

# Instruction Manual

## FS series

POWER PLAZA CO., LTD

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# FS SERIES

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### Specification(FS10)

Items	Model	FS10-3R3	FS10-5	FS10-12	FS10-15	FS10-24	UNIT
Nominal Output Voltage		3.3	5	12	15	24	V
Maximum Output Current		2	2	0.9	0.7	0.45	A
Maximum Output Power		6.6	10	10.8	10.5	10.8	W
Efficiency(Typ) (1)		73	73	75	75	75	%
Input Voltage Range (2)		85-264VAC(47-440Hz)					V
Input Current (3)		0.21/0.11					A
In -Rush Current (4)		15A max At110VAC , 30A max At 220VAC					A
Output Voltage set point accuracy		±2% max ,fixed					
Maximum Ripple & Noise(5)		80	80	120	150	200	mV
Maximum Line Regulation (6)		±1%					
Maximum Load Regulation (7)		±1%					
Over Current Protection		Over 105% of Rating					
Hold Up Time (8)		10(min)@10W					ms
Parallel Operation		Possible					
Series Operation		Possible					
Operating Temperature		-10~50					
Operating Humidity		20~90%					
Storage Temperature		-20~70					
Storage Humidity		20~95%					
Cooling		Convection Cooling					
Withstand Voltage		Input-Output: 3KV , Input-FG: 2KV , Output-FG: 0.5KV					KV
Isolation Resistance (9)		More than 70MΩ at DC 500V at 25 and 70% RH for 1 min.					
Weight		90g or less					g
Size(W.H.D)		45×19.5×58					mm

### NOTES

- (1) At 220V and Maximum Output Power
- (2) For cases where conformance to various safety specs(UL ,CSA ,VDE , etc) are required, input voltage and frequency range will be 100-240VAC, 50/60Hz.
- (3) At 110V/220V and Maximum Output Power.
- (4) Typical value at cold start Ta=25
- (5) Tested in 60MHz Oscilloscope.
- (6) From 85~264VAC, constant load.
- (7) From no load to maximum load, constant input voltage.
- (8) At 25 and 220VAC.
- (9) Output-Chassis.

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### Specification(FS15)

Items \ Model	FS15-3R3	FS15-5	FS15-12	FS15-15	FS15-24	UNIT
Nominal Output Voltage	3.3	5	12	15	24	V
Maximum Output Current	3	3	1.3	1	0.65	A
Maximum Output Power	9.9	15	15.6	15	15.6	W
Efficiency(Typ) (1)	75	75	78	78	78	%
Input Voltage Range (2)	85-264VAC(47-440Hz)					V
Input Current (3)	0.31/0.16					A
In-Rush Current (4)	15A max At110VAC , 30A max At 220VAC					A
Output Voltage set point accuracy	±2% max ,fixed					
Maximum Ripple & Noise(5)	80	80	120	150	200	mV
Maximum Line Regulation (6)	±1%					
Maximum Load Regulation (7)	±1%					
Over Current Protection	Over 105% of Rating					
Hold Up Time (8)	10(min)@15W					ms
Parallel Operation	Possible					
Series Operation	Possible					
Operating Temperature	-10~50					
Operating Humidity	20~90%					
Storage Temperature	-20~70					
Storage Humidity	20~95%					
Cooling	Convection Cooling					
Withstand Voltage	Input-Output: 3KV , Input-FG: 2KV , Output-FG: 0.5KV					KV
Isolation Resistance (9)	More than 70MΩ at DC 500V at 25 °C and 70% RH for 1 min.					
Weight	100g or less					g
Size(W.H.D)	45×19.5×70					mm

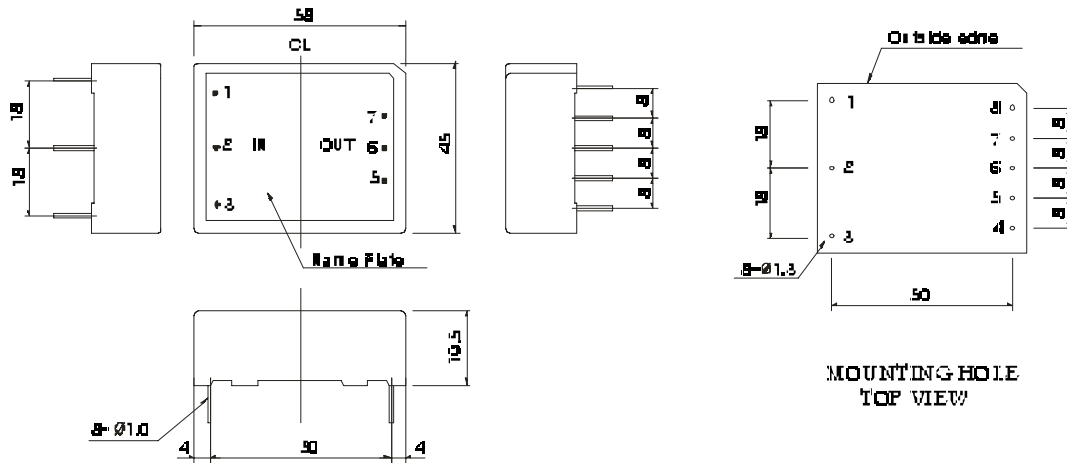
#### NOTES

- (1) At 220V and Maximum Output Power
- (2) For cases where conformance to various safety specs(UL ,CSA ,VDE , etc) are required, input voltage and frequency range will be 100-240VAC, 50/60Hz.
- (3) At 110V/220V and Maximum Output Power.
- (4) Typical value at cold start Ta=25
- (5) Tested in 60MHz Oscilloscope.
- (6) From 85~264VAC, constant load.
- (7) From no load to maximum load, constant input voltage.
- (8) At 25 °C and 220VAC
- (9) Output-Chassis.

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## Outline Drawing(FS10)



### NOTE:

- A: All dimensions are mm
- B: Weight: 90g or less

### PIN ASSIGNMENT

1. FG
2. AC(N)
3. AC(L)
4. No Pin
5. Output 1
6. No Pin
7. GND
8. No Pin

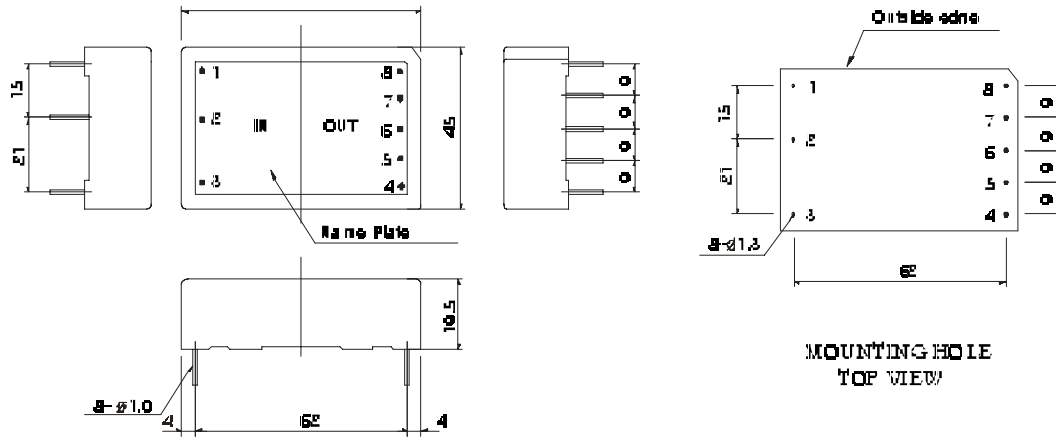
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## Outline Drawing(FS15)



### NOTE:

A: All dimensions are mm

B: Weight: 100g or less

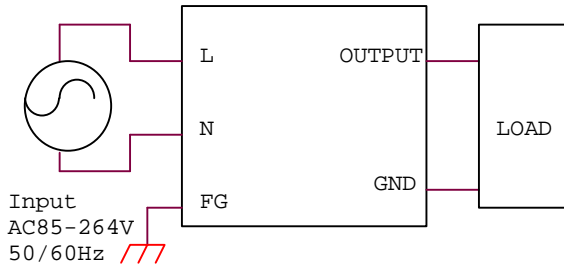
### PIN ASSIGNMENT

1. FG
2. AC(N)
3. AC(L)
4. No Pin
5. Output 1
6. No Pin
7. GND
8. No Pin

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## Instruction manual

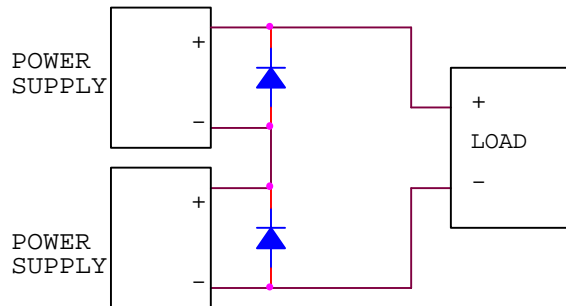
### Basic connection



- Use a schottky or fast recovery diode which has a low  $V_F$

### Series Operation

This supply can be operated the following ways.

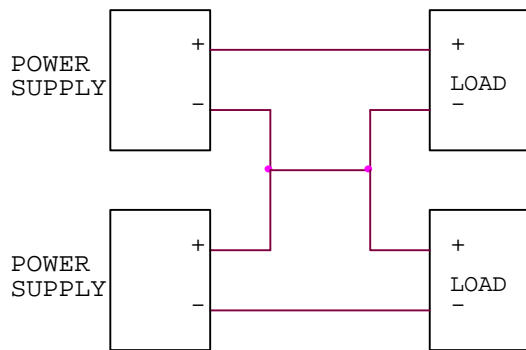
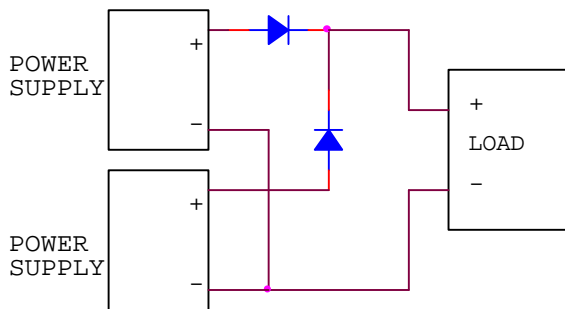


### NOTE:

- A: For safety as well as improved noise, ensure secure connection of the FG terminal to the ground terminal of the equipment.
- B: To avoid excessive voltage drop and for improved noise, short and thick wire should be used to connect the load

### Parallel Operation

This supply can be operated the following ways.



Choose a diode in accordance with voltage, power dissipation and heat radiation

- Voltage :  $V > V_o$
- Current :  $I_o \times 3$
- Design a proper heat sink according to power loss at diode (  $P_w = V_F \times I_o$  )

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- Voltage :  $V > V_o$
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- Design a proper heat sink according to power loss at diode (  $P_w = V_F \times I_o$  )
- Use a schottky or fast recovery diode which has a low  $V_F$

## **Output Ripple & Noise Measurement Method**

The standard measurement for output ripple and noise are based on normal probe with 60MHz bandwidth scope. Upon measurement of the ripple voltage, make sure that the oscilloscope probe leads are not too long.

## **Over Current Protection**

The FS Series is equipped with an over current protection circuit. When the short or overload condition is removed, the output will automatically recover. This setting is fixed and cannot be varied externally. If the short or overload condition continues, the power module could be damaged due to the heat condition

## **Maximum Line Regulation**

Maximum line regulation is maximum output voltage change when the input voltage is slowly varied within the input voltage range.

## **Maximum Load Regulation**

Maximum load regulation is maximum output voltage value change when varying the load current slowly within the standard output current range.

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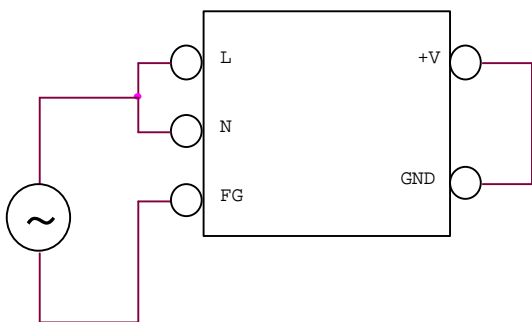
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### Withstand Voltage

CS series are designed to withstand 3KVAC(20mA) 1 minute between input-output , 2KVAC(20mA) 1 minute between input-FG , and 500VAC(100mA) 1 minute between output-FG.

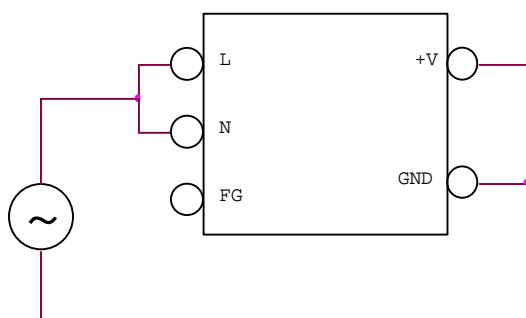
For the withstand voltage test, the applied voltage must be increased gradually from zero to the testing value, and then decreased gradually at shut down . Especially stay away from use of a timer. Where a pulse of several times the applied voltage can be generated

#### Input-FG



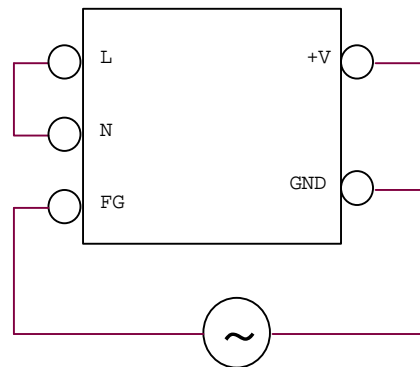
2KVAC, one minute, 20mA

#### Input-Output



3KVAC, one minute, 20mA

#### Output-FG

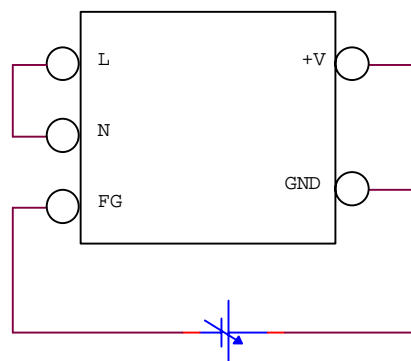


500VAC, one minute, 100mA

### Isolation Resistance

The isolation resistance is more than 70M at 500 VDC when tested with a DC isolation tester between the output and the case. Make sure that during testing, the isolation tester does not produce a high pulse when the applied voltage is varied. Ensure that the tester is fully discharged after the test.

#### Output-FG



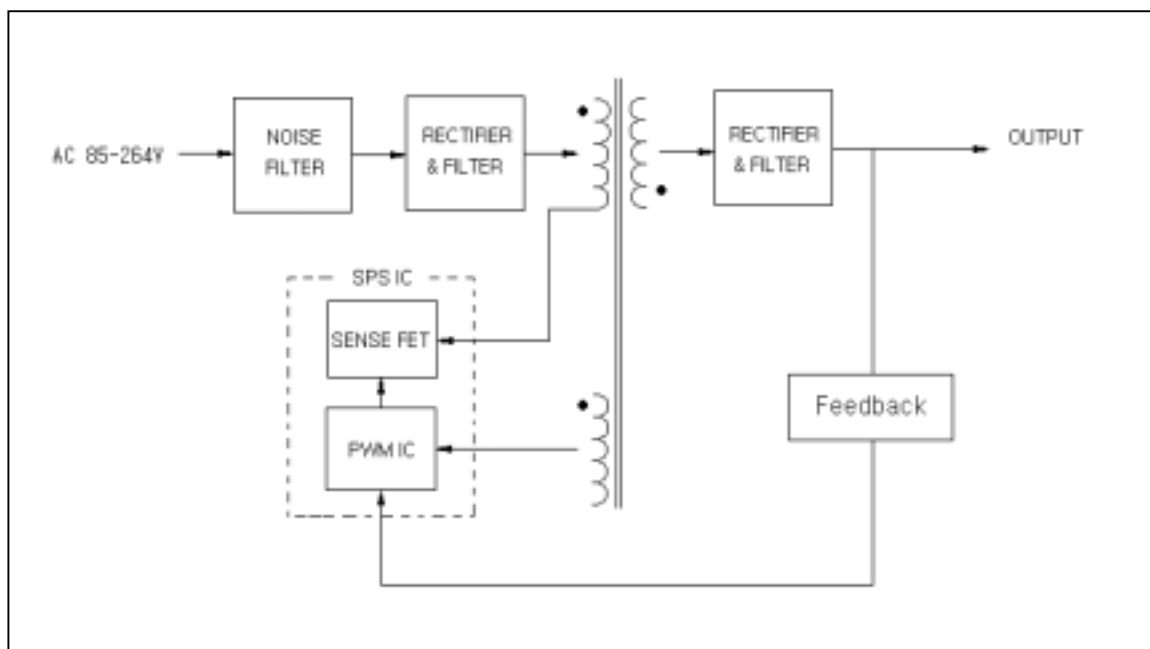
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### Block Diagrams



Circuit topology : flyback

Switching frequency : 70KHz(fixed)

## FS10 Series Specifications

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Maximum Load Regulation (7)	±1%					
Over Current Protection	Over 105% of Rating					
Hold Up Time (8)	10(min)@10W					ms
Parallel Operation	Possible					
Series Operation	Possible					
Operating Temperature	-10~50					
Operating Humidity	20~90%					
Storage Temperature	-20~70					
Storage Humidity	20~95%					
Cooling	Convection Cooling					
Withstand Voltage	Input-Output: 3KV , Input-FG: 2KV , Output-FG: 0.5KV					KV
Isolation Resistance (9)	More than 70MΩ at DC 500V at 25 and 70% RH for 1 min.					
Weight	90g or less					g
Size(W.H.D)	45×19.5×58					mm

### NOTES

- (1) At 220V and Maximum Output Power
- (2) For cases where conformance to various safety specs(UL ,CSA ,VDE , etc) are required, input voltage and frequency range will be 100-240VAC, 50/60Hz.
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Maximum Ripple & Noise(5)	80	80	120	150	200	mV
Maximum Line Regulation (6)	±1%					
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Over Current Protection	Over 105% of Rating					
Hold Up Time (8)	10(min)@15W					ms
Parallel Operation	Possible					
Series Operation	Possible					
Operating Temperature	-10~50					
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Storage Humidity	20~95%					
Cooling	Convection Cooling					
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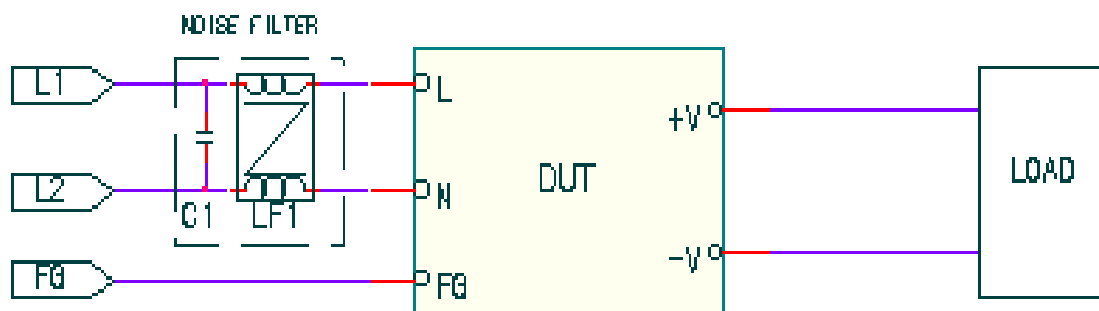
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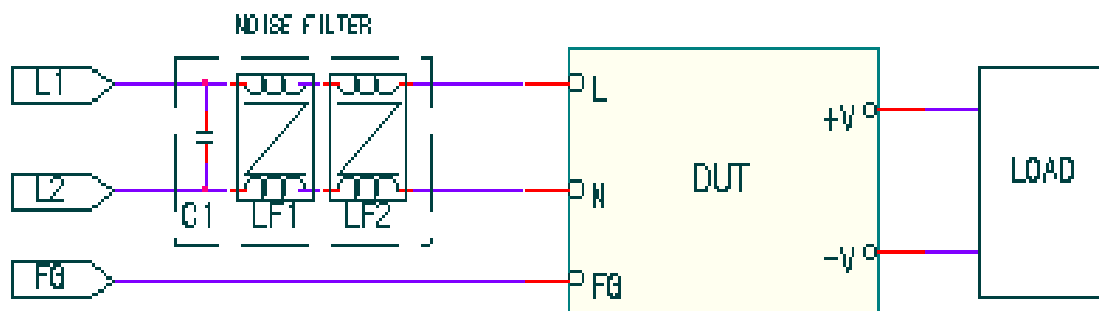
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#### EMC(Electro Magnetic Compatibility)



<Figure 1> FS10 Series



<Figure 2> FS15 Series

To meet the standard of EN55022/EN55024, use the external L-C noise filter LF1, LF2 and C1 between L and N. (see figure 1, figure2)

#### 1. FS10 Series

Capacitance(C1) : AC275V335MC224(220nF / 275Vac)

Inductance(LF1) : Typ. 20mH, Toroidal core 14.0mm

#### 2. FS15 Series

Capacitance(C1) : AC275V335MC224(220nF / 275Vac)

Inductance(LF1) : Typ. 20mH, Toroidal core 14.0mm

Inductance(LF2) : Typ. 20mH, Toroidal core 14.0mm

