

# Batteries

Product competence from EUROPART

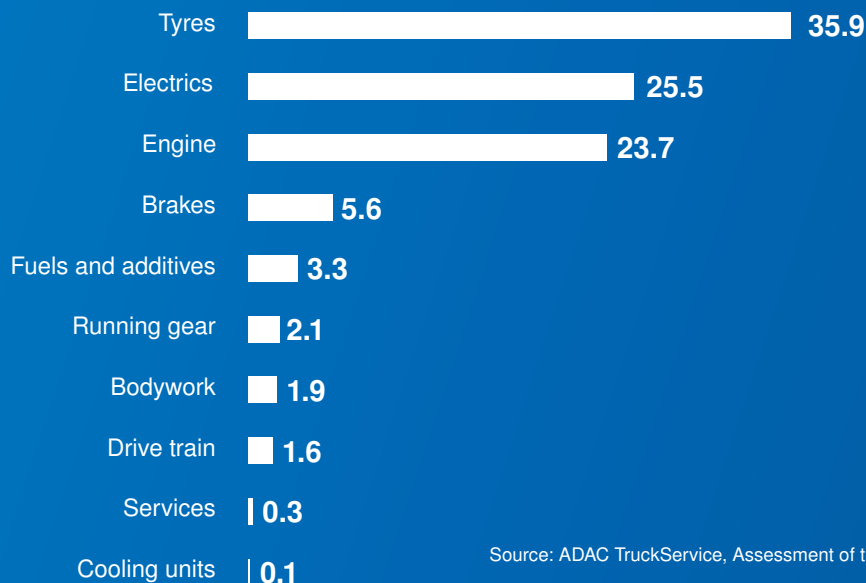


- Batteries
- Testers
- Battery tester
- Chargers
- Start booster
- Add-on products
- Typical sources of error



EUROPART – Europe's No. 1 for truck, trailer, van and bus spare parts.

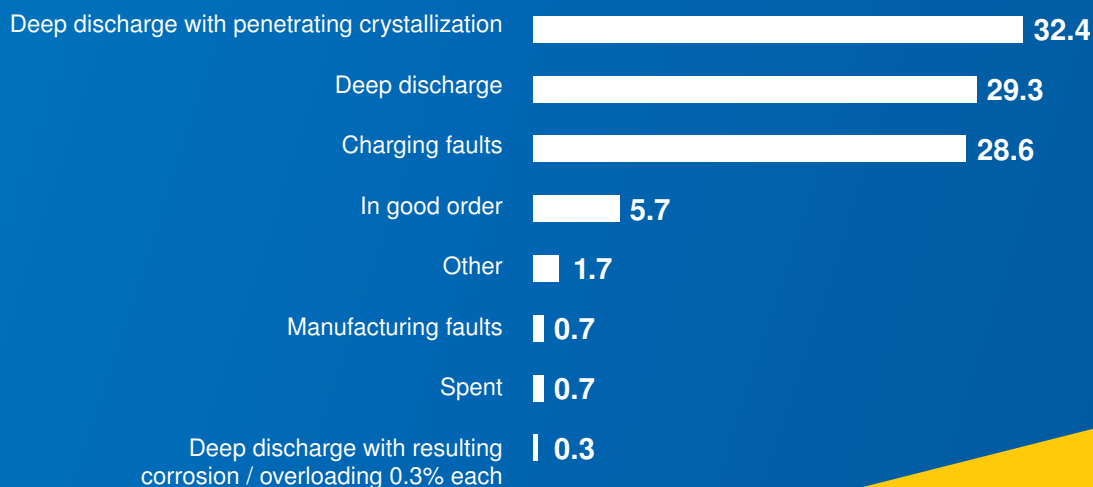
## The most common causes of truck breakdowns



Source: ADAC TruckService, Assessment of the 1st six months of 2013  
As at: September 2013

## Damage to batteries: less than 1% of problems are manufacturing faults

In over 90% of all battery failures, a charge deficiency is found to be the fault. In over 60% of all faulty batteries, misuse has led to irreparable damage. By far the most frequent cause is deep discharge. Deep discharge means that the whole capacity has been lost, which may lead to permanent damage and the inability to recharge the battery, depending on the time out of service.



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# Batteries



## Starter battery

### 12 V, filled and charged

The wide range of EUROPART starter batteries for trucks and cars stands out particularly not only thanks to its excellent price-performance ratio but also through good start-up power, low water consumption, universal application possibilities, load capacity, long service life and reliability. It goes without saying that the quality requirements of EUROPART starter batteries comply with general DIN/EN standards.

Circuit 3  
Cell type 1



Type	CCA	Capacity	Length x width x height	Bottom rail	Order no.
610 013 076	760 (A [EN])	110 Ah	514 x 175 x 210 mm	B03	9560 610 403
620 045 068	680 (A [EN])	120 Ah	513 x 189 x 223 mm	B00	9560 620 343
635 052 100	1000 (A [EN])	135 Ah	514 x 175 x 210 mm	B03	9560 635 393
640 035 076	760 (A [EN])	140 Ah	513 x 189 x 223 mm	B00	9560 640 203
640 036 076	760 (A [EN])	140 Ah	513 x 189 x 223 mm	B03	9560 635 313
643 033 095	950 (A [EN])	143 Ah	514 x 218 x 210 mm	B03	9560 643 233
655 013 090	900 (A [EN])	155 Ah	513 x 223 x 223 mm	B00	9560 643 173
680 032 100	1000 (A [EN])	180 Ah	513 x 223 x 223 mm	B00	9560 680 323
725 012 115	1150 (A [EN])	225 Ah	518 x 276 x 242 mm	B00	9560 710 143



## Starter battery

### EUROPART Plus, 12 V, filled and charged

In addition to the product advantages of the EUROPART standard starter battery, the EUROPART Plus is completely maintenance-free, has a central degassing vent, a safety cover providing flashback protection, Ca/Ca technology (Calcium/Calcium technology)

Design Super Heavy Duty  
Standard EN-4, V3  
Circuit 3  
Cell type 1  
Bottom rail B00

maintenance free

Type	CCA	Capacity	Length x width x height	Order no.
680 032 100	1000 (A [EN])	180 Ah	513 x 223 x 223 mm	9560 680 325
725 012 115	1150 (A [EN])	225 Ah	518 x 276 x 242 mm	9560 710 145



## Lighting battery

### 12 V, filled and charged

Circuit 3  
Cell type 1  
Bottom rail B00

Type	Capacity	Length x width x height	Order no.
963 051 000	180 Ah	513 x 223 x 223 mm	9561 963 513
968 001 000	230 Ah	518 x 276 x 242 mm	9561 968 013







## Starter battery

### 12 V, filled and charged

The wide range of EUROPART starter batteries for trucks and cars stands out particularly not only thanks to its excellent price-performance ratio but also through good start-up power, low water consumption, universal application possibilities, load capacity, long service life and reliability. It goes without saying that the quality requirements of EUROPART starter batteries comply with general DIN/EN standards.

Type	CCA	Capacity	Length x width x height	Circuit	Cell type	Bottom rail	Order no.
535 400 033	330 A	35 Ah	210 x 175 x 175 mm	0	1	B13	9560 536 462
541 400 036	360 A	41 Ah	207 x 175 x 175 mm	0	1	B13	<sup>1</sup> 9560 541 402
545 155 033	330 A	45 Ah	238 x 129 x 227 mm	0	3	B00	<sup>2</sup> 9560 545 152
545 412 040	400 A	45 Ah	207 x 175 x 190 mm	0	1	B13	9560 544 592
556 400 048	480 A	56 Ah	242 x 175 x 190 mm	0	1	B13	9560 555 592
560 412 051	510 A	60 Ah	232 x 173 x 225 mm	0	1	B00	9560 560 482
560 408 054	540 A	60 Ah	242 x 175 x 190 mm	0	1	B13	9560 562 192
568 405 055	550 A	68 Ah	261 x 175 x 220 mm	1	1	B01	9560 570 242
568 403 057	570 A	68 Ah	278 x 175 x 175 mm	0	1	B13	9560 568 402
570 144 064	640 A	70 Ah	278 x 175 x 175 mm	0	1	B13	<sup>3</sup> 9560 570 142
574 104 068	680 A	74 Ah	278 x 175 x 190 mm	0	1	B13	9560 572 172
590 122 072	720 A	90 Ah	353 x 175 x 190 mm	0	1	B13	9560 588 332
591 400 074	740 A	91 Ah	306 x 173 x 225 mm	0	1	B01	9560 585 162
591 401 074	740 A	91 Ah	306 x 173 x 225 mm	1	1	B01	9560 585 152
595 402 080	800 A	95 Ah	353 x 175 x 190 mm	0	1	B13	9560 592 172
600 047 060	600 A	100 Ah	413 x 175 x 220 mm	0	1	B00	9560 600 263

<sup>1</sup> with type 543 017 033 please use Ford EP 3565 579 504 terminal adapter set

<sup>2</sup> with type 545 023 030 please use JIS EP 3565 579 505 terminal adapter set

<sup>3</sup> with type 571 014 068 please use Ford EP 3565 579 504 terminal adapter set

These 5 Plus types cover up to 80% of existing motor vehicles



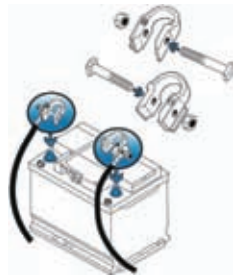
## Starter battery

### EUROPART Plus, 12 V, filled and charged

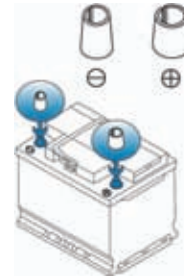
In addition to the product advantages of the EUROPART standard starter batteries, the EUROPART Plus is completely maintenance-free, has a central degassing vent, a safety cover providing flashback protection, an increased cold-start power and enhanced resistance to corrosion

Circuit 0  
Cell type 1  
Bottom rail B13

Type	CCA	Capacity	Length x width x height	Order no.
544 402 044	440 A	44 Ah	207 x 175 x 175 mm	9561 544 402
560 409 054	540 A	60 Ah	242 x 175 x 175 mm	9561 560 409
572 409 068	680 A	72 Ah	278 x 175 x 175 mm	9561 572 409
580 406 074	740 A	80 Ah	315 x 175 x 175 mm	9561 580 406
600 402 083	830 A	100 Ah	353 x 175 x 190 mm	9561 600 402



Ford Adapter



Adapter JIS Adapter



## Terminal adapter set

### Ford

Version +/-

Order no.

3565 579 504

## Terminal adapter set

### JIS:

Version +/-

Order no.

3565 579 505

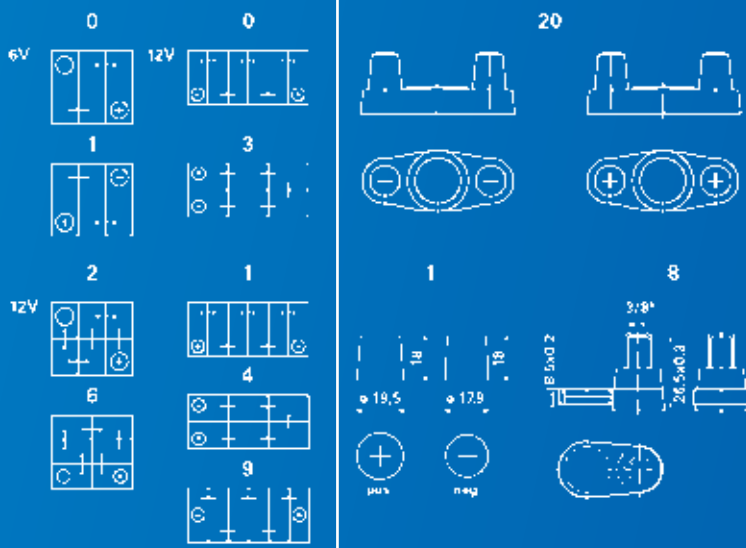
## Technical details, commercial vehicles



Circuit

Connection poles

Bottom rail



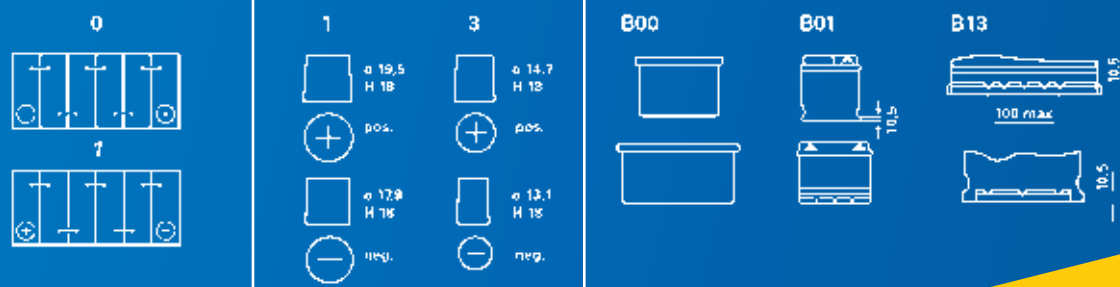
## Technical details, cars



Circuit

Connection poles

Bottom rail



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## The technical standard for commercial vehicles

The VARTA® Promotive EFB battery has been specifically developed for high-powered commercial vehicles that require a particularly high cycle stability. The Promotive EFB batteries meet the most stringent requirements for vibration resistance, even when rear mounted. The technical features of the battery guarantee improved performance and the highest reliability in daily use. The innovative acid circulator effectively prevents acid stratification, which poses a significant problem for applications with exhaustive discharge. The Promotive EFB batteries, manufactured in Europe in accordance with the highest quality standards, supply energy reliably to commercial vehicle fleets and massively reduce downtime.



### Starter and supply battery

#### Promotive EFB, 12 V, filled and charged

meets the most stringent requirements for vibration resistance, even when rear mounted, improved performance and high reliability for daily use, innovative acid circulator prevents acid stratification in the battery, longer life cycle than conventional batteries

Circuit	3
Cell type	1
Bottom rail	B00

#### Application range

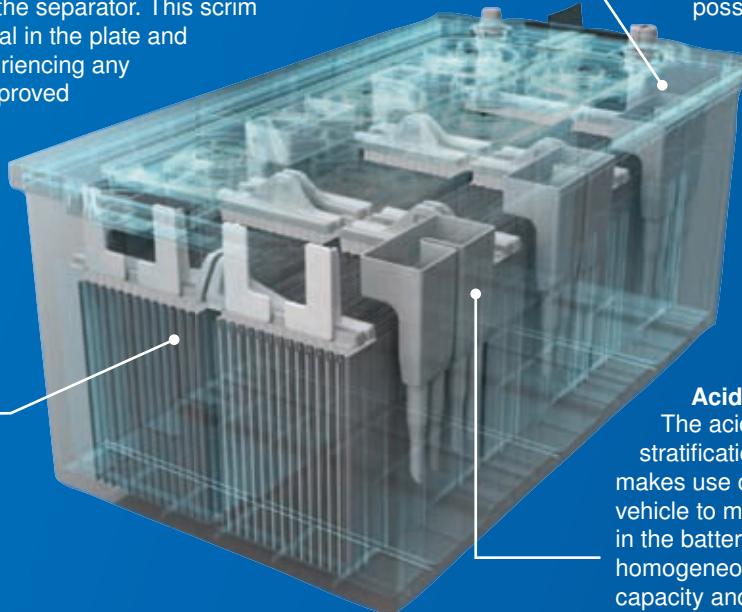
especially for high-powered commercial vehicles that require a particularly high cycle stability

Type	Capacity	CCA	Length x width x height	Order no.
680 500 100	180 Ah	1000 (A [EN])	513 x 223 x 223 mm	9560 680 500
725 500 115	225 Ah	1150 (A [EN])	518 x 276 x 242 mm	9560 725 500



### Performance features of EFB technology

The battery has an additional polyester scrim between the plate and the separator. This scrim keeps the active material in the plate and prevents the body experiencing any erosion. The result: improved durability against exhaustive discharge and superior charging. The glued-on liner holds the plates at all times in their intended position under all usage conditions.



#### High vibration resistance

Thanks to the injected connectors, the battery possesses even higher vibration resistance, as breaking of the vane connections is prevented. Additional connector fittings hold the connections and plates securely in their positions. This guarantees still higher vibration resistance - even in the most difficult road conditions.

#### Acid circulation

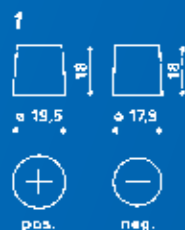
The acid circulator prevents acid stratification in the battery. This component makes use of the natural movement of the vehicle to maintain continual acid circulation in the battery. The acid density remains homogeneous, which improves the charging capacity and extends battery life.

### Technical details, commercial vehicles

Circuit



Connection poles



Bottom rail



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# EWOS – the optimum ordering and organisation solution.

Information and ordering around the clock!

**EUROPART offers an integrated solution for the workshop, with benefits for purchasing, stock management, repair and organisation:**

- safe and rapid identification, search and assignment of spare parts and accessories.
- parts for all tractor vehicles, buses, trailers, vans and cars
- immediate online ordering facility for all bus items
- immediate information on prices and availability
- detailed product descriptions
- technical data for installation, repair and maintenance



## Catalogue browser

The online offer is rounded off with a new catalogue browser. This combines the advantages of the conventional catalogue with digital possibilities. Familiar functions appreciated by the customer such as turning page by page have been usefully enhanced in the online catalogue, with fast navigation by mouse click, an intelligent search function and much more.

- direct linking into the EUROPART Workshop Online System (EWOS) for rapid ordering
- innovative and individual presentation of the products



VARTA® Promotive Silver section diagram



Innovative plate technology – Up to eight times greater deep cycle resistance than traditional wet batteries, for a longer service life



Starter battery

Promotive Silver, 12 V, filled and charged

absolutely maintenance-free, labyrinth safety cover with flashback protection, central degassing, can be stored for up to 18 months, optimised current flow with PowerFrame® grid technology for particularly low resistance and maximum conductivity, extended OE technology

Standard EN-4, V3  
Design Super Heavy Duty  
Circuit 3  
Cell type 1  
Bottom rail B00

Application range

Commercial vehicles with particularly high energy requirement



Type	CCA	Capacity	Length x width x height	Order no.
645 400 080	800 (A [EN])	145 Ah	513 x 189 x 223 mm	9560 645 400
680 108 100	1000 (A [EN])	180 Ah	513 x 223 x 223 mm	9560 680 110
725 103 115	1150 (A [EN])	225 Ah	518 x 276 x 242 mm	9560 725 104

	Black Dynamic	Promotive Silver	Promotive EFB	Silver Dynamic AGM	Professional Deep Cycle AGM	Optima Red Top	Optima Yellow Top
Applications and technology	Starting (flat plate, liquid)	Starting and supply (flat plate, liquid)	Starting and supply (flat plate, liquid, EFB)	Starting and supply (flat plate, AGM)	Supply and starting (flat plate, AGM)	Starting and supply (Spiralcell AGM)	Supply and starting (Spiralcell AGM)
Starting power	● ●	● ●	● ●	● ● ●	● ●	● ● ● ●	● ● ●
Cycle life	●	● ●	● ●	● ● ●	● ● ● ●	● ● ●	● ● ● ●
Charge acceptance	●	●	● ●	● ● ●	● ●	● ● ●	● ● ●
Vibration resistance	●	●	● ●	● ● ●	● ● ●	● ● ●	● ● ●
Range AH	40 - 220	52 - 230	180 - 230	60 - 105	24 - 260	44 - 55	38 - 75
Range H	300 - 1400	520 - 1150	1000 - 1150	680 - 950	145 - 1100	730 - 815	460 - 975

Batteries that could not be shown in the brochure can also be supplied.





## Starter battery

### Promotive blue, 12 V, filled and charged

absolutely maintenance-free, labyrinth safety cover with flashback protection, central degassing, can be stored for up to 15 months, optimised current flow with PowerFrame grid technology for particularly low resistance and maximum conductivity, extended OE technology

Design heavy duty  
Standard EN-3, V2  
Cell type 1  
Circuit 3

#### Application range

Commercial vehicles with normal energy requirement

Type	CCA	Capacity	Length x width x height	Bottom rail	Order no.
640 103 080	800 (A [EN])	140 Ah	513 x 189 x 223 mm	B00	9560 640 104
640 400 080	800 (A [EN])	140 Ah	513 x 189 x 223 mm	B03	9560 640 401
670 103 100	1000 (A [EN])	170 Ah	513 x 223 x 223 mm	B00	9560 670 102



## Starter and supply battery

### Professional Dual Purpose, 12 V, filled and charged

for starting internal combustion engines, also suitable for supplying electronic systems in mobile homes and boats, with labyrinth safety cover and glass fibre fleece separators to secure the active mass, maintenance-free, filled and charged

Cell type 1

#### Application range

for mobile homes, sailing yachts, mobile traffic guidance systems and solar power plants

Type	CCA	Capacity	Length x width x height	Circuit	Bottom rail	Order no.
930 060 056	560 A	60 Ah	242 x 175 x 190 mm	0	B13	9560 930 060
930 075 065	650 A	75 Ah	278 x 175 x 190 mm	0	B13	9560 930 075
930 090 080	800 A	90 Ah	353 x 175 x 190 mm	0	B13	9560 930 090
930 140 080	800 A	140 Ah	513 x 189 x 223 mm	3	B00	9560 930 140
930 180 100	1000 A	180 Ah	513 x 223 x 223 mm	3	B00	9560 930 180
930 230 115	1150 A	230 Ah	518 x 276 x 242 mm	3	B00	9560 930 230



## SPIRALCELL® technology

- ① Corrosion-resistant terminals
- ② Spiralcell® technology for more vibration resistance and longer service life
- ③ Electrolyte completely bound in porous glass fibre fleece separator
- ④ Plates with a grid of pure lead
- ⑤ Impact-resistant polypropylene casing
- ⑥ Safety valves for an absolutely leakproof battery system
- ⑦ Solid cast connections



## Supply and starter battery

### OPTIMA® YellowTop®

The completely maintenance-free Optima YellowTop combines the properties of a starting battery and those of a service battery thanks to Spiralcell Technologie®. In addition to a longer life and significantly larger reserve capacities, the YellowTop also offers reliable power supply, even in damp, hot, or dirty conditions, or when there are heavy vibrations. As it retains high voltage during discharge, it can use a larger portion of its saved energy. It withstands extremely high cycles without any major loss of capacity and is ideal for seasonal use due to its low self-discharge.

Voltage 12 V

Cell type 1

Circuit: positive pole left, EN/SAE conical pole



Model	Type	CCA	Capacity	Length x width x height	Circuit	Order no.
YT S 4.2	812 254 000	765 A	55 Ah	254 x 175 x 200 mm	1	9560 002 210
YT S 5.5	851 187 000	975 A	75 Ah	325 x 165 x 238 mm	1/0	9560 002 209

## Starter and supply battery

### OPTIMA® RedTop®

The Optima RedTop demonstrates its exceptional starting qualities particularly well in agricultural machinery, which is often used on a seasonal basis. Even if the battery is left in the tractor or harvester over winter, the RedTop will start again in the spring at the first try without any problems.\* The Optima Spiralcell Technologie® is behind this extraordinary starting power. As a result, a battery the size of a normal car battery is enough to start a heavy diesel engine, can fit in anywhere and is very resistant to vibrations and jolts. The stable, leak-proof construction also handles extreme usage conditions without interruption to the power supply.

CCA 815 A

Capacity 50 Ah

Cell type 1

Length x width x height 254 x 175 x 200 mm

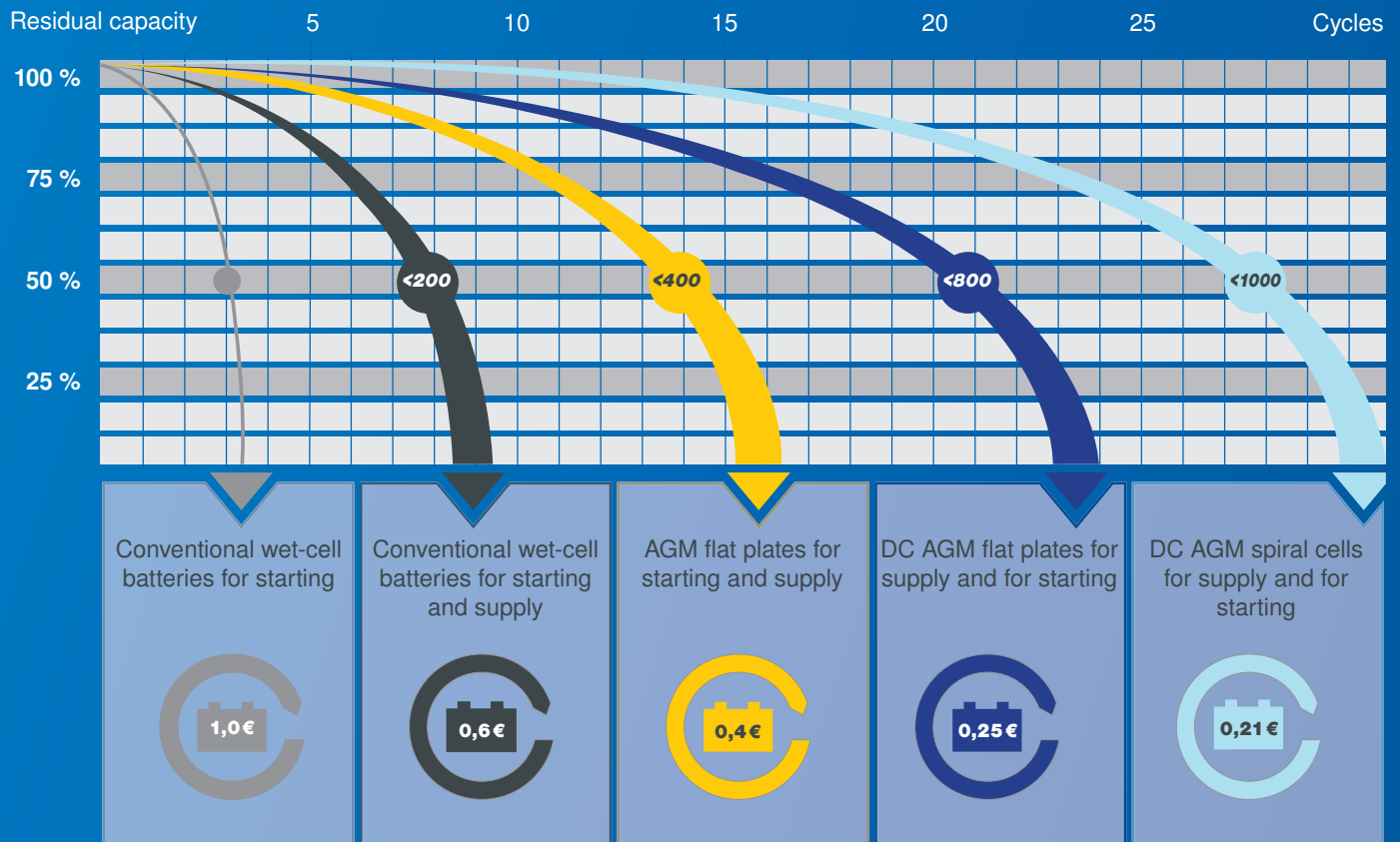
Voltage 12 V



Model	Type	Version	Circuit	Order no.
RT C 4.2	801 287 000	Circuit: poles centred, EN/SAE conical pole	1/0	9560 002 200
RT S 4.2	802 250 000	Circuit: positive pole left, EN/SAE conical pole	1	9560 002 201

## Deep cycle resistance means cost savings

Ratio between the number of cycles and the residual capacity



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## Exide Gel technology

- 1 Plate grid
  - 2 Positive grid plate
  - 3 Separator
  - 4 Negative grid plate
  - 5 Separator
  - 6 Positive plate bridge
  - 7 Electrolyte-proof cell connector
  - 8 Positive plate set
  - 9 Negative plate bridge
  - 10 Negative plate set
  - 11 12 13 Plug with safety valve  
Cover
- The safety valve ensures that the overpressure can escape in the event of overloading



### Technical features

- Sealed battery system with recombination
- Lead/calcium alloy on positive and negative plates
- Thick plates with mechanical reinforcement of positive earth
- Acid held in gel

### Advantages

- Absolutely maintenance-free
- No acid mist discharged
- Constant cold start power throughout its life
- Minimal self-discharge
- Extremely high deep cycle resistance
- Leakproof
- Permitted tilting up to 180 degrees
- Deep discharge-proof
- No acid layering
- High vibration-resistance

### Benefit/application

- Higher capacity reserves
- Safe for use indoors
- For vehicles with long idle times, seasonal use
- Long service life with frequent charging and discharge
- Operates in extreme conditions
- Deep-discharged battery can be recharged within 4 weeks
- Site and off-road vehicles

**Only modern chargers may be used with this battery.**

## Battery

### 12 V, Exide Gel

optimised supply output, 100% discharge compared to conventional batteries, cycle-proof, durable, constant starting power, robust, leak-proof at permitted tilt angle up to 180 degrees, minimal self-discharge, environmentally friendly, absolutely maintenance-free sealed battery system with safety valves, versatile

Cell type 1



Type	CCA	Capacity	Length x width x height	Circuit	Bottom rail	Order no.
G60/ES650	460 A	60 Ah	278 x 175 x 190 mm	0	B3	9560 000 600
G80/ES 900	540 A	80 Ah	350 x 175 x 190 mm	0	B3	9560 000 800
G120/ES 1350	760 A	120 Ah	513 x 189 x 223 mm	3		9560 001 200
G140/ES 1600	900 A	140 Ah	513 x 223 x 223 mm	3		9560 001 400
G210/ES 2400	1030 A	210 Ah	518 x 279 x 240 mm	3		9560 002 100

## Testers



### Acid tester

#### Gefo

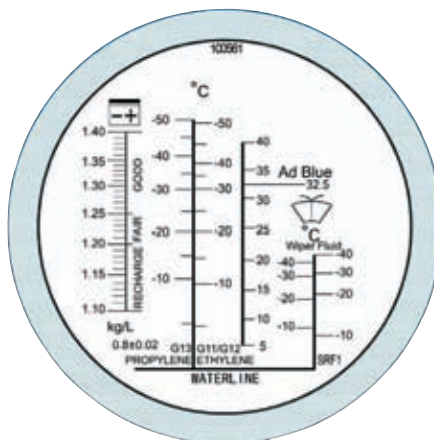
robust plastic cylinder with large glass areometer, small intake volume, reliable and quick to read with widely-spaced coloured and numbered scale, no oscillation, central guide prevents lateral movement of the areometer

Overall length 305 mm

**Application range**  
for the workshop

Order no.

9501 007 350



### Test device

equipped with automatic temperature compensation (ATC), easy to read, adjustable eyepiece

#### Application range

for measuring AdBlue®, anti-freeze coolant G11/G12/G13, anti-freeze screen wash systems, battery acid density

#### Scope of supply

Metal measuring device, pipette, screwdriver for calibration, device box

Order no.

9500 100 529



### Test device

#### for battery and charging system

Testing can be conducted removed from vehicle or installed/connected, provides immediate analysis of battery voltage, starter current and level under temperature compensation, backlit LCD display, with inverse polarity protection, can test deep-discharged batteries from 1.5 V upwards, with starter motor and alternator circuit analysis in 12/24 V systems, starter motor test: cranking voltage, alternator test: no-load voltage and charge voltage

Standard SAE: 40 to 2000 CCA  
DIN: 25 to 1300 CCA  
IEC: 30 to 1500 CCA  
EN: 40 to 2100 CCA  
JIS: Battery type no.

Type VRLA/GEL  
AGM/SPIRAL/sealed batteries  
SLI (liquid batteries)

Language selection: French, English, German, Spanish, Italian, Portuguese, Japanese

#### Application range

Vehicle battery 6/12 V from 7-230 Ah

#### Scope of supply

ABS hard protective case



Order no.

9682 202 402

# Battery tester



## Battery tester

Testing can be conducted removed from vehicle or installed/connected, with integrated thermal printer, provides immediate analysis of battery voltage, starter current and level under temperature compensation, large backlit LCD display or printout, with inverse polarity protection, can test deep-discharged batteries from 1.5 V upwards, with starter motor and alternator circuit analysis in 12/24 V systems

- Standard
- SAE: 40 to 2000 CCA  
DIN: 25 to 1300 CCA  
IEC: 30 to 1500 CCA  
EN: 40 to 2100 CCA  
JIS: Battery type no.
- Type
- VRLA/GEL  
AGM/SPIRAL/sealed batteries  
SLI (liquid batteries)

Language selection: French, English, German, Spanish, Italian, Portuguese, Japanese

### Application range

Vehicle battery 6/12V from 7-230 Ah

### Scope of supply

ABS hard protective case, 1 printer thermal paper roll 57 mm



Order no.		Accessories	
		Description	Order no.
9682 202 401		Printer paper roll	9682 202 403



## Battery tester

### AA500 PWP, Argus Analyzer

A comprehensive battery test has never been this easy. Achieve a competent overview of the battery's performance with only three measurements. Details of the charge state, the residual service life of the battery (available cold-start current) and starting ability (voltage drop when starting the engine) give you hard facts in black and white to explain the need for a preventive battery replacement to your customer, for example. At the same time, the unit checks the alternator voltage and rectifier diode harmonics. Testing of all 12 V systems.

Language selection: French, English, German, Spanish, Italian, Portuguese, Japanese

### Scope of supply

Carry bag, printer, in cardboard box

With MAN factory recommendation.



Order no.		Accessories	
		Description	Order no.
9539 640 200		Printer paper	9539 640 205



## Battery test report - Illustration

**Battery test report**

Date: xxx  
Time xxx

Recommendation:  
xxx

---

Technician:

Battery model:  
Battery type: xxx  
Battery standard: xxx  
Benchmark: xxx

Charge level: xxx  
Voltage: xxx  
Battery temperature: xxx

---

**Capacity test: xxx**  
Battery life: xxx  
Capacity: xxx

---

**Starting ability test: xxx**  
Starting ability: xxx  
Voltage: xxx

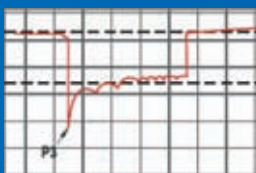
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**Charging system test: xxx**  
Voltage: xxx  
Rectifier diode harmonics: xx

---

Tester model #: xxx  
Software version: xxx

- A The device recommends appropriate actions**
- B User entries**
- Type: wet, maintenance-free (MF), fleece, gel (VRLA)
  - Standard in which the cold current is given (SAE, DIN, EN, IEC)
  - Value for cold start current
- C Measurement result 1: State of charge (temperature-compensated)**
- D Measurement result 2: Battery life remaining**  
The device determines how much cold current from the battery is still supplied and compares these values with the given battery nominal data.
- E Measurement result 3: Load test in the vehicle**  
During a starting attempt, the device measures the voltage drop in the battery (value P3) when the starter demands its power requirement. The more the voltage drops away from it, the worse is the battery.
- F Alternator test: Output voltage and diode ripple**



When P3  
4 Volt => CH 0%  
9,05 Volt => CH 100%  
Voltage curve

**Battery test report** **1**

Date: 2011/07/15  
Time 08:43

Recommendation:  
Continue using

---

Technician:

Battery model:  
Battery type: MF  
Battery standard: EN:  
Benchmark: 850A

Charge level: 100%  
Voltage: 12.65V  
Battery temperature: 25C/77F

---

**Capacity test: OK**  
Battery life: 100%  
Capacity: 898A

---

**Starting ability test: OK**  
Starting ability: 100%  
Voltage: 9.58V

---

**Charging system test: OK**  
Voltage: 14.28V  
Rectifier diode harmonics: OK

---

Tester model #: AA500P  
Software version: v3.1

**Battery test report** **2**

Date: 2011/07/15  
Time 09:18:00

Recommendation:  
Replace soon

---

Technician:

Battery model:  
Battery type: MF  
Battery standard: EN:  
Benchmark: 800A

Charge level: 100%  
Voltage: 12.64V  
Battery temperature: 23C/73F

---

**Capacity test: Warning**  
Battery life: 42%  
Capacity: 684A

---

**Starting ability test: OK**  
Starting ability: 97%  
Voltage: 9.73V

---

**Charging system test: OK**  
Voltage: 13.98V  
Rectifier diode harmonics: OK

---

Tester model #: AA500P  
Software version: v3.1

**Battery test report** **3**

Date: 2011/07/15  
Time 09:21:00

Recommendation:  
Replace now

---

Technician:

Battery model:  
Battery type: MF  
Battery standard: EN:  
Benchmark: 280A

Charge level: 94%  
Voltage: 12.52V  
Battery temperature: 21C/69F

---

**Capacity test: Not OK**  
Battery life: 0%  
Capacity: 190A

---

**Starting ability test: OK**  
Starting ability: 56%  
Voltage: 7.55V

---

**Charging system test: OK**  
Voltage: 14.20V  
Rectifier diode harmonics: OK

---

Tester model #: AA500P  
Software version: v3.1

**1** The battery is fully charged, and both the measured cold start current and the starting ability are present in full.

**2** This battery is also fully charged. However, there are significant deficiencies in the start current "D". The measurement for the starting ability "E" is only positive because the ambient temperature is high. At lower temperatures and poorer charge levels, this battery will soon stop working.

**Conclusion:** This result is tolerable in the spring, because there is a period of warm weather ahead. In the autumn the customer should be advised to replace the battery immediately.

**3** Another fully charged battery. However, this battery shows a completely inadequate cold start current "D". It will only start the engine because the temperature is high. The voltage drop to 7.55 V (56%) is a sure sign of weakness. Replace immediately.

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**GOOD TO KNOW**

# Chargers

## Crocodile Clips

Version fully insulated, with earth strap

Application range  
suitable for cables 35-50 mm²

Load capacity, max.	Length	Colour	Material	Order no.
600 A	170 mm	red	sheet steel, galvanised	3678 795 503
600 A	170 mm	black	sheet steel, galvanised	3678 795 504
1000 A	158 mm	red	cast brass	9501 003 588
1000 A	158 mm	black	cast brass	9501 003 589



## Battery service key

for inserting and removing acid plugs without damage and taking up little space

Length	91 mm
Width	80 mm
Height	13 mm



Order no.
9500 140 503



## Battery charger

### MXTS 70, 12/24 V

CTEK charger, optimum current supply when flashing with new software, unique regeneration of deeply discharged batteries, temperature compensated, charge levels visible via LED display, electronically safe, pulse charge maintenance, battery types: wet, maintenance-free, AGM, GEL and lead-calcium, charging time depends on the setting chosen

Charge voltage	12/24 V
Voltage	170-240 V AC
Capacity	50-1000 Ah
Version	8-stage charging characteristic
Protection class	IP20
Cable length	ca. 5 m

Charging current: 12 V with a choice between 20, 30, 40 and 50 A, 24 V with a choice between 10, 15, 20 and 25 A

GS tested, 2 year manufacturer's warranty



Order no.
9539 640 121



## Battery charger

### 12 V

CTEK charger, electronically safe, splash and dust-proof, 8-stage charging programme visible via LED display, fully automatic IUUoUp curve with pulse charging (regeneration of flat batteries), perfect charging and charge retention, unique regeneration of deep-discharged batteries

Voltage 170-260 V AC

Battery capacity: 1.2-110 Ah (charge), 1.2-160 Ah (maintain)  
Battery types: open, maintenance-free AGM, gel and lead-calcium  
Reverse current: < 1.3 mA  
Charging time for a 60 Ah battery: 12 hrs at 5 A

GS-tested, 5 year guarantee



This figure corresponds to 9522 320 050

Type	Charge voltage	Protection class	Charging current	Order no.
MXS 5.0	14.4/14.7/15.8 V, nominal 12 V	IP65	5 A	9522 320 050
MXS 7.0	13.6/14.4/14.7/15.8 V, nominal 12 V	IP65	7 A	9539 640 155
MXS 25	13.6/14.4/15.8 V, nominal 12 V	IP44		9539 640 158

## Battery charger

### 24 V

High frequency charger with 8-stage fully automatic IUoUp charging characteristic without voltage peaks, electronically safe, special RECOND mode in which deep-discharged batteries can be revived and restored to full capacity, pulse charge conservation

Voltage 170-260 V AC

Battery capacity: 8-100 Ah (charge), 8-225 Ah (maintain)

Reverse current: < 1 mA

Charging time for a 60 Ah battery: 14 hrs at 4 A



This figure corresponds to 9539 640 161

Type	Charge voltage	Charge current, max.	Protection class	Technical data	Description	Order no.
MXT 4.0	28.8/31.4 V, <b>nominal 24 V</b>	4 A	IP65	Battery capacity: 8-100 Ah (charge), 8-225 Ah (maintain) Reverse current: < 1 mA Charging time for a 60 Ah battery: 14 hrs at 4 A	GS-tested, 5 year manufacturer's warranty	<b>9539 640 161</b>
MXT 14	27.2 V, 28.8 V, 31.6 V, <b>nominal 24 V</b>	14 A	IP44	Battery capacity: 28-300 Ah (charge), 28-500 Ah (maintain) Battery types: open, maintenance-free AGM, gel and lead-calcium Reverse current: < 2.3 mA Charging time for a 60 Ah battery: 4 hrs at 14 A	GS-tested, 2 year manufacturer's warranty	<b>9539 640 145</b>

### Charging times/steps

Recommended ● Possible ● Not possible ●

Device type	Battery size							Charging up to starting capacity
	2 Ah	8 Ah	20 Ah	60 Ah	100 Ah	225 Ah	500 Ah	
MXS 5.0	1,5 hrs	7 hrs	3,5 hrs	11 hrs	20 hrs	●	●	20 minutes
MXS 7.0	●	●	3 hrs	8 hrs	12 hrs	25 hrs	●	10 minutes
MXS 25	●	●	●	2 hrs	3 hrs	7 hrs	16 hrs	3 minutes
MXT 4.0	●	2 hrs	5 hrs	15 hrs	25 hrs	●	●	35 minutes
MXT 14	●	●	●	4 hrs	5 hrs	13 hrs	28 hrs	10 minutes
MXTS 70 at 12 V	●	●	●	1 hrs	2 hrs	4 hrs	8 hrs	2 minutes

When dealing with batteries, many problems can be eliminated by always using modern chargers.



To counter sulphation, the actual charging process is preceded by the pulse mode. This is activated automatically in all CTEK chargers if the internal resistance of the battery indicates advanced sulphation. Another problem is 'layering' of batteries, which involves a change in the electrolyte. The acid density should be homogenous with a value of 1.28. When a battery is

deep-discharged, acid and water mix and the acid density is no longer homogenous. We will generally find that there is too much water in the top of the battery and too much acid in the bottom. It will then no longer have its full capacity.

Only by restoring a homogenous acid density can the full capacity of the battery be regained. Here, the RECOND mode provided by the larger CTEK chargers gives the desired result. The battery is fully charged, then subjected to controlled overloading with the voltage increased to 16 V at a low current of 1.5 A for max. 4 hours. This produces a homogenous acid density and so returns the battery to its full capacity. To optimise battery maintenance, CTEK chargers automatically switch to pulse charging as soon as the end-of-charge voltage has been reached. This trims the battery in the patented float/pulse mode for maximum performance and a long service life.

A timer keeps the device running in float mode for 10 days. The battery is then completely charged up with a very small current. The device then switches the current off and allows the voltage to drop to 12.8 V. At this level the device automatically switches on again and charges the battery right up to 14.4 V again. This process combines optimum performance with minimum water loss.

It is sometimes necessary for a charger to take over the supply to consumers. **Devices with a 'supply' function are able to operate as a mains adapter.** This is particularly useful when you want to supply a vehicle with power while changing the battery. Using the formula  $V \times A = W$ , it is easy to work out the maximum power output of any given device (Multi XS 25000:  $12\text{ V} \times 25\text{ A} = 300\text{ W}$ ).

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GOOD TO KNOW



## Start booster



### Start booster

#### XPA 12/24-4

**automatic reversed polarity protection and automatic 12/24 Volt voltage selection, electronics protection,** short-circuit/overload protection, long-life and deep-cycle resistant Hawker batteries, lifetime at max. 50% starting discharge: 1000 cycles, supplied IUU charger allows permanent connection to 230 V, so that 100% output is always available, very powerful, includes transport base

Cable length	140 cm
Cable cross-section	50 mm <sup>2</sup>
Capacity	4 x 16 Ah = 64 Ah

starting current at 12 V 2000 A, at 24 V 1000 A  
starting current at 12 V 5700 A, at 24 V 2850 A

#### Application range

suitable for vehicles up to 650 PS at 24 V

Order no.

9539 640 106



### Start booster

#### AS 12-24/1600

maximum starting power through extremely deep-cycle resistant AGM battery (replaceable), lifetime for max. 50% start discharge: 1,000 cycles, correct use protects the electronic equipment of the vehicle, built-in voltmeter which indicates the state of charge of the batteries and the correct operation of the charging equipment as well as the generator, built-in socket, high-quality internally bridged crocodile clips with a very wide opening angle, impact-resistant polyethylene casing, charging via electronic battery charger with pulse charge retention or with cable (not included in the delivery) via the generator through the vehicle's cigarette lighter socket

Version	portable
suitable for	Vehicles up to 250 horsepower at 24 V
Cable length	1,35 m
Cable cross-section	35 mm <sup>2</sup>
Weight	22 kg

Starting current: at 12 Volt 1600 A, at 24 Volt 800 A  
Peak current: at 12 Volts 4740 A, at 24 Volts 2370 A



Order no.

9539 640 164



## Special connections available on request!



### Start booster

professional external starter unit, maximum cold-start power thanks to an extremely cycle-resistant AGM battery, start-up without voltage peaks, manual voltage selection, correct use protects vehicles' electronic components, integrated voltmeter which displays the charging status of the batteries and the correct functioning of the charging equipment and alternator, built-in socket, high-quality, internally bridged crocodile clips with a very wide opening angle, impact-resistant one-piece housing with lifetime guarantee, charging through electronic battery charger. **NATO approval available.**

Version	manual voltage selection
Voltage	12/24 V
Cable cross-section	50 mm <sup>2</sup>
Weight	25.5 kg

Service life 1000 cycles with max. 50 % start discharge  
Starting current 2400 A at 12 V, 1200 A at 24 V  
Peak current 6200 A at 12 V, 3100 A at 24 V

**For vehicles up to 500 hp**

Order no.

9539 640 165



Special connection Nato 1+2



Photo shows special connection

## Add-on products



### Battery acid

To "activate" (prime) dry pre-charged batteries!  
specific weight of 1.28 kg/l

Contents	Container	Order no.
35 kg	Canister	9560 000 150
75 kg	Canister	9560 000 140



### Washing bottle

acid-proof and flexible

Capacity 1 l  
Material polyethylene

Order no.
9501 244 856



### Refill can

for battery care, with valve

Capacity 2 l

**Application range**  
engine garages

Version	Colour	Order no.
for distilled water	blue	9591 970 160
for battery acid	yellow	9501 007 377



### Balloon lifter

for filling liquids from large containers

suitable for Balloons with 40-60 l contents  
Hose length 1750 mm  
Length of tube approx. 650 mm  
Stopper Ø 47-60 mm

Order no.
9591 970 071

### Battery acid

Version with spout

**Scope of supply**  
6 x 496 ml bottles

Order no.
9198 549 006



### Battery filler for acid and distilled water

hard rubber tube with acid-resistant ball

Overall length 275 mm

Order no.
9501 007 356



### Valve

Version	Order no.
Valve	9501 007 378



**Jump cable set  
for start boosters**

fully insulated jump cable with solid copper cheeks, extremely flexible copper cable

Version offset clamps  
Cable length 5 m

**Scope of supply**  
Comes in a plastic case

Cable cross-section	Order no.
50 mm <sup>2</sup>	9560 002 060
70 mm <sup>2</sup>	9560 002 070



**Jump cable set  
professional version**

fully insulated clamps with solid copper cheeks, highly flexible copper cable

Cable length 5 m

**Scope of supply**  
Comes in a plastic case

Cable cross-section	Order no.
35 mm <sup>2</sup>	9560 000 201
50 mm <sup>2</sup>	9560 000 202

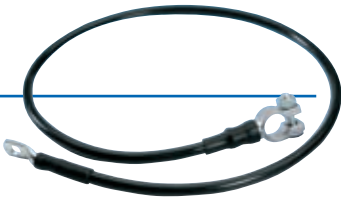


**Battery cable**

with battery terminal and  
M8 eyelet terminal

Cable length 900 mm  
Cross-section 25 mm<sup>2</sup>

**Scope of supply**  
5 pieces



Order no.
0707 919 021



**Battery cutout  
switch  
for tanker vehicles**

Order no.
9570 465 053



**Pole grease**

blue varnish coating, specially developed for lubricating electrical contacts and battery poles, prevents spark formation, micro-fusions and creeping currents, extreme oxidation resistance and excellent lubrication ability, acid-free

Contents	Container	Order no.
400 ml	Spray can	9230 002 065



**Distilled water**

**Application range**  
in the car: for refilling the car battery, for the wiper system (mixed with methylated spirits) and for the car radiator

**deionised, chemically pure, according to VDE requirement 0510, not for medical purposes**

Contents	Container	Order no.
1 l	Bottle	9792 000 000
5 l	Canister	9792 000 001
20 l	Canister	9792 000 002



**LESSMANN**  
BRANTROSTEN - WIRE BRUSHES



## Battery pole brush

Version	3-rows
Trimming material	convoluted copper wire
Length	150 mm
Width	15 mm
Wire thickness	0,2 mm
Useful length	50 mm

Order no.

9534 841 023



## Full view protective goggles

directly ventilated, lasting comfort with close-fitted sealing seat

Standard	EN 166
Material	Screen: polycarbonate, frame: PVC

Order no.

9534 880 040



## Protective gloves

high-grade quality, with jersey cotton lining, seamless

Size	10
Length	350 mm
Material	PVC
Standard	EN 388

Order no.

9534 881 253

## Apron

Resistance to greases and various chemicals

Dimensions	90 x 115 cm
Thickness	0,5 mm
Temperature resistance	up to approx. +130 °C
Colour	grey



Order no.

9751 285 002

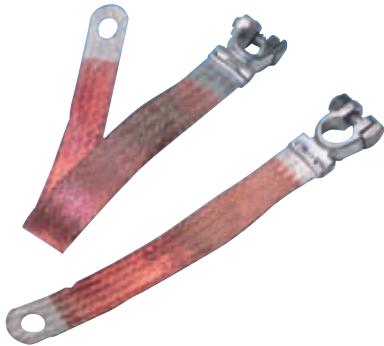


## Battery earth strap

in highly flexible copper braid, with brass strap clamp, ends and strap clamps leaded

Electric current 80 A

Length	Order no.
180 mm	0091 391 001
250 mm	0091 392 001
300 mm	0091 394 001
320 mm	0091 395 001
350 mm	0719 756 001
400 mm	0719 757 001



Engine earth strap

in highly flexible copper braid, ends leaded

Electric current 65 A

Cable cross-section	Electric current	Length	Order no.
16 mm²	65 A	150 mm	0707 916 001
16 mm²	65 A	200 mm	0707 916 011
16 mm²	65 A	250 mm	0707 916 021
21 mm²	80 A	300 mm	0707 917 031
21 mm²	80 A	200 mm	0707 917 011
21 mm²	80 A	250 mm	0707 917 021



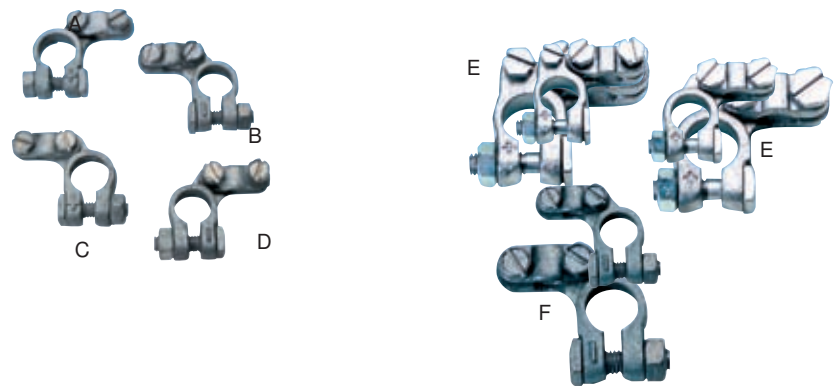
Suppressor earth strap

in highly flexible copper braid, ends leaded

Electric current 48 A

Cable cross-section 10 mm²

Length	Order no.
210 mm	0707 918 011
280 mm	0707 918 021
400 mm	0707 918 031



Battery pole terminal

in acid-resistant and oxidation-proof material, leaded, with lateral cable connection, for cables up to 120 mm²

Ø	Version	Form	Installation side	Scope of supply	Order no.
17,5 mm	positive pole	E	left		0707 911 001
15,9 mm	negative pole	F	right		0707 911 011
17,5 mm	positive pole		left		0707 912 001
15,9 mm	negative pole		right		0707 912 011
15,9 mm	negative pole			with bolt	0707 913 001
17,5 mm	positive pole			with bolt	0707 913 011
17,5 mm	positive pole	E	right		0716 405 001
17,5 mm	negative pole	E	left		0716 405 011
15,9 mm	negative pole	B	right		0043 021 001
17,5 mm	positive pole	A	left		0091 450 001
17,5 mm	positive pole	A	left		0091 450 002
17,5 mm	positive pole	C	right		0091 451 001
17,5 mm	negative pole	D	left		0091 452 001
17,5 mm	positive pole	E	left		0091 453 001



## Typical sources of error



Serious damage: battery casing and grid  
Possible cause: overloading or wrong charging mode



Battery with terminal damage.  
Clearly visible deposits!

### Complaint No power

**Fault** Battery spent

**Inspection** Acid brown/dark, deposits under the cover, possible flakes on the electrolytes

**Causes** End of service life or extremely high cyclical load

**Remedy** Install larger battery or SHD instead of HD battery, e.g. in trucks with tail-lifts

### Complaint Defective terminals

**Fault** Terminals fused

**Causes** Poor terminal contact, terminal damage from high transfer resistances

**Remedy** Check terminal contact regularly for firm fixing, and grease terminals

### Complaint Damage to fittings

**Fault** Casing material glassy, serious damage to cover and case even from the smallest mechanical stresses

**Causes** UV radiation from incorrect storage or use in unprotected areas (chemical vapours)

**Remedy** Do not expose battery to direct sunlight and ensure adequate ventilation

### Complaint Case leaking, cracked

**Fault** Deep discharge or improper mounting

**Causes** Period out of service at low acid density and frost damage or incorrect mounting in battery container

**Remedy** Check generator, ensure battery mounted correctly

### Complaint Battery damaged, pressure points

**Fault** Incorrect fitting or handling

**Causes** Mechanical damage (not to be confused with whitening of the plastic)

**Remedy** Proper handling of the battery

### Complaint very low/no power, short circuit

**Fault** Deep discharge with penetration of the cell divider by crystallization, possibly externally visible sulphate marks

**Causes** Permanent lack of charge, long period out of service at low acid density

**Remedy** Check generator or recharge in case of long periods out of service, or replace battery

### Complaint Black terminals

**Fault** a) Acid running over terminals, b) Terminal leaking

**Inspection** Clean terminal, then tilt battery so the acid is underneath the terminal

**Remedy** If no new (black) deposit can be seen after 24 hours, fault a) is confirmed

## In 24 V systems, the two 12 V batteries must match!

For 24 Volts (= 2 x 12 Volts), there are 3 rules to obey:

- only pair batteries > 85 % with new batteries
- If the difference between the two batteries > 25 %  
=> replace the weaker battery
- Replace batteries < 50 %

Benchmark:

Battery life or cold start current

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### Case studies:



Difference < 25 %  
Each battery above 50 %  
**both batteries OK**

In practice, in spring both batteries would be left in place, in autumn however, they would be replaced because of the low temperatures which could be expected.



Difference > 25 %  
neither battery above 85 %  
**replace both batteries**

In practice, the 52 % battery would be disposed of, the 80 % battery however would be kept ready for pairing with another battery having between 75 % and 90 %.



Difference > 25 %  
neither battery > 85 %  
**battery 1 is kept, battery 2 is replaced**

The 90 % battery can be well combined with a new battery.



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