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NS400 and NS700 Range 400 to 960 Watt Single Output Power Supplies

NS400 AND NS700 RANGE SINGLE OUTPUT SWITCH MODE POWER SUPPLIES

FEATURES

- Up to 960W output power with integral fan cooling
- 110/240V a.c. input.

MODELS AVAILABLE

- Up to 700W output power convection cooled
- Available open frame or enclosed.

Model Number	Nominal Output Voltage	Voltage Adjustment Range	Minimum Recommended Current	Maximum Continuous Current
NS400005	5V	4.75 - 5.25V	3.0A	150A
NS700012	12V	11 - 13V	3.0A	60A
NS700015	15V	11 - 16V	2.5A	60A
NS700024	24V	21 - 25V	1.0A	36A
NS700028	28V	21 - 30V	0.8A	36A
NS700048	48V	47 - 53V	1.5A	20A
NS700056	56V	47 - 60V	1.2A	20A

All parameters are as defined in Farnell Advance Power document *Definition of Terms*. All values are specified with an input voltage of 240V a.c. and in an ambient temperature of 25°C unless otherwise stated.

INPUT SPECIFICATION

Voltage Range	88 - 132V a.c. on 115V tap. 176 - 264V a.c. or 249 - 373V d.c. on 230V tap.
r.m.s. Current	15A maximum at 108V input and 960W output power, reducing to 9A maximum at 500W output power. 9A maximum at 198V input and 960W output power, reducing to 5A maximum at 500W output power.
Repetitive Peak Current	36A maximum at 88V 54Hz input and 960W output power. 21A maximum at 176V 45Hz input and 960W output power.
Peak Inrush Current	14A maximum at 132V input. 28A maximum at 264V input.
Frequency	45 - 440Hz for input voltages above 92V. Below 92V, the minimum operating frequency is increased to 54Hz.
Supply Type	Single phase TN-S system (as defined in IEC364). i.e. systems with a separate earth conductor which is directly connected to the neutral conductor at the source.
Power	1120W typical input power when delivering 960W output power, reducing to 600W when delivering 500W output power.
Apparent Power Factor	0.6 minimum.
Efficiency	Typically 87% when loaded to 960W at 56V output. Typically 72% when loaded to 750W at 5V output.

OUTPUT SPECIFICATION

Nominal Voltage	See table of models above. The output voltage is factory preset to within 0.2% of nominal.
Adjustment Range	See table of models above.
Minimum Current Current	All units will operate down to zero load, but below the recommended minimum current (I_{MIN}) shown in the table of models, it is likely that audible
	noise will be generated and the output ripple and noise will rise.
Maximum Continuous	See table of power ratings. Note that the maximum current rating is not available over the full output voltage adjustment range, as it is limited by the maximum power rating. Derate maximum current by 2.5%/°C in ambient temperatures above 50°C.
Surge Current	See table of power ratings. The average current over any period of 5 times the maximum duration must not exceed the continuous current rating. Output noise, RFI specification and hold up performance cannot be guaranteed when operating at currents in excess of the maximum continuous rating.
Maximum Continuous Power	See table of power ratings. At low output voltage settings, the maximum power is limited by the maximum current ratings. Derate maximum power rating by 2.5%/°C in ambient temperatures above 50°C.

POWER RATINGS

Model	Mechanical	Cooling	Maximum	Continuous	SL	irge	Maximum Continuous
Number	Format	cooling	at V _{MIN}	at V _{NOM}	Cu	rrent	Power
	Open Frame	Forced Air Convection	120A 80A	120A 80A	180A 180A	(20s) (20s)	630W 420W
NS400005	Enclosed	Integral Fan Forced Air Convection	150A 90A 65A	150A 90A 65A	180A 180A 180A	(2 min) (20s) (20s)	790W 475W 340W
	Open Frame	Forced Air Convection	60A 45A	60A 45A	- 60A	(1 min)	780W Note 1
NS700012	Enclosed	Integral Fan Forced Air Convection	60A 45A 35A	60A 45A 35A	60A 60A	(1 min) (20s)	780W Note 1 455W
	Open Frame	Forced Air Convection	60A 45A	60A 40A	- 60A	(1 min)	960W Note 1
NS700015	Enclosed	Integral Fan Forced Air Convection	60A 45A 35A	60A 40A 32A	60A 60A	(1 min) (20s)	960W Note 1 480W
NS700024	Open Frame	Forced Air Convection	36A 24A	36A 24A	36A 36A	(1 min) (1 min)	900W 600W
	Enclosed	Integral Fan Forced Air Convection	36A 24A 18A	36A 24A 18A	36A 36A	(1 min) (45s)	900W 600W 450W
N. Cont	Open Frame	Forced Air Convection	36A 24A	34A 24A	36A 36A	(1 min) (1 min)	960W 700W
NS700028	Enclosed	Integral Fan Forced Air Convection	36A 24A 18A	34A 24A 18A	36A 36A 36A	(1 min) (1 min) (45s)	960W 700W 540W
	Open Frame	Forced Air Convection	20A 12A	20A 12A	20A 20A	(1 min) (1 min)	960W 636W
NS700048	Enclosed	Integral Fan Forced Air Convection	20A 12A 9A	20A 12A 9A	20A 20A 20A	(5 min) (1 min) (1 min)	960W 636W 477W
	Open Frame	Forced Air Convection	20A 12A	17A 12A	20A 20A	(1 min) (1 min)	960W 700W
NS700056	Enclosed	Integral Fan Forced Air Convection	20A 12A 9A	17A 12A 9A	20A 20A 20A	(5 min) (1 min) (1 min)	960W 700W 540W

Note 1

Output power rating and output current are interdependant on these models. See diagram below for ratings at output voltages other than nominal.

NS700012 and NS700015 Output Ratings



TABLE 2

Line Regulation

Load Regulation

Temperature Coefficient

Ripple and Noise

Measured with the output loaded to the maximum current as stated in the table of models, I_{MAX} . An input variation of 198V to 264V or 103.5V to 132V results in a maximum output voltage deviation of 0.2% of nominal.

An output load variation of I_{MIN} to I_{MAX}, results in a maximum output voltage deviation of 0.2% of nominal.

t With the output loaded to I_{MAX}, the temperature coefficient over the temperature range 0 - 50°C is typically ±0.02%/°C.

Measured differentially with the output loaded to I_{MAX}. The output ripple is measured over the frequency range 10Hz to 100kHz and the output noise is measured over the frequency range 10Hz to 30MHz. Limits are as follows:

Model	Ripple	Noise	
NS400005	<50mV	<125mV	
NS700012	<30mV	<150mV	
NS700015	<30mV	<150mV	
NS700024	<50mV	<200mV	
NS700028	<50mV	<200mV	
NS700048	<20mV	<150mV	
NS700056	<20mV	<150mV	

PROTECTION

Input Fuse

Input Overvoltage

Output Current Limit

The power supply is fitted with a $1\frac{1}{4}$ x $\frac{1}{4}$ ceramic bodied mains fuse rated at 15A T. 250V.

Gas discharge devices are fitted to the unit which, under severe input overvoltage conditions, will breakdown and cause the input fuse to rupture.

The output is provided with self resetting overcurrent protection as standard. Alternatively by specifying option C, the unit will be fitted with a latching circuit which will cause the unit to shutdown after an continuous overload of at least 3s. Normal operation is resumed by removing the overload and interrupting the mains supply for at least 30s. The current limit curve is approximately constant current. Current limit point and short circuit current are as shown in table 3.

Output Overvoltage	A detected overvoltage causes the power supply to latch into a shutdown condition (<2W output power). The power supply is reset by removing the mains input for a period of not less than 30s. Overvoltage detection levels are as shown in table 3.
Thermal	A thermal sensor is provided on the main heatsink which, under thermal overload conditions, will cause the unit to inhibit until the temperature has reduced to an acceptable level. The power supply will then resume normal operation.

TURN ON AND TURN OFF CHARACTERISTICS

Turn on Delay	The output attains its final voltage within 350ms of application of power to the power supply input.
Hold Up Time	With the output loaded to I _{MAX} , a hold up time of at least 18ms is available when operating at 198V or 103.5V input

230V or 115V input.

AUXILIARY FUNCTIONS

Remote Sense

Parallel Operation

External Inhibit

By connecting the sense terminals directly to the load, a total voltage drop of up to 250mV in the power leads will be corrected. If remote sensing is not required, the sense terminals must be connected to +V and -V terminals directly, or links R14 & R16 must be fitted on models NS400005, NS700012 and NS700015. Up to five units of the same model

and at least 28ms when operating at

number can be connected in parallel for increased power capability. By connecting the current share terminals (J6) together and the sense terminals to a common point, the outputs will current share. Connecting together all sync. terminals (J1) forces units to operate at the same frequency.

Application of a logic low to the inhibit input (J5), will cause the output to be inhibited. When inhibited the output power is limited to less than 2W. Removal of the logic signal, or application of a logic high, will restore the output. If option C is fitted, the power supply will latch off after a delay of at least 3s if the output has not been reinstated.

TABLE 3

Model Number	Output Current Limit	Short Circuit Current	Output Overvoltage Level	DC OK Level
NS700005	187 - 190A	<190A	5.8 - 7.0V	>4V
NS700012	61 - 63A	<60A	14 - 16V	>8V
NS700015	61 - 63A	<60A	17 - 19V	>8V
NS700024	37 - 38A	<38A	26 - 30V	>18V
NS700028	37 - 38A	<38A	32 - 36V	>18V
NS700048	20.5 - 21.5A	<24A	54 - 63V	>40V
NS700056	20.5 - 21.5A	<24A	61 - 68V	>40V

Power Fail Signal

External Shutdown

D.C. OK

Application of a logic high to the shutdown input (J4), will cause the power supply to shut down. When shut down a residual output power of up to 2W is present. Normal operation is restored by interrupting the input supply for at least 30s.

Open collector logic output (J3) providing at least 5ms warning of output power loss resulting from an input power failure. Fan out capability 10 standard TTL loads i.e. $V_{OL} < 0.8V$ when $I_{OL} = -16$ mA.

Open collector logic output (J2). Logic high indicates an output voltage in excess of D.C. OK threshold level shown in table 3. At power up this transition is delayed by at least 10ms to provide a "power on reset" signal. Fan out capability 10 standard TTL loads i.e. $V_{OL} < 0.8V$ when $I_{OL} = -16$ mA.

SIGNAL WAVEFORMS



ISOLATION

Primary to Secondary

Secondary to Earth

Input to output isolation barriers, including layout and wiring, are specified to 4kV a.c. r.m.s. for one minute. Where a safety earth is interposed between primary and secondary, this potential is applied as 2kV a.c. r.m.s. input to earth and 2kV a.c. r.m.s. output to earth. The complete unit is tested to 1.5kV a.c. r.m.s. for 1 minute between a.c. input and d.c. output, with all output terminals connected together and connected to earth.

Units are tested to 500V d.c. from output to earth, with all output terminals connected together.

Earth Leakage Current	The earth current is measured as the		
	voltage across a $1.5k\Omega$ resistor in		
	norallal with a 1 EnE consoltar incortad		

voltage across a 1.5kΩ resistor in parallel with a 1.5nF capacitor, inserted in series with the earth line. Under full load, the leakage current does not exceed 1mA at 50Hz 1.2mA at 60Hz 8.8mA at 440Hz.

ELECTROMAGNETIC COMPATIBILITY

Exported Noise	Units have been tested to and found to be compliant with the requirements of VDE0871 Class B, BS6527 Class B, FCC Rules part 15 subpart J Class B.
Susceptibility	Output remains within specification for 1500V, 5ns rise time, 100ns duration common mode disturbances with a repetition rate of 10Hz.

ENVIRONMENTAL CONDITIONS

Ambient Temperature	0 to 70°C operating. See power and current ratings for derating requirements above 50°C.
	-40°C to +85°C non-operating.
Humidity	0 to 95% R.H. non-condensing in both operational and non-operational states.
Altitude	0 to 3,000m (0 to 10,000ft) operating.
	0 to 10,000m (0 to 30,000ft) non- operating.
Vibration	To IEC 68-2.6 and BS2011 Part 2.1 Fc 1983.
Pollution	These power supplies are designed to operate in office type environments.

MECHANICAL SPECIFICATION

Dimensions	External dimensions in mm(inches) are 300(11.81) x 175(6.89) x 75(2.95). When fitted with a cover, and integral fan, the height is increased from 75(6.89) to 112(4.41) in the area of the fan.
Mass	Maximum mass, unpacked is 4.7kg(10.4lb).
Fixings	2 sets of 4 fixing holes are provided on the chassis; one set on the base and one set on the rear panel. All fixing holes are M3 ISO standard threaded inserts and are marked 'a' on the outline

drawing. Maximum screw penetration of 5mm(0.2*) from the outer face of the power supply must not be exceeded.

Connectors Input Beau 72000 series barrier strip, reference 72505CV, is fitted to the power supply. Terminals are on a 9.5mm (3/8") pitch and are supplied with 6-32UNC bind head screws. Included as two ways on the input Input Voltage Selector terminal block. Output NS400005, NS700012 and NS700015 models: 2 x M8 ISO standard studs are fitted to the power supply for power output and a 2 way Metway P97/2 terminal block is provided for remote sense connections. NS700024, NS700028, NS700048 and NS700056 models. Beau 72000 series barrier strip, reference 72506CV, is fitted to the power supply. See input connector for details. Auxiliary Functions The power supply is fitted with a 6-way Molex 5046 series connector, reference 22-05-1062. A mating connector consists of a Molex 5051 series housing reference 22-01-1063, fitted with 40445 series crimps (2759 series in the USA). Mounting Orientation Units may be mounted in any orientation without derating when forced air cooled or when fitted with cover and integral fan. When convection cooled, units should be mounted with the base plate horizontal and below the circuit board, or with the base plate vertical and with the connectors downward. Ventilation and Cooling Units are multiple rated to allow for different mechanical formats and cooling methods. Convection ratings are applicable to open frame units and to units fitted with a mesh cover when they are mounted in such a way that

free airflow is permitted over the unit. Specifically faces marked 'B' in the outline drawing are partially ventilated, and the top, front and left hand faces of the mesh cover are fully ventilated. These ventilation holes must not be

obstructed.

Forced air ratings apply to open frame units and to units fitted with a mesh cover when an airflow of at least 1.5ms⁻¹ is provided in direction 1 or direction 2 as indicated in the outline drawing.

Integral fan ratings supply when unit is fitted with cover and integral fan (W option). Ventilation must be provided in the area of the fan inlet and in ventilated areas of the faces marked 'B' and 'C'.

Chassis metalwork is treated with gold coloured chemical etch. Cover metalwork is treated with semi-gloss black powder coat.

INTERNATIONAL SAFETY SPECIFICATIONS

Units have been designed in accordance with the requirements of the following standards. Applications have been made to the bodies listed for formal approval to these standards.

BABT	BS6301; BS6484. Models NS700048
	and NS700056 have received
	approval.
CSA	CSA 22.2 #234
UL	UL1950
VDE	EN60950

GUARANTEE

Finish

All Farnell Advance Power products are guaranteed against faulty manufacture and faulty components for a period of twelve months from the date of despatch. See conditions of sale for full details

ORDERING INFORMATION

The order code consists of up to six fields as follows:

1. Source Code	13
2. Series	NS
3. Range	700
4. Version	024, 028, 048 or 056
5. Overcurrent Trip (if required)	Blank - Non-latching C - Latching
 Mechanical Options (as required) 	Blank - Unit supplied with chassis. M - Unit supplied with chassis and mesh cover. W - Unit supplied with chassis and cover with integral fan

e.g. for a 48V output unit with latching current limit and fitted with cover and integral fan, the order code is

13 NS 700 048 C W.

OUTLINE DRAWING FOR NS400005, NS700012 AND NS700015

All dimensions in mm (inches)

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OUTLINE DRAWING FOR NS700024, NS700028, NS700048 AND NS700056

All dimensions in mm (inches)



Fax: Telex: 6182914 Fax:

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