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OPERATION AND INSTALLATION MANUAL

PB256-CML SERIES BATTERY CHARGERS / DC UNINTERRUPTIBLE POWER SUPPLIES

PB256-CML SERIES BATTERY CHARGERS / DC UPS

The PB256-CML series is a family of 13.8Vdc and 27.6Vdc 110W/140W off-line battery chargers / DC uninterruptible power supplies which operate from 220/240Vac mains power. When connected to a lead-acid battery, these units provide uninterrupted power to a DC load in the event of a mains failure.
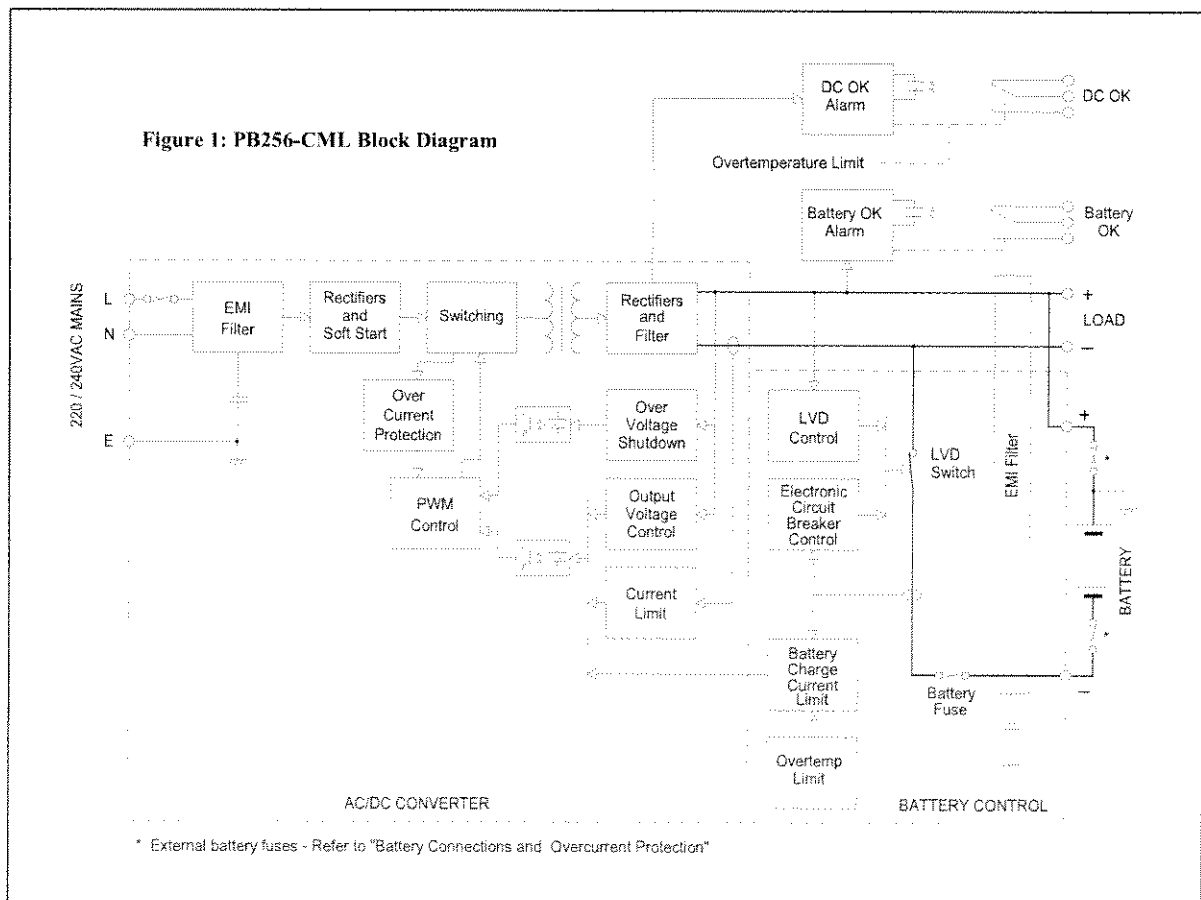
The PB256-CML contains a two-step current limited float charger, battery charge current limiting, a battery low voltage disconnect and mains/charger and battery alarms. It employs high efficiency switching technology, combined with very low output noise that makes it suitable for powering broad range of loads such as communication equipment, control equipment, alarm systems etc.

The PB256-CML is available in chassis mount enclosure. A supplementary heatsink is needed for 140W models to operate at maximum power. All models employ natural convection cooling.

FEATURES AND OPERATION

Figure 1 is a block diagram of the PB256-CML that details its various functions as follows.

- A high efficiency switching AC/DC converter provides 13.8Vdc @ 8A/10A or 27.6Vdc @4A/5A directly to the load and to charge the battery. This converter provides a constant output float voltage and a constant current limit. Latching output overvoltage shutdown and overtemperature limit are also included.

- The battery is connected across the output of the AC/DC converter via a low voltage disconnect switch (LVD switch) in the negative lead. As a result, the output and battery voltage are essentially equal and the battery is available to supply the load the instant when mains power fails.

- The PB256-CML operates as a two-step charger. If the battery is discharged and mains voltage is applied, the PB256 provides constant current to the battery. Once the battery voltage has risen to the float voltage, the AC/DC converter operates as a constant voltage charger.

Figure 1: PB256-CML Block Diagram

Battery charging current is controlled by its own constant current limiter. This circuit reduces the AC/DC converter output to control the charging current into the battery only. This current limiter has no effect on output current to the load.

- The unit is protected against battery reverse polarity by an internal fuse.

- To protect the battery against overdischarge, the LVD switch disconnects the negative load terminal from the negative battery terminal when the battery is fully discharged. This switch is automatically reset on reapplication of mains power. For this switch to operate correctly, the battery negative and load negative must not be connected together outside of the PB256.

- The LVD switch also operates as a self-resetting electronic circuit breaker for the battery. This protects the load wiring against overcurrents or accidental short circuits. The circuit breaker trips in less than 2ms for short duration current surges of greater than typically 350% of the AC/DC converter output current rating and in less than 300ms for overcurrents greater than typically 170% of the AC/DC converter output current rating.

- Overtemperature limit reduces total output power ensuring that maximum internal air temperature is not exceeded.

- Two alarms with separate voltage free changeover contacts are provided.

  DC OK indicates loss of mains power, failure of the off-line AC/DC converter and tripping of overtemperature limit.

  BATTERY OK is a battery low voltage alarm that indicates that the battery is becoming discharged. This alarm is also asserted if the battery fuse has failed.
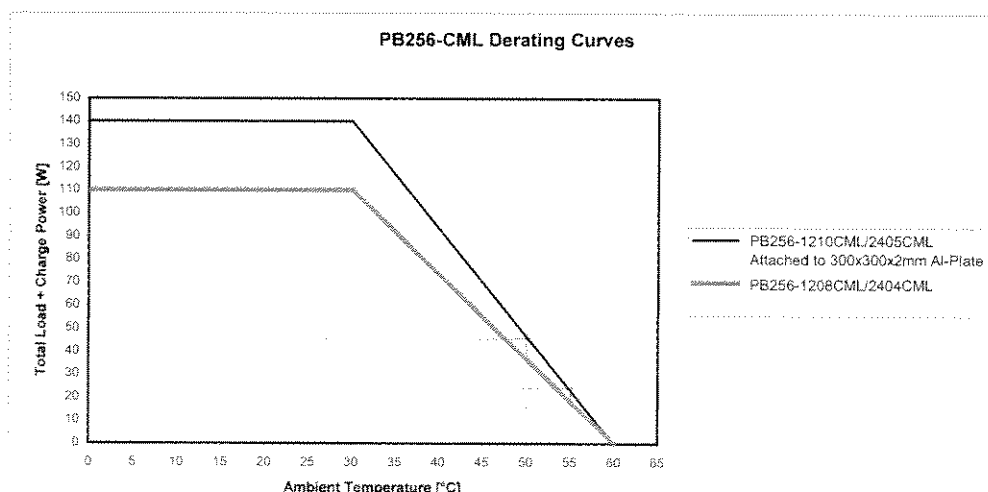
MODEL SUMMARY AND RATINGS
PB256 Ordering Information

PB256	-12	08	CML	-04
1	2	3	4	5

1 Series name

2 Output Voltage   12: 13.8Vdc
                                24: 27.6Vdc

3. Output Current
       04: 4A   08: 8A
       05: 5A   10: 10A

4. Enclosure
     CML: chassis mount

5. Battery Charging Current
     Blank: default (2A for12V version, 1A for 24V version)
        -xx: value 15-100% of maximum output current

MODEL	PB256-1208CML	PB256-1210CML	PB256-2404CML	PB256-2405CML
Total Load+Charge Power	110W	140W	110W	140W
DC Output	13.8V 8A	13.8V 10A	27.6V 4A	27.6V 5A
Battery Charge Current Limit (default)	2A	2A	1A	1A
Size	230 x 93 x 46mm (L x W x H)			
Weight	850g			

PB256-CML Derating Curves

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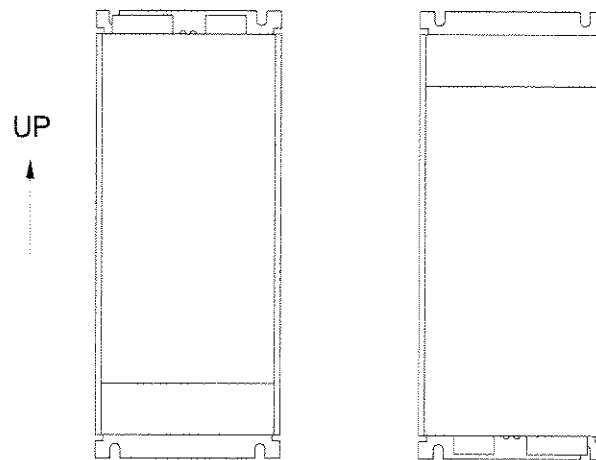### Sizing Example

The sum of the battery charge current and the load current must be kept less than or equal to the rated output current of the AC/DC converter at the required maximum ambient temperature.
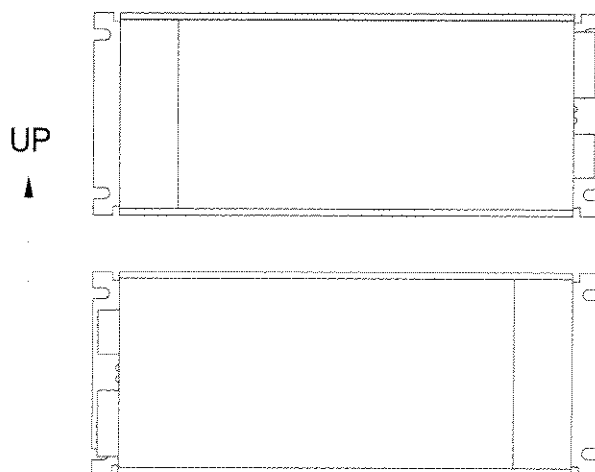
> For example: An installation must supply a 13.8V load of 4A and charge a 20Ah backup battery in a maximum ambient temperature of 40°C. The battery will require a maximum charging current of 2A (0.1C). The sum of the load current and maximum battery charging current is 4A + 2A = 6A. Multiplying by the float voltage gives a maximum output power of 13.8V x 6A = 82.8W. Referring to the derating curve, the PB256-1210CML has a maximum rated output power of 93.3W at 40°C so it is suitable for this application.

INSTALLATION

Mounting

The PB256-CML series chassis mount enclosure is designed to be mounted on a flat horizontal or vertical surface. The unit can be mounted horizontally or in the following vertical orientations without additional protection:

UP

If the unit is to be mounted in any of the following orientations, a non-combustible plate must be mounted below the unit or the unit must be installed inside a separate enclosure complying with AS/NZS60950:2000, Cl. 4.6.2.

UP

To operate at maximum power, 140W units must be attached to a heatsink with thermal resistance equivalent to or better than 300x300x2mm Aluminium plate. The heatsink mounting surface must be flat to within ±0.1mm.

Thermally conductive compound (Electrolube HTC35SL or equivalent) must be spread liberally across this interface to ensure low thermal resistance. The unit must be mounted vertically, as shown on figure below.

For all mounting positions make sure that there is at least 50mm clearance from the sides and the top of the unit to any object that might impede the airflow.

Terminals
Refer to mechanical outline drawings for terminal sizes and locations.

Battery Connections and Overcurrent Protection
The PB256-CML family is intended be used with valve regulated lead acid batteries of capacities typically between 10Ah and 20Ah. Larger batteries can be accommodated; however, the battery charging current limit may need to be adjusted at Powerbox's factory.

It is recommended that batteries be installed according to AS2676.2:1992. In particular, one or both of the battery leads must be protected against overcurrent by a fuse or circuit breaker located close to the battery. Refer to figure 1. If the positive terminal of the battery is solidly earthed, then a fuse or circuit breaker is only required in the negative terminal. If neither terminal of the battery is earthed, then a fuse or circuit breaker is required in both terminals. It is recommended that the negative terminal of the battery not be earthed. These protective devices must be sized to interrupt the short circuit current of the battery.

Initial Startup
1. Ensure that the external battery fuse in the negative battery lead is not installed and that all loads are either disconnected or turned off.
2. Apply 220/240Vac mains voltage to the input.
3. Measure the voltage at the output terminals of the unit. This voltage should be either 13.8Vdc or 27.6Vdc
4. Measure the voltage drop across the fuse holder in the negative battery lead. This voltage should be less than ±2.5Vdc for 13.8V models and less than ±5Vdc for 27.6V models. If the voltage is above this limit, the battery polarity is reversed and should be corrected before proceeding.
5. Install the fuse in the battery negative lead.
6. Measure the voltage across the battery. This should gradually rise indicating that the battery is charging.
7. Confirm that both LEDs on the unit are ON indicating no alarms.
8. Turn on loads or connect loads to the unit.

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SPECIFICATIONS

MODEL	PB256-1208CML	PB256-1210CML	PB256-2404CML	PB256-2405CML
MAX OUTPUT [W]	110	140	110	140
DC OUTPUT	13.8V 8A	13.8V 10A	27.6V 4A	27.6V 5A

SPECIFICATIONS

	MODEL	PB256-1208CML	PB256-1210CML	PB256-2404CML	PB256-2405CML
INPUT	VOLTAGE [V]	AC190 - 265 1ø or DC190 – 400			
	CURRENT [A]	1.3 max.	1.4 max.	1.3 max.	1.4 max.
	FREQUENCY [Hz]	50/60 (45 - 65)			
	EFFICIENCY [%]	80 min.			
	INRUSH CURRENT [A]	15 max. (cold start)			
OUTPUT (AC Mains Operation)	VOLTAGE [VDC][1]	13.8		27.6	
	CURRENT [A][2]	8.0	10.0[3]	4.0	5.0[3]
	CURRENT LIMIT [A][2]	9.0 typ.	11.2 typ.	4.8 typ.	5.9 typ.
	BATTERY CHARGING CURRENT LIMIT [A][4]	2.0 typ.		1.0 typ.	
	LINE REGULATION [%]	0.2 typ.			
	LOAD REGULATION [%]	2.0 typ.			
	RIPPLE [mVp-p][5]	25 max.		45 max.	
	NOISE [mVp-p][4]	20 max.		40 max.	
	OVERVOLTAGE SHUTDOWN	15.5 - 19.5 (Latching)		31.5 - 39.0 (Latching)	
	OUTPUT SHORT CIRCUIT PROTECTION	Indefinite (Autoresetting)			
	BATTERY CHARGER SHORT CIRCUIT PROTECTION	Indefinite (Autoresetting)			
	OVERTEMPERATURE LIMIT [°C][6]	110 typ. (Autoresetting)			
OUTPUT (Battery Operation)	VOLTAGE DROP BATTERY TO OUTPUT [V]	0.4 typ.		0.2 typ.	
	LOW VOLTAGE DISCONECT [V]	10.8 typ.		21.6 typ.	
	OUTPUT OVERLOAD PROTECTION	Battery Electronic Circuit Breaker			
	BATTERY REVERSE POLARITY PROTECTION	Internal Fuse			
DISPLAYS AND ALARMS	DC OK	LED (Green) ON=OK, Voltage-free Changeover Contact (32V,1A) Alarm on loss of mains, failure of AC/DC Converter and tripping of overtemperature limit			
	BATTERY OK	LED (Green) ON=OK, Voltage-free Changeover Contact (32V,1A) Alarm on battery low voltage or on failure of battery fuse.			
	Alarm Voltage (Falling) [V]	11.3		22.6	
ISOLATION	INPUT - OUTPUT	4242 VDC, 1 minute			
	INPUT - GROUND	2121 VDC, 1 minute			
	OUTPUT - GROUND	707 VDC, 1 minute			
SAFETY AND EMC	SAFETY	AS/NZS 60950, Class I			
	EMC	Complies with ACA EMC Scheme - C-Tick Emissions Comply with AS/NZS CISPR11 Group1, Class B			
ENVIRONMENT AND OTHERS	OPERATING TEMP AND HUMIDITY	0 to 60°C, 5 to 90%RH (Non condensing) (Refer to DERATING CURVE)			
	CASE SIZE / WEIGHT	230 x 93 x 46mm (LxWxH) / 850g			
	COOLING METHOD	Natural Convection			

[1] **WARNING: Do not apply voltages higher than the output voltage to the unit output or serious damage to the unit can occur!**

[2] Sum of load + batt. charging current

[3] To operate at maximum output current, these models must be attached to a 300 x 300 x 2mm Al plate or equivalent heatsink.

[4] This feature limits batt. charging current but not load current.

[5] Using a 20MHz oscilloscope at the output terminals.

[6] Internal air temperature

Left Side View

Right Side View

Front View

Top View

DC OK

BATT OK

NC C NO   NC C NO

LOAD   BATT
+ -   + -

NOTES:

1. Mounting Centres: 220 x 73mm, Suitable for M4 Hardware

2. AC Mains: 10A Class 1 IEC60320 power inlet

3. Output and Battery: 4W Pluggable Screw Terminal Block
   Suitable for up to 1.5 sq. mm wire.

4. Alarms: 6W Pluggable Screw Terminal Block
   Suitable for up to 1.5 sq. mm wire.

220

230

46

73

93