

SL POWER NCF660 SERIES

660 W Single Output
Medical Grade - CF Rated



Medical



Advanced Energy's SL Power NCF660 CF rated*medically approved AC-DC power supplies are available with a nominal main output of 12 V, 15 V, 24 V or 48 V. NCF660 series power supplies provide up to 660 W of output power with air flow. All models have output overvoltage, short circuit and overload protection and a 7 x 4 x 1.6 inch form factor.

AT A GLANCE

Total Power

660 W

Input Voltage

85 to 264 VAC

of Outputs

Single

SPECIAL FEATURES

- 5 kV Defibrillator Withstand
- Up to 660 W with Air Flow
- Up to 440 W Convection Cooled
- 4"W x 7"L x 1.6"H Size
- Universal Input 85 to 264 VAC
- Meets Class B Emissions Levels
- 7+ Years Electrolytic Capacitor Life
- Meets EN60601-1-2 4th Edition EMC
- Less than 10 μ A Leakage Current
- Class I Input
- RoHS, REACH Compliant
- Includes 5 V Standby Output
- 3 Years Warranty

SAFETY

- IEC/UL/cUL/EN60601-1, Edition 3.2
- CF Rated*



* The NCF Series models are suitable for CF Rated applications as they provide the below features:

1. Clearance and Creepage requirements between Primary and Ground for one MOPP, Primary and Secondary for two MOPP and Secondary and Ground for one MOPP.
2. Hi-pot tests between Primary and Ground, Primary and Secondary and Secondary and Ground.
3. Type CF Patient Leakage Current <10 μ A under Normal Condition and <50 μ A under Single Fault Condition

Note: As the NCF Series is classified as a component power supply, it cannot be declared an Applied Part, and therefore cannot be declared CF Rated. However, the NCF Series has been evaluated for and meets the requirements related for use in CF applications.

ELECTRICAL SPECIFICATIONS

Input	
Input Range	85 to 264 VAC, 47 to 63 Hz, 1Ø. Safety certified 100 to 240 VAC, ±10%
Input Current	7.0 A max at 115 VAC, 3.5 A max at 230 VAC
Inrush Current	40 A max, cold start at 264 VAC input
Input Fuses	10 A, 250 VAC fuse provided in both line & neutral
Leakage Current	
Earth Leakage Current	<250 µA at 264 VAC, 60 Hz, NC
Patient Leakage Current	<10/50 µA at 264 VAC, 60 Hz, NC/SFC
Efficiency	>90% typical
No Load Input Power	<1.0 W (with main output inhibited)
Isolation Voltage - CF Rated	Input/Ground: 1500 VAC (1 MOPP) Input/Output: 4500 VAC (2 MOPP) Output/Ground: 1500 VAC (1 MOPP) 5 kV Defibrillator Pulse Withstand ¹
Output	
Maximum Power	See "Ordering Information" section
Ripple and Noise	1% of Vout on all models
Load Regulation	2%
Line Regulation	1%
Total Regulation	5%
Minimum Load	Not required
Capacitive Load	1000 µF
Adjustment Range	±5% (optional)
Initial Set Point Tolerance	±1%
Overshoot	<5% overshoot at turn-on, <1% overshoot at turn-off, under all conditions
Transient Response	500 µs response time for return to within 0.5% of final value, for any 50% load step over the range of 25% to 100% of rated load, $\Delta i/\Delta t < 0.2 \text{ A}/\mu\text{s}$. Max. voltage deviation is ±3.5% of final value
Standby Output	5 V/1 A
DC OK Signal	Logic high when DC output is within regulation
Inhibit Signal	On = open or logic high; Off = Short to RTN or logic low
Reliability	
MTBF	>500 khrs per Telcordia 332, Issue 6 at 110 VAC input, 25°C, full rated load
Warranty	3 years
Electrolytic Capacitor Lifetime	All specified electrolytic capacitors will exceed 7 years life based on operating at 25°C ambient temp., 115 VAC/60 Hz and 230 VAC/50 Hz, 24 hrs/day, 365 days/year
Protection	
Overtoltage Protection	110% to 130% of nominal output voltage, requires AC recycle to reset
Short circuit Protection	Short across the output terminals will not cause damage to the unit, hiccup mode
Thermal Protection	Will shutdown upon an over temperature condition, auto-recovery mode
Overload Protection	110% to 180% of rated output current value, hiccup mode

Note 1: Meets the 5 kV difbrillation tests under clause 8.5.5 of IEC60601 for non-output parts. Refer to safety report for details.

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-20°C to +70°C
Temperature Derating	Derate output power linearly from 50°C to 70°C, 50% load at 70°C
Cooling	Airflow: ≥300LFM; convection cooled
Storage Temperature	-40°C to +85°C
Altitude	Operating: -500 to 5,000 m. Non-operating: -500 to 12,192 m
Relative Humidity	5% to 95%, non-condensing
Vibration	Random Vibration: Operating: 0.003 g/Hz, 1.5 g overall, 3 axes, 10 min/axis, 5 to 500 Hz Non-operating: Random waveform, 3 mins/axis, 3 axes and sine waveform, Vib. frequency/acceleration: 10 Hz to 500 Hz/1 g, sweep rate of 1 octave/minutes, vibration time of 10 sweeps/axis, 3 axes, per IEC60068-2 Transportation vibration: Random vib. per ISTA-1A
Shock	Operating: Half-sine, 20 gpk, 10 ms, 3 axes, 6 shocks total Non-operating: Half-sine waveform, impact acceleration of 50 g, pulse duration of 6 ms Number of shocks: 3 for each of the three axes
Audible Noise	<20 dbA

EMI/EMC COMPLIANCE

Conducted Emissions	EN55011/32: Class B, CISPR11/15/32: Class B, FCC Part 15.107, Class B Measured at 10%, 50%, and 100% load steps; 3db margin typ, at 120 VAC and 230 VAC
Radiated Emissions	EN55011/32: Class B, CISPR11/32: Class B, FCC Part 15.107, Class B Measured at 10%, 50%, and 100% load steps; at 120 VAC and 230 VAC (added ferrite core may be required)
Harmonic Current Emissions	EN61000-3-2, Class A at 230 VAC, 100% load
Voltage Fluctuations & Flicker	IEC61000-3-3
Electro Static Discharge Immunity	IEC61000-4-2, Level 4: ±8 kV contact, ±15 kV air, Criteria A, IEC60601-1-2, 4th Edition, Table 4
Radiated RF EM Fields Susceptibility	EN61000-4-3, 10 V/m, 80 MHz to 2.7 GHz, 80% AM at 1 kHz IEC60601-1-2, 4th Edition, Table 4
Electrical Fast Transients/Bursts	IEC61000-4-4, Level 4, ±4 kV, 100 kHz rep rate, 40 A, Criteria A, IEC60601-1-2, 4th Edition, Table 5
Surges Line to Line (DM) and Line to Ground (CM)	IEC61000-4-5, Level 4, ±2 kV DM, ±4 kV CM, Criteria A Surpasses IEC60601-1-2, 4th Edition requirements
Conducted Disturbances Induced by RF Fields	IEC61000-4-6, 3 V/m – Level 4, 0.15 MHz to 80 MHz; and 12 V/m in ISM and amateur radio bands between 0.15 MHz and 80 MHz, 80% AM at 1 kHz IEC60601-1-2, 4th Edition, Table 5
Rated Power Frequency Magnetic Fields Test	IEC1000-4-8, Level 4: 30 A/m, 50 Hz/60 Hz IEC60601-1-2, 4th Edition, Table 4
Voltage Dips	IEC/EN61000-4-11: --100% dip for 10 ms, at 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°, criteria A --100% dip for 20 ms, 0°, criteria A (criteria A at 60% output load) --100% dip for 5000 ms (250/300 cycles), criteria B --60% dip for 100 ms, criteria B --30% dip for 500 ms, criteria A IEC60601-1-2, 4th Edition, Table 5

Notes:

Performance criteria are based on EN55024. According to the standards, performance criteria are decoded as following:

- A. Normal performance during and after the test
- B. Temporary degradation, self-recoverable
- C. Temporary degradation, operator intervention required to recover the operation

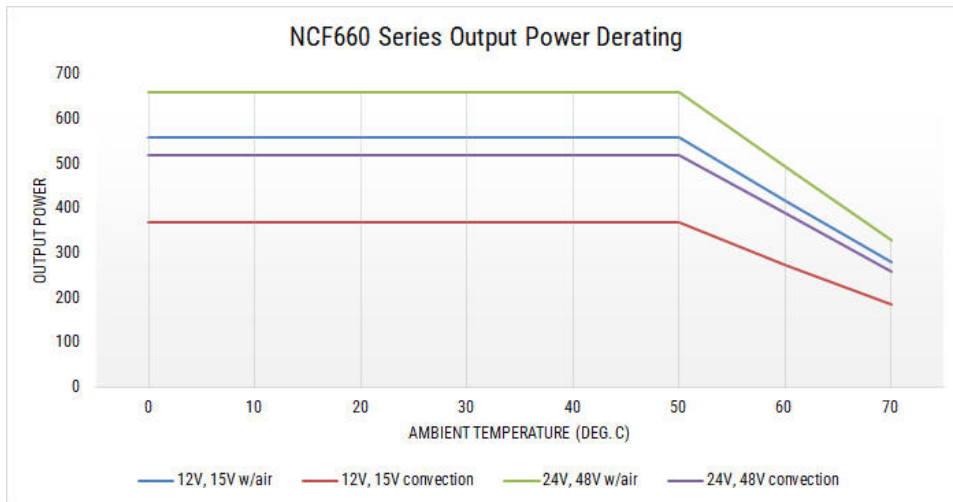
ORDERING INFORMATION

Model Number ²	Output Voltage	Output Current (fan) ¹	Output Power (fan) ¹	Output Current (convection)	Output Power (convection)	Terminations
NCF660S12K	12 V	46.2 A	560 W	30.6 A	370 W	Screw Terminals
NCF660S15K	15 V	37.0 A	560 W	24.5 A	370 W	
NCF660S24K	24 V	27.2 A	660 W	18.2 A	440 W	
NCF660S48K	48 V	13.6 A	660 W	9.1 A	440 W	

Note 1: 300 LFM airflow is required.

Note 2: Contact Advanced Energy for 15 V output models.

DERATING SPECIFICATIONS



SYSTEM TIMING SPECIFICATIONS

T1	Turn-on time - main output	500 to 1000 ms, measured at 115 VAC and 100% load
T2	Turn-on time - 5Vsb output	<100 ms
T3	Rise time	<100 ms, from 10% to main output in regulation, measured at 90 VAC and both 0% & 100% load
T4	Hold up time - main output	>20 ms, from loss of AC to main output stays within regulation, measured at 80% load
T5	Hold up time - 5Vsb output	>100 ms, from loss of AC to 5Vsb stays within regulation
T6	Turn on time at -20°C	300 ms typ.

PIN ASSIGNMENTS

Connector	Pin #	Assignment	Mating Connector
J100 (Input Connector)	1	AC Line	Molex: 19141-0052/0053
	2	AC Neutral	
	3	Ground	
J103 (DC Output Connector)	1	+Vout	Molex: 19141-0058/0063/0065/ 0059/0064 /0066
J104 (DC Output Connector)	2	-Vout	
J400 (Signal Connector)	1	RTN	M Housing: LANDWIN: 2050S1400 or JST PHDR-14VS Pins: LANDWIN: 2053T021N
	2	NA	
	3	S+	
	4	RTN	
	5	NA	
	6	PWR_GOOD	
	7	NA	
	8	ON_OFF	
	9	NA	
	10	NA	
	11	RTN	
	12	NA	
	13	5VSB	
	14	5VSB	

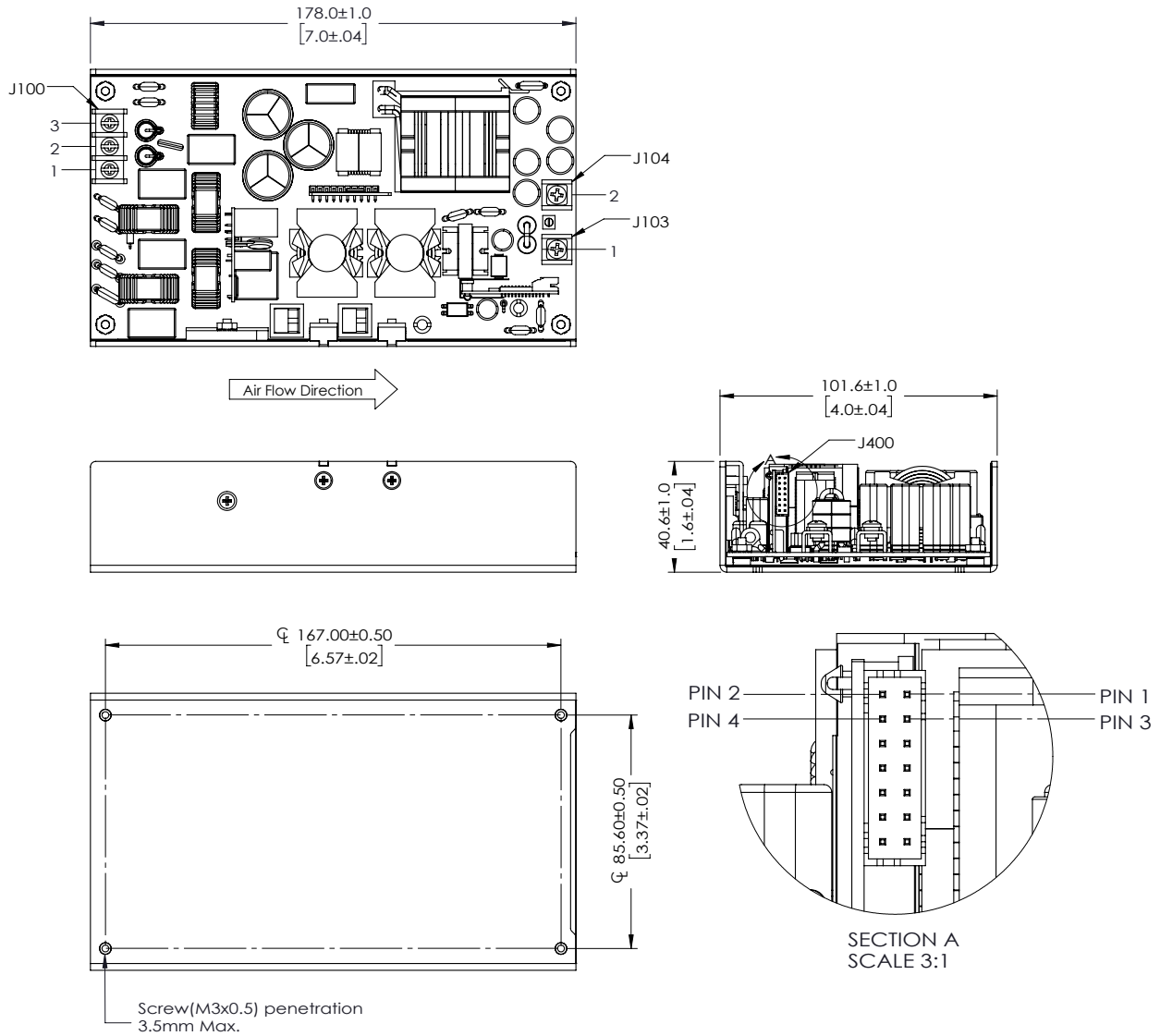
UNIT PACKAGING REQUIREMENTS

Inserted Instructions	Instruction sheet to be provided with all units packaged in individual unit box if used.
Individual Unit Packing	Units can be packed in egg crate type cartons for production quantities. Individual product shipments include an individual unit box.
Master Carton Shipping Box	16 units per master carton. Unit packaged into carton must be protected such that it will sustain 1.4 m drop test onto hard surface. Only anti-static packing material may be used inside the box. Exterior box sealing tape is anti-static type.
Individual Carton Packing Box (when used)	Individual carton is labelled with RoHS sticker and individual label showing unit serial number, bar code, manufacturing date, bar code, and manufacturing part number, bar code, country of origin.

SAFETY

UL	UL60601-1-1, latest edition, complies with CF rated application requirements
CSA	CAN/CSA-C22.2 No. 60601-1, complies with CF rated application requirements
IEC/EN (CB Report)	IEC/EN60601-1-1, Ed. 3.2, complies with CF rated application requirements

MECHANICAL DRAWING - TBD



Notes:
All dimensions in mm (inches).



For international contact information,
visit [advancedenergy.com](https://www.advancedenergy.com).

powersales@aei.com (Sales Support)
productsupport.ep@aei.com (Technical Support)
+1 888 412 7832

ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than four decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

Our products enable customer innovation in complex applications for a wide range of industries including semiconductor equipment, industrial, manufacturing, telecommunications, data center computing, and medical. With deep applications know-how and responsive service and support across the globe, we build collaborative partnerships to meet rapid technological developments, propel growth for our customers, and innovate the future of power.

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