

Modular Power Supplies



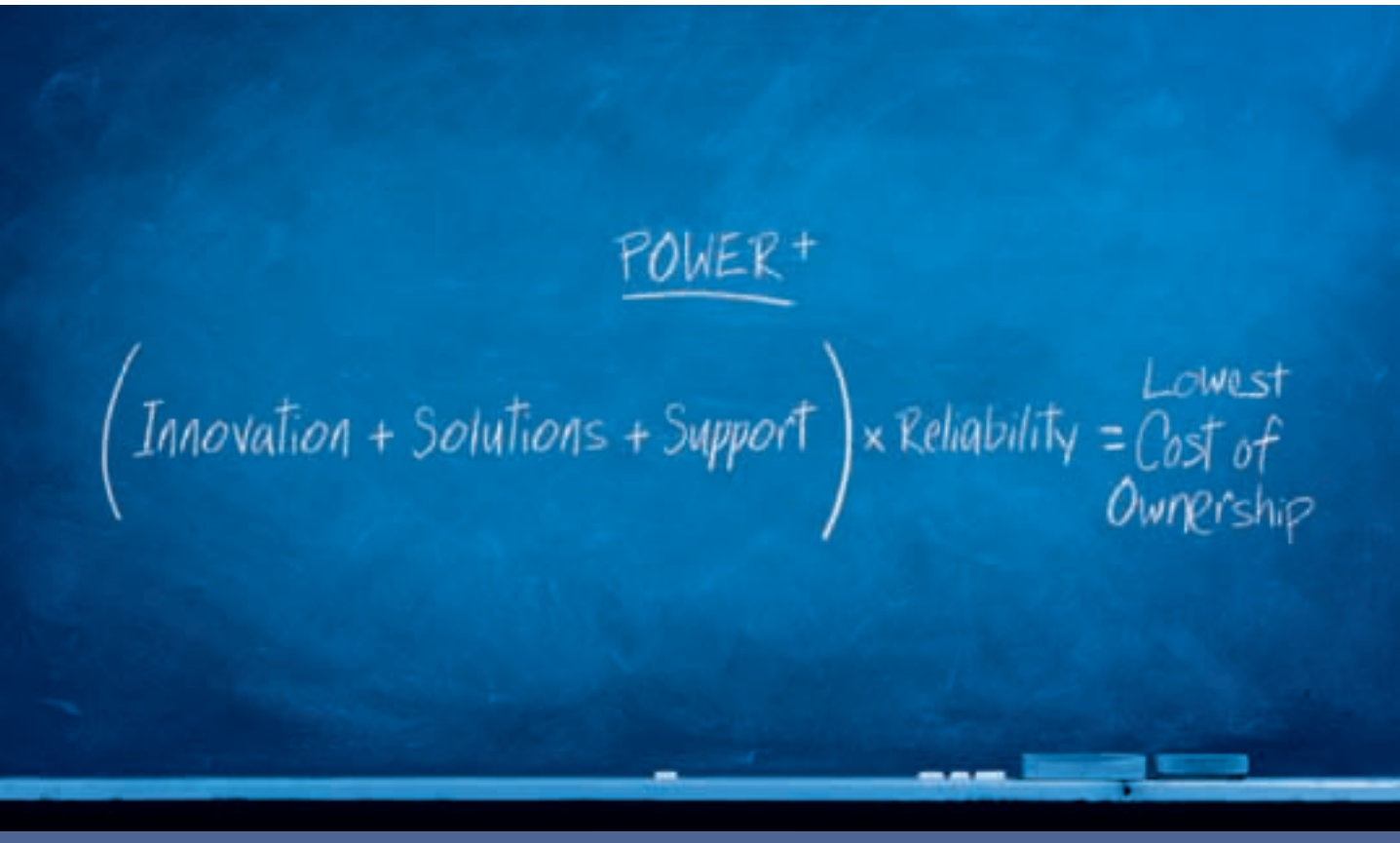
Power⁺. Theory equals reality.



Power alone is not enough which is why Lambda offers Power⁺

Power⁺ is our promise to deliver the lowest cost of ownership in the market through a combination of technical innovation driven by our customers needs, a wide range of power solutions, global application and logistics support, and also reliability in our products and everything we do.

Lambda Power⁺ turning the theory of lowest cost of ownership into reality.



Modular Power Supplies

Our NV-Power, VEGA Lite, VEGA and Alpha modular product ranges are ideal for a variety of applications, and are rated from 175 W to 1500 W, with up to 16 different outputs.

Contents

NV-Power Medical	180/200 Watts	4 – 6
NV-Power	175/180/200 Watts	7 – 11
NV-Power	300 Watts	12 – 16
NV-Power	350/960 Watts	17 – 21
NV-FEP	350 Watts	22 – 27
VEGA Lite	550 – 750 Watts	28 – 31
VEGA	450 – 900 Watts	32 – 36
Alpha	1000 – 1500 Watts	37 – 39





NV-POWER MEDICAL – 180/200 Watts

Features and Benefits

- **Reinforced Input to Output for IEC601**
- Low Earth Leakage and Class B EMC
- Medical Approval
- High Efficiency
- High Power Density (9.3 W/in³)
- Up to 3 outputs
- No minimum load
- Fits 1 U applications
- 3 Year Warranty
- Temperature controlled Fan Option
- Low Profile
- Minimises heat in system
- Less Space

Isolation

Input to Output	Reinforced	4 kV (ac) type tested to 4 kVac (equivalent to 5.7 kVdc), production tested to 4.3 kV (dc)		
Input to Earth	Basic	2.3 kV(dc)	Output to Earth	200 V(dc)

Quick selector – preferred configurations

Model	Ch1	Ch3	Ch4
NV1-1T000-M	12 V / 15 A	–	–
NV1-1G000-M	24 V / 7.5 A	–	–
NV1-3G0TT-M	24 V / 7.5 A	12 V / 5 A	–12 V / 1 A
NV1-3G0FF-M	24 V / 7.5 A	15 V / 5 A	–15 V / 1 A

Above Units available on rapid delivery. Additional variants available “Build to Order” – see below.

Available Outputs

Channel 1	Adjustment Range	Channel 2	Channel 3 ¹	Adjustment Range	Channel 4 ²	Adjustment Range
T 12 V / 15 A F 15 V / 12 A	12 – 15 V ³ 12 – 15 V ⁴	Not Available	T 12 V / 5 A F 15 V / 5 A G 24 V / 2.5 A O Omit	12 – 15 V 12 – 15 V 18 – 24 V	T –12 V / 1 A F –15 V / 1 A 3HP +3.3 V / 2 A ⁶ 5HP +5 V / 2 A ⁶ TH –12 V / 2 A ⁶ FH –15 V / 2 A ⁶ 0H Fan supply only O Omit	Fixed Fixed Fixed Fixed Fixed Fixed
G 24 V / 7.5 A	24 – 28 V ⁵					

Notes: 1 Follow letters in red by “Y” for negative output channel 3.

2 Follow letters in red by “P” for positive output channel 4.

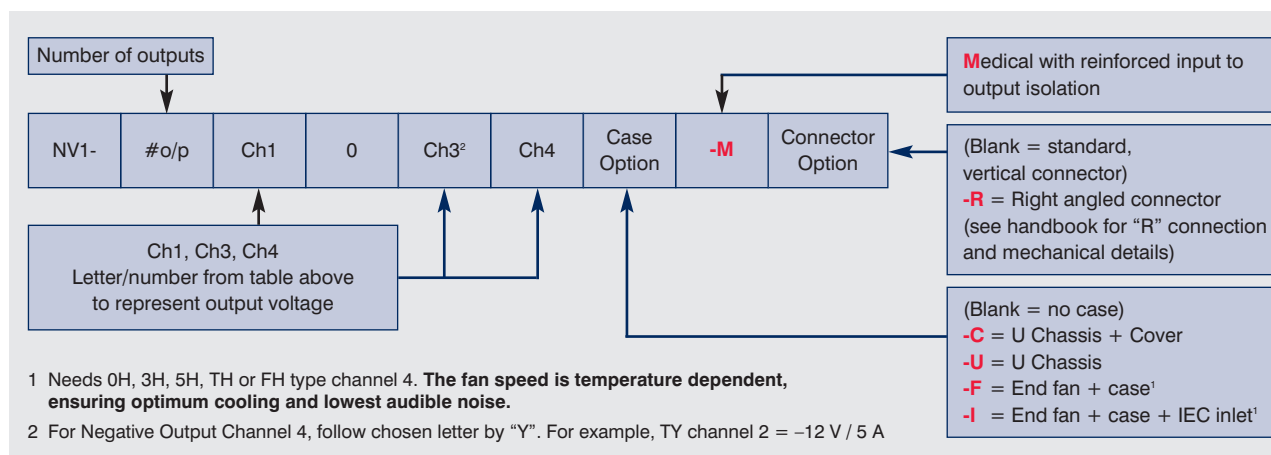
3 12 – 12.5 V if 24 V channel 3 fitted.

4 14.5 – 15 V if 24 V channel 3 fitted.

5 24 – 26 V if 24 V channel 3 fitted.

6 1.5 A max. if fitted with “-F” option.

How to create a Product Code



Confirm availability of created product code with the factory.

NV-POWER MEDICAL – 180/200 Watts

Input

Input Voltage	90 – 264 Vac (100 – 240 Vac nominal)
Input Frequency	45 – 63 Hz
Input Harmonics	EN61000-3-2 compliant
Inrush Current	<40 A at 25 °C and 264 Vac, (cold start)
Input Fuse	Fast acting (not user accessible)
Earth Leakage Current	123 µA max. at 120 Vac (60 Hz) 257 µA max. at 240 Vac (60 Hz) Worst case leakage current is less than 300 µA at 264 Vac, 63 Hz (normal condition, 500 µA Single Fault Condition)
Power Factor	0.97 typical

Output Specifications

		Notes
Remote Sense	yes	Channel 1 – Max. 0.5V total line drop
Total Regulation	1 %	Including Line (for 90 – 264 Vac input change), Load (for 0 – 100 % load change) and Cross (for 0 – 100 % load change on any other output) regulation
Ripple & Noise	1 %	(or 50 mV if higher) pk-pk, using EIAJ test method 20 MHz bandwidth
Voltage Accuracy	±1 %	±4 % for Channel 4 with “T” or “F” type outputs, +4 % / –3% for all other Ch 3
Turn on Time	1.5 s max.	at 90 Vac & 100 % rated output power
Efficiency	up to 90 %	configuration dependent
Hold up	16 ms min	at 90 Vac
Minimum Load	none	on any output
Transient Response	<4 %	of set voltage for 50 % load change (in 50 µs within the range 25 – 100 % load)
Recovery	<500 µs	for recovery to 1 % of set voltage
Short Circuit Protection	yes	
Over Temperature Protection	yes	
Over Voltage Protection	yes	See application notes for details
Ch1 Good Signal	yes	Provides a Logic “low” signal after output is within 90 % (± 5%) of nominal
Peak Output Power	200 W	Single output units with 12 V, 15 V or 24 V (T, F or G). Average output power must not exceed 180 W over any 5 minute period

Environment

Temperature	0 to 50 °C operational, – 40 °C to 85 °C storage (max. 12 months). Full load with either “-F” option fitted or 2 m/s air blown from input to output
Convection Rating	See Application note for details
Derating	50 to 65 °C derate each output by 2.5 % per °C
Low Temperature Start	– 20 °C
Humidity	5 – 95 % RH non condensing
Shock	± 3 x 30 G shocks in each plane, total 18 shocks 30 G shock = 11ms (±0.5 msec), half sine Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987
Vibration	Single axis 10 – 500 Hz at 2 G (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810E, Method 516.5, Pro I, IV, VI
Altitude	3,000 metres operational
Pollution	Degree 2, Material group IIIb

Immunity EN 61000-6-2: 2001

				Criteria
Electrostatic Discharge	EN 61000-4-2	Level 3	Air discharge 8 kV Contact discharge 4 kV Not applicable to open frame units	A
Electro-magnetic Field	EN 61000-4-3	Level 3	(12 V/m)	A
Fast / Burst Transient	EN 61000-4-4	Level 4	(tested to 4.4 kV)	A
Surge Immunity	EN 61000-4-5	Level 3	Common mode to 2.2 kV Differential mode to 1.1 kV	A
Conducted RF Immunity	EN 61000-4-6	Level 3	(12 V)	A
Power Frequency Magnetic Field	EN 61000-4-8	Level 4	(30 A/m)	A
Voltage Dips, Variations, Interruptions	EN 61000-4-11		Criteria B for 5 sec. interruption	A



NV-POWER MEDICAL – 180/200 Watts

Emissions EN 61000-6-3: 2001

Radiated Electric Field	EN55022	(as per CISPR.22) Class A, Class B (see application note for details)
Conducted Emissions	EN55022	Class B (as per CISPR.22)
Conducted Harmonics	EN61000-3-2	Compliant
Flicker	EN61000-3-3	Compliant

Safety Approvals

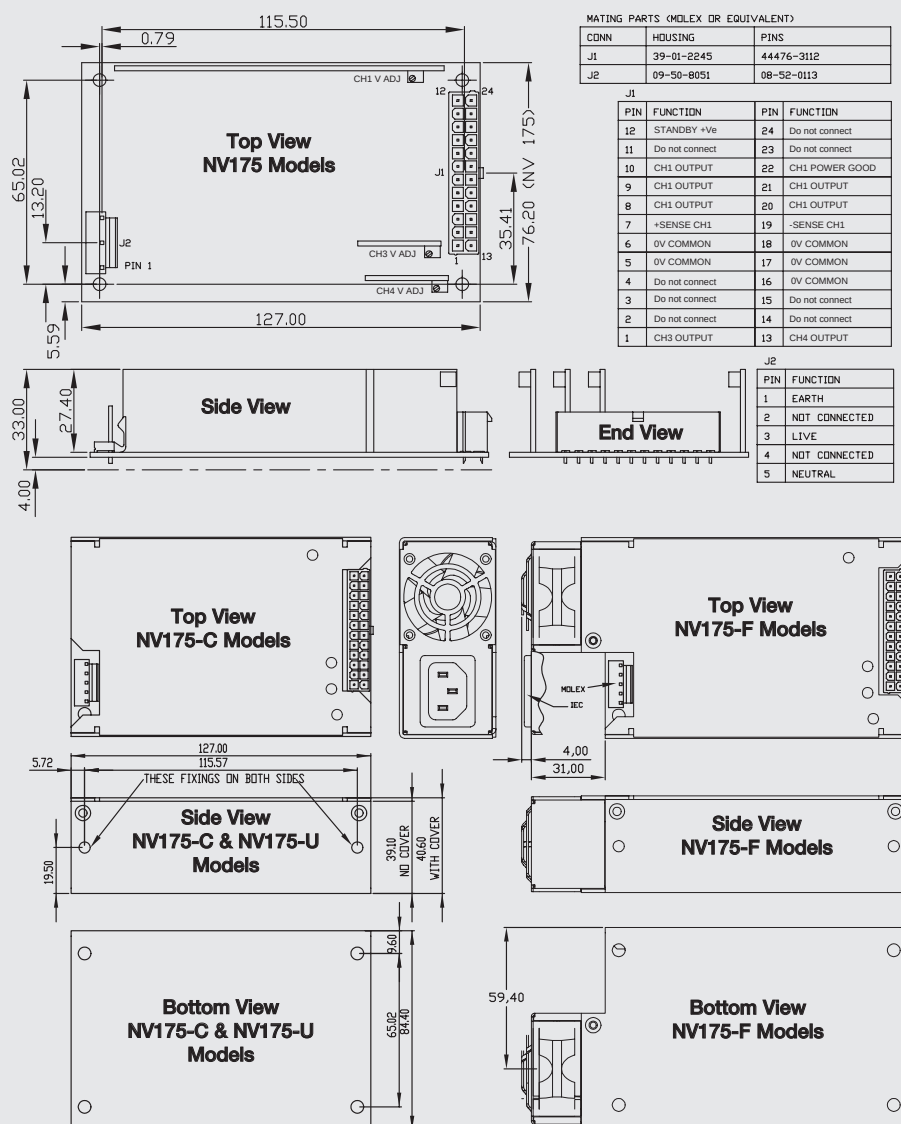
	Date	Amendments
EN60950-1	2006	
UL60950-1	2007	
CSA22.2 No 60950-1	2003	
IEC60950-1*	2005	
EN61010-1	2001	
IEC61010-1*	2001	

	Date	Amendments
IEC60601-1*	1988	A1, A2
EN60601-1	1990	A1, A2, A13
UL60601-1	2003	with revisions 2006
CE Mark	LV Directive 2006/95/EC (EN60950-1)	

* CB certificate and Report available on request.

Check with factory for status of approvals.

Outline & Connection Drawings



NV-POWER – 175/180/200 Watts

Features and Benefits

- High Efficiency
- Low Profile
- High Power Density (9.3 W/in³)
- Up to 5 outputs
- Medical Approval
- 3 Year Warranty
- Minimises heat in system
- Fits 1 U applications
- Less Space
- Temperature controlled Fan Option
- No minimum load



Quick Selector – preferred configurations

Model	Ch1	Ch2	Ch3	Ch4	Ch5	Global Option ¹
NV1-1T000	12 V 15 A					No
NV1-1G000	24 V 7.5 A					No
NV1-453TT	5 V 25 A	3.3 V 15 A	12 V 5 A	-12 V 1 A		No
NV1-453TT-N3	5 V 25 A	3.3 V 15 A	12 V 5 A	-12 V 1 A	5 V 2 A	ATX (-N3)
NV1-453FF	5 V 25 A	3.3 V 15 A	15 V 5 A	-15 V 1 A		No
NV1-453FF-N3	V 25 A	3.3 V 15 A	15 V 5 A	-15 V 1 A	5 V 2 A	ATX (-N3)
NV1-4G5TT	24 V 7.5 A	5 V 8 A	12 V 5 A	-12 V 1 A		No
NV1-4G5TT-N3	24 V 7.5 A	5 V 8 A	12 V 5 A	-12 V 1 A	5 V 2 A	ATX (-N3)
NV1-4G5FF	24 V 7.5 A	5 V 8 A	15 V 5 A	-15 V 1 A		No
NV1-4G5FF-N3	24 V 7.5 A	5 V 8 A	15 V 5 A	-15 V 1 A	5 V 2 A	ATX (-N3)

¹ see page 8 for details of global option.

Above Units available on rapid delivery.

See over for additional variants available "Build to Order".

Output Specifications

		Notes
Remote Sense	yes	Channels 1 & 2, max. 0.5 V total line drop
Total Regulation	1 %	Including Line (for 90 – 264 Vac input change), Load (for 0–100 % load change) and Cross (for 0–100 % load change on any other output) regulation
Ripple & Noise	1 %	(or 50 mV if higher) pk-pk, using EIAJ test method 20 MHz bandwidth
Voltage Accuracy	±1 %	±4 % for channel 4 with "T" or "F" type outputs, +4 %/–3 % for all other Ch 4
Turn on Time	1.5 s max.	at 90 Vac & 100 % rated output power
Efficiency	up to 90 %	configuration dependent
Hold up	16 ms min	at 90 Vac
Minimum Load	none	on any output
Transient Response	<4 %	of set voltage for 50 % load change (in 50 µs within the range 25 – 100 % load)
Recovery	<500 µs	for recovery to 1 % of set voltage
Short Circuit Protection	yes	
Over Temperature Protection	yes	
Over Voltage Protection	yes	See application notes for details
Ch1 Good Signal	yes	Provides a Logic "low" signal after output is within 90 % (± 5%) of nominal
Peak Output Power	200 W	Single output units with 12 V, 15 V or 24 V (T, F or G). Average output power must not exceed 180 W over any 5 minute period

Isolation

Input to Output	Reinforced	4.3 kV (dc)
Input to Earth	Basic	2.3 kV (dc)
Output to Earth		200 V (dc)



NV-POWER – 175/180/200 Watts

Available Outputs

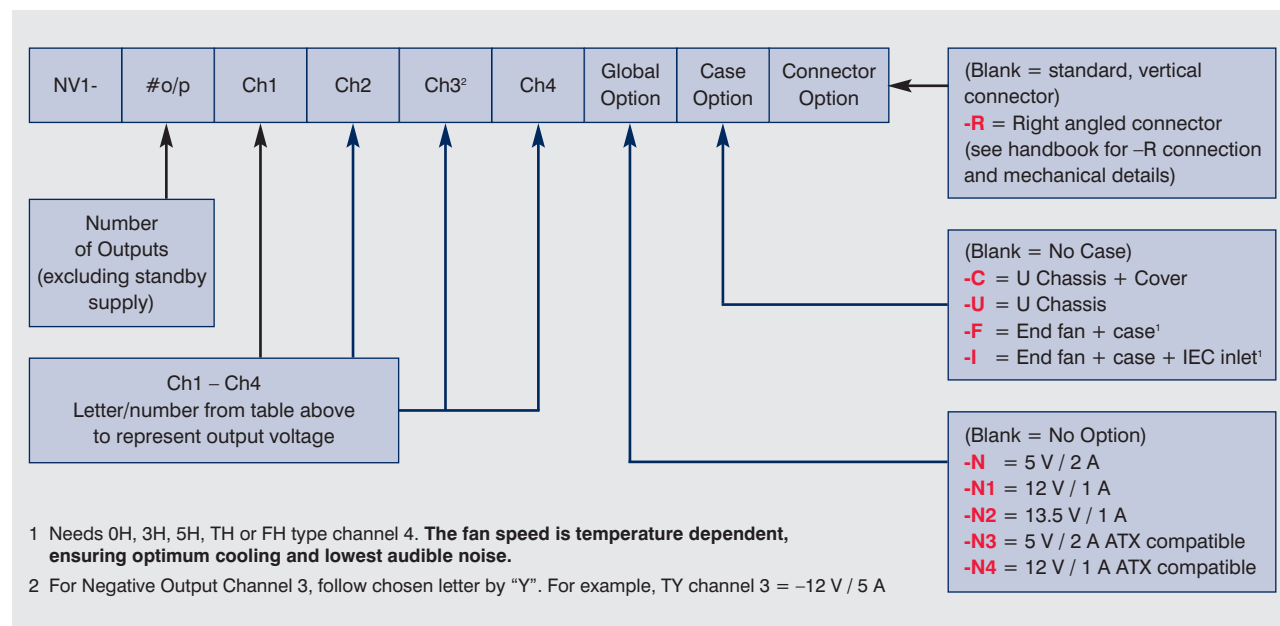
Channel 1	Adjustment Range	Channel 2 ¹	Adjustment Range	Channel 3 ³	Adjustment Range	Channel 4 ⁴	Adjustment Range
5 5 V / 25 A ²	5 – 5.5 V	1 1.8 V / 15 A 2 2.7 V / 15 A 3 3.3 V / 15 A 0 Omit	0.9 – 2.5 V 2.5 – 3.3 V 2.5 – 3.3 V	T 12 V / 5 A F 15 V / 5 A G 24 V / 2.5 A 0 Omit	12 – 15 V 12 – 15 V 18 – 24 V	T –12 V / 1 A F –15 V / 1 A 3H –3.3 V / 2 A ⁹ 5H –5 V / 2 A ⁹ TH –12 V / 2 A ⁹ FH –15 V / 2 A ⁹ OH Fan supply only 0 Omit	Fixed Fixed Fixed Fixed Fixed Fixed
T 12 V / 15 A F 15 V / 12 A	12 – 15 V ⁵ 12 – 15 V ⁶	5 5 V / 10 A 0 Omit	3.3 – 5.5 V				
G 24 V / 7.5 A	24 – 28 V ⁷	5 5 V / 8 A ⁸ 0 Omit	3.3 – 5.5 V				

Notes:

- 1.8 V, 2.7 V, 3.3 V channel 2 only available with 5 V Channel 1
5 V / 10 A channel 2 only available with 12 V or 15 V Channel 1
5 V / 8 A channel 2 only available with 24 V Channel 1.
- Maximum combined output current from Ch1 & Ch2 = 25 A
Models with 5 V channel 1 are limited to 175 W output power.
- Follow letters in red by "Y" for negative output channel 3.
- Follow letters in red by "P" for positive output channel 4.
- 12 – 12.5 V if 24 V channel 3 fitted.
- 14.5 – 15 V if 24 V channel 3 fitted.
- 24 – 24.5 V if 5 V channel 2 fitted
24 – 26 V if 24 V channel 3 fitted.
- 7 A max. if fitted with "-F" option.
- 1.5 A max. if fitted with "-F" option.

Other output options are available, please contact factory with your requirements.

How to create a Product Code



Confirm availability of created product code with the factory.

Input

Input Voltage	90 – 264 Vac / 120 – 350 Vdc
Input Frequency	47 – 63 Hz (440 Hz with reduced PFC – consult factory)
Input Harmonics	EN61000-3-2 compliant
Inrush Current	<40 A at 25 °C and 264 Vac, (cold start)
Input Fuse	Fast acting (not user accessible)
Earth Leakage Current	123 µA max. at 120 Vac (60 Hz) 257 µA max. at 240 Vac (60 Hz) Worst case leakage current is less than 300 µA at 264 Vac, 63 Hz (normal condition, 500 µA Single Fault Condition)
Power Factor	0.97 typical

NV-POWER – 175/180/200 Watts

Global Interface Signals -N and -N2 Option models

Remote on/off	TTL logic level high inhibits all outputs (except standby)
Power Good	Open collector output (referenced to PSU 0 V). Turns on to indicate ac supply is good and output 1 is within regulation.
Standby Supply	Isolated supply, not affected by remote on/off -N Option = 5 V / 2 A (2.5 A peak) -N1 Option = 12 V / 1 A -N2 Option = 13.5 V / 1 A

See application note for details.

Safety Approvals

	Date	Amendments
EN60950-1	2006	
UL60950-1	2007	
CSA22.2 No 60950-1	2003	
IEC60950-1*	2005	
EN61010-1	2001	
IEC61010-1*	2001	
IEC60601-1*	1988	A1, A2
EN60601-1	1990	A1, A2, A13
UL60601-1	2003	with revisions 2006
CE Mark	LV Directive 2006/95/EC (EN60950-1)	

* CB certificate and Report available on request.

Check with factory for status of approvals.

Environment

Temperature	0 to 50 °C operational, –40 °C to 85 °C storage (max. 12 months) Full load with either “-F” option fitted or 2 m/s air blown from input to output
Convection Rating	See Application note for details
Derating	50 to 70 °C derate each output by 2.5 % per °C
Low Temperature Start	–20 °C
Humidity	5 – 95 % RH non condensing
Shock	± 3 x 30 G shocks in each plane, total 18 shocks 30 G shock = 11ms (±0.5 msec), half sine Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987 Conforms to MIL-STD-810E/F, Method 514.4, Pro I, IV, VI
Vibration	Single axis 10 – 500 Hz at 2 G (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810E, Method 516.5, Pro I, IV, VI
Altitude	3,000 metres operational
Pollution	Degree 2, Material group IIIb

Global Signals (-N3 and -N4 Option Models)

ATX Remote on/off	TTL logic level high or open circuit will inhibit all outputs (except Standby)
ATX Power Good	Logic high indicates ac supply is good and output 1 is within regulation
Standby Supply	Common 0 V with power supply. Not affected by ATX remote on/off -N3 Option = 5 V / 2 A -N4 Option = 12 V / 1 A

Emissions EN 61000-6-3: 2001

Radiated Electric Field	EN55022	(as per CISPR.22) Class A, Class B see application note for details
Conducted Emissions	EN55022	Class B (as per CISPR.22)
Conducted Harmonics	EN61000-3-2	Compliant
Flicker	EN61000-3-3	Compliant

Immunity EN 61000-6-2: 2001

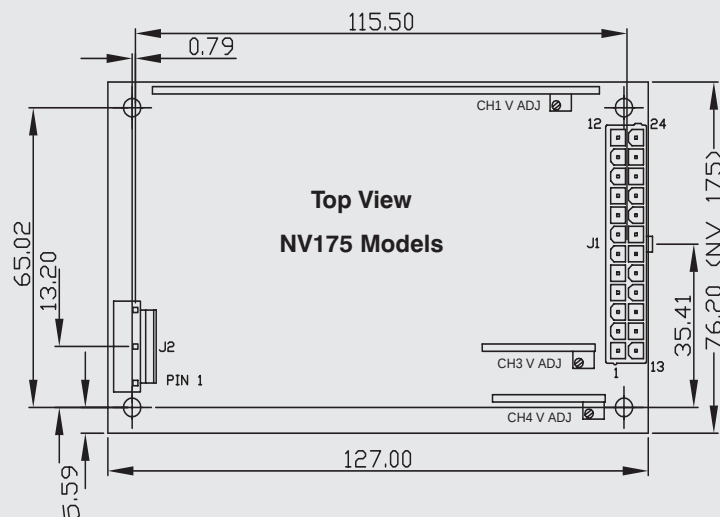
				Criteria
Electrostatic Discharge	EN 61000-4-2	Level 3	Air discharge 8 kV Contact discharge 4 kV Not applicable to open frame units	A
Electro-magnetic Field	EN 61000-4-3	Level 3	(12 V/m)	A
Fast / Burst Transient	EN 61000-4-4	Level 4	(tested to 4.4 kV)	A
Surge Immunity	EN 61000-4-5	Level 3	Common mode to 2.2 kV Differential mode to 1.1 kV	A
Conducted RF Immunity	EN 61000-4-6	Level 3	(12 V)	A
Power Frequency Magnetic Field	EN 61000-4-8	Level 4	(30 A/m)	A
Voltage Dips, Variations, Interruptions	EN 61000-4-11		Criteria B for 5 sec. interruption	A



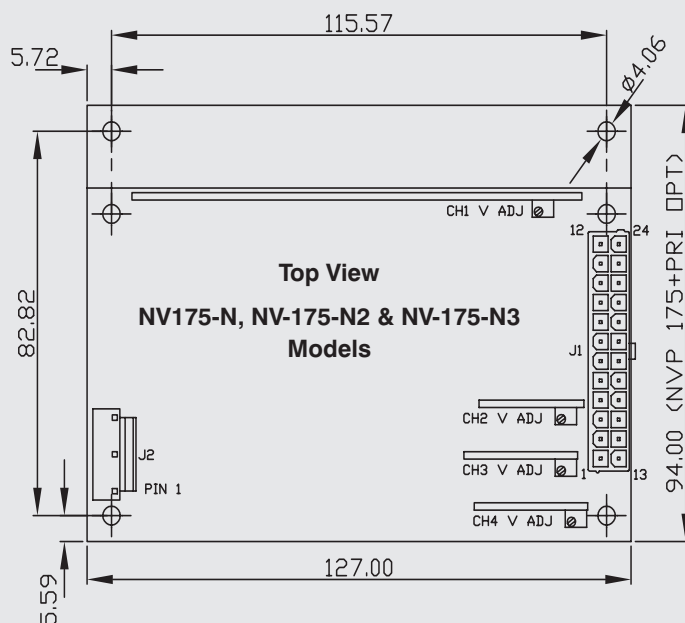
NV-POWER – 175/180/200 Watts

Outline & Connection Drawings

All drawings relate to both 175 W and 180 W versions



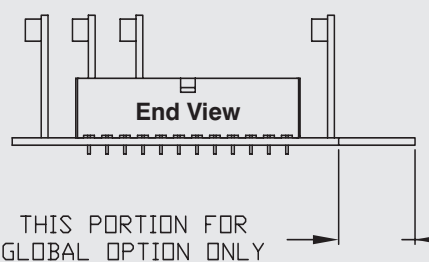
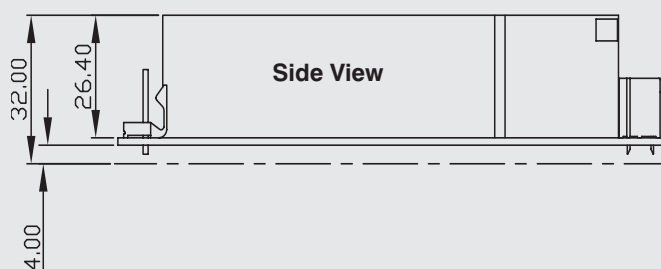
J2	
PIN	FUNCTION
1	EARTH
2	NOT CONNECTED
3	LIVE
4	NOT CONNECTED
5	NEUTRAL



J1			
PIN	FUNCTION	PIN	FUNCTION
12	STANDBY +Ve	24	Do not connect
11	Do not connect	23	Do not connect
10	CH1 OUTPUT	22	CH1 POWER GOOD
9	CH1 OUTPUT	21	CH1 OUTPUT
8	CH1 OUTPUT	20	CH1 OUTPUT
7	+SENSE CH1	19	-SENSE CH1
6	0V COMMON	18	0V COMMON
5	0V COMMON	17	0V COMMON
4	Do not connect	16	0V COMMON
3	Do not connect	15	Do not connect
2	Do not connect	14	Do not connect
1	CH3 OUTPUT	13	CH4 OUTPUT

MATING PARTS (MOLEX OR EQUIVALENT)

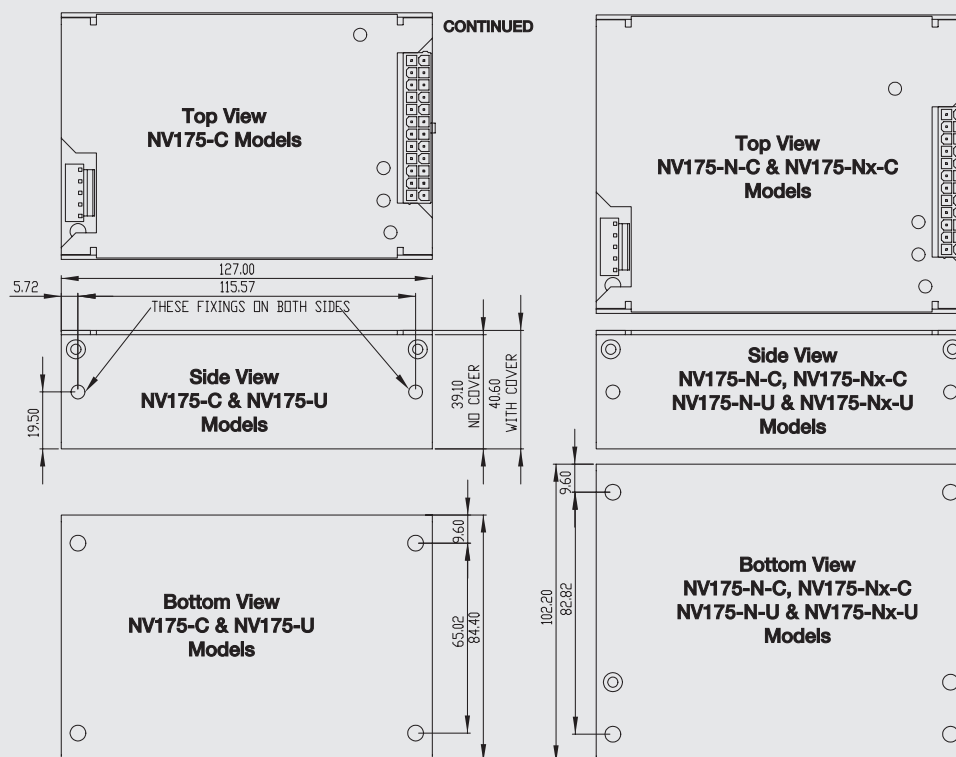
CONN	HOUSING	PINS
J1	39-01-2245	44476-3112
J2	09-50-8051	08-52-0113



NV-POWER – 175/180/200 Watts

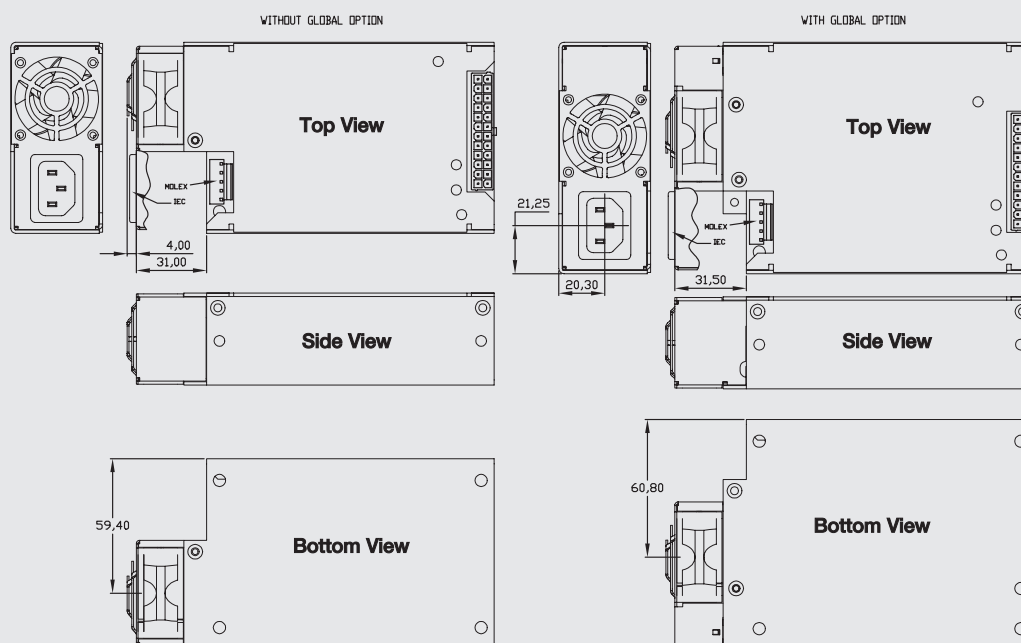
Outline & Connection Drawings

All drawings relate to both 175 W and 180 W versions



NV-175 units with fan (-F / -I)

All drawings relate to both 175 W and 180 W versions



Other dimensions same as cases without fans (above)



NV-POWER – 300 Watts

Features and Benefits

- High Efficiency
- High Power Density (8.3 W/in³)
- Up to 5 outputs
- No minimum load
- Fits 1 U applications
- Medical Approval
- 3 Year Warranty
- Temperature controlled Fan Option

Isolation

Input to Output	Reinforced	4.3 kV (dc) Note: Basic for IEC/EN/UL/CSA60601-1		
Input to Earth	Basic	2.25 kV (dc)	Output to Earth	200 V(dc)

Input

Input Voltage	90 – 264 Vac / 120 – 350 Vdc (Below 100 Vac input, derate by 3 W per Volt)	Power Factor	0.97 typical
Input Harmonics	EN61000-3-2 compliant	Earth Leakage Current	123 µA max. at 120 Vac (60 Hz), 257 µA max. at 240 Vac (60 Hz). Worst case leakage current is less than 300 µA at 264 Vac, 63 Hz (normal condition, 500 µA Single Fault Condition)
Input Fuse	6.3 A, Fast acting (not user accessible)		
Input Frequency	45 – 63 Hz (440 Hz with reduced PFC – consult factory)		
Inrush Current	<15 A at 25 °C and 264 Vac, (cold start)		

Available Outputs

Channel 1	Adjustment Range ⁵	Channel 2	Adjustment Range ⁵	Channel 3	Adjustment Range	Channel 4 ²	Adjustment Range
5 5 V / 40 A ¹	5 – 5.5 V	1 1.8 V / 15 A 2 2.7 V / 15 A 3 3.3 V / 15 A 2H 2.7 V / 24 A 3H 3.3 V / 24 A 0 Omit	0.9 – 3.8 V 2.5 – 3.8 V 2.5 – 3.8 V 2.5 – 3.8 V 2.5 – 3.8 V	T 12 V / 5 A ⁴ TH 12 V / 8 A ⁶ F 15 V / 4 A ⁴ FH 15 V / 6.4 A ⁶ G 24 V / 2.5 A O Omit	12 – 15 V 12 – 15 V 12 – 15 V 12 – 15 V 18 – 24 V	3H –3.3 V / 2 A ³ 5H –5 V / 2 A ³ T –12 V / 1 A TH –12 V / 2 A ³ F –15 V / 1 A FH –15 V / 2 A ³ 0H Fan supply only 0 Omit	Fixed Fixed Fixed Fixed Fixed Fixed

Notes:

1 Maximum combined output current from Ch1 & Ch2 = 40 A.

2 Follow letters in red by "P" for positive output channel 4.

3 1.5 A max. if fitted with "-F" option.

4 60 W max. output power.

5 Max. voltage at the output (includes remote sense).

6 96 W max. output power.

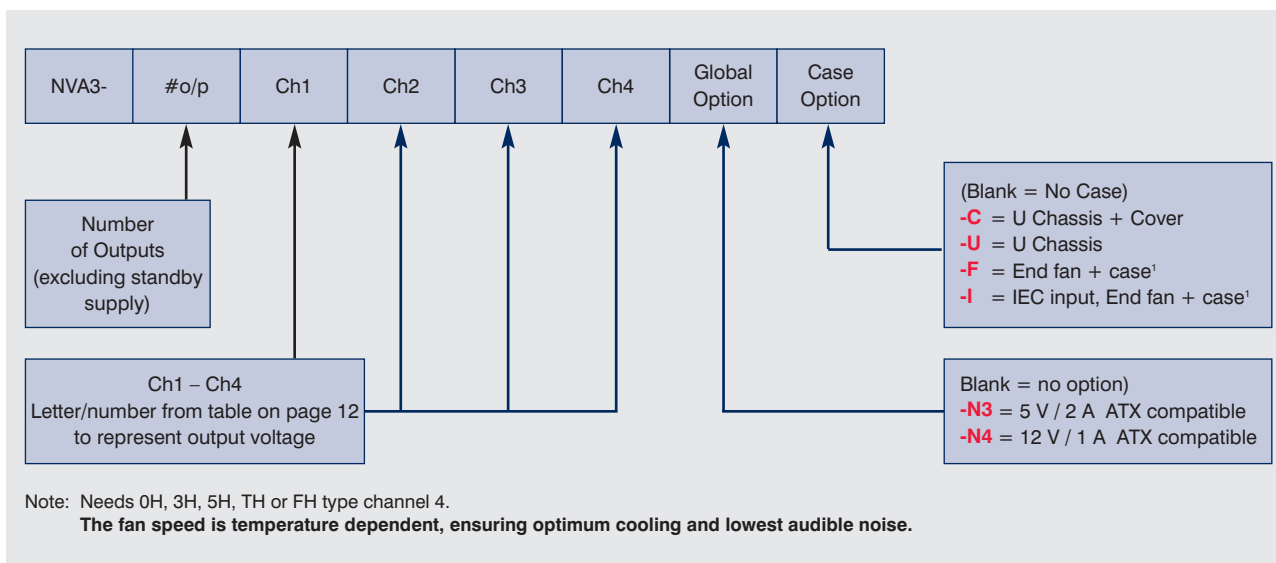
Other output options are available, please contact factory with your requirements.

NV-POWER – 300 Watts

Output Specifications

Remote Sense	Yes	Channels 1 & 2 – Max. 0.5 V total line drop.
Total Regulation	1.5 %	For channels 1, 2 and 3 (2.5 % for channel 4) Including Line (for 90 – 264 Vac input change), Load (for 0 – 100 % load change) and Cross (for 0 – 100 % load change on any other output) regulation
Ripple & Noise	1%	(or 50 mV if higher) pk-pk, using EIAJ test method & 20 MHz bandwidth
Voltage Accuracy	±1 %	±5 % for Channel 4
Turn on Time	1.5 s	max. at 90 Vac & 100 % rated output power
Efficiency	up to 90 %	configuration dependent
Hold up	16 ms min	at 90 Vac
Min Load	None	on any output
Transient Response	<5 %	of set voltage for 40 % load change (in 50 µs within the range 25 – 100 % load)
Recovery	<500 µs	for recovery to 1 % of set voltage
Short Circuit Protection	Yes	
Over Temperature Protection	Yes	
Over Voltage Protection	Yes	See Application Notes for details
Ch1 Good Signal	Yes	Provides a Logic “Low” signal after Channel 1 output is within 90 % (±5 %) of nominal

How to create a Product Code



Confirm availability of created product code with the factory.

Quick selector – preferred configurations

Model	Ch1	Ch2	Ch3	Ch4	Ch5	Global Option ¹
NVA3-453TT	5 V / 40 A	3.3 V / 15 A	12 V / 5 A	-12 V / 1 A	–	No
NVA3-453TT-N3	5 V / 40 A	3.3 V / 15 A	12 V / 5 A	-12 V / 1 A	5 V / 2 A	ATX (-N3)
NVA3-350TT	5 V / 40 A	–	12 V / 5 A	-12 V / 1 A	–	No
NVA3-350TT-N3	5 V / 40 A	–	12 V / 5 A	-12 V / 1 A	5 V / 2 A	ATX (-N3)
NVA3-453FF	5 V / 40 A	3.3 V / 15 A	15 V / 5 A	-15 V / 1 A	–	No
NVA3-453FF-N3	5 V / 40 A	3.3 V / 15 A	15 V / 5 A	-15 V / 1 A	5 V / 2 A	ATX (-N3)
NVA3-350FF	5 V / 40 A	–	15 V / 5 A	-15 V / 1 A	–	No
NVA3-350FF-N3	5 V / 40 A	–	15 V / 5 A	-15 V / 1 A	5 V / 2 A	ATX (-N3)

Above Units available on rapid delivery. See over for additional variants available “Build to Order”.

¹ See page 14 for details of global option.



NV-POWER – 300 Watts

Global Signals (-N3 and -N4 Option Models)

ATX Remote on/off	TTL logic level high or open circuit will inhibit all outputs (except Standby)
ATX Power Good	Logic high indicates ac supply is good and output 1 is within regulation
Standby Supply	Common 0 V with power supply. Not affected by ATX remote on/off -N3 Option = 5 V / 2 A -N4 Option = 12 V / 1 A

Emissions EN61000-6-3:2001, EN60601-1-2:2001

Radiated Electric Field	EN55011, EN55022	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B (2005) see application note for details
Conducted Emissions	EN55011, EN55022	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B (2005)
Conducted Harmonics	EN61000-3-2	Class A
Flicker	EN61000-3-3	Compliant – d _{max} only

Environment

Temperature	0 to 50 °C operational, –40 °C to 85 °C storage (max. 12 months). Full load, with either “-F” option fitted or 2 m/s air blown from input to output
Derating	50 to 70 °C derate each output by 2.5 % per °C
Low Temp Startup	–20 °C
Humidity	5 – 95 % RH non-condensing
Shock	±3 x 30 g shocks in each plane, total 18 shocks 30 g shock = 11 ms (±0.5 msec), half sine Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987 Conforms to MIL-STD-810E/F, Method 514.4, Pro I, Cat 1,9
Vibration	Single axis 10 – 500 Hz at 2 g (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810E, Method 516.5, Pro I, IV, VI
Altitude	3,000 metres operational
Pollution	Degree 2, Material group 3

Immunity EN61000-6-2:2005, EN60601-1-2:2001

				Criteria
Electrostatic Discharge	EN 61000-4-2	Level 3	Air discharge 8 kV Contact discharge 4 kV Not applicable to open frame units	A
Electro-magnetic Field	EN 61000-4-3	Level 3	(12 V/m)	A
Fast / Burst Transient (ac input)	EN 61000-4-4	Level 4	(tested to 4.4 kV)	A
Fast / Burst Transient (dc output)	EN 61000-4-4	Level 4	(tested to 2.2 kV)	A
Surge Immunity	EN 61000-4-5	Level 3	Common mode – 2.2 kV Differential – 1.1 kV	A
Conducted RF Immunity	EN 61000-4-6	Level 3	(12 V)	A
Power Frequency Magnetic Field	EN 61000-4-8	Level 4	(30 A/m)	A
Voltage Dips, Variations, Interruptions	EN 61000-4-11	Class 3	Criteria B for 5 sec. interruption	A
Voltage Fluctuations	EN 61000-4-14	Class 3	For 100 – 240 V Nominal	A

Safety Approvals

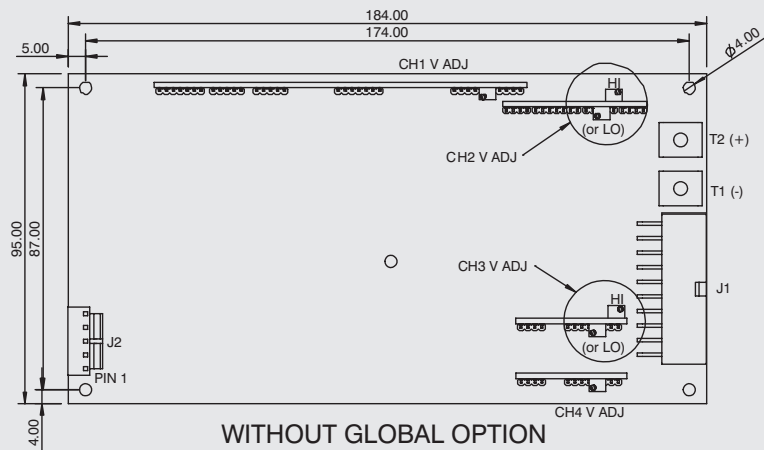
	Date	Amendments
EN60950-1	2006	
UL60950-1	2007	
CSA22.2 No 60950-1	2003	
IEC60950-1*	2005	
CE Mark	LV Directive 2006/95/EC(EN60950-1)	
EN61010-1	2001	
IEC61010-1*	2001	
IEC60601-1*	1988	A1, A2
EN60601-1	1990	A1, A2, A13
UL60601-1	2003	with revisions 2006

* CB certificate and Report available on request.

Check with factory for status of approvals.

NV-POWER – 300 Watts

Outline & Connection Drawings



J2

PIN	CONNECTION
1	EARTH
2	NOT CONNECTED
3	LIVE
4	NOT CONNECTED
5	NEUTRAL

J1

PIN	CONNECTION	PIN	CONNECTION
11	0V COMMON	1	0V COMMON
12	0V COMMON	2	0V COMMON
13	CH2 +Ve	3	CH2 +Ve
14	CH2 +Ve	4	CH2 +Ve
15	+SENSE CH1	5	-SENSE CH1
16	+SENSE CH2	6	-SENSE CH2
17	CH1 GOOD	7	N/C
18	CH3 +Ve	8	CH3 +Ve
19	0V COMMON	9	0V COMMON
20	CH4 O/P	10	CH4 O/P

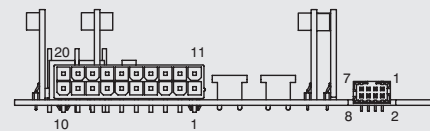
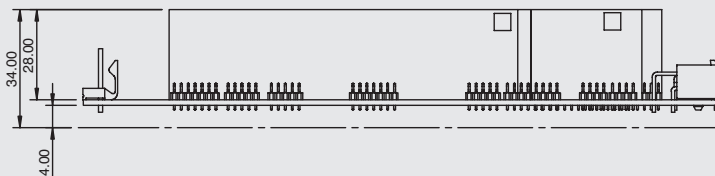
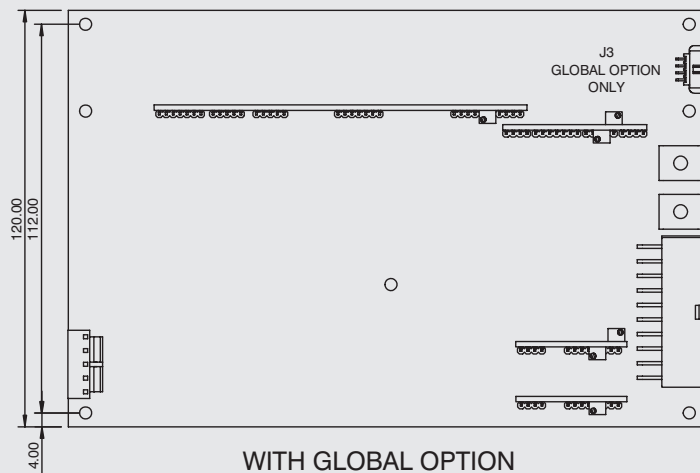
T1 & T2 (SEE TOP LEFT)

J3 (GLOBAL OPTION ONLY)

PIN	CONNECTION	PIN	CONNECTION
1	STANDBY -Ve	5	N/C
2	STANDBY +Ve	6	N/C
3	STANDBY -Ve	7	POWER GOOD
4	STANDBY +Ve	8	REM ON/OFF

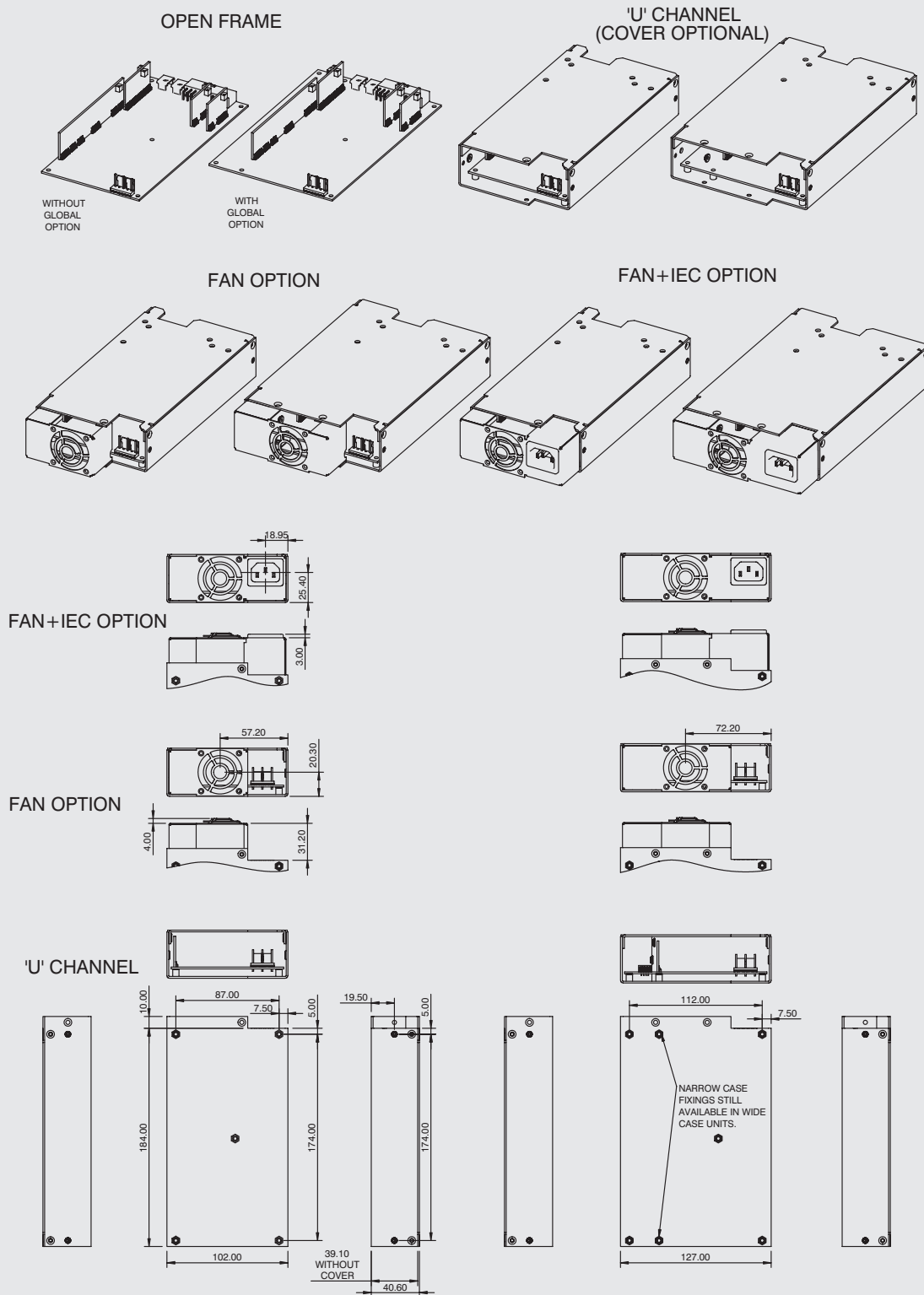
MATING PARTS (MOLEX OR EQUIVALENT)

CONNECTOR	HOUSING	CRIMP PIN
J1	39-01-2205	44476-3112
J2	09-50-8051	08-52-0113
J3	51110-0860	50394
T1 & T2	N/A	TAG 19073-0165



NV-POWER – 300 Watts

Outline & Connection Drawings



- Notes**
1. All customer fixings M3
 2. Maximum Penetration 4.5 mm
 3. Maximum torque 0.9 Nm
 4. All tolerances ± 0.5 mm

Other dimensions same as cases without fans (above)

NV-POWER – 350/960 Watts

Features and Benefits

- High Efficiency
- High Power Density (up to 12 W/in³)
- Up to 8 outputs (6 for 350 W)
- No minimum load
- Fits 1 U applications
- Medical Approval
- 3 Year Warranty



NV-350 / NV-700 Configuring

Output Power	NV3 350 W NV7 960 W				
Cooling	S Standard air – forward R Reverse air ⁴ C Customer air – no fan ¹	NV3	S	S	S
Input Connection	S Screw I IEC320 ²				EN5V
Leakage Current	S Standard leakage current: 130 µA max. at 120 Vac (60 Hz), 260 µA max. at 240 Vac (60 Hz) ⁵				
Primary Option³	ES5V ac good, psu enable, 5 V / 2 A standby ES12V ac good, psu enable, 12 V / 1 A standby IS5V ac good, psu inhibit, 5 V / 2 A standby IS12V ac good, psu inhibit, 12 V / 1 A standby EN5V ac good, psu enable, 5 V / 2 A standby, global module good EN12V ac good, psu enable, 12 V / 1 A standby, global module good IN5V ac good, psu inhibit, 5 V / 2 A standby, global module good IN12V ac good, psu inhibit, 12 V / 1 A standby, global module good				

- Notes
- 1 Thermocoupled sample recommended to ensure adequate cooling – consult sales
 - 2 Not with customer air Cooling
 - 3 The Primary Option uses 1 slot
 - 4 Not with NV7
 - 5 Worst case leakage current is less than 300 µA at 264 Vac, 63 Hz Normal Condition (<500 µA Single Fault Condition)

The extensive range of output modules and options make it possible to achieve almost any combination of Volts and Amps. You can create your own NV350 or NV700 configuration online at www.nv-power.com. This method checks your configuration and offers the optimum solution. Alternatively, you can do this manually by using the guide below.

1. Calculate total output power to ensure power requirements within 350 W or 960 W, then select required Cooling, Connection and Controls/Signals from the table above.
2. Select Output Modules from the Module Tables below ensuring that no more than 6 slots (NV-350) or 8 slots (NV-700) total are used.
Example – if you require 5.2V 40A: –

a) select B as closest match for voltage & current and prefix with voltage eg. **5.2B**

b) repeat for other outputs

This will create a complete product description eg. **NV3SSSE5V 5.2B 12/15DB** which represents a three output NV-350 with Forward air cooling, Screw input terminals, standard leakage filter, ac good, PSU enable & 5 V / 2 A aux supply

Output 1 = 5.2 V / 40 A

Output 2 = 12 V / 13 A with screw terminals

Output 3 = 15 V / 4 A with screw terminals

Max. 350 W continuous output power

3. Contact Lambda to validate configuration and issue a part number.



NV-POWER – 350/960 Watts

Single Output Modules

Module			
Code	Slots	Voltage Range	Current
B	2	3.2 – 3.6	40 A
		4.75 – 5.5	40 A ¹
BH	2	12 – 15.5	20 A ²
		24 – 28	10 A ³

- Notes
- 1 for NV3 – derate linearly from 40 A at 5.2 V to 36 A at 5.5 V
for NV7 – derate linearly from 40 A at 5 V to 36 A at 5.5 V
 - 2 for NV3 – derate linearly from 20 A at 13.2 V to 16.5 A at 15.5 V
for NV7 – derate linearly from 20 A at 12.5 V to 15.5 A at 15.5 V
 - 3 for NV3 – derate linearly from 10 A at 25.7 V to 8.5 A at 28 V
for NV7 – derate linearly from 10 A at 24 V to 8.5 A at 28 V
 - 4 derate linearly from 13 A at 12.5 V to 10 A at 15.5 V
 - 5 derate linearly from 7 A at 25 V to 6 A at 28 V

Input

Input Voltage	90 – 264 Vac
Input Frequency	47 – 63 Hz (up to 440 Hz with reduced PFC)
Input Harmonics	EN61000-3-2 compliant
Power Factor	0.97 typical
Inrush Current	NV-350 <15 A at 25 °C and NV-700 <40 A 264 Vac (cold start)
Input Fuse	NV-350 6.3 A 250 Vac HBC Fast Acting NV-700 16 A (not user accessible)
Leakage Current	130 µA max. at 120 Vac (60 Hz), 260 µA max. at 240 Vac (60 Hz). Worst case leakage current is less than 300 µA at 264 Vac, 63 Hz (Normal Condition, <500 µA Single Fault Condition)

Isolation

Input to Output	Reinforced	4.3 kV (dc)*
Input to Earth	Basic	2.3 kV (dc)
Output to Earth		200 V (dc)

* Note: Basic for IEC/EN/UL/CSA60601-1

Output

Maximum Output Power	NV7 = 960 W 700 W below 150 Vac input NV3 = 350 W NV3 Reverse air = 250 W
Voltage / Current	See module tables
Turn on Time	1.5 s max. at 90 Vac & 100 % rated output power
Rise time	<50 ms to 90 % of voltage, monotonic rise above 10 %
Efficiency	up to 90 % configuration dependent
Hold up	16 ms min. at 90 Vac and 100 % rated power (12 ms for NV-700 above 700 W output power)
Ripple & Noise	<1 % pk-pk, using EIAJ test method & 20 MHz bandwidth
Voltage Accuracy	<1 % of set voltage (±5 % for channel 2) (DA module: +5 / -1 % for channel 1, +2 / -3.5 % for channel 2)
Remote Sense	Yes standard on single o/p + ch1 of dual modules, max. 0.5 V total line drop (DA module: None)
Minimum Load	No on any output (DA module: 150 mA on channel 1)

Dual Output Modules

Module Code: DB Slots: 2				
Output 1		Output 2		
Voltage Range	Current	Voltage Range	Current	Max. Power
3.2 – 3.6	25 A	3.3 – 5.5 7 – 15 24 – 32	10 A 5 A 2 A	55 W 60 W
4.75 – 5.5	25 A	3.3 – 5.5 7 – 15 24 – 32	10 A 5 A 2 A	55 W 60 W 50 W
12 – 15	13A ⁴	3.3 – 5.5 7 – 15 24 – 32	10 A 5 A 2 A	55 W 60 W 50 W
24 – 28	7A ⁵	3.3 – 5.5 7 – 15 24 – 32	10 A 5 A 2 A	55 W 60 W 50 W
Module Code: DA Slots: 1 (one per power supply)				
Output 1		Output 2		
Voltage Range	Current	Voltage Range	Current	
12	3 A	-12	1 A	

Output cont.

Temperature Coefficient	<0.02 %	of rated voltage per °C
Load Regulation	<1 %	for 0-100 % load change (<2 % for channel 2) (DA module: <3 %)
Line Regulation	<0.1 %	for 90 – 264 Vac input change
Cross Regulation	<0.1 %	for 100% load change on any output (DA module: 0.2 % for channel 1, 3 % for channel 2)
Transient Response	<4 %	of set voltage for 50 % load change
Recovery	500 µs	for recovery to 1% of set voltage (DA module: 1000 µs)
Over Voltage Protection	Yes	
Over Current Protection (singles)	110 – 150 %	of module current, Hiccup mode. Module primary side protected
Power limit (duals)	110 – 150 %	of max. Power ch1 + ch2. Hiccup mode. Module primary side protected (DA module: 110 – 220 % for channel 1, 110 – 170 % for channel 2)
Short Circuit Protection	Yes	
Over Temperature Protection	Yes	Cycle ac off / on to reset Shutdown temperature varies according to ambient, output power & input voltage

NV-POWER – 350/960 Watts

Signals – Standard

Ch1/Ch2 Module Good	Open collector output. “On” indicates output is within 90 % (± 5 %) of nominal
Module Inhibit	TTL logic high inhibits the output (both outputs for duals) of the module
Ch2 On/Off (duals only)	TTL logic low inhibits output 2 of the module

All signals referenced to 0 V of channel

Global Interface Signals – with Primary Option

AC good collector AC good emitter	Uncommitted optocoupler. Turns on typically 5 ms after ac is good and off typically 5 ms before any channel falls below 95 % of nominal
Global module good collector Global module good emitter	Uncommitted optocoupler. Turns on typically 200 ms after all outputs are within 90 % (± 5 %) of nominal and off typically 5 ms before any channel falls below 90 % (± 5 %) of nominal. Do not connect for ES and IS type primary option.
EN/ES & IN/IS Logic 0	TTL low enables (EN or ES) or inhibits (IN or IS) the entire psu including fan (except standby)
EN/ES & IN/IS Logic 1	TTL high enables (EN or ES) or inhibits (IN or IS) the entire psu including fan (except standby)
Standby Supply	5 V / 2 A (2.5 A peak) or 12 V / 1 A (1.2 A peak)

Environment

Temperature	0 °C to 50 °C operational, –40 °C to 85 °C storage (max. 12 months)
Derating	50 °C ¹ to 70 °C derate total output power and each output current by 2.5 % per °C
Low Temp. Start-up	–20 °C
Humidity	5 – 95 % RH non-condensing
Shock	$\pm 3 \times 30$ g shocks in each plane, total 18 shocks 30 g shock = 11 ms (± 0.5 ms), half sine conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987
Vibration	Single axis 10 – 500 Hz at 2 g (sweep and endurance at resonance) in all 3 planes
Altitude	3,000 metres operational (15,000 metres non-operational)
Pollution	Degree 2, Material group IIIb

¹ 45 °C for NV7 with input voltage below 100 Vac.

Emissions EN61000-6-3: 2001, EN60601-1-2:2001

Radiated Electric Field	EN55011, EN55022	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B (2005) see application note for details
Conducted Emissions	EN55011, EN55022	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B (2005)
Conducted Harmonics	EN61000-3-2	Class A
Flicker	EN61000-3-3	Compliant – $d_{\max}$ only

Safety Approvals

	Date	Amendments
EN60950-1	2006 ²	
UL60950-1	2003	
CSA22.2 No 60950-1	2003	
IEC60950-1*	2005 ²	
CE Mark	LV Directive 2006/95/EC (EN60950-1)	
EN61010-1	2001	
IEC61010-1*	2001	
IEC60601-1*	1988	A1: 1991, A2: 1995
EN60601-1 ¹	1990	A1: 1993, A2: 1995, A13: 1996

* CB Certificate and report available on request.

¹ Not applicable to IEC320 input version

² 2001 for NV-350

Please check with Technical Sales for status of approvals for NV-700.

Immunity EN61000-6-2: 2005, EN60601-1-2:2001

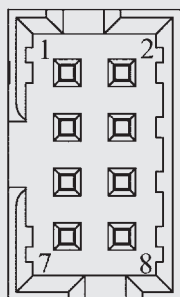
				Criteria
Electrostatic Discharge	EN 61000-4-2	Level 4	Air discharge 15 kV Contact discharge 8 kV	A
Electro-magnetic Field	EN 61000-4-3	Level 3	(12 V/m)	A
Fast / Burst Transient (ac input)	EN 61000-4-4	Level 4	(tested to 4.4 kV)	A
Fast / Burst Transient (dc output)	EN 61000-4-4	Level 4	(tested to 2.2 kV)	A
Surge Immunity	EN 61000-4-5	Level 3	Common mode 2.2 kV Differential 1.1 kV	A
Conducted RF Immunity	EN 61000-4-6	Level 3	(12 V)	A
Power Frequency Magnetic Field	EN 61000-4-8	Level 4	(30 A/m)	A
Voltage Dips, Variations, Interruptions	EN 61000-4-11	Class 3	Criteria B for 5 sec interruption	A
Voltage Fluctuations	EN 61000-4-14	Class 3	For 100 – 240 V Nominal	A



PRIMARY OPTION / DA MODULE

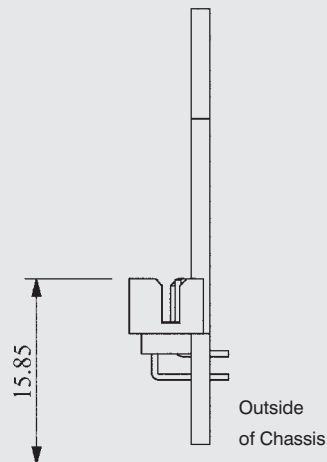
DA Module

- 1 +12 V (channel 1)
- 2 +12 V (channel 1)
- 3 +12 V (channel 1)
- 4 0 V (common ch1 / ch2)
- 5 0 V (common ch1 / ch2)
- 6 0 V (common ch1 / ch2)
- 7 -12 V (channel 2)
- 8 -12 V (channel 2)



Primary Option

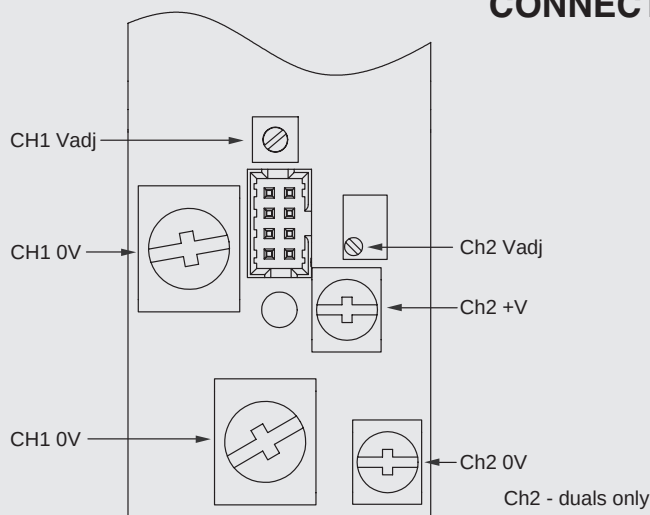
- 1 +V Standby
- 2 0 V Standby
- 3 EN/ES & IN/IS Logic 1
- 4 EN/ES & IN/IS Logic 0
- 5 Global Module Good Collector
- 6 Global Module Good Emitter
- 7 AC good Collector
- 8 ACgood Emitter



Option End View

Housing: Molex 51110-0860
Crimp pin: 50394
Hand crimp tool: 69008-0959

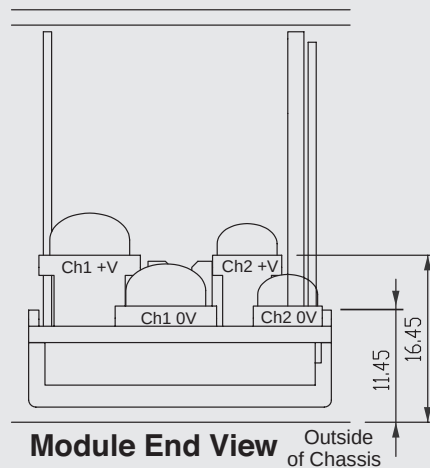
OUTPUT CONNECTIONS



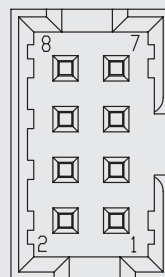
Module Top View

Connection Guidelines

Ring Tags: Up to 50 A, AMP PIDG terminals
Red: M3 36151, M4 320551, M5 130660
Blue: M3 320561, M4 320560, M5 130663
Yellow: M3 M4 320568, M5 130167
Crimp tool: 16900 Die set 169404



Module End View

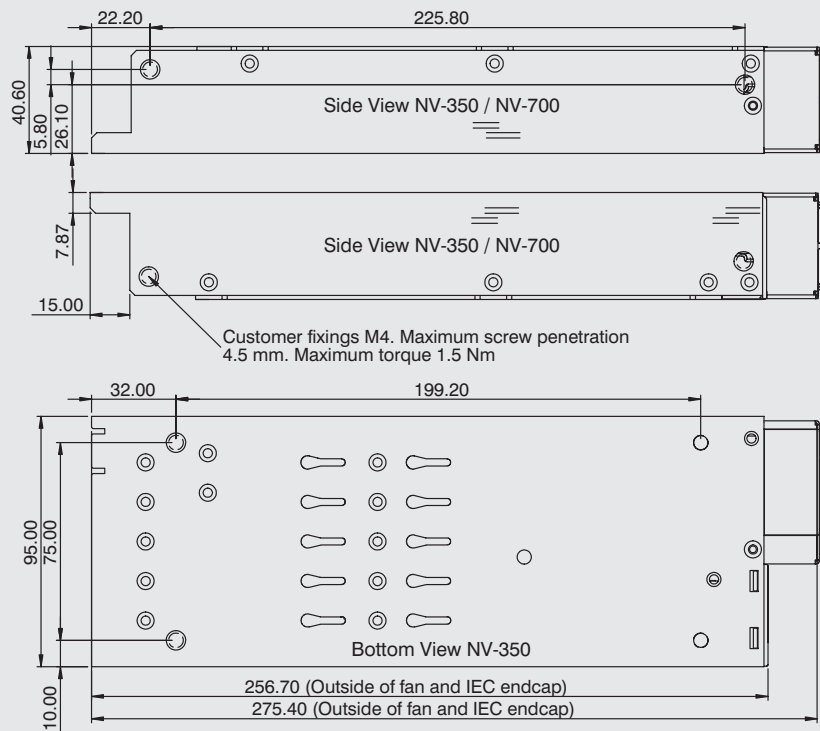


Signals

- 1 Ch2 0 V
- 2 Ch2 Output Good
- 3 Ch2 On/Off
- 4 Module Inhibit
- 5 Ch1 0 V
- 6 Ch1 Output Good
- 7 Ch1 Remote Sense -
- 8 Ch1 Remote Sense +

Housing: Molex 51110-0860
Crimp pin: 50394 Hand crimp tool: 69008-0959
Note: Do not connect pins 1 – 3 on single output modules

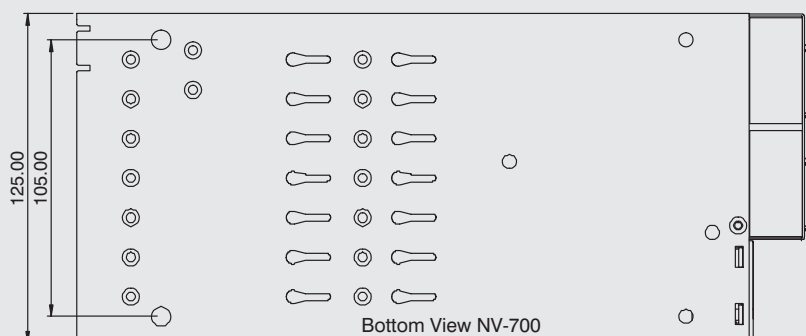
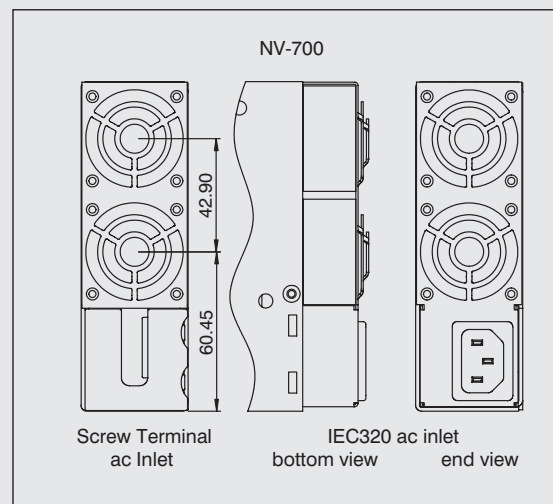
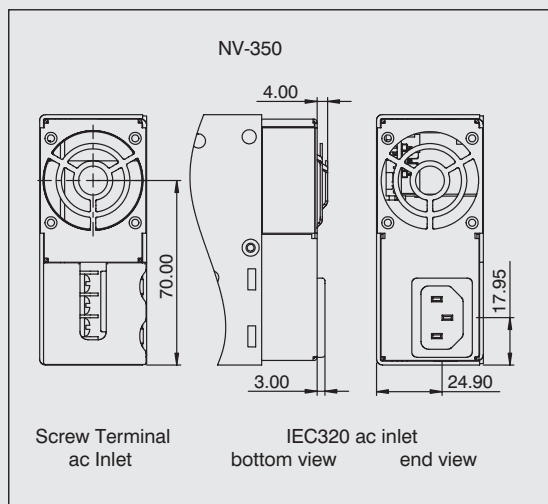
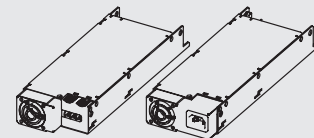
NV-POWER – 350/960 Watts



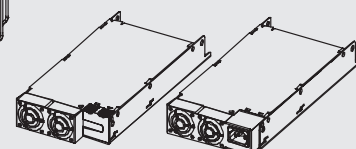
NOTES

- 1) Dimensions in mm
- 2) Tolerances:
Edge to edge/Edge to centre, ± 0.5
Centre to centre ± 0.2

NV-350 Screw Terminal NV-350 IEC Inlet



NV-700 Screw Terminal NV-700 IEC Inlet



NV-POWER – 350 Watts FEP

Features and Benefits

- Designed for distributed power
- High Efficiency
- Minimises heat in system
- Low Profile
- Fits 1U applications
- High Power Density
- Less Space
- Medical Approval
- 3 year warranty



NV-350-FEP Configuring

Output Power	NF3 350 W				
Cooling	S Standard air – forward R Reverse air C Customer air – no fan ¹				
Input Connection	S Screw I IEC320 ²				
Leakage Current	S Standard	leakage current: 130 µA max at 120 Vac (60 Hz), 260 µA max at 240 Vac (60 Hz) ³			
Primary Option	ES5V ac good, PSU enable, 5 V / 2 A standby ES12V ac good, PSU enable, 12 V / 1 A standby IS5V ac good, PSU inhibit, 5 V / 2 A standby IS12V ac good, PSU inhibit, 12 V / 1 A standby				

Diagram showing the configuration sequence: **NF3** → **S** → **S** → **S** → **ES5V**. Arrows indicate the flow from the configuration table to the final product code.

Notes

- 1 Thermocoupled sample recommended to ensure adequate cooling – consult sales
- 2 Not with customer air Cooling
- 3 Worst case leakage current is less than 300 µA at 264 Vac, 63 Hz Normal Condition (<500 µA Single fault condition)

It is possible to create your own NV-350-FEP configuration online at www.nv-power.com or by using the guide above.

1. Select required Cooling, Connection and Controls/ Signals from the table above.
2. Select output required the Module Table below.
Example – if you require 12 V 29 A: –
a) select FE module and prefix with voltage eg **12FE**

This will create a complete product description eg **NF3SSSES5V 12FE** which represents a two output NV-350-FEP with Forward air, Screw i/p terminals, 300 µA Leakage, ac good, PSU enable & 5 V/2 A aux supply
Output 1 = 12 V / 29.2 A with screw terminals
Output 2 = 12 V / 2 A with screw terminals
Max. 350 W continuous output power
3. Contact Lambda to issue a part number.

NV-POWER – 350 Watts FEP

Output Module (Type FE)

Output 1			Output 2			Total
Voltage Range	Max. Current	Max. Power	Output Voltage	Max. Current	Max. Power	Max. Output Power
11.5 – 13.2 V	29.2 A	350 W	12 V	2 A	24 W	350 W

Input

Input Voltage	90 – 264 Vac
Input Frequency	47 – 63 Hz (up to 440 Hz with reduced PFC)
Input Harmonics	EN61000-3-2 compliant
Inrush Current	< 15 A at 25 °C and 264 Vac (cold start)
Input Fuse	6.3 A / 250 Vac HBC Fast Acting (not user accessible)
Power Factor	0.97 (typical)
Leakage Current	130 µA max. at 120 Vac (60 Hz), 260 µA max. at 240 Vac (60 Hz) Worst case leakage current is less than 300 µA at 264 Vac, 63 Hz Normal Condition (<500 µA Single fault condition)

Signals – Standard

Ch1 Good	Open collector output (emitter connected to Ch1 0 V). “On” indicates output is within 90 % (±5 %) of nominal
Ch1 Remote Sense –/+	Connections for remote sense. Up to 0.5 V total line drop can be compensated. If remote sense is not required, do not connect either “Sense –” or “Sense +”

Global Interface Signals – with Primary Option

AC good collector AC good emitter	Uncommitted optocoupler. Turns on typically 5 ms after ac is good and off typically 5 ms before any channel falls below 95 % of nominal
ES & IS Logic 0	TTL low enables (ES) or inhibits (IS) the entire psu including fan (except standby)
ES & IS Logic 1	TTL high enables (ES) or inhibits (IS) the entire psu including fan (except standby)
Standby Supply	5 V / 2 A (2.5 A peak) or 12 V / 1 A (1.2 A peak)

Output

Voltage / Current	See module tables	
Turn on Time	1.5 s max.	at 90 Vac & 100 % rated output power
Rise time	<50 ms	to 90 % of voltage, monotonic rise above 10 %
Efficiency	90 %	typical
Hold up	16 ms min	at 90 Vac & 100 % rated power
Ripple & Noise	<1 %	Pk-Pk, using EIAJ test method & 20 MHz bandwidth
Voltage Accuracy	<1 %	of set voltage (± 5 % for Ch 2)
Remote Sense	Yes	Standard on single o/p + Ch1 of dual modules, max. 0.5 V total line drop
Minimum Load	No	on any output
Temperature Coefficient	<0.02 %	of rated voltage per °C
Total Regulation	1 %	Including: Load Regulation for 0 – 100 % load change and Line Regulation for 90 – 264 Vac input change 2 % fo Ch2)
Transient Response	<4 %	of set voltage for 50 % load change
Recovery	500 µs	for recovery to 1 % of set voltage
Over Voltage Protection (Ch1)	15 – 16 V	
Over Current Protection (Ch1)	110 – 150 %	of rated current, hiccup mode. Module primary side protected
Short Circuit Protection	Yes	
Over Temperature Protection	Yes	Cycle ac off / on to reset Shutdown temperature varies according to ambient, output power & input voltage



NV-POWER – 350 Watts FEP

Environment

Temperature	0 to 50 °C operational, –40 °C to 85 °C storage (max. 12 months)
Derating	50 °C to 70 °C derate each output and total output power by 2.5 % per °C
Low Temp. Start-up	–20 °C
Humidity	5 – 95 % RH non-condensing
Shock	±3 x 30 g shocks in each plane, total 18 shocks 30 g shock = 11 ms (±0.5 ms), half sine Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987
Vibration	Single axis 10 – 500 Hz at 2 g (sweep and endurance at resonance) in all 3 planes
Altitude	3,000 metres operational (15,000 metres non-operational)
Pollution	Degree 2, Material group IIIb

Safety Approvals

	Date	Amendments
EN60950-1	2006	
UL60950-1	2003	
CSA22.2 No 60950-1	2003	
IEC60950-1*	2005	
EN61010-1	2001	
IEC61010-1*	2001	
IEC60601-1*	1988	A1: 1991, A2: 1995
EN60601-1 ¹	1990	A1: 1993, A2: 1995, A13: 1996
UL60601-1	2003	with revisions 2006
CE Mark	LV Directive 2006/95/EC (EN60950-1:2001)	

* CB Certificate and report available on request.

¹ Not applicable to IEC320 input version

Emissions EN61000-6-3:2001, EN60601-1-2:2001

Radiated Electric Field	EN55011, EN55022	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B (2005) see application note for details
Conducted Emissions	EN55011, EN55022	(as per CISPR.11/22) Class B, FCC47 part 15 subpart B (2005)
Conducted Harmonics	EN61000-3-2	Class A
Flicker	EN61000-3-3	Compliant – d _{max} only

Immunity EN61000-6-2:2005, EN60601-1-2:2001

				Criteria
Electrostatic Discharge	EN 61000-4-2	Level 4	Air discharge 15 kV Contact discharge 8 kV	A
Electro- magnetic Field	EN 61000-4-3	Level 3	tested to 12 V/m	A
Fast / Burst Transient (ac Input)	EN 61000-4-4	Level 4	tested to 4.4 kV	A
Fast / Burst Transient (dc Output)	EN 61000-4-4	Level 4	tested to 2.2 kV	A
Surge Immunity	EN 61000-4-5	Level 3	Common mode to 2.2 kV Differential mode to 1.1 kV	A
Conducted RF Immunity	EN 61000-4-6	Level 3	tested to 12 V	A
Power Frequency Magnetic Field	EN 61000-4-8	Level 4	Tested to 30 A/m, 50 / 60 Hz	A
Voltage Dips, Variations, Interruptions	EN 61000-4-11	Class 3	Criteria B for 5 sec interruption	A
Voltage Fluctuations	EN 61000-4-14	Class 3	for 100 – 240 V Nominal	A

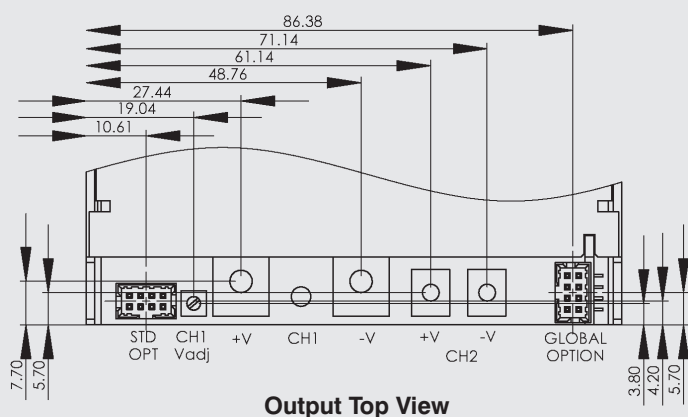
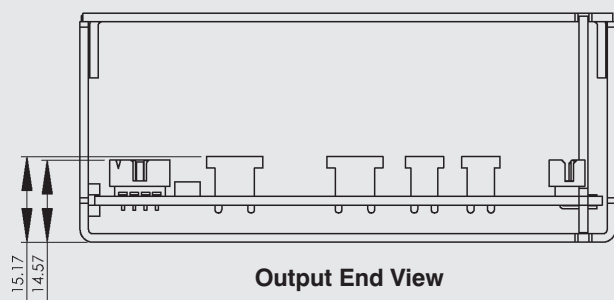
Isolation

Input to Output ²	Reinforced	4.3 kV (dc)
Input to Earth	Basic	2.3 kV (dc)
Output to Earth		200 V (dc)

² Basic for IEC/EN/UL/CSA60601-1

NV-POWER – 350 Watts FEP

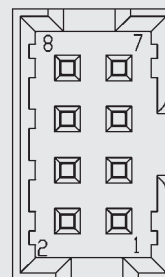
OUTPUT CONNECTIONS



Connection Guidelines

Ring Tags: Up to 50A. AMP PIDG terminals
 Red: M3 36151, M4 320551, M5 130660
 Blue: M3 320561, M4 320560, M5 130663
 Yellow: M4 320568, M5 130167
 Crimp tool: 16900 Die set 169404

Signal Connection



Housing: Molex 51110-0860
 Crimp pin: 50394
 Hand crimp tool: 69008-0959

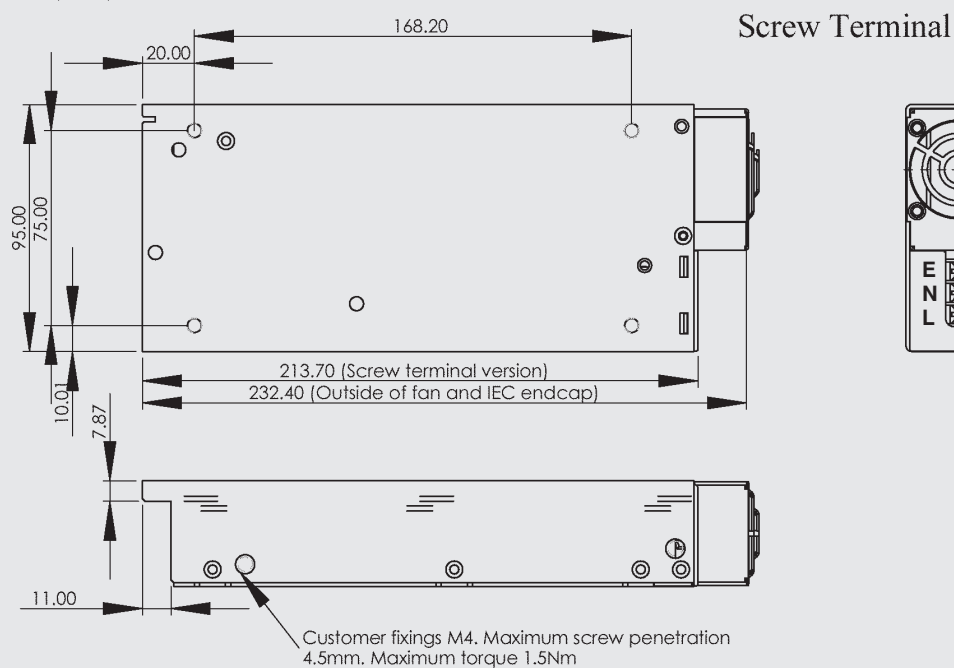
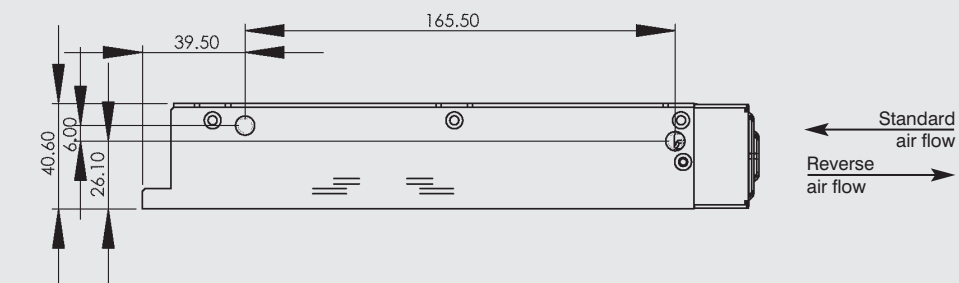
Standard Signals

- 1 Do not connect
- 2 Do not connect
- 3 Do not connect
- 4 Do not connect
- 5 Ch1 0V
- 6 Ch1 Output Good
- 7 Ch1 Remote Sense -
- 8 Ch1 Remote Sense +

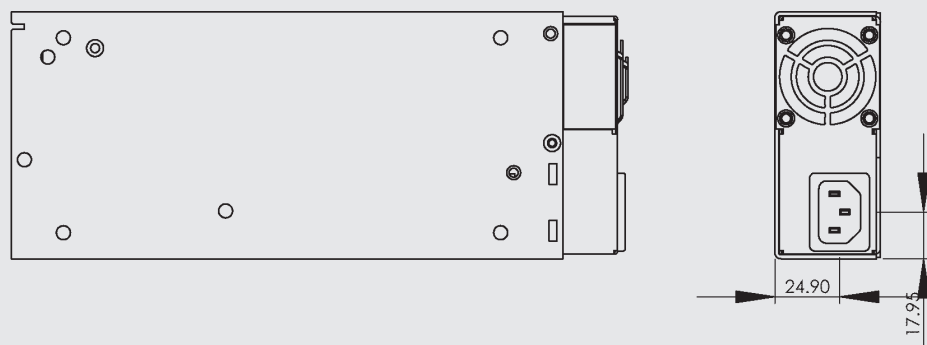
Primary Option Signals

- 1 +V Standby
- 2 0V Standby
- 3 ES & IS Logic 1
- 4 ES & IS Logic 0
- 5 Do not connect
- 6 Do not connect
- 7 AC Good Collector
- 8 AC Good Emitter

NV-POWER – 350 Watts FEP

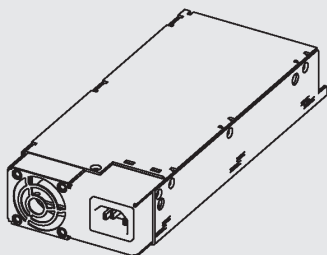
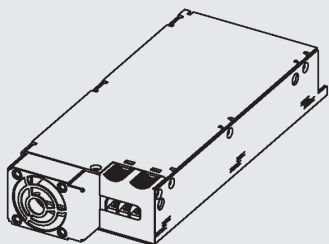


IEC Inlet



Screw terminal

IEC terminal



Notes

- 1 Tolerances
Edge to edge / Edge to centre, ± 0.5 mm
Centre to centre ± 0.2 mm

VEGA Lite – 550...750 Watts Modular

Features and Benefits

- Industry Leading Power Density
- 1 to 11 outputs
- Voltages from 1.8 to 56 V
- Current up to 60 Amps
- Screw connection
- Worldwide approvals & CB report
- Medical Approval Option



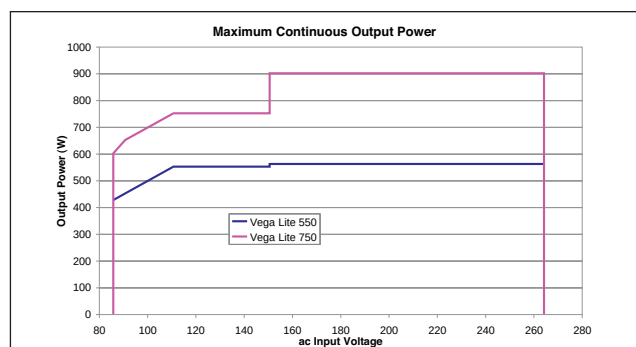
Output

Voltage / Current	See module tables	
Turn on Delay	1.5 s max.	at 90 Vac & 100 % rated output power
Rise Time	<50 ms	to 90 % of voltage, monotonic rise above 10 %
Turn on overshoot	<5 % or 250 mV	Load type dependent, no overshoot with resistive load
Efficiency	75 %	typical at 230 Vac & 100 % rated power, configuration dependent
Hold up	16 ms min	at 100 Vac & 100 % rated output power
Ripple & Noise	<1%	(or 50 mV if higher) Pk-Pk, using EIAJ test method & 20 MHz bandwidth
Voltage Accuracy	<1 %	of set voltage
Remote Sense	Yes	Standard on single output modules, max. 0.75 V total line drop. Option for twin output modules
Minimum Load	No	on any output
Temperature Coefficient	<0.02 %	of rated voltage per °C
Load Regulation	<0.5 % or 25 mV	for 0 – 100 % load change
Line Regulation	<0.1 %	for 100 – 264 Vac input change
Cross Regulation	<0.2 %	for 100 % load change on any other output
Transient Response	<6 % or 300 mV	of set voltage for 50 % load change (above 25 % load)
Recovery	500 µs	for recovery to 1 % or 100 mV of set voltage
Over Voltage Protection	120 – 130 %	of set voltage for outputs >4.1 V (Tracking OVP)
	140 – 150 %	of set voltage for outputs <4.1 V (Tracking OVP)
	120 – 150 %	of max. rated output (Fixed OVP)

Over Current Protection	105 – 125 %	of rated current, constant current characteristic
Short Circuit Protection	<150 %	of rated current, when output voltage <1 %
Over Temperature Protection	Yes	Shuts down all outputs and fan. Cycle ac off/on to reset Note 1 shutdown temp varies according to ambient, output power & input V Note 2 ac fail signal (if fitted) provides 5 ms warning of thermal shutdown

Input

Voltage Range	85 – 264 Vac
Frequency	47 – 63 Hz (440 Hz with reduced PFC – consult factory)
Inrush Current	< 40 A at 25 °C and 264 Vac (cold start)
Fuse	16 A/250 Vac High Breaking Capacity, Fast Acting (not user accessible)
Leakage Current	1.5 mA max. at 264 Vac & 63 Hz (medical version also available)
Power Factor	0.99 typical



VEGA Lite – 550...750 Watts Modular

Output Voltages (Single Modules)

Module Width (Slots)								
Output Voltage	1 Slot		1.5 Slots		2 Slots		3 Slots	
	Module	Current	Module	Current	Module	Current	Module	Current
1.8 V	1.8C1S	35 A	1.8D1LS	50 A	1.8E1S	60 A		
2 V	2C1S	35 A	2D1LS	50 A	2E1S	60 A		
3.3 V	3.3C1S	35 A	3.3D1LS	50 A	3.3E1S	60 A		
5 V	5L1S	35 A	5D1HS	50 A	5E2S	60 A		
6.5 V	6.5B2S	25 A	6.5D2S	45 A	6.5E2S	60 A		
12 V	12C3S	18 A	12D3S	24 A	12E3LS	40 A		
15 V	15C3S	18 A	15D3S	24 A	15E4S	30 A		
18 V	18C4S	14 A	18D4S	18 A	18E4S	30 A		
24 V	24C5S	10 A	24D5S	15 A	24E5HS	25 A		
28 V	28C5S	10 A	28D5S	15 A	28E5HS	25 A		
36 V	36HH5/4S	4.5 A			36BB4S	10 A		
48 V	48HH5/4S	4.5 A			48C5B4S	10 A	48DD5S	15 A

Output Voltages (Twin Modules) – all 1 Slot Width

		Channel 1					
Output Voltage		5 V / 12 A	12 V / 10 A	15 V / 10 A	18 V / 5 A	24 V / 5 A	28 V / 5 A
Channel 2	1.8 V / 8 A	5/1.8H1H/1LS					
	2 V / 8 A	5/2H1H/1LS					
	3.3 V / 8 A	5/3.3H1H/1LS					
	5 V / 8 A		12/5H3/1HS	15/5H3/1HS	18/5H5/1HS	24/5H5/1HS	28/5H5/1HS
	12 V / 6 A	5/12H1H/1LS	12/12H3/3S	15/12H3/3S	18/12H5/3S	25/12H5/3S	28/12H5/3S
	15 V / 6 A	5/15H1H/1LS	12/15H3/3S	15/15H3/3S	18/15H5/3S	25/15H5/3S	28/15H5/3S
	18 V / 4.5 A				18/18H5/4S	24/18H5/4S	28/18H5/4S
	24 V / 4.5 A				18/24H5/4S	24/24H5/4S	28/24H5/4S

Output Voltages (Single Modules)

Twin Output Modules

Module	Adjustment Range (Volts)	Amps	Slots	Module	V1 Adjust-ment Range (Volts)	Amps	V2 Adjust-ment Range (Volts)	Amps	Slots
C1S	1.8 – 3.4	35	1	H1H/1LS	3.9 – 5.1	12	1.8 – 3.8	8	1
D1LS	1.8 – 3.4	50	1.5	H1H/3S	3.9 – 5.1	12	9.1 – 16.2	6	1
E1S	1.8 – 3.4	60	2	H3/1HS	9.1 – 15.5	10	3.9 – 5.5	8	1
L1S	4.2 – 5.1	35	1	H3/3S	9.1 – 15.5	10	9.1 – 16.2	6	1
D2S	3.8 – 7.5	45	1.5	H5/1HS	16.2 – 28	5	3.9 – 5.5	8	1
D1HS	3.9 – 5.1	50	1.5	H5/3S	16.2 – 28	5	9.1 – 16.2	6	1
E2S	3.8 – 7.5	60	2	H5/4S	16.2 – 28	5	16.3 – 24	4.5	1
B2S	5 – 8	25	1						
C3S	9.1 – 15	18	1						
D3S	8 – 15	24	1.5						
E3LS	8 – 12.5	40	2						
D4S	14 – 18	18	1.5						
E4S	14 – 19	30	2						
C4S	16.2 – 18	14	1						
C5S	21.6 – 30	10	1	Options – Single Output Modules*					
D5S	21 – 28	15	1.5	N	Output Inhibit, Module Good Current Sharing				
E5HS	24 – 28	25	2						
HH5/4S	32.5 – 48	4.5	1	Options – Twin Output Modules*					
BB4S	32.6 – 40	10	2	N	Output Inhibit, Module Good, Remote Sense				
C5B4S	43 – 49	10	2	R	Remote Sense Only				
DD5S	42 – 56	15	3	* see configuring guide					

VEGA Lite – 550...750 Watts Modular

Safety Approvals

	Date	Amendments
EN60950-1	2006	
UL60950-1	2003	
CSA22.2 No 60950-1	2003	
IEC60950-1*	2005	
EN61010-1	2001	
IEC61010-1*	2001	Second Edition
IEC60601-1*	1988	A1, A2
EN60601-1 ¹	1990	A1, A2, A13
UL60601-1 ¹	2003	with revisions 2006
CE Mark	LV Directive 2006/95/EC (EN60950-1)	

* CB certificate and Report available on request.

¹ Only for "L" type leakage variants.

Check with technical Sales for status of approvals.

Isolation/Insulation

Isolation	Insulation	
Input to Output	Reinforced	4.3 kV (dc)
Input to Earth	Basic	2.3 kV (dc)
Output to Earth	Operational	200 V (dc)
Output to Output	Operational	200 V (dc)

Environment

Temperature	0 to 65 °C operational, –25 °C to 85 °C storage (max. 12 months)
Derating	50 °C to 65 °C derate each output by 2.5 % per °C
Low Temp. Start-up	–20 °C
Humidity	5 – 95 % RH non-condensing
Shock	±3 x 20 g shocks in each plane, total 18 shocks 20 g shock = 11 ms (±0.5 ms), half sine Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987 Conforms to MIL-STD-810E/F, Method 514.4, Pro I, Cat 1, 9
Vibration	Single axis 10 – 500 Hz at 2 g (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810E, Method 516.5, Pro I, IV, VI
Altitude	3,000 metres operational, (15,000 metres non-operational)
Pollution	Degree 2, Material group 3
IP Rating	IP10

Immunity BS EN61000-6-2: 2001 (Industrial Environment)*

				Criteria
Electrostatic Discharge	EN 61000-4-2	Level 4	Air discharge 15 kV Contact discharge 8 kV	A
Electro- magnetic Field	EN 61000-4-3	Level 3	10 V/m (tested to 12 V/m)	A
Fast / Burst Transient	EN 61000-4-4	Level 4	Input 4 kV Outputs 2 kV Tested at 5 kHz and 100 kHz	A
Surge Immunity	EN 61000-4-5	Level 3	Line to Line 1 kV (tested to 1.1 kV) Line to Earth 2 kV (tested to 2.2 kV)	A
Conducted RF Immunity	EN 61000-4-6	Level 3	10 V (tested to 12 V)	A
Power Frequency Magnetic Field	EN 61000-4-8	Level 4	30 A continuous	A
Voltage Dips, Variations, Interruptions	EN 61000-4-11	Class 3		A B for 5 sec. interrup- tions

* Also complies with BS EN61000-6-1: 2001.

Emissions BS EN61000-6-3: 2001 (Residential, Commercial & Light Industrial Supply)*

Radiated Electric Field	EN55022	Class B (as per CISPR.22)	See application note for details. Only for "S" type leakage versions
Conducted Emissions	EN55022	Class B (as per CISPR.22)	Only for "S" type leakage versions. "L" types meet Class A
Conducted Harmonics	EN 61000-3-2	Compliant to Class A	
Flicker	EN 61000-3-3	Compliant	

* Also complies with BS EN61000-6-4: 2001.



VEGA Lite – 550...750 Watts Modular

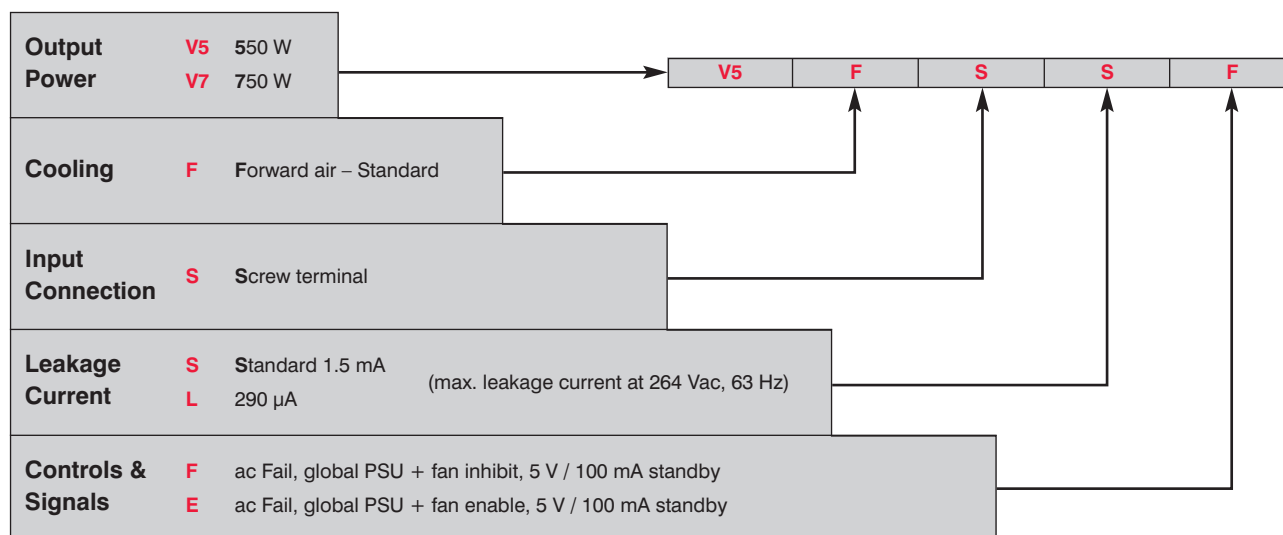
The extensive range of output modules and options make it possible to achieve all popular combinations of Volts and Amps. The “online” configurator is the best way to achieve the optimum configuration, however you can also create your own VEGA configuration from this datasheet by using the guide below.

Web Configurator

1. Visit **www.lambda-gb.com**, select “VEGA Configurator” and follow the online instructions.
2. Enter your required Volts / Amps, and any additional functions (if required)
3. Enter preferred type of cooling, input connection, lower leakage current (if required) and controls & signal functions (if required)
4. Configurator will select the most suitable modules and options and give a unique part number.

Configuring from Datasheet

1. Calculate total output power to determine VEGA 550 W (700 W at 150 Vac and above) or 750 W (900 W at 150 Vac and above) and select converter, then select required cooling, connection, leakage current and controls/signals from the following table:



2. Select Output Modules and Options from the available Output Voltages Tables.

Example – if you require 5 V / 18 A with output inhibit:

- a) select 5L1S as closest match for voltage and current
- b) add suffix N for output inhibit eg **5L1SN**
- c) repeat for other outputs

Ensure you do not select more than a total of 5 slots width of module.

This will create a complete product description eg:

V5FSSS 5L1S 12/12H3/3S 24C5S which represents a four output 550 W VEGA with Forward air, Screw input terminals, 1.5 mA Earth Leakage, ac Fail, Global Inhibit & 5 V / 100 mA aux supply.

Output 1 = 5 V / 35 A with output inhibit, Module Good and Current Share option

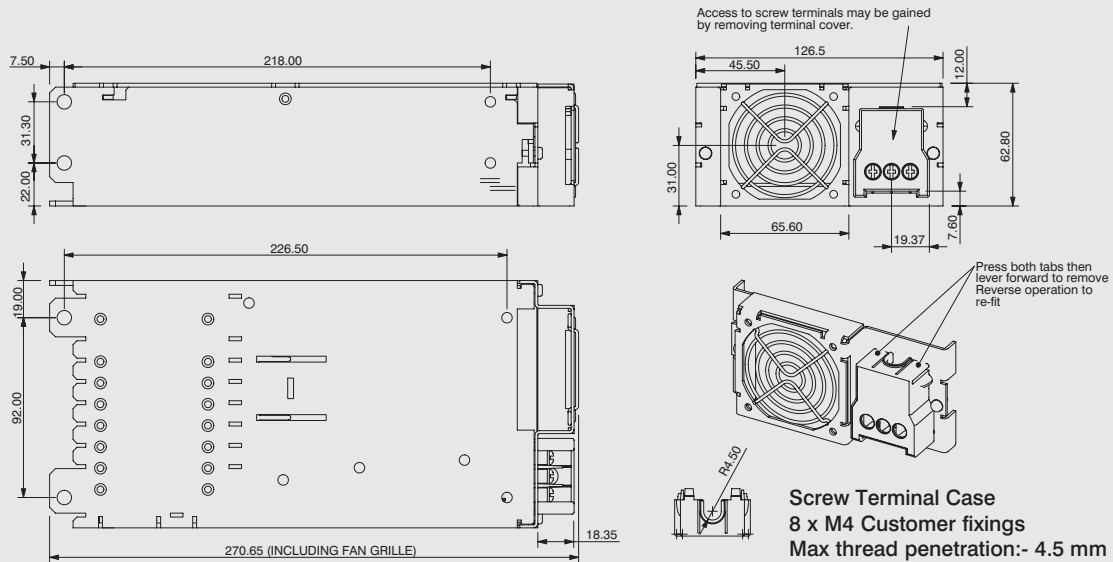
Output 2 = 12 V / 10 A

Output 3 = 12 V / 6 A

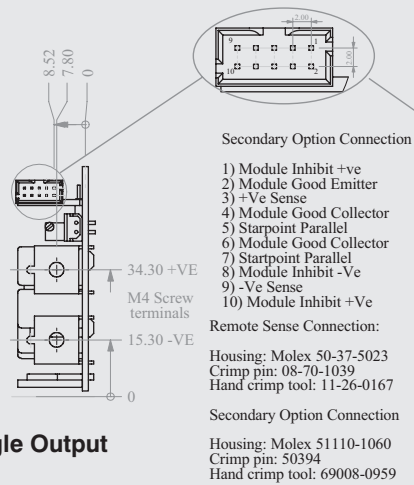
Output 4 = 24 V / 10 A

3. **Contact Lambda to validate configuration and issue a part number.**

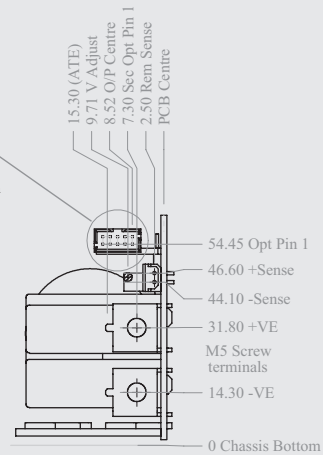
VEGA Lite – 550...750 Watts Modular



Dual Slot Single Output

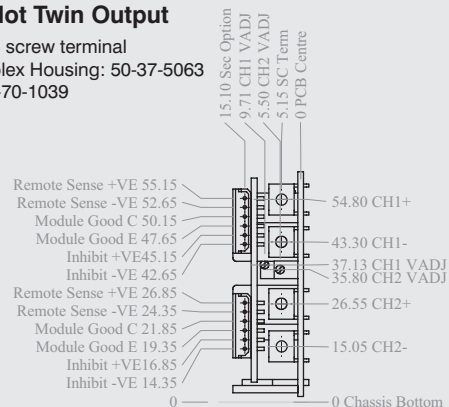


Single Slot Single Output



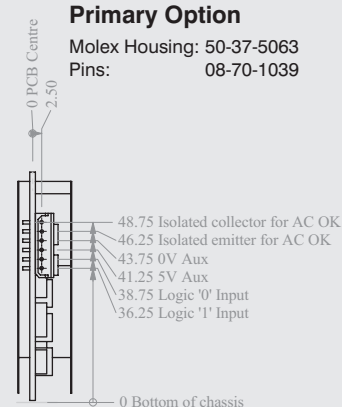
Single Slot Twin Output

Module: M3 screw terminal
Option: Molex Housing: 50-37-5063
Pins: 08-70-1039



Primary Option

Molex Housing: 50-37-5063
Pins: 08-70-1039





VEGA – 450, 650 & 900 Watts Modular

Features and Benefits

- Industry Leading Power Density
- Up to 11 outputs
- Voltages up to 62 V
- Current up to 114 Amps
- Screw, Fast-on or IEC connection
- Worldwide Approvals & CB Report
- Medical Approval Option
- 3 Year Warranty
- ac or dc Input Versions

Input

	VEGA 450, 650 and 900	VEGA dc (450 W)
Input Voltage	90 – 264 Vac & 130 – 330 Vdc 900 W version is 150 – 264 Vac only	34 – 75 Vdc Derate linearly below 44 V to 340 W at 34 V
Input Frequency	47 – 63 Hz (440 Hz with reduced PFC – consult factory)	dc only
Inrush Current	<40 A at 25 °C and 264 Vac (cold start)	<40 A at 25 °C ETSI EN300132-2
Input Fuse	16 A / 250 Vac HBC Fast Acting (not user accessible)	20 A Fast Acting (not user accessible)
Leakage Current	1.5 mA max. at 264 Vac & 63 Hz	n/a
Lower Leakage Option	see configuring guide	n/a
Power Factor	0.99 typical	n/a

Isolation/Insulation

Input to Output	Reinforced	4.3 kV (dc)
Input to Earth	Basic	2.3 kV (dc)
Output to Earth	Operational	200 V (dc)
Output to Output	Operational	200 V (dc)

Safety Approvals

	Date	Amendments
EN60950-1	2006	
UL60950-1	2003	
CSA22.2 No 60950-1	2003	
IEC60950-1*	2005	
EN61010-1	2001	
IEC61010-1*	2001	
IEC60601-1*1	1988	A1, A2
EN60601-1 ¹	1990	A1, A2, A13
UL60601-1 ¹	2003	with revisions 2006
CE Mark	LV Directive 2006/95/EC (EN60950-1)	

* CB certificate and report available on request.

¹ Only for L, R and T leakage variants. Not applicable to VEGA dc.

Emissions BS EN61000-6-3: 2001

(Residential, Commercial & Light Industrial Supply)

Radiated Electric Field	EN55022	Class B (as per CISPR.22) Class A for Vega dc	See application note for details. Only for "S" type leakage versions.
Conducted Emissions	EN55022	Class B (as per CISPR.22) Class A for Vega dc	Only for "S" type leakage versions. "M" & "L" types meet Class A.
Conducted Harmonics	EN61000-3-2	Compliant to Class A	Not applicable to Vega dc
Flicker	EN61000-3-3	Compliant	Not applicable to Vega dc

VEGA – 450, 650 & 900 Watts Modular

Output

Voltage / Current	See module output table	
Turn on Delay	1.5 s max.	at 90 Vac (150 Vac for 900 W, 48 Vdc for VEGA dc) & 100 % rated output power
Rise time	< 50 ms	to 90 % of voltage, monotonic rise above 10 %
Turn on Overshoot	< 5 % or 250 mV	Load type dependent, no overshoot with resistive load
Efficiency	75 %	typical at 230 Vac (48 Vdc for VEGA dc) & 100 % rated power, configuration dependent
Hold up	16 ms min	at 90 Vac (150 Vac for 900 W) & 100 % rated output power, 10 ms min for VEGA dc
Ripple & Noise	< 1 % or 50 mV	Pk-Pk, using EIAJ test method & 20 MHz bandwidth
Voltage Accuracy	< 1 %	of set voltage
Remote Sense	Yes	Standard on single output modules, max. 0.75 V total line drop. Option for twin output modules
Minimum Load	No	on any output
Temperature Coefficient	< 0.02 %	of rated voltage per °C
Load Regulation	< 0.5 % or 25 mV	for 0 – 100 % load change
Line Regulation	< 0.1 %	for 90 – 264 Vac input change (150 – 264 Vac for 900 W, 34 – 75 VDC for VEGA dc)
Cross Regulation	< 0.2 %	for 100 % load change on any other output
Transient Response	< 6 % or 300 mV	of set voltage for 50 % load change (above 25 % load)
Recovery	500 µs	for recovery to 1 % or 100 mV of set voltage
Over Voltage Protection	120 – 130 %	of set voltage for outputs > 4.1 V, (Tracking OVP)
	140 – 150 %	of set voltage for outputs < 4.1 V, (Tracking OVP)
	120 – 150 %	of max. rated output (Fixed OVP)
Over Current Protection	105 – 125 %	of rated current, constant current characteristic
Short Circuit Protection	< 150 %	of rated current, when output voltage < 1 %
Over Temperature Protection	Yes	Shuts down all outputs and fan. Cycle ac off/on to reset. Note 1 shutdown temp varies according to ambient, output power & input V. Note 2 ac fail signal (if fitted) provides 5 ms warning of thermal shutdown.

Environment

Temperature	0 °C to 65 °C operational, –25 to 85 °C storage (max. 12 months)
Derating	50 °C to 65 °C derate each output by 2.5 % per °C (1.5 % per °C for VEGA dc)
Low Temp. Start-up	–20 °C
Humidity	5 – 95 % RH non-condensing
Shock	±3 x 20 g shocks in each plane, total 18 shocks, 20 g shock = 11ms (±0.5 ms), half sine Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987 Conforms to MIL-STD-810E/F, Method 514.4, Pro I, Cat 1, 9
Vibration	Single axis 10 – 500 Hz at 2 g (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810E, Method 516.5, Pro I, IV, VI
Altitude	3,000 metres operational, (15,000 metres non-operational)
Pollution	Degree 2, Material group 3
IP Rating	IP10

Immunity BS EN61000-6-2:2001 (Industrial Environment)

				Criteria
Electro-static Discharge	EN 61000-4-2	Level 4	Air discharge 15 kV Contact discharge 8 kV	A
Electro-magnetic Field	EN 61000-4-3	Level 3	10 V/m (tested to 12 V/m)	A
Fast / Burst Transient	EN 61000-4-4	Level 4, Level 3 for Vega dc	Input 4 kV, (2 kV for Vega dc) Outputs 2 kV, (1 kV for Vega dc) Tested at 5 kHz and 100 kHz	A
Surge Immunity	EN 61000-4-5	Level 3, Level 2 for Vega dc	Line to Line 1 kV, tested to 1.1 kV (0.5 kV for Vega dc) Line to Earth 2 kV, tested to 2.2 kV (1 kV, tested to 1.1 kV for Vega dc)	A
Conducted RF Immunity	EN 61000-4-6	Level 3	10 V (tested to 12 V)	A
Power Frequency Magnetic Field	EN 61000-4-8	Level 4	30 A Continuous	A
Voltage Dips, Variation, Interruptions	EN 61000-4-11	Class 3 na – Vega dc	30 A Continuous	A B for 5s interruptions



VEGA – 450, 650 & 900 Watts Modular

Output Voltages

Single Output Modules

Module	Adjustment Range (Volts)	Amps	Slots
B1L	1.8 – 3.8 ^e	20	1
C1	1.8 – 4.1 ^e	35	1
C1Y	1.8 – 4.1 ^e	40	1
D1L	1.8 – 3.8 ^e	50	1.5
E1	1.8 – 3.8 ^e	60	2
F1 ^a	1.8 – 3.8	80	2
Z2	1.8 – 3.8 ^e	95	3
Z3	1.8 – 3.8 ^e	114	4
B1H	3.9 – 5.5 ^d	20	1
L1	4.2 – 5.5 ^d	35	1
D2	3.8 – 9.0 ^k	45	1.5
D1H	3.9 – 5.5 ^d	50	1.5
E2	3.8 – 8.0 ^k	60	2
Z18	4.2 – 5.5	66	2
F2 ^a	3.8 – 8.0	75	2
Z4	3.9 – 5.5 ^d	95	3
Z6	3.9 – 5.5 ^d	104	3.5
B2	5.0 – 9.0 ^f	25	1
B3	9.1 – 16.2 ^g	12	1
C3	9.1 – 16.2 ^g	18	1
D3	8.0 – 16.5 ^g	24	1.5
E3L	8.0 – 13.9 ⁱ	40	2
Z7	8.0 – 16.5 ^g	45	3
EE2	7.6 – 16.0 ^g	45	4
D4	14 – 21.5 ^j	18	1.5
E4	14 – 19.9 ^m	30	2
E3H	14 – 15	36	2
C4	16.2 – 21.5 ^j	14	1
CC3	18.2 – 32.4 ^j	18	2
E5L ^o	20 – 24	27	2
B5	21.6 – 31 ^h	6	1
C5	21.6 – 31 ^j	10	1
D5	21 – 28	15	1.5
E5H ^o	24 – 28	25	2
Z19 ^{oo}	24 – 28	36	3.5
HH5/3	25.3 – 44.2 ^b	5	1
DD4	28 – 43 ^a	18	3
EE4 ^c	28 – 38	22.5	4
HH5/4	32.5 – 53 ⁱ	4.5	1
BB4	32.6 – 43 ^q	10	2
EE5L ^{oo}	40 – 48	18	4
C5B4	43 – 48	10	2
EE5H ^o	48 – 56	18	4
CC5	48.1 – 62 ^r	10	2
DD5	42 – 56	15	3

Twin Output Modules

Module	V1 Adjustm. Range (Volts)	Amps	V2 Adjustm. Range (Volts)	Amps	Slots
H1L/1L	1.8 – 3.8 ⁿ	12	1.8 – 3.8 ⁿ	8	1
H1L/1H			3.9 – 5.5 ^d	8	1
H1L/2			5.6 – 9.0 ^f	6	1
H1L/3			9.1 – 16.2 ^u	6	1
H1L/4	3.9 – 5.5 ^d	12	16.3 – 25 ^p	4.5	1
H1H/1L			1.8 – 3.8 ⁿ	8	1
H1H/1H			3.9 – 5.5 ^d	8	1
H1H/2			5.6 – 9.0 ^f	6	1
H1H/3	5.6 – 9.0 ^f	10	9.1 – 16.2 ^u	6	1
H1H/4			16.3 – 25 ^p	4.5	1
H2/1L			1.8 – 3.8 ⁿ	8	1
H2/1H			3.9 – 5.5 ^d	8	1
H2/2	9.1 – 16.2 ^u	10	5.6 – 9.0 ^f	6	1
H2/3			9.1 – 16.2 ^u	6	1
H2/4			16.3 – 25 ^p	4.5	1
H3/1L			1.8 – 3.8 ⁿ	8	1
H3/1H	16.2 – 28	5	3.9 – 5.5 ^d	8	1
H3/2			5.6 – 9.0 ^f	6	1
H3/3			9.1 – 16.2 ^u	6	1
H3/4			16.3 – 25 ^p	4.5	1
H5/1L	16.2 – 28	5	1.8 – 3.8 ⁿ	8	1
H5/1H			3.9 – 5.5 ^d	8	1
H5/2			5.6 – 9.0 ^f	6	1
H5/3			9.1 – 16.2 ^u	6	1
H5/4			16.3 – 25 ^p	4.5	1

Wide Range Programmable Modules

Module	Voltage Range (Volts)	Amps	Slots	Select features from table below
W2 ^a	1.0 – 7.5	30	1	
W5	0.5 – 32	8.5	1	
Follow by	F or T	Fixed or TTracking Overvoltage protection		
	F or S	Fast-on or S Screw terminal		
	R or V	Resistance (0 – 32 kOhm)		
		Voltage (0 – 5 V) Programming		
		1 Inhibit, Fixed current limit		
		2 Inhibit, Programmable current limit (0 – 5 V)		
		3 Enable, Fixed current limit		
		4 Enable, Programmable current limit (0 – 5 V)		
Follow non wide range modules by F (Fast-on) or S (Screw) terminal				

a) F1, F2 and W2 modules not for Vega 900

b) 38 V max. for 900 W

c) Only available for Vega 900

d) 5.1 V max. for 900 W

e) 3.4 V max. for 900 W

f) 8 V max. for 900 W

g) 15 V max. for 900 W

h) 28 V max. for 900 W

i) 18 V max. for 900 W

j) 30 V max. for 900 W

k) 7.5 V max. for 900 W

l) 12.5 V max. for 900 W

m) 19 V max. for 900 W

n) 3.4 V max. for 900 W

o) "N" option not available

p) 24 V max. for 900 W

q) 40 V max. for 900 W

r) 60 V max. for 900 W

s) 36 V max. for 900 W

t) 52 V max. for 900 W

u) 15.5 V max. for 900 W

Options – Single Output Modules*

N Output Inhibit, Module Good, Current Sharing

Options – Twin Output Modules*

N Output Inhibit, Module Good, Remote Sense

R Remote sense only

* see configuring guide

VEGA – 450, 650 & 900 Watts Modular

The extensive range of output modules and options make it possible to achieve almost any combination of Volts and Amps. The “online” configurator is the best way to achieve the optimum configuration, however you can also create your own VEGA configuration from this datasheet by using the guide below.

Web Configurator

1. Visit **www.lambda-gb.com**, select “VEGA Configurator” and follow the online instructions.
2. Enter your required Volts / Amps, type of output connection and any additional functions (if required).
3. Enter preferred type of cooling, input connection, lower leakage current (if required) and controls & signal functions (if required).
4. Configurator will select the most suitable modules and options and give a unique part number.

Output Power	V0	450 Wdc	
	V4	450 W	
	V6	650 W	
	V9	900 W	
Cooling	F	Forward air – Standard	
	Q_d	Forward air – Quiet fan	
	R_a	Reverse air	
	P_{ad}	Reverse air – Quiet fan	
	C_b	Customer air – no fan	
Input Connection	S	Screw terminal	
	F_d	Fast-on terminal	
	I_d	IEC320 with switch	
Leakage Current	S	Standard 1.5 mA	
	M	650 μA	
	L	290 μA	
	R	175 μA	
	T	60 μA	
Controls & Signals	F	ac Fail, Global PSU + fan Inhibit, 5 V / 100 mA standby	
	FV	ac Fail, Global PSU + fan Inhibit, 5 V / 300 mA standby	
	xFW_{cd}	ac Fail, Global PSU + fan Inhibit, 5–15 V / 1 A standby	
	E	ac Fail, Global PSU + fan Enable, 5 V / 100 mA standby	
	EV	ac Fail, Global PSU + fan Enable, 5 V / 300 mA standby	
	xEW_{cd}	ac Fail, Global PSU + fan Enable, 5–15 V / 1 A standby	

Notes: a) Not available for VEGA 900. b) Thermocoupled sample recommended to ensure adequate cooling – consult sales. c) xFW and xEW options increase leakage current by 90 μ A. Replace “x” with required output voltage (5FW = 5 V aux supply). d) Not available for VEGA dc.

Configuring from Datasheet

1. Calculate total output power to determine VEGA 450 W, 650 W or 900 W and select converter, then select required Cooling, Connection, Leakage Current and Controls / Signals from the table above.
2. Select Output Modules and Options from the Output Voltages tables.
Example – if you require 5.2 V / 18 A with output inhibit:
 - a) select B1H as closest match for voltage and current and prefix with voltage (eg **5.2B1H**)
 - b) add suffix S or F for Screw or Fast-on connection (eg 5.2B1**HS**)
 - c) add suffix N for output inhibit (eg 5.2B1**HSN**)
 - d) repeat for other outputs

Ensure you do not select more than a total of 5 slots width of module. This will create a complete product description eg:

V6FSSF 5L1S 12/12H3/3S 24C5S which represents a four output 650 W VEGA with Forward air, Screw input terminals, 1.5 mA Earth Leakage, ac Fail, Global Inhibit & 5 V / 100 mA aux supply with the following outputs:

Output 1 = 5 V / 35 A with output inhibit, Module Good and Current Share option

Output 2 = 12 V / 10 A

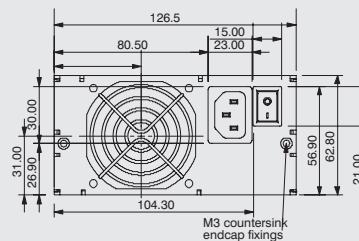
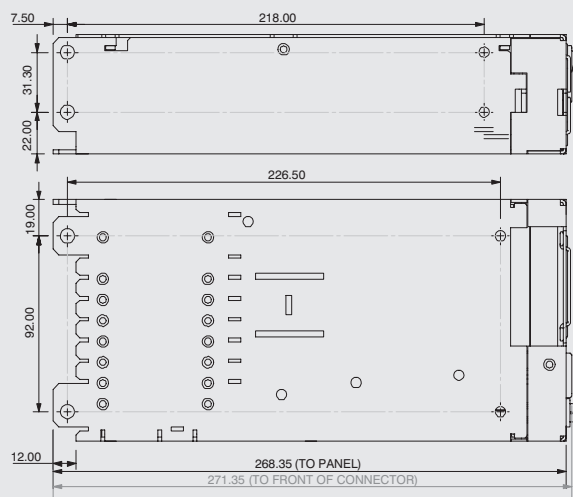
Output 3 = 12 V / 6 A

Output 4 = 24 V / 10 A

3. Contact Lambda to validate configuration and issue a part number.

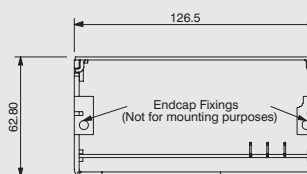
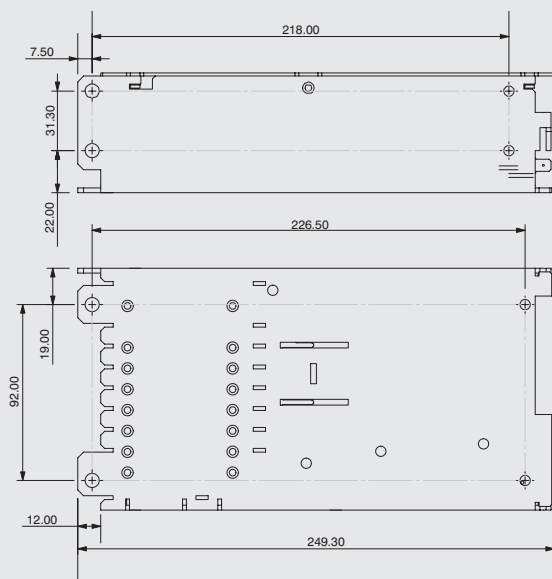


VEGA – 450, 650 & 900 Watts Modular

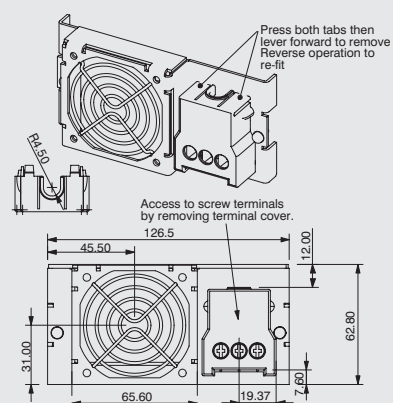
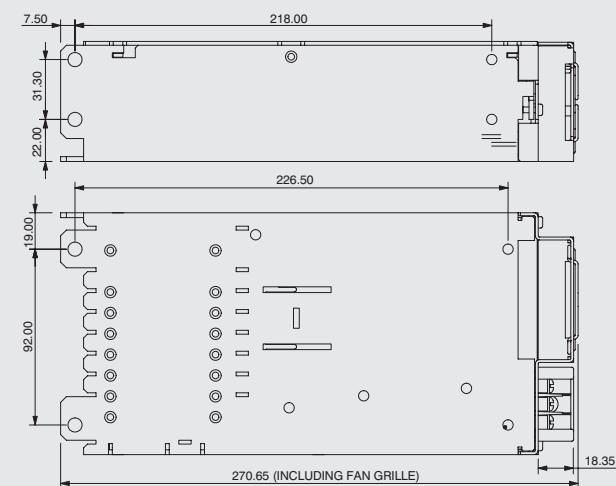


IEC-210 Connector Case

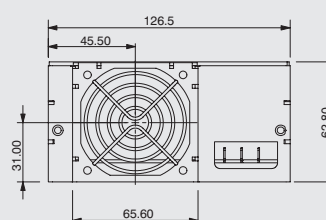
All versions have:
8 x M4 Customer fixings
Max thread penetration: 4.5 mm



Customer Air Case (no fan)



Screw & Fast-on Terminal Case



Alpha – 1000...1500 Watts

Alpha is a real “powerpack”, with our 1500 Watt model offering up to 16 different outputs, with voltages ranging from 1.8 V to 48 V. The 1000 W and 1500 W power ranges available cover a wide range of applications. Fast-On terminals ensure quick installation of Alpha into customers’ applications.

Features and Benefits

- 1 to 16 outputs
- Standard or configurable
- No minimum load
- Rapid connection
- Wide range input
- EN61000-3-2 compliant
- Class B conducted



Input

Input voltage range	Alpha 1500: 150 – 264 Vac Alpha 1000: 90 – 264 Vac
Frequency	47 to 63 Hz
Inrush current	< 50 A
Switching frequency – PFC – Forward converter	100 kHz 200 kHz
Leakage current	1.1 mA (see options for lower leakage current)
Input protection	internal fuse
Thermal protection	standard

Output

Power	1000 to 1500 W
Voltage adjustment	Multi-turn potentiometer
Line regulation	< 0.5 %
Load regulation	< 2 % < 0.5 % (sense connected)
Remote sense	single o/p modules only
Ripple and noise (value peak to peak)	2 %
Overcurrent protection	standard
Overvoltage protection	standard

General

Efficiency	75 % typically
Voltage isolation	
Input-output	3 kV RMS
Input-ground	1.5 kV RMS
Output-ground	500 Vdc

Environmental

Operating temperature	
range	0 °C to +70 °C
Derating (typ)	50 °C – 70 °C derate 2.5 % / °C
Storage temperature	–40 °C to +70 °C
EMI	Curve A – conducted
Safety approvals	CB Certificated, IEC/EN60950, UL1950 CSA 22.2 No. 950 (all models)

Standard Electrical Specification – Standard Models

Model	Max.** power	Output N° 1		Output N° 2		Output N° 3		Output N° 4		Modules
		Volts	Amp.	Volts	Amp.	Volts	Amp.	Volts	Amp.	
CA1000-5A, 12F, 12F	1000	5 V	60 A	12 V	33 A	12 V	33 A			A, F, F
CA1000-12C, 5A, 3.3R, 12F	1000	5 V	60 A	3.3 V	60 A	12 V	33 A	12 V	16 A	C, A, R, F
CA1000-24G_PP, 24G_PP	1000	24 V	40 A*							G, G

* Modules in parallel.

** Total output power must not exceed: 1000 W for Alpha 1000.

See next section for information on 1500 W models



Alpha – 1000...1500 Watts

Configured Models

To meet your requirements it is possible to configure an Alpha power supply using any of the standard Alpha models and converters. 1500 W (CA1500) models can accommodate up to 8 slots and 1000 W (CA1000) models up to 7 slots. To ensure Alpha meets your exact requirements please contact Technical Sales or visit our Website.

Module Type	A	B	C	D	E		F	G	H		J
No. of slots	2	1	1	1	1		2	2	1		2
Output voltage (pre-set)	5 V	5 V	12 V	24 V	12 V	12 V	12 V	24 V	24 V	24 V	36 V
Adjustment range	4.5–5.5 V	4.5–5.5 V	5–16 V	18–29 V	5–16 V	5–16 V	9–15.5 V	17.5–29 V	18–32 V	18–32 V	30–48 V
Output current	60 A	25 A	16 A–12 V 12 A–15 V	8 A	8 A	8 A	33 A	25 A	5 A 1 A->29 V	5 A 1 A->29 V	10 A ¹

Module Type	K	L	M	N	P		Q	R	S	T
No. of slots	2	1	1	1	1		1	2	2	2
Output voltage (pre-set)	24 V	2 V	12 V	24 V	12 V	24 V	3.3 V	3.3 V	5 V	2 V
Adjustment range	18–29 V	1.8–2.7 V	5–16 V	18–32 V	5–16 V	18–29 V	2.7–3.9 V	2.7–3.9 V	2.5–5.7 V	1.8–2.4 V
Output current	15 A	25 A	8 A	5 A 1 A->29 V	8 A	5 A	25 A	60 A	85 A	60 A

* Remote sense not available on twin output modules (E, H and P).

Note 1 Derate 0.25 V / A above 40 V.

Options

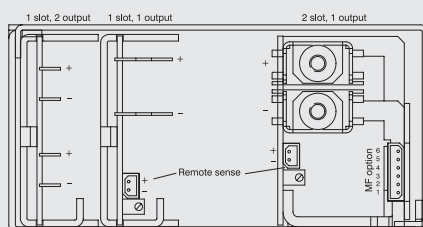
INPUT OPTIONS

MF: AC Fail, Global inhibit,
5 V / 50 mA standby supply

LOW LEAKAGE FILTER OPTIONS

ML: 500 μ A
LL: 240 μ A
RL: 100 μ A
TL: 50 μ A

MF option connector



PIN 6: Not connected
PIN 5: Inhibit (high)
PIN 4: 0 V
PIN 3: Power Fail
PIN 2: 5 V supply
PIN 1: Inhibit (low)



OUTPUT OPTIONS

IN: Output inhibit and output good signal
PP: Parallel outputs to increase current from one psu
PA: Current share and output good
(for N + 1 redundant applications)
RP: Remote program (resistance)

IN option

PIN 1: Not connected
PIN 2: Module Good
PIN 3: Inhibit
PIN 4: Not connected
PIN 5: – Power
PIN 6: – Power



PA option

PIN 1: + Sense
PIN 2: Module good
PIN 3: Star point
PIN 4: – Sense
PIN 5: – Power
PIN 6: Star point



PP option

PIN 1: + Sense
PIN 2: Not connected
PIN 3: Not connected
PIN 4: – Sense
PIN 5: Not connected
PIN 6: Not connected



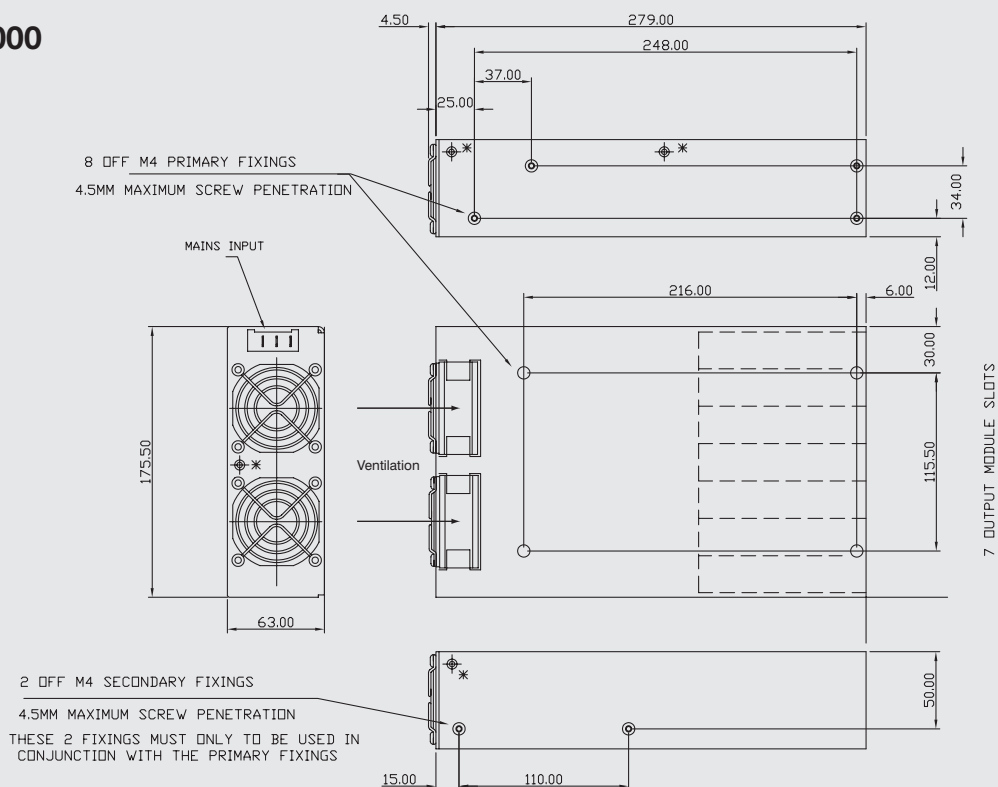
RP option

PIN 1: + Sense
PIN 2: – Sense
PIN 3: Control 2
PIN 4: Not connected
PIN 5: Control 1
PIN 6: Not connected

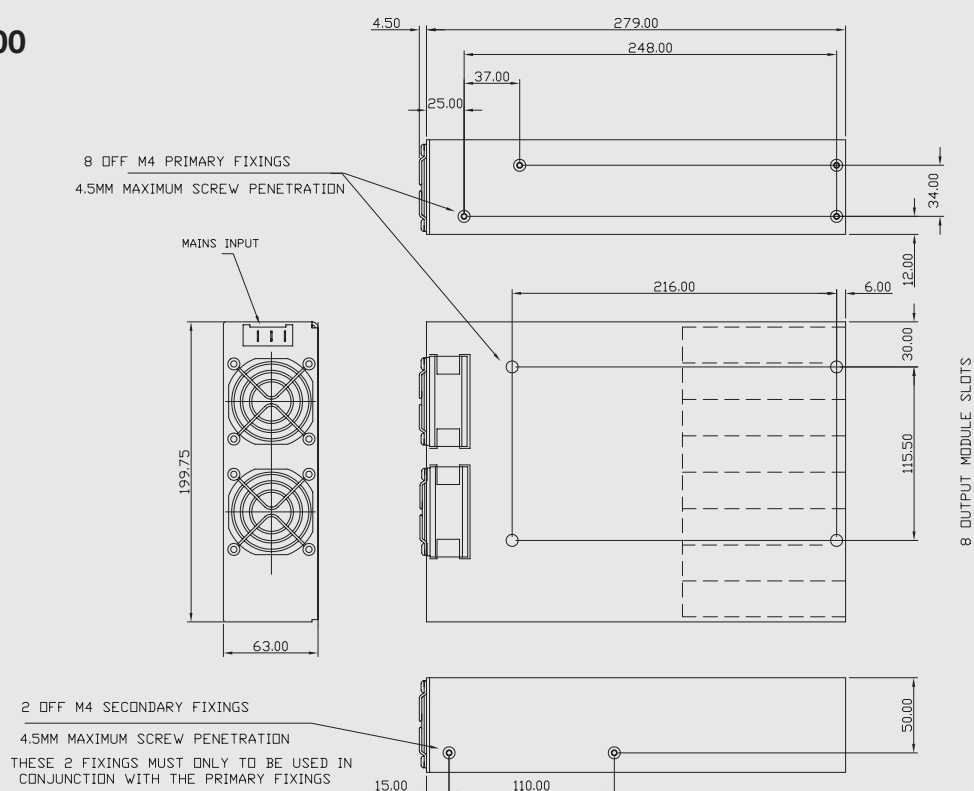


Alpha – 1000...1500 Watts

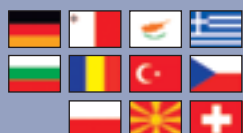
Alpha 1000



Alpha 1500



Please contact your local sales office to find the best solution to your application.



Lambda GmbH
Karl-Bold-Strasse 40
D-77855 Achern
Tel. +49 / 7841 / 666 0
Fax: +49 / 7841 / 5000
info.germany@lambda-europe.com
www.lambda-germany.com



Lambda Scandinavia
Rallarvägen 41
SE-184 40 Åkersberga
Sweden
Tel. +46 8 540 84 990
Fax: +46 8 540 66 096



Lambda GmbH
Aredstrasse 22
A-2544 Leobersdorf
Tel. +43 / 2256 / 655 84
Fax: +43 / 2256 / 645 12
info.germany@lambda-europe.com
www.lambda-austria.com



Lambda SAS
ZAC des Delaches
BP 77-Gometz-le-Chatel
F-91940 LES ULIS Cedex France
Tel. +33 / 1 60 12 71 65
Fax: +33 / 1 60 12 71 66
lambda.france@lambda-europe.com
www.lambda-f.com



Lambda UK
Kingsley Avenue
Ilfracombe
Devon EX34 8ES
United Kingdom
Tel. +44 (0)1271 856666
Fax: +44 (0)1271 864894
www.lambda-gb.com



Lambda S.r.l.
Via dei Lavoratori 128/130
IT 20092 Cinisello Balsamo (MI)
Tel. +39 / 02 61 29 38 63
Fax: +39 / 02 61 29 09 00
info.italia@lambda-europe.com
www.lambda-italy.com