Battery Selection

The PTL120C-D is designed to operate with sealed lead acid 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 the design limits. (That is why it is important not to overcharge VRLA 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 VRLA 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 a battery for your application, follow these simple steps:

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 charging time).
5. This then gives the minimum Ampere-hour capacity battery required for the application. In general, the larger the battery the better in any given application (size and cost being the compromise).

CE

INSTALLATION GUIDE

Powerterm PTL120C-D Dual Volltage PSU/Battery Charger Model C2197B

The PTL120C-D is a combined power supply/battery charger unit designed specifically for small uninterruptible instrument supply applications where loss of dc power during ac supply outages cannot be tolerated.
The PTL120C-D is designed for supply applications up to 4.2 Amps (1.5A on 12V version. Both 12Volt and 24Volt outputs are available.

These units incorporate all the functions required for a complete industrial grade uninterruptible dc power system. Minimal knowledge of battery charging and battery protection techniques are required for installation and operation.
Advanced battery management circuitry ensures that batteries are maintained at optimum charge levels over a wide temperature range, and ensures that batteries have the longest possible life.

Application Examples

- **Remote Terminal Units**
- **Alarm Systems**
- **Field Instrument Control Loops**
- **Remote Access Systems**

Features

- **DIN Rail (35x7mm) mounting**
- **Operates from 110 to 240 Vac 50/60Hz**
- **Operates with a wide range of sealed lead acid battery sizes.**
- **Constant Current charging independent of load current for optimum charge rate**
- **Optional temperature sensor for optimising battery float voltage over wide temperature swings**
- **AC detection relay incorporated.**
- **Charger shutdown input for battery testing.**
- **Current limited Battery charger for optimum battery life.**
- **Overload protection to protect wiring against short circuit faults across the battery.**
- **Under-voltage cut-out to protect battery from deep discharge.**
- **Dual mode charger for fast recharge with optimum battery float voltage.**

Specifications

Input Voltage

AC Input voltage range	85-264Vac (100-240Vac nominal)
AC input frequency	47-63 Hz
DC Input voltage range	85-264Vdc (derate 1%/V below 110Vdc) check *****
Input current at full load	<2.2A rms at 115Vac <1.5A rms at 230Vac
Switch-on inrush current	15A for <10ms
Surge withstand	2.5kA 8/20microsecond pulse 40 joules max.
Fast Transients	2 kV

DC Output

Nominal Output Voltage	**12V**	**24V**
Output Voltage	13.7+/-0.1V	27.4+/-0.2V
Voltage change from 20°C	-20mV/°C	-40mV/°C
Maximum load output voltage range over all conditions of battery, temperature and AC input	10.6V – 14.3V	21.2V-28.6V
Maximum Continuous Total Power	120 Watts from 12V and 24V combined at 60°C	
Rated Load Current	1A Continuous	4A Continuous
Battery Charging Current (current limited in charger)	1.2A min[1] 1.5A typical	1A min[2] 1.2A typical
Maximum Peak Load (drawn from the battery)	6A for 10s	6A for 10s

Charging Notes :

1. 12Volt power is available for 12Volt battery charging and 12V load supply. Therefore average 12Volt load +12Volt charge will not exceed this value .
2. 24V charge current is limited independently of load current at 1A nominal allowing 24V loadsup to 3A without affecting 24V battery charging. To derate supply at temperatures above 60 deg C reduce 24Volt dc load accordingly.

AC line regulation	0.5% max over 85-132Vac or 170-264Vac
Load Regulation	2% max over 10-100% load variation
Temp. Regulation	

Recommended Batteries

Quantity / Type	2 x 12Volt Sealed Lead Acid
Minimum Battery Capacity	7 Ah minimum recommended

AC Detect Output

A contact output across terminals 11 and 12 is provided to detect the presence/absence of the AC supply.

This contact monitors the Power Supply output (on the DC side). A closed contact confirms that the Power Supply is healthy and that the AC supply is present. The contact will open when the AC supply fails or when the Shut Down Test input is activated.

A green light labelled 'AC' on the front of the PTL120C-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.

Shut Down Test Input

Connecting terminals 14 and 15 together will lower the charger output for the purpose of testing the battery (battery takes over the load).

By monitoring the battery voltage over a short time interval, while holding the charger output low, the state of the battery can be determined. This will enable the health of the battery to be checked even when the AC supply is present. This can be used, for example, in remote RTU applications where regular system checks are necessary.

Low-voltage Cut-out

When the batteries voltage drops during discharge to a preset cut-off point, a cut-off relay in the PTL120C-D 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 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 PTL120C-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 batteries have been disconnected by the cut-out, both lamps will be off.

Charging Time

The PTL120C-D 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. In this mode the battery will be charged with a constant current until the battery reaches its bulk charge voltage. 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.

If it is important in the application that the battery be at design capacity within the ‘bulk’ charge phase, then it is wise to over-rate the battery by up to 15%, and to consider the battery fully charged when it reaches this 85-95% capacity.

As a rough working guide, the following table gives average standby and recharge times at 20°C for a range of popular battery sizes. The discharge times have been derated by 15% for reasons stated above and exclude the effect of battery ageing or temperature on the capacity of the battery.

It is recommended that you stay within the battery size limits as defined in the table.

	PTL120C-D	
Battery Size in AH	**Charge Time at 1.5A**	**Discharge Time at 4A**
2 Ah		
4 Ah	2.7 hrs	.8 hr
7 Ah	4.7 hrs	1.5 hrs
12 Ah	8 hrs	2.5 hrs
17 Ah	11.3 hrs	3.6 hrs
24 Ah	16 hrs	5.1 hrs

Use of 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 under-charge the battery at low temperatures.

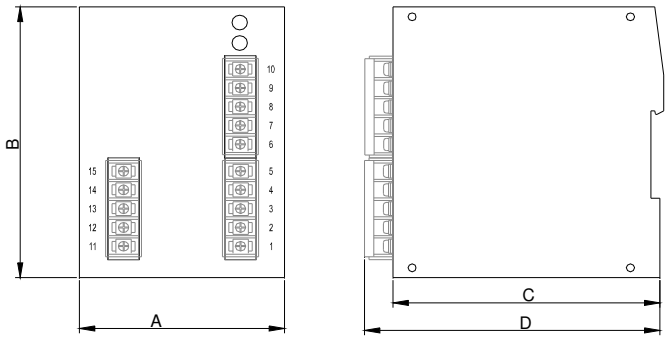
These PSU/Chargers are supplied from the factory with a resistor fitted to the temperature sensor terminals to set the float voltage for 25°C operation. Over a normal ambient working range of 15 to 35°C this is considered quite satisfactory, and no further temperature compensation is required.

If the average ambient temperature is likely to be outside of this range, then this resistor may be changed to simulate this environment. If the ambient temperature is likely to swing by more than about 15 to 20°C then it is advisable to fit the external temperature sensor. This sensor is fitted with a 500mm extension lead to allow it to be mounted with the battery, avoiding the possibility of erroneous temperature readings possible with chargers with integrated temperature compensation.

The following table gives the resistor values to be used to set the float voltage to the optimum setting for other ambient temperatures:

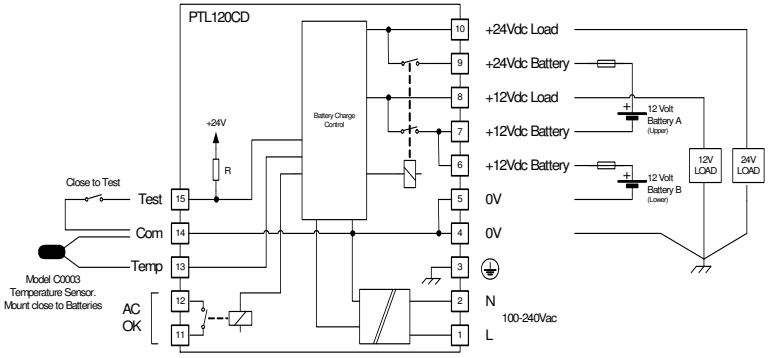
Temperature	Resistor	Float (12V)	Float(24)	Tolerance
0°C	33k	14.25V	28.5V	+/- 250mV
5°C	27k	14.22V	28.45V	
10°C	22k	14.18V	28.35V	
15°C	15k	14.05V	28.10V	
20°C	12k	13.97V	27.95V	
25°C	10k	13.90V	27.80V	(default)
30°C	8.2k	13.80V	27.60V	
35°C	6.8k	13.70V	27.40V	
40°C	5.6k	13.60V	27.20V	
45°C	4.7k	13.50V	27.00V	
50°C	3.9k	13.36V	26.72V	

Mechanical Dimensions



A	80mm
B	110mm
C	110mm
D	120mm

Electrical Connections



Under-voltage cutout

Output	12V	24V
Cut out Voltage	10.5 +- 0.3V	21+-0.6Volt
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	30Vdc
Max. closed circuit current	1A

TEST Input

Type	Connect Test Input to OV to test	
Max. Open Circuit Voltage	30Vdc	
Max. Closed Circuit Current	5mA	
Test Voltage	12V max	24V max
Test Method	When the test input is closed, the charger float voltages are lowered to just above the cut-out voltages. If the battery terminal voltages are above these settings, the batteries will take over supply to the loads. By checking the terminal voltages over a short time interval the health of the batteries can thus be checked.	

Mechanical

Weight (Unpacked)	750g approx
Dimensions	80mm x 110mm x 120mm (including terminals)

Compliance to Standards

Safety	IEC950; EN 60950:1995
Emissions	EN 55011 :1997 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 – AC & DC Power Ports 1 kV – other input/output lines
Insulation Resistance (100% tested)	100 Mohm 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
C2197B	PTL120C-D Dual Voltage PSU/Battery Charger
C0003	Powerterm Temperature Sensor (with 500mm lead)