

BOSCH BATTERIES

2021

Bosch batteries

Agenda



1 Battery's market

2 Passenger car range

3 Start/Stop

4 Heavy duty vehicle, two-wheelers and leisure ranges

Bosch batteries

Agenda



1 Battery's market

2 Passenger car range

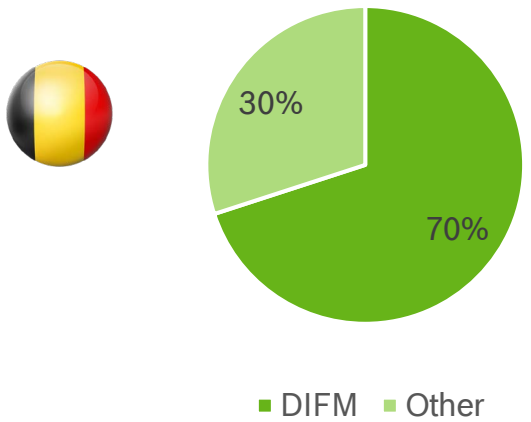
3 Start/Stop

4 Heavy duty vehicle, two-wheelers and leisure ranges

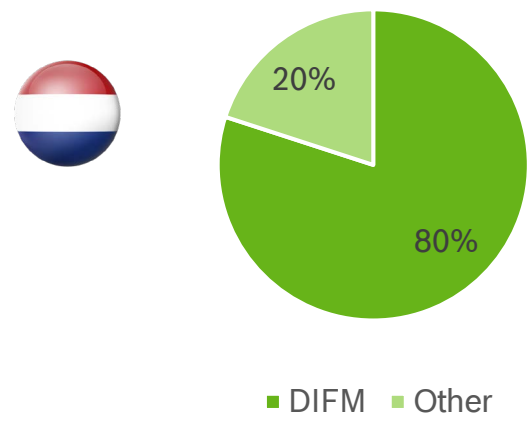
Battery's market

Global data

Although the PC battery mix is evolving towards Start/Stop technologies, the EU operation rate has been stable for the past 6 years.

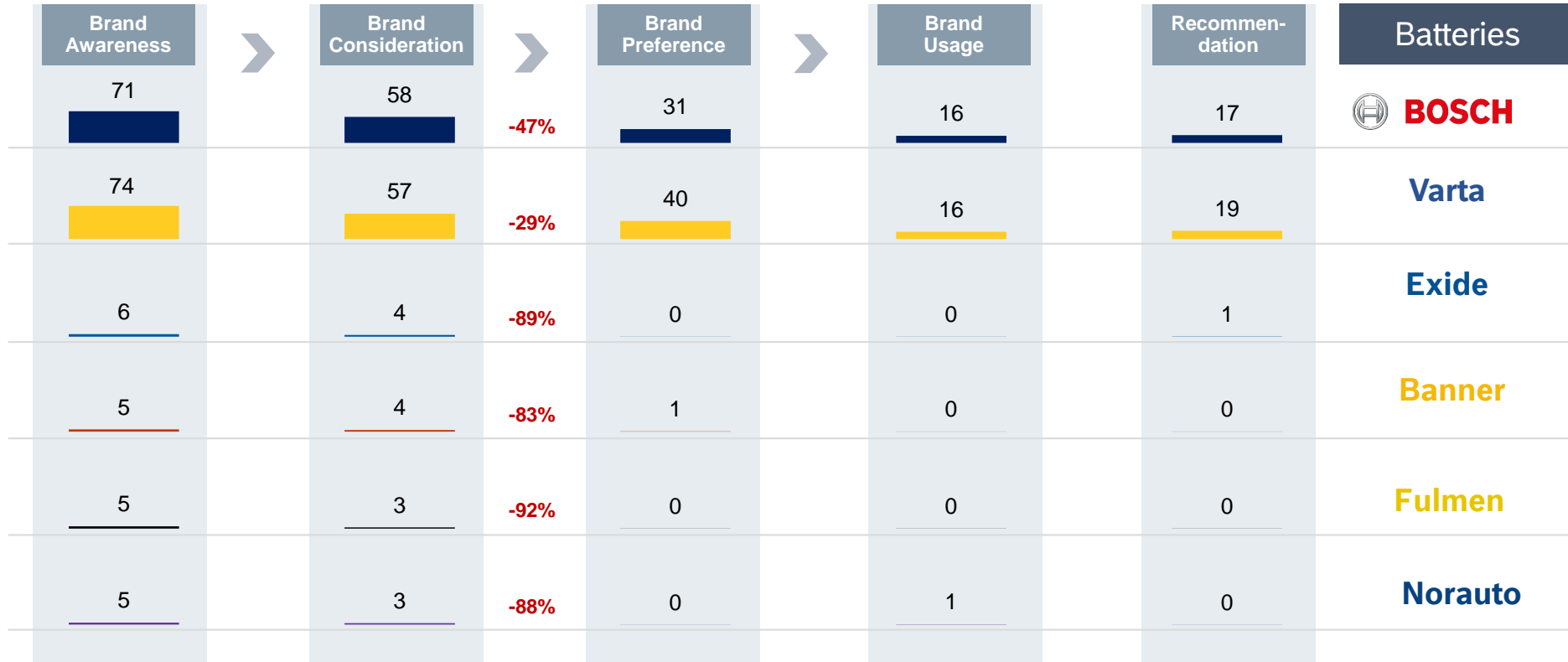


More than 70% of the battery operations in Belgium are performed in DIFM



More than 80% of the battery operations in the Netherlands are performed in DIFM

On end customer's brand awareness, Bosch and Varta are the only brands standing out.



Awareness: Please have a look at the following list of some “product category” brands. Please look at this list carefully and indicate which of these brands you know, if only by name in the category of “product category”?

Consideration: To what extent would you consider the respective brand when buying “product category” for your vehicle? Top2Box on 5 – point scale in %

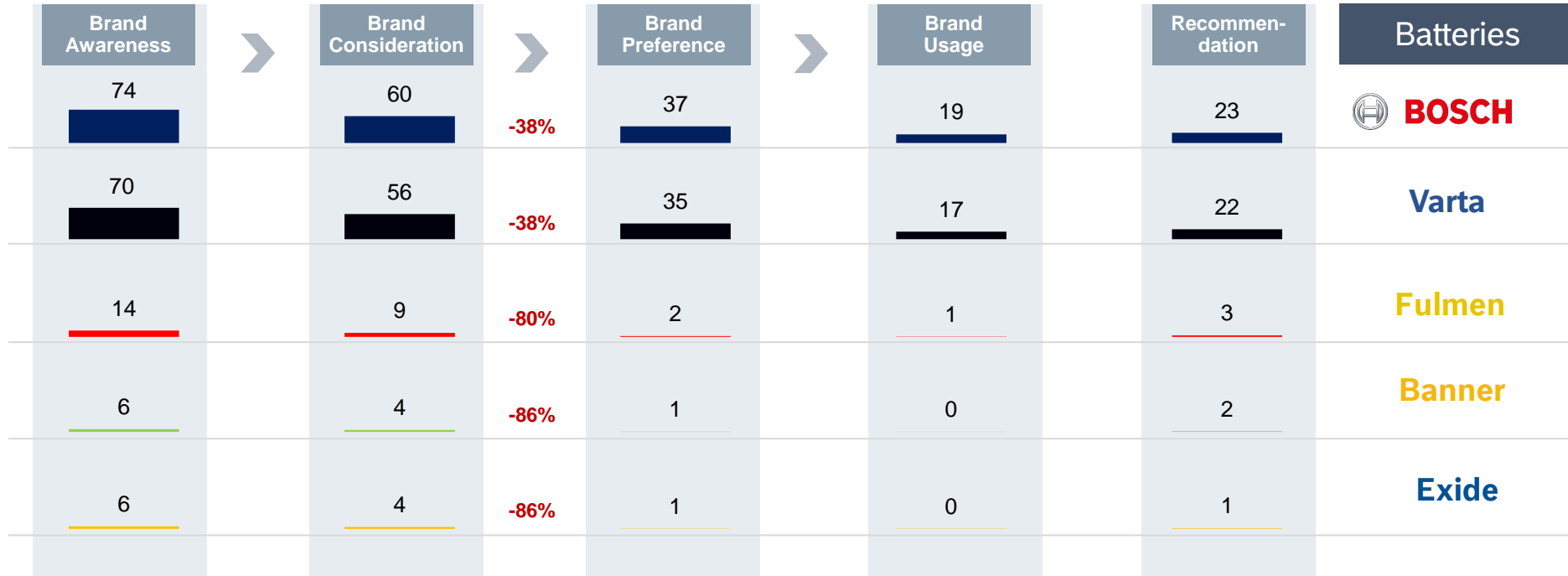
Preference: And which of these brands would be your first choice when buying “product category” for your vehicle? In %

Usage: Which of the following “product category” brands have you currently installed at your vehicle? In %

Recommend.: And which of the following brands in the category of “product category” would you recommend to a friend or colleague? Top2Box on a 10 – point scale in %

Base: n=505, in %

Bosch on par with Varta for Batteries. Other brand are not of relevance for the customers



Awareness: Please have a look at the following list of some “**product category**” brands. Please look at this list carefully and indicate which of these brands you know, if only by name in the category of “**product category**”?

Consideration: To what extent would you consider the respective brand when buying “**product category**” for your vehicle? Top2Box on 5 – point scale in %

Preference: And which of these brands would be your first choice when buying “**product category**” for your vehicle? In %

Usage: Which of the following “**product category**” brands have you currently installed at your vehicle? In %

Recommend.: And which of the following brands in the category of “**product category**” would you recommend to a friend or colleague? Top2Box on a 10 – point scale in %

Base: n=501, in %

Bosch batteries

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1 Battery's market

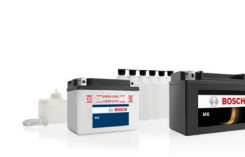
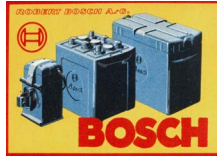
2 Passenger car range

3 Start/Stop

4 Heavy duty vehicle, two-wheelers and leisure ranges

Bosch batteries, a story since 1922

Expert for almost a century



1922

First motorcycle battery production in Stuttgart, Feuerbach

1927

First production of car battery

1960s

12V battery with polystyrene case and charge indicator

1980s

Introduction of maintenance-free batteries

1990s

Alloyed silver grids for longer service life and higher cranking power

2000s

AGM batteries for Start/Stop applications

2010s

Complete range of 2 wheelers batteries with separate acid (conventional & AGM technologies)

2020

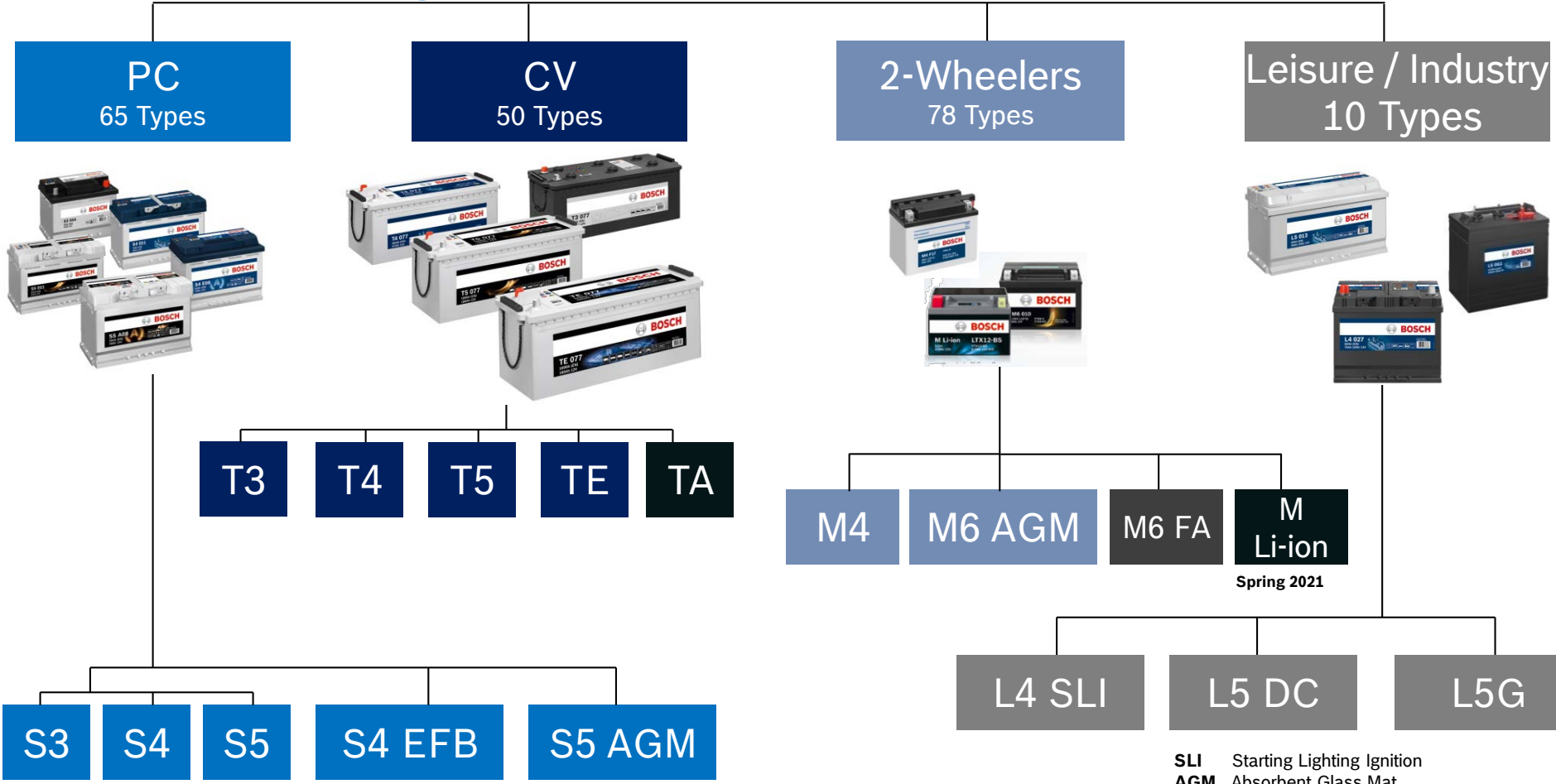
New AGM heavy duty battery for the highest requirements.



Continuous development of ranges and technologies

Batteries - ranges

Comprehensive range



SLI Starting Lighting Ignition
AGM Absorbent Glass Mat
EFB Enhanced Flooded Battery
DC Deep Cycle

PC range

S-Line range – Conventional batteries

S3

Suitable for older vehicles with a limited number of electrical consumers



- Durable and reliable power supply
- Economical solution for vehicles with few additional consumers
- High safety
- Easy to transport
- **2 year warranty**

S4

Suitable for most standard vehicles, including Asian JIS types



- 15% more cold starting performance than the S3
- 20% longer service life (vs. S3)
- Suitable for Asian models
- Instruction manual
- Double terminal cover
- **2 year warranty**

S5

Adapted to recent vehicle and premium models



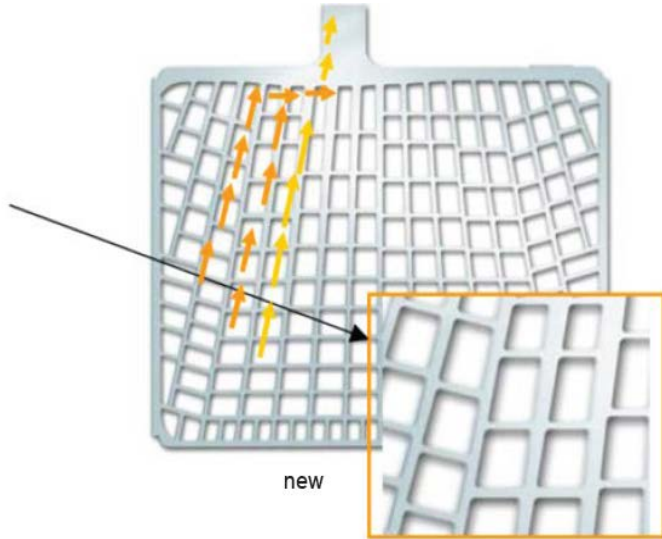
- 15% more cold starting performance than the S4
- Adapted to recent vehicle and premium models
- Instruction manual
- Double terminal cover
- Perfect for short trips and for vehicles with many electrical consumers
- **2 year warranty**

Total coverage of the range: 96%

PC range

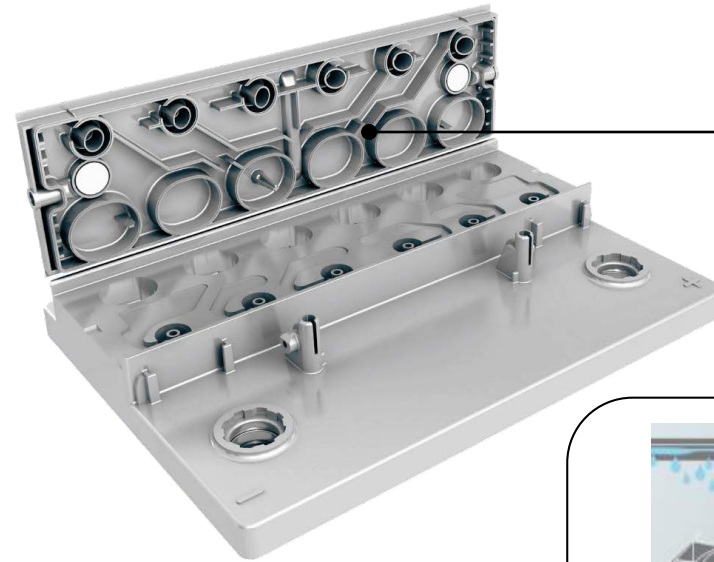
Technologies inside Bosch batteries

it's based on an innovative plate structure.
Obtained by a new industrial process, by stamping.

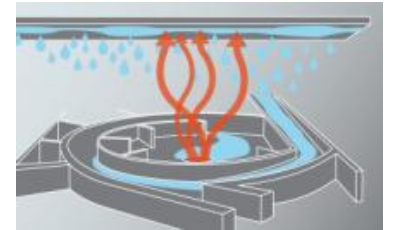


PowerFrame

drawn or cast lead plate
without structure



Labyrinth lid



1. The water steam condenses on the battery lid.
2. Water flows safely into the battery thanks to the labyrinth lid design.

Bosch batteries

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1 Battery's market

2 Passenger car range

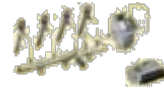
3 Start/Stop

4 Heavy duty vehicle, two-wheelers and leisure ranges

Start/Stop Bosch system maker competence


Start

 **BOSCH** Start/Stop injection



 **BOSCH** Start/Stop Starter




 **BOSCH** Smart crankshaft sensor




Energy management

 **BOSCH** Start/Stop battery



 **BOSCH** Battery management sensor



 **BOSCH** Combination of a generator and an integrated controller with a LIN interface



 **BOSCH**

Safety

Clutch pedal sensor



Hood sensor
engine/door/belt



Gearbox sensor



 **BOSCH**

Brake pressure sensor



 **BOSCH**

Comfort

DC/DC inverter converter



 **BOSCH**

Air conditioning



Multifunctional screen



Start/Stop

Two technologies fitting different needs



EFB battery

- ✓ Batteries designed for vehicles with intermediary emission reduction requirements.
- ✓ Technology: positive plate coated with a polyester scrim
- ✓ Cold cranking performance 15% higher than conventional ranges.
- ✓ 10% increase in service life vs. conventional ranges.

AGM battery

- ✓ Batteries designed for vehicles with the most restrictive emission requirements.
- ✓ Technology: Micro-fiber glass mat
- ✓ More energy available and specific to premium vehicles.
- ✓ Extreme resistance to deep cycles and vibrations.
- ✓ Suitable for regenerative braking

**9 P/N S4E (EFB)
+ 5 P/N S5A (AGM)
= 99% fleet coverage**

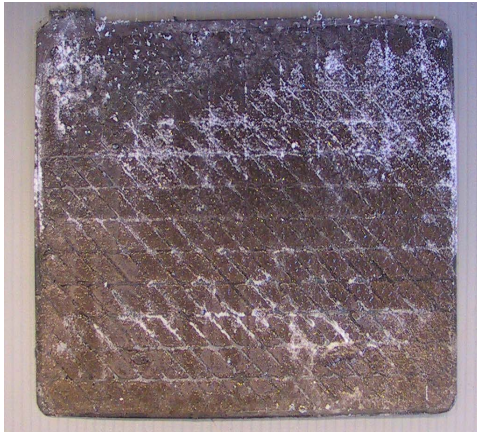
PC Sales → 2% in 2017 - 20% in 2020

Start/Stop

The most efficient "battery killers"

Prolonged low state of charge causes:

- ▶ Corrosion of grids.
- ▶ Sulfation of active coating.

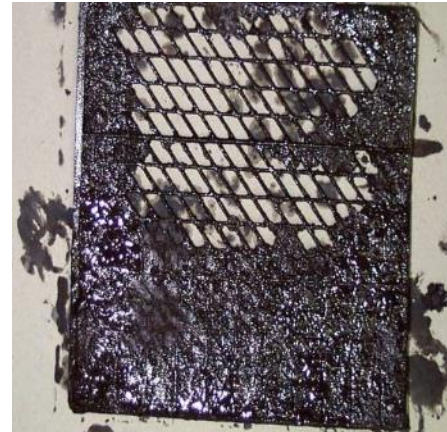


Damaged by deep discharges.
DoD

The internal resistance increases!

Wear and tear due to high cycle frequencies:

- ▶ The loss of active coating on the plates is accelerating
- ▶ Stratification of the electrolyte.

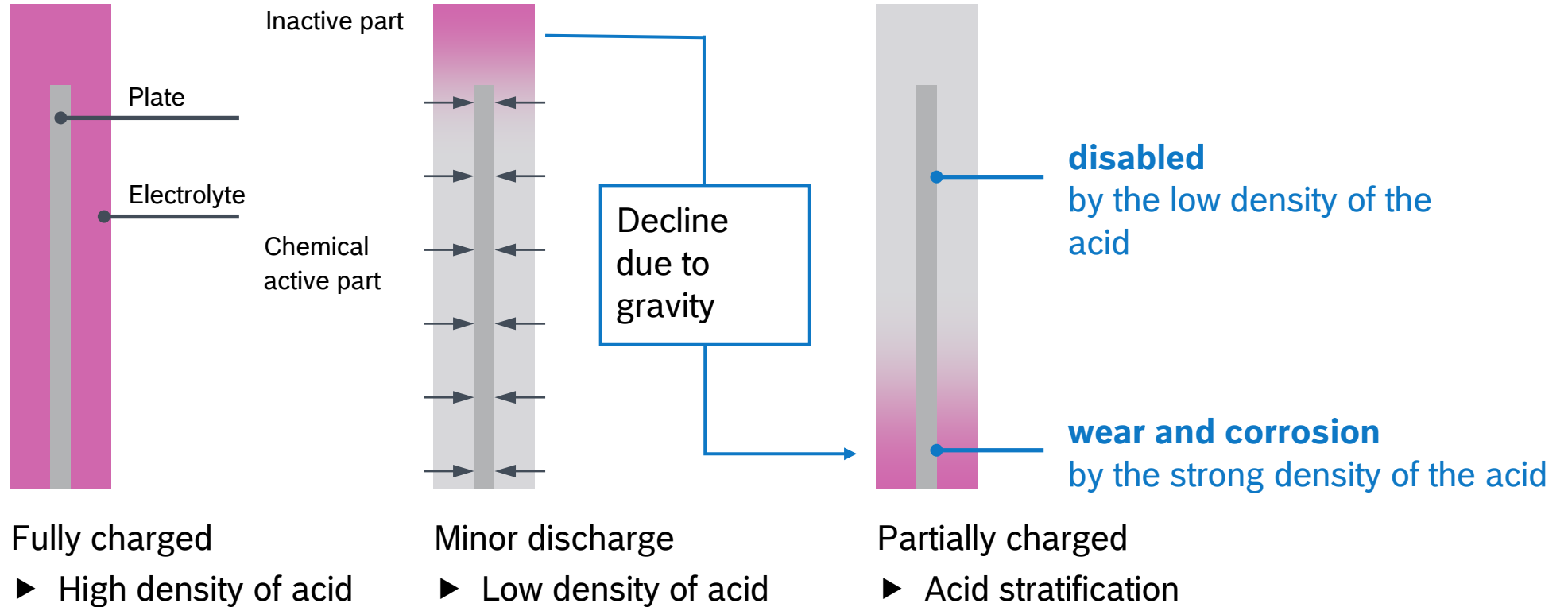


Damaged by numerous cycles

The battery performance drops!

Start/Stop

Acid stratification in conventional lead acid batteries



Drastic decline in usable capacity in a few weeks!

Start/Stop

Two technologies according to the need

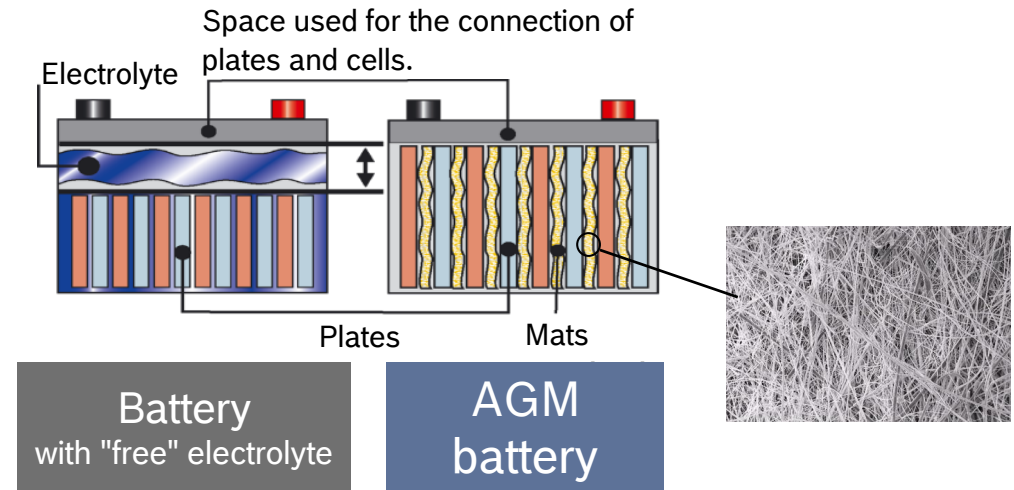
EFB technology

Microporous pocket separator made of resistant polyester, prevent the active coating from disintegrating while being permeable to ions for the proper functioning of the battery.



AGM technology

The electrolyte is trapped in **microfiber glass mat** similar to a sponge. This prevents electrolyte stratification, increases the active surface of the plates and allows the battery to support a higher state of charge.



Bosch batteries

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Commercial vehicle range

Description of the T-Line range



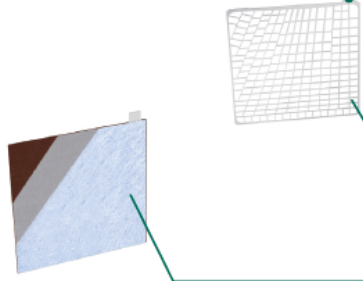
Technology	AGM TA Microfiber glass mat	EFB TE Enhanced electrolyte battery	SLI T5 Starter batteries / Starting-Lighting-Ignition	T4	T3
Service life	●●●●●	●●●●	●●●	●●●	●●
Cold cranking performance	●●●	●●●	●●●	●●●	●●
Resistance to deep discharge cycles	●●●●	●●●	●●	●●	●
Number of electrical consumers	●●●●	●●●	●●	●●	●
Vibration resistance	●●● V4	●●● V4	●● V3	●● V3	● V3 / V2
Maintenance	Maintenance free	Maintenance free	Maintenance free	Maintenance free	Low maintenance

Commercial vehicle range

Description of the T-Line range

Patented PowerFrame® (grid) for optimized current flow and reduced corrosion

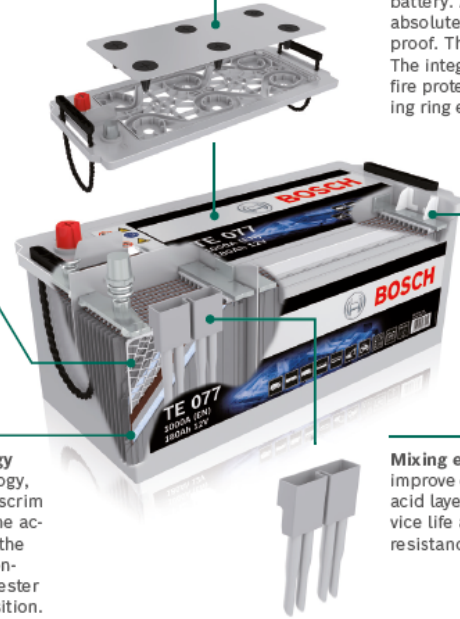
The special grid-stamping technique makes this battery particularly corrosion-resistant and durable. The flow-optimized PowerFrame® grid design ensures consistently high starting power. This results in a very low self-discharge rate.



EFB (Enhanced Flooded Battery) technology
At EFB (Enhanced Flooded Battery) technology, the positive plate is coated with a polyester scrim (fleece). It ensures additional retention of the active material on the battery plates doubling the deep-cycle resistance in comparison with conventional batteries. The specially glued polyester fleece reliably keeps the battery plates in position. As a consequence, the battery remains operational even if subject to strong and lasting vibrations.

Labyrinth lid

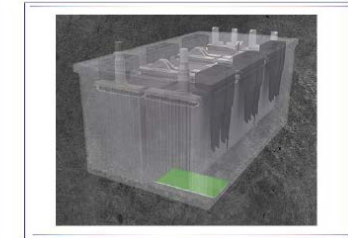
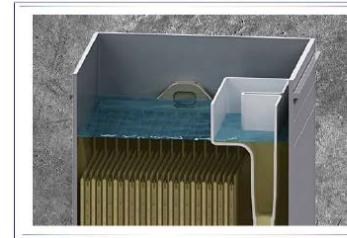
The double lid with labyrinth design returns condensed water to the battery. As a result, TE batteries are absolutely maintenance-free and leak-proof. They consume very little water. The integrated central degassing, back-fire protection and an additional sealing ring ensure high operational safety.



Additional stabilization for vibration resistance (V4 according to EN-standard)

Mixing elements

improve electrolyte mixing and prevent acid layering – thus expanding the service life and improving the deep-cycle resistance.



No acid stratification with the Bosch EFB battery



Commercial vehicle range

Description of the T-Line range

AGM battery: Benefits in figures

- ▶ 250 cycles with 80% DoD*
- ▶ 600 cycles with 50% DoD*
- ▶ Number of cycles achieved:
6 times higher than conventional batteries, 3 times higher than EFB CV batteries.
- ▶ Part no.: 0092TA0800
- ▶ Specifications: 12 V, 210 Ah, 1200 A
- ▶ ETN: 710901120

*DoD = Depth of discharge



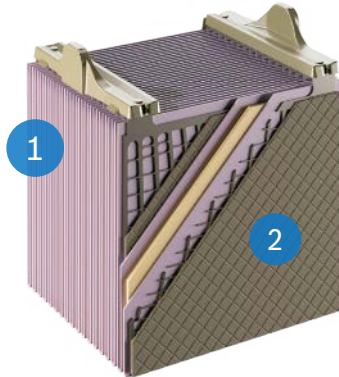
Today's best CV battery on the market

Commercial vehicle range

Description of the T-Line range

1 Plate with AGM glass microfiber mat

The glass microfibers mat completely absorb the electrolyte and provide a pressure on the plates that prevents stratification and reduces material loss due to deep cycles.



2 Active coating in a waffled structure

Reduction of internal resistance and improvement of cycling performance for high starting power and durability.



3 Safety lid

High operational safety with VRLA pressure safety valves, one per cell. Overcharge protection of the sealed AGM battery against the risk of explosion.



4 Higher stability

Improved durability and operational safety due to vibration resistance (the most restrictive V4 standard).

2-wheelers range

Varied offer to fit the need

M4

Suitable for almost all types of motorcycles - also suitable for quads, snowmobiles, jet skis, lawnmowers



- Absolutely maintenance-free
- Reliable starting power
- Long service life even in extreme conditions
- Acid pack included

M6 AGM

Suitable for the most extreme traffic conditions - suitable, for example, for off-road and touring motorcycles, scooters, enduro bikes, quad bikes, snow bikes, jet skis



- Absolutely maintenance-free
- Extreme vibration resistance
- Labyrinth lid
- 20% longer service life (vs M4)
- Outstanding starting performance
- Totally leak-proof
- Acid pack included
- Mounting angle 45°

M6 AGM FA

Suitable for the most extreme traffic conditions - suitable, for example, for off-road and touring motorcycles, scooters, enduro bikes, quads, snowmobiles, jet skis



- Factory pre-filled range
- Absolutely maintenance-free
- Extreme vibration resistance
- Labyrinth lid
- 20% longer service life (vs M4)
- Outstanding starting performance
- Sealed and totally leakproof battery
- Mounting angle 45°

M Li-ion

Ultra-light, extremely powerful lithium-ion batteries for maximum energy requirements and extreme loads over long distances - ideal, for example, for motorcycles with ABS and ESP, scooters, enduro bikes, quad bikes, jet skis



- Ultra light, 1/3 the weight of a lead acid battery
- Outstanding starting performance
- Absolutely maintenance-free
- Up to 10 times more cycling resistance*
- Fast charge
- Extreme vibration resistance
- Totally leak-proof
- Very low discharge rate
- Mounting angle 360°

* Compared to a lead acid battery

2-wheelers range

M4-M6 batteries

54 Part number:
 33 conventional M4 batteries
 21 AGM batteries

Coverage of the main JIS codes
 MOQ : surpack (2 to 10 pcs)



	M Li-ion	M6 AGM
	Ultra-light motorcycle battery with lithium-ion technology – specifically designed for sport bikes and racing motorcycles placing high requirements on the starting performance and being subject to extreme strains	Dynamic motorcycle battery with AGM technology – for off-road and powersports applications requiring quick and powerful starting power and having to cope with high strains
Technology	Lithium-ion: very light, durable and powerful lithium-iron-phosphate cells	Lead-acid AGM (Absorbent Glass Mat): thanks to acid absorbed by micro-fiberglass mats, higher amounts of energy can be provided
Scope of application	Motorcycles with ABS and ESP® (racing, off-road and touring bikes), enduros/dirt bikes, scooters, ATV quads, jet skis, applications with numerous electrical consumers	Motorcycles (off-road and touring bikes), enduros/dirt bikes, scooters, ATV quads, jet skis, snowmobiles, applications with numerous electrical consumers

2-wheelers range

M4-M6 batteries

Maximum power

Connectors linked to the plates

Provides faster power

Higher starting power

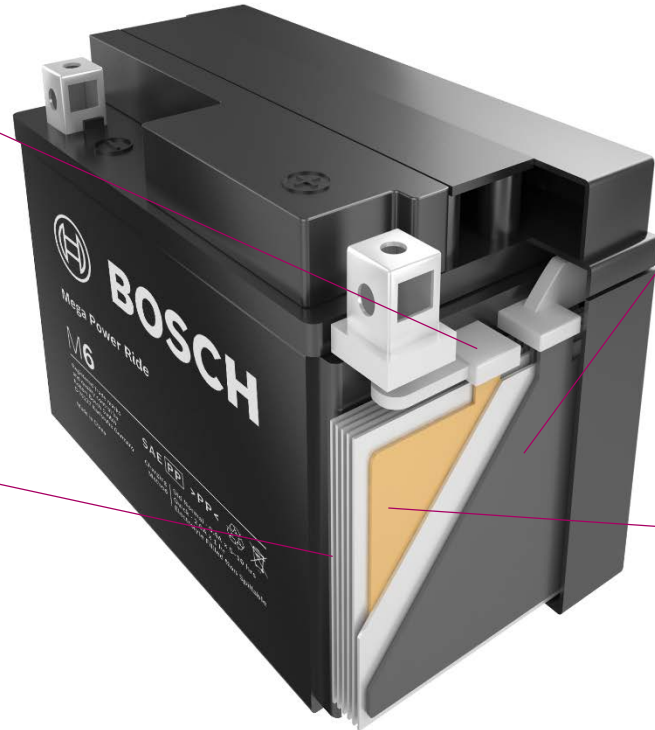
Optimal performance

A unique grid model

Designed to optimize conductivity

Increases starting performance

Improved corrosion resistance



Great resistance

Thermoplastic box

Excellente résistance qui favorise le recyclage et permet de sécuriser la batterie grâce à une matière innovante

Improved service life

Improved active material

Anti-sulphate additives reduce the sulphate crystals that have formed, thereby improving the service life of the battery

Better endurance and increased discharge rate of the battery

2-wheelers range

M6 Factory Activated Batteries

- ▶ Regulation (EU) 2019/1148 on the sale and use of explosives precursors aims to limit their availability to the general public in order to reduce the risk of their misuse in the manufacture of homemade explosives.



Article 5
Making available, introduction, possession and use

1. Restricted explosives precursors shall not be made available to, or introduced, possessed or used by members of the general public.

- ▶ This regulation applies to Bosch M4 and M6 2-wheelers batteries because the batteries and the electrolyte, which has a sulfuric acid concentration of more than 15%, are delivered separately. It is therefore a product considered as an explosive precursor accessible to the general public.
- ▶ In order for the product to be suitable for consumer sale, the battery must be filled beforehand.

This regulation is effective on February 1, 2021

2-wheelers range

M6 Factory Activated Batteries

Compact range of 8 pre-filled part numbers:

Selection of EU Fast Movers
Completely sealed battery

Upgrade of the top selling M4 to M6 AGM

MOQ : pallet



Face of the FA 101 battery packaging

2-wheelers range M Li-ion batteries

Connection plug for BMS connection

Interface connected to the battery management system (BMS) integrated in the battery lid.



Battery lid with voltage tester and balancer (passive balancing of battery cells)

distributes the voltage level over the cells during charging or discharging

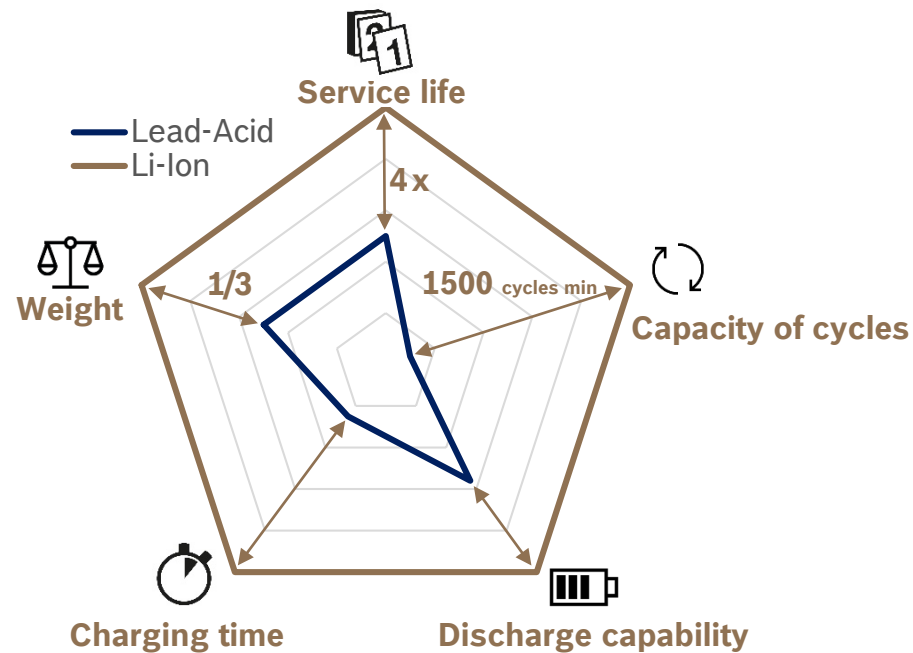
Display of the state of charge of the battery



Spacers

Ensure the battery positioning

Lithium-ion technology : (Lithium-iron-phosphate cells):
The extremely light lithium-iron-phosphate cells bring along weight saving 2/3 in comparison with conventional lead-acid batteries. Featuring 4 X 3,2 V (12,8 V in total). This battery stands out for its high energy density and deep-cycle resistance. In addition, it can be recharged quickly and without any problems. Yet another advantage of the lithium-iron-phosphate electrodes: this material does not tend to overheat – not even of mechanically damaged.



2-wheelers range

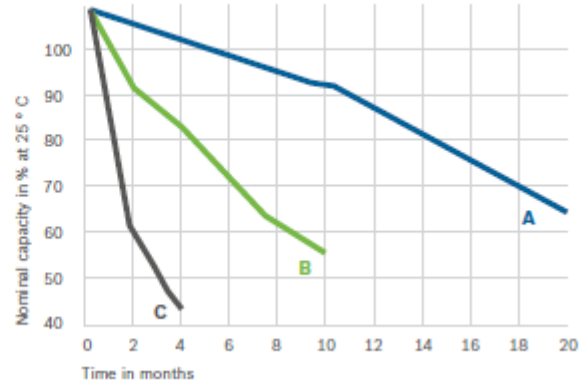
M Li-ion batteries

Getting through the winter break unscathed

Benchmark test on self-discharge rates proves:

- ▶ Extremely low self-discharge rates in comparison with conventional lead-acid batteries

A: Bosch M Li-ion battery
 B: AGM battery
 C: Lead-acid battery

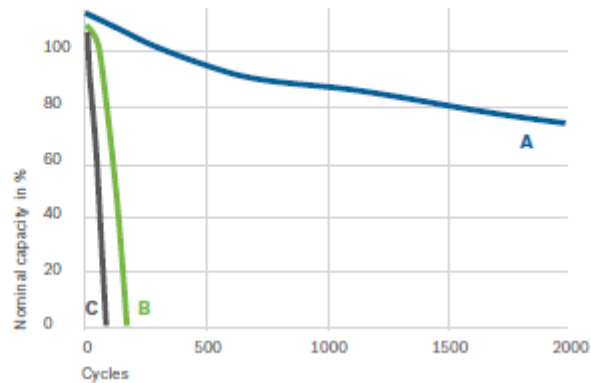


Service life increased by at least 4 times

Benchmarking stress test in the laboratory (100% discharged) proves:

- ▶ M Li-ion batteries are particularly powerful and deep-cycle-resistant

A: Bosch M Li-ion battery
 B: AGM battery
 C: Lead-acid battery



M Li-ion

Ultra-light motorcycle battery with lithium-ion technology – specifically designed for sport bikes and racing motorcycles placing high requirements on the starting performance and being subject to extreme strains

Technology

Lithium-ion: very light, durable and powerful lithium-iron-phosphate cells

Scope of application

Motorcycles with ABS and ESP® (racing, off-road and touring bikes), enduros/dirt bikes, scooters, ATV quads, jet skis, applications with numerous electrical consumers

2-wheelers range

M Li-ion batteries

15 part numbers:

Complete with adjustable spacers

→ for maximum coverage with a minimum of part numbers

→ Complete coverage

→ MOQ : surpack (2 to 8 pcs)



Leisure range

Leisure Applications

Dans le monde du loisir (nautisme, caravaning), les batteries remplissent les fonctions suivantes

L4 : STARTING APPLICATIONS

SLI (Starting, Lighting, Ignition)

MOTORBOATS

- Starting of the vehicle or light alimentation (inflatable boats or small boats with rigid hull)
- Occasional need for a high power supply



Campers

- Starting of the vehicle



L5 : POWER SUPPLY APPLICATIONS

DC (Deep Cycle)

YACHTS - motor / sailboat

- Power supply for safety and comfort functions (radio, lighting, winch)



CAMPING CAR ET CARAVANES

- Higher energy demands for the system and equipment (radios, lighting)
- Housing energy demand



L5 : TRACTION APPLICATIONS

DC (Deep Cycle)

ELECTRIC BOATS

- Resistance to maximum cycles and low discharge



CARAVAN WITH AXLE MANEUVERING AID

- Resistance to maximum cycles and low discharge



L5G : SPECIFIC NEEDS

DC (Deep Cycle)

Lifting platforms, auto scrubbers, forklifts
industrial cleaners or golf carts and utility vehicles



Old Timers Batteries

Overview

- 6 volt and 12 volt starter batteries with **retro design**
- **Modern technology & plastic box** (security)
- Up to 70% **increase in starting power**
- **Almost a thousand** supported models of vehicles



Upcoming battery ranges

Bosch designs 48V Li-ion batteries for hybrid applications

Advantages

- ▶ Compact: 300 x 175 x 90 mm
- ▶ Light : 7 kg
- ▶ Powerful : 300 A / 48 V
- ▶ Easy to install : No cooling fluids
- ▶ High performance with recovery / boost



For car manufacturers, low-voltage hybrid technology (48 volts) is the best economic solution to achieve CO2 reduction.

Technical supports and sales tools

Stock proposal

Préconisations de stock / STOCKVOORSTEL 2021
Batteries Leisure Bosch

Préconisations de stock / STOCKVOORSTEL 2021
Bosch batteries - 2 Wheelers

Préconisations de stock / STOCKVOORSTEL 2021
Batteries SLI Bosch

Préconisations de stock / STOCKVOORSTEL 2021
Batteries Truck Bosch

Classe	A - 50%	B - 30%	C - 10%	D
5	0001.50750	L3075		
6	0001.60640	L3064		
7	0001.50640	L3064		
8	0001.60710	L3071		
9	0001.60630	L3063		
10	0001.60640	L3064		

Classe	A - 50%	B - 30%	C - 10%	D
1	0002.60020	M0020		
2	0002.60010	M0010		
3	0002.60070	M0070		
4	0002.60050	M0050		
5	0002.60090	M0090		
6	0002.60140	M0140		
7	0002.60120	M0120		
8	0002.60230	M0230		
9	0002.60120	M0120		
10	0002.60010	M0010		
11	0002.60120	M0120		
12	0002.60120	M0120		
13	0002.60040	M0040		
14	0002.60000	M0000		
15	0002.60120	M0120		
16	0002.60020	M0020		
17	0002.60010	M0010		
18	0002.60120	M0120		
19	0002.60120	M0120		
20	0002.60120	M0120		
21	0002.60120	M0120		
22	0002.60120	M0120		
23	0002.60120	M0120		
24	0002.60120	M0120		
25	0002.60120	M0120		
26	0002.60120	M0120		
27	0002.60120	M0120		
28	0002.60120	M0120		
29	0002.60120	M0120		
30	0002.60120	M0120		

Classe	A - 50%	B - 30%	C - 10%	D
1	0002.70170	T0170	AM	A
2	0002.70800	T0800	225	100
3	0002.74740	T4740	140	800
4	0002.70260	T0260	240	530
5	0002.73200	T3200	30	600
6	0002.74770	T4770	170	800
7	0002.70277	T0277	160	650
8	0002.73200	T3200	30	600
9	0002.73001	T3000	10	600
10	0002.73001	T3000	10	600
11	0002.70170	T0170	145	600
12	0002.73170	T3170	130	600
13	0002.73001	T3000	10	600
14	0002.73000	T3000	10	600
15	0002.74750	T4750	140	800

AA-E-NEWS

BOSCH
Technologie voor het leven

AA E-News
Start/Stop-systemen
Januari 2021

De wereld van Start/Stop bij Bosch

Afleveringen:

- 1. De geschiedenis en de werking van het start/stop-systeem
- 2. Starten
- 3. Energiebeheerfuncties van het start/stop-systeem
- 4. Veiligheid
- 5. Omsluit
- 6. Eilijng, Controle en onderhoud

Aflevering 3. Energiebeheerfuncties

Rol van energie in het start/stop-systeem

Energie is een belangrijke parameter voor de goede werking van het start/stop-systeem. Om deze energie te leveren, zijn specifieke onderdelen nodig.



Onderdelen nodig voor de goede werking van het start/stop-systeem



- 1) Motorbestuursregelaar met softwaregeïntegreerde start-stop
- 2) DC/DC-converter 12 V
- 3) AGU (EPS, ADU) en accu
- 4) Start-Help-functie
- 5) Informatieve verbindingszender
- 6) Informatieve ontvanger
- 7) Informatieve zender
- 8) Informatieve ontvanger
- 9) Informatieve zender
- 10) Informatieve ontvanger
- 11) Informatieve zender
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- 30) Informatieve ontvanger



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Parkhaus