

**BORDLADER** (on-board charger)  
with combined Wae- / Wu-characteristic

**LG 12/50, LG 12/80**  
**LG 24/30, LG 24/50, LG 24/80**

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## Introduction

„philippi bordlader“ are designed to charging lead accumulators for use on yachts and pleasure boats. These on-board chargers are able to charge a on-board battery (Wae-/Wu-characteristic) and a starter battery (Wu-characteristic) at the same time.

## Features

### ***Complete DC power supply on-board***

These Chargers are able to provide for the complete DC power supply on-board, while at the same time charging the on-board batteries with combined Wae/Wu-characteristic. Separately, a second charger step with Wu-characteristic charges the starter battery. -The tickle charge (Wu-characteristic) with a current of 2 A is suitable for a permanent winter charging of both batteries.

### ***Automatic charging process***

The newly developed electronic control of these chargers prevents dangerous gassing, and a additional charging step with Wu-characteristic ensures the trickle charge of the on-board battery after completion of the heavy charging duty. Automatic reset of the battery charging procedure when the battery voltage falls down (<12,5 V) due to the battery being discharged, is ensured.

### ***Permanently connection***

The on-board charger may be permanently connected without danger to the batteries. The electronic control provides for a optimum and safe charging process.

### ***Equalizing charge***

By using the key switch you can start a equalizing charge to regenerate sulphated batteries. The equalizing charge must not used on completely closed and gas-tight battery systems.

### ***Sea water resistant materials***

The aluminium housing of the chargers is sea water resistant and finished with a plastic protective coating. All screws are made of stainless steel. The transformers are hermetically sealed and thus protected against humidity.

## Caution

In no cause connect the batteries in wrong polarity to the charger. There is no active reverse battery protection.

The equalizing charge by using the key switch must not used on completely closed and gas-tight battery systems. It is not useful to run the on-board charger in combination with a multi battery isolator.

## Installation

The on-board charger may be installed wherever you want to. Use 4 screws to fix the charger standing upright. Please take care that the battery chargers are properly secured mechanically.

The chargers must neither be installed directly in the battery room nor in the gasoline engine room nor where the fuel tanks are stored (due to the explosion hazard because of gassing vapours from the batteries (oxyhydrogen) or any gasoline vapours that may emit). Please take care that the chargers are installed in a place where is sufficient air circulation cooling the power electronics and the transformer.

## Electrical connection

The direct and imperative original battery voltage supply of the control electronics via an additional holding wire for B+ and B- is a special feature of all philippi on-board chargers. This means another 1,5 mm<sup>2</sup> cable as a holding cable for the + and the - pole directly to the on-board battery. The holding cable must not be bridged at the battery charger. The correct performance of our battery chargers is only ensured if they are properly connected!

## Shore-power connection

230 V/ 50 Hz with mains earthing-contact type plug for appropriate socket (3 x 0,75 / 1,5 mm<sup>2</sup> cable).

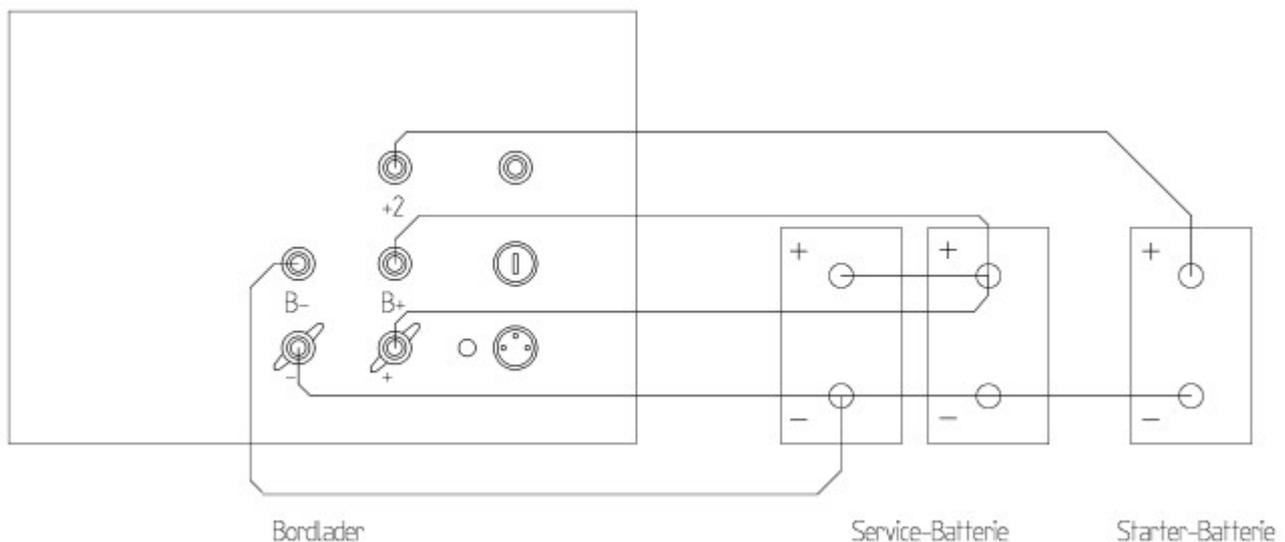
## Battery connection

The connection plugs are on the front side of the housing. Please take care to the right battery connection. The on-board charger has no active reverse battery protection. Please take also care that the charging and holding cables from the battery charger to the batteries are correctly laid and dimensioned to get the best charging power.

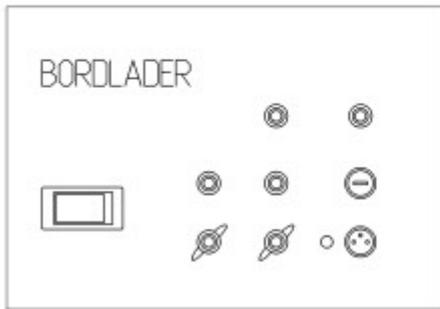
Battery cables to load should also be protected by appropriate protection devices -please see our relevant sales programme.

| terminals                        | sections              | dimensions          |                      |                      |
|----------------------------------|-----------------------|---------------------|----------------------|----------------------|
|                                  |                       | bordlader 30 A      | bordlader 50 A       | bordlader 80 A       |
| charging wire negative pole (-)  | all batteries (-)     | 6,0 mm <sup>2</sup> | 16,0 mm <sup>2</sup> | 35,0 mm <sup>2</sup> |
| charging wire positive pole (+1) | on-board battery (+)  | 6,0 mm <sup>2</sup> | 16,0 mm <sup>2</sup> | 35,0 mm <sup>2</sup> |
| holding wire positive pole (B+)  | on-board battery (+)  | 1,5 mm <sup>2</sup> | 1,5 mm <sup>2</sup>  | 1,5 mm <sup>2</sup>  |
| holding wire negative pole (B-)  | on-board battery (-)  | 1,5 mm <sup>2</sup> | 1,5 mm <sup>2</sup>  | 1,5 mm <sup>2</sup>  |
| charging wire positive pole(+2)  | starter-battery 1 (+) | 2,5 mm <sup>2</sup> | 2,5 mm <sup>2</sup>  | 2,5 mm <sup>2</sup>  |

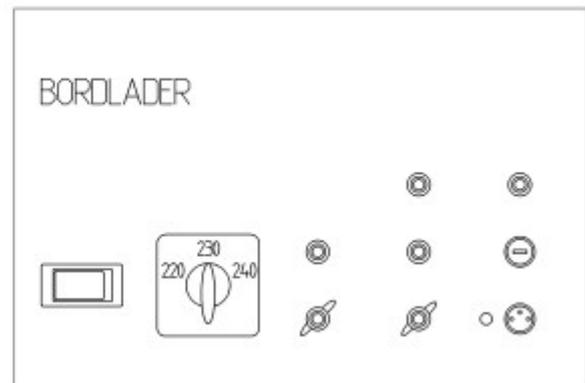
## Wiring diagram



## Design and performance



LG 12/50-150 B, LG 24/30-230 B



LG 12/80-180 B, LG 24/50-250 B, LG 24/80-280 B

### **Mains switch / circuit breaker**

The on-board battery charger may be switched ON or OFF by means of the mains switch. With the switch OFF the control electronic with the battery connected will require less than 1 mA only. The integrated mains circuit breaker will trip at overload, overheat or when the transformer is defective (thermal protection). After the battery charger cooling down, the circuit breaker may be manually turned ON. If the charger is installed where it is not easily accessible, the switch may be permanently ON. In this case the battery charger is switched ON or OFF by means of an external switch in the power line

### **Charging control**

A signal lamp indicates that the charger is operating. A control button may be inserted into the pertinent jack in the charger to externally control the charging process and to remotely control the battery charger (accessory FB). Upon reaching the gassing voltage at 14,4 V, the lamp extinguishes and signals completion of the charging process with Wae-characteristic. An additional function of this control button makes it possible to manually start the charging process before the on-board battery voltage reaches the lower automatic starting value at 12,5 V. The control lamp will then immediately indicate the new charging process. Afterwards the on-board charger will operate automatically again.

### **Equalizing charge (not for completely closed and gas-tight battery systems!)**

All controlled battery chargers that do not exceed the gassing voltage will charge the batteries connected up to max. 14.4 V or 28.8 V only. The voltage at the end of the charging process will be higher, i.e. ca. 15,6 V or 31,2 V. The battery will gas in this range.

It is necessary to have the batteries fully charged and caused to gas from time to time. To do this use the key switch „equalizing charge“ integrated in the battery charger. Operation this key switch changes the automatic Wae-characteristic into the normal W-characteristic. The key switch bypasses the control electronic. In the normal condition, with the electronic connected, it may be removed easily. With the electronic disconnected, the key cannot be removed from the switch. This is to remind you that the battery charger is not in its normal condition.

The equalizing charge should be carried out at least once or twice a year. This ensures a longer battery life and a higher capacity reserve. In the course of time, a sulphate layer will built up on the positive battery plates. This layer may be partly removed by the gassing process. The positive plates will also sulphate when the battery is deep-discharged, in which case the layer may become so thick that the battery does hardly accept the charge: the voltage is forced up, but the battery is not charged. In this case, please operate the key switch in order to provide for recharging. The equalizing charge may last about 10 hours without the batteries being damaged. Upon completion of the equalizing charge process it is imperative to check the acid level of the batteries and to add distilled water, if necessary. The battery valves shall be open during the equalizing charge process and the battery room shall be well ventilated. Please don't use any open light and don't smoke -oxyhydrogen gas hazard!

### **Charging current circuit breaker**

A thermal protection device is provided on the right side of the on-board charger. This circuit breaker will trip at overload or overheat. It should only be reset after the battery charger has cooled down. If the circuit breaker trips again after a short time, please check if there is an overload in the electrical system (e.g. short-circuit, or sustained excessive battery load).

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## Mains selector switch (types LG 12/80, LG 24/50 and LG 24/80 only)

This selector switch offers the possibility to choose the input voltage between 220-, 230-, 240 V. Selecting different voltage positions the charging rate is influenceable. If the charger is connected to a generator (230 V) the position 220 V will be recommended.

## Charging time

| on-board charger                             |               | LG 12/50-150 B | LG 24/30-230 B | LG 12/80-180 B | LG 24/50-250 B | LG 24/80-280 B |
|--|---------------|----------------|----------------|----------------|----------------|----------------|
| recommended capacity of the on-board battery |               | 240-450 Ah     | 110-250 Ah     | 420-800 Ah     | 240-450 Ah     | 420-800 Ah     |
| charging time* for % of capacity             | 0 up to 85 %  | max. 8 h       |                |                |                |                |
|  | 0 up to 100 % | max. 72 h      |                |                |                |                |

\* Test conditions : LG 12/50-115 B: max. 50 A charging current, 250 Ah capacity  
 LG 12/80-180 B: max. 80 A charging current, 450 Ah capacity  
 LG 24/30-230 B: max. 30 A charging current, 150 Ah capacity  
 LG 24/50-250 B: max. 50 A charging current, 250 Ah capacity  
 LG 24/80-280 B: max. 80 A charging current, 450 Ah capacity

## Ratings

| on-board charger                 | LG 12/50-150 B | LG 24/30-230 B | LG 12/80-180 B | LG 24/50-250 B | LG 24/80-280 B |
|----------------------------------|----------------|----------------|----------------|----------------|----------------|
| rated supply voltage             | 230 V          |                |                |                |                |
| rated mains current              | 2,9 A          | 3,2 A          | 4,7 A          | 5,3 A          | 8,5 A          |
| rated power                      | 670 VA         | 740 VA         | 1080 VA        | 1220 VA        | 1960 VA        |
| power frequency                  | 50 / 60 Hz     |                |                |                |                |
| rated battery voltage            | 12 V           | 24 V           | 12 V           | 24 V           | 24 V           |
| Wae turn off voltage Tol. -0,2 V | 14,4 V         | 28,8 V         | 14,4 V         | 28,8 V         | 28,8V          |
| Wae turn on voltage Tol. -0,2 V  | 12,5 V         | 25 V           | 12,5 V         | 25 V           | 25 V           |
| Wu voltage                       | 13,8 V         | 27,6 V         | 13,8 V         | 27,6 V         | 27,6 V         |
| characteristic on-board battery  | Wae/Wu         |                |                |                |                |
| max. current on-board battery    | 50 A / 2 A     | 30 A / 2 A     | 80 A / 4 A     | 50 A / 4 A     | 80 A / 4 A     |
| characteristic starter battery   | Wu             |                |                |                |                |
| max. current starter battery     | 2 A            | 2 A            | 4 A            | 4 A            | 4 A            |
| temperature range                | -10 °C / 40 °C |                |                |                |                |
| weight                           | 12 kg          | 12 kg          | 21 kg          | 21 kg          | 26 kg          |
| dimensions WxLxH                 | 310x245x205 mm |                |                | 400x320x245mm  |                |

## Additional Information

We wish to give some additional information on the capacitance performance when monitoring on-board batteries. A battery may only be checked under load. In this case a good voltmeter will be able to detect immediately if the battery is still operable. If the battery voltage after disconnecting the charging process with Wae/Wu-characteristic (charger must be disconnected) stabilises at ca. 13.3 V to 13.7 V, or 26.6 V to 27.4 V, the battery is all right. The battery voltage of a defective battery or a battery with sulphated positive plates will decrease sensibly below its rated voltage. In such case, an equalizing charge will help -but the battery will suffer a capacitance loss in any case. In our catalogue we are offering suitable measuring instruments to monitor your on-board systems.