Splash proof battery chargers

– For all type lead/acid batteries –

LADAC

Objective

The objective for Ladac is to give our customers an optimal use of products that get their energy from batteries. We want to be an active partner in creating good charging solutions, safe charging and lowering service costs.

We want the customer back but not the charger.

- ☑ **Splash proof IP66/67**
- ☑ **Automatic float charging**
- ☑ **Easily installed**
- ☑ **Safe against short circuiting**
- ☑ **Inadvertent polarity safe**
- ☑ **Double insulated**
- ☑ **Indicates charging process**
- ☑ **Charges batteries individually**
- ☑ **Safe against overheating**
- ☑ **Does not charge destructively discharged batteries**

Why do we need battery chargers?

A lead/acid battery charges fast up to approx. 80-85% capacity. To get up to 100%, additional 8-16 hours charging is needed.

On a long term base - battery that never has been fully charged will die a too early death.

Why is that?

During the past years, more and more equipment has been developed and installed onboard vehicles and boats in order to make our workday or off duty time more convenient and/or pleasant. Requirement for more power has increased since a lot of this equipment need electricity to operate even if the engine is not running.
When batteries deliver more power than we are able to charges it, or when we store it, batteries will self **discharge.**

Self discharging of a battery takes place inside the battery and through creeping current on the outside (keep the poles clean and dry at all time). In order to avoid self discharging it is important to have a float charging voltage connected at all time to keep the battery fully charged. It is even more important to have floated charging voltage connected when we have major variances in air temperature. The air temperature has following effect on a fully charged battery:

+25 °C gives 100% capacity
0 °C give 65% capacity
- 18 °C give 40% capacity

Charging state unlikeness

In a series connected battery system an unlikeness between the charging stages of the batteries will appear over time. This unlikeness will grow wider each time the batteries been charged. This problem lowers the capacity and leads to an early battery death. Ladac has developed battery chargers that solve this problem by treating each battery individually even when they are connected in larger battery systems. This type of charging eliminates the differences in charging stages and battery age and it is always a valuable asset.

Hidden cost

When a bus or truck has a break-down, it will be towed to a service station or serviced in the field. If and emergency happend on a ship and the life-boat engine would not start, it's just too late start thinking about charging the batteries properly.
There may be other reason for not getting the engine run, but for a ship owner it is in great important to eliminate as many possible things that can happend up front.

This is how Ladac battery chargers work

1 *The charger will read the electrical statues of the battery and determines charging level.*

2 *When the battery is full, the charger goes to float charging. At all times, the charger monitors the battery.*

Individual charging

In all Ladac splash proof chargers there are separate charging modules (1 to 4 per charger). The modules deliver 12 Volt 5 Amp. each. Each channel is connected to a battery and serves individual 12V charging, even if the battery is connected in a 12V, 24V, 36V or a 48V system.

Parallel current consumption

If there is parallel current consumption during charging, this consumption should not exceed 0,5 Amp. per channel. If more parallel consumption is present, Ladac has other types of chargers better suited.

Easy to use - easy to install

Ladac chargers need main connection and two cables to each battery. If a wrong battery connection is made, a red lamp lit, and no harm is done to the charger. Neither is there any fuses blowing.

Easy use - connect to main - the charger takes care of the rest.

The charger need a battery source, in order to work.

Prolong the battery life time

Lead/acid batteries will last the longest when they are fully charged at all times. Most batteries, though, are never fully charged and therefore die an early death. A fully automatic Ladac charger is constructed to fully charge and then float charge the batteries. This means that the charger can be connected at all times without any risk of high water consumption.

Ladac splash proof chargers are made to be mounted in tough environments - in the engine room, in a lifeboat, in a fishing boat or outdoors. They are easy to install, and may be pressure washed

L0312 / L0512

Order no.:	*L0312C / L0512C*
Mains voltage:	*230VAC*
Charging voltage:	*14,7VDC*
Float voltage:	*13,7VDC*
Charging current:	*3A / 5A*
Water tightness:	*IP67*
Weight:	*1,4 kg / 1,8 kg*

Exist as well in 24V version with half current.

These chargers do the job with good protection.

Protected against reverted polarity.

Short circuit protection.

Draws no return current when disconnected from main.

Can be used as power-supply when changing batteries.

Can be delivered with Calix cable-system.

0512

Order no.:	*00512C*
Mains voltage:	*230VAC*
Charging voltage:	*14,4VDC*
Float voltage:	*13,3VDC*
Charging current:	*5A*
Dimensions (HxWxD):	*108x74x81mm*
Water tightness:	*IP67*
Weight:	*1,5 kg.*

Ladac 512 is a single channel charger for 12V lead/acid batteries. It delivers max. 5 A
It may be installed in the engine compartment of a car, on a tractor, on a harvester, in a boat or in any other tough environment. Draws no return current when disconnected from main.

Universal

Order no.:	*4041UNC*
Mains voltage:	*230VAC*
Charging voltage:	*14,4VDC*
Float voltage:	*13,3VDC*
Charging current:	*10A*
Dimensions (HxWxD):	*245x135x80mm*
Water tightness:	*IP66*
Weight:	*4,5 kg.*

Universal is also a single channel charger, but gives more effect than the 0512. Stand-by engines - equipment such as emergency generators or motor pumps which need a starting battery. The battery can be charged with the Universal and be full at all times without "boiling" of the battery. Draws no return current when disconnected from main.

Dual Universal

Order no.:	*4041DUC*
Mains voltage:	*230VAC*
Charging voltage:	*2x14,4VDC*
Float voltage:	*2x13,3VDC*
Charging current:	*2x5A*
Dimensions (HxWxD):	*245x135x80mm*
Water tightness:	*IP66*
Weight:	*4,5 kg*

Dual Universal is an automatic charger made for 24V battery systems. It may as well be used for charging two 12V battery in series or two separate 12V batteries (i.e. starting battery and service battery). Draws no return current when disconnected from main.

Marine

Order no.:	*4041EMC*
Mains voltage:	*230VAC*
Charging voltage:	*14,4VDC*
Float voltage:	*13,3VDC*
Charging current:	*10A*
Dimensions (HxWxD):	*245x135x80mm*
Water tightness:	*IP66*
Weight:	*4,5 kg*

Boats - small vessels and pleasure crafts often need a trickle charging during shore side to compensate for the voltage loss when the engine is not running. The Ladac Marine will do this job without harming the batteries. It has one output of 12V 10 Amperes. Draws no return current when disconnected from main.

Dual Marine

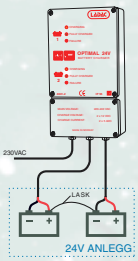
Order no.:	*4041DMC*
Mains voltage:	*230VAC*
Charging voltage:	*2 x 14,4VDC*
Float voltage:	*2 x 13,3VDC*
Charging current:	*2 x 5A*
Dimensions (HxWxD):	*245x135x80mm*
Water tightness:	*IP66*
Weight:	*4,5 kg*

Due to the two-channel charging technique, the starting battery and the service battery can be charged individually through two outputs of 12V 5 Amp. each. Draws no return current when disconnected from main source. Paralell power max 1 Amp. per channel.

Optimal

Order no.:	*4041OPC*
Mains voltage:	*230VAC*
Charging voltage:	*2x14,4VDC*
Float voltage:	*2x13,3VDC*
Charging current:	*2x5A*
Dimensions (HxWxD):	*245x135x80mm*
Water tightness:	*IP66*
Weight:	*4,5 kg*

Trucks - many trucks have extra equipment that requires additional electrical power. Electrical lifts, small cranes, electrical pumps and retarders demands high amounts of energy. During normal operation, the vehicle generator is not able to fill the batteries completely. The Optimal uses the "down time" to fill the batteries. Draws no return current when disconnected from main. Also in MIL-version (Nato # 6130-25-150-2736 Optimal MIL) Ladac supplier # N3890



Optimal charges a 24V system. The connection between the batteries may be removed, Optimal then charges two 12 V batteries.

Duplex

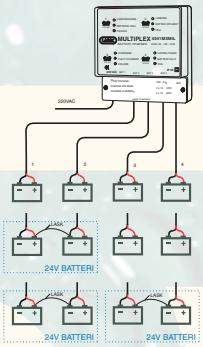
Order no.:	*4041DXC*
Mains voltage:	*230VAC*
Charging voltage:	*2x14,4VDC*
Float voltage:	*2x13,3VDC*
Charging current:	*2x10A*
Dimensions (HxWxD):	*245x220x80mm*
Water tightness:	*IP66*
Weight:	*9,3 kg*

Powerful DUPLEX has 2 channels, each of 10 Amperes. All electronic parts are moulded in, this allows the charger to be mounted in tough environments - on the truck frame, in a fishing boat, anywhere outdoors. The batteries will always be ready for use. Duplex can take 2 Ampere of parallel current consumption per channel (like pumps or radio equipment) and is therefore ideal for buses and rescue vehicles.

Multiplex

Order no.:	*4041MXC*
Mains voltage:	*230VAC*
Charging voltage:	*4x14,4VDC*
Float voltage:	*4x13,3VDC*
Charging current:	*4x5A*
Dimensions (HxWxD):	*245x220x80mm*
Water tightness:	*IP66*
Weight:	*9,3 kg*

Ladac Multiplex has gotten its name from its flexibility. It can be connected to four 12V batteries and charges each of them individually. Even if these batteries are connected to a 24V or 48V system, the charger will still treat them separately. This ensures battery levelling so they all have the same charging state. Two or more of the chargers channels can be parallel connected to charge for instant one battery with 10 Ampere and two others with 5 Ampere each, or all channels to one battery, creating a 12V 20 Ampere charger. Ladac MULTIPLEX constantly monitors the battery voltages separately, this ensures maximum battery economy and ready-for-use batteries. Also in MIL-version (NATO # 6130-25-150-2735 Multiplex-MIL) Ladac supplier # N3890



Flexibility
Different ways of using the Multiplex. 1. Four 12V batteries. 2. Two 12V and one 24V. 3. Two 24V systems. Multiplex charges individually and tackles serial connections just as good as parallel connections

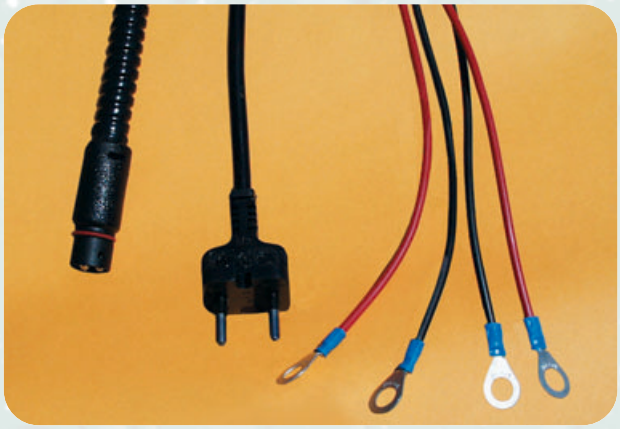
Lifeboat

Order no.:	*4041LBC*
Mains voltage:	*42VAC*
Charging voltage:	*2x14,4VDC*
Float voltage:	*2x13,3VDC*
Charging current:	*2x5A*
Dimensions (HxWxD):	*245x135x80mm*
Water tightness:	*IP66*
Weight:	*4,5 kg*

Lifeboats - start batteries in life-boats often suffer from neglected maintenance. Although the regulations state that the batteries shall be checked and maintained regularly. A Ladac 4041 charger will take care of the life-boat batteries, keeping them in good condition. The chargers are delivered to fit the main voltage of the vessel in each case

Different standard mains voltages available: 42VAC, 48VAC, 55VAC or 230VAC

Cable sets



Cables either have connectors for permanent installation or crocodile clamps for easy connection.

Set of cables with mains cable and charging cables for 1,2 or 4 channels for use with garage hoist or charging room.

KAB401 One-channel, crocodile clamps, mains cable
KAB402 Two- channels, crocodile clamps, mains cable
KAB404 Four-channels, crocodile clamps, mains cable

Set of cables for permanent installation:

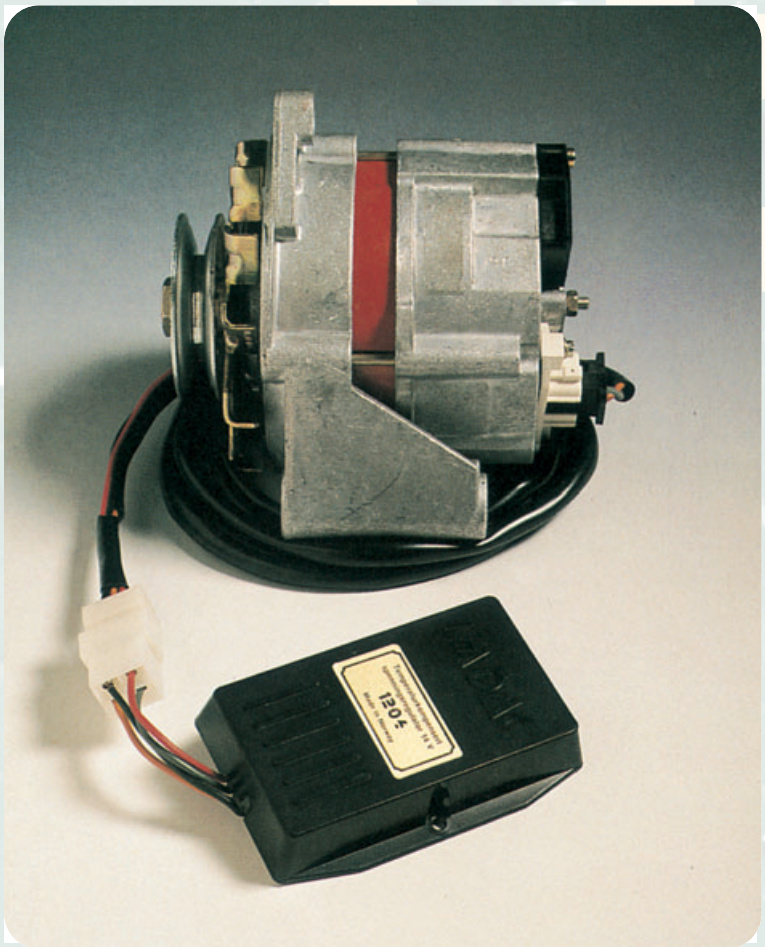
KAB401F One-channel, Cable shoes, mains cable
KAB402F Two- channels, Cable shoes, mains cable
KAB404F Four-channels, Cable shoes, mains cable

All Ladac chargers can be delivered with Calix cable-system.

Ladac Regulators – Charging tuner

A regulator measures the battery voltage and temperatures, in order to optimize the output from a generator.

In most modern engine on the marked today, the regulators are build inside the generators without any direct contact with the batteries. I.e. the regulators have the same temperature as the generators. In order to give the battery correct charging voltage, it is often an advantage to separate those two vital components.



Ladac regulators make sure that optimal charging voltage is delivered from the generator to the batteries at any given temperature.

Community

Safety signs at the highway are often battery operated. For these applications we recommend our splash proof, double insulated chargers.

Rescue vehicles

Multiplex charges 4 batteries separately. In the ladder engine, two batteries for the truck, one for the pump and one for the hydraulic pump.

Fire engines, ambulances and police vehicles are often used for brief periods, but stay ready for a long amount of time. The chargers will top the batteries when the generator is stopped.

Even starting and testing every morning may inflict the batteries enough to kill them early. Float charging with Ladac chargers keeps the batteries alive.

Maritime

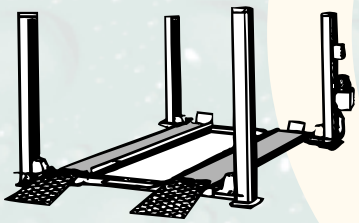
Time and money saving installation of battery chargers for lifeboats and mob-boats

The 4041-2 is developed to meet the needs of lifeboat producers and users. The simple installation, combining mains connection to the charger and the engine heater saves time and money. The charger is built to keep the batteries ready for use at all times.

The chargers are CE-marked, and approved by the Norwegian Maritime Directorate as well as by Bureau Veritas and the NEMKO

Garage

Multiplex can be used as a charging station in gas stations or for other multiple charging needs.



Use a Ladac Universal on the hoist to keep the car battery full when servicing the car. Happy customers are the result.

Defence

Two Multiplex keeps the 8 Leopard tank batteries ready for action.

Airport

Full batteries on the de-icing machines and push-back vehicles secures that your flight departs on time

Transport

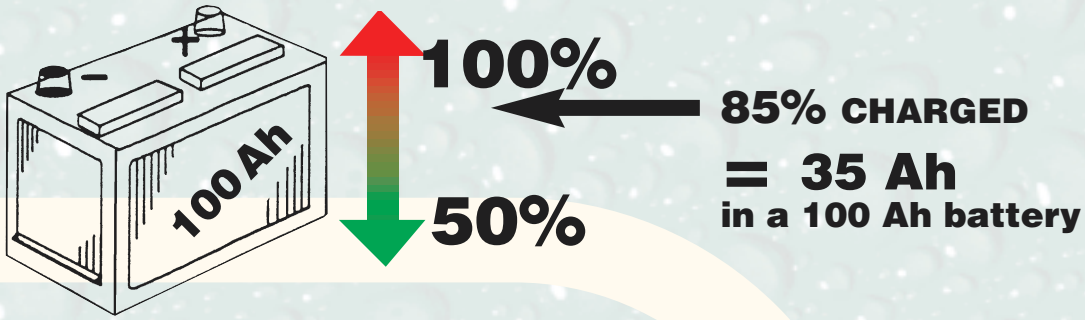
Distribution cars with electrical operated lifts will always have battery problems. A Ladac Optimal gets the truck to work every day.

Bus companies changes thousands of batteries a year because of battery-fatique. Ladac Duplex gives better battery economy and reliability

The lead/acid battery – some simple facts

The lead/acid battery is a more than a 100 years old invention. During the first 30 years, the technical progression made the battery more or less the same as we know it today. The following progression has mainly been concentrating on keeping the production prices down. The charging process is more or less the same.

In order to give clients good charging and maximum life-time on their batteries, there are some simple facts to be aware of.



What do you get for your money

When you buy a lead/acid battery that is marked with capacity 100 Ah it means that the battery capacity is 100 Ah. I.e. it should be possible to use 5 amps. during 20 hours (5A x 20h = 100 Ah). This is not the fact in real life. One of the characteristics of a lead/acid battery is when discharged by more than 50%, each discharge will affect on the battery's life. Actually you have received 50Ah of usable energy when you think you have bought a 100 Ah.

Another significant fact is, based on the batteries chemistry, is that charging up to 80-85% of the capacity requires a short amount of time, whilst the remaining 15-20% takes longer (8-16 hours) even if a big charger is used. The battery resists and therefore most of the batteries in everyday use are only 85% full. Going back to the arithmetic we find that only approx. 35 Ah of your 100 Ah battery has been used.

Choose a proper battery

The battery gets enough charging time

If the battery gets enough time to fully charge, a key rule is to depend on 50% of the batteries capacity as usable. If you need 100 Ah of energy, it will be wise to buy 200Ah of batteries.

If you have less than 8-10 hours of charging time between discharges, the battery will never reach full, but lack about 15-20% of maximum capacity. It would then be wise to choose a battery package of 300 Ah if your need is 100Ah of energy.

A normal lead/acid battery should have a charging voltage of 14, 4 Volts at room temperature (20˚C). Under cold conditions, the charging voltage will have to be higher.

In some cases there are more than one batteries connected to the same charger. In order to avoid interference between various batteries, a diode is connected through the output All batteries connected to the same charge sources, should be of the same type due to correct charging voltage. In cases different batteries appear, adjust the charger so that none of the batteries get less than 2,21V and not more than 2,24V per cell.

Several surveys by car organization have determined that average charging voltage in cars is 13,8 Volts. The will cause problems, especially in vehicle with high current consumption and with short driving distances.

Ladac has two suggestions for this problem: Voltage regulator or float charger. The voltage regulator connects to the generator and assures correct charging voltage based on the battery needs. The float charger will use the time when the engine is off to charge the battery fully.

Logbooks/protocols

All measure results and observation from maintenance and battery controls should be written down in a logbook.

The logbook would be a tool the day you have to decide if you need a new battery or a not.

To follow the historic pattern of cells which decline from the normal over time, you may be able to detect and avoid faihler before majored problems accrue.

Precisely written logbooks are an advantage with respect to clam of variety against suppliers showing that the battery has been taken care off.

The logbook has to be written so that various notes and measurements from various times can be comparison. In addition to columns for cell voltage, acid weight and general remarks, there should be space for measurements for temperature, acid level and rippelamps.

Splash proof

A battery charger that will be installed in an engine compartment, in a lifeboat or in a tank is subject to weather, oil fumes and/or chemicals. Our splash proof charger withstands this and causes no problems. In addition, our moulding process makes the chargers withstand extreme vibrations and shocks. Our charger is short circuit proof.

Approvals

In EU, a directive has been introduce in order to verify that products sold in European marked, comply with common rules. These basic directives do not state anything about the quality of the product.

Ladac´s R&D department are working closely with NEMKO and DELTA to ensure that quality and performance is in accordance with what we promise.

Battery maintenance

When a lead/acid battery is being charged, a chemical process is undergoing inside. Two of the products of this process are hydrogen and oxygen gases, and together they are highly explosive. These gases go into the air if the battery is not valve regulated where the gases are made into water again.

This loss of water has to be replaced. If the battery is in daily use, check the battery once a month. Refill with distilled water and keep the connectors clean.

Ladac takes care of the extreme charging challenges

Over the years we have build up a knowledge which has given us the ability to solve the most extreme charging challenges for lead/acid batteries. Continuous contact with battery manufacturers and battery users ensures us that we will be able to offer the best charging solution for any application.

Ladac Products AS is on for the largest producer of watertight chargers to the lifeboat industry. We deliver to lifeboats on board platforms in the North Sea and keep the batteries fully charges at all time for any emergency that may accrue. We comply with Authorities and International rules onboard oil and gas platforms.

Fire and Rescue trucks on the new Oslo Airport Gardermoen are equipped with chargers from Ladac in original. This trucks has to be "on the road" in seconds in order to protect life and equipment. Rosenberg Panthers fire and rescue trucks are present on a lot of airport around the World.

The Army has a lot of tanks that has to be ready for any purposes in short notice. The Leopard Tanks is always ready for operation with Ladac chargers. All Ladac charges have to comply with NATO regulations.

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This is LADAC

Function

Ladac Products develops and produces battery chargers for lead/acid batteries. Through 20 years we have built a wide competence in charging solutions. Continuous contact with battery manufacturers and battery users ensures that we will be able to offer the best charging solution for any application.

Partner

We want to be an active partner in creating good charging solutions, safe charging and lowering of service costs

Our philosophy is that of quality and service to "get the customer back but not the products"

Our business idea is to give our customers an optimal use of products that get their energy from batteries.

"We charge batteries"

LADAC

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