- **Low installation-space requirements**
- **Reliable functioning even at very low temperatures**
- **Corrosion-resistant**
- **Special ranges RF/CF for extreme operating conditions**

The best solution – for every vehicle, for all our customers and for the environment

Bosch engineers are constantly working on novel system solutions. The success of these developments speaks for itself: for decades Bosch has been one of the leading companies in the world in respect of inventions patented.

Drivetrain components
Our compact, low-noise generators for passenger cars are characterized by high efficiency and performance. They guarantee a reliable supply of energy to the vehicle's electrical system and contribute towards a noticeable reduction in fuel consumption.

Starter motors
We offer a comprehensive range of long-life starter motors for passenger cars with gasoline and diesel engines in addition to solutions for their use in the fuel-saving "Smart Electronic Start/Stop System".

Solutions for commercial vehicles
Our product range for commercial vehicles contains powerful and economical starter motors as well as generators with working lives of around 800,000 km.

Body electronics
As well as solutions for setting up vehicle electrical systems, we develop vehicle safety systems as well as control units for the co-ordination of the central comfort and safety functions at the nodal locations door, seat and roof. Electronic Energy Management EEM controls the entire energy supply to the vehicle's electrical system. The Electronic Battery Sensor EBS determines the momentary performance of the battery, prioritizes the consumers and thus safeguards the energy supply.

Wiper systems
As a system supplier, we develop and apply wiper systems for front and rear windows. Thanks to their ideal matching to wiper arm and wiper blade, our compact, low-noise drive units with rotating and reversing motors guarantee a good field of vision in all weather conditions. Our rain and light sensor improves the system's comfort and safety for the driver.

Thermal systems
Our range comprises engine-cooling blower modules, water pumps and valves. Our engine-cooling conceptions take all requirements of the overall system into account. We thus produce the most efficient and quietest solution for every vehicle with single or dual intake and/or pressure fans. In addition, we develop and manufacture air-conditioner fans and air-flap control elements as well as components for triggering and regulating fans.

Actuation systems
Electric and pneumatic drive units can perform a wide range of seating comfort functions: from the individual adjustment of the seat position right up to massage and driving-dynamic multi-contour seats. Electric drive units for controlling windows and sliding roofs bring additional comfort. Integrated electronics permit additional functions such as closing-force limitation. To control the functions of door, roof and seat modules we develop systems with a central control unit or with distributed electronics.

Robert Bosch GmbH
Energy and Body Systems
P.O. Box 1163
D-77813 Bühl
GERMANY

www.bosch.de/k

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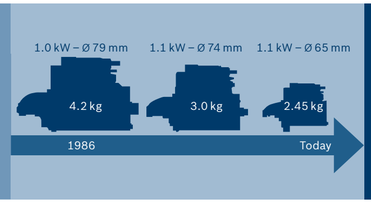
Energy and Body Systems

Passenger-car starter motors – the power packs in miniature for reliable engine start

BOSCH
Invented for life

Outstanding all-round performance
thanks to perfection in detail

Range	Application	
	Engine	Displacement
C 65	Gasoline	Up to 2.5 l
R 70	Gasoline	Up to 5.0 l
R 74	Gasoline/Diesel	Above 5.0 l/up to 3.0 l
R 78	Diesel	Up to 4.0 l



Development of Bosch starter motors: smaller and lighter, but the same power output

Bosch is the provider of comprehensive services for the automobile development engineer: for instance, online 3D CAD starter-motor data

Innovation in detail: for instance, the planetary gearing. This was further developed by Bosch to give it higher mechanical stability, with the result that the starter motor makes even less noise when starting the engine

With their lightweight, compact design, our R and C starter motors are a convincing argument. After all, lower weight leads to lower fuel-consumption figures and reduced emissions. Furthermore, compact starter motors provide the development engineer with more latitude in his design work. With these reduction-gear starter motors we have the appropriate starting system for each and every passenger car – featuring high power density and top quality.

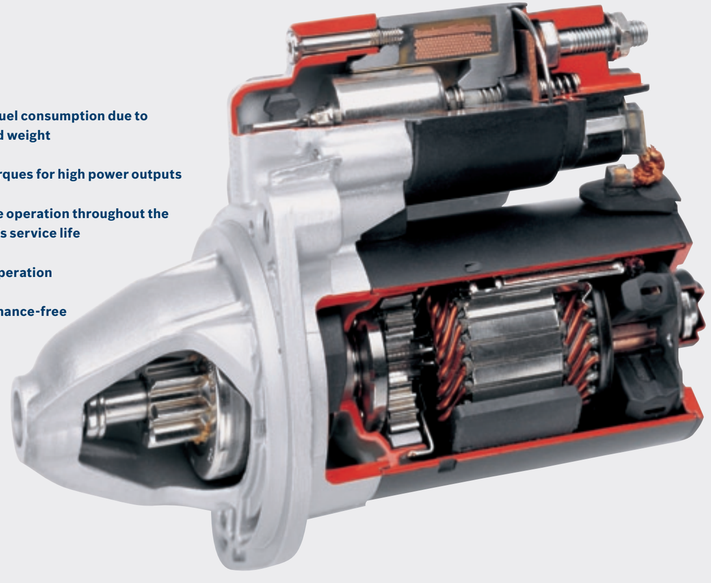
Clearly defined target and complex development work: the convincing results
In order to construct its compact, lightweight, high-power starter motors, Bosch reduced the size of the major components and redesigned them. This resulted in improvements in efficiency and power/weight ratio.

The magnet: permanent power
The strong magnetic field needed for cranking the engine is generated by state-of-the-art magnet technology. The starter-motor's permanent magnets are insensitive to demagnetization influences, as well as being vibration-resistant and resistant to high temperatures. This all equates to high powers throughout the starter motor's service life.

High torque: high output
Torque is of vital importance when cranking the engine. The generation of high torque is based on optmized planetary gearing. This means that small starter motors can crank large engines.

Output: up to 2.5 kW
Further development work on the permanent magnets enabled the starter motor to be designed for output powers up to 2.5 kW. This is appropriate for gasoline engines with displacements in excess of 5.0 l and for diesel engines up to 4.0 l.

- **Lower fuel consumption due to reduced weight**
- **High torques for high power outputs**
- **Reliable operation throughout the vehicle's service life**
- **Quiet operation**
- **Maintenance-free**

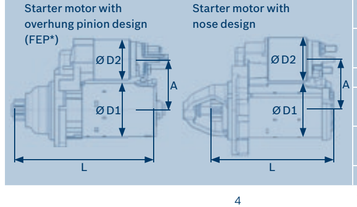


Brush unit and commutator: long service life
The brush holders guide the carbon brushes precisely, and thus guarantees them constant running conditions. The commutator also remains dimensionally stable at high revolutions and is practically non-wearing. These two factors contribute to the starter motor's constant high-power performance.

When things get really tough: the RF/CF special range
Bosch developed the RF/CF special range for cross-country vehicles which are forced to operate in extremely wet, dirty, and dusty conditions, and for passenger cars with fording abilities. The starter motors in this range are protected against water and dust by sealing off joints and shifting the shaft bearing into the housing. They are therefore unaffected by environmental influences.

Tested under the most severe conditions
We simulate severest operating conditions using numerous laboratory and field tests. For instance, the starter motors must still operate perfectly at temperatures down to –30°C, and must demonstrate their reliability in extensive test series and duration runs. Furthermore, they must remain corrosion-resistant under extreme environmental conditons, and must successfully complete further special tests. All of these tests must have been passed before Bosch releases the starter motor for operation in the vehicle. These measures relieve the customer of complicated and costly vehicle testing.

All over the world – near to the customer
Bosch is never far away from the customer. With manufacturing plants, application engineering centers, and a global customer service organization. Since Bosch automotive products are manufactured on all continents, the customer has the advantage of being able to purchase from local production. All this is backed by the reliability of a precisely functioning logistics organization and the certainty that a competent partner is not far away. All Bosch manufacturing plants operate in line with the high, internationally binding Bosch Quality Guidelines.



Overview R and C starter motors

				C 65	R 70-S	R 70-M	R 70-L	R 74-E	R 78-M
Weight		Nose type	[kg]	2.45	2.60	2.65	2.90	3.50	4.10
		FEP* type		2.75	2.90	3.00	3.25	3.80	4.40
Length	(L)	Nose type	[mm]	148	148	152	168	180	188
		FEP* type		174	179	185	200	210	220
Polehousing Ø	(D1)		[mm]	65	70	70	70	74	78
Solenoid		Type		306	305	305	305	303	303
		Ø(D2)	[mm]	52.5	52.5	52.5	52.5	56.5	56.5
Center distance soleonid/polehousing	(A)		[mm]	61.5	65.5	65.5	65.5	69.5	71.5
Max. battery	(DIN)		[Ah/A]	66/300	55/255	66/300	88/395	110/450	143/570

* FEP - Free exiting pinion