

XL Power Supply

General Description

The XL-PSU module is a 250W, power factor corrected, switched mode power supply for use with XL stepper drives. Designed for direct operation from world-wide single phase AC input voltages, the supply is capable of powering up to six drives without the need for an EMC mains input filter*. The use of the XL-PSU offers the following benefits:

- Auto-adapts to supplies between 95 and 264V AC
- No EMC filter*
- Less cabinet space
- Built-in +24V DC supply

*For drives with up to 30 metre motor leads.

Physical Appearance

Housed in a slim, 50mm-wide metal case, the XL-PSU is shown in Figure A-1. This form of case matches the appearance of the XL drives and has the same height and depth.

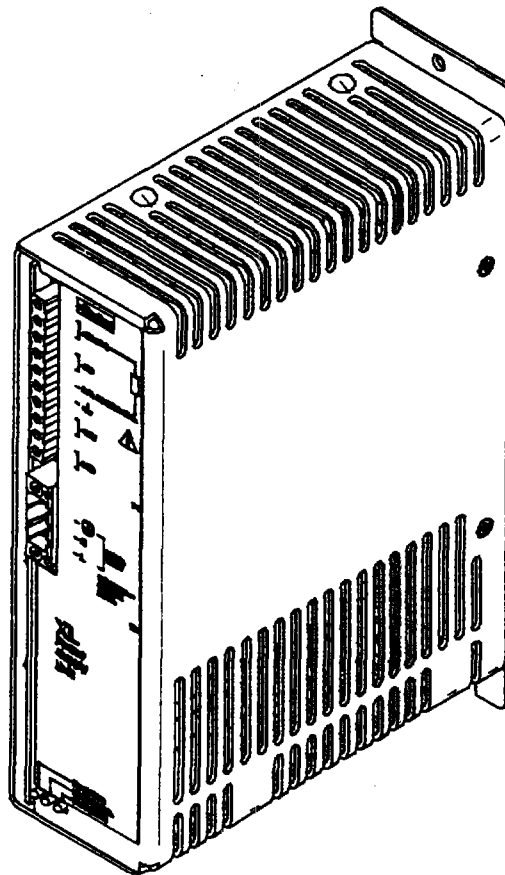


Figure A-1. XL-PSU Switched Mode Power Supply

Dimensions

The overall dimensions of the supply are 130mm deep (without connectors fitted), 50mm wide and 195mm high. Refer to Figure A-2 for details.

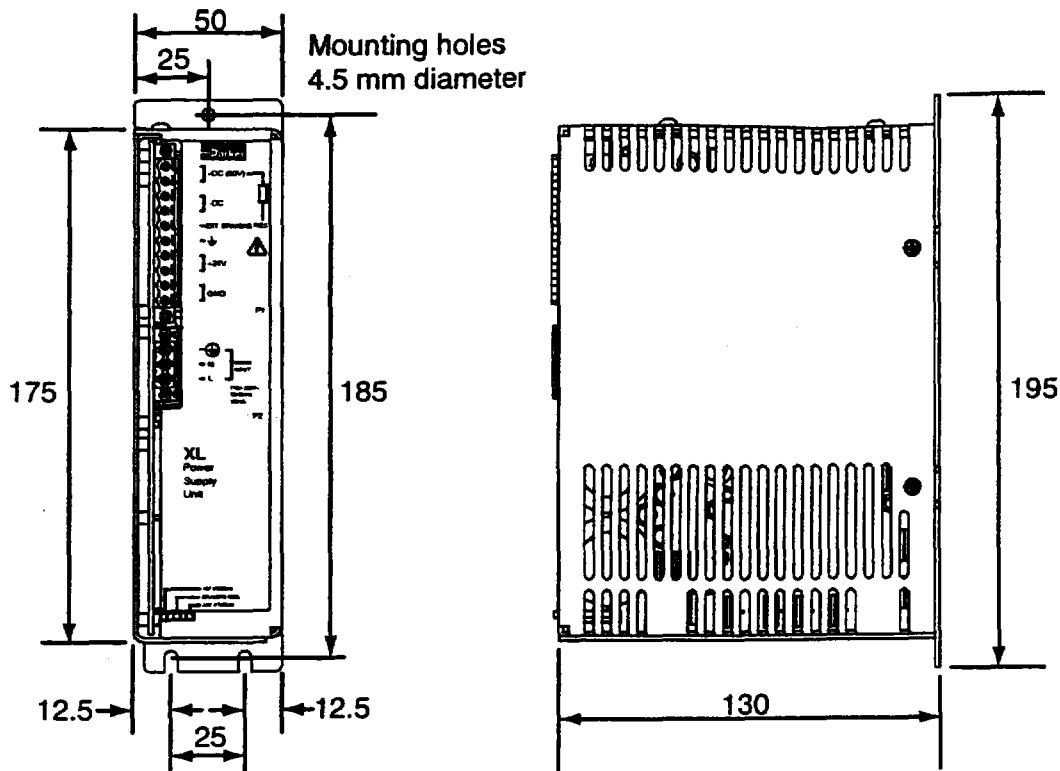


Figure A-2. Supply Dimensions

Mounting Information

The supply should be mounted vertically, near the drives it will supply. Both the top 4.5mm diameter fixing hole and the bottom two 4.5mm width fixing slots should be used.

The supply should be mounted with a minimum free space of 50mm both below and above its case. A side clearance of 10mm free space on both sides should be allowed.

Note, the supply must not be mounted above or close to other products which generate a significant amount of heat by radiation or convection.

AC Supply Connections

Input AC supplies need to be connected to the 3-way mains input connector P2. Use approved mains cable, with a minimum wire size of 0.75mm². The supplied mating connector is a Phoenix Contact, having the name MSTB 2,5/3-STF-5,08 and order number 1777992.

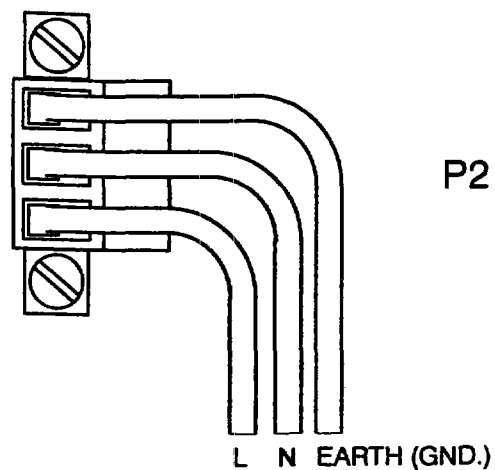


Figure A-3. P2 Power In Socket Wiring

Output Connections

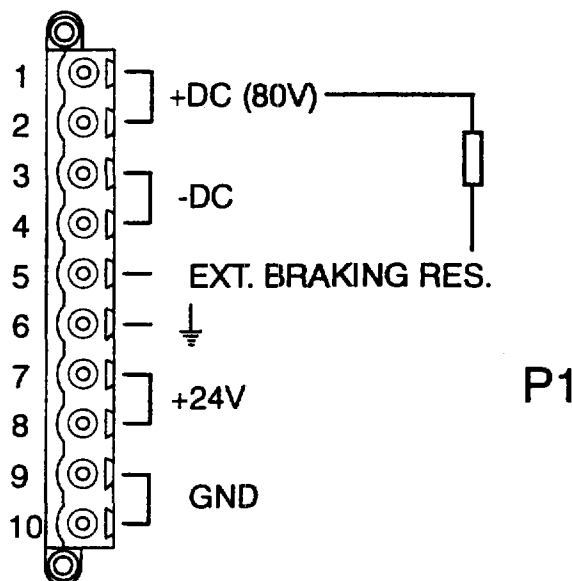


Figure A-4. P1 Output Power Connector

Power out (+80V) is taken from pins 1 and 2 (use 32/02 1 mm² cable), the return connection being pins 3 and 4. +24V is available on pins 7 and 8 with the return connection being made to the GND pins 9 and 10. The earth pin 6 is internally connected to the -DC pins 3 and 4. The supplied mating connector is a Phoenix Contact, having the name IC 2,5/10-STF-5,08 and order number 1825394.

No connection exists between the earth pin 6 and the GND pins 9 and 10

Note: A kit of five connecting links is available, called 'XL-connect'. You will need one kit for every drive connected to the XL-PSU.

Power Dump/Braking Resistor Considerations

The XL power supply incorporates a regenerative power dumping circuit which may be used to divert regenerated power into a dump or brake resistor. The need for such a circuit should ideally be determined during system design, but the calculations are repeated here for reference.

Calculating the Need for a Braking Resistor

For one drive axis a dump resistor will be required if the deceleration time in seconds is less than $(J\omega^2 - 0.2)$, where J is the total inertia in kg.m^2 and ω is the maximum speed in revs/sec. In a multi-axis system where a number of axes are decelerating at the same time, a given axis will not pump the HV up, provided that the deceleration time on that individual axis is greater than $J_1\omega_1^2$, where J_1 is the inertial of axis 1 and ω_1 is the angular speed of axis 1. Generally, other operating axes will absorb power from the supply and will add greater capacitive loading and will therefore reduce the need for power dumping. If it is known that certain conditions will cause several axes to decelerate together (say axes 3 & 4), then check that the $J\omega^2$ value minus the deceleration time for each axis (both 3 & 4), added together, do not give a result that is greater than 0.2. If they do, a dump resistor is likely to be required.

External Braking Resistor Installation

If required, an external braking resistor may be fitted between pins 1 and 2 of P1 and pin 5 of P1, as shown. The need for a braking resistor should be considered if the application requires large inertial loads to be decelerated quickly. During deceleration if the drive faults-out with over voltage or the braking resistor LED flashes orange - requesting power dumping, it is likely a braking resistor needs to be fitted.

Note: If a braking resistor is fitted, a ferrite ring-core needs to be fitted over the braking resistor leads, as shown in Figure A-5. A suitable ring-core is the Parker Chomerics part number H8FE-1115-NC, as used for the drive's motor cable. The ferrite may be held in place using heat shrinkable tubing, or cable ties. An in-line 5 X 20 mm fuse is recommended to be fitted between pin 2 of P1 and the braking resistor. The fuse should have a maximum value of 3.15A with a time delay low breaking characteristic.

The braking resistor should be wired using 16/02 0.5 mm² cable.

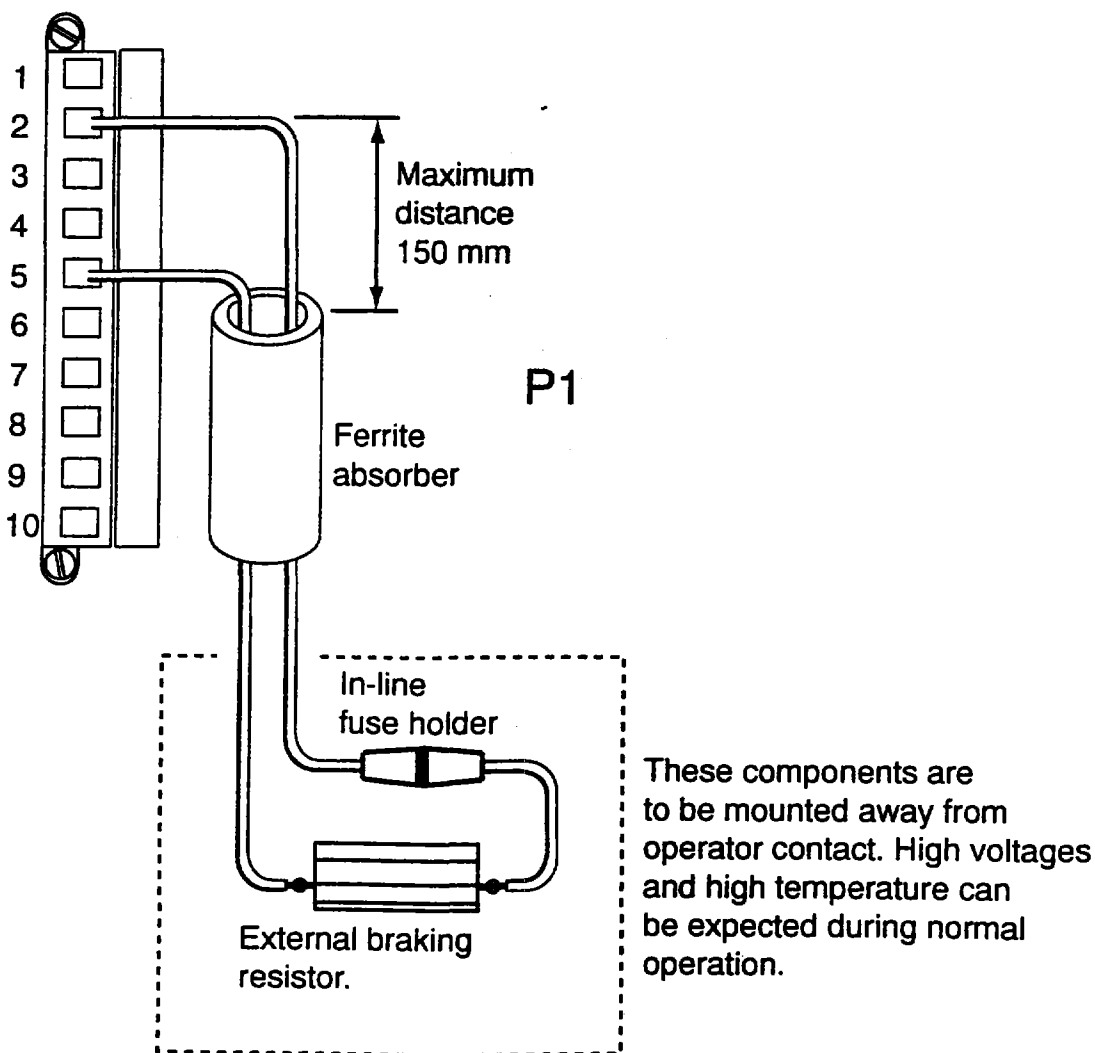


Figure A-5. Braking Resistor Wiring

An internal dump switch has a peak rating of 800W. The dump resistor used should be 10 Ohms (nominal) with a power rating of 100W.

LED Indicators Function

Three tri-state LEDs are positioned on the front panel of the XL-PSU. Their function is described in Table A-1.

Position	Colour	Function
Left	Orange	AC Input present and PSU fault. No HV output
	Green	AC Input present
	No colour	AC input off
Middle	Orange	Dump request
	Green	80V DC present
Right	Red	24V disabled by overcurrent fault
	Orange	24V supplied by external supply
	Green	24V supplied by XL-PSU
	No colour	No 24V present

Table A-1. LED Indicators Function

WARNING – Risk of damage and/or personal injury

The XL-PSU contains no user-serviceable parts. Attempting to open the case of any unit, or to replace any internal component, may result in damage to the unit and/or personal injury.

Electrical Specification

Parameter	Value
Input voltage	
Nominal	110 to 230 V AC RMS
Min/Max	95 to 264V AC RMS
Mains supply frequency range	50/60Hz +/- 2Hz
Input power factor	Better than 0.9 at 250W load
Output voltage	80V DC $\pm 5\%$ (no load)
Output current	
230V AC input, no 24V load	3.1A continuous, 7.5A peak
230V AC input, max 24V load	2.6A continuous, 7.0A peak
<150V AC input, no 24V load	2.5A continuous, 6.2A peak
<150V AC input, max 24V load	2.0A continuous, 5.7A peak
Protection	Short circuit / overload protected
On board capacitance	6600 μ F
24V Auxiliary output	
Voltage	24V DC +10% -15%
Current	1.8A Max
Protection	Short circuit / overload protected
Output cable length restriction	not to exceed 10m in length
Total output power	250W continuous
Peak	600W for 1 second. Below input voltages of 150V AC, output power is 200W continuous, 500W peak.
Protection circuits	
XL-PSU Module	Overtemperature
Output	
Current	Short circuit / Overload
Power	Excessive continuous power
+24V supply	
Current	Short circuit
Voltage	Reverse polarity
Connection / disconnection	Hot plugging protection

Mechanical Specification

Parameter	Value
Housing	Two part brushed aluminium case
Dimensions	
Depth	130 mm Max
Width	50 mm Max
Height	175 mm Max (195 mm at flange mount)
Weight	1 kg

Environment Specification

Parameter	Value
Pollution	Degree 2
Installation category	II*
Operating temperature range	0 to 50°C ambient
Storage temperature range	-20° to 70°C
Humidity	5 to 95% non condensing
Altitude	2000 metres
Ingress protection	IP20
Cooling	Natural convection with integral fan. Unit to be mounted vertically with at least 50mm free space above and below the package. Side clearance of 10mm free space both sides.

*Note: Installation category (also called Overvoltage Category) specifies the level of mains voltage surges that the equipment will be subjected to. The category depends upon the location of the equipment, and on any external surge protection provided. Equipment in an industrial environment, directly connected to major feeders/short branch circuits, is subjected to Installation Category III. If this is the case, a reduction to Installation Category II is required. This can be achieved by use of an isolating transformer with an earthed screen between primary and secondary, or by fitting varistors from live to neutral and from neutral to earth. Varistors for a 120V AC input should be rated to absorb at least 40 Joules. For example, DIN-rail mounted surge suppressor RS 240-062 (110V AC, 70J) or Farnell 294-275 (110V AC, 80J) would be suitable. Varistors for a 240V AC input should be rated to absorb at least 80 Joules. For example, DIN-rail mounted surge suppressor RS 240-078 (240V AC, 140J) or Farnell 294-287 (240V AC, 140J) would be suitable.