PTL50CS-D Dual Voltage PSU/Battery Charger

Model C2296A 2Amp 12 & 24Volt Combined Power Supply/ Battery Charger

DATASHEET

- Supply both 12Vdc and 24Vdc continuous power during ac line interruptions without the need for inverters or mains UPS
- Ideal for RTU's, dataloggers, remote field instrumentation, alarm systems, etc. where 24Volts is required for instrumentation and 12Volts is required for radios etc.
- Battery Management Functions include Low Voltage Cut-out, temperature compensation and current limited battery charging
- IEC320-C5 power input for serviceability without needing a wireman's licence

Features

- **True 12/24Volt Split Battery Charge Equalisation**
- **Under-voltage cut-out to protect battery from deep discharge.**
- **AC detect output for mains monitoring.**
- **Temperature compensation for optimum battery float voltage in changing ambient temperatures.**
- **Universal 85-264Vac mains supply**
- **DIN Rail mounting with small panel footprint**

OVERVIEW

The PTL50CS-D is a combined Power Supply and Battery Charger for small uninterruptible instrument supply applications where 12Volts and 24Volts are required.

Providing both 24Volts and 12Volts in battery-backed systems can be inconvenient and costly. While 12Volts is available in 24Volt battery systems by centre-tapping the two series connected 12Vdc batteries, until now this has been impractical to use because of the different charging requirements of the two batteries.

The PTL50CS-D dual voltage charger now makes this possible by the provision of true split rail battery charging to provide balanced charging to both batteries even when 12Volts loads are tapped from the battery pack.

Applications include RTU's, dataloggers, remote field instruments and alarm systems where the requirement exists to power both 12Volt radios and 24Volt instruments.

BATTERY MANAGEMENT

During prolonged power outages, the back-up batteries will eventually discharge. If the load remains connected, the batteries can enter their "deep" discharge phase, which can cause irreparable damage to the batteries, and reduce their capacity and life expectancy.

The PTL50CS-D incorporates a low voltage cut-out that disconnects the loads when either battery voltage falls below its low voltage threshold.

The maximum float voltage necessary to ensure full charge, but not overcharge, is temperature dependent for lead-acid batteries. If the installation is in an environment with widely fluctuating temperature, then fixed voltage chargers will either under-charge or over-charge the batteries.

The PTL50CS-D is provided with temperature compensation so that the float voltage to the batteries is held at its optimum value at all times.

DUAL MODE CHARGING

Batteries can be kept on continuous charge as long as the charging current and float voltage are kept below their specified maximum values. The maximum charging current for a battery is based upon the Ampere-hour capacity of the battery. Many conventional switch mode power supplies do not control their maximum delivered current and can cause batteries to be charged from flat with current levels that exceed the manufacturer's recommendation. The PTL50CS-D provides dual-mode charging, with a well defined current limit in boost mode, so that even when the batteries are discharged, the charging current will be controlled.

SYSTEM MONITORING

The PTL50CS-D also provides an AC OK output. This output can be used to detect power failures without the need for an additional mains detection relay.

SAFE MAINS INPUT CONNECTOR

The main input is connected using an IEC320-C5 standard mains connector. This rugged and secure connector provides a safe means for any service personnel to exchange power supplies in the field without the need for a wiremans licence.

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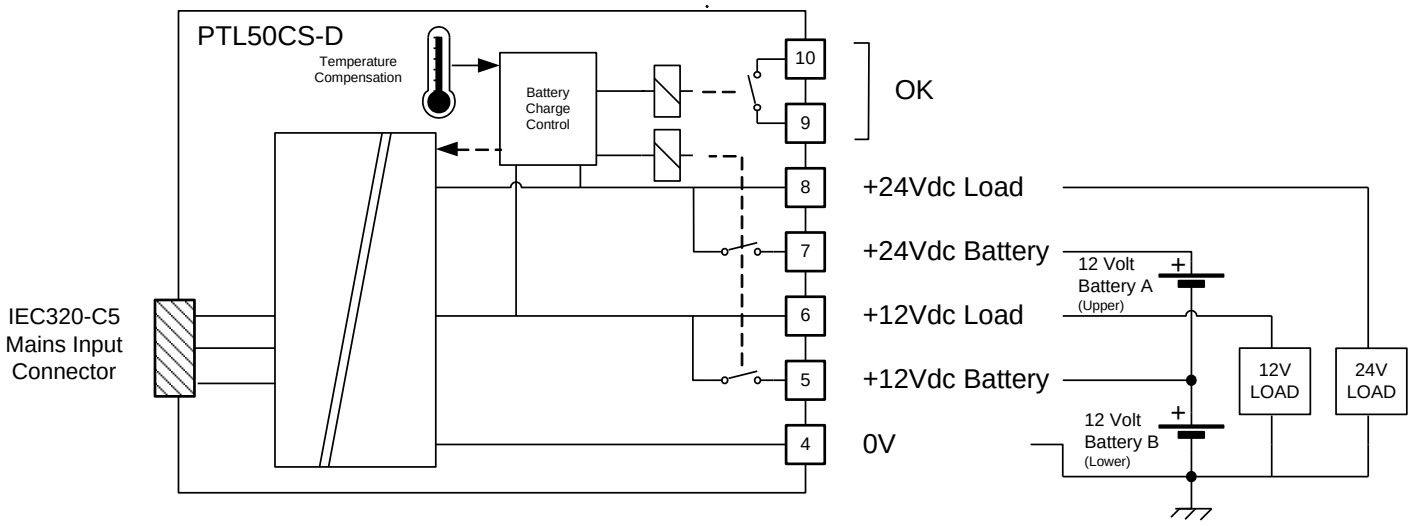
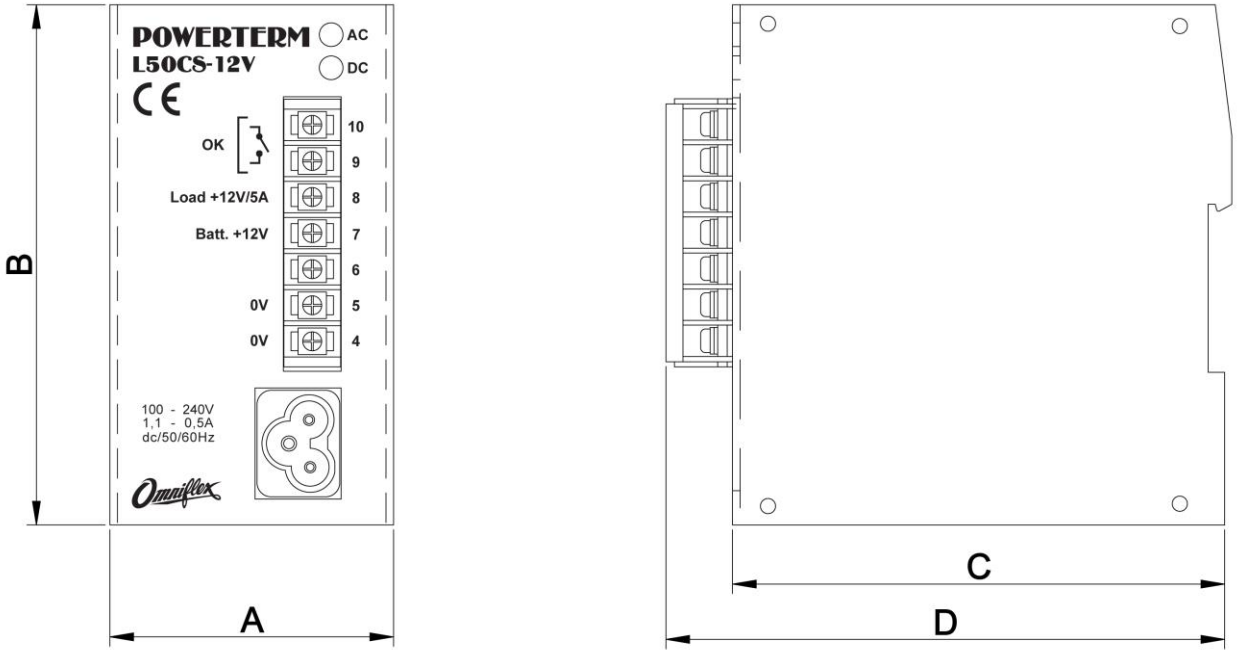
Typical System Connection Diagram



Mechanical Details



A	60mm
B	110mm
C	110mm
D	120mm

PTL50CD Dual Voltage PSU/Battery Charger

Model C2296A 2Amp 12/24Volt Power Supply/ Battery Charger

Specifications

AC Input

AC input voltage range	85-264Vac
AC input frequency	47-63 Hz
Input current at full load	<1.5A rms at 115Vac <0.7A rms at 230Vac
Switch-on inrush current	11A for <10ms (80A for < 1ms)
Surge withstand	2.5kA 8/20us pulse 40 joules max.
Fast Transients	2 kV

Load Ouput

Nominal Output Voltage	**12V**	**24V**
Output Voltage at 20°C	13.7±0.1V	27.4±0.2V
Voltage change from 20°C	-20mV/°C	-40mV/°C
Maximum Voltage Range	13.0V -14.0V	26.0V –28.0V
Max continuous load current (Load + Battery)	1A	2A
	(subject to Maximum Total Power)	
Maximum Continuous Total Power	55Watts from 12V and 24V combined	
Maximum Peak Load (drawn from the battery)	5A	5A
AC line regulation	0.5% max over 85-132 / 170-264Vac	
Load Regulation	2% max over 10-100% of total load (output load + battery charge current)	

Recommended Batteries (not included)

Quantity	2
Type	12 Volt Sealed Lead Acid
Minimum Battery Capacity	7Ah minimum recommended
Relative battery Size	12Volt connected battery must be equal to or greater capacity (in Ah) than the 24Volt connected battery

Under-voltage cutout

Output	**12V**	**24V**
Cut out Voltage	11 +- 0.5 Volt	22 +-0.8 Volt
Restore Voltage	9.5 +- 0.5 Volt	19 +-1.0 Volt
Battery drain when cut out	1mA max	1mA max

OK Output

Type	Normally open contact – closed when AC is ON and DC power is healthy.
Max. operating voltage	30V dc
Max. closed circuit current	1A

Environment & Safety

Operating Temperature	0 to +60°C at continuous full load
Temperature derating	derate 3%/°C up to 70°C maximum
Storage Temperature	-10°C – 70 °C (+14°F – 158°F)
Insulation Resistance (100% tested)	100Mohm at 500Vdc input to outputs to ground.
Insulation Breakdown (100% tested)	1500Vac input to earth for 1s 1000Vac output to earth for 1s
Safety Conformance	Conforms to IEC950; EN60950
Electromagnetic Interference	Conforms to EN55011; EN50082-2
Design Life at 50°C full load	50 000hours

Mechanical

Width	60mm
Height	110mm
Depth	120mm (including terminals)

Weight

Unpacked	450gm approx.
Packed	550gm approx.

Compliance to Standards

Safety	EN 60950:1995
Emissions	EN 55011 and EN50081-2:1994 Group I, Class A
Immunity – ESD	IEC 61000-4-2:1995, level 3
Immunity – RF Fields	IEC 61000-4-3:1995, level 3
Immunity – Fast Transients	IEC 61000-4-4:1995 2 kV – DC power port 1 kV – input/output lines

Ordering Information

ORDER CODE	**DESCRIPTION**
C2296A	Powerterm Model PTL50CS-D Dual voltage 12/24Vdc PSU/Charger

PTL50CD Dual Voltage PSU/Battery Charger

Model C2296A 2Amp 12/24Volt Power Supply/ Battery Charger

Application Notes

BATTERY SELECTION

The PTL50CS-D is designed to operate with sealed lead acid (SLA) type batteries also known as Valve Regulated Lead Acid (VRLA) batteries. This type of battery is sealed except for a valve that opens when the internal gas pressure exceeds safe limits. (That is why it is important not to overcharge SLA batteries). Generally, these batteries can be used in confined areas and can be mounted in any orientation. (see the specific manufacturer's data for details.)

There are two types of SLA batteries on the market: Absorbent Glass Mat (AGM) and Gel-Cell. This refers to the method used to immobilise the electrolyte in the battery. Either of these two types of battery may be used with these chargers.

In order to select the batteries for your application, follow these simple steps:

For each load – 12 Volts and 24 Volts:

1. Calculate the Ampere-hours of standby time required, by multiplying the number of hours of standby required by the average standing load in Amps.
2. To take into account deterioration of battery capacity over the life of the battery (20% over 48 months typical), and residual charge remaining at cutoff (20% remaining) multiply this figure by 1.6 (This figure may vary from application to application)
3. If the battery is required to provide full standby time at temperatures lower than 20°C, then increase this capacity by a further 10% for each 10°C below 20°C.
4. An additional factor of 15% may be added to the battery capacity if the recharge time to required capacity from discharged state is an important factor of the design. (see section on Recharge time).
5. Battery 'B' (see the System Connection Diagram) must have the capacity as calculated for the 24Volt load as a minimum.
6. **IMPORTANT**: Battery 'A' must have a capacity equal to the SUM of the capacities required for BOTH the 12Volt and 24Volt loads as a minimum. (This is because Battery 'A' is delivering current to both the 12Volt and 24Volt loads).
7. These calculations then gives the minimum Ampere-hour capacity required for batteries in your application. In general, the larger the battery the better in any given application (size and cost being the compromise).
8. Choose the next highest standard size available from your chosen manufacturer. Remember that Battery 'A' must never be smaller in Ampere-Hour rating than Battery 'B'.

AC DETECT OUTPUT

A contact output across terminals 9 and 10 is provided to detect the presence/absence of the AC supply, and the correct operation of the charger.

A closed contact confirms that the AC supply is present, and that the charger is successfully charging. The contact will open when the AC supply fails.

A green light labelled 'AC' on the front of the PTL50CS-D is a visual indication of the state of this contact and the AC supply. When this light is on, then the AC Supply is present, and the contact is closed.

It is normal for this contact to open then close again momentarily during a power failure as the battery takes over from the Power Supply.

LOW VOLTAGE CUTOUT

When either battery voltage drops during discharge to its preset cut-off point, the cut-off relay in the PTL50CS-D will disconnect the batteries from the loads. This prevents the batteries from entering into a state of deep-discharge, protecting them from permanent damage.

When the AC supply returns, the cut-out relay will automatically reconnect the batteries to the charger and load only if the battery is above the (lower) restore voltage point. This protects against danger or damage from reverse connected or dead batteries.

A red lamp labelled 'DC' on the front of the PTL50CS-D when on, indicates that there is DC supply to the load. During battery backup, the Green lamp will be off and the Red lamp will be on. After the battery has been disconnected by the cut-out, both lamps will be off.

TEMPERATURE COMPENSATION

A Lead Acid Battery is constructed of a series string of cells of approx. 2.3 volts each when fully charged. A 12 Volt battery has 6 such cells. This fully charged voltage varies by approximately –3.3mV/°C per cell. This does not sound much but, over 12 cells in a 24Volt application, this amounts to a change of 0.4V over a 10°C temperature swing.

If the float voltage of the charger does not compensate for this change, then it is possible to over-charge the battery at high temperatures and/or under-charge the battery at low temperatures.

The PTL50CS-D is supplied from the factory with an internal temperature sensor that monitors the ambient temperature and adjusts the battery float voltage to the optimum point for that temperature. For best operation the PTL50CS-D PSU/Charger should be mounted in the same environment as the batteries to ensure that the temperature measured is representative of the temperature of the batteries.

CHARGING TIME

The PTL50CS-D is a dual-mode charger. This means that the batteries are charged in two phases. When the AC power returns after the battery has been on load, and requires recharging, the charger will enter into "bulk" mode charging. The charger then switches into "float" charge mode, and the voltage is reduced to its "float" voltage, where the battery can remain indefinitely.

The bulk mode charge rate is chosen to ensure that the battery reaches 85-95% charge in the shortest possible time within the constraints of the battery specifications. The remaining 5-15% charge is then topped up more slowly during the float charge cycle.