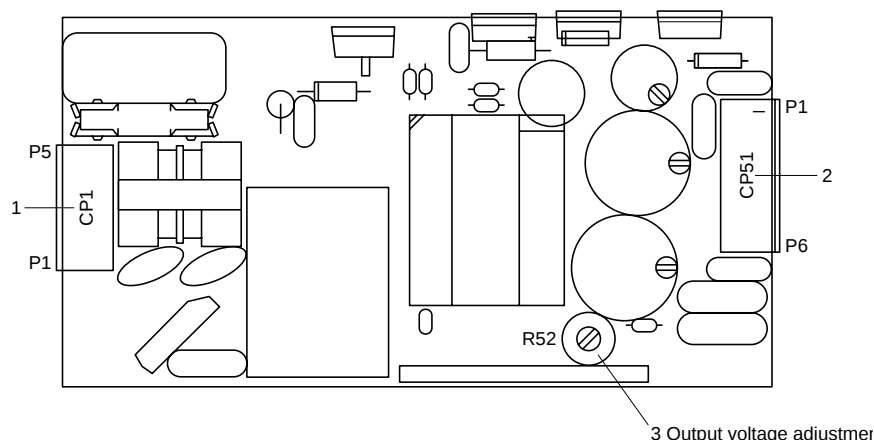
Amplitude	5 to 10Hz	All amplitude 10mm[3 directions, each 1h]
	10 to 55Hz	Acceleration 19.6m/s ² [2G, 3 directions, each 1h]
Vibration	Acceleration	196m/s ² [20G, 3 directions, each 3 times]
	Vibration time	11±5ms

Withstand voltage and insulation resistance

Withstand voltage	Input terminal to ground terminal($\frac{1}{\pm}$)	Eac(kV)2, 1min[Normal temperature, normal humidity, cutout current 10mA]
	Input terminal to output terminal	
Insulation resistance	Input terminal to ground terminal($\frac{1}{\pm}$)	Edc(V)500, 100MΩ min. [Normal temperature, normal humidity]
	Input terminal to output terminal	
	Output terminal to ground terminal($\frac{1}{\pm}$)	

TERMINAL DESIGNATIONS AND FUNCTIONS

FMW01/02



Note: For the FMW01 type, the component arrangement other than the terminal section differs from that of other types.

1 CP1

P1	G	Frame ground terminal: Connect to earth ground.
P2	—	
P3	N	AC input terminals: Connect to AC.100/115V or AC.200/230V single phase input line.
P4	—	
P5	L	

2 CP51

P1	V ₃	DC output terminals: Connect to load. V ₃ (+12 or +15V) output terminal.
P2	G2	DC output terminals: Connect to load. In the V ₂ and V ₃ return (0V) side.
P3	V ₂	DC output terminals: Connect to load. V ₂ (–12 or –15V) output terminal.
P4	V ₁	DC output terminals: Connect to load. V ₁ (5V) output terminal.

P5 G1

P6 G1 DC output terminals: Connect to load. In the V₁ return (0V) side.

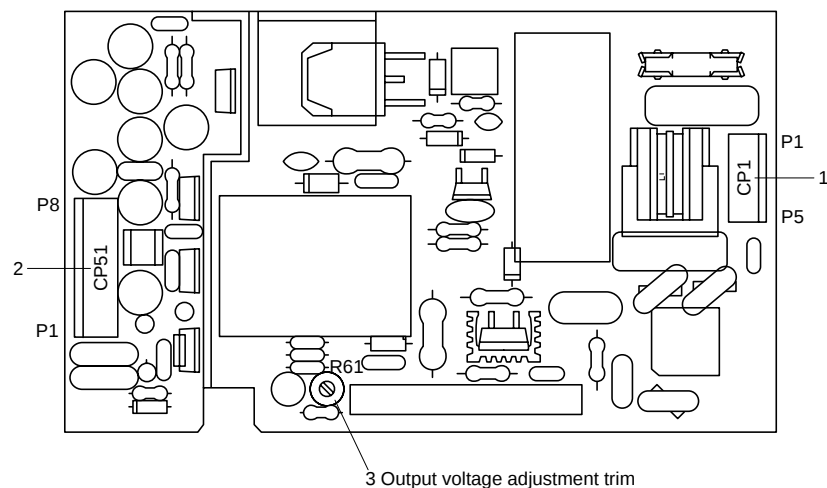
* G1 and G2 outputs are floating. They are connected through a capacitor of the rated voltage 50V.

3 R52

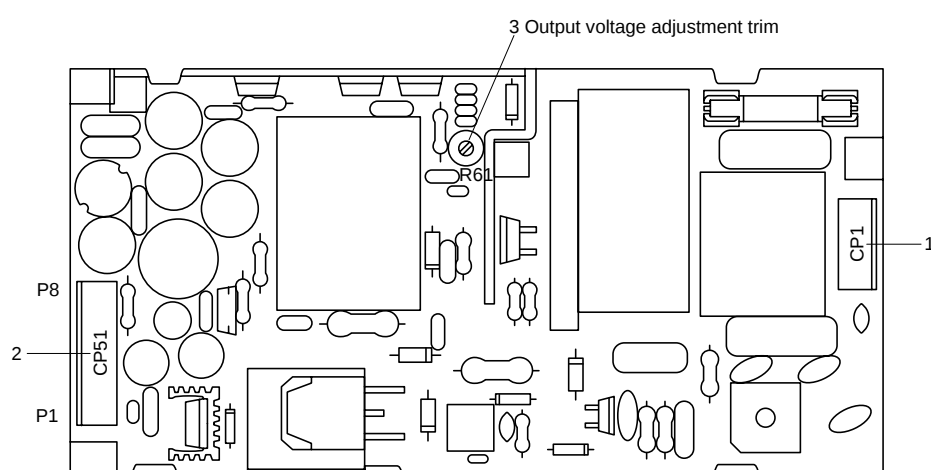
Output voltage adjustment trim: While the variable voltage is fixed, only the V₁ (+5V) is increased by rotating the R52 clockwise. This trimmer is for use in fine adjustment with a variable range of approx. ±3%.

Characteristics, Functions, and Applications

FMW03



FMW05



1 CP1

P1	L	AC input terminals: Connect to AC.100/115V or AC.200/230V single phase input line.
P2	—	
P3	N	
P4	—	
P5	G	Frame ground terminal: Connect to earth ground.

2 CP51

P1	V ₃	DC output terminals: Connect to load. V ₃ (–12V) output terminal.
P2	G2	DC output terminals: Connect to load. In the V ₃ return (0V) side.
P3	V ₂	DC output terminals: Connect to load. V ₂ (+12V) output terminal.
P4	V ₂	

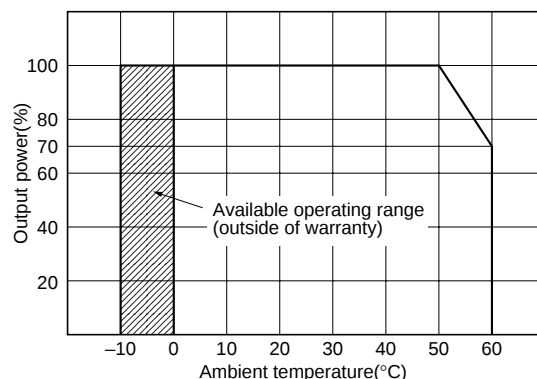
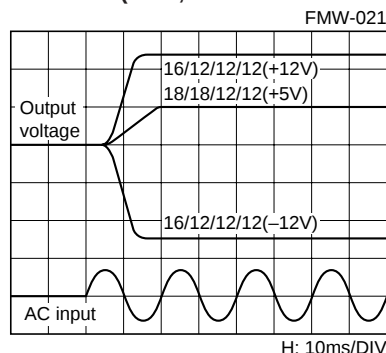
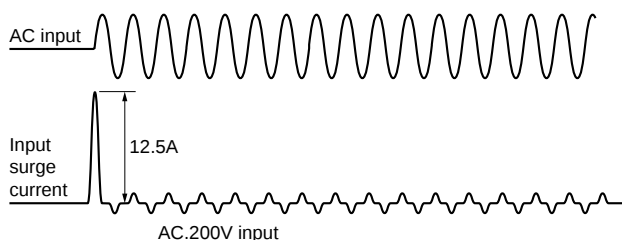
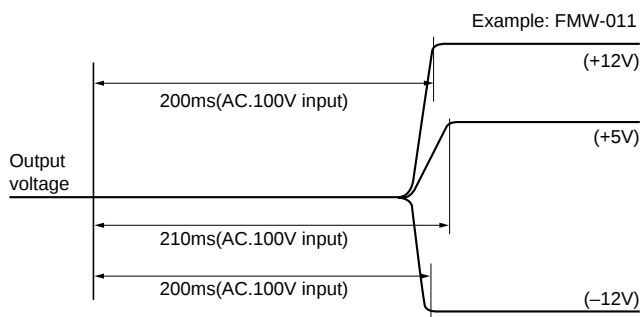
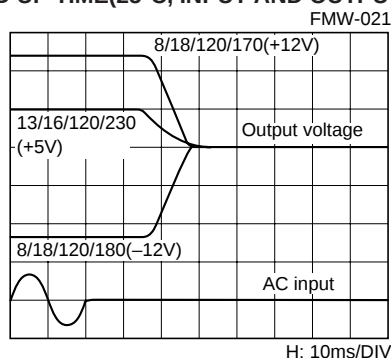
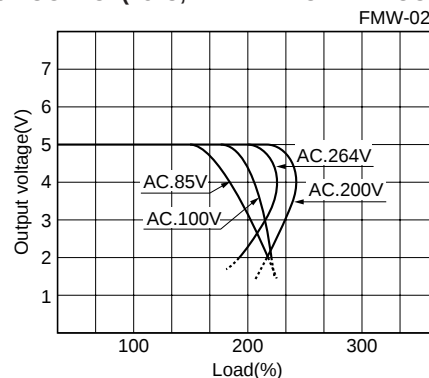
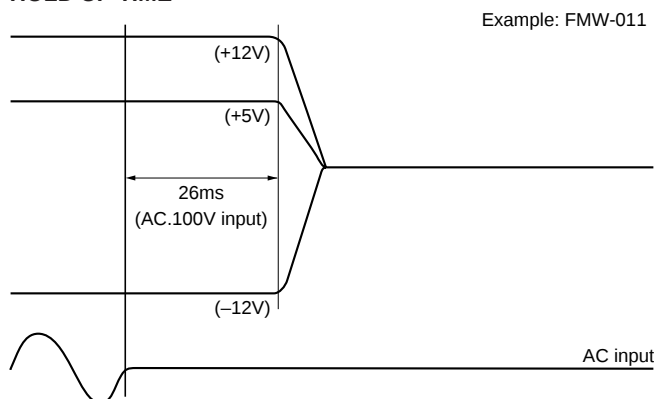
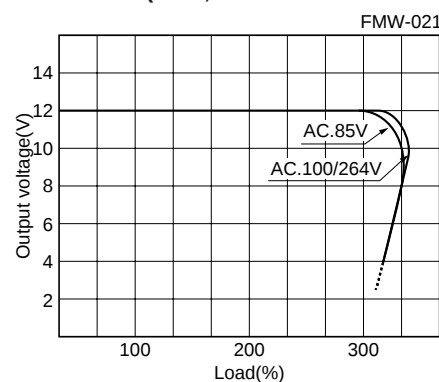
P5	G1	DC output terminals: Connect to load. In the V ₁ and V ₂ return (0V) side.
P6	G1	

P7	V ₁	DC output terminals: Connect to load. V ₁ (+5V) output terminal.
P8	V ₁	

3 R61

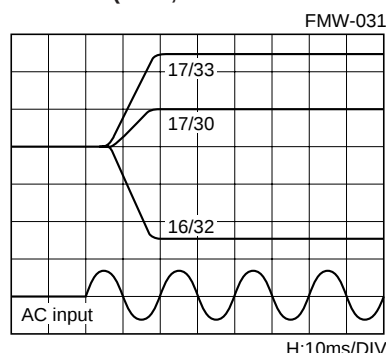
Output voltage adjustment trim: While the variable voltage is fixed, only the V₁ (+5V) and V₂ (+12V) are increased by rotating the R61 clockwise (V₁ and V₂ are linked with each other).
This trimmer is for use in fine adjustment with a variable range of approx. ±3%.

Characteristics, Functions, and Applications

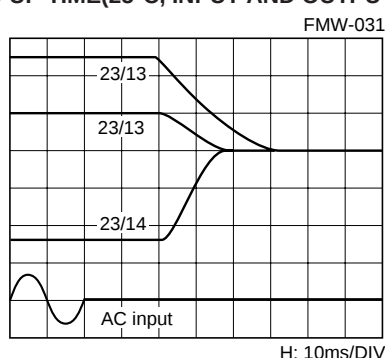
OUTPUT POWER-AMBIENT TEMPERATURE(DERATINGS)

START UP TIME(25°C, INPUT AND OUTPUT RATINGS)

SURGE CURRENT AND START UP TIME

HOLD UP TIME(25°C, INPUT AND OUTPUT RATINGS)

OUTPUT CHARACTERISTICS
5V OUTPUT(25°C, ±12V • INPUT AND OUTPUT RATINGS)

HOLD UP TIME

±12V OUTPUT(25°C, 5V • INPUT AND OUTPUT RATINGS)


Characteristics, Functions, and Applications

START UP TIME(25°C, INPUT AND OUTPUT RATINGS)

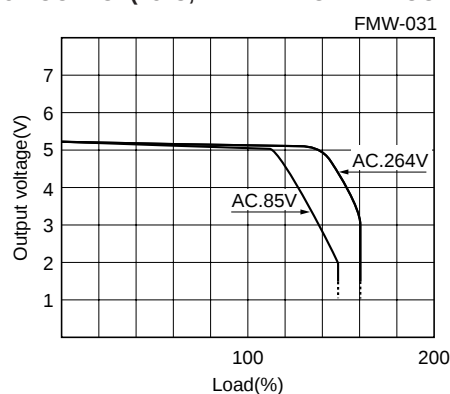


HOLD UP TIME(25°C, INPUT AND OUTPUT RATINGS)

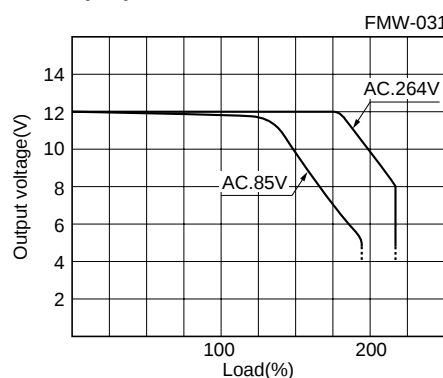


OUTPUT CHARACTERISTICS

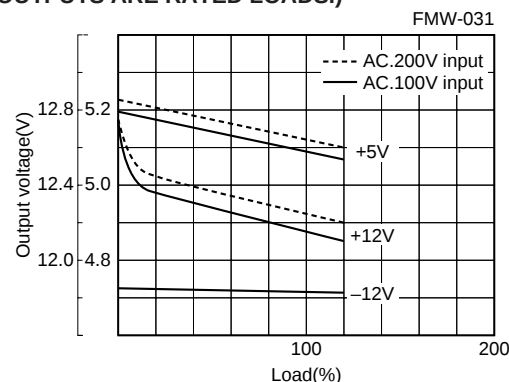
+5V OUTPUT(25°C, $\pm 12V \cdot$ INPUT AND OUTPUT RATINGS)



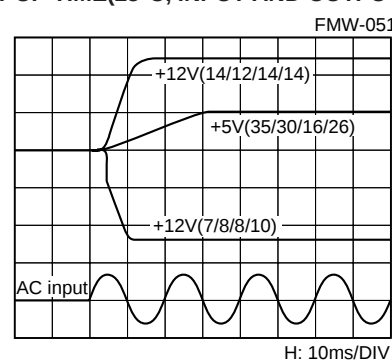
+12V output(25°C, $5V \cdot 3.4A$, $-12V \cdot 0.3A$ OUTPUT)



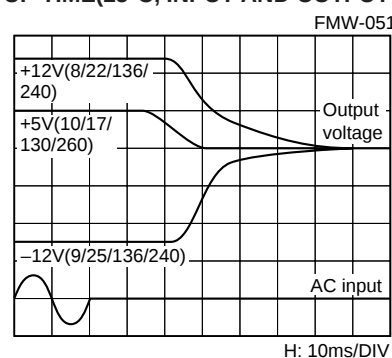
LOAD CHARACTERISTICS (25°C, INVARIABLE TWO OUTPUTS ARE RATED LOADS.)



START UP TIME(25°C, INPUT AND OUTPUT RATINGS)

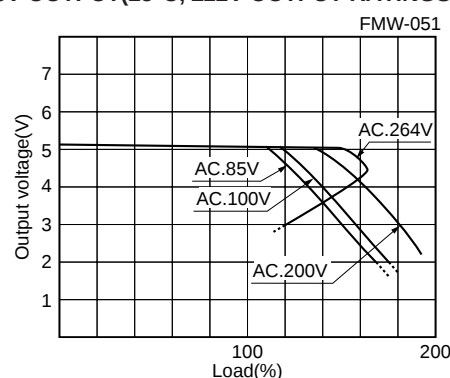


HOLD UP TIME(25°C, INPUT AND OUTPUT RATINGS)



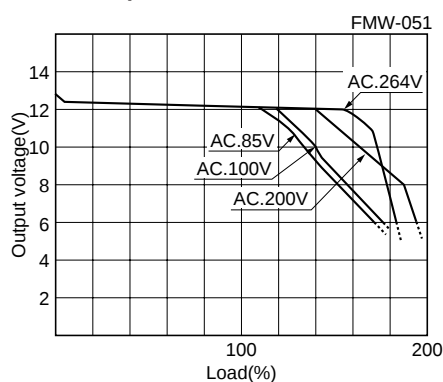
OUTPUT CHARACTERISTICS

+5V OUTPUT(25°C, $\pm 12V$ OUTPUT RATINGS)

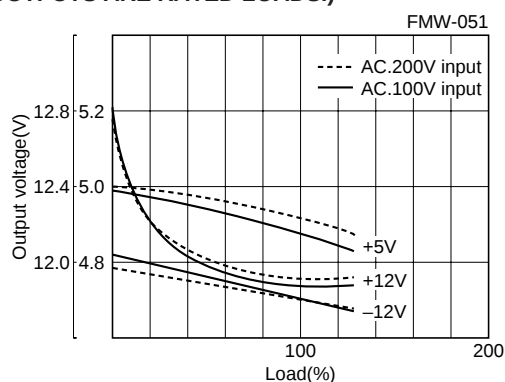


Characteristics, Functions, and Applications

±12V OUTPUT(25°C, 5V • 5A, -12V • 0.3A OUTPUT)



LOAD CHARACTERISTICS (25°C, INVARIABLE TWO OUTPUTS ARE RATED LOADS.)



OTHERS

1. Unless conditions are otherwise specified in the specifications or standards, 25°C and rated input-output should be applied.
2. Ripple and noise (20MHz or lower) should be specified at maximum output power, a temperature within a range of 0 to +50°C.