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# DATASHEET



## Pitch Battery Charger PBC



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# 1. Introduction

This document describes the PBC. The document is mainly intended for persons responsible for the integration of the PBC in their product as well as buyers and R&D engineers who needs detailed information about the PBC.

For specific information about the installation of the PBC, refer to the *PBC installation instructions*.

This document can be printed on either a colour or monochrome printer with no loss of information.




## 1.1 Revision history

Apart from editorial changes the following changes have been made in this revision:

Date	Revision	Changes
2022-09-09	D	Table in Variant dependent control specifications corrected
2017-01-06	D	The manual is converted to a generic manual, valid for all PBC variants. <ul style="list-style-type: none"> <li>Product name changed to the generic “PBC” in order to cover all variants</li> <li>All variants specifications are included</li> </ul> X4 (PT100) is optional depending on the variant.
2016-12-02	C	Vin specification changed
2012-12-14	B	This is the first version of the document.
N/A	A	Not used

## 1.2 Conventions

The following conventions are used in this document:

Used in document	Description
	A yellow symbol that illustrates hazard type (this symbol is an example for general hazard). There are different types such as electrical, chemical and so on.
Danger!	A signal word used to indicate an imminently hazardous situation, which if not avoided, will result in death or serious injury. (ISO 3864)
Warning!	A signal word used to indicate an imminently hazardous situation, which if not avoided, could result in death or serious injury. (ISO 3864)
Caution!	A signal word used to indicate a potentially hazardous situation, which if not avoided, could result in minor or moderate injury. (ISO 3864)
	A blue symbol illustrates a need for mandatory action. In this example read instructions. Other types of blue symbols exist and always indicate mandatory action.
	A symbol used to draw attention to extra information or an action that is not mandatory

Used in document	Description
PBC	PBC is a generic name for all variants of the Pitch battery charger

## 2. Safety information



### **Danger!**

Hazardous live currents and voltages. Do not touch any AC supply inputs and DC outputs as this could lead to injury or death. Only authorised personnel may install or operate the unit.

The installation and service of the units should only be handled by qualified persons, who are conscious of the risks involved.

Ensure that the grounded connection wire of the line is correctly connected to the line input of the unit. Load and service or measuring setup must be grounded, if possible, in order to protect the units and the persons working with them.

During normal operation, the persons working with the units have absolutely no contact to dangerous voltages within the unit.

## 3. General product information

### 3.1 Application

The PBC is a high-voltage battery charger, built to work in the rough environment of a wind turbine pitch application. It can be applied to charge and maintain the full-charge condition of closed or gastight 12 V or 24 V Pb (lead-acid) and gel type batteries as well as ultra-capacitors. Different variants are available with different output voltage and current, as well as battery temperature controlled (depending on the variant).

The PBC is a float (also known as trickle or standby) battery charger. Once the batteries are fully charged, the charger will go to float voltage mode, thereby compensating for the self-discharge of the batteries or ultra-capacitors, and keeping them fully charged.

### 3.2 Features

The PBC offers the following features:

- Simple function and interface
- Base mounting (with six fixing holes)
- Temperature- controlled for lead-acid batteries (on some variants)
- Overvoltage protection
- LED indicators for power OK and alarm indication
- Alarm relay output contacts
- Convection cooling, no moving parts
- Output short circuit-protected
- Reverse polarity-protected
- Low output ripple and noise level
- Lower volume compared to similar alternatives
- Galvanically isolated input and output, typically 4 kV
- High efficiency
- High reliability, long life

### 3.3 Product variant overview and ordering information

Product	Output voltage (nominal)	Output current	Temperature controlled	DEIF ordering no.
PBC-300-2	300 V DC	2 A DC	No	1240040004
PBC-2	330 V DC	1.8 A DC	Yes	1240040001
PBC-360-2	360 V DC	1.7 A DC	No	1240040005
PBC-385t-2	385 V DC	1.54 A DC	Yes	1240040008
PBC-425-2	425 V DC	1.5 A DC	No	1240040006
PBC-450-2	450 V DC	1.35 A DC	No	1240040007

## 4. Technical information

This section describes the technical aspects of the PBC.

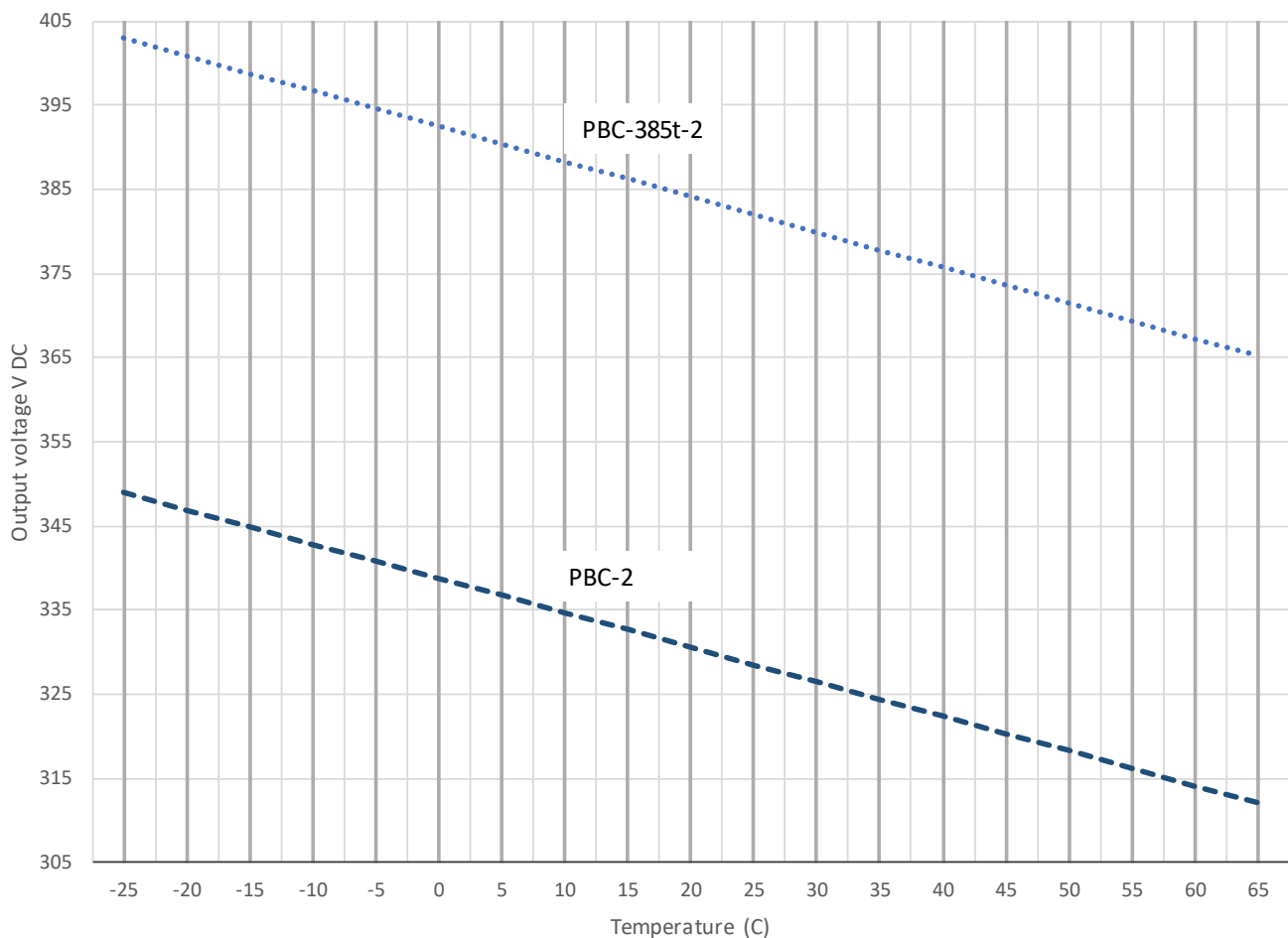
### 4.1 Temperature controlled output and float charge



#### Attention

This section applies only for chargers with temperature control.

To ensure optimal charging of the batteries, some of the PBC variants have a temperature input, X4, and a built-in charging characteristic for lead-acid batteries type that compensates for the change of temperature. The output voltage is adjusted in the temperature range  $-25^{\circ}\text{C}$  to  $+65^{\circ}\text{C}$  (sensed by 3-wire PT100). The voltage will be adjusted by approximately  $-0.4\text{ V}/^{\circ}\text{C}$ .



#### Info

It is recommended to fasten the temperature sensor on one of the batteries, since batteries get warmer during charge. Fastening the sensor on a battery will ensure optimal charging.

## 4.2 Technical specifications

### 4.2.1 Input (X1)

Input voltage (Vin)	185 – 230 V AC
Input current	4.4 A RMS (full load)
Turn on voltage	Vin >95% Vin(min)
Max. permissible voltage	105% of Vin, continuously 115% of Vin, for 30 – 300 s 120% of Vin, for 2 – 30 s 130% of Vin, for 0,8 – 2 s
Fuse/MCB	External 10 AT (slow blow) or 10 A D-characteristic
Frequency range	40-70 Hz (supply)
Power factor AC input	0.65-0.75 capacitive
Crest factor (AC) input	2.0-2.5
Switch-on time	Typically 2 s
Hold-up time	Typically 15 ms



## 4.2.2 Output (X5)

### 4.2.2.1 Common specifications

Line regulation	0.6%, measured directly at the connection terminal
Load regulation	1.0%, measured directly at the connection terminal
Current derating	None
Ripple	<1% p-p without battery (typically 1 V p-p)
Response time	Typically 2 s
Load transient 10-100-10%	Typically 6% ( $\pm 20$ V)
On/off overshoot	None
Protection diode	Internal series decoupling diode at +output
Overvoltage protection	Electronically. Se section <a href="#">0</a> on page <a href="#">9</a> for value
Current protection	Electronically short circuit protection

### 4.2.2.2 Variant specific output specifications

Variant	Output voltage	Output current	Output overvoltage protection
PBC-300-2	300 V DC	2 A DC	370 V DC
PBC-2	330 V DC nominal, 312 (@65°C) – 349 (@-25°C) V DC temperature controlled	1.8 A DC.	370 V DC
PBC-360-2	360 V DC	1.7 A DC.	400 V DC
PBC-385t-2	385 V DC nominal, 365 (@65°C) – 403 (@-25°C) V DC temperature controlled	1.54 A DC.	425 V DC
PBC-425-2	425 V DC	1.5 A DC.	465 V DC
PBC-450-2	450 V DC	1.35 A DC.	490 V DC

### 4.2.3 Battery check (X3)

Battery check (X3)	Programming signal to decrease output voltage Activated by control signal 12-30V DC, max. 10 mA (24V DC) SELV: <ul style="list-style-type: none"> <li>• High = output voltage low, <math>V_{out} - 10\%</math></li> <li>• Low = output voltage nom. voltage (charge mode)</li> </ul>
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### 4.2.4 Temperature control (X4)

The following variants have temperature control:

PBC-2	Output characteristic are temperature-controlled (-25 to +65°C)
PBC-385t-2	Output characteristic are temperature-controlled (-25 to +65°C)



#### Attention

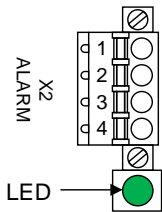
The PT100 terminal (X4) is not galvanic insulated from the output X5, and therefore must be connected using double insulated shielded wire (Test voltage min. 4000V).and protect against direct contact.

## 4.2.5 Monitoring (X2)

### 4.2.5.1 Common specifications

Alarm relay that indicates the state of the battery or ultra-capacitor's voltage. The relay is active when the battery or ultra-capacitor voltage is over the variant specific limit see section [4.2.5.2](#) on page [11](#).



Alarm relay contact type	potential free contacts (1 NO/1 NC)
Alarm relay contact load	max. 110 V DC/60 W



#### Info

The green LED is a visual indication of the alarm relay state.

#### Green LED

-  LED on: Alarm relay is active.  
The battery voltage is above the voltage limit
-  LED off: Alarm relay is not active.  
The battery voltage is under the voltage limit

### 4.2.5.2 Variant dependent control specifications

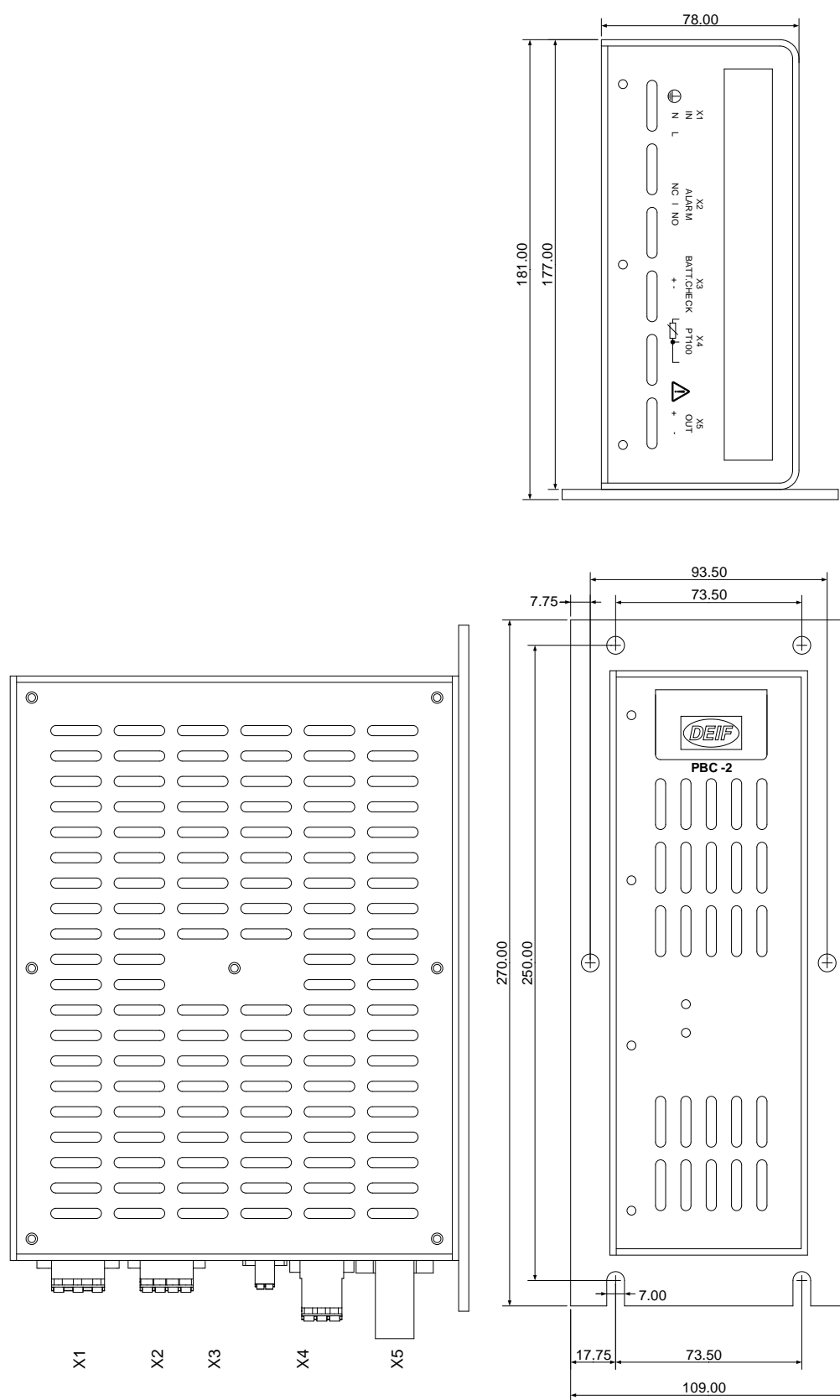
Alarm relay (X2) battery/ultra-capacitor voltage limits:

PBC-300-2	Relay active if output $\geq 265$ V DC.
PBC-2	Relay active if output $\geq 295$ V DC.
PBC-360-2	Relay active if output $\geq 325$ V DC.
PBC-385t-2	Relay active if output $\geq 344$ V DC.
PBC-425-2	Relay active if output $\geq 395$ V DC.
PBC-450-2	Relay active if output $\geq 420$ V DC.

## 4.2.6 General

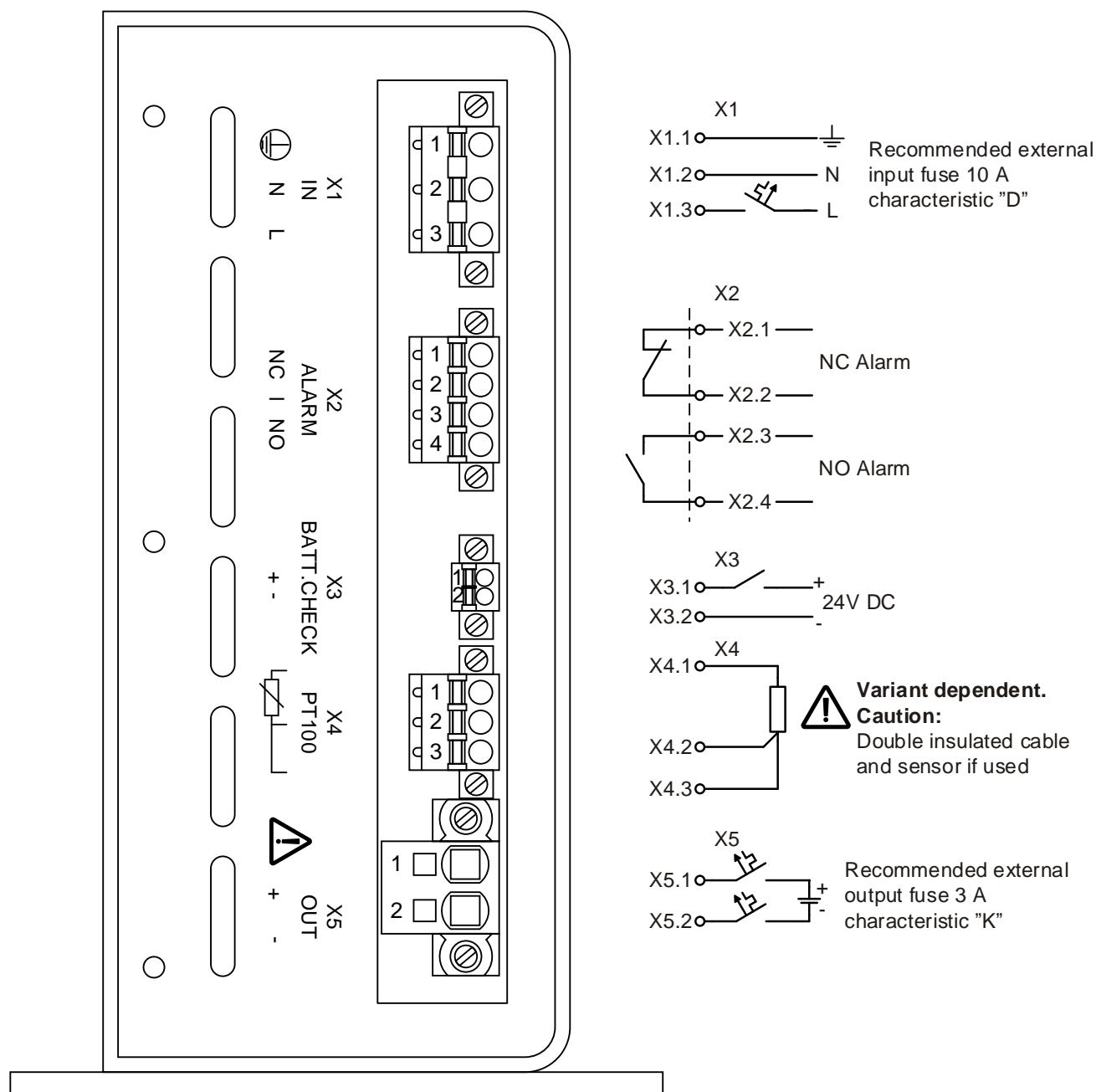
Case	Painted aluminium and steel
Weight	2.80 kg (61.7 lbs)
Dimensions	W x H x D in mm ("): 109 (4.29) x 270 (10.63) x 181 (7.13)
Mounting	Chassis mount, Ø 7 mm. Max Torque: 12 Nm (106 lb-in)
Terminals	Spring-loaded connectors X1, X2, X4: 2.5 mm <sup>2</sup> X3: 1.5 mm <sup>2</sup> X5: 6.0 mm <sup>2</sup>
Temperature range	Operating, free convection: -25°C to +65°C Storage: -40°C to +85°C <b>Note:</b> from 2000 to 4000 m altitude, the maximum operating temperature decreases with 1°C per 200 m altitude increase.
Altitude	Maximum 4000 m
Humidity	95% (operating, no condensing)
Efficiency at full load	>90%
Creepage distances	Connector/ground: 6.4 mm
Air distances	Connector/ground: 5 mm
EMC/CE	IEC/EN 61000-6-4, IEC/EN 61000-6-2 Spikes: According to IEC/EN 61000-4-5, class 3 Bursts: According to IEC/EN 61000-4-4, level 3
Vibration	3...13.2 Hz: 2 mmpp 13.2...100 Hz: 0.7 g to IEC 60088-2-6 & DNV Class A 3...13.2 Hz: 6 mmpp 13.2...50 Hz: 2.1 g to IEC 60088-2-6 & DNV Class C
Shock	10 g, 11 ms, half sine to IEC 60255-21-2 Response (class 2) 30 g, 11 ms, half sine to IEC 60255-21-2 Withstand (class 2) 50 g, 11 ms, half sine to IEC 60068-2-27
Bump	25 g, 16 ms, half sine to IEC 60068-2-27 & IEC 60255-21-2 (class 2)
Safety	Installation Cat.III 600V, Pollution degree 2, IEC/EN 60950-1
Protection	IP 20, IEC/EN 60529

## 5. Mechanical drawings



**Figure 1** PBC mechanical drawing

## 6. Connections



**Figure 2** Connection diagram

## 7. Glossary

### 7.1 Terms and abbreviations

LED	Light emitting diode
MCB	Main circuit breaker
PBC	Pitch battery charger, also a generic name for the whole product family

### 7.2 Units

Unit	Unit Name	Quantity name	US unit	US name	Conversion	Alternative units
A	ampere	Current				
°C	degrees Celsius	Temperature	°F	Fahrenheit	$T[^{\circ}C] = \frac{(T[^{\circ}F] - 32^{\circ}) \times 5}{9}$	
g	gram	Weight	oz	ounce	1 g = 0.03527 oz	
Hz	hertz	Frequency (cycles per second)				
kg	kilogram	Weight	lb	pound	1 kg = 2.205 lb	
m	metre	length	ft	foot (or feet)	1 m = 3.28 ft	
mA	milliampere	Current				
mm	millimetre	Length	in	inch	1 mm = 0.0394 in	
ms	millisecond	Time				
Nm	Newton metre	Torque	Lb-in	pound-force inch	1 Nm = 8.85 lb-in	
s	second	Time				
V	volt	Voltage				
V AC	volt (alternating current)	Voltage (alternating current)				
V DC	volt (direct current)	Voltage (direct current)				
W	watt	Power				