

Shelter Distribution Unit (SDU) Guide to pre-set layout designs

The SDU is a NATO codified, portable field power distribution module, which provides 230V (power), 400V (ACUs) and 110V (lighting) within a shelter system. Fitted with both FEPS and industrial inlets, the SDU offers connectivity into a wide number of existing UK MoD power systems.

Pre-planned layouts

For safe use and to ensure compliance with BS7671:2008, a pre-planned layout needs to be approved by an authorised person (AP). The multi-voltage nature of the SDU design looks to simplify design calculations by removing many of the variables associated with a multi layered distribution system.

Where a basic localised power system is required and access to APs is limited, pre-planned SDU layouts can offer simple yet flexible solutions to equipment users.

Design Criteria

Based on the guidance within BS7671:2008 the pre-prescribed layouts should provide a correct design which will:

- Ensure low impedance conductive paths for prospective fault currents, thereby enabling fast automatic disconnection of the faulted circuit by an appropriately rated MCB.
- Establish and maintain an equipotential zone, at near earth potential, through the bonding of the electrical installation and all extraneous conductive parts, to alleviate the risk of personnel being in simultaneous contact with installations at different potentials. Earth bonding may be monitored using PCLM.
- Provide low impedance conductive paths of sufficient cross sectional area to ensure minimum voltage drops and power losses.
- Allow the pre-planned system to be installed by persons who have received limited training.
- Utilise existing codified component parts which are in use with UK MoD.
- Provide a design which is as close as can be achieved to a “plug and play” system.
- The maximum permissible volt drop is assumed to be 8% based on the nature of the “private supply” i.e. local generator.
- The maximum disconnection time permissible for final circuits is 0.4 seconds.



Protection

The SDU incorporates MCB, RCD & PCLM protection.

Function of an MCB – Offers both overcurrent and short circuit protection which, under fault conditions, provides automatic disconnection of the supply.

Function of an RCD - Provides additional protection so that if the cpc (circuit protective conductor or earth wire) is broken, or the circuit impedance is too high to operate the MCB in the permitted time, an RCD will operate under earth fault conditions. When the value of impedance of a circuit is too high, it should be protected by an MCB and an RCD. The RCD is utilised to provide automatic disconnection against earth faults (within the required time) and the MCB provides protection against overcurrent. An RCD also ensures effective and rapid disconnection in the event of lower earth leakage currents, which might otherwise be undetected but cause fire. RCDs used within the SDU are 30mA sensitivity non-adjustable and provide supplementary protection against “direct contact” electric shock.

Function of PCLM - Monitors the continuity of the cpc so that there is always a return path for earth fault currents to flow along, to operate the MCB. If the value of impedance of a circuit is too high then the presence alone of the cpc is not sufficient to ensure that the associated MCB will provide automatic disconnection in the required time and the addition of RCD protection may be required. The PCLM monitor is not affected by inherent earth leakage (e.g. filters) and the trip threshold is pre-set and non-adjustable.

System Layouts

The layouts shown are indicative only and should be verified by calculation to establish voltage drops, cable size, protective device operating times and energy demand. The circuits may be used individually or as apart of a larger power plan subject to the previously mentioned conditions.

