Technical training.
Product information.

I01 Product Presentation

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BMW Service

General information

Symbols used

The following symbol is used in this document to facilitate better comprehension or to draw attention to very important information:

Contains important safety information and information that needs to be observed strictly in order to guarantee the smooth operation of the system.

Information status and national-market versions

BMW Group vehicles meet the requirements of the highest safety and quality standards. Changes in requirements for environmental protection, customer benefits and design render necessary continuous development of systems and components. Consequently, there may be discrepancies between the contents of this document and the vehicles available in the training course.

This document basically relates to the European version of left hand drive vehicles. Some operating elements or components are arranged differently in right-hand drive vehicles than shown in the graphics in this document. Further differences may arise as the result of the equipment specification in specific markets or countries.

Additional sources of information

Further information on the individual topics can be found in the following:

- Owner's Handbook
- Integrated Service Technical Application.

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The information contained in this document forms an integral part of the technical training of the BMW Group and is intended for the trainer and participants in the seminar. Refer to the latest relevant information systems of the BMW Group for any changes/additions to the technical data.

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I01 Product Presentation

Contents

I01 Product Presentation

Contents

I01 Product Presentation

Contents

I01 Product Presentation

1. BMW i Brand

1.1. BMW i

1.1.1. Introduction

As the world's most successful manufacturer of premium cars, the BMW Group will also play a leading and pioneering role in the future in the design of individual mobility. The foundations for sustainable mobility solutions were laid with the research and development work carried out since 2007 within the framework of the i project, which takes into consideration the ecological, economical and social change. The BMW Group strikes the necessary balance between individual needs and the global requirements of future mobility with a comprehensive approach, which is portrayed by the new BMW i brand. BMW i represents future-oriented vehicles and mobility services whose premium character is consistently defined using sustainability. Now this vision is becoming a reality. The BMW i3 (development code I01), the first series model of the new brand, allows emissions-free mobility in a premium car.

View of the BMW i3 from rear left

The BMW i3 is the world's first premium electric vehicle which was designed from scratch for this type of drivetrain. A car which conveys the typical BMW driving pleasure was thus developed - emissions-free and more intensive than ever before in an electrically powered vehicle. As well as the unique vehicle architecture with LifeDrive structure, including the carbon passenger compartment and the aluminium module for the electric motor, high-voltage battery and chassis and suspension, within the framework of BMW eDrive the electrical machine, power electronics and the high-voltage battery are also developed independently by the BMW Group. The Ultimate Driving Machine characteristic also becomes an elementary product feature of the BMW i3.

The use of the lightweight, long-life and crash-resistant high-tech carbon material on this scale is unique for the mass production of a vehicle. Thanks to the optimized weight, the BMW i3 is not heavier than a comparable vehicle with a traditional engine and full fuel tank. Its vehicle curb weight i.a.w. German Standardization Institute (DIN) is 1195 kg/2634 lbs, including a high-voltage battery, which enables sporty vehicle performances and day-to-day range.

I01 Product Presentation
1. BMW i Brand

An additional range of mobility solutions, which can be used independently of the vehicle, is also an element of BMW i. The holding company BMW i Ventures was founded for this purpose. The New-York-based company My City Way is the first company in which BMW i Ventures is involved. It offers a mobile app for over 40 cities in the USA with information on public transport, available car parks and entertainment. Another 40 cities, including Munich, will be added in the course of the global market introduction.

1.1.2. BMW i3

The BMW i3 with the electric motor is designed vehicle for urban traffic: With a purely electric motor and customized to the requirements of sustainable and emissions-free mobility, it incorporates an intelligent method of mobility in the city or for commuting.

The high-voltage battery of the BMW I01 only has to be charged every two to three days when used for the typical commute between the place of residence and work. This corresponds to a range of 130 to 160 km (80 to 100 mi). The BMW I01 is thus ideal for driving requirements in the city and, at the same time, allows comfortable cross-country journeys. The voltage supply of the electric motor and all other vehicle functions is powered via a specially developed high-voltage battery. This sets even more standards in terms of the energy efficiency. The intelligent heating/cooling system of the high-voltage battery ensures that the energy performance (and also the range of the vehicle) is not affected as much by temperature fluctuations as is normally typical with such batteries. Furthermore, during the development of the BMW I01 particular importance was attached to low energy consumption of the electrical components.

The standard range can be increased by up to 25 percent by using the different driving modes and the distance travelled using purely electric means can be extended comfortably to 200 km (125 mi).

Drive system

The electrical machine of the BMW I01 is primarily designed for use in urban traffic and delivers 125 kW/170 bhp at a peak torque of 250 Nm (184 lb-ft). The full torque is already available from standstill, which is typical for electric motors, and does not have to be built up first over the engine speed like in combustion engines.

This gives the BMW I01 particularly high agility and delivers impressive acceleration values.

The high torque is also available over a very large engine speed range, thus enabling very homogeneous power development. The single-stage transmission ensures optimal power transmission to the rear wheels and accelerates the BMW I01 by means of an electronic control without the loss of power up to 150 km/h (93 mph). The electric motor also offers the option of braking using the accelerator pedal. If the driver takes his foot off the accelerator pedal, the electrical machine assumes the function of an alternator, which returns the current converted from the kinetic energy to the high-voltage battery. A braking torque is generated by this so-called energy recovery, which leads to effective deceleration of the vehicle.

This unique "one pedal control", acceleration and braking only using the accelerator pedal, is even more comfortable with freewheeling. If the driver takes his foot off the accelerator pedal, the zero torque control of the electric motor disconnects the transmission as long as the accelerator pedal is in this position. The vehicle then continues to roll without energy consumption and uses its own kinetic energy for the electric motor.

In contrast to the MINI E, the BMW I01 has a more pronounced "intermediate setting" of the accelerator pedal. This allows the vehicle "to roll". The vehicle does not recover straight away when the driver releases his foot off the accelerator pedal, but in principle disengages. The electrical

machine then rotates load-free so that the BMW I01 rolls without energy consumption. Within the framework of a proactive driving style "rolling" offers a very comfortable option to generate a slightly larger range.

Range extender

As many customers would like an even larger range or a high degree of flexibility, an optional range extender (REX) in the BMW I01 enables the range to be increased by a further 130 km (80 mi) approximately. The range extender (REX) is a small, very smooth-running and quiet gasoline engine, which drives an electrical machine, in order to maintain the state of charge of the high-voltage battery so that the vehicle can continue to drive using electrical energy.

1.1.3. Development

The BMW i LifeDrive architecture means less weight and an extended range. Two separate function units, a Drive module made from aluminium and a Life module made from carbon, result in the interaction of an ultralight and stable design. The result: improved energy efficiency, higher range and enhanced safety.

LifeDrive architecture in the I01

Index	Explanation
1	Life module
2	Drive module

The LifeDrive architecture comprises two independent units. The upper module: the passenger compartment made from carbon fibre reinforced plastic – also called CFK or simply carbon. On the one hand, it offers the occupants the best possible protection in the event of accidents thanks to its stability, and, on the other hand, it is still light enough to offset the additional weight of the high-voltage battery.

I01 Product Presentation
1. BMW i Brand

The lower module which is made entirely from aluminium has space for the high-voltage battery. The suspension, structure and impact elements, as well as the electric motor, are housed here. With the location of all drive components in the lower module the occupants now have more space because there is no center console dividing the passenger compartment. The LifeDrive architecture is thus an innovation which not only balances the weight of the high-voltage battery, but also lowers the center of gravity of the vehicle and thus lends every BMW i the agility which is expected of a BMW.

As the carbon passenger compartment is particularly robust, driving pleasure and comfort go hand and hand with enhanced safety for the occupants. The result: less weight, enhanced safety and spacious and comfortable passenger compartment.

First-class aerodynamics is an important element of efficient electric mobility. In the BMW i the fully cladded vehicle underbody prevents recirculation under the vehicle. At the same time, so-called AirCurtains and AeroFlaps improve the aerodynamics at the wheel arches and in the side sill area behind the front wheels.

The passenger compartment of the BMW I01 is characterized by its high-quality equipment features made from renewable raw materials such as natural fibers and naturally tanned leather. 25% of the plastic used for the passenger compartment of the BMW I01 and 25% of the thermoplastic parts at the body either come from recycled materials or renewable sources.

Carbon era

It is a breakthrough achievement and one of the most innovative developments of BMW i: the standard production of passenger compartments made from carbon (CFK). To date, the weight of the high-voltage battery restricted the range of electric vehicles. The larger the high-voltage battery, the heavier the vehicle - and thus the more energy that was required to get from A to B.

Thanks to the intensive use of carbon components in the I01 additional weight of the high-voltage battery has now been successfully offset. For a long time it was only possible to use these carbon components in a restricted manner, as they were very expensive (hand-made). BMW i has now rewritten this standard with the first passenger compartment made from carbon originating from standard production.

However, carbon components not only revolutionizethe lightweight construction. They also enable new moulds in the design as the plastic reinforced with carbon fibers is just as easy to process when dry as textile material. On the one hand, bodies made from carbon offer more space in the passenger compartment, and, on the other hand, also enable complex styling which is optimized in terms of aerodynamics. Last but not least, carbon is a high-strength material and increases the safety of all occupants of a BMW i. After over ten years of intensive research and experience in production, the BMW Group, together with SGL Automotive, is now developing and producing carbon fibers, as well as carbon fiber boards.

Interior

The LifeDrive architecture with the carbon passenger compartment also allows greater freedom in the design of the passenger compartment of the BMW i3. Doors which open in the opposite direction and the omission of B-pillars are the basis for the exceptionally high degree of spatial comfort and freedom of movement in relation to the outer dimensions. Thanks to the direct location of the electrical machine at the rear axle and also the omission of the normal center console in conventional vehicles, there is a direct link between the right and left footwell.

I01 Product Presentation

1. BMW i Brand

Interior in the I01

Line management and surface design in the area of the cockpit and the door trim panels highlight the impression of lightness and modern functionality. Defined lines, strong contours and small radii characterizethe geometric shapes. The design of the dashboard is defined by the layering structure also used in the interior equipment. It is divided into three levels, which are designed depending on the equipment specifications in different colors and materials. A central design element is the curved decor area which runs from the air vents on the left cockpit side behind the steering column and up above the glove box. It can also be optionally maintained in bright, porous gum wood. The other material selection with a mix of naturally processed leather, wood, wool and other renewable materials makes the premium characteristics of the BMW i3, which are complemented with the sustainability aspect, visible and noticeable.

1.1.4. Production

Because the production of carbon fiber demands a large amount of energy; it’s produced in Moses Lake in the USA. This facility can be operated using clean energy from one of the world's largest hydroelectric power stations (the Grand Coulee Dam). This means 100% electricity from renewable sources is used for the production of carbon fiber.

BMW has been leading the ranking list of the Dow Jones Sustainability Index (since 2005) as the most sustainable automobile manufacturer in the world. The BMW i plant in Leipzig is the first to exceed this standard. In comparison to the production of the industry leader BMW, 70% less water and 50% less energy on average is required for the production of the i models.

I01 Product Presentation

1. BMW i Brand

Plant in Leipzig

The new pressing plant in Leipzig boasts state-of-the art technology for carbon components in automotive manufacture. In this plant (which is designed for large-scale industrial production) BMW now manufactures its own carbon fibre composites. The formula, i.e. the composition, of resistance and geometry of the carbon components, can be adapted variably to the design specifications in the pressing plant. The customized non-woven carbon fibre fabric delivered from the Wackersdorf plant is first subjected to the so-called preform process where it obtains its subsequent mold. A heating tool gives the layered package its stable, 3D shape. Several of these preform moulding blanks can be joined to form a larger component. For example, large body components can be manufactured, which are extremely difficult to produce in aluminium or sheet steel.

The newly produced carbon composite components from the new pressing plant in Leipzig, as well as the carbon components supplied from the pressing plant in Landshut, are joined together to form the new body construction hall. The basic shape of the Life module of a BMW i3 is created from approximately 150 parts, which only represents one third of the parts in conventional sheet steel construction. There is no noise pollution from screws or rivets and no flying sparks when welding. Only state-of-the-art bonding technology is used (100% automated). A technology which only the BMW Group possesses. In the unique joining process developed by BMW the individual components are joined contactlessly up to an adhesive gap of 1.5 millimeters, in order to guarantee optimal resistance after the bonding process. The precision in the bonded connection ensures optimal power transmission between the individual carbon components and thus the highest quality standard in mass production.

The production of the BMW i3 is setting new standards in terms of environmental protection. In comparison to the already highly efficient average values in the production network of the BMW Group, energy consumption is approximately 50 percent less and water consumption roughly 70 percent less. The power for the production of BMW i cars in the Leipzig plant stems exclusively from

wind power, i.e. 100 percent from renewable energy sources. For this purpose, wind power stations were erected locally for the first time in Germany on the grounds of an automobile manufacturer for the direct power supply for production.

The production of the electrical machine and the high-voltage battery for the BMW i3 is done within the production network of the BMW Group. The company also uses its leading global position in the area of drive technology for future-oriented innovations in the area of electric mobility. The BMW Group has created a competence network for electric mobility at the Lower Bavarian production plants located in Dingolfing and Landshut.

1.1.5. Usage

Consistent sustainability also means that carbon dioxide emissions generated outside the vehicle are avoided. This is why BMW i is cooperating with producers of renewable energy such as NATURSTROM AG to make electricity from renewable sources easily accessible to BMW i drivers.

Overall, in comparison to a vehicle of a similar size and with a very efficient combustion engine, a I01 (including production, usage and recycling) generates approximately 30% less CO_2 with the use of conventional electricity (EU-25 Mix) and even approximately 50% less CO_2 during operation using renewable electricity.

1.1.6. Recycling

There are many options for reusing the high-performance lithium-ion cells of the high-voltage battery after the usage in the vehicle. For example, a simple and effective use would be as a temporary storage device for solar or wind power plants.

The remains from carbon production and the production of carbon components are valuable materials for the BMW Group. They are either fed back into production directly or reused in other areas. Ten percent of the quantity of carbon fibers required for the production of a I01 already comes from reused materials.

1.1.7. The BMW i sub-brand

The BMW i sub-brand stands for innovation, inspiration, design and visionary mobility. It creates a successful balance between the BMW M sub-brand, which is oriented towards a sporting character and performance, and the parent group BMW.

The advantage of a sub-brand in comparison to an individual brand is that the corresponding product is automatically associated with the main brand, in this case BMW, and thus benefits from the image and feeling communicated by this brand. BMW i should therefore not only convey the innovation, sustainability and design of the i models, but also the quality and the driving pleasure and the aesthetic features of BMW models.

BMW i should reach new target groups and thus generate growth for the company. In addition, BMW i intensifies the image of the BMW Group as a sustainable company, thus ensuring a future-proof portfolio. With the BMW i sub-brand BMW is clearing setting itself apart from other vehicle manufacturers and with the sports car BMW i8 is creating a vehicle which is designed not only for performance, but also for BMW EfficientDynamics, innovation and sustainability.

I01 Product Presentation

1. BMW i Brand

1.1.8. 360° ELECTRIC

The objective of the design of the range for the BMW i3 was to ensure that the customers can cover their typical energy requirements with two to three charges per week. The studies conducted within the framework of the i project with over 1000 participants and over roughly 20 million kilometers revealed that the average distance covered per day is roughly 45 kilometers/27 miles. In addition to the wallbox provided by BMW i, a conventional household socket can also be used for charging. BMW i already has a comprehensive product and service offering under the designation 360° ELECTRIC for all individual customer requirements in the areas of power supply and mobility planning. The extent of the services ranges from the installation of the BMW i wallbox in the customer's garage to special offers for the supply using regenerative energy sources to the charging map for the convenient use of the public transport infrastructure and additional assist services of BMW ConnectedDrive. And where a mobility requirement cannot be fulfilled using the vehicle concept of the BMW i3, 360° ELECTRIC offers solutions with alternative vehicles from the model range of BMW and DriveNow under the key word Flexible Mobility.

With the complete 360° ELECTRIC package the advantages of electric mobility in day-to-day life can be experienced reliably, conveniently and flexibly. The portfolio of 360° ELECTRIC is based on four pillars and essentially includes the areas charging at home, charging at public charging stations, mobility security, as well as integration in innovative mobility concepts for overcoming range restrictions.

Several technical properties distinguish electric vehicles from conventional vehicles. A growing selection of "360° ELECTRIC" products and services ensures simple and comfortable electric mobility in almost every situation.

I01 Product Presentation

1. BMW i Brand

Service and product offer of 360° ELECTRIC

Global partnership

BMW i is constantly implementing its strategy for customer-friendly electric mobility. An extensive partnership with Schneider Electric and the electric mobility service provider The Mobility House (TMH) was formed.

The agreement includes services such as checking house installations at the customer's home, the delivery and installation of charging stations (wallboxes), as well as maintenance and other services. Future owners of a BMW i3 or i8 can connect their vehicle safely and charge it quickly at home or at the place of work.

I01 Product Presentation

1. BMW i Brand

Convenient charging at home

I01 and BMW i wallbox

If one has a fixed parking space at home, then the high-voltage battery can be charged using the standard charging cable supplied and the connection at a typical household socket. Charging is even quicker and more conveniently using the charging station offered by BMW i for wall installation in the house. This "wallbox" is not only the ideal design add-on for BMW i vehicles: The reliable installation service organized by BMW i is part of the overall package and is adapted to the special requirements of the customer. And because BMW i is responsible for complete sustainability in E-mobility, one can obtain clean power on request also from BMW i in cooperation with providers of regenerative energy sources.

Charge on the road

Those who do not want to charge their BMW i3 at home or at the work place have the option of individual solutions with 360° ELECTRIC. In cooperation with car park operators and providers of public charging stations BMW i offers the customer reliable access to the public charging infrastructure. Together with its partners, BMW i supports the networking between vehicle, driver

and surrounding area in order to provide users with convenience features, and the display of available charging stations in the navigation system and on the customer's smartphone, as well as simple, transparent payment processes using the ChargeNow card. The ChargeNow card gives the customer comprehensive access to charging stations and enables cashless payment. As a result, in all BMW i markets it concentrates the largest possible number of providers of charging infrastructure in the public sphere so that the customer only has to use the one card to access the charging stations of different providers and receives a standard invoice from BMW i.

In Germany alone there are over 70 different providers of public charging stations, which currently use various payment and service concepts. It is necessary to harmonize this landscape. The ChargeNow card is a BMW i product which is an intelligent solution for customers. The challenge now lies in further expanding and harmonizing the comprehensive offers with all partners involved.

A current example for the networking of public charging infrastructure is the recently presented solution portfolio from Hubject GmbH, a joint venture of the BMW Group, Bosch, Daimler, EnBW, RWE and Siemens. The company allows providers of electric mobility services to extend their offer by the so-called eRoaming. Drivers of electric vehicles thus obtain access to every public charging point of an existing European network, which the BMW i customer can use with the ChargeNow card - all this with just one supplier agreement. This means charging electric vehicles in the future will be simple and there will be no need to withdraw cash at an ATM. Access to the charging station is done using a standard QR code, which starts and ends the charging procedure by means of scanning and a smartphone app.

Assistance services

Drivers of a BMW i3 will be able to rely on their vehicle at all times and can obtain around-the-clock assistance and support if required. A comprehensive service system and mobility guarantees, as well as intelligent convenience functions, make this possible.

Using the smartphone the status and state of charge of the battery, range, as well as the function of the heating and air-conditioning system, can be conveniently monitored or pre-programmed. A navigation system with extended options supports the driver when planning his journey and selects the most economical route upon request. In addition, charging stations along the route are displayed to the customer to optimally use the range of the BMW i3. In this connection, BMW i actively supports networking of the public charging infrastructure in cooperation with partners in order to provide electric mobility customers with further convenience features such as advance reservation of charging stations and simple and transparent payment processes.

So that the BMW i3 always functions reliably in day-to-day usage, the high-voltage battery and the other electrical systems are also constantly monitored during the journey. In the unlikely situation of a fault the BMW Service and Mobile Service or workshops are able to identify faulty components within the framework of the diagnosis and re-establish driving ability of the BMW i3 within the shortest time. With regard to the scope and quality of the service, there are no differences to conventional BMW vehicles.

All necessary service or repair work is completed within the framework of a comprehensive Service package of the BMW i service partner. A wide range of replacement vehicles are available to the BMW i customer.

I01 Product Presentation
1. BMW i Brand

BMW i in Service mode

Flexible mobility

In the situation where the range of a BMW i3 is insufficient, the customer can resort to additional mobility modules, with whose help larger distances can also be covered - for example by temporarily using a BMW with a combustion engine or hybrid drive. For this purpose, individual annual quotas can be added via 360° ELECTRIC. The car sharing option DriveNow is also available to the BMW i customer.

1.1.9. BMW i Technical Training

Two new Instructor Led courses were created for the BMW i sub-brand for the US market. The courses are divided into the two different areas of responsibility based on the safety risks and the necessary professional knowledge required for handling high-voltage batteries:

- ST1403a I01 Complete Vehicle
  ST1403b I01 High Voltage Battery and Maintenance

ST1403b I01 High Voltage Battery and Maintenance includes all services including the repair of the high-voltage battery by replacing the cell modules except the repair of the carbon structure. The service format BMW i Full Service includes all services previously mentioned, as well as repair to the carbon structure. Therefore a BMW i Full Service facility must also be a BMW i CCRC (Certified Collision Repair Center)

In addition, the BMW i Routing service makes it easier for the customer to hand over his vehicle for the repair. The Routing service is responsible for forwarding the respective vehicle to a workshop with an appropriate service format and assuming the arising costs for the customer. This should ensure an all-inclusive service for the BMW i customer.

I01 Product Presentation

1. BMW i Brand

1.1.10. Repair costs

Plastic parts of the outer skin of the I01

According to investigations conducted by car insurance companies and the BMW Accident Research Department, it is mainly minor losses which are sustained in most accidents. In the case of approximately 90 percent of all accidents registered involving conventional vehicles the accident results in damage to the outer skin. The BMW i3 takes into account this fact and therefore has a robust plastic plating around the vehicle which is screwed/clipped on. Minor knocks are absorbed without causing dents as is typical for sheet metal parts. Damage to the paintwork does not cause corrosion. If components at the outer skin of the BMW i3 need to be replaced, the component is replaced quickly and at a reasonable cost - the repair costs are roughly 40 percent lower than for the conventional design. Overall, the accident repair costs are the same amount as for a BMW 1-Series.

1.1.11. Mobility services

BMW i provides innovative mobile solutions which improve urban mobility - inside and outside the vehicle. With the aim of helping to shape the city of the future, BMW i offers intelligent services and seamless mobile solutions. These are the first apps which can already be downloaded today - further apps are currently being developed and will be available in the near future:

I01 Product Presentation
1. BMW i Brand

ParkNow

Using this service drivers can locate the nearest free car parks - both at ParkNow locations and also in other multi-storey car parks. At the same time, users receive real-time information about inexpensive parking fees and can also use other useful services. These include, for example, information on car wash facilities and the availability of rental bikes at the respective ParkNow locations.

DriveNow

The new car sharing service of BMW i, MINI and SIXT.

With DriveNow, BMW i together with MINI and SIXT offers the possibility to rent a car when and where you need it. You no longer need your own car! Usage is charged on a per minute basis and payment is made afterwards. Parking fees and fuel costs are included. Available cars can be found on the BMW website, the mobile app and locally.

DriveNow is already available in San Francisco. Other international locations are currently being planned.

The programme started in San Francisco with a fleet of 80 brand new, fully electric vehicles from the BMW ActiveE series. With its high-performance electric motor, the aerodynamic body and the modern lithium-ion battery technology, the BMW ActiveE offers the ultimate driving experience - all without pollutant emissions.

I01 Product Presentation

2. Technical Data

With a body length of 3,999, a width of 1,775 and a height of 1,578 millimeters, the BMW i3 has discrete proportions which with its dynamics and compact design accentuate the agility of the vehicle in urban traffic. The extremely short overhangs at the front and rear are also clear indicators of the agile drivability of the BMW i3.

The key technical data of the I01 is listed in the following table.

	Unit	BMW i3 (BEV)	BMW i3 (REX)
Body			
Doors/Seats		5/4	5/4
Length	mm/ in	3999/157.5	3999/157.5
Width	mm/ in	1775/69.9	1775/69.9
Height (* with roof fin)	mm/ in	1578 (* 1597)/62.1 (* 62.9)	1578 (* 1597)/62.1 (* 62.9)
Wheelbase	mm/ in	2570/101.2	2570/101.2
Turning radius	m/ft	9.9/32.3	9.9/32.3
Front/Rear overhang	mm (in)	707/722 (27.8/28.4)	707/722 (27.8/28.4)
Ground clearance	mm/ in	140/5.5	140/5.5
Luggage compartment volume	m^3	0,260 – 1,100	0,260 – 1,100
Fuel tank capacity	liter/ gal	0	7/2.4
Vehicle curb weight i.a.w. DIN/EU	kg (lb)	1195/1270 (2534.5/2799.9)	1315/1390 (2899/3064.4)
Perm. total weight/payload	kg/kg	1620/425	1730/415

	Unit	BMW i3 (BEV)	BMW i3 (REX)
Drive			
Drive concept		Rear-wheel drive	
Transmission		Single-stage with fixed transmission	

I01 Product Presentation

2. Technical Data

	Unit	BMW i3 (BEV)	BMW i3 (REX)
Electrical machine			
Power output	kW/ hp	125/170	125/170
Torque	Nm/ lb-ft	250/184	250/184
Recovery	kW	50	50

	Unit	BMW i3 (BEV)	BMW i3 (REX)
High-voltage battery			
Nominal voltage	V	360	360
Energy capacity (gross)	kWh	22	22
Storage technology		Lithium-ion	Lithium-ion

	Unit	BMW i3 (BEV)	BMW i3 (REX)
Combustion engine			
Torque	Nm/ lb-ft	-	55/40
Engine design/cylinders/ valves per cylinder.		-	In-line engine/2/4
Displacement	cm^3	-	647
Stroke/bore	mm/ mm	-	66/79
Power/At engine speed	kW/ HP/ rpm	-	25(34)/4300
Torque at speed	Nm/ rpm	-	55/4300
Compression/Poss. fuel (recommendation)		-	10.6/ROZ87-98 (RON 95)
Exhaust emission standards/ Fuel		-	SULEV II

	Unit	BMW i3 (BEV)	BMW i3 (REX)
Chassis and suspension			
Front wheel suspension		Single-joint McPherson spring strut axle in aluminium design with anti-dive control	
Rear wheel suspension		Five-joint axle with direct connection to the Drive module	
Standard Front/Rear tires		155/70 R19 / 155/70 R19	155/70 R19 / 175/60 R19
Front/Rear wheel rims		5 x 19 / 5 x 19	5 x 19 / 5.5 x 19

I01 Product Presentation

2. Technical Data

	Unit	BMW i3 (BEV)	BMW i3 (REX)
Vehicle performances			
Power-to-weight ratio (DIN)	kg/kW	9.6	10,5
Acceleration 0 – 100 km/h	s	7.2	7.9
Acceleration 0 – 60 km/h / 100 mph	s	3,7	3.9
Acceleration 80 - 120 km/h / 50 - 75 mph	s	4.9	5,5
Maximum speed	km/h (mph)	150 (93.2)	150 (93.2)
Range in day-to-day operation (Comfort mode)	km (mi)	130 to 160 (80 to 100)	240 to 300 (150 to 186)
Range in day-to-day operation (in the most efficient driving mode)	km (mi)	up to 200 (124)	up to 340 (211)
Fuel consumption in EU cycle			
Electrical energy	kWh / 100 km	12,9	13,5
Fuel	liter	0	0.6 (i.a.w. EU cycle, calculation rule for vehicles with range extender)
CO^2 emissions	g/km	0	13 (i.a.w. EU cycle, calculation rule for vehicles with range extender)

I01 Product Presentation

3. Overview of Body

3.1. Introduction

In the BMW i3 with the development code I01 new standards are set in the body construction.

The design and production of the I01 were already redefined in the basic approach. This vehicle architecture is therefore the first such architecture designed especially for electric vehicles.

Thanks to the selection of the materials and the innovative use of different materials the mobility of the future is already being realized today.

The high-voltage battery is fully integrated in the vehicle underbody of the vehicle, thereby creating optimal axle-load distribution and a lower center of gravity.

In order to compensate for the additional weight of the high-voltage battery the focus is on an intelligent lightweight construction.

The combination of carbon, aluminium and plastic make this body concept unique.

3.2. LifeDrive concept

The vehicle structure of the I01 comprises two independent units.

I01 Product Presentation

3. Overview of Body

The LifeDrive concept of the I01 is a material combination of carbon and aluminium alloys.

LifeDrive concept

Index	Explanation
1	Life module
2	Drive module

The Life module and Drive module are joined together in the production process using screws and a bonded connection and can only be ordered in Service as a bodyshell (entirety).

I01 bodyshell

I01 Product Presentation

3. Overview of Body

In the I01 Drive module crash-proof structures made from aluminium are installed in the front and rear area, which absorb the kinetic energy in the event of a crash, thus ensuring additional safety in the event of an accident.

The battery is located in the vehicle underbody for the best possible protection as a vehicle suffers the least amount of deformation in this area in the event of a crash.

In crash tests the LifeDrive concept is even sometimes superior to the previous steel constructions thanks to this special vehicle architecture.

I01 LifeDrive concept

Owing to the product-specific special features of the LifeDrive module, there will be repair centers (BMW i Full format dealers) where specialist employees are authorised to repair BMW i vehicles with damage to the aluminium or carbon structure.

3.2.1. Life module

The passenger compartment of the I01, the so-called Life module, is mainly made up of carbon.

I01 Product Presentation

3. Overview of Body

Carbon is used in industry for the manufacture of carbon fibers. The combination of the carbon fibers and the fibre material, such as epoxy resin (thermosetting plastic), gives carbon fibre reinforced plastic, CFK for short.

Carbon is the lightest material that can be used in the body construction without compromising safety. The material is also very weatherproof and has, despite its light weight, very high strength and stability.

The use of the lightweight and crash-proof high-tech material carbon on this scale is unique for the mass production of a vehicle.

An advantage of the use of carbon is that the body can be reinforced specifically at the necessary points on the structure and therefore offers excellent impact resistance and occupant safety, i.e. the best possible protection in the event of accidents.

I01 Life module

For more information on carbon please refer to the "Fundamentals of Carbon" product information bulletin.

In the carbon structure of the Life module reinforcements made from high-strength steel, aluminium and plastic are also used.

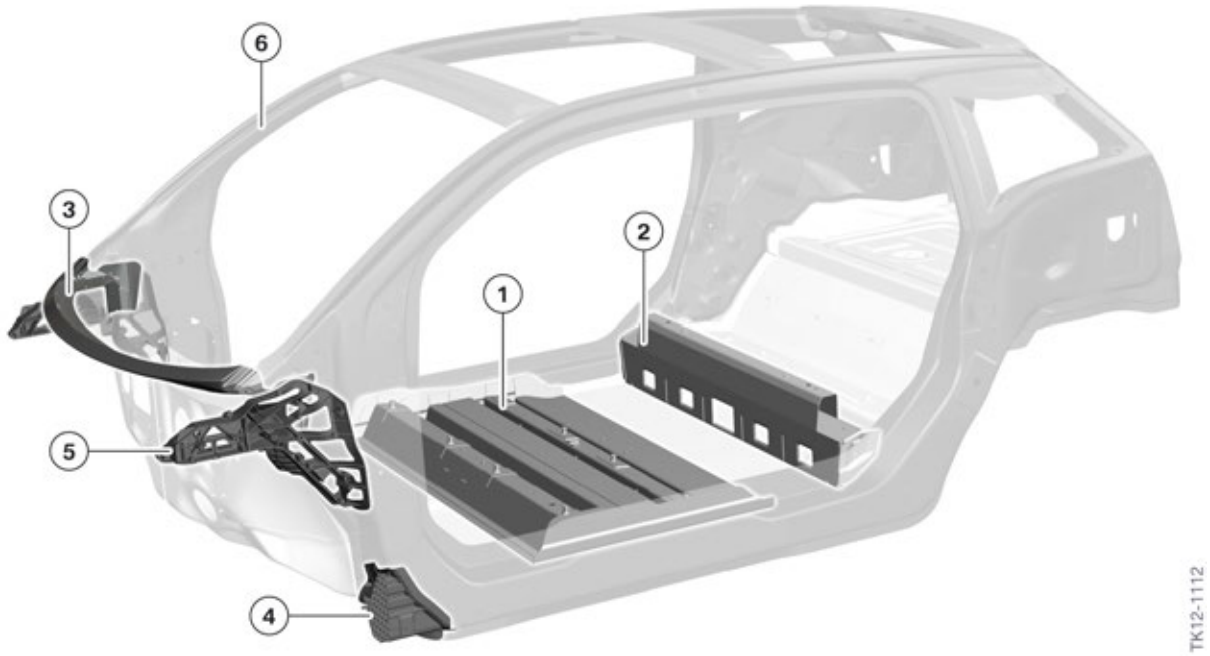
For example, the attachment points of the door hinges in the inside of the side frame are made from steel.

I01 Product Presentation

3. Overview of Body

The seat cross members are made from aluminium.

In the side sills of the carbon structure honeycombed deformation elements made from plastic (thermoplastic) are also integrated, which help absorb some of the impact energy in the event of an accident.



i01 Life module

Index	Explanation	Material
1	Seat cross member (front)	Steel
2	Seat cross member (rear)	Aluminium
3	Cowl panel	High-strength steel
4	Deformation element at side sill, outer	Plastic
5	Carrier support	Die-cast aluminium
6	Life module structure	Carbon

3.2.2. Drive module

The chassis of the I01, the so-called Drive module, is made from aluminium alloys and forms the stable base in which the high-voltage battery unit is securely integrated.

The Drive module also contains the entire chassis and suspension and the drive components.

Thanks to clever solutions, the electric motor, the transmission and the drive electronics are located here in a very small area above the rear axle.

I01 Product Presentation

3. Overview of Body

For the Drive module of the I01 aluminium alloys are used according to component requirements such as strength and crash performance. The material properties of aluminium achieve roughly the same properties of steel through alloy additives such as magnesium or silicon.

Material usage in Drive module of I01

Index	Material	Abbreviation
A	Aluminium alloy (die-cast)	AlSi10MnMg
B	Aluminium alloy	AlMg4.5Mn0.4
C	Aluminium alloy (extruded profiles)	ALSi0.6Mg0.8

For more information on aluminium and its alloys please refer to the "Fundamentals of Aluminium" Body and Paint training information bulletin.

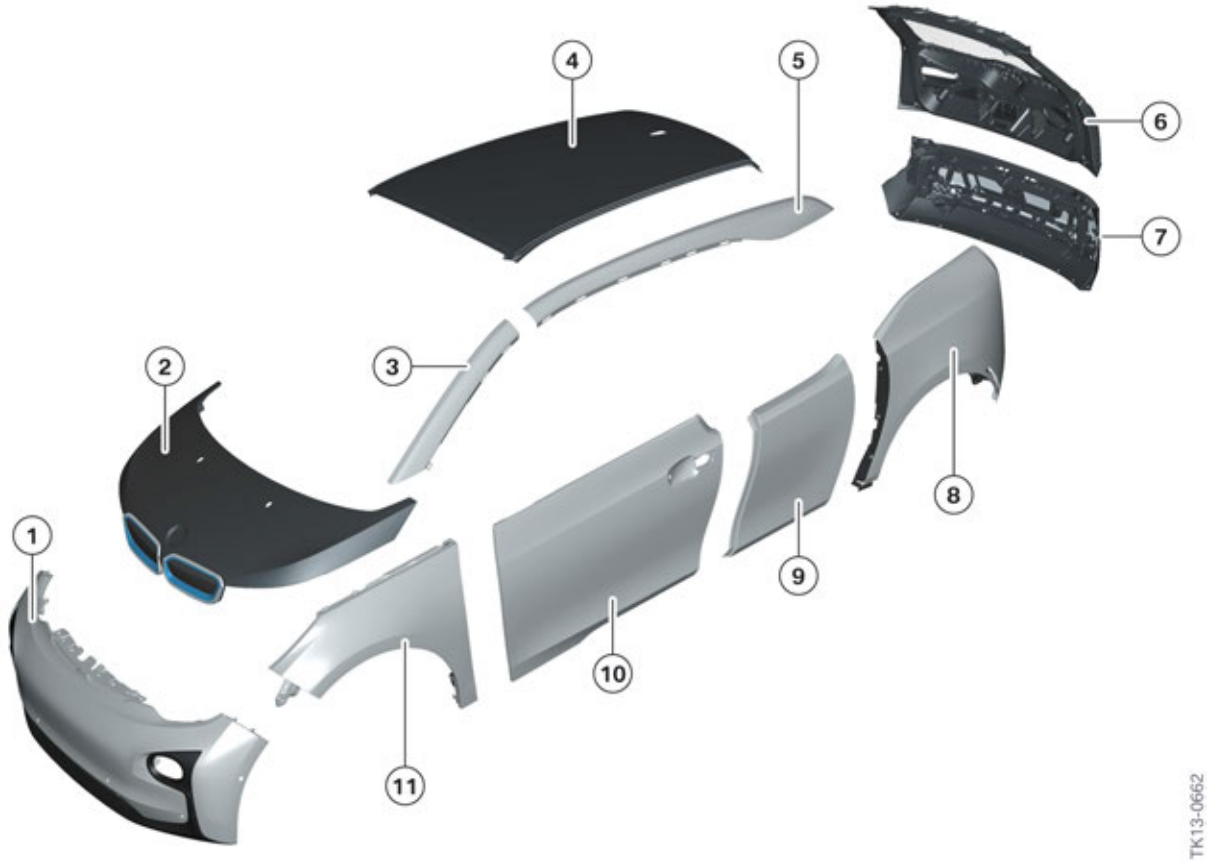
3.3. Outer skin concept

The outer skin of the I01 is made almost entirely of thermoplastic plastics (material designation: PP +EPDM). The outer skin components cannot corrode and are considerably lighter than equivalent components made of steel.

The outer skin of the tailgate has another special feature - for the first time it is manufactured from glass. The rear lights can therefore be integrated below the outer skin which lends a unique appearance.

I01 Product Presentation

3. Overview of Body



I01 outer skin

Index	Explanation	Material
1	Bumper, front	Thermoplastic
2	Engine compartment lid (outer skin)	Thermoplastic
3	Trim panel, A-pillar front	Thermoplastic
4	Roof	Carbon
5	Roof frame trim panel	Thermoplastic
6	Tailgate outer skin	Glass
7	Rear bumper	Thermoplastic
8	Rear side panel	Thermoplastic
9	Rear door outer skin	Thermoplastic
10	Front door outer skin	Thermoplastic
11	Front side panel	Thermoplastic

The outer skin components are clipped in using additional base tracks made from plastic and screwed in or bonded using connecting elements to the I01 body.

I01 Product Presentation

3. Overview of Body

Rear side panel with base tracks

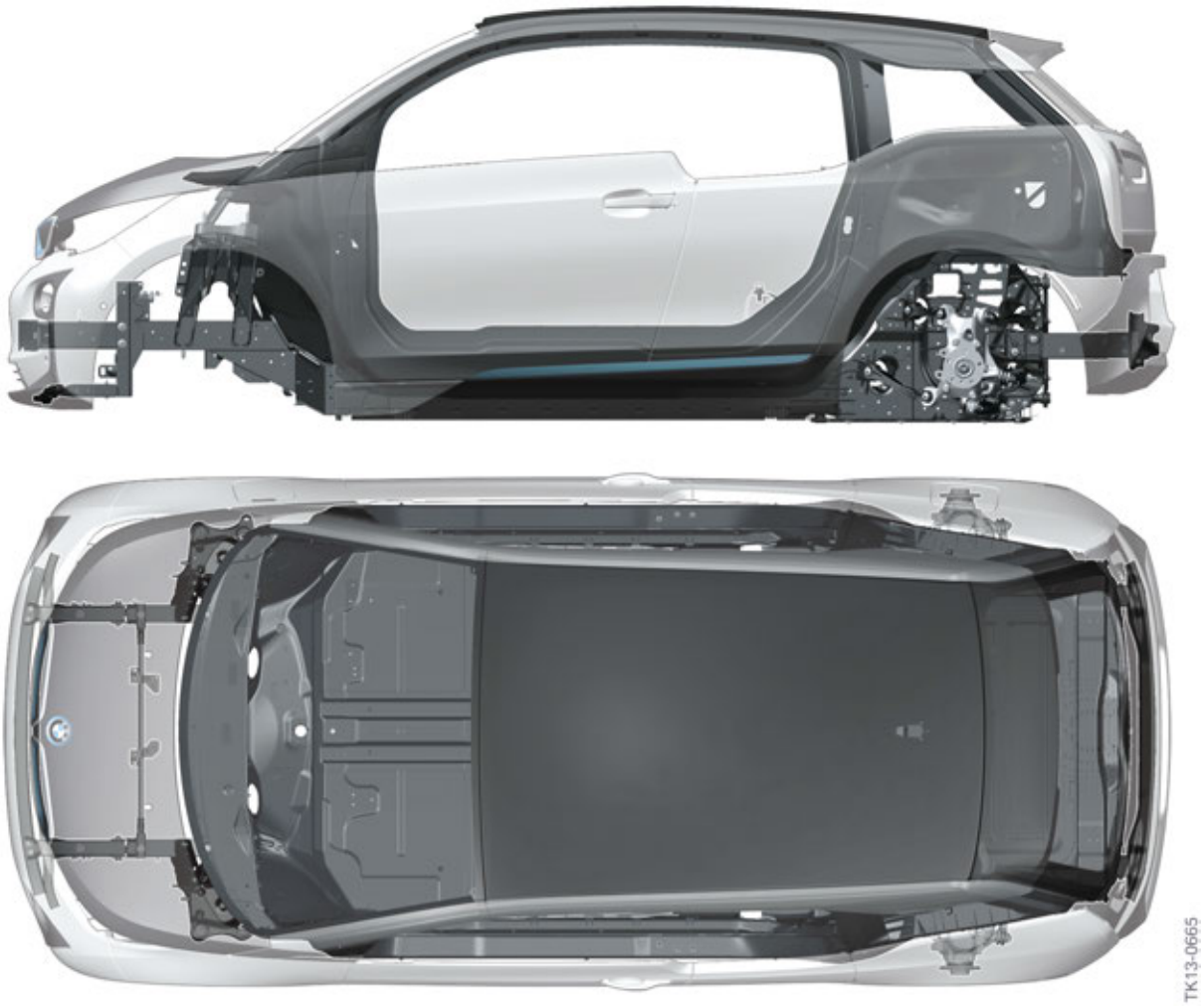
Index	Explanation	Material	Abbreviation
1	Side frame	Carbon	CFK
2	Rear base track	Thermoplastic	PC+ABS
3	Insert	Thermoplastic	PP+EPDM
4	Base track, rear side panel	Thermoplastic	PC+ABS
5	Outer skin	Thermoplastic	PP+EPDM

Because the plastic outer skin is clipped in or screwed on, smaller impacts are absorbed without causing dents, which is typical of sheet metal parts. Also paint damage to the outer skin does not cause corrosion.

The vehicle structure is far behind the outer skin so that it does not suffer damage in the event of smaller knocks. In the event of impacts, the deformation elements screwed in up to the vehicle structure in the front and rear area help to intercept these specifically.

I01 Product Presentation

3. Overview of Body



I01 body concept

The roof of the I01 is made of carbon and is permanently bonded to the body. It is thus part of the body structure of the Life module.

I01 Product Presentation

3. Overview of Body

I01 roof

Index	Explanation	Material designation	Abbreviation
1	Roof outer skin	Carbon (painted)	CFK
2	Roof outer skin with slide/tilt sunroof	Carbon (painted)	CFK

Work belonging to the I01 Body Repair Stage Level 1 must only be performed by authorized BMW i dealers that have completed the training ST1403a I01 Complete Vehicle. If the damage to the vehicle cannot be repaired during the course of the I01 Body Repair Stage Level 1, the vehicle must be passed on to a BMW i dealer with the relevant service format. Please observe the current procedure that applies in your market.

3.4. Door concept

The Life module of the I01 is designed without a B-pillar and thus offers convenient access. However, the necessary reinforcement (B-pillar) is integrated in the rear door. The doors can be opened from the center of vehicle to the left and right. The rear door can only be opened after the front seat belt has been released and the front door was opened.

I01 Product Presentation

3. Overview of Body

I01 doors opened

3.5. Passenger compartment concept

Thanks to the wide-opening doors which work in the opposite direction and the almost flat floor assembly in the passenger compartment, a unique space offering is created with a lounge ambience.

The new passenger compartment concept ensures more space in the passenger compartment and offers additional freedom of movement to the occupants.

The I01 is equipped with four seats, a luggage compartment capacity of about 200 l, as well as an additional function compartment in the front area below the engine compartment lid.

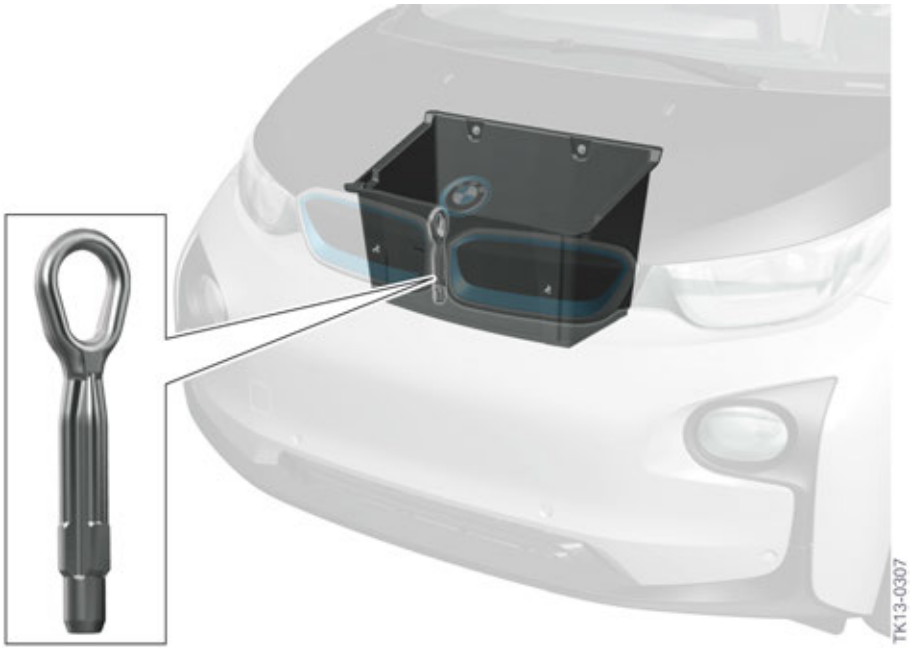
I01 Product Presentation
3. Overview of Body

I01 passenger compartment concept

3.5.1. Luggage compartment

I01 luggage compartment, rear

In addition to the rear luggage compartment, there is a useful storage compartment in the area below the engine compartment lid



I01 storage compartment at the front with towing eye

3.5.2. Seats

With the model introduction of the I01 a mechanically adjustable seat is available. Electrical adjustment is not offered for weight reasons. In order to facilitate entry into the rear passenger compartment, the seats of the I01 have a convenient entry function. The entire seat is folded towards the front. The operating lever is located at the head restraint.

3.5.3. Materials

The interior equipment of the I01 is characterized by the visual use of natural raw materials such as European gum wood. The natural fibers accentuate the premium claim of BMW i.

Recycled and renewable raw materials are used throughout the I01. For example, for the seats in the standard equipment recycled plastics are used.

The leather used in the interior equipment is tanned using a natural tanning agent made from olive leaves. The extract from the leaves of the olive tree naturally protect the leather against fading and wear and, at the same time, lend it a unique appearance and a distinctive character.

The leather made from South-German cowhide is not only environment-friendly, but also has the longest life.

For the dashboard only wood which is grown in Europe and comes from certified, responsible forestry (100%) is used. Processing in Europe means short delivery routes and ensures sustainability in all stages of production. The treatment with natural materials also give the components an elegant appearance and individual color.

I01 Product Presentation

3. Overview of Body

3.6. Equipment specifications

Three different equipment specifications are offered for the I01 for the US market:

Mega is the standard equipment level for the i3.

3.6.1. Giga World

Optional equipment "Giga World" with interior design (SA 7KY).

I01 "Giga World" interior design

3.6.2. Tera World

Optional equipment "Tera World" with interior design (SA 7KZ).

I01 Product Presentation

3. Overview of Body

I01 "Tera World" interior design

3.7. Notes on body damage

3.7.1. Notes on body damage

As new materials and new fastening concepts are being used, thus resulting in new repair methods, the following notes must be observed: Special care must be taken when carrying out work at the vehicle due to the use of high-voltage components in the I01.

To ensure that the I01 is repaired professionally and safely, special procedures and methods have been developed. These are, as is already known, communicated via the usual workshop information system.

Please also find out about the work that your dealership is permitted to carry out. The Service formats referred to at the outset must be observed without fail.

⚠

Danger to life!

When carrying out work, observe the detailed procedure and sequence specified in the repair instructions that are valid at the time of repair.

I01 Product Presentation

3. Overview of Body

Danger to life!

Before repair work on a vehicle that has been involved in an accident can be carried out, it must be ensured (by appropriately qualified personnel) that the vehicle is intrinsically safe.

When assessing damage at a I01, the current procedure in the repair instructions must be observed.

The procedure is markedly different to the procedure followed up until now. Please familiarize yourself with the relevant contents beforehand.

Based on current information, the following elements are subject to a special inspection following damage which must be carried out without fail:

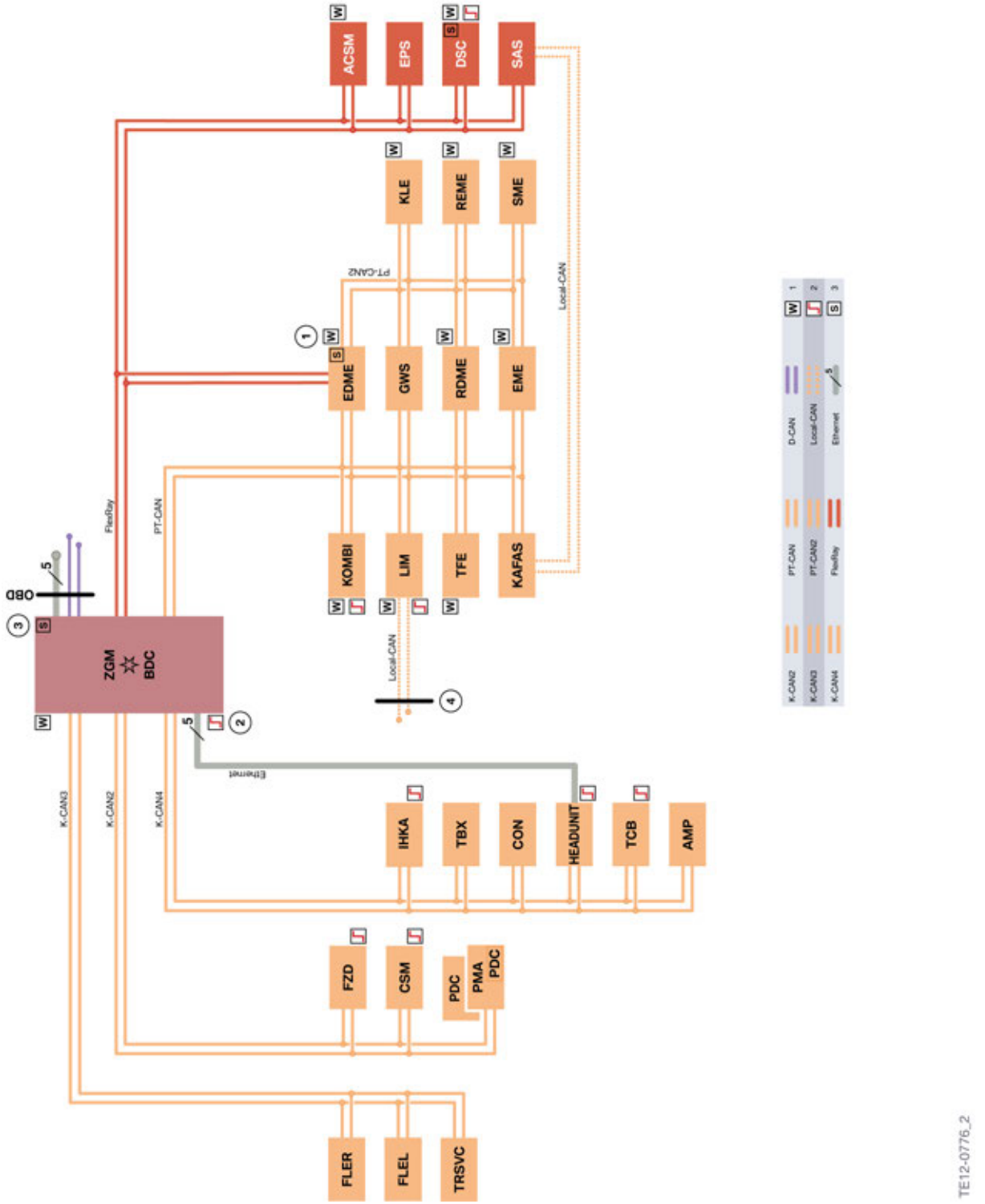
- Carbon body components (Life module)
- Surfaces of body components made of carbon
- Retaining elements at body components made of carbon (e.g. rivet nuts, holders for mounting the outer skin, attachment points of hinges)
- Structural components made of aluminium (Drive module).

I01 Product Presentation

4. General Vehicle Electrical

4.1. Vehicle electrical system

4.1.1. Bus overview



I01 bus overview

I01 Product Presentation
4. General Vehicle Electrical

Index	Explanation
ACSM	Crash Safety Module
AMP	Amplifier
BDC	Body Domain Controller
CON	Controller
CSM	Car Sharing Module
DSC	Dynamic Stability Control
EDME	Electrical Digital Motor Electronics
EME	Electrical machine electronics
EPS	Electronic Power Steering
FLER	Frontal Light Electronics Right
FLEL	Frontal Light Electronics Left
FZD	Roof function center
GWS	Gear selector
HEADUNIT	Head unit
IHKA	Integrated automatic heating / air conditioning
KAFAS	Camera-based driver support systems
KLE	Convenience charging electronics
KOMBI	Instrument cluster
LIM	Charging interface module
PDC	Park Distance Control
PMA	Parking manoeuvring assistant
RDME	Range Extender Digital Engine Electronics
REME	Range Extender Electrical Machine Electronics
SAS	Optional equipment system
SME	Battery management electronics
TFE	Hybrid pressure refueling electronic control unit
TBX	Touchbox
TCB	Telematic Communication Box
TRSVC	Top rear side view camera
ZGM	Central gateway module
1	Control units also connected at terminal 15WUP
2	Control units with wake-up authorisation
3	Start-up node control units for starting and synchronizing the FlexRay bus system
4	Charging socket at the vehicle

All bus systems in the I01 are known from the other F-series.

There is no MOST in the I01.

4.1.2. K-CAN

In the I01 the following K-CAN are used:

- K-CAN2
- K-CAN3
- K-CAN4.

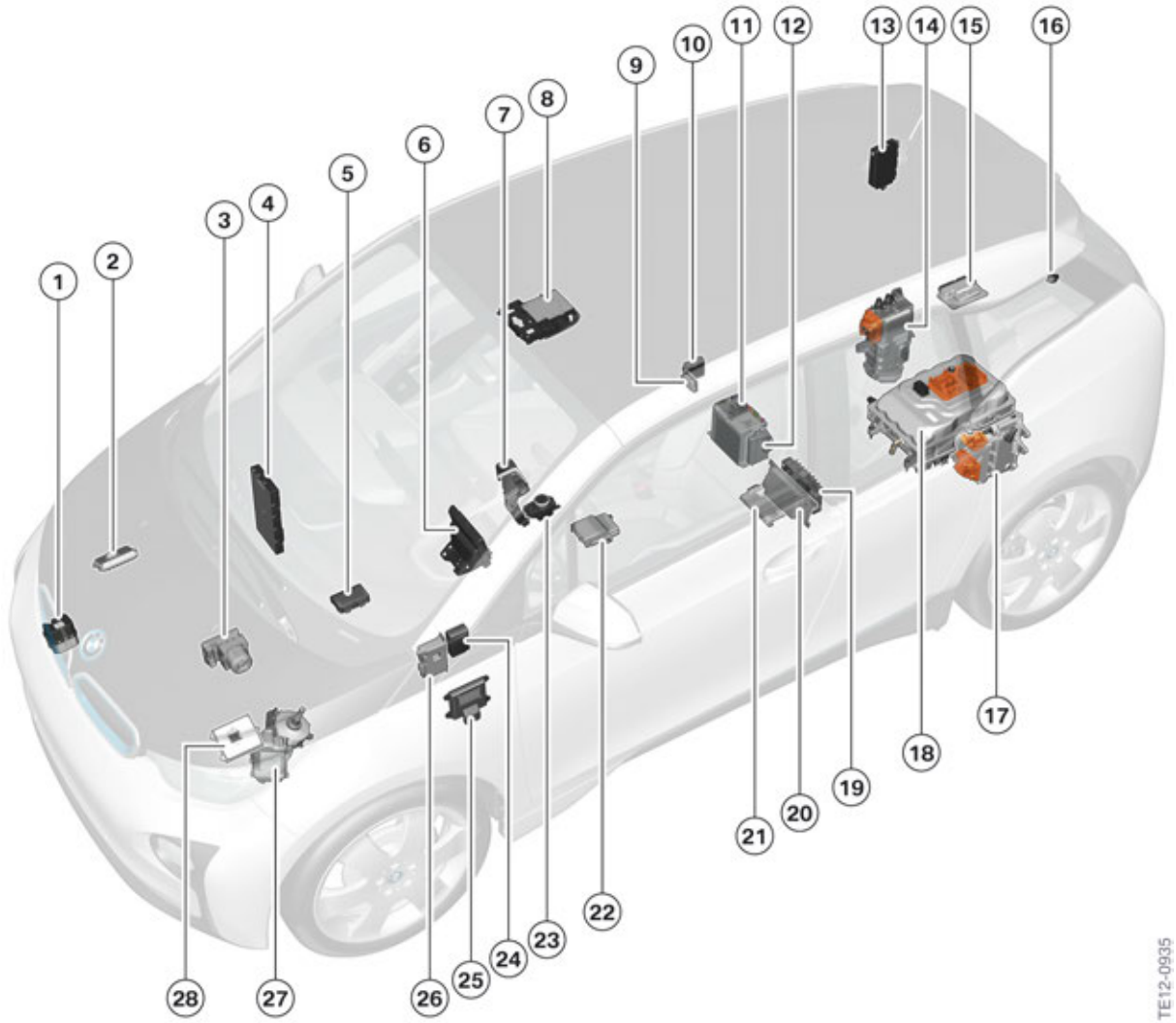
All K-CAN data buses have a data transfer rate of 500 kBit/s.

The K-CAN with 100 kBit/s data transfer rate is not used in the I01.

I01 Product Presentation

4. General Vehicle Electrical

4.1.3. Installation locations of control units



Installation locations of control units

Index	Explanation
1	Vehicle Sound Generator (VSG) Not for the US market
2	Frontal Light Electronics Right (FLER)
3	Dynamic Stability Control (DSC)
4	Body Domain Controller (BDC)
5	Integrated automatic heating / air-conditioning system (IHKA) (IHKR not available in the US market)
6	Instrument cluster (KOMBI)
7	Gear selector switch (GWS)
8	Roof function center (FZD)

Index	Explanation
9	Touchbox (TBX)
10	Parking Manoeuvring Assistant (PMA) or Park Distance Control (PDC)
11	Headunit
12	Optional equipment system (SAS)
13	Charging interface module (LIM)
14	Range Extender Electrical Machine Electronics (REME)
15	Range Extender Digital Engine Electronics (RDME)
16	Top Rear Side View Camera (TRSVC)
17	Convenience charging electronics (KLE)
18	Electrical machine electronics (EME)
19	Amplifier (AMP)
20	Telematic Communication Box (TCB)
21	Battery management electronics (SME)
22	Crash Safety Module (ACSM)
23	Controller (CON)
24	Hybrid pressure refueling electronic control unit (TFE)
25	Electrical Digital Motor Electronics (EDME)
26	Camera-based driver support systems (KAFAS)
27	Electronic Power Steering (EPS)
28	Frontal Light Electronics Left (FLEL)

The Car Sharing Module is connected to the base plate of the eject box instead of a snap-in adapter.

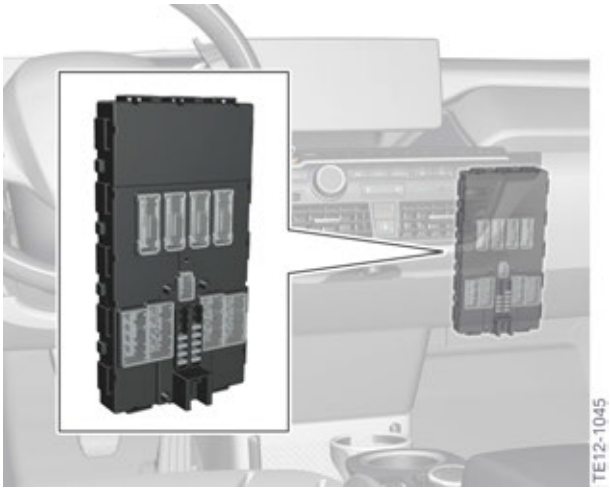
4.1.4. Control units

Information on control units

- which are used for the first time in the I01
- which are adapted for the I01.

I01 Product Presentation
4. General Vehicle Electrical

Body Domain Controller.



Body Domain Controller

The Body Domain Controller (BDC) replaces the control units known from the F30:

- Front Electronic Module (FEM) and
- Rear Electronic Module (REM).

BDC functions

The Body Domain Controller is responsible for the following functions:

- Gateway
- Electronic immobilizer
- Terminal control
- Comfort Access
- Central locking system
- Power window regulator
- Lighting
- Wash/wipe system
- Horn

I01 Product Presentation
4. General Vehicle Electrical

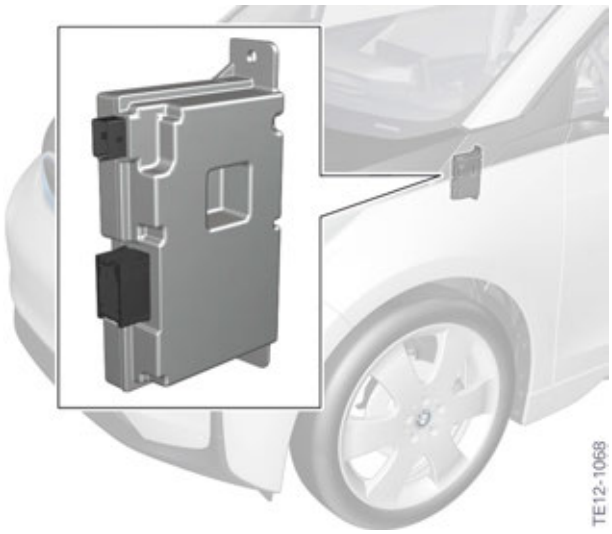
Head unit

Headunit High

The Headunit High does not have a DVD drive.

- BMW Assist with eCall (emergency-call function)
- BMW Online
- BMW Internet using a SIM card integrated in the vehicle (P-SIM)
- Remote functions (reception and controller)
- "Text-to-speech" function in Office area
- BMW TeleServices via P-SIM.

Camera-based driver support systems



Camera-based driver support systems

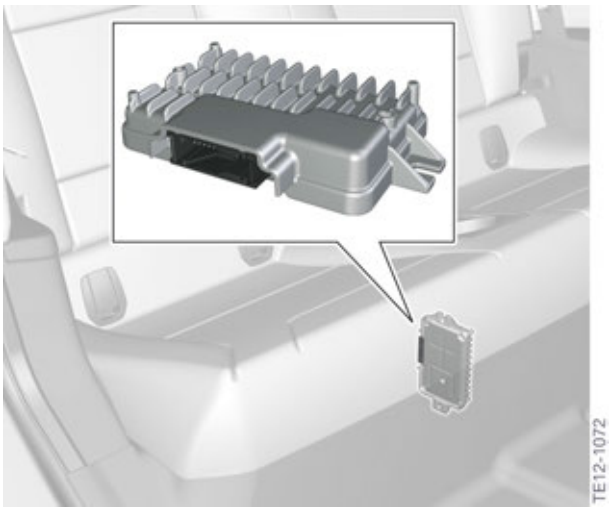
I01 Product Presentation
4. General Vehicle Electrical

The control unit camera-based driver support systems KAFAS is required for the following optional equipment:

- Camera-based cruise control with Stop&Go function
- Road sign recognition
- Tailgate warning
- Person recognition with city braking function
- Collision warning with city braking function.

The camera-based driver support systems control unit is connected to the PT-CAN and to the optional equipment system via a Local Controller Area Network.

Optional equipment system



Optional equipment system

The optional equipment system control unit provides a variety of driver assistance functions.

Possible functions:

- Collision warning with city braking function
- Cruise control with braking function
- Person recognition with city braking function
- Parking manoeuvring assistant
- Camera-based cruise control with Stop&Go function
- Active driving assistant.

The image information required by the optional equipment system is provided by the camera-based driver support systems.

I01 Product Presentation

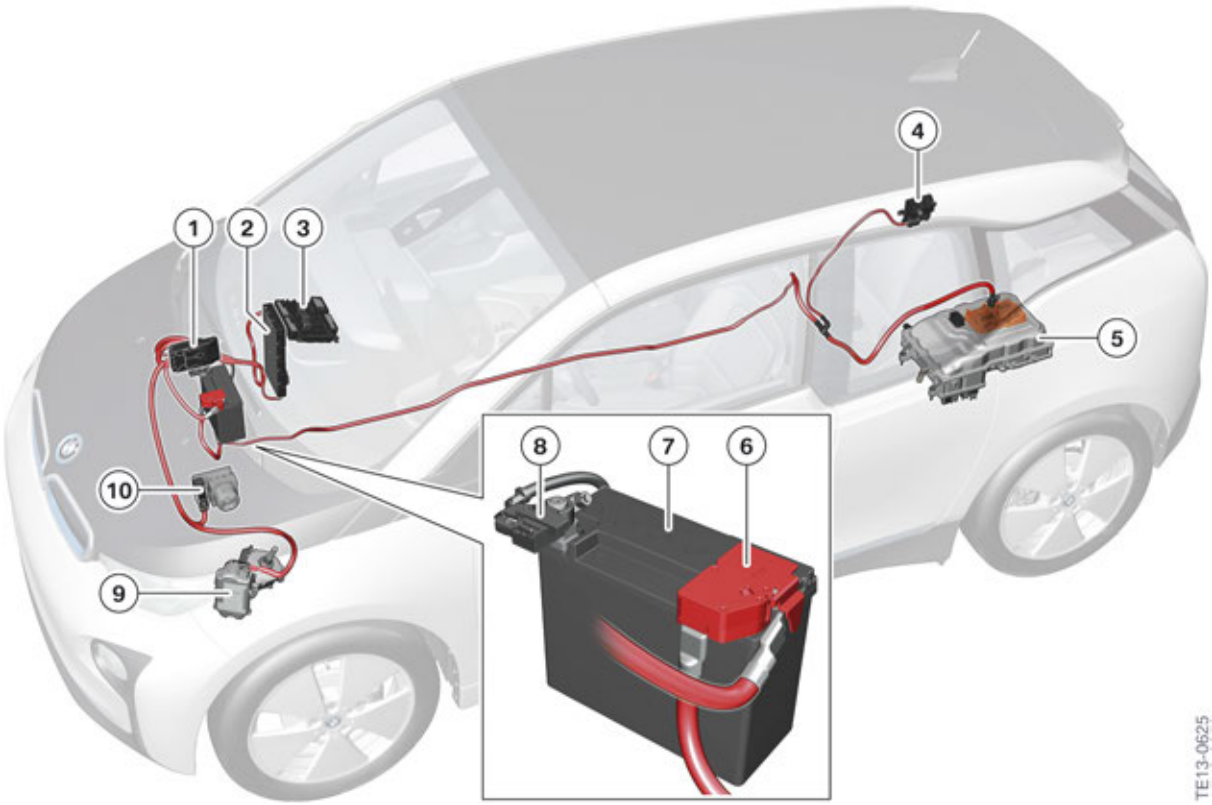
4. General Vehicle Electrical

The optional equipment system is not an element of the standard equipment. It is only installed if the customer orders a corresponding optional equipment. In the I01 there is no Integrated Chassis Management (ICM). The data required for the driver assistance functions is made available via the FlexRay.

Not all possible functions are offered in all national-market versions.

4.2. Voltage supply

4.2.1. Overview of the 12 V voltage supply



Overview of the 12 V voltage supply

Index	Explanation
1	Power distribution box, front
2	Body Domain Controller
3	Power distribution box in the passenger compartment
4	Integrated supply module (only for vehicles with range extender)
5	Electrical machine electronics
6	Safety battery terminal

Index	Explanation
7	Battery
8	Intelligent battery sensor
9	Electronic Power Steering
10	Dynamic Stability Control

4.2.2. Components

The voltage supply of the I01 comprises the following components:

- 12 V battery
- Intelligent battery sensor (IBS)
- Safety battery terminal (SBK)
- Integrated supply module (only for vehicles with range extender)
- Power distribution box, front
- Power distribution box in the passenger compartment
- DC/DC converter in the electrical machine electronics for supplying the 12 V vehicle electrical system with power
- Ground connections.

Battery

For the voltage supply of the 12 V vehicle electrical system a 12 V battery is used in the I01.

Battery:

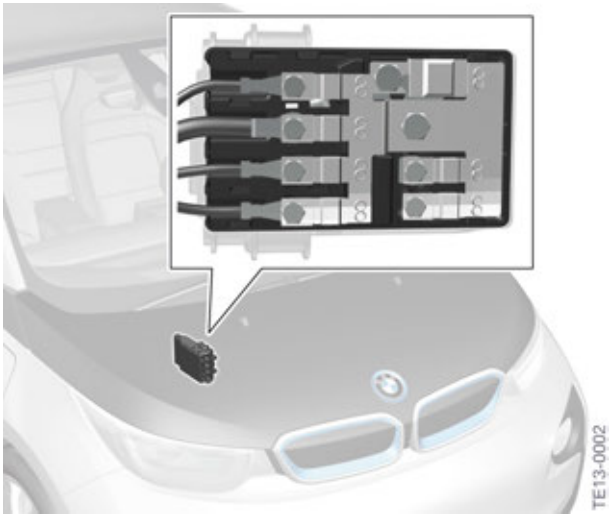
- 20 Ah AGM battery

In contrast to a vehicle with a combustion engine, the requirements of the 12 V battery in the I01 with regard to an engine start are different. In the I01 the job of the 12 V battery is only to ensure the powering up of the high-voltage system. What is required of the 12 V battery is no longer a minimum SoC to ensure engine starting, but rather a minimum SoC to protect the 12 V battery against freezing at temperatures below 0 °C and to power up the high-voltage system.

The voltage supply of the 12 V vehicle electrical system (and also the charging of the 12 V battery) is not done by the conventional alternator, but via the DC/DC converter in the EME.

I01 Product Presentation
4. General Vehicle Electrical

Power distribution box, front



Power distribution box, front

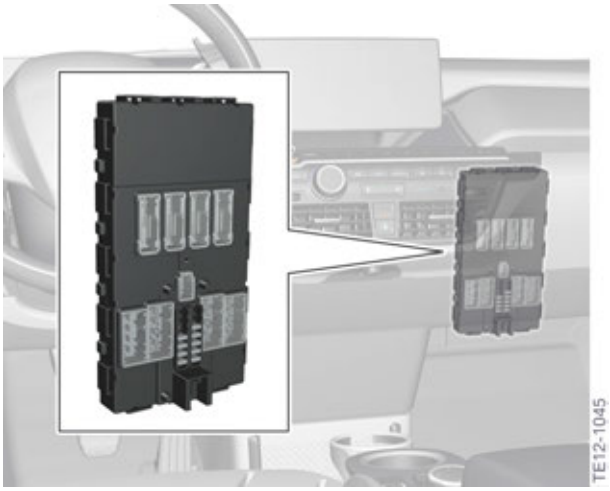
The power distribution box at the front is powered by the 12 V battery.

The following components are supplied with voltage via the power distribution box at the front and protected accordingly:

- Power distribution box in the passenger compartment
- Electronic Power Steering (EPS)
- Dynamic Stability Control (DSC) (valves)
- Dynamic Stability Control (DSC) (pump)
- Electric fan
- Body Domain Controller

I01 Product Presentation
4. General Vehicle Electrical

Body Domain Controller



Body Domain Controller

The Body Domain Controller (BDC) is responsible for the terminal control.

In the I01 there are 2 relays for terminal 30F and 2 relays for terminal 30B.

There is a relay for terminal 30F in the Body Domain Controller.

The following relays in the power distribution box in the passenger compartment are activated by the BDC:

- Terminal 30F
- Terminal 30B
- Terminal 15N.

The voltage supply and protection of the following components is done by the BDC.

Components at terminal 30

- Power distribution box, passenger compartment.

Components at terminal 30F

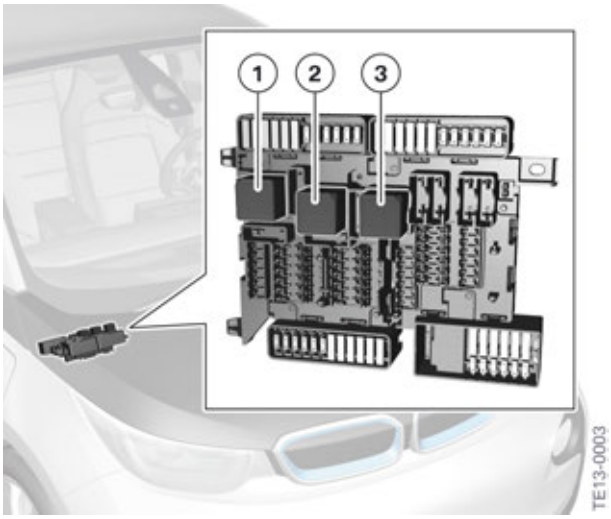
- Steering column switch cluster (SZL)
- Operating facility for assist systems
- Operating unit for light
- OBD2 connection
- Integrated heating / air-conditioning regulation or IHKA
- Outside door handle electronics.

The following components are switched by a relay in the BDC and are protected accordingly:

I01 Product Presentation
4. General Vehicle Electrical

- Power window regulators
- Central locking system
- Horn
- Heated rear window.

Power distribution box in the passenger compartment

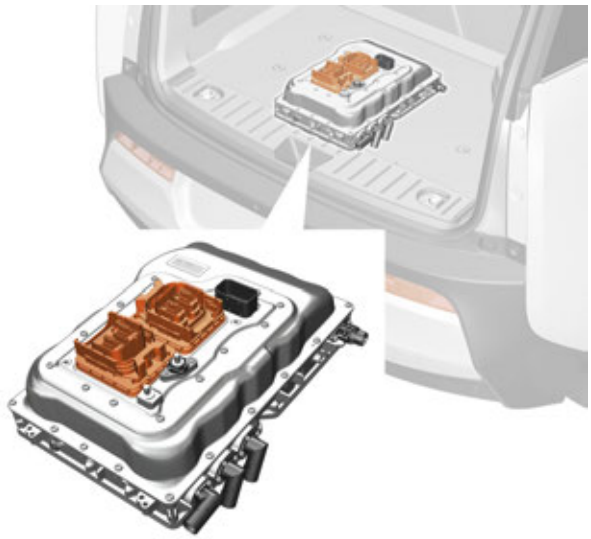


Power distribution box in the passenger compartment

Index	Explanation
1	Relay, terminal 30B
2	Relay, terminal 30B
3	Relay, terminal 15N

I01 Product Presentation
4. General Vehicle Electrical

Electrical machine electronics



Electrical machine electronics

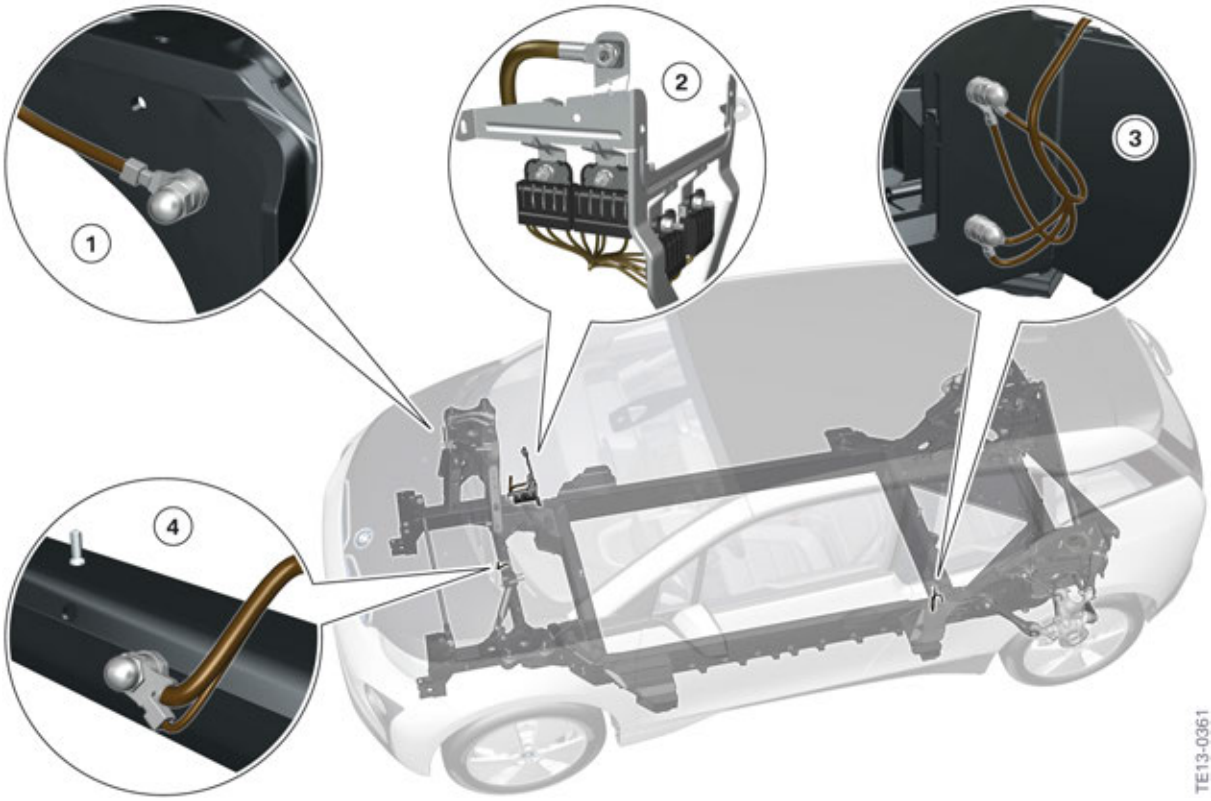
The function of the electrical machine electronics is to activate and control the permanently excited electrical machine in the high-voltage electrical system. This necessitates the use of a bidirectional inverter which converts the high direct current voltage of the high-voltage battery into a three-phase alternating current for the electrical machine. The high-voltage battery is charged again by the alternator operation of the electrical machine.

The EME also incorporates the DC/DC converter which is responsible for the voltage supply to the 12 V vehicle electrical system.

The power electronics for charging with AC voltage at 3.7 kW is also located in the EME.

I01 Product Presentation
4. General Vehicle Electrical

Ground connections



Ground connections

Index	Explanation
1	Ground Drive module at the right spring strut
2	Ground Life module in the area of the power distribution box in the passenger compartment
3	Ground Drive module at the rear cross member
4	Ground Drive module at the front cross member

Other ground connections can also be located at the Drive module corresponding to the vehicle equipment and national-market version.

In the I01 the ground connections for the consumers cannot be connected to the body because of the use of carbon for the Life module. The grounding cables of all consumers are connected to ground support points.

The ground support points are located:

- Directly at the ground for the Drive module
- In the case of the Life module via a ground cable at a ground distribution block, which in turn is connected to the Drive module.

Electrical characteristics of carbon

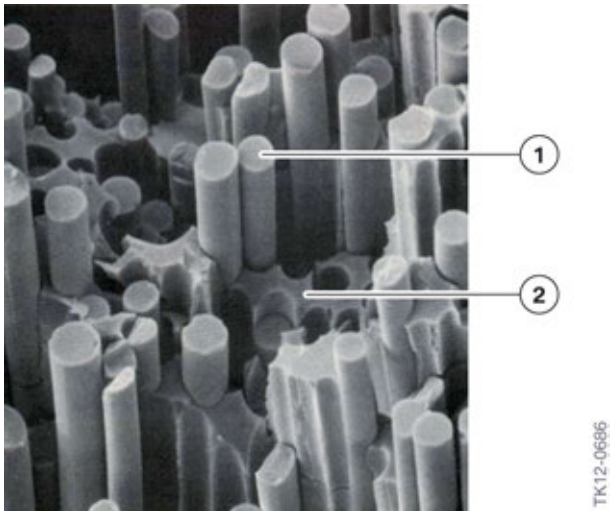
I01 Product Presentation
4. General Vehicle Electrical

Carbon is used in industry for the manufacture of carbon fibers. If these carbon fibers are also introduced to a resin, carbon fibre-reinforced plastic, which is also referred to as CFRP, is obtained. For the sake of simplicity, this product is referred to as "carbon" in this document.

A differentiation is made between short fibers (0.1 – 1 mm long), long fibers (1 – 50 mm long) and endless fibers (> 50 mm long). The fibers are used for different processing technologies, according to their length.

The short and long fibers are suitable for fibre spraying. During this process, the fibers are sprayed with a resin in a mould. Endless fibers are processed further to obtain rovings (bundles), or other semi-finished textile products such as woven fabrics.

The resin fixes the carbon fibers in the required arrangement and transmits the applied forces to and between the fibers. The material carbon ultimately only exists once the carbon fibers are introduced into the resin.



Structure of carbon

Index	Explanation
1	Carbon fiber
2	Resin

The electrical and thermal conductivity of the carbon fibers themselves is extremely good. However, as soon as they are introduced into the resin, the resin defines the conductivity properties. The electrical and thermal conductivity is then extremely low as the carbon fibers are encased in resin. The carbon fibers are not covered entirely in resin, but can also be exposed at the component surface.

The passenger compartment made from carbon is connected to the aluminium frame. The aluminium frame is connected to ground. As the carbon fibers establish contact with this aluminium frame, the passenger compartment has an undefined potential similar to ground.

If the insulation of a live electrical line becomes damaged as a result of an incident, such as:

- Accident
- Crushed cable
- Improper repair

and if the electrical conductor touches the carbon passenger compartment, a current may flow through the carbon fibre depending on the circumstances.

With a vehicle voltage of 12 V the current level is in the range of a few amperes. This means a fuse installed for the protection of the electrical line would not activate under certain circumstances.

The current flow through the carbon fibers would also cause a thermal event at the contact points for the carbon fibers. Due to the good thermal conductivity this thermal event would also spread to other parts/components in the event of continued current flow. The resulting gases are harmful and have an unpleasant odor.

Exercise extreme caution when working on electrical lines.

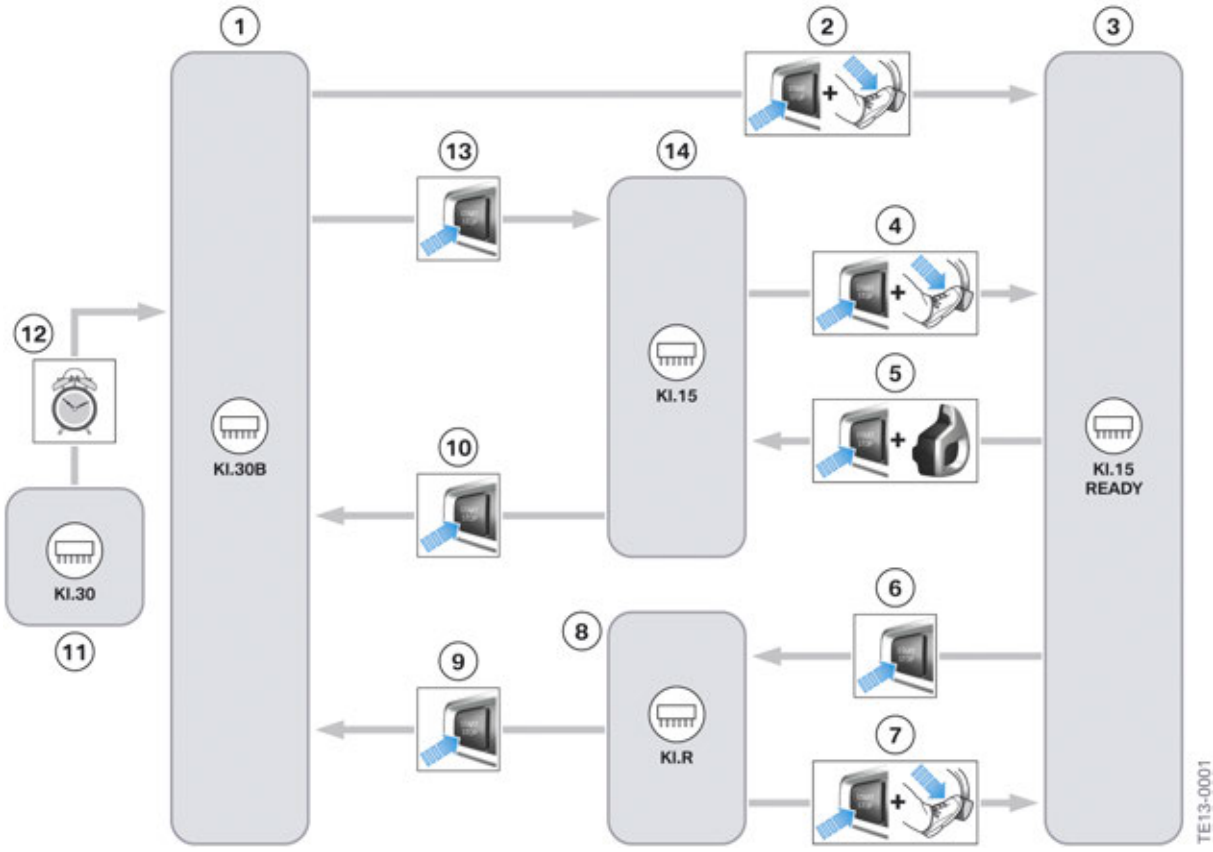
Lines or connectors which are not insulated cannot touch the carbon body components.

In each case follow the general and special information on electrical characteristics of the carbon body in the repair instructions!

I01 Product Presentation

4. General Vehicle Electrical

4.2.3. Terminal control.



Terminal control I01

Index	Explanation
1	Terminal 30B
2	Driving readiness is activated by simultaneously pressing the START-STOP button and the brake pedal
3	"Ready to drive" with terminal 15
4	Driving readiness is activated by simultaneously pressing the START-STOP button and the brake pedal
5	By pressing the START-STOP button when the N gear is engaged the terminal status switches to car wash mode
6	When the START-STOP button is pressed the terminal status changes from terminal 15 to terminal R
7	Driving readiness is activated by simultaneously pressing the START-STOP button and the brake pedal
8	Terminal R
9	When the START-STOP button is pressed the terminal status changes from terminal R to terminal 30B

Index	Explanation
10	When the START-STOP button is pressed the terminal status changes from terminal 15 to terminal 30B
11	Terminal 30
12	Vehicle is woken up by a wake-up event
13	By pressing the START-STOP button the terminal status switches from terminal 30B to terminal 15. If the START-STOP button is pressed again within 10 seconds, the following Check Control message "Press brake for engine start" is displayed
14	Terminal 15

Terminal 15 is switched off if the vehicle has been locked or the state of charge of the battery is too low.

The driving readiness is deactivated by pressing the START-STOP button when the vehicle is stationary. The drive position "P" is automatically engaged in the process. The car wash function is an exception to this: If the driver engages the drive position "N" when the driving readiness is switched on and then presses the START-STOP button, the drive position "N" remains engaged and terminal 15 remains switched on.

4.2.4. Emergency charging

It is not possible to operate the vehicle if the high-voltage battery and 12 V battery are not charged.

In order to put the vehicle back into operation, the charging cable for charging the high-voltage battery must be connected. If necessary manually unlock the charging socket cover and connect the charging cable. Emergency charging is started automatically. The charging status is not displayed.

The 12 V battery is charged somewhat after a few minutes. The 12 V vehicle electrical system is ready for operation again. The high-voltage system can be started, the high-voltage battery can therefore be charged. The charging status of the high-voltage battery can be displayed again. Continue to charge the vehicle until the state of charge for the desired range is reached.

An additional AC/DC converter is located in the electrical machine electronics (EME) for the emergency charging function. This supplies the electronics of the EME if the 12 V battery is discharged, thus enabling the start-up of the high-voltage system. With an active high-voltage system the 12 V battery is charged using the DC/DC converter in the EME by the high-voltage battery.

4.2.5. Diagnosis and programming

So that the high-voltage and the 12 V battery are not discharged during diagnosis and programming, these have to be charged accordingly. The procedure for charging is different during diagnosis and programming.

Diagnostics

For diagnosis work at the vehicle the high-voltage battery can be charged using a charging cable. With terminal 15 switched on the 12 V vehicle electrical system is supplied with power via the DC/DC converter and the 12 V battery charged.

Programming

During programming the 12 V battery must be charged using an external 12 V charger.

It is not possible to charge the high-voltage battery via the 12 V vehicle electrical system. During programming the high-voltage system is switched off if necessary.

4.3. Exterior lights

The I01 is equipped with LED headlights as standard (for the US market).

For all variants

- halogen bulbs are installed for the high-beam headlight
- bulbs are installed for the front turn indicator
- LEDs are installed for the side lights and daytime driving lights.

4.3.1. Front lights

LED headlights

LED headlights

Index	Explanation
1	Side lights and daytime driving lights
2	Low-beam headlight

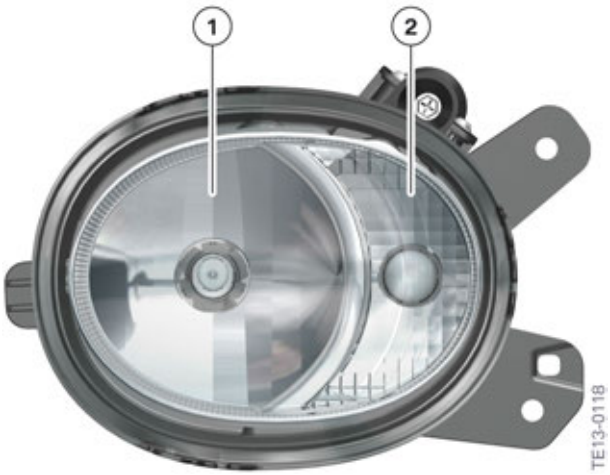
LEDs are used for the low-beam headlight, side lights and daytime driving lights (LEDs in icons).

The control units for the Frontal Light Electronics Left (FLEL) and Frontal Light Electronics Right (FLER) are installed in the left and right headlight for the LED headlights.

The Frontal Light Electronics includes:

- The activation of the LEDs in the corresponding headlight
- The activation of the stepper motor for the headlight beam throw adjustment.

High-beam headlight and turn indicator



High beam headlight/Turn indicator

Index	Explanation
1	High-beam headlight
2	Turn indicator

Bulbs are used for the high-beam headlight and turn indicator for all model versions.

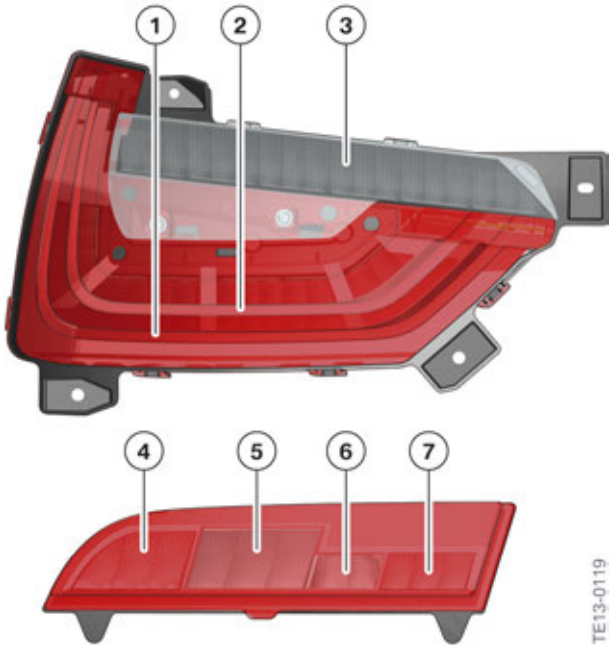
The bulbs have the following power:

- High-beam headlight 55 W H7
- Turn indicator 21 W.

4.3.2. Rear lights

So that the vehicle can also be identified when the tailgate is opened, the I01 has a two-part rear light. One part is located in the tailgate, the other in the bumper panel. The following lights in the bumper panel are only active when the tailgate is open:

- Tail light
- Brake light
- Turn indicator.



Lighting, rear

Index	Explanation
1	Tail light
2	Brake light
3	Turn indicator
4	Tail light/Brake light[1]
5	Turn indicator[2]
6	Reverse light
7	Rear fog light (not US)

[1]The tail light and brake light in the bumper panel are only active when the tailgate is open. The tail light of the tailgate is switched off when the tailgate is open.

[2]The turn indicator in the bumper panel is active when the tailgate is open.

LEDs are used for all lights for the rear lighting.

4.4. Wash/wipe system

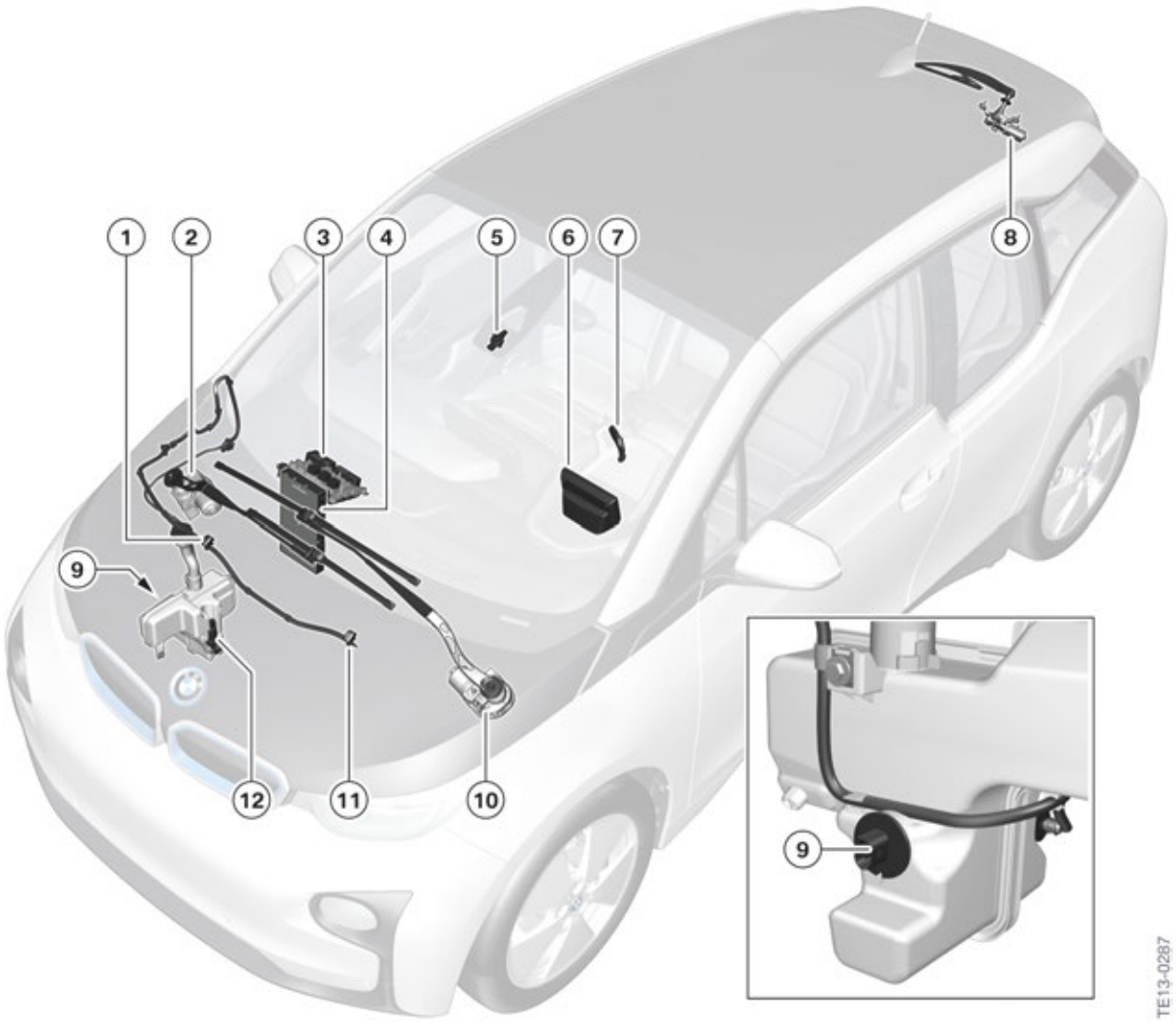
The I01 is equipped with two windshield wipers and a rear wiper.

I01 Product Presentation

4. General Vehicle Electrical

4.4.1. System components

In the I01 a windshield wiper system which works in the opposite direction is used for the first time. This takes up significantly less space than a wiper system with mechanics working in the same direction known from one of the previous models.



I01 system components of wash/wipe system

Index	Explanation
1	Washer jet, right
2	Wiper motor, right
3	Power distribution box in the passenger compartment
4	Body Domain Controller (BDC)
5	Rain-light-solar-condensation sensor (RLSBS)
6	Instrument cluster (KOMBI)

Index	Explanation
7	Steering column switch at steering column switch cluster (SZL)
8	Rear wiper with electric motor
9	Washer fluid level switch
10	Wiper motor, left
11	Washer jet, left
12	Electric motor, windshield washer pump

4.4.2. System components

In the I01 a wiper motor with integrated control unit electronics including two Local Interconnect Network interfaces is used. The wipe request and driving speed is transmitted to the control unit of the wiper motor on the driver's side (master) via Local Interconnect Network by the BDC. Via another LIN bus the master control unit then activates the control unit of the wiper motor on the passenger's side.

4.5. Heating and air-conditioning system

4.5.1. System functions

IHKA

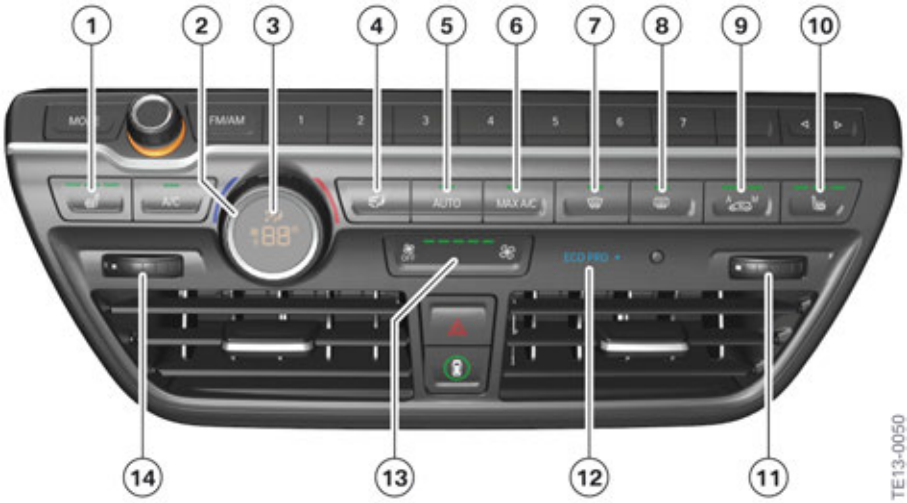
Automatic integrated heating / air-conditioning is offered as standard equipment on the i3. The IHKA with display in the temperature selector wheel has automatic temperature, air flap and blower control. The automatic air recirculation control sensor, which enables the automatic air recirculation function, is only installed. The button for the air recirculation function has a dual function.

The illuminated blue ECO PRO or also ECO PRO + display can only be seen on the IHKA controls and also indicates the activated operating mode.

Control panel and control unit

I01 Product Presentation

4. General Vehicle Electrical



Combined audio and heating and air-conditioning control panel in the IHKA

Index	Explanation
1	Button for seat heating, left
2	Temperature selector wheel **automatic** control of the temperature for the driver's side **and** passenger's side with display
3	Display for temperature, air distribution and propeller symbol
4	Button for manual air distribution
5	Button for automatic program
6	Button for maximum cooling power
7	Defrost function button
8	Heated rear window button
9	Button with dual function: Air recirculation function **and** automatic air recirculation function
10	Button for seat heating, right
11	Knob for center vent on passenger's side
12	Display of ECO PRO or ECO PRO + mode by blue writing upon activation
13	Shift paddle, blower output
14	Knob for center vent on driver's side

Automatic function

- Automatic air distribution, no range of adjustment, the automatic mode assumes the control.

Manual operation

- The air distribution can be changed by pressing the button for manual air distribution several times. The selected air distribution (top, center, bottom) is displayed by an arrow symbol on the display.

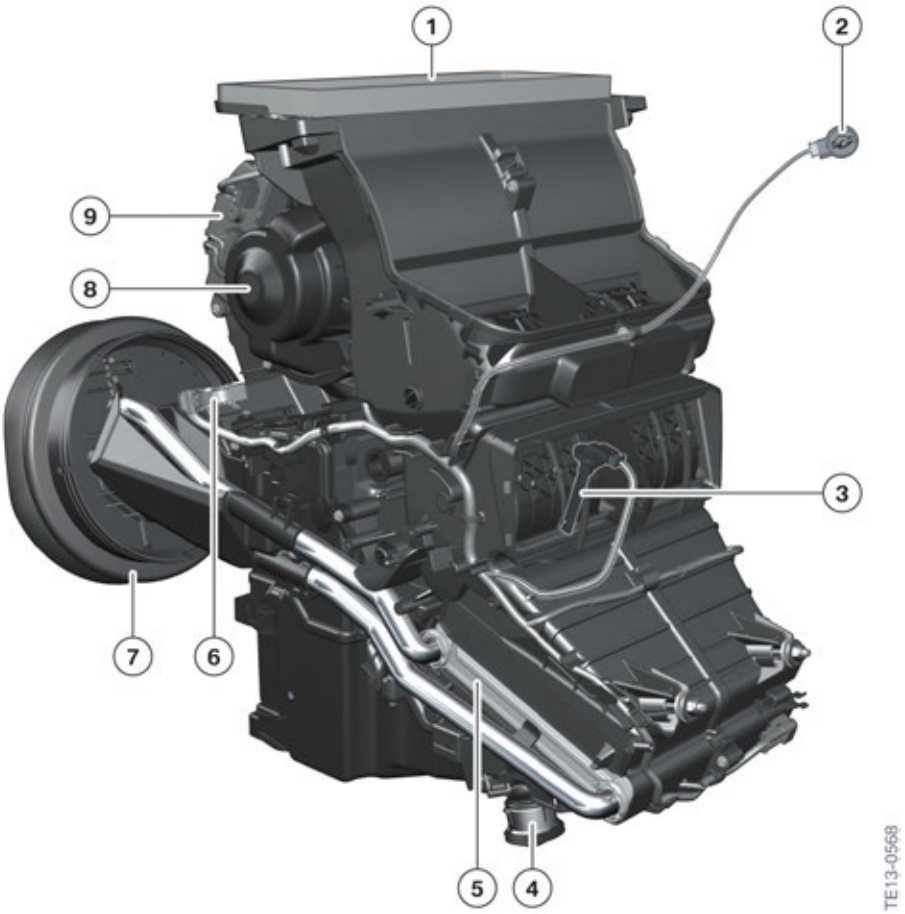
I01 Product Presentation
4. General Vehicle Electrical

Heating and air-conditioning unit

A new heating and air-conditioning unit is used in the I01.

Properties of the heating and air-conditioning unit:

- 1-zone IHKA
- No left-right separation
- No rear-seat area ventilation
- No adjustable stratification (this happens automatically)
- Air switches via flaps
- No variants: Only differentiated by different expansion valves depending on equipment
- 2-part microfilter. This can be replaced from the right passenger compartment via a Service flap.

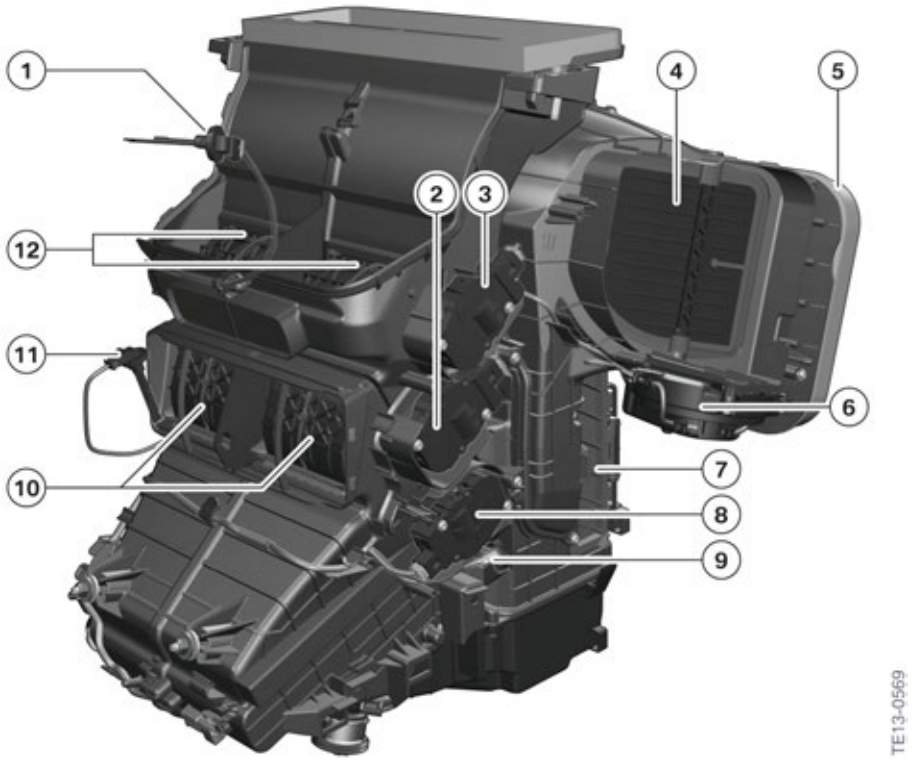


Heating and air-conditioning unit (driver side view)

I01 Product Presentation

4. General Vehicle Electrical

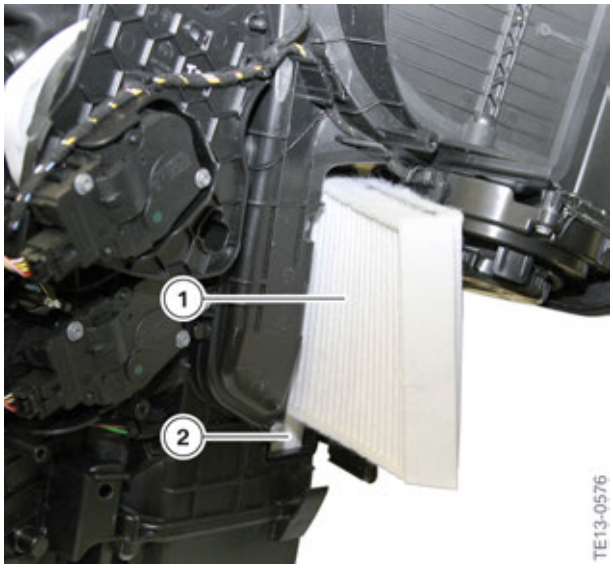
Index	Explanation
1	Air vent, top
2	Temperature sensor, center vent
3	Temperature sensor, footwell air outlet
4	Discharge of condensation from the heating and air-conditioning unit
5	Heat exchanger
6	Connector at the IHKA control unit
7	Sleeve, bulkhead
8	Blower motor
9	Blower output stage



Heating and air-conditioning unit (passenger side view)

Index	Explanation
1	Temperature sensor, center vent
2	Stepper motor for footwell ventilation, left and right
3	Stepper motor for defrost function
4	Recirculated air flap
5	Ambient air intake area at the bulkhead
6	Stepper motor for recirculated air flap (with kinematics control)

Index	Explanation
7	Service flap of two microfilters
8	Stepper motor for blending flap
9	Evaporator temperature sensor
10	Air flaps, footwell ventilation
11	Temperature sensor for footwell ventilation
12	Air flaps, center vent



Heating and air-conditioning unit, replacement of microfilter

Index	Explanation
1	Upper microfilter
2	Lower microfilter

I01 Product Presentation
4. General Vehicle Electrical

Heating and air-conditioning unit, replacement of microfilter

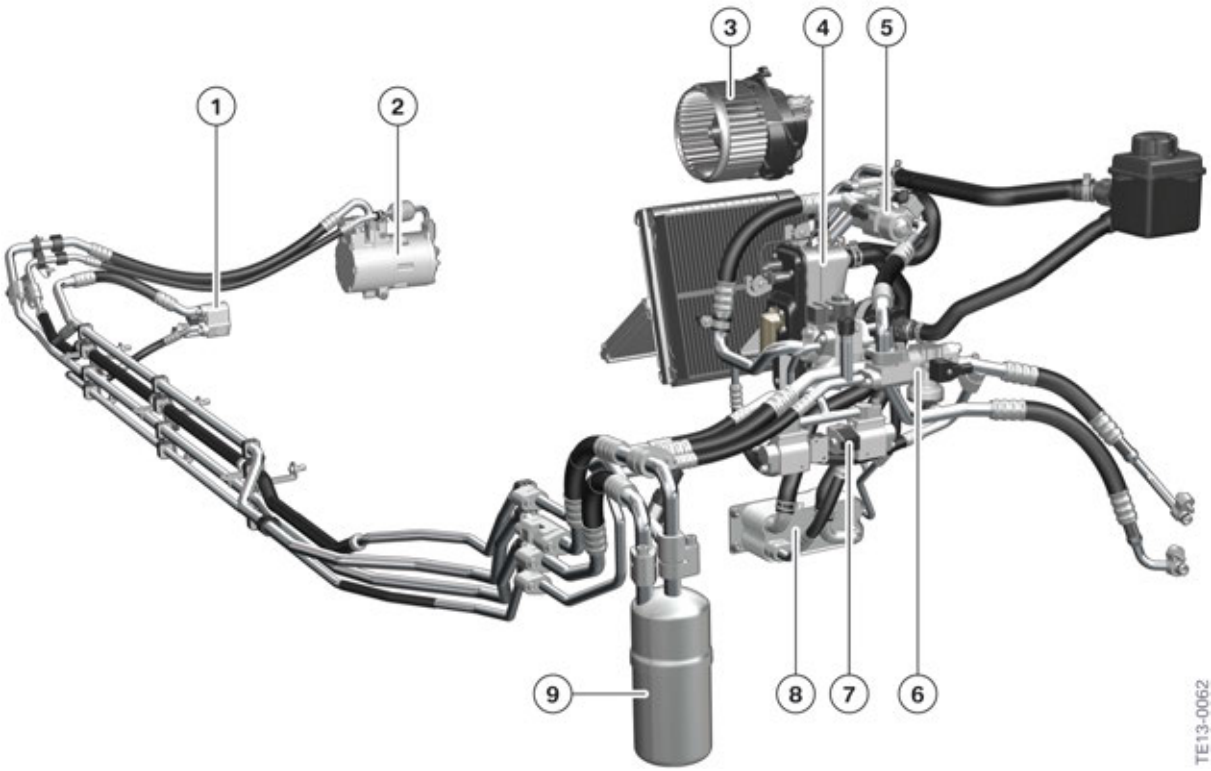
Heat pump

The highly complex system of the heat pump, adapted to the heating and air-conditioning system of the vehicle, places high demands on the workshop personnel during diagnosis, but when it comes to its application the customer is unable to distinguish it from the conventional heating and air-conditioning system in the standard equipment.

Due to weight saving reasons the heat pump is only offered in the BEV (Battery Electric Vehicle) as standard equipment (i.e. in vehicles without range extender).

I01 Product Presentation

4. General Vehicle Electrical



Complete system with heat pump equipment

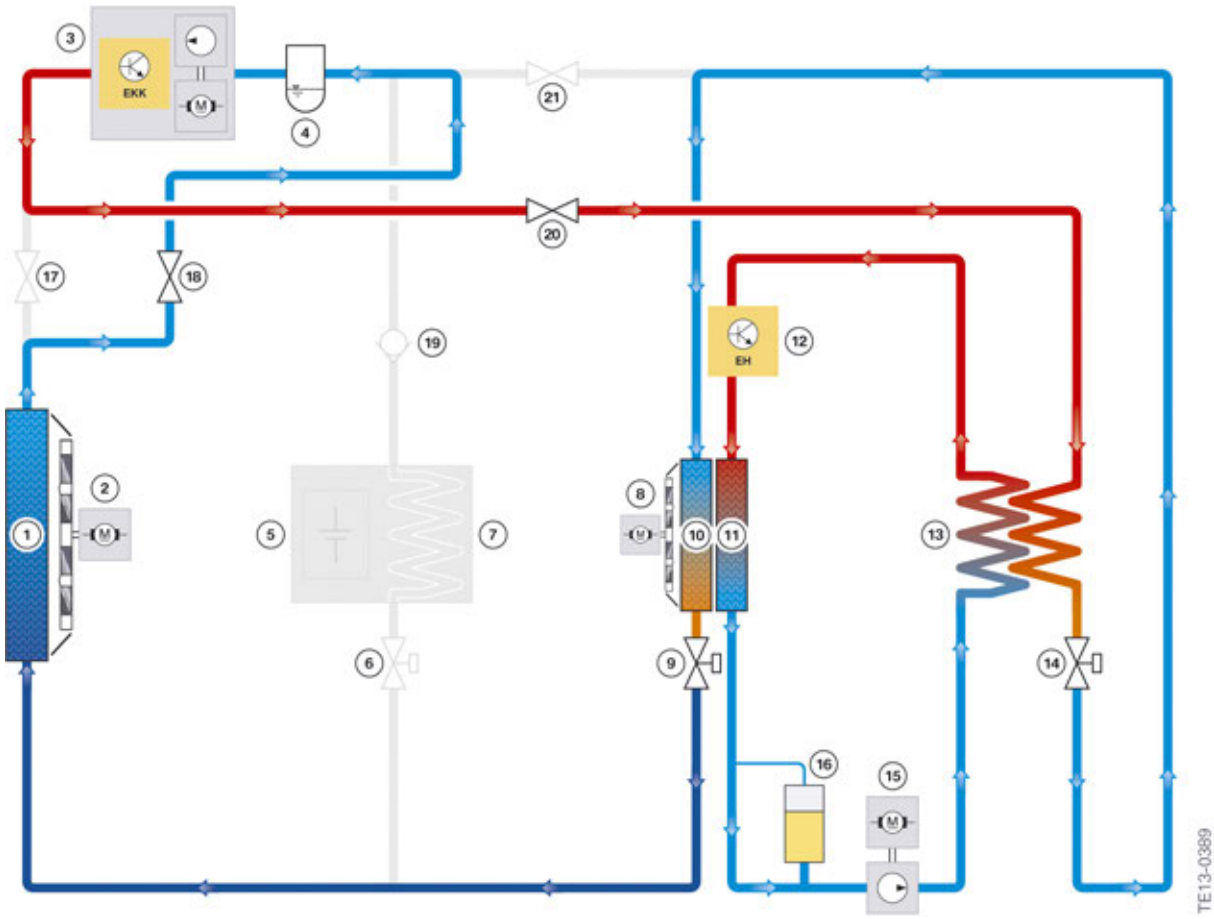
Index	Explanation
1	Electrical expansion valve (EXV) at the high-voltage battery unit
2	EKK
3	Blower, passenger compartment
4	Electric heating
5	Electrically controlled expansion valve (EXV) for the evaporator in the passenger compartment
6	Refrigerant shutoff valve between condenser and dryer flask
7	Refrigerant shutoff valve between EKK and heat pump heat exchanger
8	Heat pump heat exchanger
9	Dryer flask

The heat pump is responsible for helping increase the range with the same heating and air-conditioning comfort of a system without this device. From an ambient temperature of -10 °C (14 °F) and a mean set-point value of the heating and air-conditioning system (22 °C (71.6 °F) in automatic function) an interior air temperature control without the additional heating is realized by the electric heating. The heat pump is no longer operated below -10 °C (14 °F).

BEV Refrigerant circuit with heat pump in cooling

I01 Product Presentation

4. General Vehicle Electrical



Refrigerant circuit with heat pump in heating mode

Index	Explanation of heating mode of heat pump
1	Capacitor
2	Electric fan
3	EKK
4	Dryer flask
5	High-voltage battery unit
6	Electrically controlled expansion valve (EXV) for the cooling loop in the high-voltage battery unit
7	Cooling loops in the high-voltage battery
8	Blower for passenger compartment
9	Electrically controlled expansion valve (EXV) for the evaporator in the passenger compartment
10	Evaporator, passenger compartment in the heating and air-conditioning unit
11	Heat exchanger
12	Electric heating

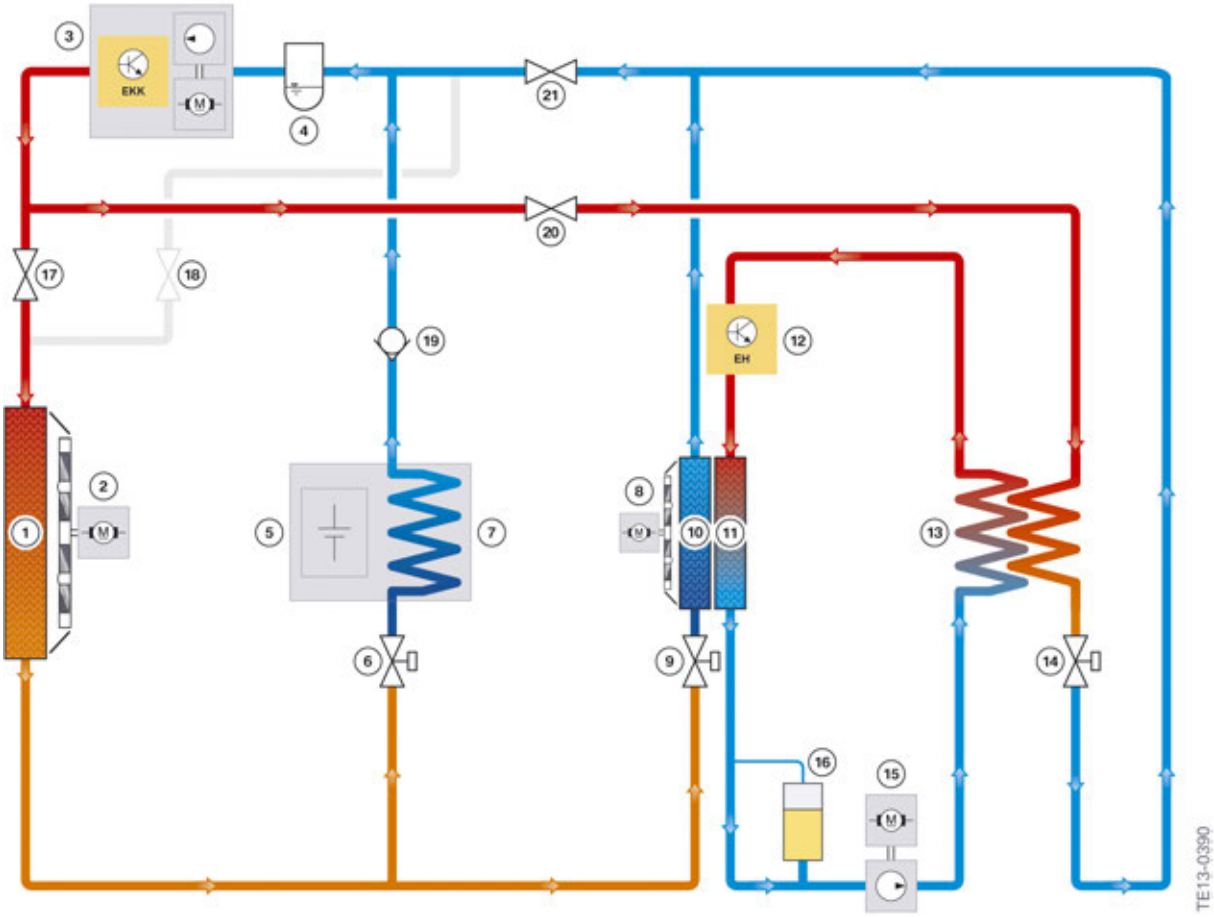
Index	Explanation of heating mode of heat pump
13	Heat pump heat exchanger
14	Electrically controlled expansion valve (EXV) for the heat pump heat exchanger
15	Electric coolant pump
16	Coolant expansion tank
17	Refrigerant shutoff valve between EKK and condenser. **This valve is open and currentless.**
18	Refrigerant shutoff valve between condenser and low-pressure battery (dryer flask). **This valve is closed and currentless.**
19	Refrigerant non-return valve
20	Refrigerant shutoff valve between EKK and heat pump heat exchanger. **This valve is open and currentless.**
21	Refrigerant shutoff valve between electrically controlled expansion valve at the heat pump heat exchanger and the low-pressure battery (dryer flask). **This valve is open and currentless.**

The heat is therefore no longer emitted unused at the condenser, but is emitted at the coolant for the heater circuit via the heat pump heat exchanger. The energy consumption for the electric heating can thus be reduced or saved entirely.

BEV Refrigerant circuit with heat pump in mixed operation

I01 Product Presentation

4. General Vehicle Electrical



Refrigerant circuit with heat pump in mixed operation

Index	Explanation of mixed operation of heat pump
1	Capacitor
2	Electric fan
3	EKK
4	Dryer flask
5	High-voltage battery unit
6	Electrically controlled expansion valve (EXV) for the cooling loop in the high-voltage battery unit
7	Cooling loop in the high-voltage battery unit
8	Blower for passenger compartment
9	Electrically controlled expansion valve (EXV) for the evaporator in the passenger compartment
10	Evaporator, passenger compartment in the heating and air-conditioning unit
11	Heat exchanger
12	Electric heating

Index	Explanation of mixed operation of heat pump
13	Heat pump heat exchanger
14	Electrically controlled expansion valve (EXV) for the heat pump heat exchanger
15	Electric coolant pump
16	Coolant expansion tank
17	Refrigerant shutoff valve between EKK and condenser. **This valve is open and currentless.**
18	Refrigerant shutoff valve between condenser and dryer flask. **This valve is closed and currentless.**
19	Refrigerant non-return valve in the pressure line from the cooling loop in the high-voltage battery unit to the dryer flask
20	Refrigerant shutoff valve between EKK and heat pump heat exchanger. **This valve is open and currentless.**
21	Refrigerant shutoff valve between electrically controlled expansion valve (EXV) at the heat pump heat exchanger and the dryer flask. **This valve is open and currentless.**

In mixed operation this results in a division of the hot, high-pressure refrigerant.

On the one hand, cooling of the high-voltage battery unit and dehumidification of the passenger compartment can be realized by the cooling at the evaporator, on the other hand, the divided heat transported with the refrigerant is used for the heat pump heat exchanger.

Another advantage in comparison to a vehicle without a heat pump is that in the event of strong sunlight, and hence the necessary blowing of cold air from the ventilation grille is also not necessarily an advantage for the footwell. The vehicle without a heat pump must be slightly heated using the electric heating in order to acclimatize the footwell to a pleasant temperature.

In mixed operation with a heat pump the footwell can therefore be heated without using energy using the heat pump heat exchanger.

I01 Product Presentation

5. IKT System Overview

5.1. System components

5.1.1. Headunits

The I01 is available with 2 navigation headunit options. The Entry NAV or option SA606 Business Navigation system is the standard equipment. It offers the new Basic Headunit, a 6.5” screen and most of the basic navigation features needed for the functions of the i3. And the optional equipment variant option SA609 Navigation Professional with the HU-H headunit which offers a 10.25” screen and adds a split screen, media hard drive, 3D maps, etc.

The telephone and multimedia functions are integrated in the Headunit. The Telematic Communication Box (TCB) is installed for telematics functions.

Optional equipment	Headunit	CID	Controller	Navigation	DVD drive
Navigation Business (SA606) is the standard equipment at the series launch.	Basic Headunit	6.5”	Standard 7-button	Yes (Basic)	No
Navigation Professional (SA609) SA609 is offered as part of the ZTD Technology + Driver Assistance Package.	Headunit High	10.25"	7-button with touchpad	Yes	No

The hardware structure of the Entry Navigation Basic Headunit is similar to Headunit High. Therefore the hardware contains the necessary components for the navigation system. With the exception of the yaw rate sensor, which in the I01 is housed in the Crash Safety Module (ACSM) and is transferred to the headunit via a bus signal. A non removable flash memory with 32 GB is installed for the Entry navigation system for permanent storage of the map data.

Vehicles with the Entry navigation (SA606) Business system are equipped as standard with a 7-button iDrive controller. The Touch controller is only available with SA609 Navigation Professional.

Standard 7 button controller for Basic Navigation

I01 Product Presentation
5. IKT System Overview

The Headunit High known from other BMW models is used.

Headunit Installation location (Headunit High

5.1.2. External devices

AUX-IN connection with USB interface

With the use of the Headunit High the USB interface in the glove box is largely discontinued. This also relates to the I01.

The interface for USB audio/video and data import/export is located at the **center console**. This connection is then used both to play external media and for data import/export such as when updating navigation data for example.

AUX-IN connection with USB interface

Index	Explanation
1	Cigarette lighter socket/12 V power socket
2	AUX-IN connection with USB interface

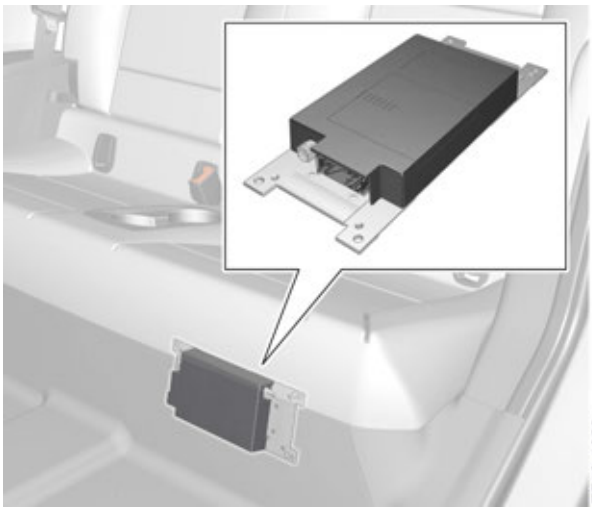
5.1.3. Telephone Systems

In the I01 two telephone systems are used in conjunction with the Headunit High:

- Basic version of telephone with hands-free system and USB interface (included in the basic equipment)
- Comfort telephone with extended smartphone connection.

5.1.4. Telematic Communication Box

The Telematic Communication Box (TCB) is a permanently installed speech and data modem for the Headunit High. As there is automatic activation upon series launch, the I01 already has a Telematic Communication Box (TCB) in the basic equipment.



Telematic Communication Box TCB

- BMW Assist with eCall (emergency-call function)
- BMW Online
- BMW Internet using a SIM card integrated in the vehicle (P-SIM)
- Remote functions (reception and controller)
- "Text-to-speech" function in Office area
- BMW TeleServices via P-SIM.

I01 Product Presentation
5. IKT System Overview

5.1.5. Touch controller

The controller introduced with the headunit CIC High with rotary adjuster/knob and seven keys is replaced in the BMW 5-Series LCI worldwide with a touch controller with an additional touch control panel at the top at the rotary adjuster/knob. The I01 has the touch controller from series launch.

Touch Controller

5.1.6. Speaker Systems

Overview

The speaker systems in the I01 are available in two specification levels:

- Stereo system (standard)
- Harman Kardon HiFi loudspeaker system (SA 674).

The following table gives an overview of the possible speaker systems in the I01:

Stereo system	Harman Kardon HiFi loudspeaker system
Activation by headunit (4 x 25 W) 4 speakers	7-channel AMPH (360 W) 12 speakers

5.2. Functions

5.2.1. Display and operating concept

The familiar user interface of the iDrive was adapted to the requirements of the I01 and the design was revised.

The following diagrams reflect a comparison between BMW and BMW i:

Main menu of Headunit High BMW

I01 Product Presentation
5. IKT System Overview

Main menu of Headunit High BMW

Main menu of Headunit High BMW i

Main menu of Headunit High BMW i

5.2.2. BMW i specific navigation

The Headunit High is activated automatically in the I01 upon series launch. The I01 in the basic equipment therefore has the optional equipment Professional navigation (SA 609), which was customized to the specific requirements of electric mobility.

A dynamic range display is the core element of this navigation. It takes into consideration all relevant factors such as state of charge of the high-voltage battery, driving style, topographical preconditions and even the current traffic situation. A nearby charging station is displayed upon the driver's request. The system also informs the driver about how much charging time is required in order to be able to complete the return journey or the journey to another destination.

Recommendations for electric mobility

Index	Explanation
1	Recommendations
2	Outside the range
3	Search for charging stations

5.2.3. BMW ConnectedDrive

In addition to the navigation system, the BMW i ConnectedDrive Services are fully customized to the specific requirements of electric mobility.

Via the ConnectedDrive Internet portal or a smartphone the customer has the option of establishing a connection to his vehicle and having important information for his planned route displayed, for example the state of charge of the high-voltage battery.

Thanks to this intelligent networking the customer is able to comfortably plan his route or upcoming journeys from home.

BMW i Remote app

The BMW i Remote app is a further development of the familiar My BMW Remote app, which was tailored especially for the specific requirements of electric mobility.

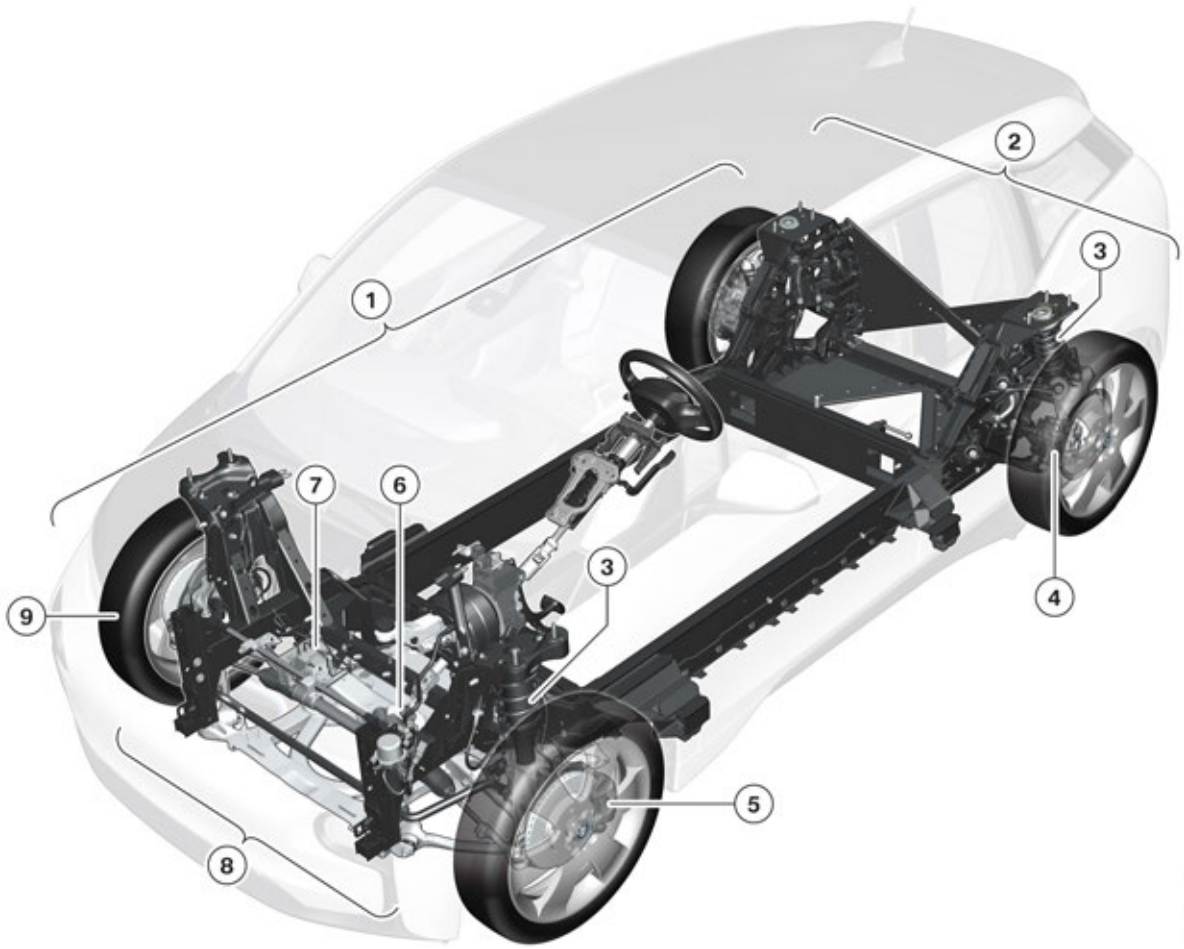
BMW i Remote app. Example: Activation of the charging procedure

I01 Product Presentation

6. Chassis and Suspension Overview

6.1. Introduction

6.1.1. Overview of chassis and suspension



I01 chassis and suspension, complete overview

Index	Explanation
1	Drive module
2	Five-link rear axle (HA5)
3	Suspension/dampers
4	Electromechanical Parking Brake (EMF)
5	Brakes
6	Electronic Power Steering (EPS)
7	Dynamic Stability Control (DSC)
8	Single-joint spring-strut-type front axle
9	Wheels

I01 Product Presentation
6. Chassis and Suspension Overview

A significant difference when compared to current BMW vehicles is the omission of a unitary body. In the I01, the Drive module constitutes the supporting structure that connects the various chassis and suspension components. The Drive module is made of aluminium and is permanently connected to the Life module which constitutes the passenger compartment, among other things. This architecture has been chosen so that the large energy accumulator can be positioned optimally in the vehicle. The battery cells are fully integrated into the vehicle underbody and fill the entire central area of the Drive module; a favorable location in terms of dynamic handling characteristics. This positioning guarantees optimum axle-load distribution and a low center of gravity.

6.2. Wheels

Forged aluminium rims are used with the basic and optional equipment.

Four different wheel sets in total are available. The vehicle can be equipped with 19" or 20" wheel rims, depending on the customer request.

I01 Overview of aluminium rims

Index	Explanation
1	Basic equipment, star spoke 19" (427)
2	Optional equipment, turbine styling 19" (428)
3	Optional equipment, turbine styling 19" (429)
4	Optional equipment, double spoke 20" (430)

6.2.1. Wheel sizes

The following table provides an overview of the various wheel sizes with reference to the two versions with and without range extender.

I01 Product Presentation

6. Chassis and Suspension Overview

Tires	I01 without range extender	Rim size	I01 with range extender	Rim size
Basic version, summer tire, front	155/70 R19	5 x 19	155/70 R19	5 x 19
Basic version, summer tire, rear	155/70 R19	5 x 19	175/60 R19	5.5 x 19
Basic version, winter tire, front	155/70 R19	5 x 19	155/70 R19	5 x 19
Basic version, winter tire, rear	155/70 R19	5 x 19	155/70 R19	5 x 19
OE summer tire, front	155/60 R20	5 x 20	155/60 R20	5 x 20
OE summer tire, rear	175/55 R20	5.5 x 20	175/55 R20	5.5 x 20

The front and rear axles of the (standard) I01 without range extender are equipped with the same tires and rim size (mixed tires are available as an option). If the vehicle is equipped with a range extender, mixed tires are standard in order to satisfy the higher demands in relation to driving dynamics due to the increased rear axle loads. By using 175/60 R19 tires, it has been possible to ensure that the driving dynamics of the I01 with range extender remain on a par with the driving dynamics of the I01 without range extender. This means that the drivability of the I01 is the same for each customer, irrespective of which vehicle version they drive.

If the I01 with range extender is converted for winter tires, R19 tires are also used at the rear axle 155/70.

Reasons for using the low tire width:

- It was only possible to ensure sufficient freedom of movement when using snow chains with tire size 155/70 R19
- Improved traction and braking deceleration on smooth or wet roads is achieved using 155/70 R19 tires.

Winter tires are not available for the optional equipment 20" wheel rim, also due to freedom of movement of the snow chains.

The vehicle is equipped in all dimensions with rolling resistance optimized tires without emergency running properties.

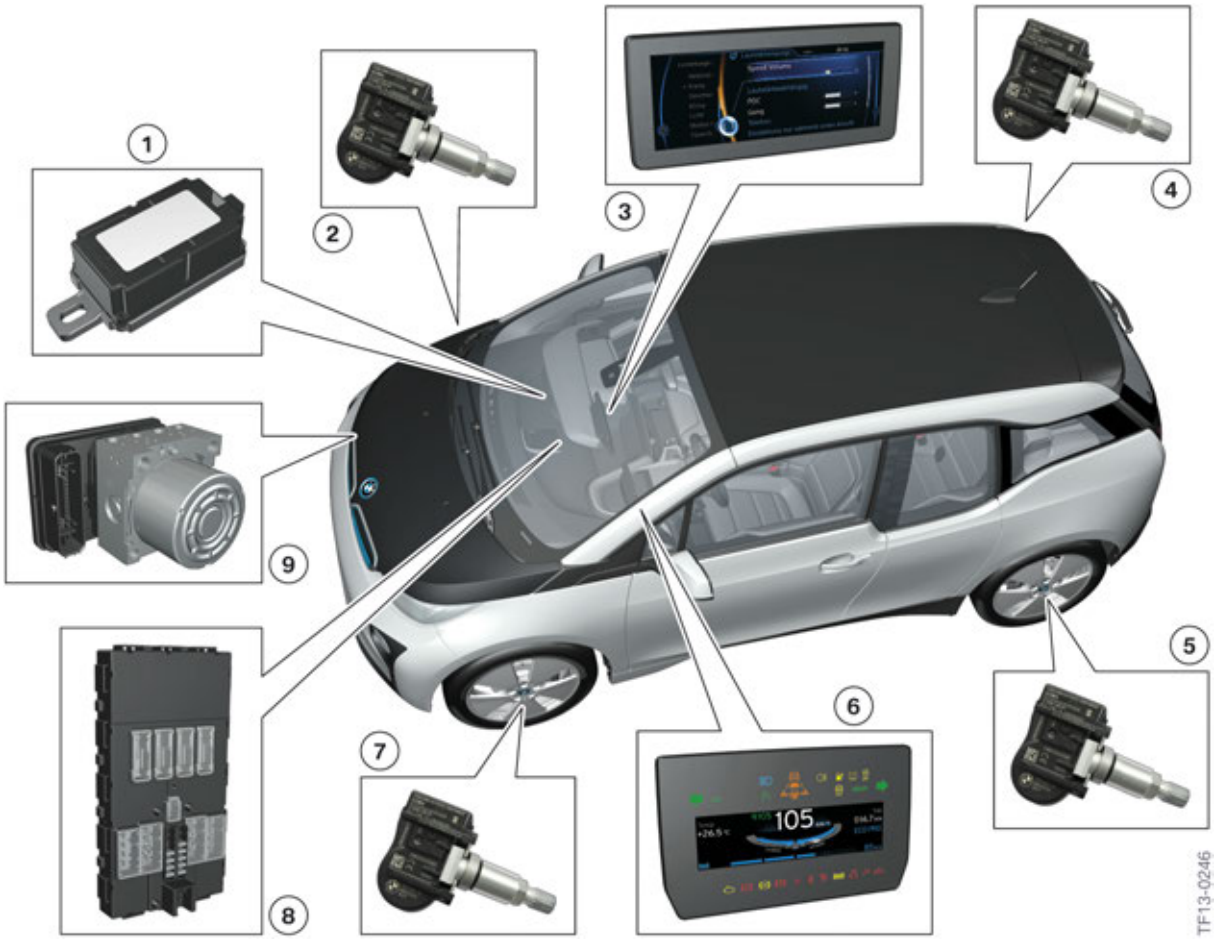
There is no spare wheel recess in the I01 therefore compact spare wheel for use in the event of a puncture is not provided. All US market vehicles come with a Mobility Kit included as standard equipment.

I01 Product Presentation

6. Chassis and Suspension Overview

Overall the omission of the spare wheel and use of tires without emergency running properties provides benefits in terms of reducing the vehicle weight and thus increasing the range.

6.3. Tire Pressure Monitoring System (TPMS)



I01 Overview of tire pressure monitoring system (TPMS)

Index	Explanation
1	Remote control receiver (FBD)
2	Tire pressure sensor, front right
3	Central information display (CID)
4	Tire pressure sensor, rear right
5	Tire pressure sensor, rear left
6	Instrument panel (KOMBI)
7	Tire pressure sensor, front left
8	Body Domain Controller (BDC)
9	Dynamic Stability Control (DSC)

I01 Product Presentation
6. Chassis and Suspension Overview

Tire pressure monitoring is a system for monitoring the actual tire pressure of all four wheels. The latest version of TPMS is used in the I01. It is integrated into the DSC control unit (9). This means that a separate TPMS control unit is not required.

The tire pressures and temperatures of the air in the tires are calculated by the tire pressure sensor (2, 4, 5, 7) at all four wheels and forwarded via radio signals. The radio signals from the tire pressure sensor are received by the remote control receiver (FBD) (1) and sent to the DSC control unit via FlexRay Bus signal the Body Domain Controller (BDC) (8). The evaluation function of the tire pressures takes place in the DSC control unit. The tire pressures can be displayed via the Central Information Display (CID). Warnings due to insufficient tire pressure are output via the CID or KOMBI (6).

6.3.1. Wheel electronics teach-in process

For the measured tire pressures to be displayed at the Central Information Display (CID), the TPMS must have successfully completed a wheel assignment with the assistance of a teach-in operation. The teach-in operation comprises the following two phases.

Phases of the teach-in operation:

- Checking and storing the ID numbers of the tire pressure sensors assigned to the vehicle. Once the ID numbers have been successfully stored, the system is capable of issuing warnings. However, tire pressures still cannot be displayed.
- Determine and store the various installation positions of the tire pressure sensors. Once the installation position has been successfully stored, the system is capable of issuing warnings and displaying tire pressures via the (CID).

The teach-in operation starts automatically when the journey commences providing a standstill period of 8 minutes has been exceeded and cannot be influenced manually. The DSC control unit launches a program as soon as the teach-in operation is active and serves to assign the wheels to the wheel electronics. In doing so, the wheel speed signals from the wheel speed sensors are compared with the messages sent from the wheel electronics. As both signals are only available during the journey, this process must be performed dynamically. It is not possible to teach in when the vehicle is at a standstill.

When changing a wheel of the I01, make sure that the vehicle is **stationary** for at least **8 minutes** before initializing the tire pressures.

6.3.2. Functional prerequisites

To ensure that the TPMS issues correct a warning in the event of a pressure drop, an initialization with the tire pressures set correctly must be performed manually.

Prerequisites for an initialization are:

- All four wheels equipped with correct version of tire pressure sensor
- Sufficient energy in the batteries of the tire pressure sensors
- Prescribed tire pressures at all four wheels.

An initialization can be started at any time. However, it is only performed upon completion of the wheel assignment by the TPMS .

The following threshold values are stored in the system:

- Initialization threshold; when the minimum pressure of 2.0 bar is undercut during initialization the “Tire pressure too low” warning is issued
- First warning threshold value with a pressure drop of 20 % compared to the initialized nominal pressure
- Second warning threshold when 1.6 bar is undercut.

6.3.3. Initializing the tire pressure monitoring system (TPMS)

The TPMS is initialized via the iDrive menu.

The tire pressures must be initialized if:

- The tire pressures have been changed
- A tire change has been carried out
- The tire pressure sensor have been exchanged.

The initialization ends with a journey that can be interrupted at any time. When the journey continues, the process is automatically resumed. In order to complete it, a speed of more than 30 km/h / 18 mph must be attained. If no measuring results are available, the wheels in the Central Information Display will be displayed grey. A progress bar appears in the CID during the initialization process. Once the initialization has been completed successfully, all four wheels will be displayed green with the corresponding tire pressures.

To ensure the system works reliably, an initialization must be performed following each wheel change or tire pressure adjustment.

6.3.4. Information in Central Information Display

As the tire pressure sensor are in sleep mode when the vehicle is at a standstill, the actual tire pressures cannot be queried via the Central Information Display. As soon as the vehicle is in motion and exceeds a speed of roughly 30 km/h, the tire pressure sensors start transmitting. If the identification numbers ID are stored in the DSC control unit, the tire pressures can be displayed in the CID.

The tire and system statuses are indicated by different colors of wheels and a text message. The following illustration shows how the different system statuses are displayed in the CID.

I01 Product Presentation

6. Chassis and Suspension Overview

I01 TPMS messages in the CID

Index	Explanation
1	Loss of pressure in one or several tires
2	Loss of pressure in all tires
3	Tire pressures within the permissible tolerance
4	Tire pressures OK
5	Tire pressures are being initialized
6	Loss of pressure in front left tire
7	TPMS dropped out

1 **All wheels orange, without tire pressure**

- The identification numbers of the tire pressure sensor are known
- The positions of the tire pressure sensor have not been taught in
- The tire pressures are not displayed
- Text message: tire pressure loss. Fill tires correctly
- Loss of pressure in one or several tires.

2 **All wheels orange, with tire pressure**
- The identification numbers of the tire pressure sensor are known
- The positions of the tire pressure sensor have been taught in
- The tire pressures are displayed
- Text message: “Tire pressure loss”. Fill tires correctly
- Loss of pressure in all tires.

3 **All wheels green, without tire pressure** (teach-in operation active)
- The identification numbers of the tire pressure sensor are known
- The positions of the tire pressure sensor have not been taught in
- Tire pressure monitoring active
- Tire pressures within the permissible tolerances.

4 **All wheels green, with tire pressure**
- The identification numbers of the tire pressure sensor are known
- The positions of the tire pressure sensor have been taught in
- Tire pressure monitoring active
- Tire pressures OK.

5 **All wheels grey** (teach-in operation active)
- The identification numbers of the tire pressure sensor are being taught in
- The positions of the tire pressure sensor are being taught in
- Text message: TPMS reset is being performed.

6 **Three wheels green, with tire pressure**
- The identification numbers of the tire pressure sensor are known
- The positions of the tire pressure sensor have been taught in
- Text message: “Tire pressure loss front left. Fill tires correctly”
- Loss of pressure in one tire.

7 **All wheels grey**
- Text message: “Tire pressure monitoring dropped out”.

When installing new tire pressure sensor IDs, an initialization must be started manually. If this initialization has not been performed, the driver will be prompted via the iDrive menu to do so once the journey has started.

Possible factors that prevent the tire pressures being displayed in the Central Information Display:

- Wheel standstill before a journey starts
- Incorrect version of tire pressure sensor
- Battery capacity depleted

- Wheel assignment of tire pressure sensor not complete
- Tire pressure sensor faulty
- Internal fault in DSC control unit.

6.3.5. Information in the instrument cluster (KOMBI)

The yellow warning light on the puncture display informs the driver about various system statuses.

I01 Yellow warning light of puncture display

If the warning light lights up continuously, this indicates that there may be problems with the tire pressure.

This could be due to one of the following causes:

- A puncture or more significant loss of pressure
- The system has not been initialized and its warning is based on the old status.

If a warning light flashes then lights up continuously this indicates a malfunction.

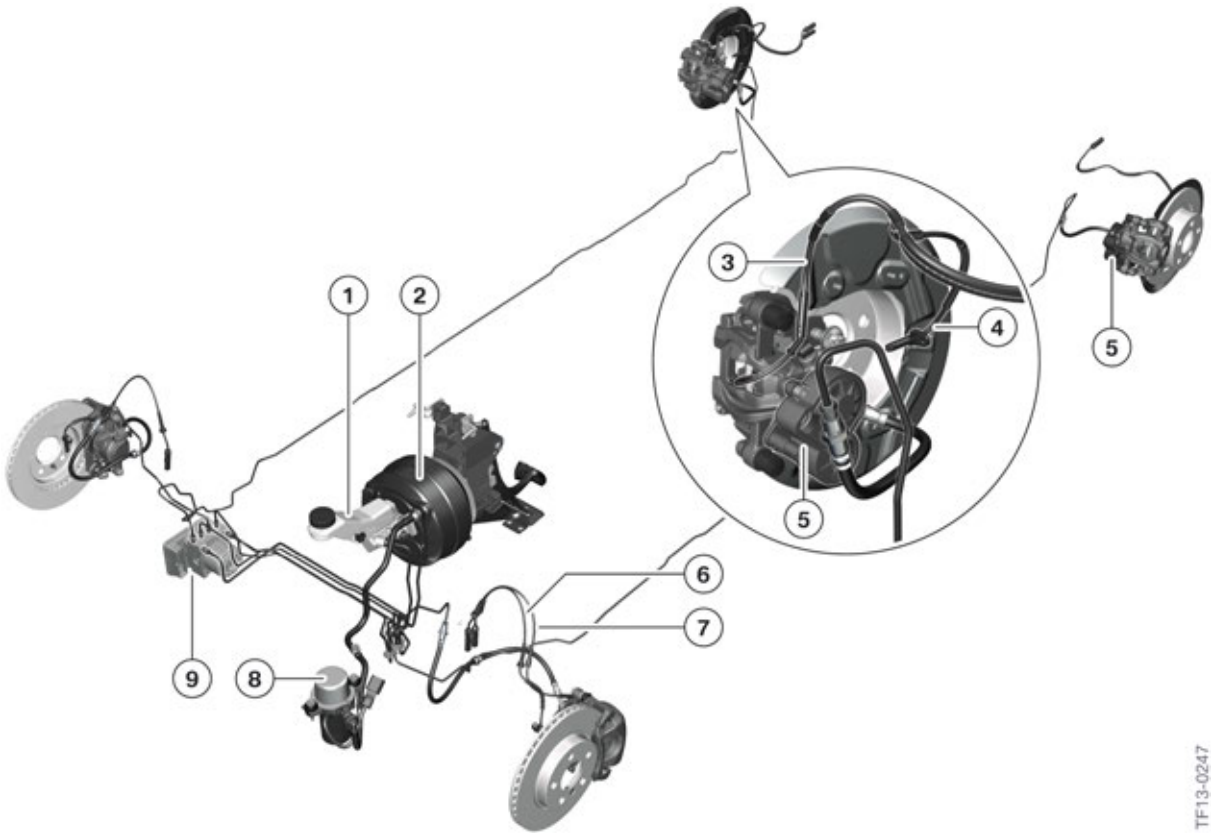
This could be due to one of the following causes:

- Wheel mounted without tire pressure sensor
- TPMS could not complete the initialization process
- Faults in transmission frequencies of tire pressure sensor.

I01 Product Presentation

6. Chassis and Suspension Overview

6.4. Brake



I01 Overview of brake system

Index	Explanation
1	Brake fluid expansion tank
2	Brake servo
3	Brake pad wear sensor, rear axle
4	Wheel speed sensor, rear axle
5	Electromechanical parking brake actuator
6	Brake pad wear sensor, front axle
7	Wheel speed sensor, front axle
8	Vacuum pump
9	Dynamic Stability Control (DSC)

By harmonizing the accelerator pedal operation with the I01, in normal operation braking decelerations of up to 1.6 m/s² can be performed purely electrically and thus wear-free via the electrical machine. When the accelerator pedal module is released, there is a noticeable deceleration by the alternator activation of the electrical machine. The energy generated is stored in the form of electrical voltage in the high-voltage battery unit. This means that the wear of the brake discs and brake pads will be extremely low, providing a “forward-thinking” driving style is adopted.

I01 Product Presentation

6. Chassis and Suspension Overview

6.5. Dynamic handling control systems

6.5.1. Dynamic traction control, DTC

I01 Activating the DTC function

Index	Explanation
1	Central information display (CID)
2	"Settings" menu
3	Dynamic Traction Control
4	Controller
5	Instrument cluster (KOMBI)
6	DSC indicator and warning light

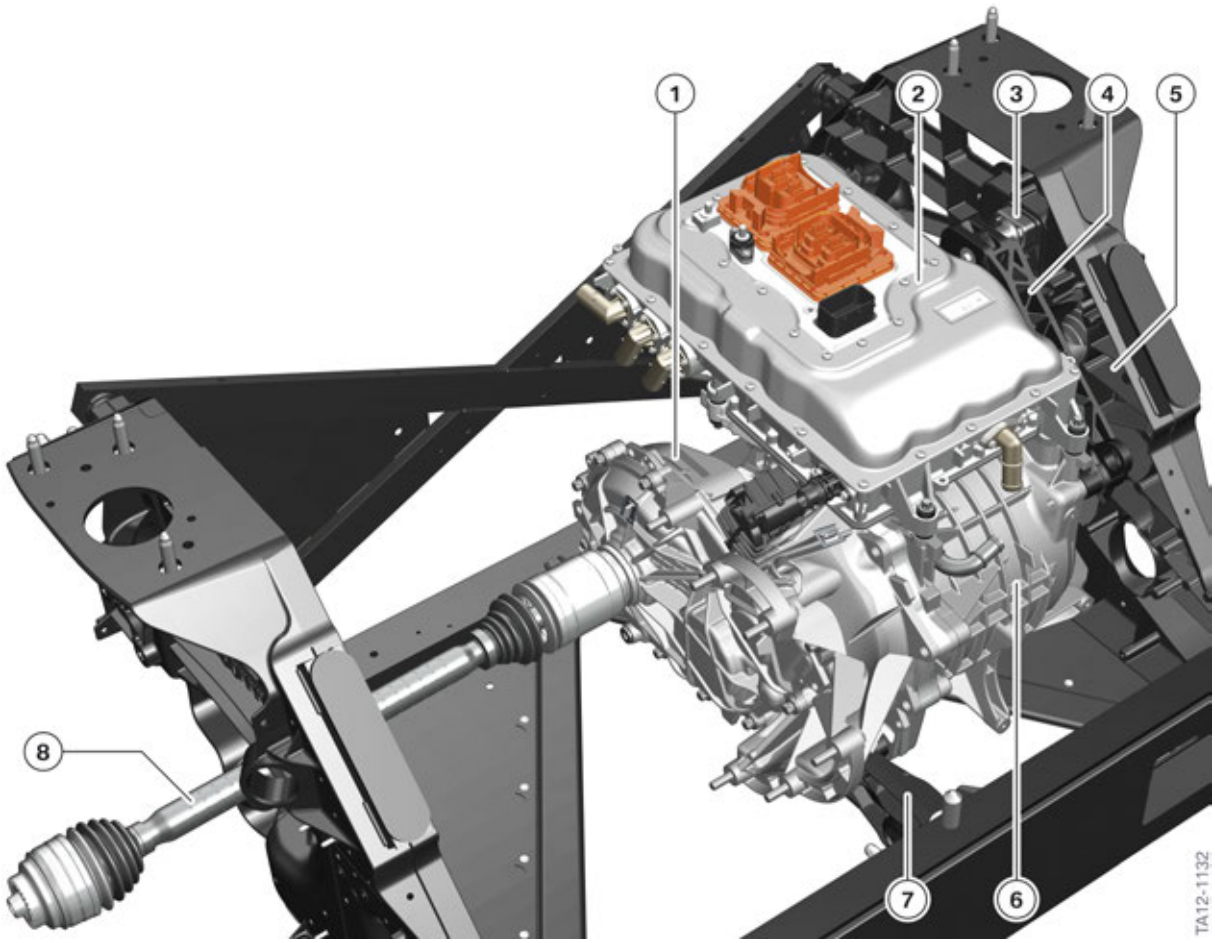
The Dynamic Traction Control cannot be activated or deactivated using a button as before, but must be selected in the central information display using the controller. The activation of the DTC is confirmed with a tick box. Then all functions of the Dynamic Traction Control are only available to a limited extent. This is shown to the driver by the DSC indicator and warning light. The DTC can be reactivated using the controller or by a terminal change.

I01 Product Presentation

7. Overview of Electric Motor

7.1. Components of the electric motor

The electrical machine, electrical machine electronics and the high-voltage battery developed by the BMW Group for the I01 are elements of the BMW eDrive technology. The BMW eDrive technology identifies all concepts which enable purely electric, and therefore emissions-free, driving and thus becomes another pillar of BMW EfficientDynamics. The components of the electric motor are shown below.

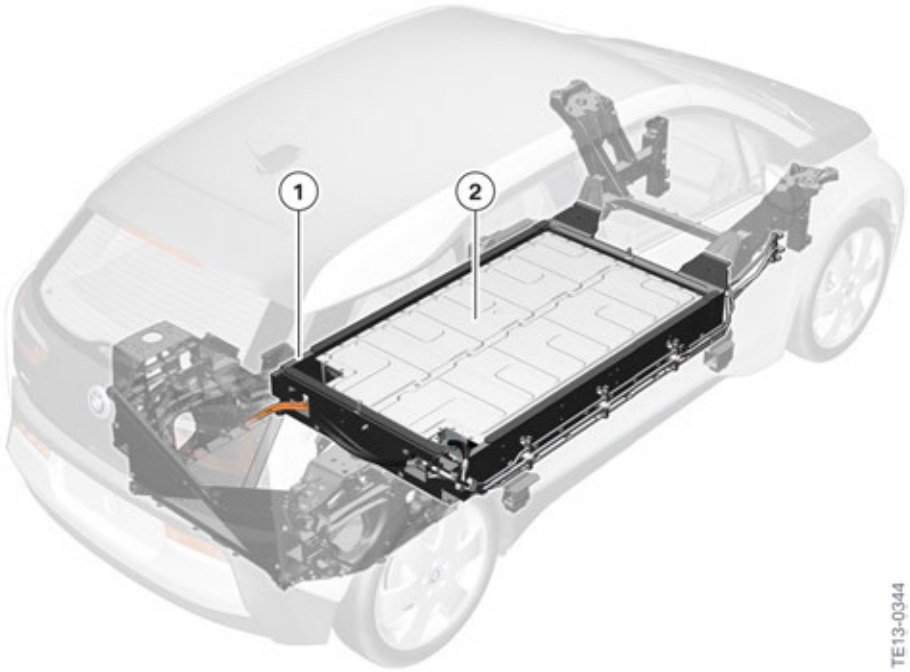


Components of the electric motor (without range extender)

Index	Explanation
1	Transmission
2	Electrical machine electronics
3	Bearing for engine support arm
4	Engine support arm
5	Rear axle module
6	Electrical machine
7	Anti-roll bar link
8	Output shaft, right

I01 Product Presentation

7. Overview of Electric Motor



Installation location of the high-voltage battery

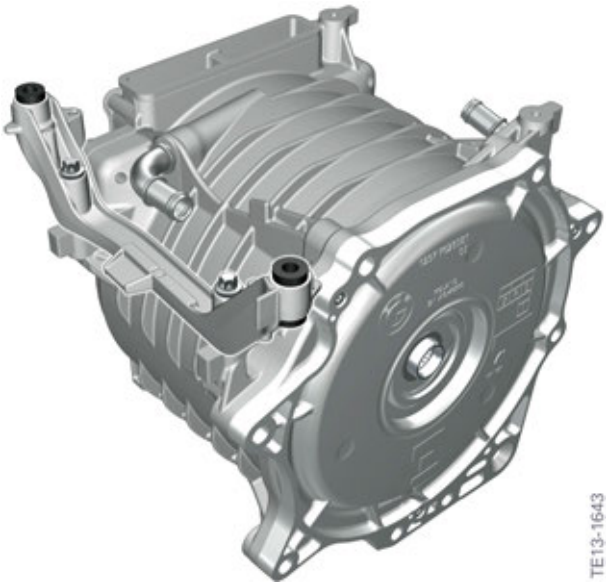
Index	Explanation
1	Aluminium frame (Drive module)
2	High-voltage battery

The I01 has the perfect package for sporty driving pleasure in urban traffic. With a DIN vehicle curb weight of 1195 kg/ 2634 lbs it is lighter than most vehicles of the compact segment and, at the same time, offers significantly more space for up to four occupants. The spurt from zero to 100 km/h / 62 mph is done in 7.2 seconds and the range of 130 to 160 kilometers 80 to 100 miles is sufficient for everyday operation to conveniently cover the mobility requirements of the target group customers.

The low and central position of the high-voltage battery benefits the agility of the vehicle and the harmonised axle load distribution in the ratio 50:50 achieved through the arrangement of all components in the Drive module. Also in terms of crash safety the high-voltage battery which is covered by aluminium sections is positioned in a particularly favorable location. The electrical machine and transmission are housed in direct proximity to the rear axle. Thanks to the rear-wheel drive the front axle remains free of drive influences.

I01 Product Presentation
7. Overview of Electric Motor

7.1.1. Electrical machine



Electric motor in the I01

In a conventional passenger car a combustion engine is used to generate the drive torque. In the I01 this task is performed by an electrical machine. The electrical machine is a so-called hybrid synchronous machine. It has a maximum power of 125 kW /170 hp and a maximum torque of 250 Nm / 184 lb-ft. The electrical machine of the I01 is significantly smaller than a combustion engine with comparable power. The electrical machine also holds advantages over the combustion engine in terms of weight. For example, while a N52 engine weighs about 160 kg /352 lbs, the electrical machine of the I01 only weighs in at roughly 49 kg /108 lbs. It is thus possible to secure the electrical machine of the I01 directly to the rear axle module. The electrical machine has a speed range of over 11,000 rpm in comparison to the combustion engine. The maximum torque of 250 Newton meters /184 lb-ft is available from the first revolution. The electrical machine can be operated not only as an engine, but also as an alternator. The electrical energy recovered from the kinetic energy of the vehicle can then be used to charge the high-voltage battery during the journey (brake energy regeneration).

7.1.2. Transmission

As the electrical machine offers a large usable engine speed range, the transmission of the I01 also only has to provide one gear, i.e. a fixed gear ratio. A combustion engine cannot deliver torque when the engine speed is zero. Unlike the electrical machine of the I01: Its high torque is already available when the engine speed is zero meaning a clutch in the transmission of the I01 is not required – not for driving off or for shifting gears.

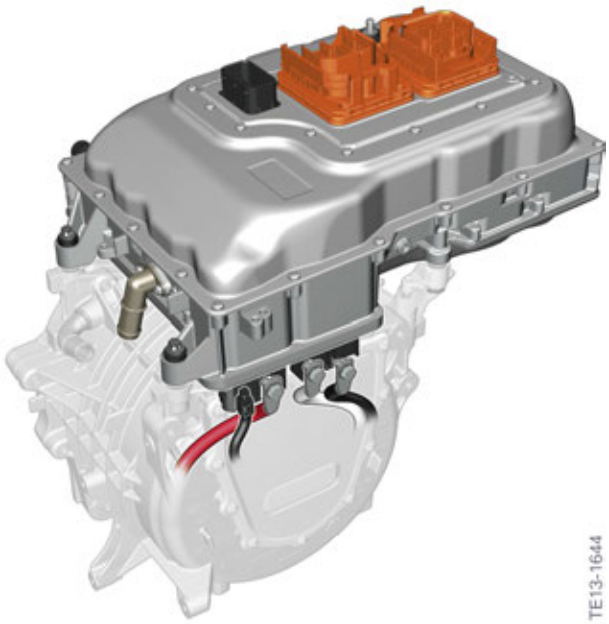
The transmission has an overall ratio of 9.7:1. The engine speed at the transmission input is 9.7 times greater than at the transmission output.

The transmission in the I01 is operated using a monostable rotary gear selector switch. The gear selector switch offers the option of selecting the familiar drive positions "P", "N", "R", "D".

The parking lock is responsible for securing the vehicle against rolling away, just like in a conventional vehicle with automatic transmission. Even on steep inclines/downhill gradients up to 32% the parking lock is able to safely hold the I01 at a standstill. Nevertheless, just like for conventional vehicles it is recommended to also secure the vehicle against rolling away using the parking brake.

The driver can engage the parking lock in the I01 using the P button at the gear selector switch. It is, however, automatically engaged and under the same conditions known from BMW vehicles with an electronic gear selector switch. For example, the parking lock is automatically engaged when it is detected that the driver has left the vehicle (driver's door open, seat belt open and the pedals not operated). In contrast to conventional vehicles, there is a further precondition, where disengaging the parking lock in the I01 is not possible: A current charging procedure. This precondition prevents the driver taking off unintentionally as long as a charging cable is connected.

7.1.3. Electrical machine electronics



Electrical machine electronics EME

The electrical machine electronics EME of the I01 is the central link between the high-voltage battery and the electrical machine. It also makes possible the voltage supply of the low-voltage vehicle electrical system from the high-voltage vehicle electrical system. The EME is installed above the electrical machine. As a result, the electrical connection between the EME and the electrical machine is very short and enables energy transmission almost without any losses. A compact, joint cooling circuit was also able to be realized thanks to the proximity of both components. The EME and the electrical machine are firmly connected. Power electronics within the EME convert the direct current voltage of the high-voltage battery to three-phase voltages for the electrical machine. Energy flow in both directions is possible. The high-voltage battery is charged during brake energy regeneration and discharged during acceleration.

The EME is also connected to the low-voltage vehicle electrical system. Via a DC/DC converter in the EME energy is transmitted from the high-voltage electrical system to the low-voltage vehicle electrical system. The DC/DC converter thus assumes the function of the alternator and supplies the low-voltage vehicle electrical system with energy.

7.1.4. High-voltage battery

The high-voltage battery unit is the energy storage device for the electric motor of the I01. It is the equivalent to the fuel tank of a conventional vehicle with a combustion engine. Also in BMW active hybrid vehicles there is already a high-voltage battery unit, which supplies the electric motor with energy. In the BMW active hybrid the high-voltage battery is charged when the electrical machine is operated as an alternator. This happens during brake energy regeneration or by a load point increase of the combustion engine. In the I01 the high-voltage battery can also be partially charged during brake energy regeneration. However, it is mainly charged using energy from an external power network. An optional range extender can also provide electrical energy using a gasoline engine and another electrical machine. However, this is primarily used for maintaining the state of charge when the high-voltage battery is already heavily discharged. The range of the I01 can be increased.

The battery cells used in the high-voltage battery of the I01 are **lithium-ion batteries**. The battery cells are supplied by the Samsung SDI to the BMW plant in Dingolfing. There the cell modules are assembled from the battery cells and mounted into complete high-voltage battery units with the other components.

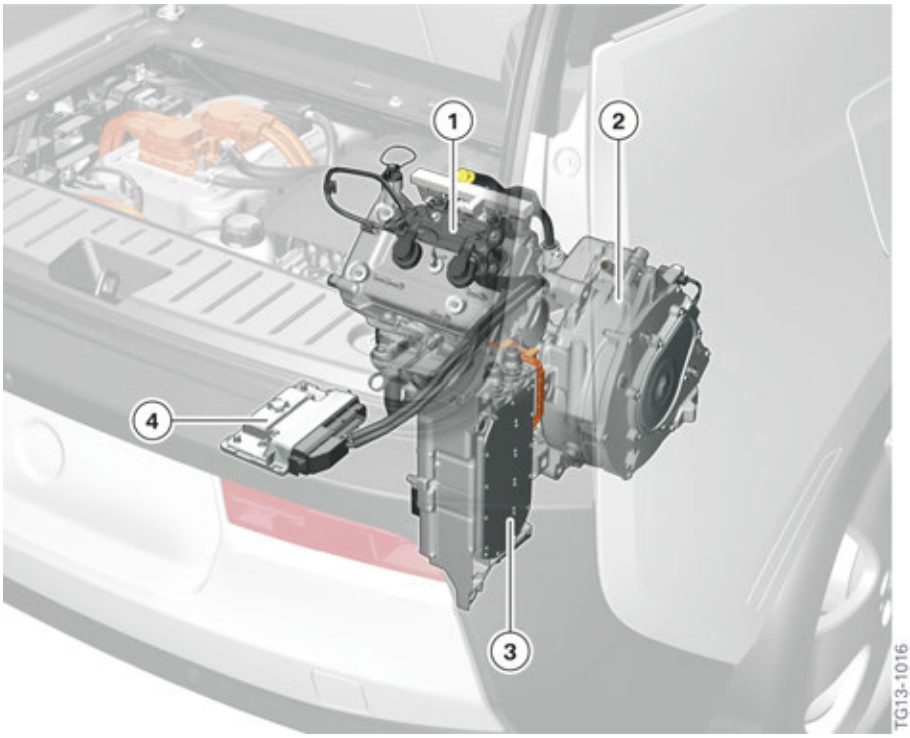
7.2. Role and components of the range extender

The I01 is equipped with a purely electrical drive system. The energy required to operate the electrical machine is stored in the high-voltage battery. As a result, the range is restricted. As soon as the state of charge of the battery reaches a critical level 6.5%, the range extender ensures enough energy is available to reach the destination. The range extender is therefore only started by the vehicle electronics if required. The 2-cylinder engine is a small, very smooth and quiet gasoline engine, which powers a range extender electrical machine and thus delivers the necessary energy for the onward journey. As a result, the state of charge of the battery can be kept constant so that the vehicle can continue to drive using the electrical machine. The range of the vehicle can thus be extended. In order to realize the lowest possible fuel consumption and thus reduce CO_2 emissions, the gasoline engine also has an automatic start-stop function and other intelligent operating strategies.

The key components which are also installed in the I01 with range extender are shown in the following graphic.

I01 Product Presentation

7. Overview of Electric Motor



I01 installation location of components of range extender

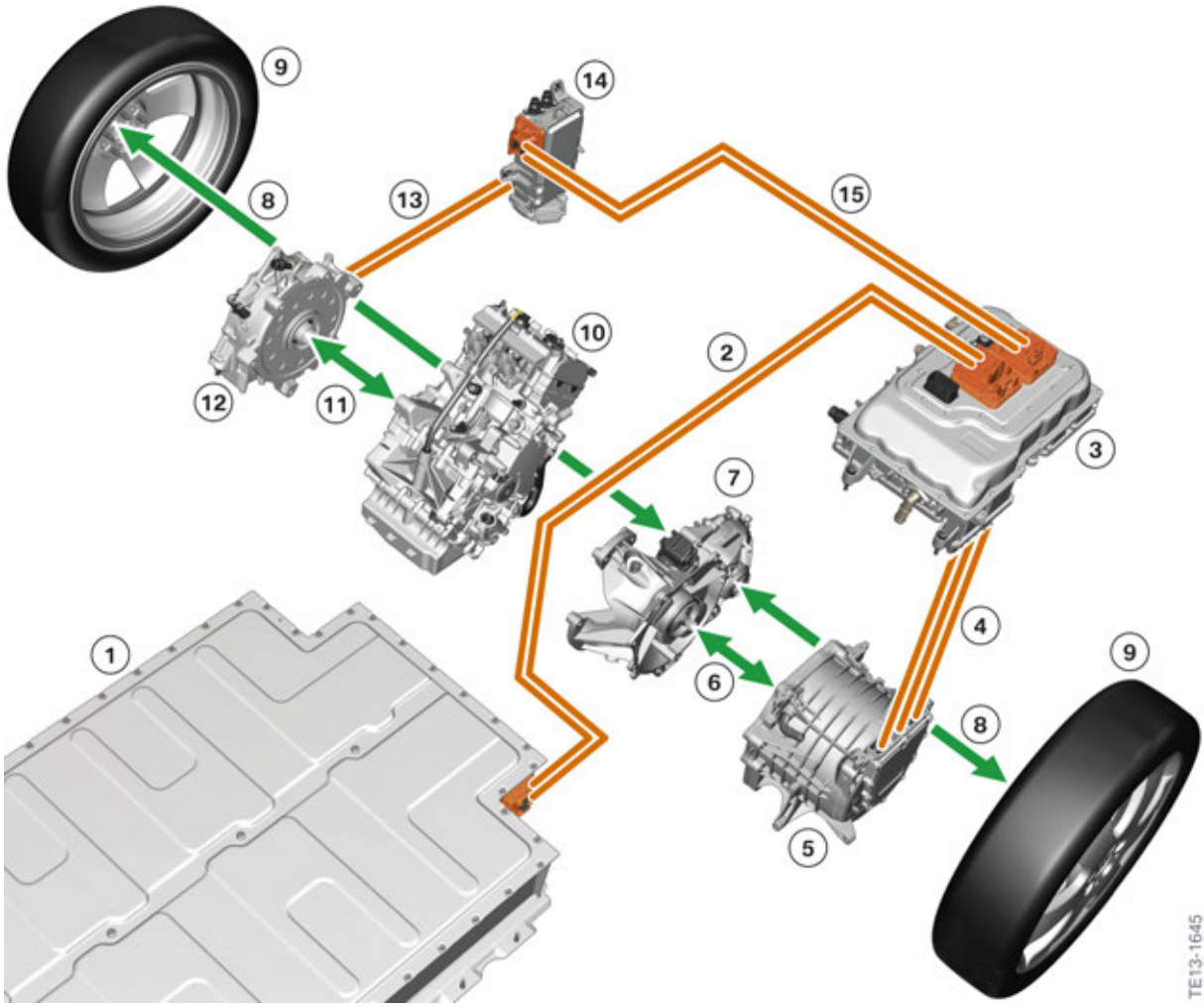
Index	Explanation
1	Range extender, combustion engine
2	Range extender electrical machine
3	Range Extender Electrical Machine Electronics (REME)
4	Range Extender Digital Engine Electronics (RDME)

7.3. Power transmission

The energy/power flow between the individual drive components is shown in the following graphic.

I01 Product Presentation

7. Overview of Electric Motor



Energy/Power flow in the I01

Index	Explanation
1	High-voltage battery
2	Energy flow (electrical) via the two-pin high-voltage cable in both directions
3	Electrical machine electronics
4	Energy flow (electrical) via the three-phase high-voltage cable in both directions
5	Electrical machine
6	Power flow (mechanical) from the electrical machine to the transmission and vice versa
7	Transmission
8	Power flow (mechanical) from the transmission via the output shafts to the rear wheels and vice versa
9	Rear wheels
10	W20 Combustion engine

I01 Product Presentation

7. Overview of Electric Motor

Index	Explanation
11	Power flow (mechanical) from the combustion engine to the range extender electrical machine in both directions
12	Range extender electrical machine
13	Energy flow (electrical) via the three-phase high-voltage cable in both directions
14	Range Extender Electrical Machine Electronics
15	Energy flow (electrical) via the two-pin high-voltage cable in both directions

7.4. Operating strategy of the electric motor

The operating strategy has the task of maximizing the service life of the high-voltage battery and protecting it against damage during operation. All customer requirements when driving and during charging should also be fulfilled. The behavior of the electric motor in the event of a fault is also an element of the operating strategy. The EDME is the master control unit for the operating strategy.

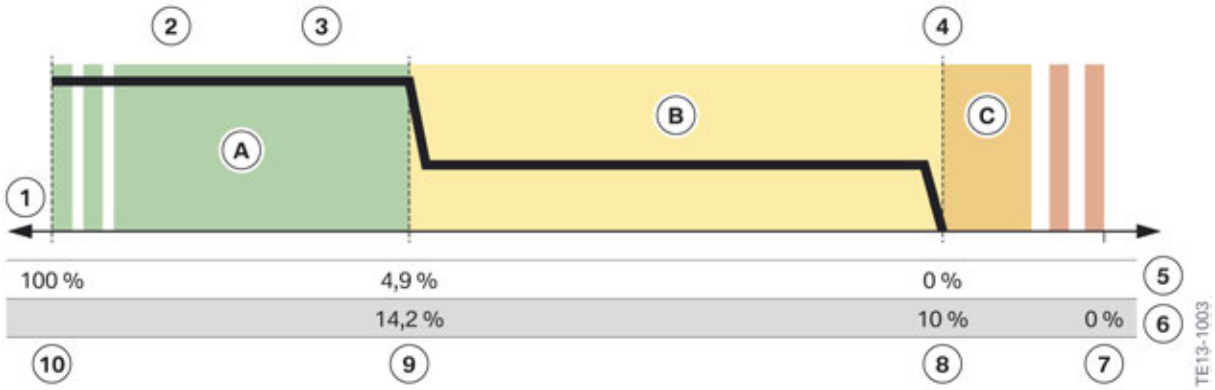


Diagram for the operating strategy of a I01 without range extender

Index	Explanation
A	Range in which driving without restrictions is possible
B	Range in which driving with restricted drive power takes place
C	Range in which driving is not possible
1	Calculated state of charge of the high-voltage battery (State of Charge = SOC)
2	Warning for range of 20 km / 12 mph
3	Warning for range of 10 km / 6 mph
4	Warning for range of less than 1 km / .6 mph
5	Axis for relative SOC values
6	Axis for absolute SOC values

Index	Explanation
7	SOC of the high-voltage battery 0% absolute
8	SOC of the high-voltage battery 10% absolute, or 0% relative
9	SOC of the high-voltage battery 14.2% absolute, or 4.9 % relative
10	SOC of the high-voltage battery 100% relative

In the diagram the relative and the absolute state of charge values (SOC values) of the high-voltage battery are shown. The absolute values correspond to the actual state of charge of the high-voltage battery. The relative SOC values are the values which are displayed to the driver in the instrument cluster or in the central information display. In range "A" driving without power restriction and full functionality of the convenience functions are available. If the SOC value of the high-voltage battery drops to about 5%, the Check Control messages for ranges between 20 km / 12 mph and 10 km / 6 mph are issued.

In range "B" the performance of the drive train is reduced due to the low state of charge of the high-voltage battery. The heating and air-conditioning system is switched off here.

If the absolute SOC value falls below 10%, driving the vehicle is no longer possible. The reserve of 10% is required to give the customer adequate time to charge the high-voltage battery and prevent deep discharge.

7.5. Operating strategy of the range extender in the I01

7.5.1. Overview

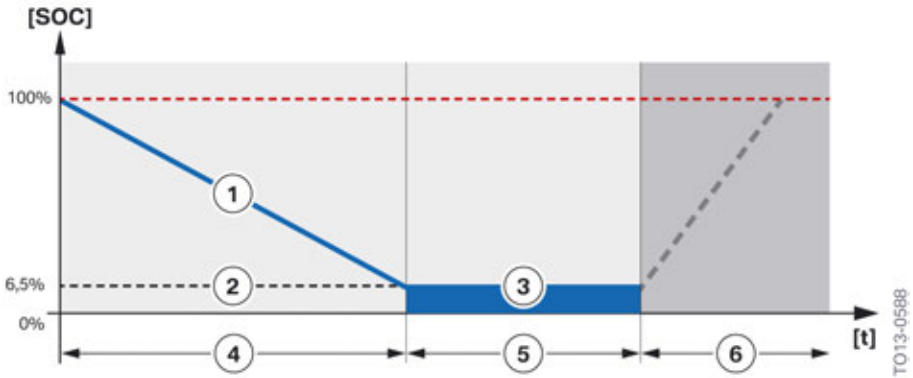
The optional range extender powers a range extender electrical machine, where current is supplied to the high-voltage intermediate circuit. Depending on requirements the current flows directly to the motor of the electrical machine or to the high-voltage battery unit. The aim is to keep the state of charge (SOC) at a constant level.

The operating strategy of the range extender in the I01 is shown in the following graphic. The available power and thus the state of charge of the high-voltage battery is defined between 0 and 100 %. It is important to note that these are relative values and not absolute values. When driving without a combustion engine (4) the energy required is taken from the high-voltage battery. The state of charge (1) drops continuously and reaches the switch-on threshold (2). The combustion engine is now started and powers the range extender electrical machine. Depending on the driving style it is now possible to keep the state of charge of the high-voltage battery constant or even increase it (3). If the state of charge rises again above the switch-on threshold (2), the combustion engine is switched off.

The driving style has a direct influence on the discharge of the high-voltage battery and thus also on the range. A comparison of the performance data at full load should highlight this:

- 25 kW mechanical output power of the combustion engine
- 23.5 kW electrical output power of the alternator
- 125 kW power diversion by the electrical machine.

Using this example at full load it is clear that this driving style leads to a further drop in the state of charge of the high-voltage battery. The output power of the combustion engine and thus the range extender electrical machine is not sufficient to keep the state of charge of the high-voltage battery constant.



I01 operating strategy with range extender

Index	Explanation
1	State of charge of the high-voltage battery
2	Switch-on threshold, SOC 6.5% relative
3	Internal combustion engine running, SOC 6.5 - 0 % relative
4	Electrical driving without combustion engine
5	Electrical driving with combustion engine
6	Charging, external

7.5.2. Automatic engine start/stop function

The combustion engine also has an automatic engine start-stop function. To activate the automatic engine start-stop function the presence of the driver must be detected using the seat belt and door contact. As long as the seat belt is inserted and the door is closed, the driver is considered present and the range extender is operated with automatic engine start-stop function.

The combustion engine is switched off under the following conditions:

- SOC 3.5 - 6.5%
- Speed < 10 km/h / 6 mph.

If the speed of the vehicle is greater than 20 km/h / 12 mph, the combustion engine is restarted.

During the warm-up phase of the combustion engine or if the state of charge drops below 3.5% the automatic engine start-stop function is deactivated.

7.5.3. Automatic service

After a period of roughly eight weeks the combustion engine is automatically started. An automatic start is required to guarantee the operational reliability of the range extender.

The process is indicated to the driver via a Check Control message during driving. The duration of the engine running is dependent on the starting temperature of the combustion engine. The driver is informed about the duration of the service via a time bar in the central information display. If the service of the range extender is carried out at an unfavorable time, this can be stopped by pressing the START-STOP button.

The following prerequisite must be satisfied so that the combustion engine is started:

- State of charge of the high-voltage battery < 75%
- Fuel tank content > 0.8 l
- No fault code entry in the RDME control unit.

7.6. Refueling with range extender

For the operation of the range extender the vehicle is equipped with a pressurized fuel tank made from stainless steel. As a result during purely electric driving it is guaranteed that the gasoline fumes remain in the pressurized fuel tank. Only through the operation with range extender are the gasoline fumes directed via the purge air line and the tank vent valve to the differentiated air intake system and thus into the combustion chamber of the engine.

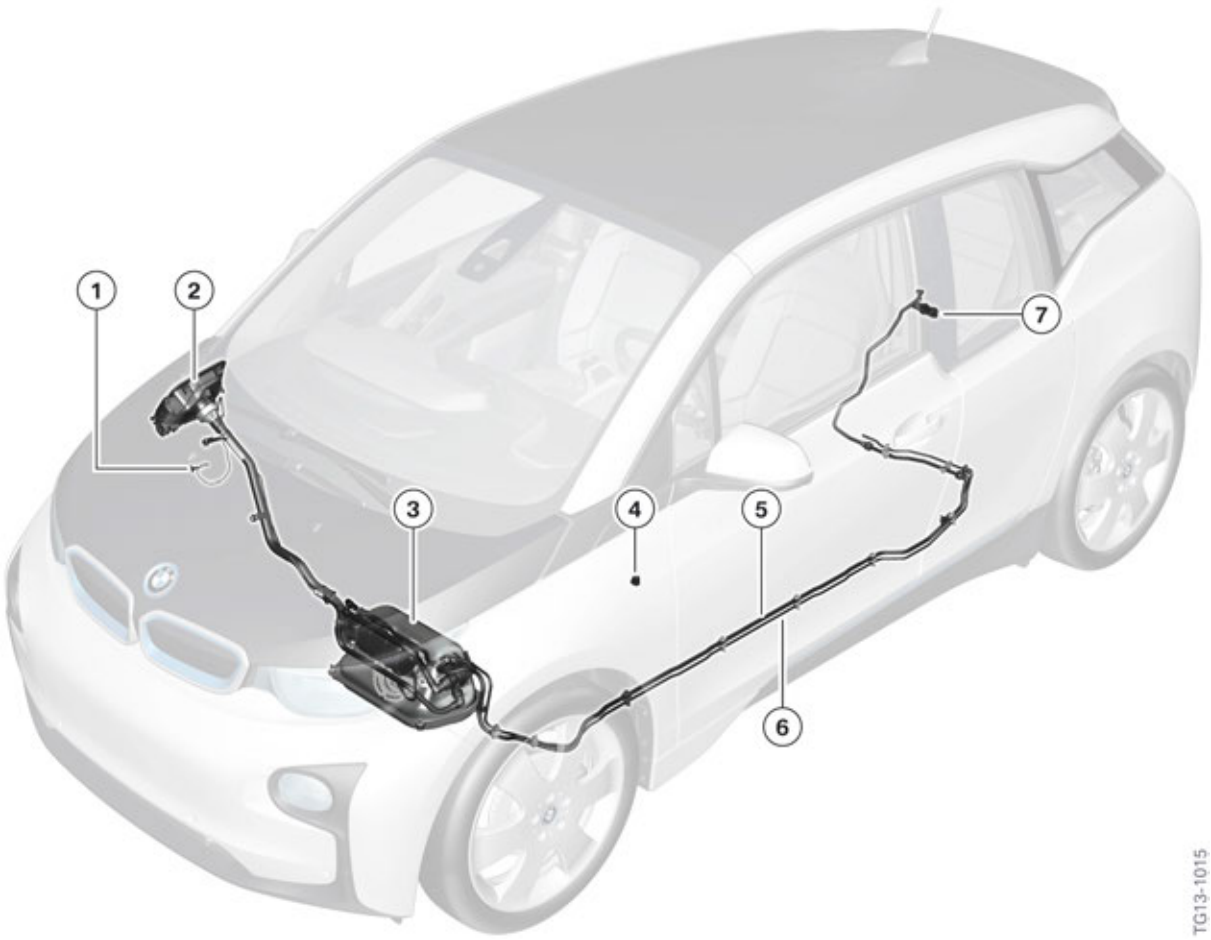
The pressurized fuel tank must be bled for refuelling. The refueling request is indicated by operating the button for refueling at the A-pillar. The hybrid pressure refueling electronic control unit TFE monitors the current operating condition via a pressure temperature sensor in the fuel tank and then controls the pressure reduction by opening a valve. The actuator drive for locking the fuel filler flap is activated and the fuel filler flap with fuel filler cap can be opened manually.

At the same time, the driver receives the status of the tank readiness displayed in the instrument cluster and in the central information display. If the fuel filler flap is not opened within 10 minutes after the fuel filler cap has been released, it is automatically locked again.

After the refueling procedure and the closing of the fuel filler cap the fuel filler flap is automatically locked again. The displays in the instrument cluster and central information display are removed.

I01 Product Presentation

7. Overview of Electric Motor



I01 components of the fuel system

Index	Explanation
1	Emergency operation of the fuel filler flap
2	Fuel filler flap with electrical lock
3	Stainless steel pressurized fuel tank
4	Fuel tank button
5	Purge air line
6	Feed line
7	Tank vent valve

No charging and refueling at the same time! When the charging cable is inserted do not initiate a refueling procedure and keep a safe distance from highly flammable materials. Otherwise, in the event of incorrect connection or removal of the charging cable there is a risk of personal injury or material damage by burning fuel for example.

I01 Product Presentation

8. Charging the High-voltage Battery

8.1. Introduction

The "charging" procedure for an electric vehicle corresponds to "refuelling" a conventionally driven vehicle. Accordingly, in this chapter "charging" means:

- Charging the high-voltage battery in the vehicle
- while at standstill (not through brake energy regeneration)
- by supply of electrical energy
- which is provided by an AC voltage network outside the vehicle
- and is fed to the vehicle via a charging cable.

As a charging cable is used, one also refers to conductive (grid-bound) charging. The inductive charging is not possible with the I01. It is still undergoing research and development.

Components inside and outside the vehicle are required for charging. In the vehicle a charging socket and power electronics are required for the voltage conversion. Outside the vehicle a device which performs the protection and control functions is needed, in addition to the AC voltage network and a charging cable. This device is called an "Electric Vehicle Supply Equipment (EVSE)" in the standards and in development. The following graphic shows the components for the charging of the high-voltage battery inside and outside the electric vehicle and compares them to the components needed for refueling in a conventional vehicle.

Components for refueling the vehicle and charging the high-voltage battery

Index	Refueling the vehicle	Charging the high-voltage battery
1	Filling station	AC voltage network
2	Gasoline pump	Electric Vehicle Supply Equipment (e.g. wallbox)
3	Fuel line between fuel pump nozzle and gasoline pump	Charging cable
4	Fuel pump nozzle	Vehicle connector at charging cable
5	Fuel filler neck	Charging socket
6	-	Power electronics
7	Fuel tank	High-voltage battery

I01 Product Presentation

8. Charging the High-voltage Battery

The Electric Vehicle Supply Equipment can either be integrated in the charging cable or be an element of a fixed charging station (also called "wallbox"). The EVSE establishes the connection to the AC voltage network and serves for the fulfilment of requirements for electrical safety when charging the vehicle. Communication to the vehicle can also be set up via the so-called pilot line. As a result, it is possible to safely start the charging procedure and exchange the charging parameters (e.g. maximum current level) between vehicle and EVSE.

The voltage of the AC voltage network can be in the range of 110 V to 240 V. It is fed to the vehicle via a single-phase supply. From the AC voltage network side, in theory a maximum charging power of $P_{max} = U_{max} \times I_{max} = 240\ V \times 32\ A = 7.7\ kW$ is possible.

Many of the components mentioned for charging the I01 are standardized in terms of their structure and functions. The components for charging the I01 satisfy charging mode 2 (connection to standard household socket with additional pilot line) and charging mode 3 (connection to fixed wallbox with pilot line). The standard valid for America is SAE J1772. Charge Level 1 and 2 are comparable to charging modes 2 and 3. Most components for charging the I01 only satisfy both standards with one technical version. A national-market or standard-specific version is required for Europe and America only by the "Electric Vehicle Supply Equipment".

For the employees in BMW Service the following important safety rules must be observed in relation to charging:

Refueling the vehicle while the high-voltage battery is charging is not permitted!

When the charging cable is inserted do not initiate a refueling procedure and keep a safe distance from highly flammable materials. Otherwise, in the event of incorrect connection or removal of the charging cable there is a risk of personal injury or material damage by burning fuel for example.

While the I01 is connected to the AC voltage network for charging, no work may be performed at the high-voltage system.

During the charging procedure the electric coolant pump and the electric fan can be switched on automatically for cooling the power electronics. This is why no work can be performed at the cooling system of the electric motor and at the electric fan when a charging cable is connected to the I01.

Work at the charging cable, at the Electric Vehicle Supply Equipment, at household sockets or charging stations can only be performed by qualified electricians, and **not** by BMW Service employees without this additional qualification.

I01 Product Presentation

8. Charging the High-voltage Battery

8.2. Charging plug

In general, the high-voltage battery can either be charged using alternating current (AC charging) or direct current (DC charging). The charging options of the high-voltage battery in the I01 are generally specified by the equipment for charging in the vehicle, as well as the national-market charging infrastructure.

The charging plugs used are also standardized (IEC 62196-2). Depending on the vehicle equipment two different charging sockets in the US are used.

	USA (Type 1)
AC charging	 SAE J1772 / IEC 62196–2
Combo charging plug (DC charging) option 4U7	 SAE J1772 / IEC 62196–3 Combo 1

8.3. Electric Vehicle Supply Equipment

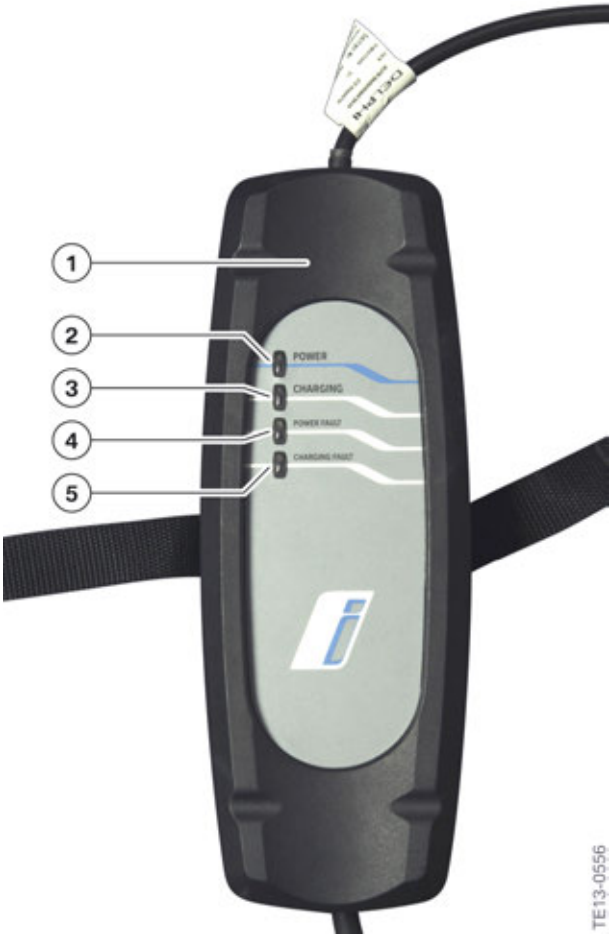
The EVSE establishes the connection to the AC voltage network and serves for the fulfilment of requirements for electrical safety when charging the vehicle. Communication to the vehicle can also be set up via the so-called pilot line. As a result, it is possible to safely start the charging procedure and exchange the charging parameters (e.g. maximum current level) between vehicle and EVSE. The EVSE can either be integrated in the charging cable (mobile solution) or be an element of a fixed charging station (also called "wallbox").

In both cases the EVSE contains the following subcomponents:

- Ground leakage circuit breaker (FI)
- Display whether the AC voltage network is connected and available
- Electronic disconnect switch for phase (L1) and neutral conductor (N)
- Electronic switching for generating the pilot signal
- Continuous protective earth (PE).

8.3.1. Mobile solution

The version integrated in the charging cable is also called "In-Cable box" and is designed for mobile use. The volume and weight of this solution are low and the charging cable and EVSE can be easily transported in the vehicle.



EVSE for mobile use

Index	Explanation
1	BMW i mobile EVSE
2	Display for the availability of the voltage supply
3	Display for charging
4	Display for fault in the voltage supply
5	Display for fault during charging

As a household power socket is used for the connection of this EVSE to the AV voltage network, the maximum current level is restricted for charging. A product of this kind offered for the AC voltage up to a charging power of 3.7 kW. The duration until a fully discharged high-voltage battery of the I01 is fully charged up again (18.8 kWh net) would be roughly 8–10 hours in optimal conditions.

Please consult the operating instructions of the respective manufacturer for the operation and use of a charging cable with an integrated EVSE.

Employees in BMW Service cannot perform any maintenance or repair work on the charging cable or the EVSE. In the event of a defect with or a malfunction of the charging cable or the EVSE, the manufacturer must be contacted.

8.3.2. Fixed charging station

This version of the Electric Vehicle Supply Equipment must be installed permanently owing to its size and electrical requirements, e.g. at the house or in the customer's garage. Such a charging station can also be built at public places, e.g. car parks.

The installation, maintenance and repair of fixed charging stations can only be performed by suitably qualified electricians. Employees in BMW Service are not authorized to perform this work as they generally do not have this training.

For the fixed charging stations (also called "wallbox") a distinction is made between AC charging stations and DC charging stations.

AC charging stations

The connection of the AC charging stations to the AC voltage network can be done via a two-phase (USA) supply – the connection to the I01 is, however, always designed as a single-phase supply. In comparison to the mobile solution, a maximum current level of 32 A or a maximum charging power of 7.4 kW is possible. These maximum values are, however, still dependent on the size of the line cross-section, which was used in the electrical installation at the erection site. The electrician configures the charging station during installation according to the line cross-section so that the applicable maximum current level is transmitted to the vehicle using the pilot signal.

AC charging stations from other manufacturers or the versions for other countries may differ from the versions shown up to now. The following graphic shows an AC charging station for the US market.

I01 Product Presentation

8. Charging the High-voltage Battery

AC charging station for the US market, manufactured by AeroVironment

Index	Explanation
1	Display of the operating condition
2	Button for starting and stopping the charging procedure
3	Charging cable with connector for the connection at the vehicle (stored in the AC charging station)

In the USA a plug connection between the charging cable and AC charging station is not permitted. This is why the charging cable cannot be separated from the AC charging station for the customer.

DC charging station

I01 Product Presentation

8. Charging the High-voltage Battery

DC charging station

The DC charging is optional on all I01 vehicles with the option code 4U7. DC charging stations form the second group of the fixed charging stations. In comparison to the AC charging station, the AC voltage is already converted to direct current in the DC charging station. Therefore, power electronics for the conversion of the AC voltage to direct current voltage in the electric vehicle are not required.

As the weight of the power electronics in the DC charging station plays a minor role, large transformers and a rectifier can be installed there to use the full network power. For this reason, DC charging stations generally deliver a much higher charging power than AC charging stations. Using a DC charging station the high-voltage battery can thus be charged much quicker.

8.4. Charging status display.

A C-shaped fibre-optic conductor runs around the charging socket at the vehicle and is illuminated using two LEDs. With this C-shaped fibre-optic conductor it is possible to show the status for charging. At the same time, this fibre-optic conductor is used as locator lighting for the charging socket.

I01 Product Presentation

8. Charging the High-voltage Battery

Locator lighting:
The locator lighting of the charging socket is used as an orientation aid by the driver for the connection and disconnection of the charging plug.
The two LEDs light up in white as soon as the charging socket cover has been opened. The locator lighting remains switched on as long as the bus systems are active. As soon as a charging plug has been identified as correctly connected, the locator lighting is switched off and the initialization status is displayed.

Initialization:
The initialization starts immediately after the correct connection of the charging plug. The initialization phase takes up to 10 seconds.
The LEDs flash in an orange color at a frequency of 1 Hz.
After successful initialization the charging of the high-voltage battery can be started.

Charging active:
The currently active charging procedure of the high-voltage battery is displayed by flashing blue LEDs. The flashing frequency is about 1.42 Hz.
Charging interval:
Charging interval or charging readiness present when the initialization phase was completed successfully and the charging start is sometime in the future (e.g.: charging at a less expensive time).

Charging complete:
The state of charge of the high-voltage battery "fully charged" is indicated by permanently green LEDs.

Fault during charging:
If faults occur during the charging procedure, then this status is displayed by flashing red LEDs. The LEDs flash three times at a frequency of about 2 Hz and an interval of about 0.8 seconds between the three groups.

The LEDs for these displays are activated after the charging plug is connected or after unlocking/locking the vehicle for 12 seconds. If during this time the vehicle is unlocked/locked again, the display lasts for another 12 seconds.

8.5. Charging in Service mode

The "Charging Data Information System" (CDIS) is a system developed especially for the requirements of BMW i. It supports the user in the dealer organization to be able to better plan and control the charging of electric vehicles. It has two essential functions:

- Charging Time Calculator (CTC),
  which allows an estimation of the charging time until the state of charge desired by the customer is reached. The calculated charging time can be taken into consideration directly during scheduling and ensures exact and reliable appointments.
- the State of Charge Monitoring (SoCM),
  which shows the current state of charge of all BMW i vehicles in operation in an overview and draws attention to possible problems such as charging interruptions. As a result, the satisfaction of the charging request by the customer can be provided without timely manual control at the vehicle, thereby creating an efficient process for charging high-voltage batteries.

I01 Product Presentation

8. Charging the High-voltage Battery

The CDIS application can be started at the beginning via DCSnet and later directly from ISPA Light and ISPA Client using the corresponding buttons. A prerequisite for the usage in all cases is a BMW i contract.

The Service Advisors of the BMW i Service dealerships are trained accordingly for this application.

I01 Product Presentation

9. Maintenance

9.1. Service

An intelligent service already starts in the vehicle. This is why the maintenance system Condition Based Service (CBS) is also used in the I01. The instrument cluster automatically provides information in advance about what servicing must be performed.

9.2. Maintenance work for range extender

As the combustion engine in the I01 is not permanently used, the servicing is reduced to a minimum. In the US market version a change of the engine oil with filter is only required after a time interval of 10,000 miles/12 months.

During an oil change care should be exercised to ensure no oil is spilled when filling. A suitable funnel must be used. The repair instructions must be followed.

Only use a flat bed to transport vehicle is vehicle is not able to move on its own power.

Pushing vehicle at walking speed for short distances is permitted.

No fast mobile charging is permitted.

I01 Product Presentation

10. Assessing the vehicle after an accident

It is necessary to assess this vehicle to further process the vehicle involved in an accident. No more than four weeks should be left between the identification of intrinsic safety of the I01 and the evaluation of the high-voltage battery. After this period the intrinsic safety check must be performed again. The responsibility for the observance of this deadline, as well as the observance of intrinsic safety during this period, lies with the qualified individual.

This chapter describes the main procedure in order to identify the intrinsic safety of vehicles involved in an accident. How this measure must be performed in detail depends on the individual situation locally and is not an element of this chapter. These procedures must be defined according to local regulations/laws and included in the locally applicable work instructions.

Note the following repair instructions:

- 61 00 ... "Safety information when handling electric/hybrid cars"
- 61 25 ... "Visual inspection of high-voltage battery unit after accident"
- 61 25 ... "Assessment of the suitability for transportation of the high-voltage battery unit in Service workshops".

The analysis and assessment of the vehicle must be performed by e-mobilty expert (a person that has been certified by the BMW Technical Training department to work on BMW ActiveHybrid and Electric vehicles). The e-mobility certification allows that person to work only on **de-energized** high-voltage system. This is ultimately the responsibility of the qualified individual.

10.1. Electrical assessment

The electrical assessment of the high-voltage battery unit is done using a diagnosis and procedure.

Disconnect the high-voltage system from the supply!

Then answer the following questions:

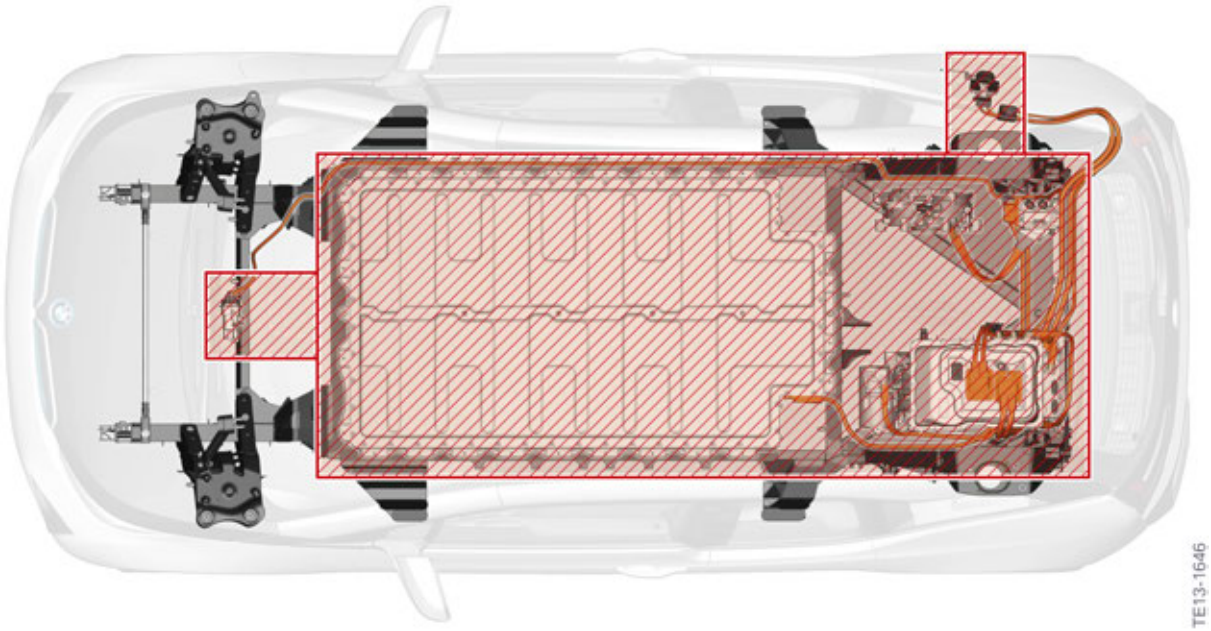
A de-energized state could not be identified.	yes	no
Intrinsic safety not met according to diagnosis or procedure	yes	no

I01 Product Presentation

10. Assessing the vehicle after an accident

10.2. Visual assessment

For the visual assessment of the vehicle involved in an accident it is important to identify the deformation depth. The deformation depth was not defined at the time of the editorial deadline. The graphic with the penetration depth can be found later on in the ASAP portal. The following graphic only shows the rough area which cannot be deformed (area shaded in red).



Area that cannot be deformed

Smoke formation?	yes	no
Are there scorch marks on the vehicle?	yes	no
Suspected water damage including water used for firefighting (vehicle and high-voltage battery unit)	yes	no
Does the vehicle have mechanical damage in the area of the red shaded area? (see graphic above)	yes	no
Crack or opening at the housing of the high-voltage battery unit	yes	no
Dents in the housing, deformations, changes (scratch marks up to 0.5 mm deep or 5 cm long are allowed) to the high-voltage battery unit	yes	no
Connections of the high-voltage battery unit loose or damaged	yes	no
High-voltage cables dangling freely from the vehicle.	yes	no

I01 Product Presentation

10. Assessing the vehicle after an accident

The result of the electrical and visual assessment must be recorded in writing!

If one or several points are answered with yes, the further course of action must be clarified with Technical Support! The vehicle must also be locked and restricted using barrier tape.

If all points are answered with no, the vehicle is intrinsically safe. Here the vehicle can be repaired in a normal workshop process (for intrinsically safe vehicles).

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