Bosch Starters and Alternators: The Comprehensive Range from a Single Supplier

- Comprehensive Product Range
  - for passenger cars, commercial vehicles, agricultural and special machinery
  - Bosch new starters and alternators
  - Bosch spare parts for starters and alternators
  - Bosch eXchange – the exchange program for starters and alternators

- Simple and Transparent Core Collection Process
  New: Coremanagement as a service for external partners

- Reliable Products
  Solutions based on the high quality requirements of original equipment manufacturing

- High Availability
  - Products available throughout the vehicle’s life cycle
  - Starters, alternators and spare parts for vehicles of all ages

- Comprehensive Sales Support
  - Service hotline with expert knowledge
  - Extensive technical information and repair support on ESI[tronic]
  - Detailed application information available in Bosch electronic and paper catalogs as well as on Tecdoc
    www.bosch-automotive-catalog.com

Your address for genuine Bosch quality:

For more information:
www.bosch.com
Bosch Starters and Alternators:
Excellent Quality from the Experts in Automotive Technology

Bosch has almost 100 years of experience in the development and manufacturing of starters and alternators. This knowledge pays dividends – not only for motorists but also for workshops. All parts are manufactured according to OE specifications and are offered to the aftermarket at the beginning of series production.

Advantages of Bosch Starters and Alternators

► Starters, alternators and spare parts in OE quality and technology
► High market coverage
► Innovative products supporting fuel and CO² saving drive systems (e.g. start/stop system)
► Spare parts repair concept
► Quick and reliable delivery
► Detailed application information (ESI[tronic], Tecdoc, catalogs)

Comprehensive Product Range
Bosch has the appropriate starter and alternator for the various requirements of

► All classes of passenger cars
► Commercial vehicles (on- and offroad)
► Industrial applications
► Start/stop vehicles

Spare Parts for Starters and Alternators
Bosch offers a comprehensive range of spare parts for starters and alternators in OE-quality including

► Multifunctional regulators
► Rectifiers
► Roller bearings
► Solenoid switches
► Starter pinions
► Brushholders, etc.
Powerful Right from the Start

Starters from Bosch stand for high performance, long life, excellent quality and reliability. Our product portfolio comprises a broad range of innovative starters for passenger cars and commercial vehicles. Sturdy, technically mature solutions for gasoline and diesel engines that fulfil the requirements of all vehicles and offer the best possible starting reliability – even in the most unfavourable conditions.

Many leading vehicle manufacturers decided in favour of Bosch starters right from the outset. And there are good reasons for doing so – Bosch is synonymous with outstanding quality, innovation, in-depth expertise and an unrivalled range in the fields of starting systems. By constantly developing new starting concepts, Bosch can provide a guarantee of high-grade, state-of-the-art products.

Advantages of Bosch Starters

- Highly reliable and long lasting
- Broad product range, also for start/stop systems
- Units and spare parts in OE-quality
- Complete documentation of the vehicle equipment – over 75 years
- Replacement part concepts matched with the original equipment

Start/Stop System – Economical Driving

The operating principle of the start/stop system is as simple as it is efficient: when the vehicle comes to a stop, the engine is automatically switched off. To drive off again, activate the clutch or, in the case of vehicles with automatic transmission, take your foot off the brake pedal to restart the engine.

Less Fuel and Emission

Engine starts with a start/stop system take place very quickly and economically. Measurements in the New European Driving Cycle (NEDC) indicated savings in consumption and reductions in emissions of around 8%. In urban traffic, savings can be considerably higher. In a modern gasoline engine, a warm start only uses as much fuel as is consumed in 0.7 seconds of idling. This means that stops are worthwhile from the first second onwards: for people and the environment.

Bosch Milestones in Starters

1914 - "Type S" starter motor
1933 - "Bosch starter-alternator" – first unit worldwide, combining alternator and starter motor
1982 - DW starter motor – compact, lightweight and extremely powerful
2000 - GVB starter motor – first overhung pinion/reduction gear starter for commercial vehicles
Today - Starter motor for start/stop systems

Start/Stop System - Economical Driving

1. Engine control unit with start/stop
2. DC/DC converter 12 Volt
3. Deep-cycle resistant battery (EFB, AGM) and battery sensor
4. Start/stop starter motor
5. Neutral gear sensor
6. Wheel-speed sensor
7. Crankshaft sensor
8. Alternator with brake energy recuperation

Current supply 12V
Communication
Hydraulic lines/brake systems
Alternators for Every Type of Vehicle: Leaders in Performance and Efficiency

Bosch has almost 100 years of experience in developing alternators with excellence in performance and efficiency. Whether it is for small cars with low electrical energy requirements or for mid- or high class cars with higher requirements, Bosch will have the right alternator. The latest examples of our constant innovative developments are the New Baseline Alternators and the Efficiency Line Alternators.

Advantages of Bosch Alternators
- Highly reliable and long service life
- Excellent power output
- High market coverage
- Units and spare parts in OE-quality
- Replacement part concepts matched with the original equipment
- Complete documentation of the vehicle equipment – over 75 years

New Baseline Alternators
These robust designed alternators are particularly manufactured for small vehicles with lower electrical demands. With three sizes, the New Baseline Alternators cover the performance range between 1.0 and 1.8 kW. A speed of 6,000 rpm provides a rated current of 70 to 150 Ampere.

Efficiency Line Alternators
The Efficiency Line Alternator is the ideal supplement for the start/stop system – even at low rotation speeds they are particularly efficient as the high power of the alternator means a quicker recharge of the battery. So very soon after every stop the battery will be recharged enough to make another restart happen without any influence on the performance of the car.

Advantages of Bosch Efficiency Line Alternators
- Excellent power output even at low engine speeds
- Increased performance and reduced fuel consumption
- Increased efficiency; optional HED (high efficiency diode) takes this up to 77%
- Noise-optimised

Bosch Milestones in Alternators

1913
- "Bosch light" – alternator, regulator, switch and headlight

1958
- "Variode" – first semiconductor element for the use in alternators

1989
- Compact alternators LI-C – with internal fan, low noise, lightweight and powerful

2005
- Introduction of highline alternators – high efficiency combined with impressive power output, ranging from 150 A – 230 A

Today
- Introduction of New Baseline Alternators and Efficiency Line Alternators

Efficiency Line Alternators are a new generation of alternators with a particularly high degree of efficiency permitting reductions in fuel consumption as well as CO² output of up to 2% – good for motorists and good for the environment. The further improved electrical design and optimized materials used contribute to a never before reached efficiency level of 77%.

Fields of application for the New Baseline and Efficiency Line Alternators
Bosch Spare Parts for Alternators: For Maximum Alternator Performance

Bosch Multifunction Regulators
Bosch's alternators are equipped with innovative multifunction regulators. With efficiency and quality as key aims, the multifunction regulator guarantees the protection of the vehicle's electronic system. This unique Bosch invention does not only verify and control the voltage produced by the alternator, as a common tension regulator does, but it also has multifunctional accessories that integrate it to the vehicle's electronic system.

Characteristics
- Charge sensor provides a charged battery and prevents premature wear
- Specifically developed for each type of alternator, guaranteeing long life of components, continuous control of tension and reduces maintenance
- Brushes with special alloy for optimal conduction of current
- Thermal protection preserves the alternator and other electronic equipment in case of overheating
- Avoids overload and tension variances that can cause damage to the alternator

Benefits
- Safe engine starts
- Long service life
- High vibration resistance
- Safe alternator operation

Bosch multifunction regulator
- it affords reliable communication and safe alternator operation

Regulator Comparison: Bosch Multifunction Regulator vs. Competitor Regulator

<table>
<thead>
<tr>
<th>Bosch Multifunction Regulator</th>
<th>Competitor Regulator</th>
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</thead>
<tbody>
<tr>
<td>Protective Gel</td>
<td>Protective gel in the inner housing</td>
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<tr>
<td></td>
<td>Protects the electronic chip from the entrance of water and other residues</td>
</tr>
<tr>
<td></td>
<td>Increased vibration resistance</td>
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<tr>
<td>Electronic Chip</td>
<td>Chip with electronic multifunction circuit</td>
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<tr>
<td></td>
<td>Supervises the on-board voltage to car manufacturers data</td>
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<tr>
<td></td>
<td>No or limited multifunctions</td>
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<tr>
<td></td>
<td>The voltage can not be optimally monitored and controlled</td>
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<td></td>
<td>Risk of voltage losses by the thermal stress components</td>
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<tr>
<td>Dissipater</td>
<td>Dissipater is integrated in the regulator</td>
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<td></td>
<td>A high-temperature shutdown reduces the flow of current</td>
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<tr>
<td></td>
<td>No temperature detection of the dissipater</td>
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<tr>
<td></td>
<td>Safe operating temperature is not guaranteed</td>
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<tr>
<td>C-Terminal</td>
<td>C-Terminal in copper alloy ensures low contact resistance and a reliable contact</td>
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<tr>
<td></td>
<td>Suspension protects against damage from vibration</td>
</tr>
<tr>
<td></td>
<td>C-Terminal in the conventional metal alloy increases the contact resistance at the contact surfaces</td>
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</table>

Rectifiers

Characteristics
- Special resin housing
- Zener diodes which reduce the voltage peaks
- Individually tested diodes
- Liquid welding in all diodes

Benefits
- Withstands high temperatures
- Perfect rectification of current
- Guaranteed connection
- Operational security for longer periods of time

Roller bearing

Characteristics
- Double sided closed construction against dust entrance
- Specifically developed for alternators

Benefits
- Perfect adjustment
- Does not damage the housings in the end frames
- Less noise
**Bosch Spare Parts for Starters:**
For Maximum Starter Performance

![Image of starter components]

**Program Overview:**
Bosch Start/Stop Starters at a Glance

**Characteristics**
- Special resin housing
- Individually tested diodes
- Liquid welding in all diodes

**Drive end Shield**
- Starter Pinion
- Multiplate Clutch
- Armature

**Stator Frame**
- Control Relay
- Solenoid Switch
- Commutator Set
- Excitation Winding

**Bosch Spare Parts for Starters:**
For Maximum Starter Performance

**Drive end Shield**
- Starter Pinion
- Multiplate Clutch
- Armature

**Control Relay**
- Armature
- Stator Frame
- Commutator Set
- Excitation Winding

**Solenoid**
- Characteristics:
  - Totally sealed
  - Pure copper or silver tin-oxide contacts
  - High quality thermoset isolation
- Benefits:
  - Long service life
  - Excellent connection and isolation

**Starter Pinion**
- Characteristics:
  - Module with specially selected material
  - Special springs in freewheel
  - Special bearing in overrunning clutch
- Benefits:
  - Does not slip, does not slide
  - Ensures perfect engagement and high resistance

**Brush Holder**
- Characteristics:
  - Holder with special surface treatment
  - Special spring for brushes
  - Brushes with calibrated hardness
- Benefits:
  - No oxidation
  - Better contact
  - Does not wear off the slip ring

**Material no.**

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*As of July 2012 – program is extended continuously*