# NEVO+1200M

## MEDICAL DATA SHEET

AC/DC Modular Configurable PSU

1200W
Powerful
6″ x 6″ x 1.61″
Small
1.2kg
Light

## The Ultimate 1200 Watt Configurable Solution

The NEVO+1200M is the smallest in its class and the ultimate power solution for medical applications where size, weight, low standby power and primary side inhibit are vital factors and delivers up to 1200 Watts from a 1.2kg 6″ x 6″ x 1.61″ package. Each configured unit consists of an input module with up to eight output modules, where any combination of outputs can be fitted to create a power solution with up to sixteen isolated outputs. Standard features include intelligent fan control, wide output voltage adjust capability and primary side shutdown with standby power consumption of less than 3 Watts. A low noise fan option with virtually silent operation is also available, which allows you to use this innovative power supply in even the quietest of environments. The series carries full IEC/UL60601-1 3rd edition & IEC/UL60601-1-2 4th edition safety approvals, complies with EN61000 Immunity, EN55022-B EMC Standards and features market leading specifications and design in application support.

## MAIN FEATURES

- Up to 1200 Watts of output power
- Primary side remote on/off function
- Standby power ≤ 3 Watts
- 6″ x 6″ x 1.61″ footprint
- Low noise fan option
- IEC/UL60601-1 Ed. 3 & -1-2 Ed. 4 (EMC)
- Industry leading power density (21W/in$^3$)
- Lightest modular design – only 1.2kg – 1000Watts/kg
- Efficiency up to 89%
- Remote current / voltage programming
- Accurate current sharing
- Parallel and series connection of modules
- 2 x 5V 1A bias supply
- Field configurable
- RoHS compliant
- 3 Year warranty

## APPLICATIONS

- Test & Measurement equipment
- Robotics
- Oil & Gas
- Telecommunications
- Laboratory & Analysis equipment
- Display
- Avionics
- LED lighting
- Retrofit of legacy PSUs
- Lasers

## CUSTOMER BENEFITS

- Fast time to market
- 24 hrs samples from distribution
- Safety & EMC certified
- World class engineering support
- Proven technology
- Eliminates custom design costs
- Field replaceable
- Low cost of ownership
- Technology consolidation
- Supplier consolidation

# SPECIFICATIONS

## INPUT MODULE SPECIFICATIONS

| Parameter | Details | Min | Typical | Max | Units |
|---|---|---|---|---|---|
| AC Input Voltage | Nominal range is 100$V_{RMS}$ to 240$V_{RMS}$ | 85 | | 264 | $V_{RMS}$ |
| AC Input Frequency | Contact factory for 400Hz operation. | 47 | 50/60 | 63 | Hz |
| DC Input Voltage | Not covered by safety approvals. Contact Vox Power. | 120 | | 370 | $V_{DC}$ |
| Output Power Rating | De-rate linearly from 1200Watts at 120$V_{RMS}$ to 850Watts at 85$V_{RMS}$ | | | 1200 | Watts |
| Input Current | 1200Watts output at 120$V_{RMS}$ input | | | 12 | Amps |
| Input Current Limit | Maintains power factor | | 14 | | Amps |
| Inrush Current | 265$V_{RMS}$, 25°C (cold start) | | | 40 | Amps |
| Fusing | Live line fused (5x20 Fast acting) | | | 12.5 | Amps |
| Efficiency | See graphs | | 86 | 89 | % |
| No load Power consumption | All outputs fitted and disabled/enabled | | 32/46 | | Watts |
| Standby Power | Latched off state, 120Vrms | | 2.5 | | Watts |
| Power Factor | | | 0.96 | 0.99 | |
| Holdup | 1200Watts output at 120$V_{RMS}$ input | 17 | 20 | 21 | mS |
| UVP | Turn on under voltage protection | 78 | | 84 | $V_{RMS}$ |
| Over temperature | Internally monitored. | 115 | | 125 | °C |
| Reliability [1] | Input module | | | 1.62 | FPMH |
| | Fan (2 Fans per unit) | | | 2.7 | FPMH |
| Warranty | Standard terms and conditions apply | | | 3 | Years |
| Size | 154.5 (L) x 152.4 (W) x 41.0 (H). See diagram for tolerance details | | | | mm |
| Weight | 720 + 60 per output module | | | | Grams |
| Note 1. | 30˚C base & ambient, 100% load, SR332 Issue 2 Method I, Case 3, Ground, Fixed, Controlled | | | | |

## GLOBAL SIGNALS SPECIFICATIONS

| Parameter | Details | Min | Typical | Max | Units |
|---|---|---|---|---|---|
| Bias Voltage | Two isolated Bias Outputs available | 4.8 | 5 | 5.2 | Volts |
| Bias Current | Hiccup type current limit | 0 | | 1 | Amps |
| AC_OK Voltage | Low output level/High output level | 0/3.5 | 0.2/4.5 | 1/5.2 | Volts |
| AC_OK Current | | -10 | | 20 | mA |
| Power Good Voltage | PNP open collector with internal 10kΩ pull down. Low output level/High output level | 0/8 | 0/10 | 0/15 | Volts |
| Power Good Current | Open collector output. Current source only. All Slots. | | | 20 | mA |
| Global Inhibit Voltage | Low input level/High input level. | 0/3 | | 1/15 | Volts |
| Global Inhibit Current | 5k input impedance. | 0.6 | | 3 | mA |
| Inhibit Voltage | Low input level/High input level. All slots. | 0/2.5 | | 1/15 | Volts |
| Inhibit Current | 10k input impedance. All slots. | 0.25 | | 1.5 | mA |
| Primary Bias voltage | Medically Isolated | 4.8 | 5 | 5.2 | Volts |
| Primary Bias current | Hiccup type current limit | | | 0.5 | Amps |
| Primary Remote On/Off | Negative Edge Triggered, Refer to User Manual | | 5 | | Volts |

## OUTPUT MODULE SPECIFICATION SUMMARY

| MODEL | Output Voltage | | | Output Current | Rated Power | Peak Power | Load Reg. | Line Reg. | Cross Reg. | Ripple & Noise | FPMH [1] | Feature Set [2] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min. | **Nom.** | Max. | | | | | | | | | |
| OP1 | 1.5V | **5V** | 7.5V | 25A | 125W | 187.5W | ±50mV | ±5mV | ±10mV | 50m$V_{PP}$ | 0.5 | ABCDEFG |
| OP2 | 4.5V | **12V** | 15V | 15A | 150W | 225W | ±100mV | ±12mV | ±24mV | 120m$V_{PP}$ | 0.5 | ABCDEFG |
| OP3 | 9V | **24V** | 30V | 7.5A | 150W | 225W | ±150mV | ±24mV | ±48mV | 240m$V_{PP}$ | 0.5 | ABCDEFG |
| OP4 | 18V | **48V** | 58V | 3.75A | 150W | 217.5W | ±300mV | ±48mV | ±96mV | 480m$V_{PP}$ | 0.5 | ABCDEFG |
| OP5 | 3.3V | **12V** | 15V | 5A | 2x 75W | 2x 75W | ±50mV | ±12mV | ±24mV | 240m$V_{PP}$ | 0.75 | AFG |
| OP8 | 23.2V | **24V** | 24.7V | 3.125A | 2x 75W | 2x 75W | ±100mV | ±24mV | ±48mV | 480m$V_{PP}$ | 0.75 | AFG |
| OPA2 | 4.5V | **12V** | 15V | 25A | 300W | 375W | ±100mV | ±12mV | ±24mV | 120m$V_{PP}$ | 0.5 | ABCDEFGH |
| OPA3 | 9V | **24V** | 30V | 15A | 300W | 450W | ±150mV | ±24mV | ±48mV | 240m$V_{PP}$ | 0.5 | ABCDEFGH |

Note 1. Output module, 30˚C base, 100% load, SR332 issue 2 Method I, Case 3, Ground, Fixed, Controlled

Note 2. A = Remote Sense, B = External Voltage control, C = External constant current control, D = Current output signal, E = Current share, F =Over Voltage protection, G = Over temperature protection, H = Dual Slot module

## SAFETY SPECIFICATIONS

| Parameter | Details | Max | Units |
|---|---|---|---|
| Isolation Voltages | Input to Output (2 MOPP). Do not perform test on assembled unit[1] | 4000 | $V_{AC}$ |
| | Input to Chassis (1 MOPP) | 1500 | $V_{AC}$ |
| | Global signals (J2) to Output/Chassis | 250 | $V_{DC}$ |
| | Output to Output/Chassis (Standard modules) | 250 | $V_{DC}$ |
| Earth Leakage Current | Normal condition, 264Vac, 63Hz, 25°C | 300 | uA |
| Touch Leakage Current | Standard modules NC/SFC | 20/200 | uA |
| Patient Leakage Current | Standard modules 264Vac, 63Hz, 25°C NC/SFC[2] | ----- | uA |

Note 1. Testing an assembled unit to 4000$V_{AC}$ may cause damage. Please refer to application note (APN-002) on Vox Power website or contact Vox Power representative.
Note 2. Not Applicable

## INSTALLATION SPECIFICATIONS

| Parameter | Details | Parameter | Details |
|---|---|---|---|
| Equipment class | I | Flammability Rating | 94V-2 |
| Overvoltage category | II | Ingress protection rating | IP10 |
| Material Group | IIIb (indoor use only) | ROHS compliance | 2011/65/EU |
| Pollution degree | 2 | Intended usage environment | Home Healthcare |

## ENVIRONMENTAL SPECIFICATIONS

| Parameter | Details | Non-Operational | | Operational | | Units |
|---|---|---|---|---|---|---|
| | | Min | Max | Min | Max | |
| Air Temperature | Operational limits subject to appropriate de-ratings | -40 | +85 | -20 | 70 | °C |
| Humidity | Relative, non-condensing | 5 | 95 | 5 | 95 | % |
| Altitude | | -200 | 5000 | -200 | 3000 | m |
| Air Pressure | | 52 | 106 | 69 | 106 | kPa |
| Noise Level | Variable. Measured 1m from fan intake. | - | - | 42 | 61 | dBA |
| Shock | 3000 bumps at 10G (16ms) half sine wave | | | | | |
| Vibration | 1.5G 10 to 200Hz sine wave, 20G for 15min in 3 axes random vibration | | | | | |

## ELECTROMAGNETIC COMPLIANCE – EMISSIONS

| Phenomenon | Basic EMC Standard | Test Details |
|---|---|---|
| Radiated emissions, electric field | EN55011/22, FCC | Class A compliant (See note for Class B) |
| Conducted emissions | EN55011/22, FCC part 15, CISPR 22/11 | Class B compliant |
| Harmonic Distortion | IEC61000-3-2 | Compliant |
| Flicker & Fluctuation | IEC61000-3-3 | Compliant |

Note: To meet Class B radiated emissions the end user should add ferrites to I/P and O/P cables. Consult Vox Power for details.

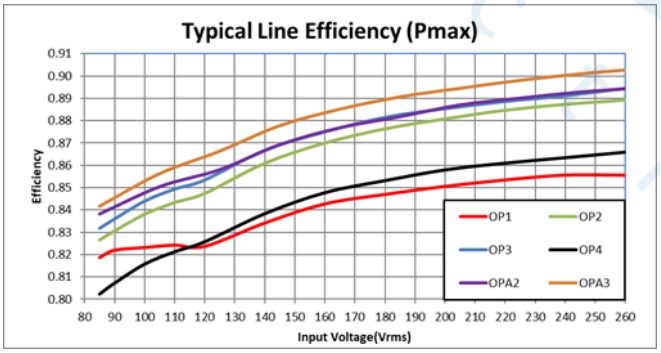
## ELECTROMAGNETIC COMPLIANCE – IMMUNITY

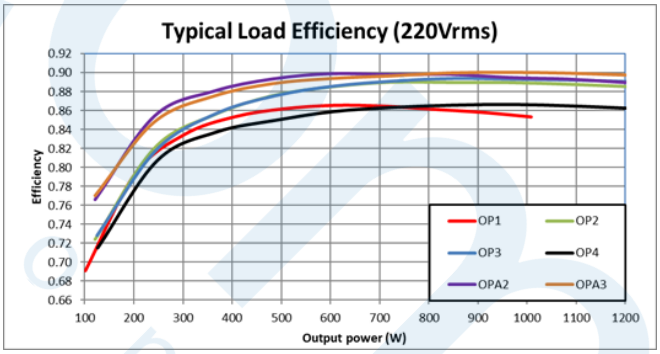
| Phenomenon | Basic EMC Standard | Test Details |
|---|---|---|
| Electrostatic discharge | IEC61000-4-2 | Test level 4: 15kV air, 8kV contact |
| Radiated RF EM fields | IEC61000-4-3 | Test Level 3: (10V/m, 80MHz-2.7GHz) sine wave AM 80% 1kHz |
| Proximity fields from RF wireless communications equipment | IEC61000-4-3 | Test levels as per IEC60601-1-2:2014 Table 9 |
| Electrical Fast Transients/bursts | IEC61000-4-4 | Test Level 3: (2kV Power, 1kV I/O) 5kHz(ed3) & 100kHz(ed4) |
| Surges | IEC61000-4-5 | Test Level 3: 1kV L-N, 2kV L-E |
| Conducted disturbances induced by RF fields | IEC61000-4-6 | Test Level 3: 10V, 0.15 to 80Mhz sine wave AM 80% 1kHz |
| Power Frequency Magnetic Fields | IEC61000-4-8 | Test level 4: 30A/m 50Hz |
| Voltage Dips | IEC61000-4-11& SEMI-F47-0706 [2] | 0% 10ms, 0% 20ms, 80% 1s, 80% 10s, 90% continuous (Criterion A)<br>70% 0.5s, 40% 0.2s (Criterion A at 240V and Criterion B at 100V) |
| Voltage interruptions | IEC61000-4-11 | 0% 250/300 cycle as per IEC60601-1-2:2014 (Criterion B) |

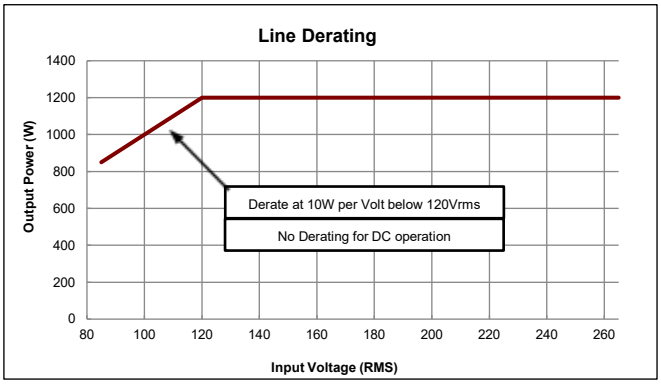
Notes: 1. Criterion A = No degradation of performance or loss of function.
Criterion B = Temporary degradation of performance or loss of function is allowed, provided the function is self-recoverable.
Criterion C = Temporary loss of function is allowed but requires operator intervention to recover.
2. Tested at nominal range (100V to 240V). Line deratings applied where appropriate.

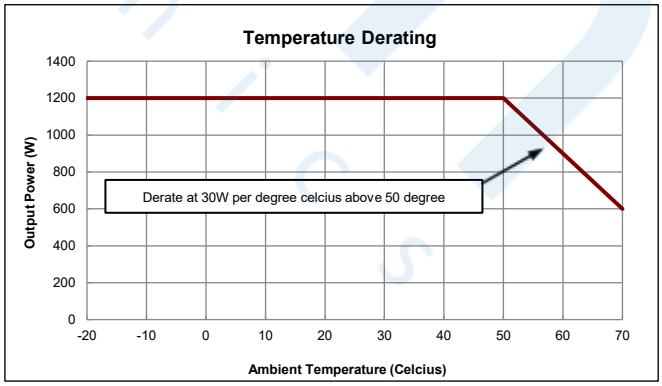
## AGENCY APPROVALS

| Standard | Details | File |
|---|---|---|
| IEC 60601-1:2005 + CORR1 2006 + CORR2: 2007 + A1:2012 | Medical electrical equipment Part 1: General requirements for basic safety and essential performance | UL: E316486 |
| EN60601-1:2006 + A11:2011 + A1:2013 + A12:2014 | Medical electrical equipment Part 1: General requirements for basic safety and essential performance | |
| CAN/CSA-C22.2 No. 60601-1 (2008) | Medical Electrical Equipment Part 1: General Requirements for Basic Safety and Essential Performance | |
| ANSI/AAMI ES60601-1 (2005 + C1:09 + A2:10) | Medical Electrical Equipment Part 1: General Requirements for Basic Safety and Essential Performance | |
| CE MARK | LVD 2014/35/EU, EMC 2014/30/EU | |
| CB certificate and report available on request | | |

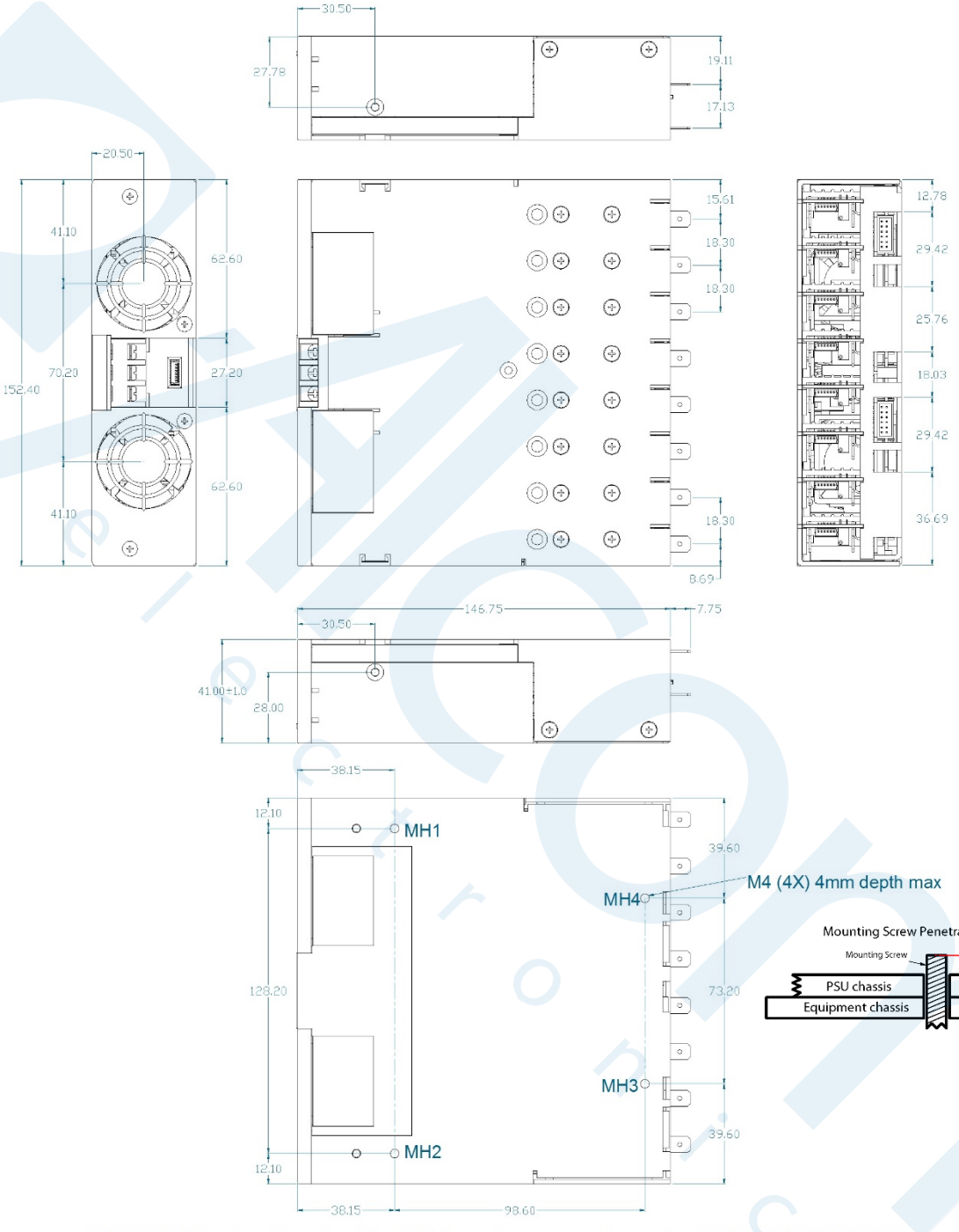


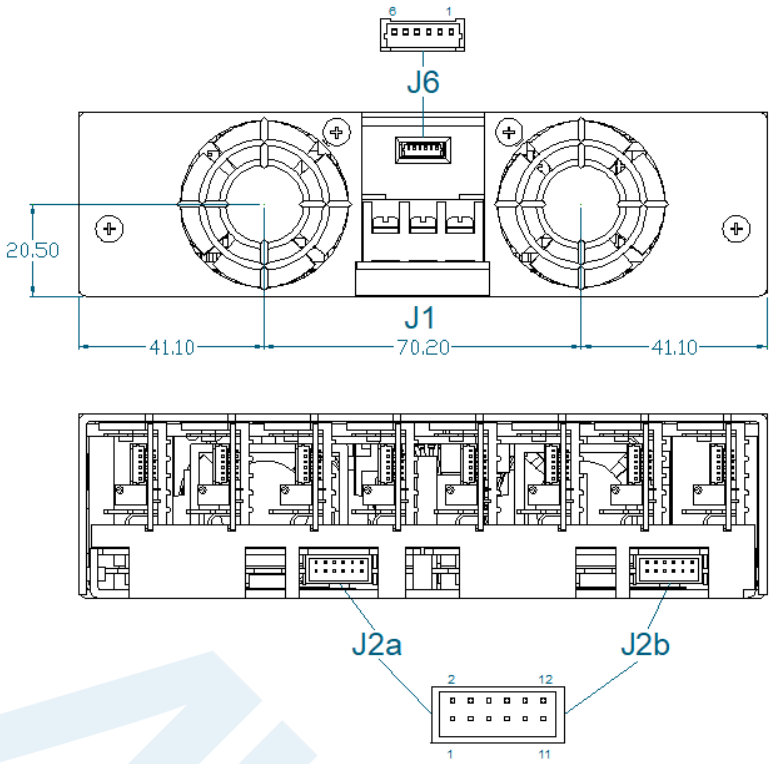
| MECHANICAL DIMENSIONS AND MOUNTING | | | |
|---|---|---|---|
| SCREWS | | | |
| LOCATION | DETAILS | PENETRATION | TIGHTENING |
| MOUNTING | M4 | 4mm max, including chassis | 0.5 NM |
| OUTPUT MODULES | M3 x 5, Countersink Posi, 16 Places | Defined by screw | 0.5 NM |
| CHASSIS LID AND FACEPLATE | M3 x 5, Countersink Posi, 9 Places<br>M3 x 30, Countersink Posi, 2 Places | Defined by screw | 0.5 NM |
| Torque settings are for general reference only. The torque settings shown are the insert manufacturers recommended values. | | | |




TOLERANCES unless otherwise stated - All dimensions in mm and according to DIN 2768-1/-2 CLASS C

## CONNECTORS

| PINOUTS | | |
|---|---|---|
| J1 | | |
| Circuit | Details | |
| 1 | Live | |
| 2 | Earth | |
| 3 | Neutral | |
| J2a/b | | |
| Circuit | Details | |
| 1 | Power Good | Slot A and E |
| 2 | Inhibit | |
| 3 | Power Good | Slot B and F |
| 4 | Inhibit | |
| 5 | Power Good | Slot C and G |
| 6 | Inhibit | |
| 7 | Power Good | Slot D and H |
| 8 | Inhibit | |
| 9 | Global Inhibit | |
| 10 | AC OK | |
| 11 | +5V 1A Bias Supply | |
| 12 | COM | |
| J6 | | |
| 1 | Common | |
| 2 | +5V 500mA Bias | |
| 3 | Shut Down | |
| 4 | Reserved | |
| 5 | Reserved | |
| 6 | Reserved | |




| REF. | DETAILS | MANUFACTURER | HOUSING | TERMINAL |
|---|---|---|---|---|
| J1 | MAINS INPUT: 3 Pin, Barrier, 6-32 Steel Screws, 0.8 NM or 7IN LB Torque Cable 14-18AWG, 300V, 16A, 105°C, use appropriately rated fork or ring terminal. | MOLEX | | |
| J2a/b | GLOBAL SIGNALS: 12 Pin, 2mm, without Friction Lock, 24-30 AWG | MOLEX | 511101251 | 503948051 |
| J6 | INPUT BIAS: OUTPUT SIGNALS: 6 Pin, 1.25mm, with Friction lock, 28-32 AWG | MOLEX | 510210600 | 500588000 |

Notes
1. Direct equivalents may be used for any connector parts.
2. All cables must be rated 105°C min, equivalent to UL1015

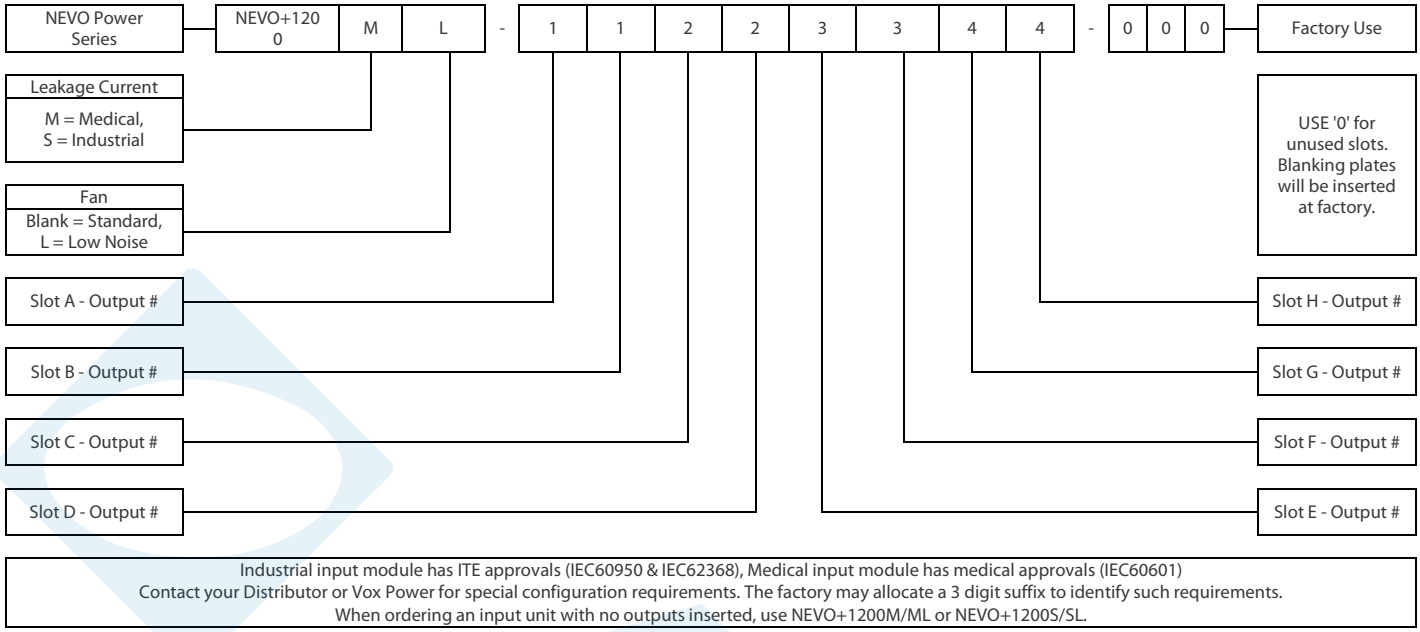
## SINGLE OUTPUT MODULE CONNECTORS

| PINOUTS | |
|---|---|
| J3 | |
| Circuit | Details |
| 1 | Positive output |
| J4 | |
| Circuit | Details |
| 1 | Negative output |
| J5 | |
| Circuit | Details |
| 1 | -Sense |
| 2 | +Sense |
| 3 | Voltage control |
| 4 | Current control / share / out |
| 5 | COM |
| 6 | +5V local bias supply |


| REF. | DETAILS | MANUFACTURER | HOUSING | TERMINAL |
|---|---|---|---|---|
| J1 | MAINS INPUT: 3 Pin, 5.08mm, with Friction Lock, 18-24 AWG | MOLEX | 10013036 | 0008701031 |
| J2 | GLOBAL SIGNALS: 12 Pin, 2mm, without Friction Lock, 24-30 AWG | MOLEX | 511101251 | 0503948051 |
| J3/4(1) | OUTPUT POWER TERMINAL: TAB SIZE 6.35mmx0.8mm | VARIOUS | | VARIOUS |
| J5 | OUTPUT SIGNALS: 6 Pin, 1.25mm, with Friction lock, 28-32 AWG | MOLEX | 0510210600 | 0500588000 |

Notes
1. Terminal and wire current rating must exceed maximum short circuit output current. Eg. Output 1 = 25A*1.25 = 31.25Amps
2. Direct equivalents may be used for any connector parts
3. All cables must be rated 105°C min, equivalent to UL1015

## PART NUMBERS AND ORDERING INFORMATION




Industrial input module has ITE approvals (IEC60950 & IEC62368), Medical input module has medical approvals (IEC60601)
Contact your Distributor or Vox Power for special configuration requirements. The factory may allocate a 3 digit suffix to identify such requirements.
When ordering an input unit with no outputs inserted, use NEVO+1200M/ML or NEVO+1200S/SL.