LEAB
mobile energy

FEED IN // CHARGE // STORE // SUPPLY

We make energy mobile.

PRODUCTS // SOLUTIONS // SERVICES // KNOWLEDGE

Issue: July 2022

Whether it's emergency, special, recreational or commercial vehicles: *the mobile power supply must be totally reliable and keep pace with the dynamic developments in the automotive industry.*

To ensure this reliability, while at the same time developing innovations, we started out as two people in an attic flat over 30 years ago. Today we work with a wonderful team each day to enable our customers to find the optimum mobile power supply solution for their vehicle in every case.

Together, we ensure that original equipment manufacturers, vehicle fitters and professional users always have the right energy available at the right time, so that all processes can run smoothly and reliably. To achieve this, we rely on consistent development work, clever innovations and needs-based service.

PRODUCTS

High-quality and innovative – for mobile power supply in emergency, special, recreational and commercial vehicles.

Chargers

On-board chargers 6

Workshop chargers 12

Inverters 14

Combined devices 16

Battery solutions 18

Lithium Power Supply II 20

Charge boosters 22

DC-DC converters 24

Relays 26

On-board power distributors 29

Generators 30

Supply systems and connectors 32

SERVICES

Our experts are at work for you – with services small and large.

34

SOLUTIONS

Straightforward and efficient answers to complex mobile power requirements.

36

KNOWLEDGE

Key essential information on the topic of power supply at a glance.

38

OUR EXPERTISE: MOBILE ENERGY

Innovative products, efficient solutions, consistently service-oriented

CERTIFICATION

Consistent and out of concivtion: ISO 9001 and ISO 14001 seamlessly integrated since 2006

OUR CLAIM

Quality leader for mobile power supply in the automotive sector

// **In-house development department**
// **In-house production**
// **National and international distribution**

OUR RESPONSIBILITY

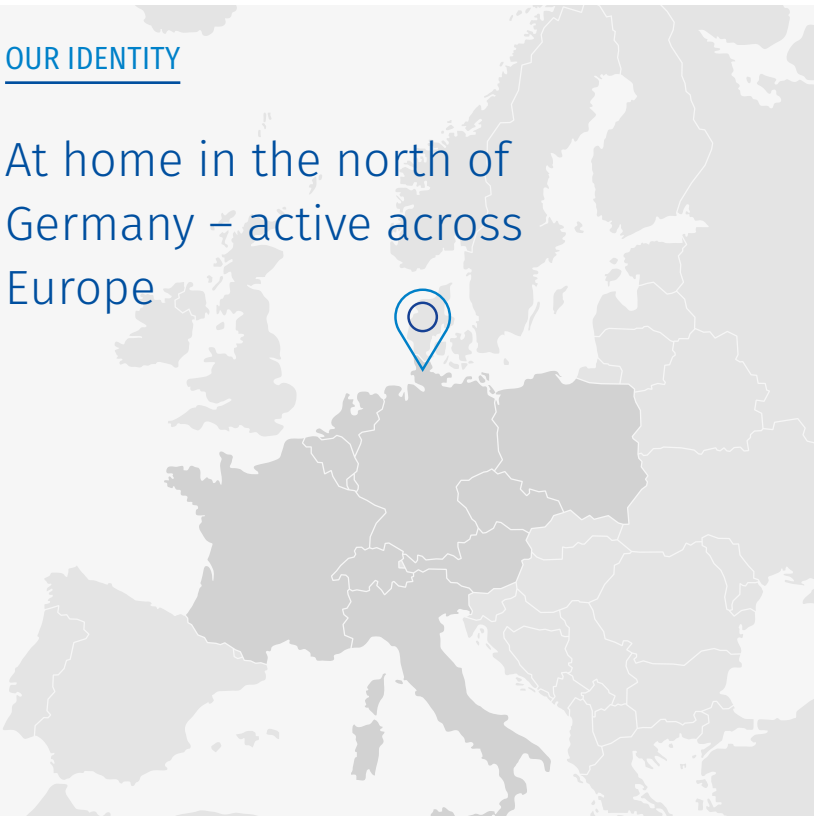
Carbon neutral company

// **Carbon neutral through compensation**
// **Long-term reduction of emissions through solar energy, bicycle leasing, e-mobility, etc.**

Carbon neutral
Company
ClimatePartner.com/18702-2206-1001

OUR IDENTITY

At home in the north of Germany – active across Europe



OUR GOALS

Focused on four core markets

// **BOS**
- Police
- Customs
- Constitutional protection
- Technical relief agency
- Fire fighting services
- Rescue services
- Disaster management

// **Service**
- Councils
- Workshops
- Pipe and sewer construction
- Vehicle equipment
- Mobile workshops
- Test vehicles

// **Transport**
- Passenger transport
- Goods transport

// **Recreation**
- Motorhomes

EXTENSIVE B2B ONLINE SHOP

www.leab.eu

On-board chargers

In most cases, a second battery is charged via an external 230 volt feed. This household voltage is fed through the body of the vehicle via a plug-in device into the on-board charger, where it is converted into a 12, 24 or 48 volt voltage.

Depending on the type of auxiliary battery (e.g. lead-acid AGM or lithium-ion), different charging characteristics are required to charge the batteries as gently as possible.

WHY ON-BOARD CHARGERS?

Permanently installed chargers in vehicles have several key advantages over classic external installations in the vehicle depot.

No loss of voltage: Long cable runs, for example by installing the charger under the hall ceiling and/or using a spiral cable, result in high cable resistance and hence to a voltage drop between the charger and the battery. Poor charging, sulphation and ultimately premature battery failure are the result. On-board chargers, on the other hand, can be installed near the battery, avoiding this problem.

Greater performance: DC plug connections are often only approved up to 16 amps. A 230 V feed can transmit almost 10 times the power at 16 amps compared with 24 V, so that even powerful chargers in the vehicle can be easily supplied.

Gentler charging: The charger in the vehicle can be precisely matched to the battery to be charged, taking into account the battery type, capacity and any additional consumers. This ensures that the battery is charged in the best possible way and that its service life is maximised.

TOPIC

Charging characteristics

Not all chargers are the same – in order to be able to charge batteries gently and exactly according to the manufacturer's specifications, it is important that the charging program can be individually adapted to the battery to be charged. LEAB chargers have IUoU characteristics for all common battery types and are also suitable for permanent trickle charging of batteries.

ABC series chargers, for example, have 15 different characteristic curves, which allows the devices to be very finely adjusted to the battery to be charged in terms of voltage, current and capacity. This enables the best possible charging and hence ensures maximum battery life.

TOPIC

Choosing the right charger

To charge your batteries optimally, the charging current should be between 10 % and 30 % of the capacity. For a battery with a capacity of 100 Ah, the following therefore applies: 10 A to 30 A charging current. If additional consumers need to be supplied during the charging process, the demand increases accordingly.

ON-BOARD CHARGER // ABC

ABC

On-board charger for professional use with adjustable charging characteristic curve

The ABC series chargers cover a battery voltage range from 12 V to 48 V and provide charging currents from 15 A to 100 A. Battery charging is fully automatic and microprocessor-monitored with a selectable charging characteristic. This guarantees optimum and gentle charging. In addition to the standard configurations, some units are available in protection class II.

// **For all types of lead batteries**
// **Also available in protection class II**
// **Choice of 15 charging characteristics**

ON-BOARD CHARGER // CHAMP

Champ

Small, compact and waterproof charger for universal use

These all-rounders can be used in all 12 volt and 24 volt vehicle power circuits with lead batteries. They are suitable for charging and trickle charging auxiliary batteries. They are available with different charging connectors (e.g. MagCode) or ring terminals.

// **Compact design**
// **Waterproof: IP67 rating**
// **Robust: Metal housing**
// **Available for all lead-acid battery types**

ON-BOARD CHARGER // CHAMP PRO

Champ Pro

Small, compact and waterproof charger with adjustable charging characteristic and power supply function

The Champ Pro chargers are extremely robust on-board chargers for the special vehicle sector. Thanks to their robust design with a sturdy metal housing and a fully encapsulated circuit board, all units in the series are waterproof and dustproof to IP67.

These all-rounders can be used in all 12 volt and 24 volt vehicle power circuits with lead batteries. They are suitable for charging and trickle charging auxiliary batteries. They are also available on request with pluggable DC cables or ring cable lugs with an integrated temperature sensor.

- **Compact design**
- **Waterproof: IP67 rating**
- **Robust: Metal housing**
- **Available for all lead-acid battery types**

CPC

Modern charger with adjustable charging characteristic and pluggable leads

The robust and rubberised mounting rim allows for both secure, vibration-free and particularly easy attachment in the vehicle and, when used as a portable charger, laying down of the unit without the risk of damaging sensitive vehicle surfaces. Installation is also made much easier addition by a Neutrik connector and highly flexible Twinflex charging cables.

- **Choice of 16 charging characteristics**
- **Short circuit proof**
- **Robust metal housing**
- **Neutrik connector**


ON-BOARD CHARGER // CPC


ON-BOARD CHARGER // RBC

TS

The system solution for charge conservation

The TS 12/12 or TS 24/12 trickle charger is a classic DC-DC charger designed to maintain the charge of portable fire pumps and other generators from the vehicle power circuit. Gentle charge retention for wet, gel and AGM batteries with a maximum charge current of 6 amps ensures a long battery life.

- // **Waterproof to IP65**
- // **Robust metal housing**
- // **Easy assembly**
- // **Overvoltage & overheating protection**

RBC

Especially robust and powerful charger with CAN bus connection

The special feature of the RBCs is their CAN communication. This means that, in addition to the regular charging of wet, lead and gel batteries, lithium-ion batteries can also be charged automatically.
For particularly gentle charging of all battery types, a temperature and voltage sensor can also be connected.

- // **Particularly robust design (IP54 or IP66)**
- // **High power (up to 3 kW)**
- // **CAN bus connection**

	TS
Battery type	Lead acid (wet, gel, AGM)
Battery voltage	12 V
Recommended battery capacity	6 Ah ... 25 Ah / 10 Ah ... 50 Ah*
Charging current	Duration: 3 A / 6 A*
Input voltage	12 V / 24 V*
IP rating	IP65
Dimensions (L × W × H)	108 mm × 91 mm × 52 mm
Weight	0.4 kg
Optional	Output lead: DIN 14690, MagCode, open

ON-BOARD CHARGER // TS

* depending on model

On-board chargers

	ABC	Champ
Battery type	Lead acid (wet, gel, AGM)	Lead acid (wet, gel, AGM)
Battery voltage	12 V/ 24 V/ 48 V*	12 V / 24 V*
Recommended battery capacity	50 Ah ... 1,000 Ah	55 Ah ... 170 Ah
Charging characteristics	Choice of 15	preprogrammed
Charging current	15 A... 100 A	7 A... 17 A
Input voltage	230 V	230 V / 115 V*
Operating display	LED	LED
Power supply unit function	Yes	No
Protection class	I (II optional)	I
IP rating	IP21	IP67
Operating temperature	-30 °C ... + 60 °C	-30 °C ... +60 °C
Dimensions (L× W × H)	220 mm × 112 mm × 73 mm* 265 mm × 135 mm × 85 mm*	80 mm × 155 mm × 43 mm* 98 mm × 192 mm × 47 mm*
Weight	1.5 kg / 2.6 kg*	0.8 kg / 1.4 kg*
Optional	Voltage sensor Temperature sensor Remote display Switching contact (CBL)	

Champ Pro	CPC	RBC
Lead acid (wet, gel, AGM)	Lead acid (wet, gel, AGM)	Lead acid (wet, gel, AGM), Lithium
12 V / 24 V*	12 V / 24 V*	12 V/ 24 V/ 48 V*
40 Ah ... 300 Ah	50 Ah ... 300 Ah	50 Ah ... 800 Ah
Choice of 4	Choice of 15	Choice of 30 /CAN-controlled
12 A... 30 A	15 A... 60 A	40 A... 105 A
230 V	230 V	230 V
LED	LED	LED
Yes	Yes	Yes
I	I	I
IP67	IP21	IP54 / IP66*
-30 °C ... +60 °C	-30 °C ... +60 °C	-35 °C ... +55 °C
195 mm × 98 mm × 47 mm	264 mm × 127 mm × 86 mm	410 mm × 240 mm × 83 mm* 410 mm × 230 mm × 78 mm* 410 mm × 235 mm × 110 mm*
1.5 kg	1.5 kg	4.9 kg / 6.7 kg / 7.9 kg*
	Voltage sensor Temperature sensor Remote display Switching contact (CBL)	Voltage sensor Temperature sensor CAN communication Switching contact (CBL)

* depending on model

Workshop chargers

The peak charging current is up to 100 amps (12-100 for the PWC). The intelligent and microprocessor-supported IUoU charging characteristic ensures that the battery is charged gently and effectively.

The charging characteristic of our PWC workshop chargers can be adjusted for all battery types, which means that the connected battery is charged extremely gently and effectively. Another feature of our PWC workshop chargers is that batteries can also be permanently supplied with constant voltage through the power supply function. This is useful, for example, when programming control units to prevent the battery from discharging and therefore aborting during the process. In addition, the battery's charge status is displayed via an LED and can thus be monitored at all times.

TOPIC

Service in modern vehicles

In order to maintain the vehicle's settings and not discharge batteries, modern vehicles rely on powerful chargers and power supplies during servicing (e.g. when updating the control unit or changing batteries). The PWC charger combines both in one device and provides sufficient voltage and current during operation.

ACCESSORIES

Wall bracket for PWC chargers

Wall bracket for PWC chargers, extremely robust, for stable attachment of the charger to the wall.

// **Material: Metal, black powder-coated**

PWC

LEAB's Professional Workshop Chargers (PWC) are high quality battery chargers for use in workshops and service vehicles

The PWC 12-24/70 allows all types of 12 volt and 24 volt lead-acid batteries to be charged fully automatically. Simply press a button to switch to the voltages. The peak charging current is 70 amps. The intelligent and microprocessor-supported IUoU charging characteristic ensures that the battery is charged gently and effectively. The PWC 12-24/70 also has a power supply function and indicates the battery charge status via an LED.

- **Two IUoU charging characteristics available**
- **Charging current: max. 70 A (12 V), continuous 60 A (12 V and 24 V)**
- **LED display of the charging status**
- **Reverse polarity protection & short circuit proof**
- **DC charging cable: 1.5 m, Twinflex 10 mm² with charging clamps 200 A**
- **Rubber housing protection**

	PWC
Battery type	Lead acid (wet, gel, AGM)
Battery voltage	12 V / 24 V*
Recommended battery capacity	40 Ah ... 1,000 Ah
Charging characteristics	Choice of 4
Charging current	70 A... 100 A
Input voltage	230 V
Operating display	LED
Power supply unit function	Yes
Connections	Battery terminals
Protection class	I
IP rating	IP20
Operating temperature	-20 °C ... + 50 °C
Dimensions (L× W × H)	294 mm × 135 mm × 94.5 mm
Weight	2.2 kg

Inverters

The CLP series inverters provide a real sine wave that constantly supplies even sensitive loads with a 230 V voltage.

LIGHT, COMPACT, RELIABLE

The inverters are available for 12 V and 24 V on-board power supplies and in various power levels up to a continuous output of 2,300 W. With a robust design, they are suitable for installation in commercial and special vehicles as well as for stationary use outside a vehicle.

The standby mode ensures that self-consumption is reduced to a minimum. A remote display can be connected at any time. In system operation, with Clayton lithium batteries, the data link (single wire) ensures direct communication and optimal operating parameters. Several different colour LEDs signal the operating status and the battery voltage present.

TOPIC

Starting currents

The starting current is the electrical current that flows directly after a consumer is switched on. This differs from the rated current and must be taken into account when designing the electrical system (e.g. for relays, fuses, inverters), as it can be many times the rated current depending on the type of consumer.

If you have any questions regarding the dimensioning of LEAB units, our experts in technical sales will be happy to help you.

+49 4621 97860-110 // anfrage@leab.eu

	CLP 1012	CLP 1024	CLP 1312
Battery voltage	12 V	24 V	12 V
Continuous power	1,000 W	1,000 W	1,300 W
Output voltage	230 V; 50 Hz	230 V; 50 Hz	230 V; 50 Hz
Operating display	LED	LED	LED
Operating temperature	-20 °C ... +50 °C	-20 °C ... +50 °C	-20 °C ... +50 °C
Degree of efficiency	> 90 %	> 90 %	> 90 %
IP rating	IP21	IP21	IP21
Dimensions (L × W × H)	299 mm × 198 mm × 116 mm	299 mm × 198 mm × 116 mm	299 mm × 198 mm × 116 mm
Weight	6.0 kg	6.0 kg	6.0 kg
Optional	Remote display	Remote display	Remote display

ACCESSORIES FOR OUR INVERTERS AND COMBINED DEVICES

Connection kits

Wiring kit for simple and quick connection in the vehicle.

G3 Remote display

Remote display to measure battery voltage, display status information, display battery current and display inverter power.

CLP 1512	CLP 1524	CLP 2012	CLP 2324
12 V	24 V	12 V	24 V
1,500 W	1,500 W	2,000 W	2,300 W
230 V; 50 Hz	230 V; 50 Hz	230 V; 50 Hz	230 V; 50 Hz
LED	LED	LED	LED
-20 °C ... +50 °C	-20 °C ... +50 °C	-20 °C ... +50 °C	-20 °C ... +50 °C
> 90 %	> 90 %	> 90 %	> 90 %
IP21	IP21	IP21	IP21
346 mm × 198 mm × 116 mm	346 mm × 198 mm × 116 mm	346 mm × 198 mm × 116 mm	346 mm × 198 mm × 116 mm
7.5 kg	7.5 kg	7.5 kg	7.5 kg
Remote display	Remote display	Remote display	Remote display

Combined devices

One device – two functions: Combined devices are inverters and chargers in one housing – saving you a lot of space in your vehicle. They are designed for 12- and 24 volt vehicle power circuits and provide a 230 volt AC voltage on the output side. The charging current is adjustable – independent of the battery system. Charging of all common lead batteries as well as lithium batteries is possible.

Thanks to the integrated mains priority circuit, your battery is only charged when there is no shore power via an external feed. Likewise, your consumers continue to be supplied almost without delay, even in the vehicle hall.

The mains priority circuit enables automatic changeover from inverter operation to voltage supply via an external feed. Of course, the combined devices are short-circuit proof, switch off in case of excessive temperature as well as overvoltage and allow easy control of all parameters via coloured LEDs. With a comparatively low weight, the installation of a combined device reduces the wiring effort, saves space and cash. In addition, possible sources of error are reduced.

Clayton Power's combined devices are based on the popular CLP inverters and therefore also have the

	CLP 1012-50	CLP 1024-30	CLP 1312-80
Battery type	Lead acid (wet, gel/AGM), lithium	Lead acid (wet, gel/AGM), lithium	Lead acid (wet, gel/AGM), lithium
Battery voltage	12 V	24 V	12 V
Operating display	LED	LED	LED
Charging current	0-50 A	0-30 A	0-80 A
Continuous power	1,000 W	1,000 W	1,300 W
Output voltage	230 V; 50 Hz	230 V; 50 Hz	230 V; 50 Hz
Temperature sensor	Optional	Optional	Optional
Remote display	Optional	Optional	Optional
Operating temperature	-20 °C ... +50 °C	-20 °C ... +50 °C	-20 °C ... +50 °C
Degree of efficiency	> 90 %	> 90 %	> 90 %
IP rating	IP21	IP21	IP21
Dimensions (L× W × H)	299 mm × 198 mm × 116 mm	376 mm × 198 mm × 116 mm	299 mm × 198 mm × 116 mm
Weight	6.0 kg	7.5 kg	6.0 kg
Optional	Temperature sensor Remote display	Temperature sensor Remote display	Temperature sensor Remote display

option of direct communication (single wire) with Clayton lithium batteries. The G3 remote display can also be used with the combined devices.

// Compact, lightweight and powerful

// Short circuit proof

// For all standard batteries

ACCESSORIES

→ see page 15

CLP 1512-80	CLP 1524-40	CLP 2012-100	CLP 2324-50
Lead acid (wet, gel/AGM), lithium	Lead acid (wet, gel/AGM), lithium	Lead acid (wet, gel/AGM), lithium	Lead acid (wet, gel/AGM), lithium
12 V	24 V	12 V	24 V
LED	LED	LED	LED
0-80 A	0-40 A	0-100 A	0-50 A
1,500 W	1,500 W	2,000 W	2,300 W
230 V; 50 Hz	230 V; 50 Hz	230 V; 50 Hz	230 V; 50 Hz
Optional	Optional	Optional	Optional
Optional	Optional	Optional	Optional
-20 °C ... +50 °C	-20 °C ... +50 °C	-20 °C ... +50 °C	-20 °C ... +50 °C
> 90 %	> 90 %	> 90 %	> 90 %
IP21	IP21	IP21	IP21
376 mm × 198 mm × 116 mm	299 mm × 198 mm × 116 mm	376 mm × 198 mm × 116 mm	376 mm × 198 mm × 116 mm
7.5 kg	6.0 kg	7.5 kg	7.5 kg
Temperature sensor Remote display	Temperature sensor Remote display	Temperature sensor Remote display	Temperature sensor Remote display

LITHIUM BATTERY WITH INTEGRATED BATTERY MANAGEMENT SYSTEM

Lithium Power Pack

The lithium-ion batteries from Clayton are real power packs and are available in 12 V and 24 V. They offer a capacity of 100 Ah and can therefore replace much larger and heavier lead batteries of comparable capacity in the smallest space.

The battery management system is already integrated fully functionally and protects against overcharge and deep discharge. With a cycle life of 2,000 full cycles, the average life is up to six times longer than conventional batteries.

In addition, lithium-ion batteries can be charged extremely quickly: they tolerate high charging currents effortlessly. Under ideal conditions, the 100 Ah variant, for example, is fully ready for use again in under an hour.

- // **Integrated battery management system**
- // **Long service life**
- // **Compact and lightweight**

	Lithium Power Pack
Battery type	Lithium-ion battery
Capacity	100 Ah
Watt hours	12 V = 1,320 Wh / 24 V = 2,640 Wh*
IP rating	IP20
Operating temperature	-40 °C ... +50 °C
Cycle stability (80 % DoD)	≥ 2,000
Self consumption (month)	< 3 %
Communication	CAN, single wire
Continuous discharge current	100 A
Nominal voltage	12 V / 24 V*
Parallel connection	1 ... 20 batteries
Dimensions (L× W × H)	302 mm × 192 mm × 274 mm* 558 mm × 192 mm × 274 mm*
Weight	16.52 kg / 31.22 kg*

* depending on model

ACCESSORIES

MelfBox

→ See page 33

G3 Remote display

→ See page 15

THE FLEXIBLE, COMPACT AND LIGHTWEIGHT COMPLETE SYSTEM AS A KIT

Energy Unit with XBU 420

Self-sufficient energy supply – durable and powerful. The Energy Unit guarantees an uninterrupted power supply.

The Energy Unit is a complete system consisting of a lithium battery and a charger and can be expanded by various components, depending on the application. The heart of the system is our own design, the XBU 420 battery, which, thanks to its high capacity, also supplies large consumers with energy on a permanent basis.

The applications of the system are numerous, from transport cooling to test vehicles to applications for service technicians and mechanics – a whole host of things are possible. Depending on the application, the system can be flexibly designed and expanded.

For example, the Energy Unit can optionally be supplemented with an inverter for a 230 V output voltage, and with a DC-DC converter for a 12 V output voltage. In addition to charging via the 230 V household connection and the supplied charger, charging can also be carried out in vehicles with combustion engines during travel thanks to an optional booster.

The Energy Unit comes in two different versions:

// With the XBU 420c battery, for combustion engines (DC charging possible).

// With the XBU 420e battery, for electric vehicles (DC charging not possible).

// **High capacity**
// **Supplies large consumers**
// **Easy to install**

	XBU 420
Nominal voltage	24 V
Nominal voltage	25.9 V
Max. voltage	28.49 V
Min. voltage	17.5 V
Nominal capacity (RT at 0.2 C)	410 Ah
Removable capacity	324 Ah
Max. discharge current (duration)	200 A
Max. charge current (duration)	200 A
Operating temperature	–28 °C to +60 °C
Charge temperature	0 °C to +55 °C
Cycle stability (80 % DoD)	≥ 3,000
Dimensions (L × W × H)	810 × 215 × 425 mm
Weight	76 kg

THE NEXT GENERATION OF MOBILE POWER SUPPLY

Lithium Power Supply (LPS II)

The Lithium Power Supply II (LPS II), the successor model to the popular LPS, has been significantly improved in many features. Like its successful predecessor, the LPS II has been developed by our partner Clayton Power from Denmark.

With its modern design and many technical advancements, the LPS II sets new standards for mobile power vehicles. Whether it is used in emergency ambulances, recreational, command vehicles or service vehicles: the LPS II reliably ensures your mobile power supply – thanks to its integrated inverter, battery management system, charge booster, personal protection device and more. DC charging can also be performed from the 24 V vehicle power circuit. In addition, the self-consumption has been reduced, the capacity of the lithium batteries further increased and a solar charge controller (MPPT) added. The accessories include a remote control, a mounting rail and a connection kit. The LPS II is very easy to install and comes in three variants featuring different capacities and output power.

THE NEW FEATURES OF THE LPS II

Optimised all-in-one solution

With the next generation of our complete solution based on state-of-the-art lithium technology, not only is **self consumption significantly reduced,** the benefits also include **very fast charging during travel**. It also ensures that large consumers with high starting currents can be operated. Despite comparable dimensions to the predecessor LPS, **numerous new functions** have been integrated and a **higher performance** achieved.

INTEGRATED SOLAR CHARGE CONTROLLER

A solar charge controller is fed via solar modules and thereby charges the connected battery. The intelligent charge controller ensures effective charging to minimise the charging time. It also protects against overcharging, thereby ensuring a long battery life.

- // **Extreme weight saving**
  (> 75 % compared to conventional systems)
- // **Euro 6 optimised supercharging via vehicle engine**
- // **Very short installation time of less than two hours**
- // **Connections for 12 volt and 230 volt consumers**
- // **Extremely compact design**
- // **Integrated solar charge controller**

	LPS II 1512-100	LPS II 2512-100	LPS II 3012-160
Cell chemistry	LiFePO4	LiFePO4	LiFePO4
Capacity	100 Ah (1,320 Ah)	100 Ah (1,320 Ah)	160 Ah (2,112 Ah)
Available capacity	80 Ah (1,050 Ah)	80 Ah (1,050 Ah)	136 Ah (1,900 Ah)
Output power (AC), permanent	1,300 W	2,000 W	2,300 W
Output power (AC), 10 min	1,500 W	2,500 W	3,000 W
Output power (AC), peak 10 s	2,600 W	4,000 W	5,000 W
Output discharge current (DC), permanent	180 A	180 A	180 A
Output discharge current (DC), peak (1 min)	270 A	270 A	350 A
Input power solar (max.)	400 W	400 W	400 W
Self consumption (DC+DC active)	< 1 W	< 1 W	< 1 W
IP rating	IP21	IP21	IP21
Dimensions (L× W × H)	409 mm × 277 mm × 256 mm	409 mm × 277 mm × 256 mm	409 mm × 277 mm × 256 mm
Weight	25 kg	25 kg	28.5 kg

ACCESSORIES

Remote control

Remote display

Mounting rail

Connection kit

Recreational vehicles

Mobile offices/control centres

Service vehicles

Workshop trolleys

Charge boosters

If a modern special vehicle has a second battery as well as a contemporary generator management system, reliable charging of the additional battery is usually not guaranteed. After the engine has ignited, the alternator often shuts down the charging voltage and charging current after a short time to save fuel.

Without charging voltage at the starter battery, the auxiliary battery cannot be charged either. As a result not even a long journey will provide a full extra battery.

A modern technical solution is a charge booster, which simulates a large additional consumer for the generator management and therefore provides a permanent charging current until the second battery is also charged.

BPC 12-12/40

The BPC 12-12/40 is an active charge booster that gently charges the auxiliary batteries during travel.

The booster is mounted between the starter battery and the auxiliary battery. If the vehicle is in operation, the charge booster simulates a large additional consumer; this is detected by the generator management and the power is increased accordingly. This generates charging current until the auxiliary battery is also 100 % charged.

The BPC 12-12/40 charge booster is designed for 12 V vehicle power circuits and monitors the charge voltage and battery levels fully electronically, thereby extending the service life of the batteries.

The special feature of this booster is the gentle manner in which the CLP batteries are charged by the CAN bus. In addition, it also allows lithium batteries to be charged.

// Optimised for Euro 6
// Protects against over-/undervoltage
// Suitable for lead-acid and lithium batteries

CLP 600

The CLP 600 charge booster is an active DC-DC converter that charges the auxiliary battery from the vehicle power circuit, with a 5-stage charging characteristic and jump start function.

The CLP 600 charge booster from Clayton Power is an active DC-DC converter that charges the auxiliary battery in vehicles with generator management while driving. It charges both lead-acid and lithium batteries alike. The same applies to the voltage of the battery and the vehicle power circuit: The CLP 600 charges 12 V batteries in 24 V vehicle power circuits as well as 24 V batteries in 12 V vehicle power circuits.

The charge booster can be used in all special and commercial vehicles that are equipped with an auxiliary battery. The auxiliary battery is only charged when the D+ signal is present, so that the starter battery is not discharged. The 5-stage charging characteristic for lead batteries ensures optimum and gentle charging, while the charging of lithium jump start function (current from the auxiliary battery flows into the starter battery for max. 5 minutes).

- // Charges 12 V batteries in 24 V vehicles and vice versa
- // Automatically detects voltage levels
- // CAN bus for connection to lithium systems
- // Optimised for Euro 6 vehicles

	 BPC 12-12/40	 CLP 600
Input voltage	12 V	12 V/24 V (11.5 V .... 32 V)
Input current, max.	55 A	45 A
Output voltage	14.1 V/ 14.5 V/ 15 V	14.4 V / 28.8 V (with characteristic curve)
Output current, max.	40 A	40 A
Operating display	LED	LED
Degree of efficiency	> 95 %	> 96 %
Operating temperature	-20 °C ... +50 °C	-25 °C ... +80 °C
IP rating	IP21	IP21
Dimensions (L× W × H)	170 mm × 137 mm × 70 mm	222 mm × 111 mm × 40 mm
Weight	0.94 kg	0.83 kg

DC-DC converters

With our PP series of DC-DC converters, your 12 V vehicle power circuit can easily be converted to a 24 V vehicle power circuit and vice versa.

The PP series converters feature compact dimensions and low weight combined with a high IP rating. This makes them a reliable solution, especially under difficult operating conditions.

Other voltage ranges (e.g. 48 V) can also be considered if required, depending on the application. Please contact our technical sales department to find the right solution for your requirements.

PP series with IP67 rating

The PP converters of the IP67 series are completely encapsulated. As a result, the units are waterproof and protected against shocks and vibrations. This makes them particularly robust and ideally suited for use under difficult operating conditions.

	PP 12-24/25	PP 12-24/16	PP 48-12/29
IP rating	IP67	IP67	IP67
Output voltage	29 V (24 V ... 30 V)	28.8 V (24 V ... 30 V)	13.5 V
Output current, max.	25 A	16 A	29 A
Input voltage	12 V (9 V ... 18 V)	12 V (9 V ... 18 V)	48 V (36 V ... 65 V)
Input current, max.	77 A	50 A	12 A
Galvanically separated	Yes	Yes	Yes
Power	700 W	400 W	400 W
Housing	Aluminium	Aluminium	Aluminium
Dimensions (L× W × H)	150 mm × 93 mm × 31 mm	150 mm × 93 mm × 31 mm	150 mm × 93 mm × 31 mm
Weight	820 g	820 g	820 g

PP series with IP21 rating

The PP series of DC-DC converters with IP21 rating are characterised by their high efficiency of over 96 %.

The internal electronics are protected against reverse polarity and short circuit, preventing damage to the device arising from incorrect operation. In addition, the DC-DC converters of this series are highly compact and lightweight.

- **High efficiency**
- **Reverse polarity protection**
- **Short circuit proof**

	PP 24/12	PP 12/24-24	PP 48/12
IP rating	IP21	IP21	IP21
Output voltage	13.7 V	24.5 V	12.5 V
Input voltage	18 V ... 36 V	9 V ... 36 V	33 V ... 65 V
Input current, max.	77 A	50 A	12 A
Galvanically separated	Yes	Yes	Yes
External switch	Yes	Yes	Yes
Degree of efficiency	> 96 %	> 96 %	> 96 %
Power	70 W ... 400 W	200 W	200 W
Housing	Plastic	Plastic	Plastic
Dimensions (L× W × H)	115 mm × 88 mm × 18 mm	115 mm × 88 mm × 9 mm	155 mm × 88 mm × 9 mm
Weight	200 g	215 g	215 g

PRODUCT CONSULTATION

If you have any questions about our products, our experts in technical sales will be happy to help.

+49 4621 97860-110 // anfrage@leab.eu

Relays

Whether it's low voltage protection, charging current distributor or other switching technology – with the right relay, your 12 V or 24 V battery system has the ideal supplement.

Our low voltage protection prevents deep discharge of your battery via a two-stage safety system. Audible and visual alarms warn you of imminent deep discharge. If more current is drawn, our low voltage protection disconnects connected loads from the battery and thereby protects against deep discharge.

Two batteries can also be charged effortlessly via the alternator or the charger – this is ensured by our charging current distributor, which can distribute the charging current both uni- and bidirectionally. The batteries are therefore charged virtually loss-free.

TOPIC

Protecting the vehicle battery

Unlike most lithium batteries, lead batteries do not have built-in protection against deep discharge. This can cause the battery to fail prematurely as a result of improper use, which can result in high costs.

A battery monitor provides a useful remedy here. The battery voltage is permanently monitored by the device. When the set undervoltage limit is reached, the consumers are disconnected, further discharge is thereby prevented and the user is warned visually or acoustically. This ensures that any harmful operating conditions are reliably prevented.

ELECTRONIC CUT-OFF RELAY

EDR 12/75

The EDR 12/75 is an electronic cut-off relay (normally open contact) for simultaneous charging of two batteries via the alternator or the charger.

It has automatic charge detection and switching between the two batteries.

- **// Automatic charge detection and switching**
- **// Voltage detection on the input side**
- **// Easy to install**

	EDR 12/75
Input voltage	9 V ... 16 V
Switch-off voltage type	12.8 V
Switch-on voltage type	13.5 V
Capacity	75 A
Overload	250 A
Relay function	N/O contact
Current consumption (rest)	1 mA
Current consumption (On)	0.28 A
Dimensions (L× W × H)	75 mm × 32 mm × 50 mm
Weight	0.15 kg

	BW 801E
Nominal voltage of the battery	12 V/24 V
Continuous load	50 A
Overload (10 s)	70 A
Switch-off voltage (adjustable)	12 V: 9 V ... 12 V 24 V: 18 V ... 24 V
Operating temperature	-30 °C ... +70 °C
Self consumption	6 mA
Operating display	LED
Dimensions (L× W × H)	100 mm × 90 mm × 25 mm
Weight	0.11 kg

BATTERY MONITORS

BW 801e

The BW 801e battery monitor can be used in both 12 V and 24 V vehicle power circuits. The self-consumption is 6 mA in normal operating mode, in idle mode it is < 3 mA.

The alarm thresholds are set by DIP switch, which allows the BW 801e to be used with all battery types. A high current carrying capacity of 70 A and the solid M6 bolts allow even strong consumers to be switched off without an intermediate relay. Thanks to an integrated hysteresis, short-term voltage dips or peaks, which can occur when switching powerful loads, do not result in false tripping. The BW 801e also has an alarm output and a connection option for an additional switch. This makes it possible to use it as a remote-controlled battery master switch.

- **// Undervoltage and overvoltage protection**
- **// Low self power consumption**
- **// Audible and visual alarm**

	CDR 12/24 V
Current limit	200 A/100 A
Input voltage	universal 12 V or 24 V
Switch-on voltage	13.5 V/27.5 V
Switch-off voltage	12.8 V/25.6 V
Operating temperature	-40 °C ... +60 °C
IP rating	IP67
Dimensions (L× W × H)	134 mm × 95 mm × 31 mm
Weight	700 g

CHARGING CURRENT DISTRIBUTORS

CDR 12/24 V

The CDR 12/24 V can be installed between the starter and auxiliary battery as an electronic charging current distributor.

The device can be used both bi- and unidirectionally. The batteries are charged virtually loss-free and the plastic housing protects against short circuits. Thanks to a switch-off function, it can also be used as master switch (as used above in the text) to switch a consumer or an on-board supply system on or off.

// **Short circuit proof**
// **Bi-/unidirectional**
// **Can be used as a master switch**

TOPIC

Charging current distributor or charge booster?

A charge booster is always required if the vehicle has generator management (Euro 6), the cable routes between the starter and auxiliary battery are particularly long or lithium batteries need to be charged with increased end-of-charge voltage. Boosters provide a stable charging voltage optimised for the battery type to ensure the best possible charge.

A charging current distributor, for example our CDR, can be used for vehicles without a regulated generator (e.g. trucks, buses, cars and vans with Euro 5 or older). The advantages are higher performance compared to the charge booster (current limited to 200/100 A) and bidirectional charging, so only one charger is needed for the starter and auxiliary battery. The charge detection is automatic.

On-board power distributors

On-board power distributors act as a safe sub-distribution for AC voltage networks in emergency vehicles. They are essential, among other things, for protecting the fuses of chargers and inverters. Thanks to standard personal protection switches, our on-board power distributors can be installed quickly. Distributors with insulation monitoring for operation in IT (Isolé Terre) networks are also optionally available – as well as a variety of socket combinations for operation with LEAB generators.

- // **Personal protection switch**
- // **Insulation monitoring optionally available**
- // **Many different models available**

OUR OFFER

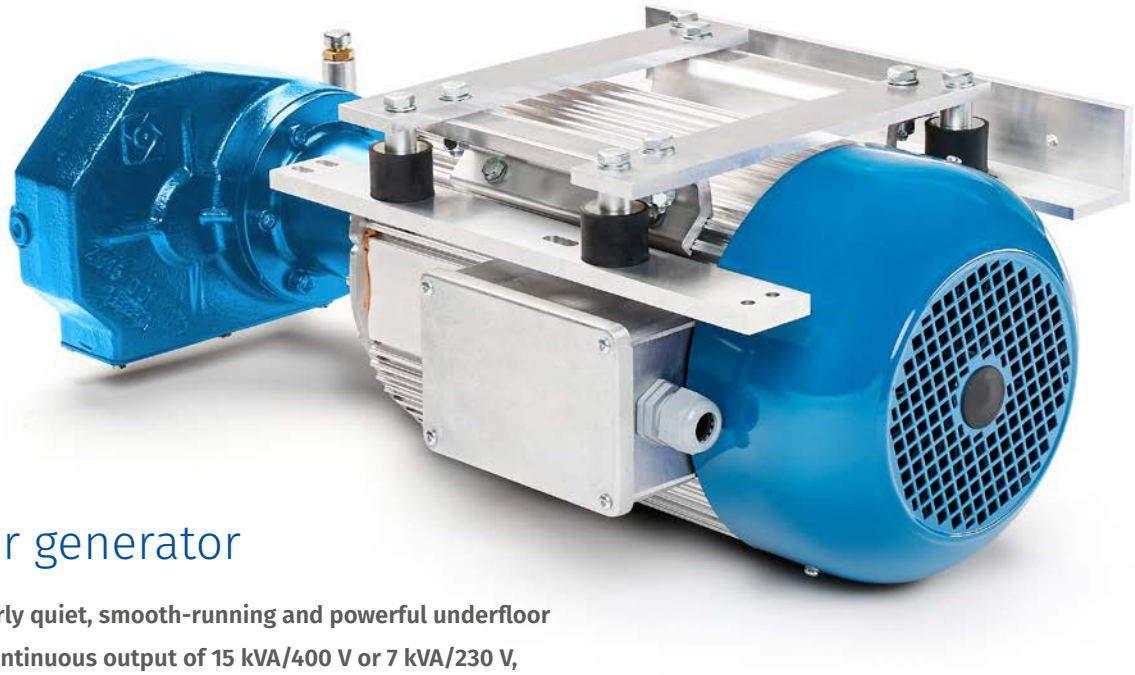
We supply on-board power distributors and socket combinations for a variety of applications. Please contact us to configure the right product for you.

+49 4621 97860-110
anfrage@leab.eu

Generators

For many years, LEAB has been a specialist in the field of generators and offers support in the vehicle-specific design of systems, adapted to your application scenarios.

Our generators provide a particularly reliable and powerful 230 V power supply in the vehicle.



Underfloor generator

Compact, particularly quiet, smooth-running and powerful underfloor generator with a continuous output of 15 kVA/400 V or 7 kVA/230 V, dustproof and splashproof to IP54. Different versions are available for different types of vehicles.

The underfloor generators are driven by a power take-off, feature a high overload capacity and are maintenance-free. Specifically developed and tested mounting kits are available for many vehicles. We supply underfloor generators as a complete set on request – including socket combinations and, if required, control cabinets in accordance with DIN 14686.

// **Output voltage: 400 V/230 V**
// **Rated power: 3-phase 15 kVA/1-phase 7 kVA**
// **Rated current 22 A / 30 A**
// **IP rating: IP54**

Dynawatt generator

High-performance generator driven by the combustion engine via belt drive.

Dynawatt generators provide 230 V in the vehicle, with an output of 4,000 VA to 5,000 VA. The drive is provided by the vehicle engine, when stationary by belts with automatic tensioning device.

The generator requires the Dynawatt control unit (see below).

- **Light and quiet**
- **Fewer emissions**
- **Independent of the on-board power supply**

Dynawatt control unit

Control unit that transforms the generator voltage into 230 V/50 Hz sinusoidal AC voltage.

The control unit with electronic regulation ensures clean sine wave voltage.

- **Output voltage: 230 V**
- **Frequency: 50 Hz**
- **Starting current: 70 A**
- **IP rating: IP21**
- **Protective functions: System switches off automatically in the event of overload, overtemperature and short circuit.**

PRODUCT CONSULTATION

Dynawatt, underfloor generator or 14 V/28 V auxiliary generators: We have suitable generators for a wide range of applications and almost all vehicles. We also carry the corresponding mounting kits as well as other accessories. For your individual offer, please contact our product consultation service at any time.

+49 4621 97860-110 // anfrage@leab.eu

FEED IN

Power supply systems

With our in-house developments – the MelfBox and the PowAirBox – you can feed electricity into your vehicle from outside particularly safely to obtain a 230 V power supply. Thanks to the high IP55 protection rating, both plugs and sockets are protected not only against humidity but also against dirt particles and can therefore withstand even demanding applications without damage.

WHEN EVERY SECOND COUNTS

- // **Intelligent operating display**
- // **Integrated start-locking**
- // **Automatic ejection**
- // **IP55 rating**

PowAirBox

The PowAirBox is a system which supplies electrical power and compressed air to emergency vehicles. The feed is via a special coupling and combines compressed air and electricity in a single cable. The robust housing made of glass-fibre reinforced polyamide is designed to IP55 rating and is therefore dust-tight and protected against splash water.

The feed allows for installation in accordance with DIN 14679. The coupling is automatically separated and ejected from the vehicle when the engine starts. This prevents the from being torn off when the vehicle drives off.

CONVENIENT POWER AND COMPRESSED AIR SUPPLY SYSTEM

The PowAirBox also offers other convenient functions: An LED operating display indicates the battery charge status, a delayed switching on of the consumer minimises the contact erosion of the plug-in connector. This reduces wear and associated costs.

Two auxiliary contacts can be freely assigned, e.g. for signal transmission or for setting up a start prevention when the coupling is plugged in. Several variants are available: 12 volts and 24 volts if the charger is outside the vehicle, and a 230 volt version if the charger is permanently installed in the vehicle.

A NEW GENERATION OF 230 V POWER SUPPLY

MelfBox

With our MelfBox in-house design, safety is always at the forefront when it comes to feeding 230 V into a vehicle.

The standard-compliant cabling to VDE 0100-717 and the IP55 rating ensure maximum safe operation. The screwless installation, which can also be performed retrospectively, ensures efficient retrofitting and upgrading of a vehicle fleet.

With an IP55 rating, the MelfBox is protected against humidity and dirt particles and is able to withstand even robust applications without damage. Delayed electrical engagement and electronic disconnection of the load before the coupling is pulled out/unplugged prevent contact burn-off and significantly minimise wear.

// Integrated start-locking
// Dynamic operating display
// IP55 rating

SERVICES

Our experts are at work for you – with services small and large.

We offer a variety of useful services around our product portfolio. Because our expertise extends far beyond the mere components. We strive to be a partner for our customers, enabling a wide variety of paths to success. From small alignments to big processes, we help you with our services so that you can focus on what really matters: your core business.

PRODUCTION

We produce the way you need it.

Exact cable lengths, your own labels, special configurations or pre-assembled modules – we not only produce in series, but also fully customised for you.

Starting with customising series products, our production service also includes labelling, plug-and-play solutions and – if no other solution fits – creating customised designs.

PLUG AND PLAY

We make even the complicated things simple: Together with you, our team develops plug-and-play solutions that are optimised for your production processes. These can include pre-assembled modules that can also be installed and connected by semi-skilled workers.

ENGINEERING

Many components, one certainty: that's for sure.

Do you require engineering services for your project or to make your decision?

Modern vehicles with a variety of electronics from different suppliers are complex systems. There are many factors and interactions altogether, and therefore a lot to consider. We can therefore apply a wide range of available engineering services to give you complete certainty that the power supply to your system will work reliably.

TRAINING

Experience, learn, benefit: We give you a head start in knowledge.

Our company combines 30 years of knowledge and experience in the field of mobile power supply, and we are happy to share this valuable resource with you. That's why our services include a wide range of training courses. Whether we are working with vehicle builders, users or sales partners, we always adapt the content to the relevant areas of focus. We offer the following topics, among others:

- // Charging technology
- // Batteries
- // Installation
- // Standards
- // Maintenance
- // Product portfolio

TECHNICAL CONSULTATION

Reaching the best decisions together.

From the product to the system: For large projects in the field of mobile power supply, a number of factors need to be taken into account. Many connections also go beyond our product portfolio, but not beyond our knowledge. That's why our experts are also happy to assist you as technical consultants. We give you neutral and individual recommendations based on tangible experience. This allows us to jointly create sustainable and safe system solutions that you can rely on.

LOGISTICS

Efficient logistics is a crucial success factor for many companies. That's why we also offer our customers contemporary solutions in this field, for your advantage.

Together with you, our logistics experts design the optimal delivery processes for the best possible use of all resources.

// Order picking // Framework agreements // Special packaging // Scheduled delivery

SOLUTIONS

More than the sum of the parts.

In mobile power supply, complex challenges arise time and again. Conventional products are not up to these challenges. Reliability and practicality can only be ensured by targeted system solutions – and at LEAB we have been developing these for over 20 years.

For our customers, this means that you receive tried-and-tested solutions that we of course adapt to your individual needs. To this end, we assemble systems from various high-quality components. These interlock optimally, making your work easier.

STAY COOL

Power supply in temperature-controlled transport

Fresh food logistics experts, medicine transporters and frozen food suppliers know the problem: Every time the engine stops, the active cooling is brought partially or completely to a standstill. Frequent opening of the load compartment doors has a visible effect on the temperature recorder. The only thing that helps is a self-sufficient power supply – such as the Energy Unit. → Read more on page 19.

24/7 FULL POWER

Workshop trolleys

Whether it's for tools or additional light – without a mobile power supply, modern workshop trolleys are ineffective. The Lithium Power Supply II therefore reliably supplies the energy required for the entire working day.

→ Read more on page 20.

EVERY SECOND COUNTS

Supply unit

We developed the PowAirBox for feeding electricity, especially into vehicles used in rescue and fire-fighting operations. It ensures the supply of electricity and compressed air at the same time. When the vehicle engine starts, a special device automatically disconnects the supply line vehicle. → Read more on page 32.

SYSTEMATIC SOUND ADVICE

For personal advice on our system solutions, please contact us at:

+49 4621 97860-110 // anfrage@leab.eu

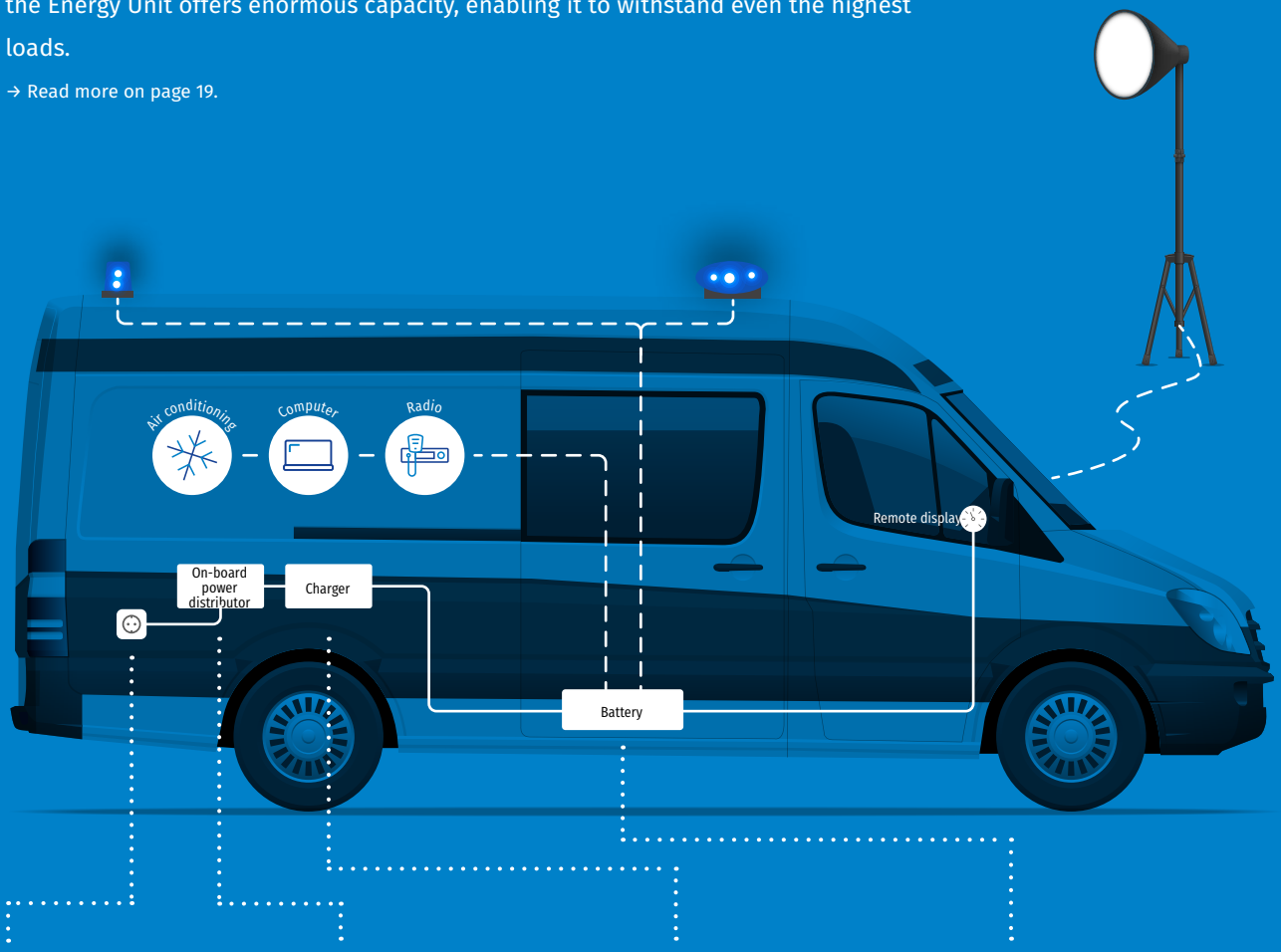
ALL ROUND CARE

Power supply in the emergency vehicle

Modern emergency vehicles are inconceivable without their own source of energy. Additional consumers make them powerful and ensure that a wide variety of tasks can be completed on a mobile basis – but this requires energy. And this energy must be as quickly operational and reliable as the vehicles and their crews themselves.

To ensure this, we developed the Energy Unit, which is equipped for all technical requirements in the emergency vehicle. Consisting of several coordinated components, the Energy Unit offers enormous capacity, enabling it to withstand even the highest loads.

→ Read more on page 19.



FEED IN

Our own development – the MelfBox – enables 230 V to be easily and comfortably fed into vehicles.

DISTRIBUTE

The on-board power distributor, the PCM4, safely distributes the single-phase AC voltage to the charger.

CHARGE

When it comes to charging the battery pack, we rely on our microprocessor-controlled RBC 24105 charger, which is pre-programmed to gently charge the battery pack.

STORE

The battery, the heart of the Energy Unit, offers enormous capacity and also supplies large consumers with power.

KEY ESSENTIAL INFORMATION ON POWER SUPPLY

At a glance

DIN EN 60529

IP ratings

EXAMPLE:

Rating IP65

FIRST DIGIT
Contact protection/foreign body protection

0 No contact protection, no protection against foreign bodies
1 Protection against large-surface contact with the hand; protection against foreign bodies with a 50 mm diameter
2 Protection against contact with fingers; protection against foreign bodies with a 12 mm diameter
3 Protection against contact with tools, conductive objects with a 2.5 mm diameter
4 Protection against contact with tools, conductive objects with a 1.0 mm diameter
5 Complete protection against accidental contact; protection against dust deposits on the inside in harmful quantities
6 Complete protection against contact; protection against ingress of dust (dust-tight)

SECOND DIGIT
Water protection

0 No protection against water penetration
1 Protection against vertically falling dripping water
2 Protection against dripping water falling at an angle (up to 15° from the vertical)
3 Protection against water spray (up to 60° from the vertical)
4 Protection against splashing water from any angle
5 Protection against water jet (from all directions)
6 Protection against water penetration in case of temporary flooding
7 Protection against water penetration during brief immersion
8 Protection against water penetration during immersion without time limit
9 Protection against water penetration during high-pressure cleaning

UNITS EXPLAINED

Unit and formula symbol	Description	Formula	
Volt (U)	Electrical unit for voltage	Volt = Watt/Ampere	U = P/I
Ampere (I)	Unit for electric current	Ampere = Watt/Volt	I = P/U
Watt (P)	Electrical unit for power	Watt = Volt × Ampere	P = U × I
Ohm (R)	Unit of electrical resistance	Volt = Ohm × Ampere	U = R × I

OVERVIEW

Protection classes

PROTECTION CLASS I
(with protective earth)
All metal parts of electrical equipment that can carry voltage during operation and maintenance in the event of a fault must be conductively connected to the earth conductor.

PROTECTION CLASS II
(with protective insulation)
Protection against accidental contact is ensured by protective insulation. No conductive components of the electrical appliance may be led out.

PROTECTION CLASS III
(protective extra-low voltage up to 50 V)
Protection class III describes electrical equipment where protection is provided by extra-low voltage (voltage equal to or less than 50 VAC or 120 VDC).

BATTERY SIZE AND USABLE CAPACITY

Battery design

ESTIMATING THE REQUIRED BATTERY SIZE

I × t/discharge factor = required battery size

Lead batteries → I × t/0.5 = required battery size
Example: 5 A ×16 h/0.5 = 160 Ah

Lithium batteries → I × t/0.8 = required battery size
Example: 5 A ×16 h/0.8 = 100 Ah

I[A] = Discharge current t[h] = Discharge duration

ESTIMATING THE USABLE CAPACITY

Cn × discharge factor = usable capacity

Lead batteries → Cn × 0.5 = usable capacity
Example: 100 A h ×0.5 = 50 Ah

Lithium batteries → Cn × 0.8 = usable capacity
Example: 100 A h ×0.8 = 80 Ah

The abbreviation Cn stands for capacity.

MORE INFORMATION

// **Selecting the right charger** → Page 6
// **Charging characteristics** → Page 6
// **Service in modern vehicles** → Page 12
// **Starting currents** → Page 14
// **Protecting the vehicle battery** → page 26
// **Charging current distributor or booster?** → Page 28

LEAB
mobile energy

We make energy mobile.

LEAB Automotive GmbH

Thorshammer 6 // 24866 Busdorf // +49 4621 97860-0 // www.leab.eu