



Powerterm L50C Single Output PSU/Battery Charger

Model C2198A-1 (12V/5A) or Model C2198A-2 (24V/3A)

DATASHEET

- A Complete solution for small battery-backed dc instrument power systems
- Supply continuous 12Vdc 5A or 24Vdc 3A
- Ideal for RTU's, data loggers, remote field instrumentation, alarm systems, etc. where 12 Volts dc or 24Volts dc is required
- Low Voltage Cutout to preserve battery life
- Temperature Compensation for best standby time
- Current limited dual mode battery charging gives optimum load performance



Features

- Under-voltage cut-out to protect battery from deep discharge.
- 8A Peak Load capability
- 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 PTL50C is a combined Power Supply and Battery Charger system with integrated standby battery management for small uninterruptible instrument supply applications.

Just connect mains supply, standby battery and load for an industrial grade standby power supply system.

This DIN rail mounted product is ideal for providing dc power to instrument systems where battery backup is necessary for continuous operation during power failure.

Applications include RTU's, dataloggers, remote field instruments, alarm systems and access controllers.

Managing battery-backed systems for optimum backup time and battery life can be tricky and expensive.

This product incorporates many features that make installing such systems straightforward.

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 PTL50C incorporates a low voltage cut-out that disconnects the loads when 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 PTL50C is provided with temperature compensation so that the float voltage to the battery 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 PTL50C provides dual-mode charging, with a well defined current limit in boost mode, so that even when the battery is discharged, the charging current will be controlled.

System Monitoring

The PTL50C also provides an AC OK output. This output can be used to detect power failures without the need for an additional mains detection relay..

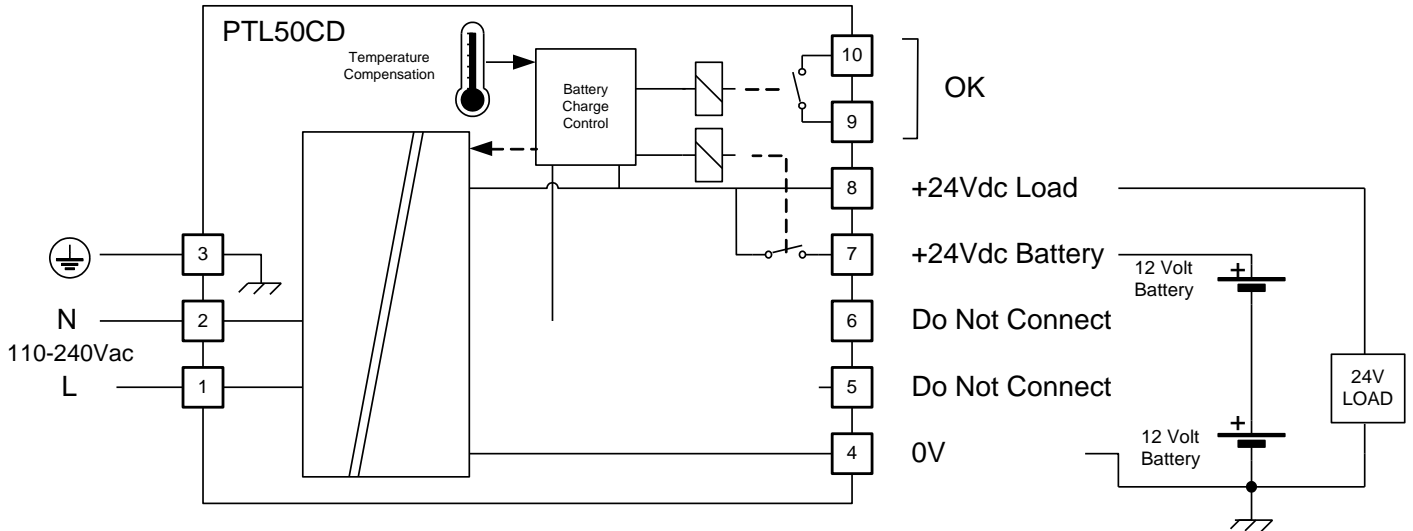




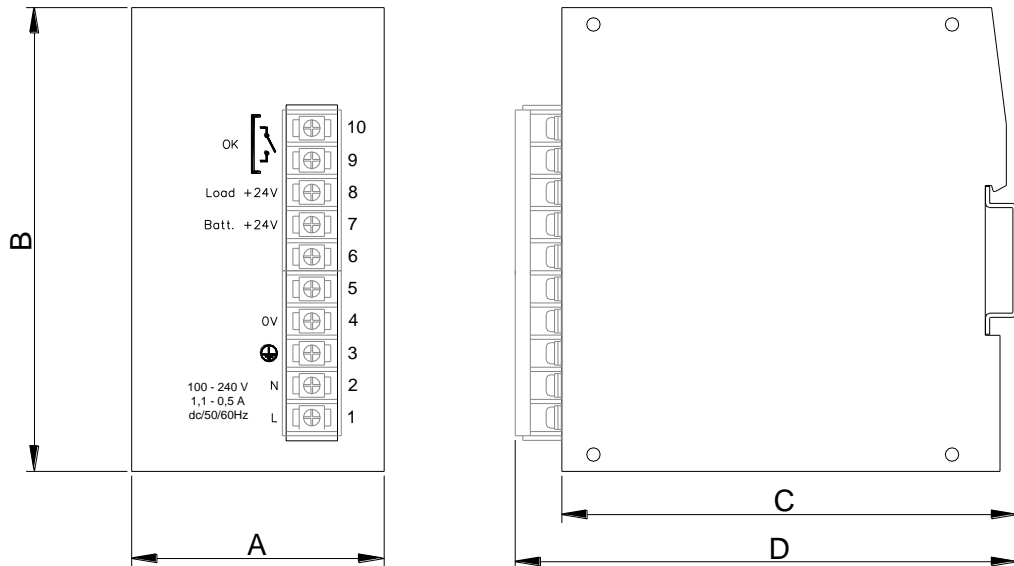
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Typical System Connection Diagram



Mechanical Details



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





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Specifications

AC Input

AC input voltage range	85-264Vac
AC input frequency	47-63Hz
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

DC Output

Model	C2198A-1 (12V)	C2198A-2 (24V)
Output Voltage at 20°C	13.8±0.1V	27.6±0.2V
Voltage change from 20°C	-20mV/°C	-40mV/°C
Maximum load output voltage range over all conditions of battery, AC input and temperature	10.0V -14.3V	20.0V -28.6V
Rated Load Current	4.5A continuous (average)	2.5A continuous (average)
Battery Charging Current (current limited in charger)	0.5A typical	
Total Current capacity (Load + Battery)	5A typical	3A typical
Maximum Peak Load (drawn from the battery)	8A for 10s with 10% duty cycle maximum	
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	1	2
Type	12 Volt Sealed Lead Acid	
Minimum Battery Capacity	7Ah (minimum recommended)	

Under-voltage cutout

Output	12V	24V
Cut out Voltage	10.5 ± 0.3 Volt	21.0 ± 0.6 Volt
Restore Voltage	9.5 ± 0.5 Volt	19.0 ± 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

Indicator Lights

AC (Green)	ON when AC input is on and charger is charging (indicates OK output is on).
DC (Red)	ON when cut-out relay is closed and DC output is present.

Environment

Operating Temperature	0 to +60°C at continuous full load
Temperature derating	derate 2W/°C up to 70°C maximum
Storage Temperature	-10°C – 70 °C (+14°F – 158°F)
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, IEC61326-1: Group I, Class A
Immunity – ESD	IEC 61000-4-2:2001, level 3
Immunity – RF Fields	IEC 61000-4-3:2003, level 3
Immunity – Fast Transients	IEC 61000-4-4:2004 2 kV – DC power port 1 kV – input/output lines
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

Ordering Information

ORDER CODE	DESCRIPTION
C2198A-1	Powerterm Model PTL50C 12V 5A PSU/Charger
C2198A-2	Powerterm Model PTL50C 24V 3A PSU/Charger





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Application Notes

BATTERY SELECTION

The PTL50C 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 battery 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. These calculations then gives the minimum Ampere-hour capacity required for battery in your application. In general, the larger the battery the better in any given application (size and cost being the compromise).
6. Choose the next highest standard size available from your chosen manufacturer.

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 PTL50C 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 battery voltage drops during discharge to its preset cut-off point, the cut-off relay in the PTL50C will disconnect the battery from the load. This prevents the battery from entering into a state of deep-discharge, protecting it from permanent damage.

When the AC supply returns, the cut-out relay will automatically reconnect the battery 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 battery.

A red lamp labelled 'DC' on the front of the PTL50C 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 $-3.3\text{mV}/^\circ\text{C}$ 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 PTL50C 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 PTL50C PSU/Charger should be mounted in the same environment as the battery to ensure that the temperature measured is representative of the temperature of the battery.

CHARGING TIME

The PTL50C is a dual-mode charger. This means that the battery is 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.

