

# *i*Power Active and Passive PDU, Technical Construction File

**Overview of the Build Standard,  
Technical, Construction, and Testing  
Criteria of the IPower PDU Range**



2016

# Table of Contents

<b>Introduction</b>	<b>About this Document</b>	<b>P4</b>
	General	
	BS EN 60950	
	BS EN 6396	
<b>About Us.</b>	<b>General</b>	<b>P5</b>
	SI1994/3260	
	ISO 9001	
	Customer Variations	
<b>Chapter 1.</b>	<b>Technical Specifications</b>	<b>P6</b>
	General	
	Isolators	
	Input Cables	
	Protection	
	Transient & RFI Suppression	
	BS EN 61643-11:2012	
<b>Chapter 2.</b>	<b>Construction Specifications</b>	<b>P8</b>
	EN 60950	
	EMC	
	CE Marking	
	Construction Techniques	
	Inspection	
	Data Applications	
	Low Voltage Directive	
	Data Wiring	
	Current Ratings	
	Labels	
	Earthing	

**Chapter 3.**

**Test Specifications**

**P10**

General

Earth Bond Test

Insulation Test

Flash Test

Load/Fuse Check

Continuity Check

Function/Phase Test

Data Module Test

**Chapter 4.**

**Material Specifications**

**P11**

BSI Approved Materials List

Flame Retardancy

RoSH Compliance

Customer Variations

# Introduction

## About This Document

### General

This document is set out to demonstrate the conformance of all products in accordance with The Electrical Equipment (Safety) Regulations 1994 and in particular to the relevant standards governing Information Technology equipment and Electrical installations in office furniture,

Electrical equipment shall be safe & constructed in accordance with principles generally accepted within the member States as constituting good engineering practice in relation to safety matters and in particular shall be designed and constructed to ensure that it is safe when connected to the electricity supply system by providing a level of protection against electric shock which relies on a combination of insulation and the protective earth conductor contained within the electricity supply system or which achieves that level of protection by other means; and in conformity with the principal elements of the safety objectives for electrical equipment set out in Schedule 3 to these Regulations.

### **BS EN 60950-1:2006+A2:2013**

BS EN 60950-1:2006+A2:2013 Information technology equipment. General requirements specify requirements intended to reduce risks of fire, electric shock or injury for the operator and layman who may come into contact with the equipment and, where specifically stated, for a service person. This standard is intended to reduce such risks with respect to installed equipment, whether it consists of a system of interconnected units or independent units, subject to installing, operating and maintaining the equipment in the manner prescribed by the manufacturer. This standard is applicable to mains-powered or battery-powered information technology equipment, including electrical business equipment and associated equipment, with a rated voltage not exceeding 600 V.

This standard is also applicable to such information technology equipment:

- Designed for use as telecommunication terminal equipment and TELECOMMUNICATION NETWORK infrastructure equipment, regardless of the source of power;
- Designed and intended to be connected directly to, or used as infrastructure equipment in a CABLE DISTRIBUTION SYSTEM, regardless of the source of power;

### **BS 6396:2008**

BS 6396:2008 Electrical systems in office furniture and educational furniture.

This specifies requirements for the safe provision and assembly of electrical power, data and telecommunications distribution systems in office furniture, educational furniture and office screens. BS 6396 applies to single-phase electrical power distribution systems operating at rated voltages up to 250v AC that are connected to the fixed wiring of the permanent installation of the building by a 13 A fused plug and socket outlet arrangement conforming to BS 1363.

# About Us

***IPower***

## **General**

*IPower*, Intellect Power Technologies Ltd, and PRSI Ltd, use Manufacturing partners to build all our products, these partners include PCB Manufacturers / Assemblers, and PDU Assembly Manufacturers, all members of the production process are required to follow the guidelines detailed below in the construction of *IPower* products, This Guarantees a consistent level of Material quality and build quality throughout the range of products.

All our power distribution products are designed to assist in supplying power to Information Technology rack cabinets, desks and other areas requiring power outlets. They are manufactured in the UK using multiple output connectors including standard BS 1363 outlets, IEC C13 or C19 outlets, or other UK and European approved electrical sockets. The outlets can be configured as a single circuit, or as branch circuits with protection devices to suit applications or customer specifications.

Desking modules can be power only or a mixture of power and data outlets fitted in a single housing for the effective distribution of services to the desk top or office furniture.

## **SI1994/3260**

All products are designed to meet the Electrical Equipment (Safety) Regulations 1994 (SI 1994/3260) and as such are manufactured from materials sourced from manufacturers and suppliers in accordance with BS EN 60950-1:2006+A2:201 Information technology equipment Safety General requirements.

## **ISO9001**

The company operates to ensure consistent quality in both the design stage and production of all the products. Manufacturing is controlled by a documentation and process system set out to ISO 9001, ensuring full traceability of products and components. With over 25 years' experience in providing power distribution systems to a wide range of customers, the management team are committed to supplying a cost effective, high quality product to the most demanding of time scales.

## **Customer Variations**

We specify, design and manufacture products to suit prescribed environments, or alternatively, clients can specify their own bespoke design for manufacture. Customer specified or supplied designs will be entered into the company documentation system and produced to the same criteria as a standard design.

**Note.** *Units manufactured to customer's own specifications must conform to the standards and specifications laid out in this document.*

# Chapter 1

## PDU Technical Specifications

### General

The power distribution units consist of one or more mains outlet connectors connected together in parallel. These can be either a BS 1363 UK style 13A outlet, BS 4491 IEC 60320 C13 or C19 outlet, or when requested, any other UK, European or other approved electrical outlet.

### Isolators

Where applicable, the incoming supply is switched via a suitably sized isolator which has high inrush capabilities to prevent contact arcing under full load conditions. Styles of isolators that can be fitted include switches, thermal switches, Hydraulic Magnetic breaker, DIN standard MCB's.

Units are also fitted with a mains neon indicator to show power present.

### Input Cables

Power into the units is by a flexible cable consisting of conductors with the appropriate cross sectional area for the rated load. This is securely attached to the body of the unit by a locking cable gland. Leads are supplied to standard or customer specified lengths and terminated with a suitable plug commensurate to the specified current rating of the product. Alternatively, any make of Bus Bar tap off lead can be fitted, over sheathed with armoured or plastic flexible conduit.

### Protection

Units may be fitted with an overall fuse or thermal breaker, or individual fuses per outlet, (in accordance with BS 6396.) For personal protection against electric shock or burns, a 30mA trip level RCD or RCBO can be fitted.

### Transient and RFI Suppression

Units can be fitted with Transient Voltage Suppression circuitry, which also incorporates filtering to combat Radio Frequency Interference (RFI). Transient voltages are often referred to as "Spikes" or "Surges" and can be caused by the switching on or off of other electrical equipment. Another source of surges is nearby lightening activity, where surge voltages can typically reach in excess of 6Kv and current surges in excess of 3kA. The maximum protection provided under these conditions will depend on the position of the unit within a building.

## **BS EN 61643-11:2012**

Low-voltage surge protective devices. Surge protective devices connected to low-voltage power systems as fitted by G4 MPS will provide protection from mains born surges and Radio Frequency Interference, In accordance with BSEN 61643-1 Class 3 and BSEN 61643-11 Type 3.

Surge Suppression covers the requirement for live to neutral on input and output and also live to earth on output.

<b>Maximum Working Voltage.</b>	<b>275v</b>
<b>Maximum Load current.</b>	<b>16A (Option to upgrade to 32A)</b>
<b>Line Frequency.</b>	<b>50-60Hz</b>
<b>Clamping Voltage.</b>	<b>710v @10A</b>
<b>Maximum Withstand Capability.</b>	<b>1.75kA for 8/20µsec</b>
<b>Transient Response Time.</b>	<b>10ns</b>
<b>RFI attenuation (Typ).</b>	<b>-45db @ 1MHz</b>
<b>Operating Temperature.</b>	<b>-10°C to +70°C (Nominal)</b>

## Chapter 2

### Construction Specifications

#### EN60950

All *IPower* mains distribution products have been designed to conform to the European Harmonisation document EN 60950. They are manufactured in accordance with BS 5733:2010+A1:2014.

#### EMC

All products manufactured for *IPower* are designed to comply with the EMC directive BS EN 55022 2006 for emissions and intrusions where applicable. Typically, a PDU that contains only sockets with no additional control or monitoring circuitry is classed as a passive component of an active system and as such does not fall within the general scope of EMC testing.

All active PDU's conform to the relevant requirements for EMC conformity.

#### CE Marking

All products manufactured for *IPower* are CE marked to show compliance with the relevant standards and directives pertaining to the products.

#### Construction Techniques

All products are manufactured to high standards. Each build stage is treated as a sub assembly and as such subject to rigorous inspection. All wire assemblies are produced by semi-automatic machine which ensures consistency. Random checks are carried out for defects and correct formation and tested for mechanical integrity using a digital pull tester to 25Kg (Series 4, Model DPT 50, See BS EN 60352-2 1997.) The overall assembly techniques used guarantee a consistently high standard of manufacturing.

All units are fitted with an input lead consisting of conductors with the appropriate cross sectional area for the rated load. Where specified, units can be supplied without a lead for on-site termination. In this case, a suitable rated connector block is fitted inside the unit for the cable to be connected to, thus avoiding unnecessary disturbance of the internal wiring.

Internal construction complies with BS 5733:2010+A1:2014. Units are rated at 16A as standard and 32A or 63A to order. Internal links are either soldered with 12swg or 14swg solid copper rod or made with 2.5mm, 4mm or 6mm Tri-Rated stranded cable and terminated with either a brass ferrule or crimp receptacle. Where connectors have a screw down terminal, all wire connections will have a ferrule fitted to ensure an even loading when tightened down. All units are fully earth bonded with bases and lids linked by a suitably sized earth wire, secured to a 4mm earth stud.

#### Inspection

The final stage in the construction cycle is a full visual inspection, prior to being sent for testing. On completion of the tests, the unit has a serial number and voltage & current ratings label attached before being cleaned and packed.

#### Data Applications

Desking Modules can be fitted with shuttered data modules to either CAT5e or CAT6. Other connector styles can be incorporated if required.



## **Low Voltage Directive**

When units are fitted with data outlets, a metal segregation plate is fixed into the chassis to produce a separate enclosed area within the body of the unit to comply with the Low Voltage Directive. We fit our own choice of data module. Alternatively, any make of industry standard 25x50mm or LJ6C sized can be specified.

## **Data Wiring**

Data cables can be fed into the units by way of a 21mm flexible plastic conduit, forming a protected umbilical, or as individual plain cables secured by a soft compression gland. This is normally at the opposite end to the power cable entry, or on the rear face of certain styles, although both the power and the data cables can enter from the same end to meet the requirements of specific applications.

Units containing data modules can be supplied with pre-terminated data cables and RJ 45 plugs, to specified lengths.

Responsibility of conformance with network cabling standards with regards to total cable length and the number of plug and socket connections in the Permanent Link resides with the customer.

## **Current Ratings**

All internal wiring is rated at either 16A as standard or 32A or 63A to order and made with 2.5mm (16A), or 4mm (32A) or 10mm (63A) Tri-Rated stranded cable.

To deliver 32A or 63A rating, the circuit is wired as a ring, with a link being taken from the furthest connection point, back to the start.

## **Labelling**

All units are fitted with the *IPower* logo and a label stating voltage & maximum current rating and the CE mark, together with a unique serial number for traceability purposes.

### **Note.**

*The maximum current rating for each unit will be set by the maximum current rating of the input connector.*

## **Earthing**

All units are fully earthed through the supply cable, which is attached to the unit by a crimped ring terminal secured to a 4mm welded earth stud. Where units have a separate metal lid, this has its own earth stud and is linked back to the stud on the chassis.

All units are manufactured with a M6 external Earth stud.

## Chapter 3

### Test Specifications

#### General

All units have undergone a rigorous five stage test programme as specified by British Standards for Class 1 appliances. This is an automated test performed with a Portable Appliance Tester. In addition, each socket is checked for functionality.

#### Earth Bond Test

The object of this test is to ensure that the connection between the earth or protective conductor of the mains supply plug makes contact with the earth pin on every outlet, as well as with the metal casing. Approximately 6v AC is passed down the earth pin of the input plug and a lead is connected to the furthest output socket. A current of 25A @.1w is applied for approximately 5 seconds to simulate full load conditions. The time limit of 5 seconds is to prevent damage by over stressing.

#### Insulation Test

To test the effectiveness of the insulation, a nominal 500V DC is applied between the earth pin of the supply plug and the live and neutral pin which are automatically connected by the PAT Tester for the duration of the test. A resistance level not less than 1M $\Omega$  is measured to confirm sufficient insulation is present.

#### Load / Fuse Check

A low voltage is applied to the unit to check if there is a load/fuse present.

#### Continuity Check

Each outlet is checked under load for cross connection between live & neutral to ensure correct fuse protection. (When fitted)

#### Function / Phase Test

Each socket is tested for correct operation by inserting a Phase tester to show correct live and neutral phases. This also checks the socket for correct mechanical operation in terms of ease of fit and shutter function.

#### Data Module Wiring

Where data modules are fitted and supplied with pre-terminated cables, an additional test is carried out using a line checker to ensure correct punch down terminations.

## Chapter 4

### Material Specifications

#### BSI Approvals

All components used in the manufacture of *IPower* products conform to the relevant British Standards Institute approvals or that of an equivalent recognised body.

#### Materials List

The following list shows the key components used and the BSI specification number relevant to that component. Copies of specification documents are available from The British Standards Institute.

- |                                 |                  |
|---------------------------------|------------------|
| • 13A UK Socket outlets.        | BS 1363          |
| • IEC 60320 connectors.         | BS 4491          |
| • Moulded cord sets and cables. | BS 6500:1990     |
| • Moulded plug top.             | BS 1363          |
| • MCB isolator.                 | BS EN 60898      |
| • RCD isolator.                 | BS EN 61008      |
| • RCBO isolator.                | BS EN 61009      |
| • Thermal Disconnect.           | EN 60934         |
| • Illuminated switch.           | BEAB CS0005      |
| • Tri-rated equipment wire.     | BS 6231 / UL1015 |

#### Flame Retardency

All components and plastic mouldings used throughout the products will conform to the International Flame Retardency specifications. Full details are covered under the relevant manufacturers specification documents.

#### Customer Variations

Units produced to customer specifications will be constructed to conform to the relevant standards. All components used will be to the required BS specifications.

#### RoHS Compliance

The EU Directive 2002/95/EC for the Restriction of use of certain Hazardous Substances in electrical and electronic equipment (RoHS) states that products should not contain prohibited lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

*IPower* have taken the necessary actions to ensure that these elements are not included in any of the components used in the manufacture of products.