



**600-to-5000-Watt  
Front-End Power Solutions**



(600, 850, or 1000 Watts)

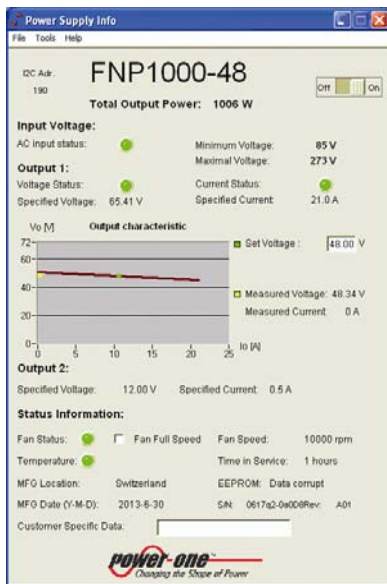
**I<sup>2</sup>C Management Software:** All FNP front-ends can be controlled via Power-One's GUI-driven I<sup>2</sup>C Management software and an I<sup>2</sup>C-to-USB interface (P/N HZZ02002G). An I<sup>2</sup>C Programming Manual describes the complete range of parameters that can be programmed to these front-ends. This manual is available by searching

**Features**

- RoHS lead free solder and lead solder exempted products are available
- High density front-ends 10.5 to 16.1 W/in<sup>3</sup>
- Universal input voltage range (90-264 VAC) with PFC
- 1U or 2U height configurations
- Droop current share with ORing FETs
- I<sup>2</sup>C interface status and control
- Standby voltage of 12 VDC @ 0.5 A
- Overtemperature, overload, and overvoltage protection
- Status LEDs: AC OK, DC OK, Overtemperature
- FNP850-12 model has airflow direction from front-to-rear or from rear-to-front (-12R model)

**Applications**

- Telecom
- Datacom
- Distributed power systems



FNR-5 Power Shelf



FNR-5-48G Power Shelves provide up to 5000 watts in a 19" rack.  
(See the Rack section for power shelf details.)

**Description**

The FNP600/850/1000 power factor corrected (PFC) front ends provide (depending on model) either a 12 VDC or a 48 VDC output for telecom, datacom, and other distributed power applications. Their small 1U by 2U size allows for configurations of either height in hot-swap redundant systems while their internal fan and cooling design permits wide use with reliable operation.

Status is provided with front panel LEDs, logic signals, and via the I<sup>2</sup>C management interface bus. In addition, the I<sup>2</sup>C bus can enable the power supply, control fan speed, and on the 12 VDC models it allows for adjusting the output voltage from 7 to 12 VDC. This powerful feature allows the same power supply to be used in various applications where bus voltages driving isolated dc-dc converters and POL regulators may be different.

Also, the FNP850-12R is uniquely designed with airflow from the rear of the power supply to the front. This airflow direction supports those critical applications where space limitations and/or higher ambient temperatures near the rear of the rack system, prohibit the discharge of higher temperature airflow from regular front-to-rear cooled power supplies.

The FNP600/850/1000's meet international safety requirements and are CE marked to the Low Voltage Directive (LVD).

### Model Selection

Model	Nominal Output Voltage (VDC) <sup>1</sup>	Adjustment Range (VDC)	Maximum Output Current (Amps)	Line Regulation (%)	Load Regulation (%) <sup>2</sup>	Ripple & Noise pk-pk % <sup>3</sup>	Compatible Shelf
FNP600-12	12 12 (Standby)	7 to 12 N/A	51 0.5	0.17 8	6 8	1 1	FNR-5-12
FNP850-12	12 12 (Standby)	7 to 12 N/A	73 0.5	0.17 8	6 8	1 1	FNR-5-12
FNP850-12R <sup>4</sup>	12 12 (Standby)	7 to 12 N/A	73 0.5	0.17 8	6 8	1 1	FNR-5-12
FNP600-48	48 12 (Standby)	44 to 50.5 N/A	12.6 0.5	0.17 8	6 8	1 1	FNR-5-48
FNP1000-48	48 12 (Standby)	44 to 50.5 N/A	21 0.5	0.17 8	6 8	1 1	FNR-5-48

<sup>1</sup> Models with 5V and 3.3V standby voltages are also available. (Contact factory.)

<sup>2</sup> Primary 12V and 48V outputs have built-in droop regulation.

<sup>3</sup> Maximum peak-to-peak noise expressed as a percentage of output voltage; 20 MHz bandwidth.

<sup>4</sup> FNP850-12R model has airflow from rear to front.

### Ordering Information

Options	Suffixes to Add to Part Number
RoHS lead solder exemption	No RoHS suffix character required.
RoHS compliant for all 6 substances	Add "G" as the last character of the part number.

### Input Specifications

Parameter	Conditions/Description	Min.	Nom.	Max.	Units
AC Input Voltage	Single-phase continuous input range.	90		264	VAC
Input Frequency	AC input.	47		63	Hz
Hold-up Time	After last AC line peak at full power. At 115 VAC.	20 <sup>1</sup>			ms
Input Current	At full-rated load. At 90 VAC.			14	A rms
Inrush Surge Current	Internally limited. Vin = 230 VAC. 25 °C			34	A pk
Power Factor	Per EN61000-3-2	0.97			W/VA

<sup>1</sup> FNP1000-48 model has a hold-up time of 16 ms.

## Output Specifications

Parameter	Conditions/Description	Min.	Nom.	Max.	Units
Efficiency: FNP600-48 FNP1000-48 FNP600-12 FNP850-12	Full rated load at 230 VAC input.	88 88 84 84	89.5 89.5 87 87		%
Minimum Load	Minimum loading required to maintain regulation.	0			A
Output Power FNP1000 FNP850 FNP600				1006 856 600	W
Overshoot	Output voltage overshoot at turn-on.			3	%
Transient Response	Maximum recovery time to within 1% of initial set point due to a 50% load change, 1A/ $\mu$ s. 12V or 48V output: Standby output:  Maximum deviation: 12V or 48V output: Standby output:			400 2  2 4	$\mu$ s ms  % %
Turn-On Delay	Time required for initial output voltage stabilization after application of AC input..			1.5	Sec
Output Regulation	See Model Selection table.				

## Protection

Parameter	Conditions/Description	Min.	Nom.	Max.	Units
Overvoltage Protection	FNP600-12 & FNP850-12	14.4	15	15.6	V
	FNP600-12: FNP850-12:	8.75 8.44	9.04 8.75	9.33 9.1	V
	FNP600-48 & FNP1000-48	57 <sup>1</sup>		60	V
Overcurrent Protection  (Power supply recovers when short is removed.)	FNP600-12	54 0.55	56 0.75	61 1.0	A
	FNP850-12	77 0.55	80 0.75	88 1.0	A
	FNP600-48	13 0.75	14	16 1.75	A
	FNP1000-48	22 0.75	23	25 1.75	A
Short-Circuit Protection	Power supply recovers when short is removed.				
Overtemperature/ Fan Failure Warning	<p>FNP 12V or 48V Vo1 supply output will shut down in the event of an overtemperature condition or blocked fan rotor. Supply's fan and Vaux are active. Power supply will recover when OT condition is removed. Amber OT LED will turn ON to indicate fault condition.</p> <p>OT/Fan Fail is an open-collector signal with 20-mA pull-down. High signal indicates a normal operating condition. Output will go low at least 100 ms before OT condition shuts down the power supply. Internally pulled up to 5V with a 5.1 k<math>\Omega</math> resistor. Note.<sup>2</sup></p>				

<sup>1</sup> FNP1000-48 overvoltage protection range is 56 V minimum and 60 V maximum.

<sup>2</sup> A pull-up to 3.3V can be achieved by terminating the logic signal with a 10 k $\Omega$  resistor to logic ground.

### Control and Monitoring

Parameter	Conditions/Description	Min.	Nom.	Max.	Units
DC OK	TTL open-collector signal with active 20-mA pull-down. Represents percent of output voltage where signal is OK. Below this voltage, a signal high condition indicates an output which is out of tolerance. Green DC OK LED on front panel indicates normal operation. <sup>1</sup> Internally pulled up to 5V with a 5.1 kΩ resistor. Note. <sup>2</sup>	90		110	%
Input Power Fail Warning	TTL open-collector signal with active 20-mA pull-down. High indicates an input power fail. Power Fail Warning will turn OFF green AC OK LED. Represents the time after warning signal before Vout drops to 95% due to loss of input power. <sup>1</sup> Internally pulled up to 5V with a 5.1 kΩ resistor. Note. <sup>2</sup>	5			ms
Power Supply Present Signal	Resistance of connection to logic ground which allows user to determine if power supply is present. <sup>1</sup>		10		Ω
Current Share	FNP600-12:			5	A
	FNP850-12:			7	
	FNP600-48:			2	
	FNP1000-48:			2	
Remote Sense	Total voltage compensation for cable losses with respect to the main output.			0.5	V
Output Enable	Open circuit or logic high from ENA pin to Vo1 RTN shuts OFF Vo1; Vaux and fan are operational. Logic low (2 mA sink capability) or jumper will turn ON Vo1 within 100 ms. Open circuit voltage on enable pin is 3.3 VDC. Externally applied voltage to the enable pin should NOT exceed 7 VDC. Signal is referred to as Logic Return (LRTN).				

<sup>1</sup> Also available on I<sup>2</sup>C data line.

<sup>2</sup> A pull-up to 3.3V can be achieved by terminating the logic signal with a 10 kΩ resistor to logic ground.

### I<sup>2</sup>C Bus Management Interface

<b>Static</b>	Includes static information such as: part number and revision level, output rating, serial number, date code, and manufacturing location.
<b>Status</b> (Logic 1 or 0)	Power Supply OK. AC Input OK. DC Output OK. Power Supply Seated. Overtemperature. Overcurrent. Fan OK.
<b>Real-Time Monitoring</b>	Output voltage (main output) 0.1V LSD. Output current (main output) 0.1A LSD. Time in service.
<b>Control Signals</b>	Enable for main output.  Output voltage to: (0.01V resolution on 12V supplies; 0.05V resolution on all 48V supplies).  Fan speed level.

**Safety, Regulatory, and EMI Specifications**

Parameter	Conditions/Description	Min.	Nom.	Max.	Units
Agency Approvals	UL60950, (UL) CSA 60950 (cUL), EN60950 (TÜV), CE Mark for LVD.				
Electromagnetic Interference	FCC CFR title 47 Part 15 Sub-Part B, EN55022/CISPR 22.	Conducted: Radiated: B A			Class
Harmonics	Per IEC61000-3-2.	A			Class
Voltage Fluctuation and Flicker	Per IEC61000-3-3.	Pass			
ESD Susceptibility	Per EN61000-4-2, Level 4.	8		.	kV
Radiated Susceptibility	Per EN 61000-4-3, Level 3.	10		.	V/M
EFT/Burst	Per EN 61000-4-4, Level 4.	±4		.	kV
Input Transient Protection	Per EN 61000-4-5, Class 3.	Line-to-Line: Line-to-Ground: 1 2		.	kV
RF Conducted Disturbances	Per EN 61000-4-6, Level 3.	10		.	V
Voltage Interruptions	Per EN 61000-4-11, performance criterion B 30%. Per EN 61000-4-11, performance criterion C 60%. Per EN 61000-4-11, performance criterion C 95%.	10 100 5		.	ms ms Sec
Voltage Sag Immunity	Per SEMI F47-0999 > 100 VAC. No output voltage interruption.			.	
Leakage Current	Per EN60950.	At 240 VAC:		3.5	mA

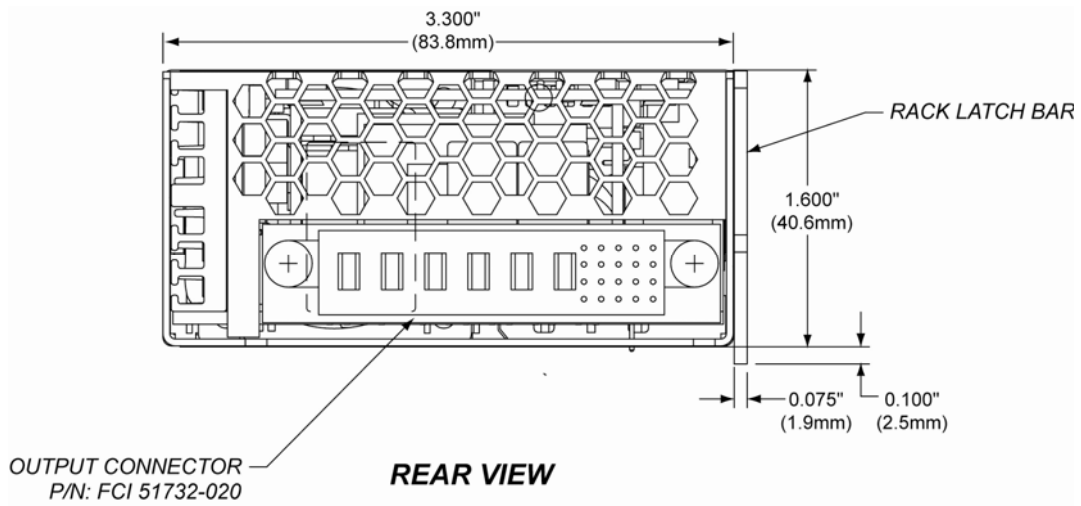
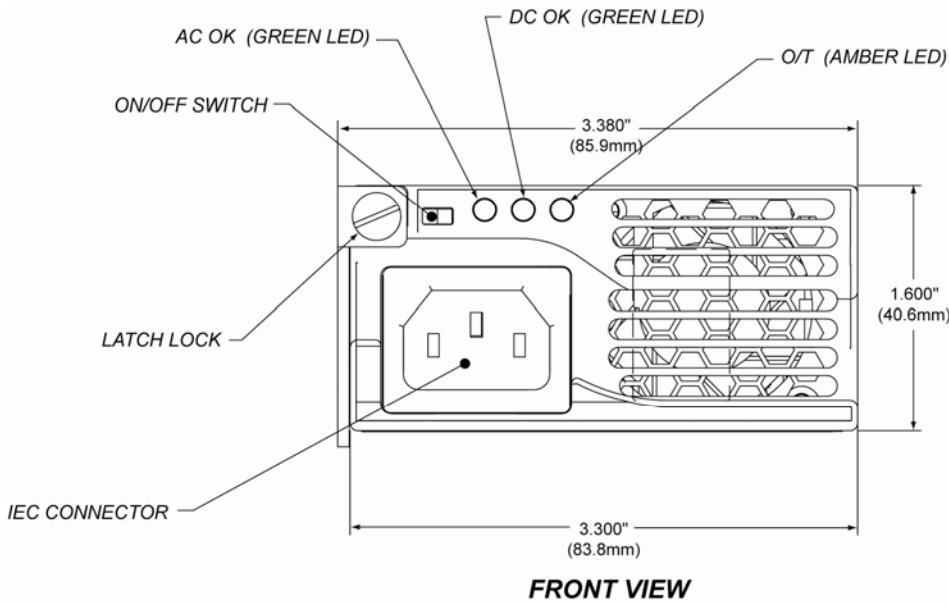
**Environmental Specifications**

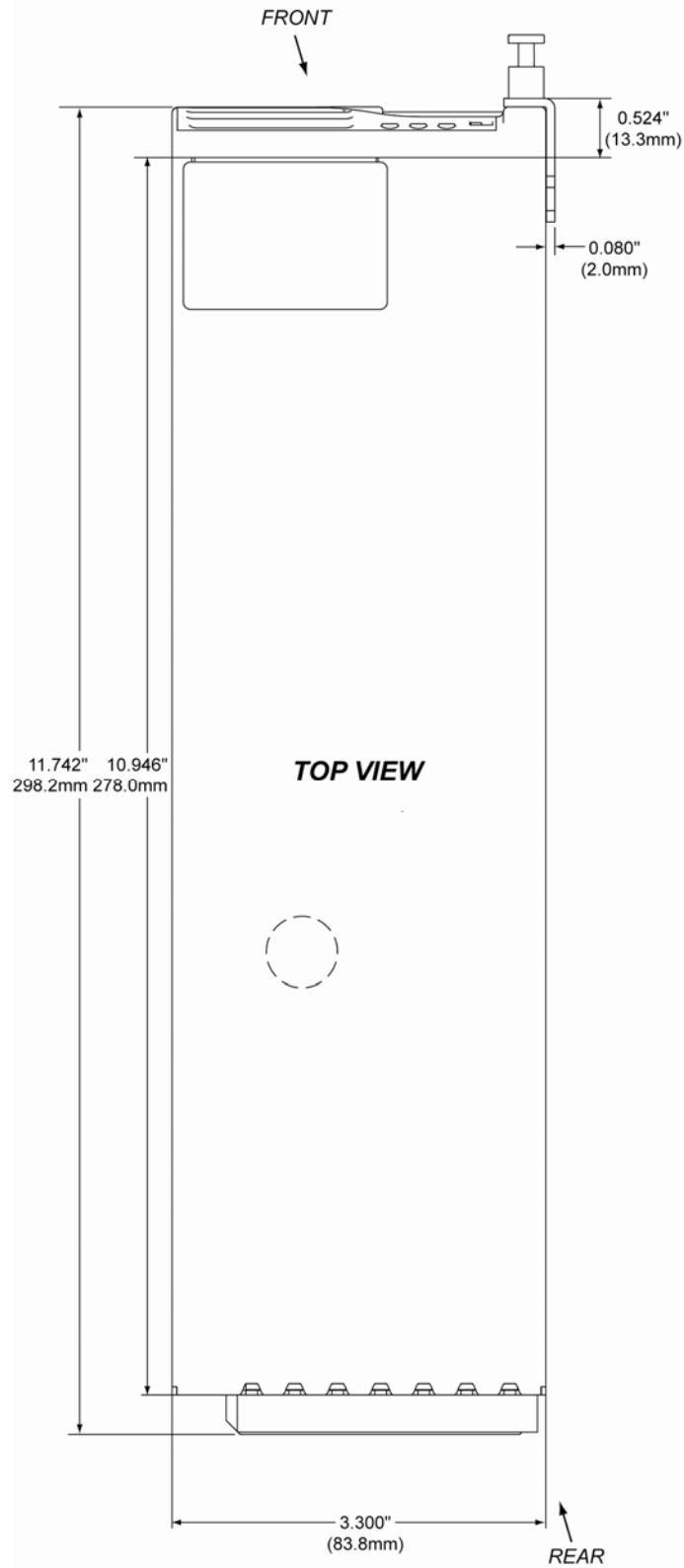
Parameter	Conditions/Description	Min.	Nom.	Max.	Units	
Altitude	Operating. Non-Operating.			10K 40K	ASL ft ASL ft	
Operating Temperature	FNP600-12: FNP850-12: FNP600-48: FNP1000-48:	Internal DC fan for cooling. At 100% load: At 50% load:		0 0	50 70	°C
	FNP850-12R:	Internal DC fan for cooling. At 100% load: At 94% load: At 50% load:		0 0 0	40 50 70	°C
Storage Temperature		-40		85	°C	
Temperature Coefficient	0 °C to 70 °C (after 15-minute warm-up).			0.02	%/°C	
Relative Humidity	Non-condensing			95	%RH	
Shock	Operating: half-sine, 10 ms, 3-axis.			+20	Gpk	
	Non-Operating: half-sine, 10 ms, 3-axis.			+40	Gpk	
Vibration	Operating: swept sine 5-2000-5 Hz, 5-32 Hz, 0.02iDA, 32-2000 Hz.			1	Gpk	
	Non-operating: random 10-2000 Hz.			6.15	Grms	

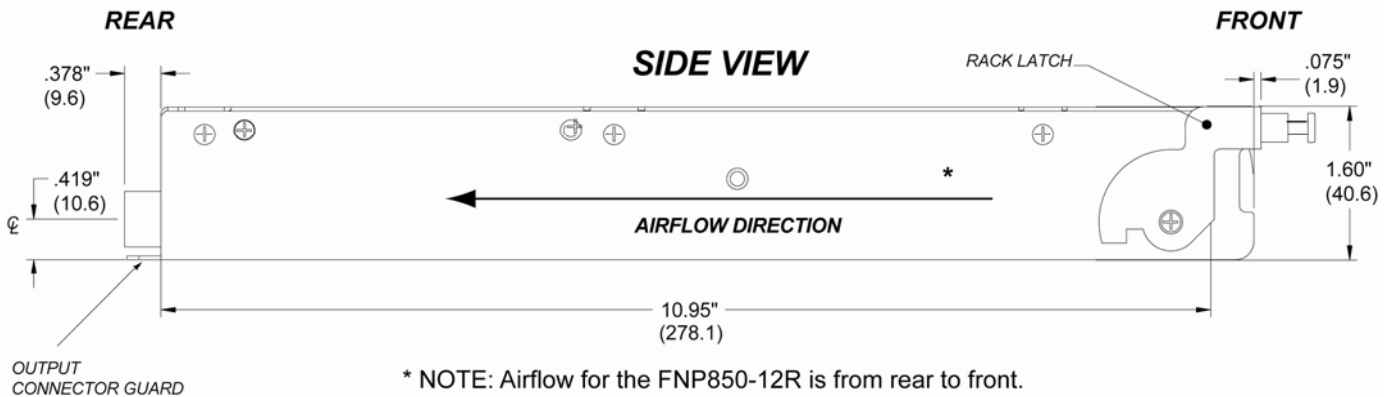
**Reliability**

Parameter	Conditions/Description	Min.	Nom.	Max.	Units
MTBF	(Calculated) MILHDBK 217F Ground Benign. Demonstrated. Useful Life.	100 000 250 000 10			hrs hrs yrs

**Mechanical Drawings**







**Connector Information**

**Power Supply:**

Input - IEC 320 input (Male) standard line cord connection  
Output - P/N FCI 51732-020

**Mating Connections:**

Input - IEC 320 output (Socket) Standard line cord (15A)  
Output - P/N: FCI 51742-020 (Backplane)  
P/N: FCI 51762-020 (Right Angle)

**Input IEC Connector**

Input	Location
Chassis (Safety) Ground	Ground
Line 1 (Line)	L
Line 2 (Neutral)	N





## Racks

(FNR-5-12G and FNR-5-48G Power Shelves)

Each rack (power shelf) is 1U high with backplane and designed for up to five front-end models in parallel or in n+1 operation. Each power shelf has:

- Output terminals with two M4-screws on each power tab.
- Two fast-on contacts for system earthing.
- Address coding over five pole DIP switch on each unit, 37-pin D-Sub connector with I<sup>2</sup>C-lines, monitoring signals and support functions.
- Provides a start-up synchronization circuit and EMV filters.



FNR-5-12G and FNR-5-48G Power Shelf Front View

## Overall Mechanical Dimensions (FNR-5-12G and FNR-5-48G Power Shelves)

FNR-5-12 & FNR-5-48 Mechanical Data (W, H, D)	17.68" (449 mm) x 1.72" (43.6 mm) x 13.05" (331.5 mm)
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