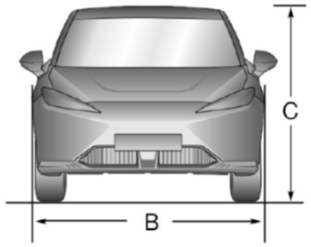
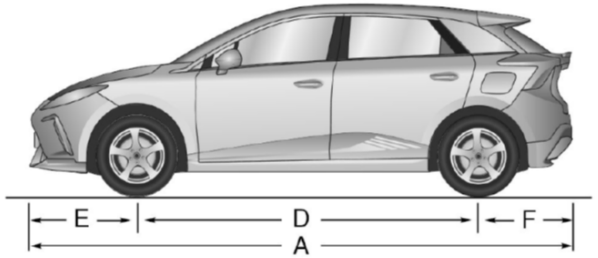
Technical Data Dimensions





Item, Units	Parameters
Overall length A，mm	4287
Overall width B，mm	1836
Overall height C (unladen), mm	1504
Wheelbase D，mm	2705
Front overhang E，mm	841
Rear overhang F, mm	741

Recommended Fluids & Capacities

Name	Grade	Capacity (L)
EDS coolant，L	Glycol（OAT）	5.6
ESS coolant，L	Glycol（OAT）	4.0
EDU Transmission oil，L	Shell E-Fluids E6 iX (SL2808)	0.75
Brake fluid，L	DOT 4	0.8
Washer fluid，L	ZY-VIII	2.5
AC refrigerant，g (heat pump)	R1234yf	660±20
AC refrigerant，g (non heat pump)	R1234yf	580±20

Wheel Alignment Parameter Table

Item		Parameter
Front	Camber angle	-35′±45′
	Castor angle	4°01′±45′
	Toe-in angle（total）	8′±15′
	King pin inclination	12°04′±45′
Rear	Camber angle	-1°15′±45′
	Toe-in angle（total）	24′±20′

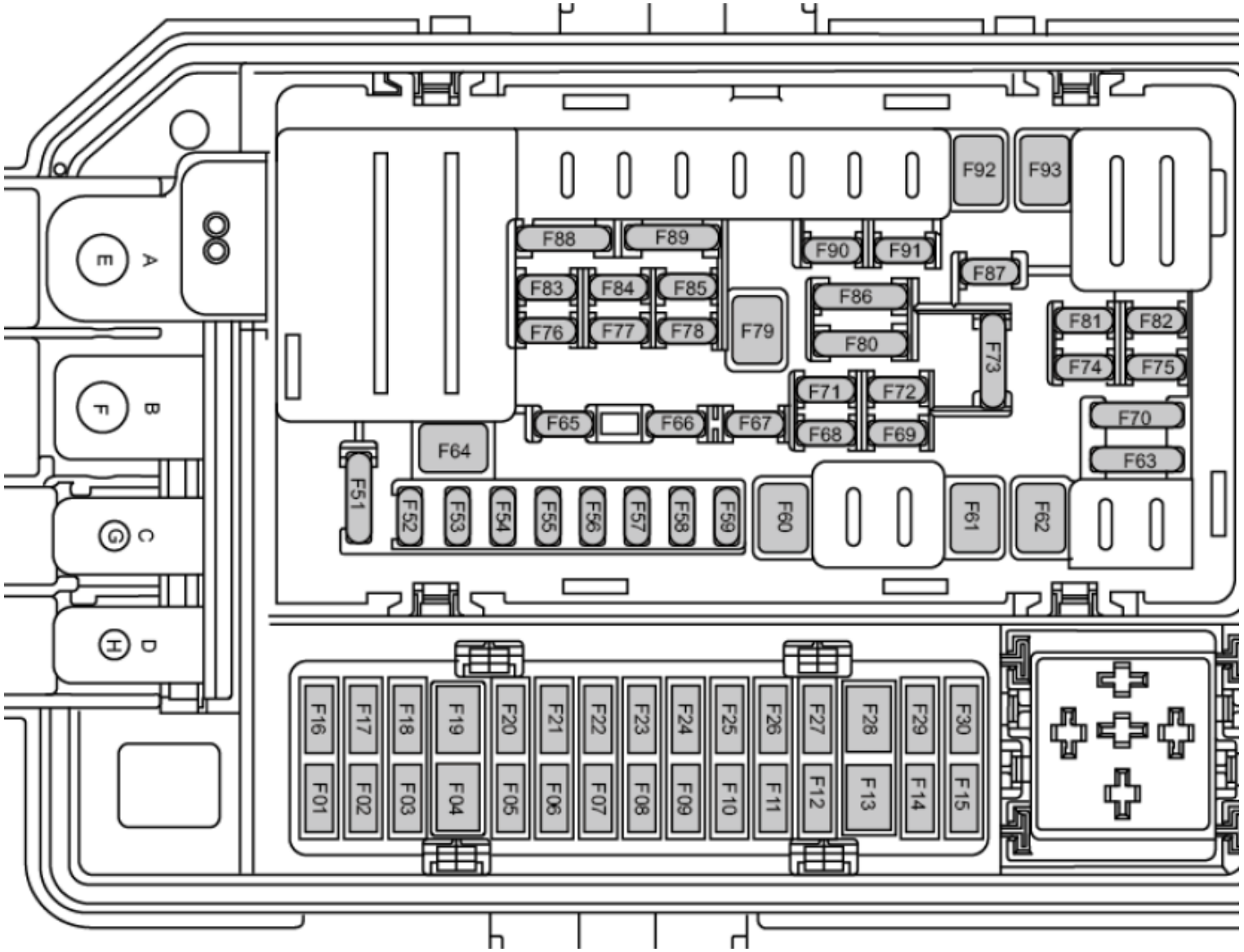
Wheels and tyres

Wheel rim size	6.5J×16	7.0J×17
Tyre size	205/60 R16 96H	215/55 R17 95V

Tyre Pressures

Wheels	Half-load	Laden
Front Wheels	2.5Bar/37psi	2.5Bar/37psi
Rear Wheels	2.5Bar/37psi	2.5Bar/41psi

Front Compartment Fusebox



Fuse

Code	Spec	Function
EF01	20A	Reserved Trailer Module
EF02-EF50	-	-
EF51	15A	Horn Relay
EF52	5A	Electric Vehicle Communication Controller, Active Grille Shutter
EF53	20A	Left Headlamp Assembly
EF54	30A	Body Control Module
EF55	30A	Body Control Module
EF56	5A	Front Detection Radar
EF57	5A	Electric Parking Motor Control Unit
EF58	30A	Body Control Module
EF59	-	-
EF60	30A	Heated Rear Window
EF61	40A	Integrated Brake System
EF62	30A	Power Window Regulator Motor
EF63	5A	Sensing Diagnostic Module,Crash Power Module Instrument Pack,Gateway,parking assist sensor, Body Control Module
EF64	30A	Crash Power Module
EF65	-	-
EF66	10A	Electric Exterior Rearview Mirror
EF67	-	-
EF68	20A	Electric Parking Motor Control Unit
EF69	30A	Crash Power Module
EF70	5A	Secondary Axle Motor Controller, Intelligent Motor Control Unit, Electric Power Steering,Integrated Brake System
EF71	-	-
EF72	20A	Right Headlamp Assembly
EF73	5A	Brake Pedal Switch,Electrical Battery Sensor
EF74-EF76	-	-

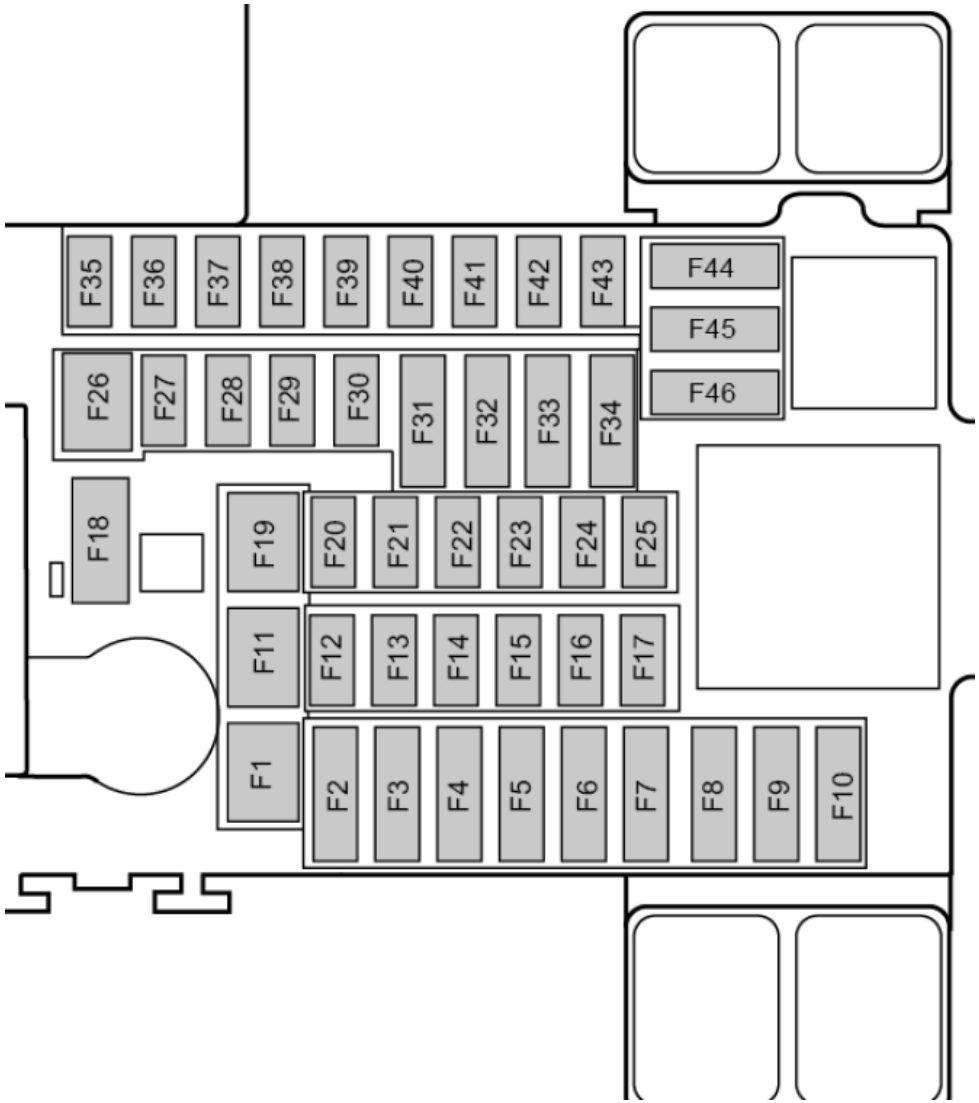
Fuse

Code	Spec	Function
EF77	15A	PEB Coolant Pump
EF78	20A	Energy Storage System
EF79	50A	High Voltage Air Conditioning Inlet Box
EF80	10A	Secondary Axle Motor Controller, Intelligent Motor Control Unit
EF81	15A	PEB Coolant Pump
EF82	-	-
EF83	15A	ESS Coolant Pump
EF84	-	-
EF85	15A	Front Wiper Motor
EF86	15A	Hot Pump Controller
EF87	5A	Combined Charging Unit
EF88	5A	Electric Air Conditioning Compressor, battery pack heater
EF89	5A	Outside Mirror and Master Light Height Adjust Switch Right Headlamp Assembly,Left Headlamp Assembly, Interior Mirror
EF90	-	-
EF91	30A	Body Control Module
EF92	25A	Wiper Relay
EF93	30A	Automatic Window Regulator Motor
FUSE A	-	-
FUSE B	-	-
FUSE C	80A	Electric Power Steering
FUSE D	-	-
FUSE E	100A	Front Compartment Fusebox
FUSE F	-	-
FUSE G	60A	Cooling Fan Power Supply
FUSE H	60A	Integrated Brake System

Relay

Code	Type	Function
ER01-ER50	-	-
ER51	4PIN	Rear Windscreen Heating Relay
ER52	4PIN	Ignition Relay
ER53	-	-
ER54	4PIN	Horn Relay
ER55	4PIN	Main Relay
ER56-ER57	-	-
ER58	5PIN	Front Washer Relay
ER59	-	-
ER60	4PIN	KL15 Switch Relay
ER61	4PIN	Front Wiper High/Low Speed Relay
ER62	4PIN	Front Wiper Enable Relay
ER63	4PIN	PEB Coolant Pump Relay

Passenger Compartment Fusebox



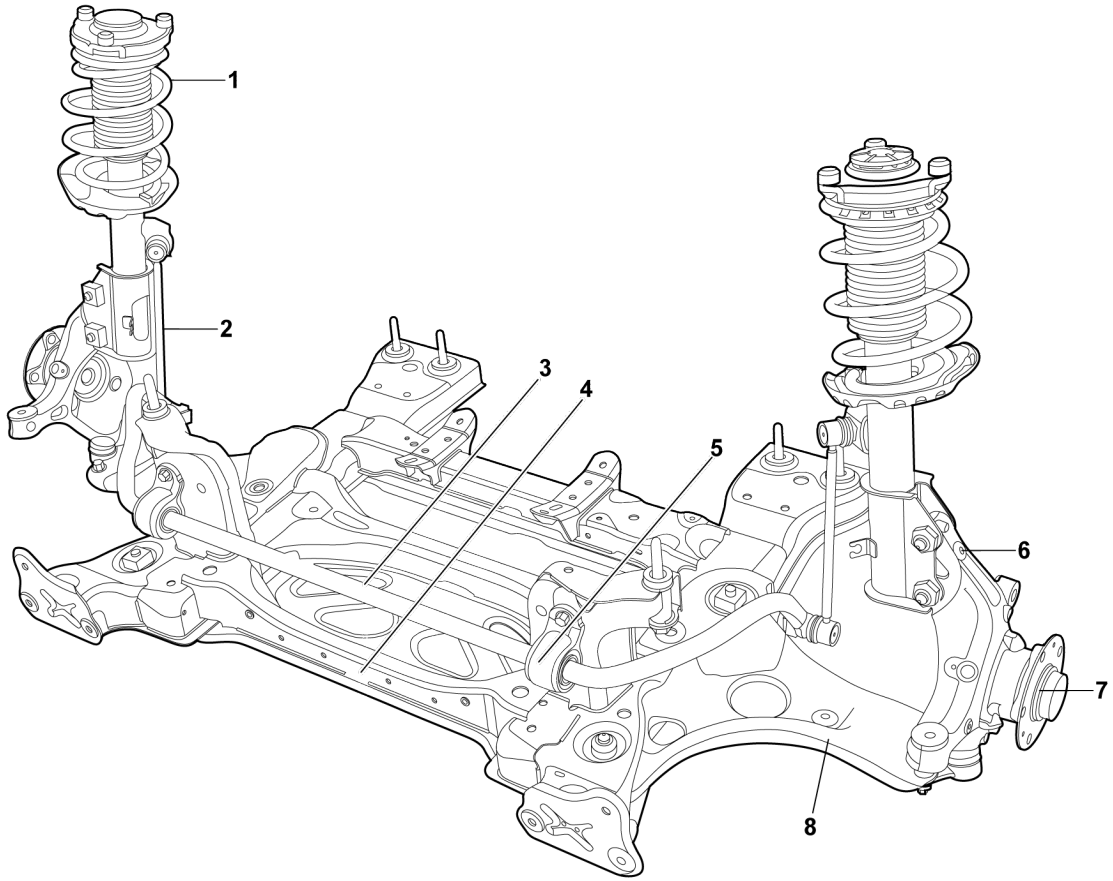
Fuse

Code	Spec	Function
CF01	-	-
CF02	5A	High Voltage Electric Heater
CF03	7.5A	Gateway
CF04	15A	Heated Steering Wheel
CF05	5A	Clock Spring,EPB Switch,Information Faceplate, Outside Mirror and Master Light Height Adjust Switch Driver Door Switch Pack
CF06	5A	Pedestrian Alert Control Module, Pedestrian alert module
CF07	5A	Instrument Pack,Shift Control Unit
CF08	7.5A	Front View Control Module,{DABM}, Front Central Display
CF09	5A	Integrated Charging Socket
CF10	-	-
CF11	30A	Driver Seat Control Module,Driver Seat Adjust Switch
CF12	-	-
CF13	5A	Driver Monitor System
CF14	10A	Sensing Diagnostic Module
CF15	15A	Super Lock Relay
CF16-CF17	-	-
CF18	10A	Electronic Steering Column Lock
CF19	-	-
CF20	10A	Diagnostic Line Connector
CF21	-	-
CF22	10A	Automatic Temperature Controller
CF23	-	-
CF24	20A	Entertainment Mainframe
CF25	5A	Rear Driving Assistance Radar
CF26-CF43	-	-
CF44	5A	Front Power Socket
CF45	5A	Phone Wireless Charger,Rear USB

Relay

Code	Spec	Function
CR1	4PIN	KLR Relay
CR2	4PIN	Steering Wheel Heating Relay
CRK1	5PIN	Super Lock Relay

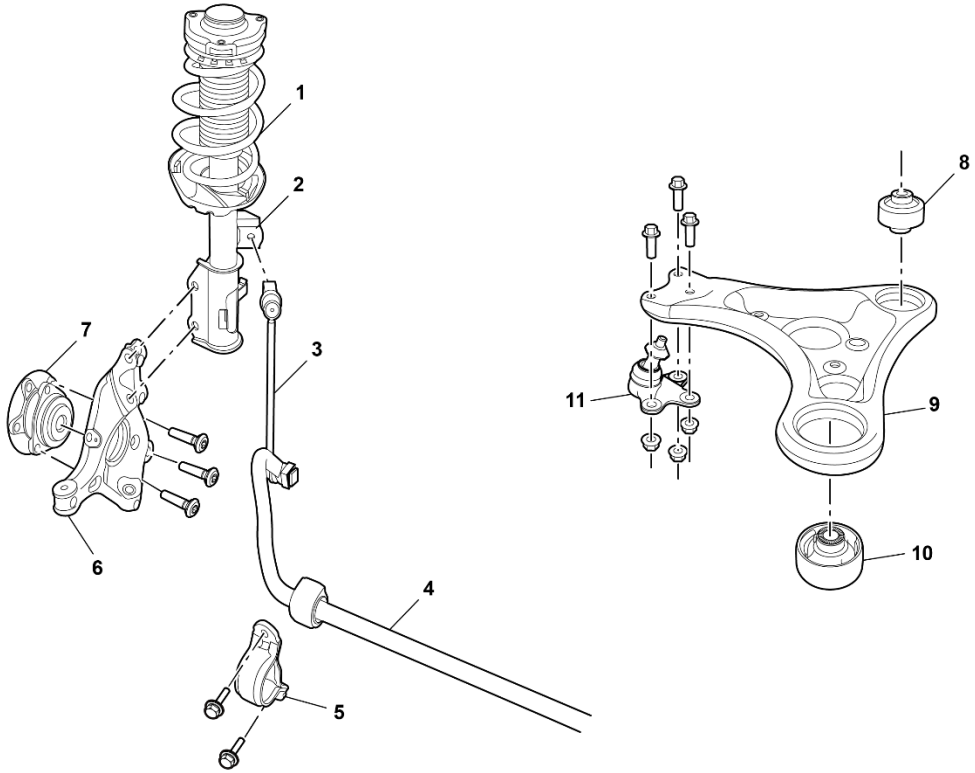
System Layout
Front Suspension Layout



S2210100

1. Front Shock Absorber Assembly (2)
2. Front Anti-roll Bar Link (2)
3. Front Anti-roll Bar
4. Front Subframe Assembly
5. Front Anti-roll Bar Bushing
6. Steering Knuckle Assembly (2)
7. Front Wheel Hub Bearing Assembly (2)
8. Front Lower Control Arm Assembly (2)

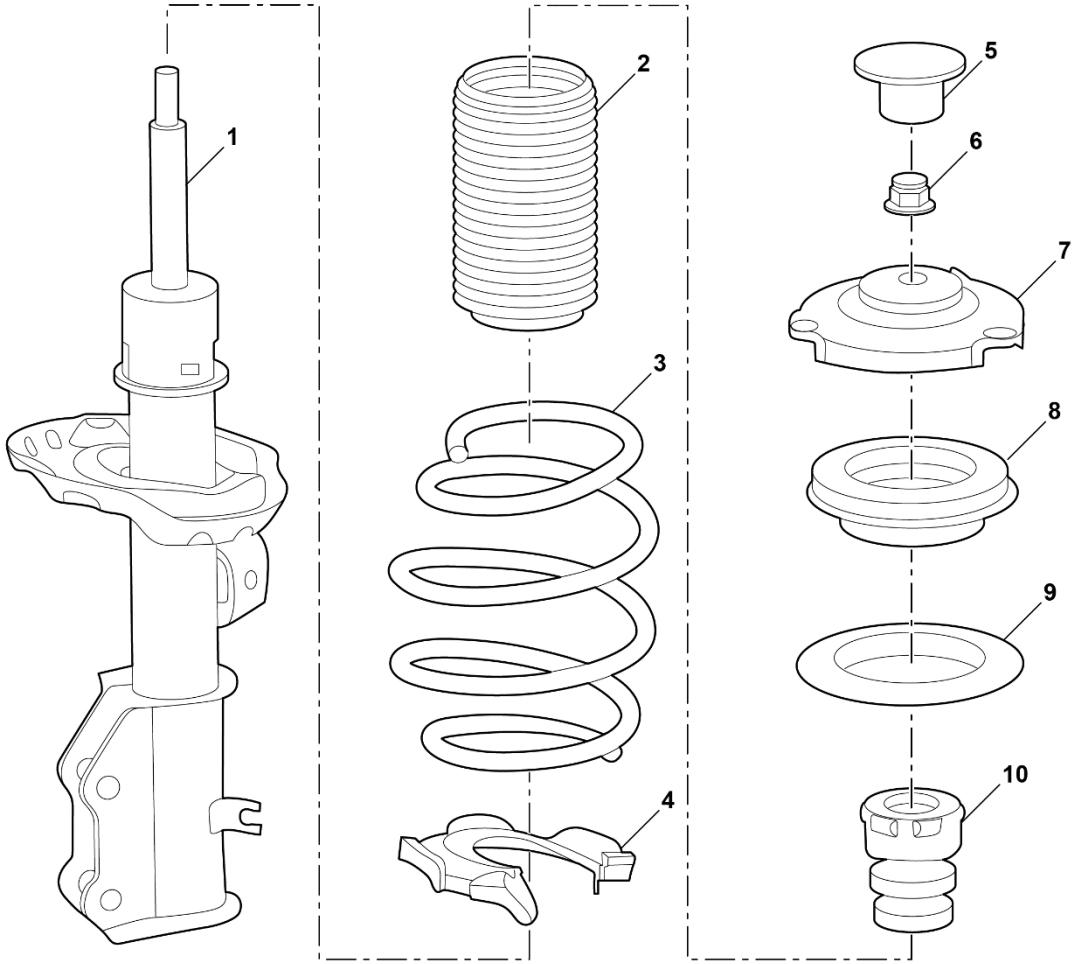
Exploded View of Front Suspension



S2210101

1. Front Shock Absorber Coil Spring
2. Front Shock Absorber Strut
3. Front Anti-roll Bar Link
4. Front Anti-roll Bar
5. Front Anti-roll Bar Bushing Clamp
6. Steering Knuckle Assembly
7. Front Wheel Hub Bearing Assembly
8. Front Lower Swing Arm Rear Bushing
9. Front Lower Control Arm
10. Front Lower Swing Arm Front Bushing
11. Steering Knuckle Ball Head

Exploded View of Front Shock Absorber



S2211102

1. Front Shock Absorber Strut
2. Dust Shield
3. Coil Spring
4. Front Shock Absorber Lower Spring Cushion
5. Dust Cap
6. Top Nut
7. Front Shock Absorber Upper Mounting Support Assembly
8. Top Bearing of Front Shock Absorber
9. Front Shock Absorber Upper Spring Cushion
10. Bumper Block

Overview

Front suspension includes:

- Front Subframe Assembly
- 2 front lower control arm assemblies
- 2 steering knuckle assemblies
- 2 front shock absorber assemblies
- 2 front wheel hub bearing assemblies
- Front ant-roll bar and 2 anti-roll bar links

Front Subframe Assembly

The front subframe is stamped and welded with the high-strength steel, which features light weight and high structural strength. The geometric dimension of all key positions is accurately controlled during manufacture to ensure proper location of the front suspension and steering system components. The front subframe is assembled on the vehicle body through 4 supporting points. The front subframe provides locations for assembly of all front suspension components except the top support of the shock absorber and the support of the powertrain.

The rear supporting plate of the front subframe between the rear mounting point of the front subframe and the body can increase the rigidity of the front subframe. The arrangement of the supporting points can avoid the displacement of the front subframe under the lateral force, which will produce unnecessary steering effects.

The front end of the front subframe of some models is equipped with 2 longitudinal beam reinforcement bars, 1 cross beam and 1 lower buffer beam, which can better transmit and absorb the collision force and improve the protection of passenger compartment.

Front Shock Absorber Assembly

2 McPherson shock absorber assemblies control the damping effect of front suspension. Each shock absorber consists of a damping unit, a coil spring and a upper mounting support assembly. According to the damper transmission ratio (1:1), the design of the front suspension shall feature the anti-dive and anti-squat. The layout and design of shock absorber minimizes the wheel camber loss as a result of lateral force and improves the handling performance and steering response capability. The coil spring is between the damper spring seat and upper mounting support assembly, which remains in the compressed state. Vibration isolator at both ends of the spring reduces noises delivered to the vehicle body from the front suspension. Under the upper mounting support assembly is fitted a bearing, when the steering system work, the bearing allows coil spring rotation. The dust shield protects the shock absorber strut from getting dirty or damaged. Coil spring shaft and damper shaft are offset, in the turning process, this arrangement can provide lateral load compensation, and enhance the damping effect.

Front Shock Absorber

The front shock absorber is a dual barrel type structure, which can be inflated and fuelled. This type of structure allows the movement of shock absorber piston inside the inner cylinder. There is an oil drain hole on the inner cylinder between the inner and outer cylinders. This structure minimizes the cavitation and eliminates the influence of the piston motion due to the damaged outer cylinder. The lower end of the front shock absorber is connected to the steering knuckle and fixed with bolts and nuts to ensure a correct orientation. The front shock absorber strut is integrated with the upper mounting support by nuts. There is a hexagonal slot at the top of front shock absorber strut, when fastening the nuts of the front shock absorber strut, the hexagonal slot can prevent rotation of the front shock absorber strut. The spring seat at a certain angle is combined with the shock absorber strut, and the mounting brackets for front anti-roll bar link are welded near the spring seat. There are 2 welding brackets near the bottom of the shock absorber strut, which are used for fitting the front brake hose and wheel speed sensor harness respectively.

Coil Spring

The coil spring is made of spring steel (containing carbon, silicon, manganese, phosphorus, chromium, and other alloy materials), which is assembled with the shock absorber strut. The top of the coil spring is fitted with an upper vibration insulator under the bearing seat, and the bearing is in the upper mounting support. The lower end of the coil spring is fitted on the spring seat through the lower vibration insulator, and the spring seat and the shock absorber strut are integrated. The front coil spring may vary depending on the powertrain used in the vehicle and vehicle configuration. Front coil springs with different configurations can be identified by the color code applied to the coil.

Upper Mounting Support Assembly

The upper mounting support assembly is composed of the inner and outer support frames, vulcanized rubber, and upper/lower supports. The rubber is vulcanized on the steel frame, with a support pressed in the upper/lower sides respectively. The top bearing is pressed into the base under the upper mounting support, and it can be replaced separately. The upper mounting support is integral, so that any part of it cannot be replaced separately. If necessary, a new upper mounting support assembly must be replaced.

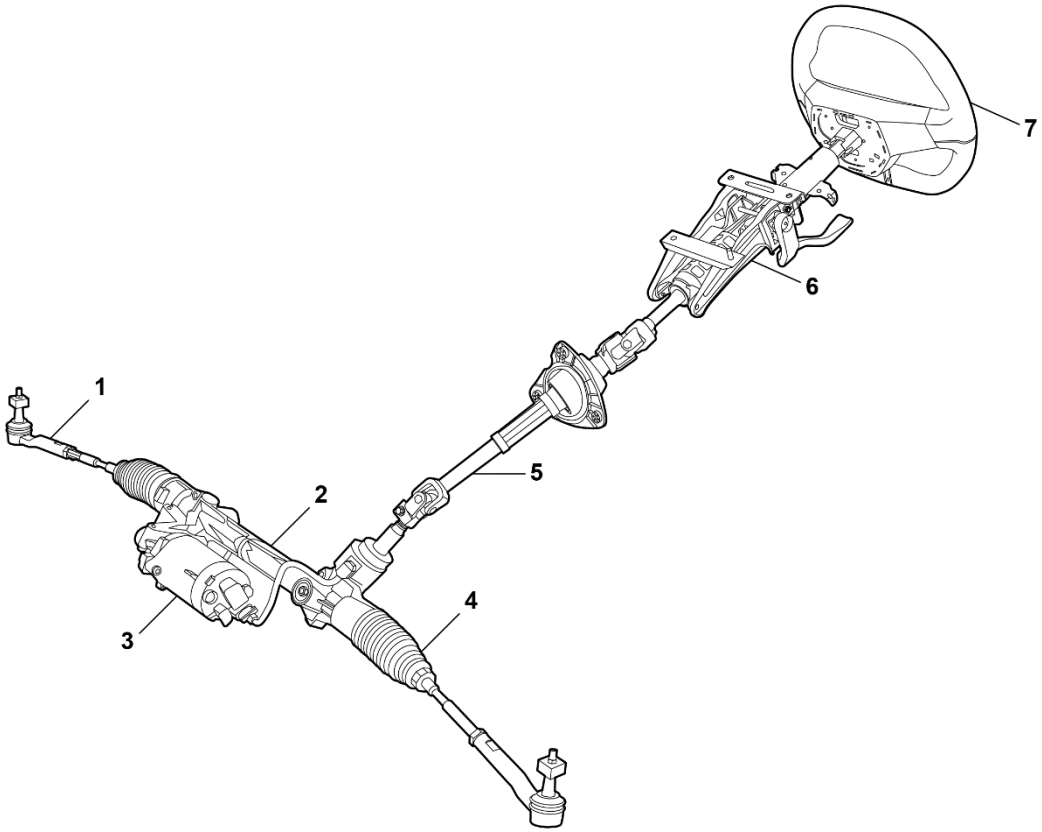
Front Lower Control Arm Assembly

The front lower control arm is of fork type. The swing arm body is stamped and welded with alloy steel, which connects the front steering knuckle and the front subframe. The front lower swing arm has a ball head, which is tapered to fit the steering knuckle hole, and is fixed on the steering knuckle with a locking nut. The front lower swing arm is connected with the subframe through the front and rear bushings. The front bushing is assembled to the front subframe with a bolt. The rear bushing is assembled to the subframe with a pair of bolts/nuts. The force from the vehicle wheel is transferred to the swing arm body by the ball head before the front/rear bushings transfer it to the subframe. In addition to transferring force, the flexibility of the bushings also allows the swing arm to sway up and down, they can absorb the vibration from the ground and their rigidity can provide a good stability. When the swing arm swings, the axis of the front bushing is the axis of rotation to swing, which plays a guiding role in the movement track of the wheel and makes the wheel move according to the predetermined track. The ball head of swing arm and the rear bushing can be replaced separately.

Front Anti-roll Bar and Link

The front anti-roll bar made of solid spring steel is connected to the rear of the front subframe by two bushings and bushing clamps. The bushings are assembled with the anti-roll bar as a whole through the secondary vulcanization process. The bushing clamps are fitted through special tooling, neither of which can be disassembled or replaced individually. The bushings are of low friction without additional lubrication, and allow the front anti-roll bar to rotate freely in static state. This allows the front anti-roll bar to respond quickly to roll inputs. The two ends of the front anti-roll bar are attached to one ball head of front anti-roll bar link, while the other ball head of the link is connected to the front shock absorber strut. This arrangement allows the front anti-roll bar to act in the ratio of 1:1 with wheel travel, providing the maximum lateral stability performance. The ends of each front anti-roll bar link are fitted with a ball joint which can increase the response speed and efficiency. The upper ball joint is mounted to the link at 90° to the axis, connected directly to the welded support on the front shock absorber strut, and secured with a locking nut. The lower ball joint is also mounted to the link at 90° to the axis, connected to the front anti-roll bar, and secured with a locking nut. The ball joints on the front anti-roll bar link are not serviceable and if replacement of any ball joint is necessary, a new link will be required.

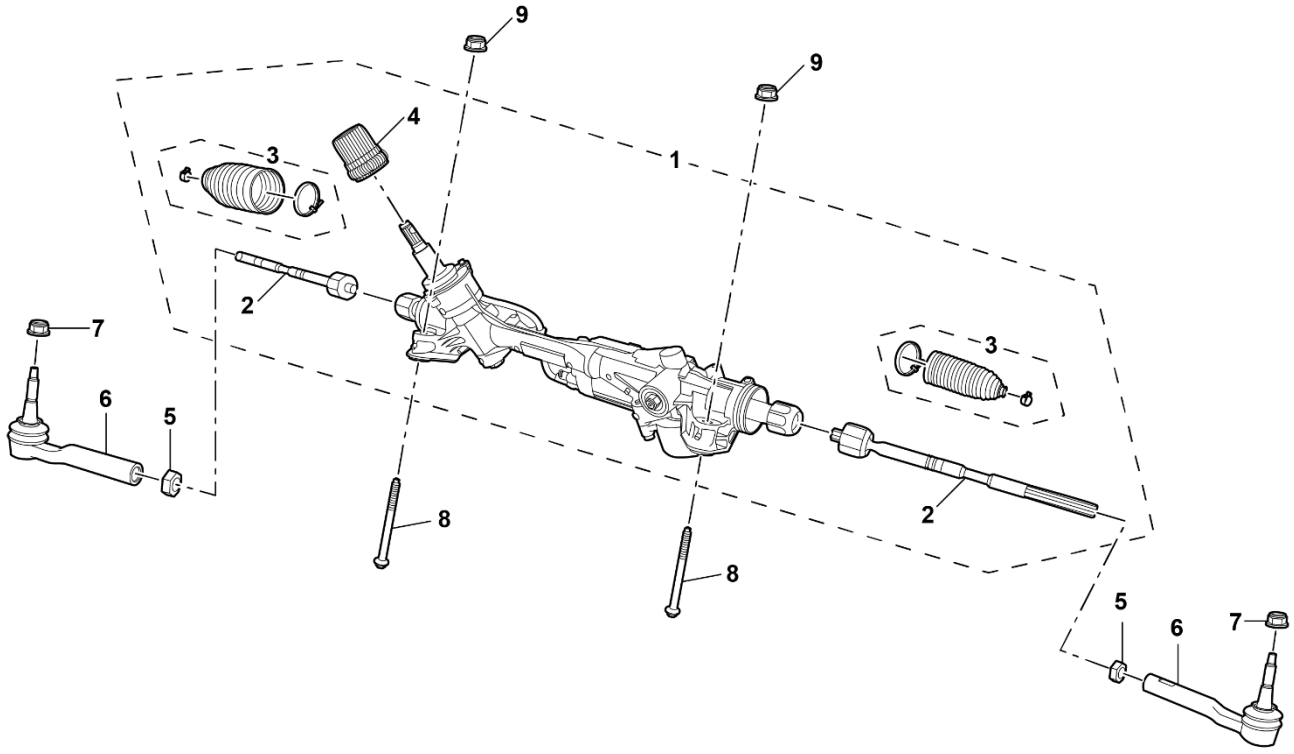
Steering System Component Layout



S2111240

1. Steering Gear Outer Tie Rod
2. Steering Gear Subassembly
3. Steering Motor
4. Steering Gear Boot
5. Steering Intermediate Shaft
6. Steering Column
7. Steering Wheel

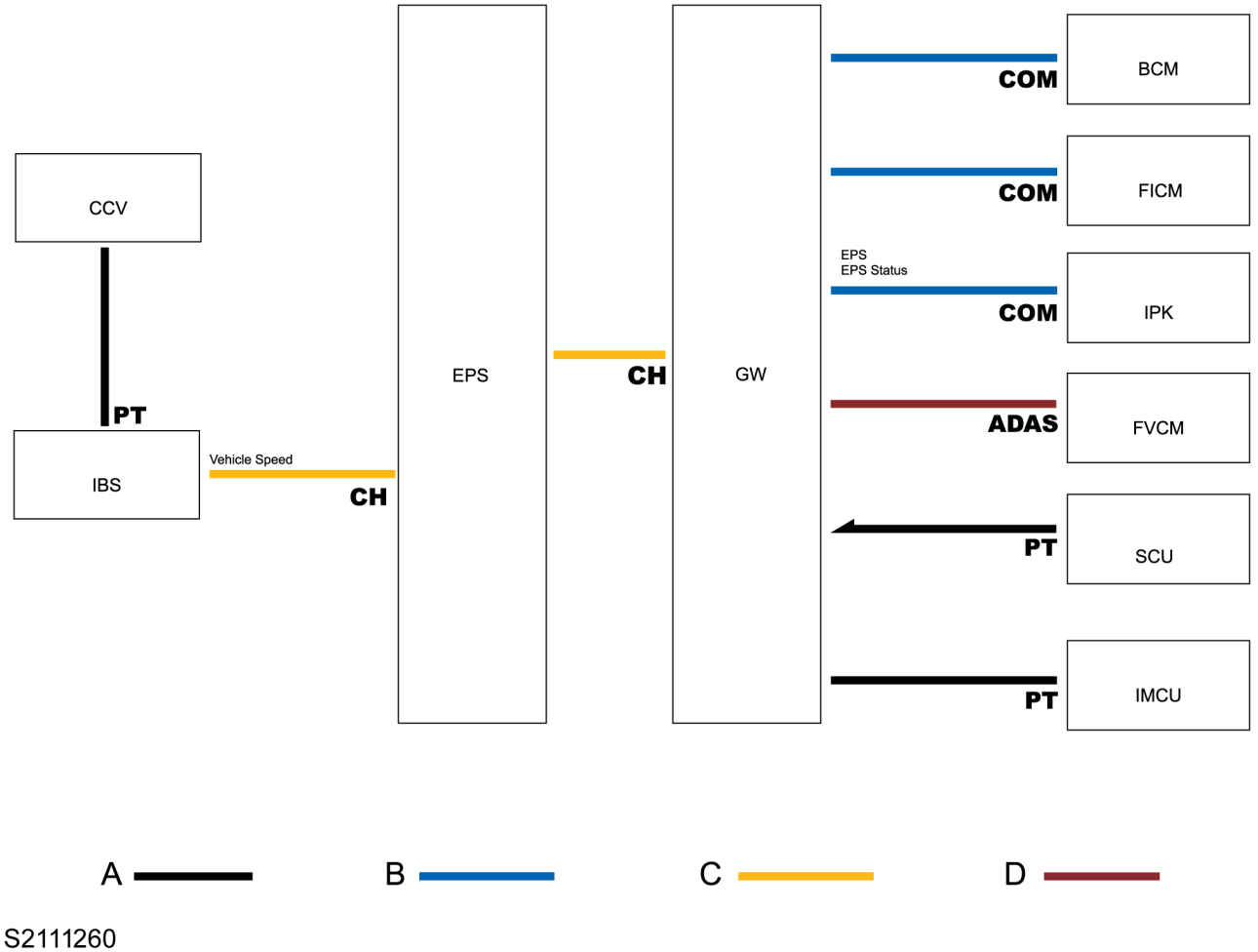
Steering Gear Assembly Component Layout



1. Steering Gear Subassembly
2. Steering Gear Inner Tie Rod
3. Steering Gear Boot
4. Universal Joint Sleeve
5. Locking Nut
6. Steering Gear Outer Tie Rod
7. Nut - Outer Tie Rod Ball Head to Steering Knuckle
8. Steering Gear Retaining Bolt
9. Steering Gear Retaining Nut

S2111241

System Control Diagram
EPS Control Diagram



S2111260

Overview

EPS is a power steering system that directly relies on the motor to provide auxiliary torque. According to different locations of motor arrangement, EPS can be divided into four types: steering column-assist type, gear-assist type, rack-assist type, double pinion-assist type. The motor of steering column-assist type EPS is fixed on one side of steering column, and connected to the steering shaft through reducer mechanism, directly driving the steering shaft to assist the steering. The motor and the reducer mechanism of gear-assist type EPS directly drive the rack to provide assist. The double pinion-assist type EPS has two pinions, a driving pinion connected to the steering column and a power-assisted pinion connected to the motor, with the output torque of the motor acting on an additional power-assisted gear through a reducer mechanism and transmitted to the rack.

The basic principle for different types of EPS is the same: the torque sensor is connected with the steering shaft (pinion shaft). When the steering shaft rotates, the torque sensor starts to work and turns the relative rotational displacement of the input shaft and output shaft under the action of the torsion bar into electric signals and transmits them to the ECU , which decides the rotation direction of the motor and the size of the power-assisted current according to the signals from the speed sensor and the torque sensor, thus completing the real-time control of power steering. Therefore, it can easily realize the effect of providing different power assist to the motor at different speeds to ensure that the vehicle is light and flexible at low speeds and stable and reliable at high speeds. Therefore, the EPS has a high degree of freedom in setting the steering characteristics.

Electric Power Steering System

The electric power steering system consists of the following components:

1. Electric Power Steering Control Module
2. Steering Motor
3. Torque Sensor
4. Steering Reducer Mechanism

Electric Power Steering Control Module

The function of the ECU is to perform logic analysis and calculation based on the torque sensor signals and vehicle speed sensor signals, then send commands to control the motor operation. Furthermore, the ECU is also configured with safety protection and self-diagnosis functions, and the ECU determines if the system is in normal state by collecting the motor current, powertrain status and other signals. If the system fails, the power assist will be canceled automatically and the ECU will carry out fault diagnosis and analysis.

Steering Motor

The function of motor is to output an appropriate auxiliary torque based on the ECU instruction, and it is the power source of EPS . Brushless permanent magnet motors are mostly used.

Torque Sensor

The torque sensor is integrated in the steering gear, and its function is to measure the size and direction of the torque acted by the driver on the steering wheel. It is the control signal of EPS .

Reducer Mechanism

The reducer mechanism of EPS is connected to the motor, which plays the role of speed reduction and torque increase.

Steering Angle Sensor

The steering angle sensor is integrated on the rotary coupler in the steering column combination switch, it can monitor the steering angle data entered by the driver, transmit corresponding data to the related ECU, and give corresponding control of the vehicle.

Operation

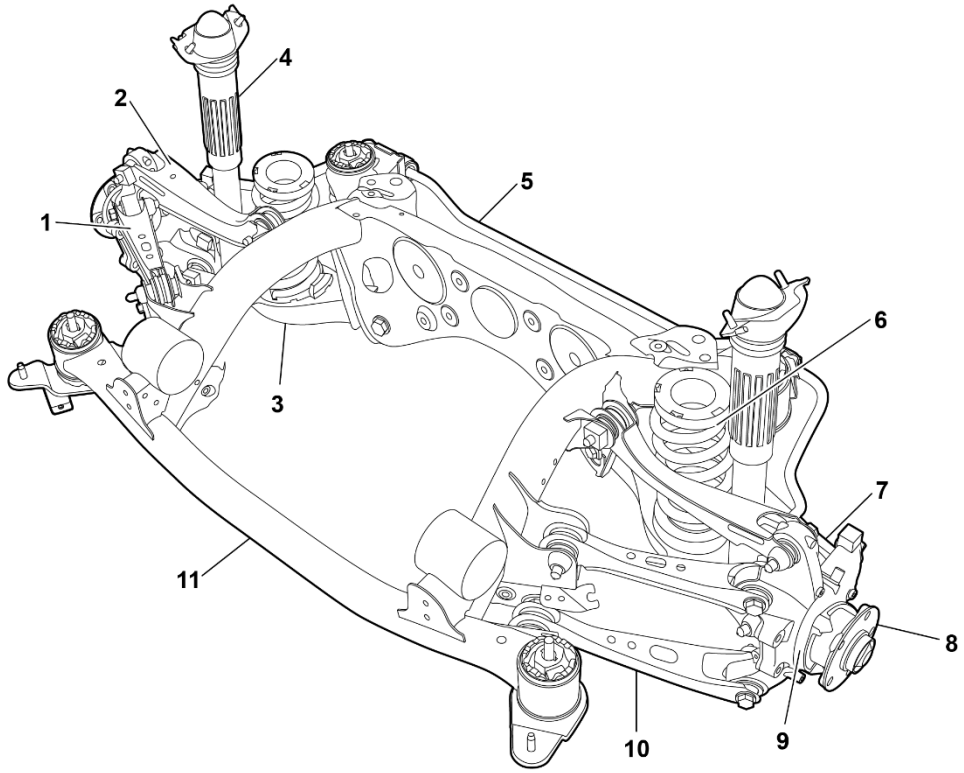
When the electric power steering control module is used to control the power steering motor so as to operate the steering gear, the electric power steering system can reduce the power required for the driver to steer the vehicle. The electric power steering control module also uses a combination of torque sensors, steering angle sensors, battery voltage circuits and serial data circuits to perform system functions. The EPS control module will monitor the vehicle speed and powertrain status information through the CAN Bus to determine the magnitude of power for vehicle steering. At a low speed, greater assistance is provided for steering during parking operations. At a high speed, less assistance is provided to improve road feel and directional stability.

The EPS module determines the magnitude of desired force by using the combination of torque sensor, steering angle sensor, speed and system temperature input calculated value. The EPS control module continually monitors the return signal from the torque sensor and the steering position signal. With the rotation of the steering column and steering shaft, monitor the steering input shaft and output shaft by torque signal circuit, then use the EPS control module to calculate the torque.

The EPS control module responds to the change of torque sensor signal and steering angle sensor signal by controlling the current of the steering motor. The EPS control module controls the PWM motor drive circuit to drive the 3-phase motor.

The EPS control module can calculate the internal system temperature and protect the EPS system from high temperature damage. In order to reduce the high system temperature, the EPS control module will decrease the directive current flowing to the steering motor, that is, reduce the steering power. The EPS control module can detect failures of the EPS system. When failure of the EPS is detected, the steering warning lamp on the instrument will illuminate.
The EPS control module is provided with the "active self centering" function, when the driver's hands leave the steering wheel, control of the self centering speed can improve the driving feel and safety greatly.
The EPS control module is also configured with the "end stop protection" function which can decrease the auxiliary torque and avoid noise, overheat and damage to the mechanical parts before the maximum travel of the steering gear rack is achieved.

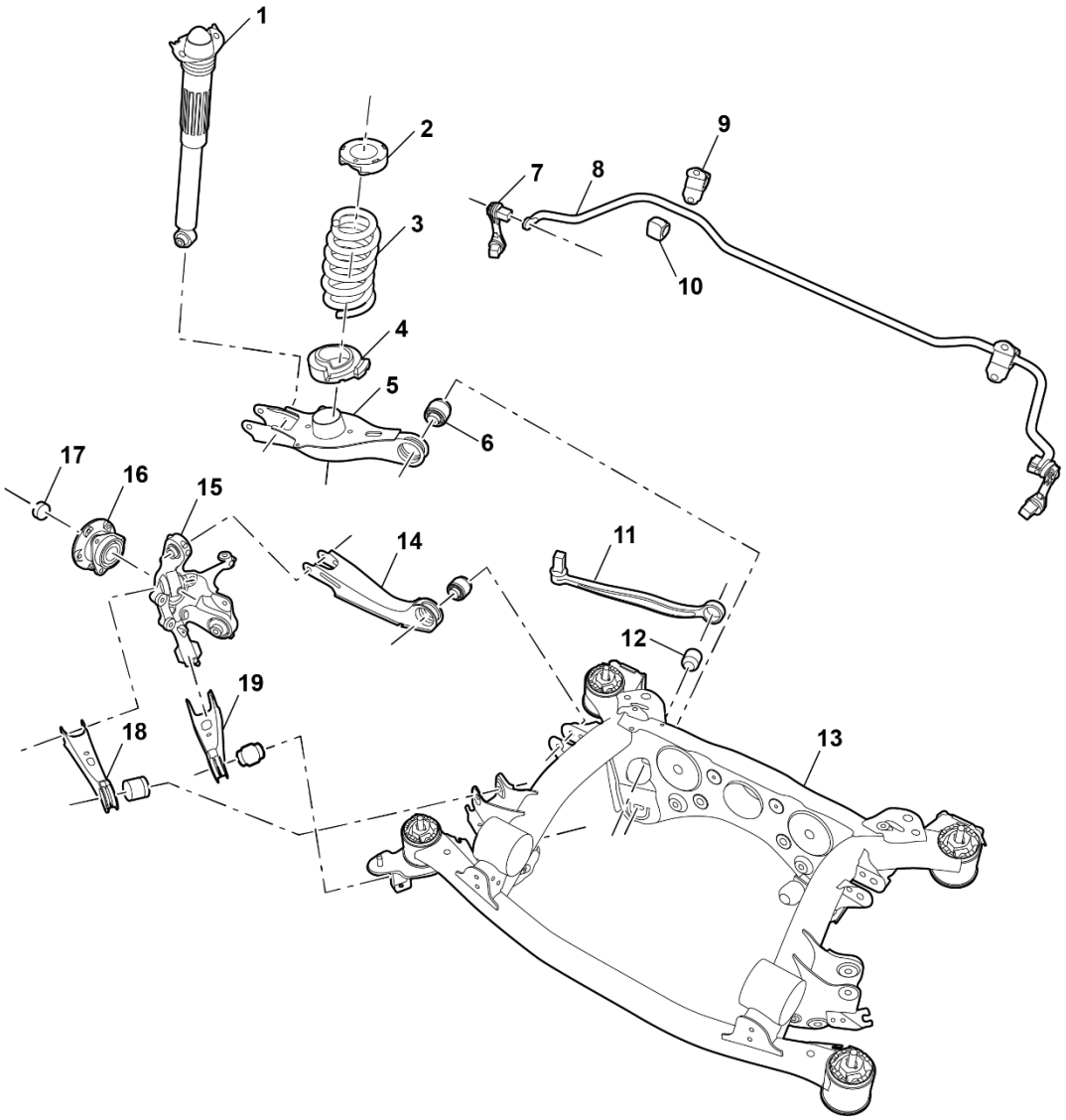
System Layout
Rear Suspension Layout



1. Rear Suspension Front Upper Control Arm Assembly (2)
2. Rear Upper Control Arm Assembly (2)
3. Rear Lower Control Arm Assembly (2)
4. Rear Shock Absorber Assembly (2)
5. Rear Anti-roll Bar
6. Rear Suspension Coil Spring Assembly (2)
7. Rear Wheel Bracket Assembly (2)
8. Rear Wheel Hub Bearing Assembly (2)
9. Rear Lateral Push Rod Assembly (2)
10. Rear Suspension Front Lower Control Arm Assembly (2)
11. Rear Subframe Assembly

S2220100

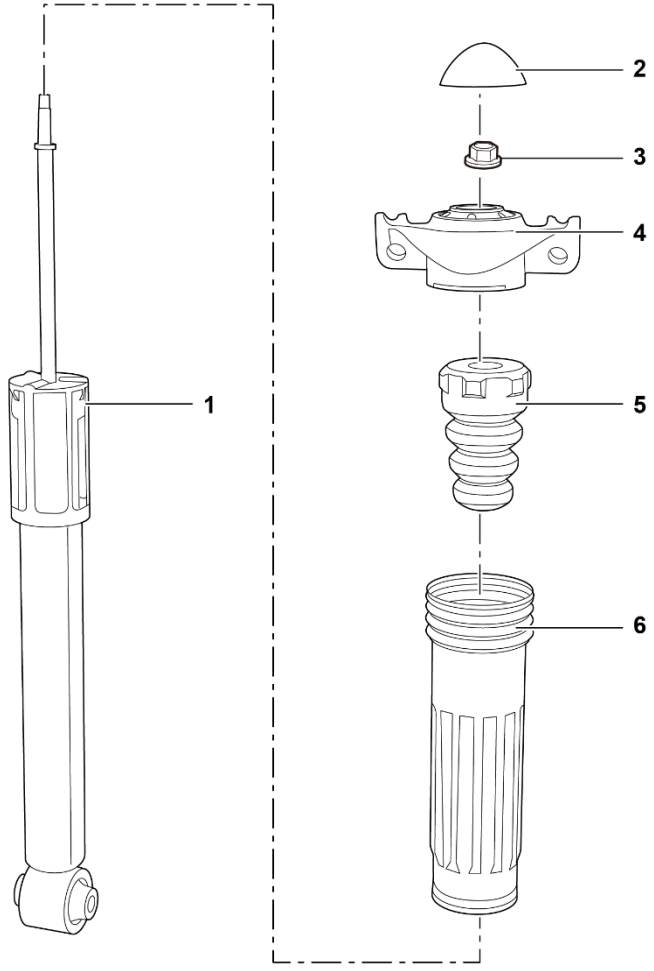
Exploded View of Rear Suspension



S2220101

1. Rear Shock Absorber Assembly
2. Rear Suspension Spring Upper Vibration Isolator
3. Rear Coil Spring
4. Rear Suspension Spring Lower Vibration Isolator
5. Rear Lower Control Arm
6. Rear Lower Swing Arm Bushing
7. Rear Stabilizer Bar Link
8. Rear Stabilizer Bar
9. Rear Stabilizer Bar Bushing
10. Rear Stabilizer Bar Clamp
11. Horizontal Push Rod Assembly
12. Lateral Push Rod Assembly Bushing
13. Rear Subframe Assembly
14. Rear Upper Control Arm
15. Rear Wheel Bracket Assembly
16. Rear Wheel Hub Bearing Assembly
17. Nut - Rear Wheel Hub Bearing Assembly
18. Front Upper Control Arm Assembly
19. Front Lower Control Arm Assembly

Exploded View of Rear Shock Absorber Assembly



S9410103

1. Rear Shock Absorber Strut
2. Soundproof Cap
3. Upper Mounting Nut
4. Upper Support Base
5. Auxiliary Spring
6. Dust Shield

Overview

Rear suspension includes:

- Rear Subframe Assembly
- 2 trailing arm assemblies
- 2 lower control arm assemblies
- 2 upper control arm assemblies
- 2 lateral push rod assemblies
- 2 shock absorber assemblies
- 2 coil spring assemblies
- Rear anti-roll bar and 2 links
- 2 wheel hub bearing assemblies
- 2 wheel bracket assemblies

Rear Subframe Assembly

The rear subframe assembly is in a frame structure, which is connected rigidly to the body by 6 bolts. The rear subframe provides mounting positions for the rear upper control arm, rear lower control arm, rear lateral push rod and anti-roll bar, etc. The rear subframe assembly can transfer the load of the suspension components to the lower vehicle body and mitigate the impact from the collision with the body structure.

Rear Shock Absorber

The rear shock absorber is a dual barrel type structure, can be inflated and fueled. This type of structure allows the movement of shock absorber piston inside the inner cylinder with an oil hole which is between the inner and outer cylinders. This structure minimizes the cavitation and eliminates the influence of the piston motion due to the damage of outer cylinder. The lower part of the shock absorber is equipped with a bushing, which is connected with the lower control arm through a pair of bolts/nuts. This mounting position allows the rear shock absorber to have a mechanical lever ratio of 1:1, thus enhancing vibration control. The upper part of the rear shock absorber is connected with the body by two bolts.

Coil Spring

The coil spring is made of spring steel (containing carbon, silicon, manganese, phosphorus, chromium, and other alloy materials), which is fitted between the body and the rear lower control arm. Each spring is fitted between the upper and lower spring vibration isolators which reduce noise transmitted to the body from the suspension. The lower vibration isolator is fitted in a flat hole in the rear lower control arm, when removing, pull it out of the flat hole. When fitting, align it with the corresponding hole of the rear lower control arm. The rear coil spring may vary depending on the powertrain used in the vehicle and vehicle configuration. Different rear coil springs can be identified by the color code applied to the coil.

Rear Upper Control Arm

The rear upper control arm is stamped and welded with hot-rolled steel plate, with a rubber bushing at both ends. The inner side of the rear upper control arm is connected with the rear subframe by a bolt and a nut, and the outer side of the rear upper control arm is connected with the rear wheel bracket by a bolt, a nut and a gasket.

Rear Lower Control Arm

The rear lower control arm is a box-shaped structural part which consists of the upper and lower pieces made of hot-rolled steel plate stamped and welded together. It carries the rear shock absorber and spring, and is connected with the anti-roll bar link. The inner side of the rear lower control arm is press-fitted with a rubber bushing, which is connected with the rear subframe by an eccentric bolt, an eccentric gasket and a nut. The eccentric bolt can be used to adjust the four-wheel alignment camber of the rear axle. The outer side of the rear lower control arm is connected with the rear wheel bracket by a bolt and a nut.

Rear Lateral Push Rod

The rear lateral push rod is press-fitted with a rubber bushing at both ends. The inner side of the rear lateral push rod is connected with the rear subframe by an eccentric bolt, an eccentric gasket and a nut, and the eccentric bolt can be used to adjust the four-wheel alignment toe-in of the rear axle. The outer side of the rear lateral push rod is connected with the rear wheel bracket by a bolt, a nut and two gaskets.

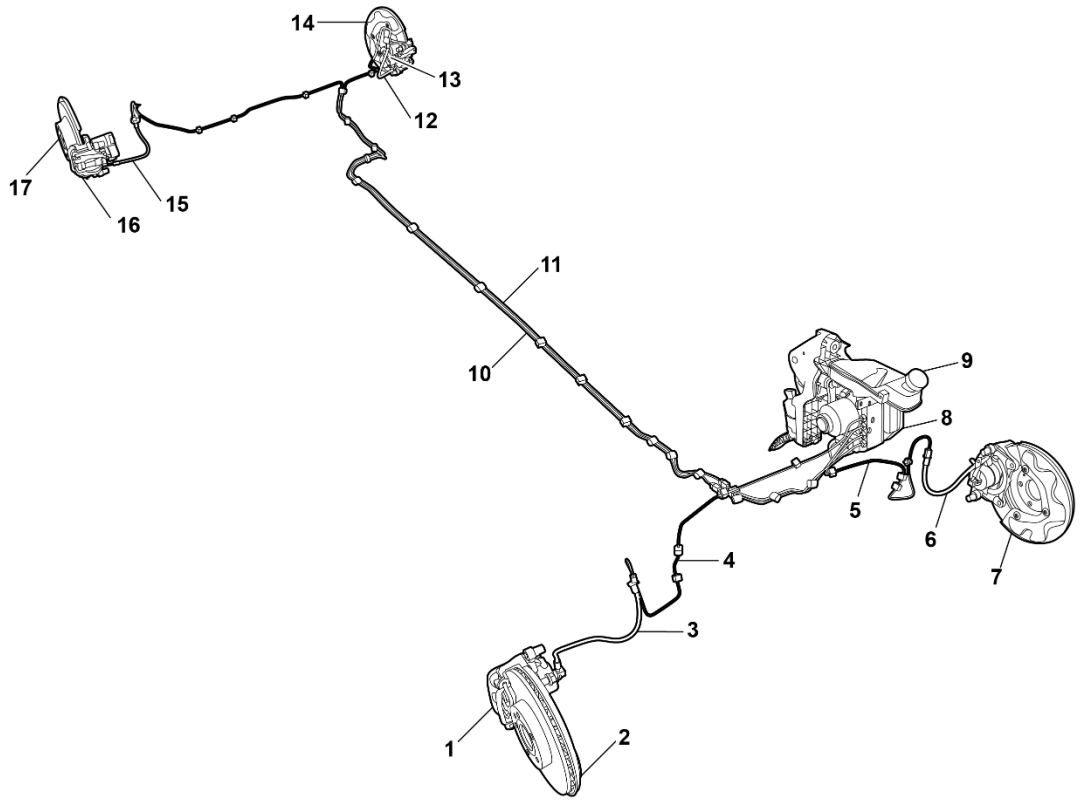
Trailing Arm Assembly

The trailing arm is stamped with high-strength steel, which is a single-piece structural part like a "blade" and is mainly used to transfer the force of the rear wheels to the body. The front end of the trailing arm is welded with a steel pipe for fitting the rubber bushing. The trailing arm is connected to the body through a mounting bracket which is equipped with a dust cover to protect the bushing from impurities. The rear of the trailing arm is connected to the rear wheel bracket by 3 bolts. In order to relieve the longitudinal impact of the rear axle, the longitudinal structure of the rubber bushing uses a hollow design, which can be replaced separately.

Anti-roll Bar and Links

The anti-roll bar made of solid spring steel is connected to the front of the subframe by two bushings and bushing clamps. The bushings are assembled with the anti-roll bar as a whole through the secondary vulcanization process. The clamps are fitted through special tooling, and the bushings and clamps cannot be disassembled or replaced individually. The bushings are of low friction without additional lubrication, and allow the anti-roll bar to rotate freely in static state. This allows the anti-roll bar to respond quickly to roll inputs. The two ends of rear anti-roll bar are connected with the rear anti-roll bar link, while the other end of the link is connected with the rear lower control arm. Each rear anti-roll bar link is attached to the rear anti-roll bar through the ball joint connection, and a bushing is fitted at the lower end to connect with the lower control arm by a bolt and a nut. The ball joint connection can improve the response and efficiency of the vehicle to rollover.

Brake System
System Layout



S2410135

1. Front Brake Caliper Assembly
2. Front Brake Disc
3. Front Right Brake Hose
4. Front Right Brake Hard Pipe
5. Front Left Brake Hard Pipe
6. Front Left Brake Hose
7. Front Brake Disc Guard Plate
8. Brake Master Cylinder Booster
9. Brake Fluid Reservoir
10. Rear Right Brake Hard Pipe
11. Rear Left Brake Hard Pipe
12. Right Rear Brake Hose
13. Parking Motor
14. Rear Brake Disc Guard Plate
15. Right Rear Brake Hose
16. Rear Brake Caliper Assembly
17. Rear Brake Disc

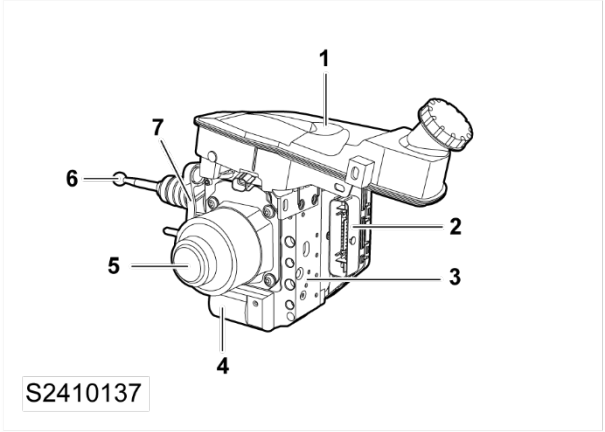
Description

This series of vehicles is equipped with IBS , which mainly consists of the following components: pedal assembly on the driver side in the passenger compartment, master cylinder booster assembly on the left of the front compartment (integrated with SCS function), wheel speed sensors, brake caliper assemblies at 4 wheel ends, brake discs and brake disc guard plates, corresponding brake hard pipes and hoses. IBS is a vacuum-free braking system. Compared with models with vacuum booster, brake master cylinder, electronic vacuum pump and brake regulator, the pressure buildup time of emergency brake is significantly shortened, and the weight and size of the braking system are reduced.

The pedal assembly is fixed on the dash panel and includes a brake pedal and an accelerator pedal. The brake pedal is connected with the push rod of the master cylinder booster assembly through a booster connector. A brake lamp switch is fitted on the pedal assembly to provide signals for vehicle starting and illumination of the brake lamp.

The master cylinder booster assembly is fixed on the dash panel and pedal assembly bracket through 4 welding studs on the fixing flange.

The master cylinder booster assembly mainly consists of the following components:



1. Brake Fluid Reservoir with Level Sensor
2. Electronic Control Unit
3. Valve Block with Solenoid Valve
4. Pedal Simulator
5. Brushless Motor
6. Brake Pedal Interface
7. Fixing Flange

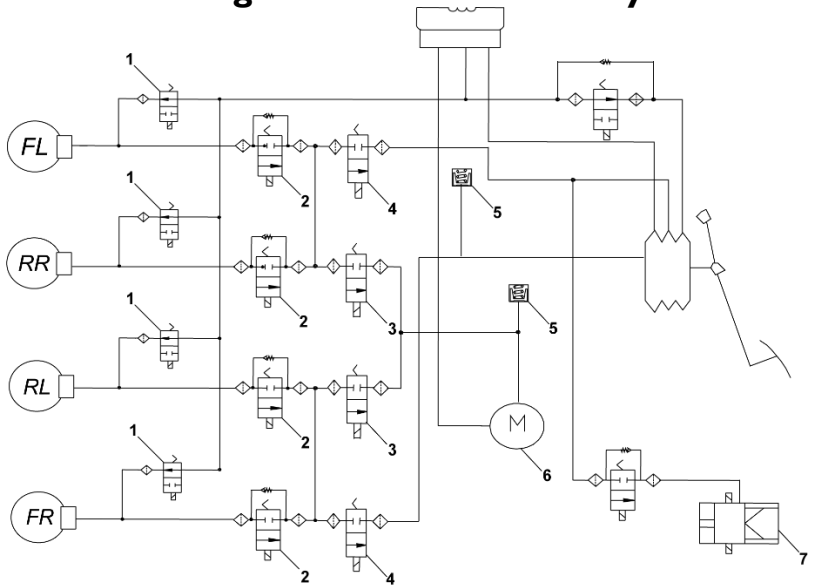
The wheel speed sensor generates a pulse signal by coordinating with the magnetic ring in the wheel hub bearing, and the front wheel speed sensor is fixed on the steering knuckle, while the rear wheel speed sensor is fixed on the wheel bracket.

The front brake caliper assembly is a 4-piston fixed caliper, which is mounted on the steering knuckle. The front brake disc is a vent disc, and the inner guard plate protects the front brake disc. When the hydraulic pressure is transmitted to the brake caliper, both the inner and outer pistons push the brake pad against the brake disc, causing friction to decelerate the vehicle. The rear brake caliper assembly is a single-piston floating type, which is mounted on the wheel bracket. The rear brake disc is a vent disc, and the inner guard plate protects the rear brake disc.

When the hydraulic pressure is transmitted to the brake caliper, the piston stretches outward, forcing the inner brake pad to press against the brake disc. Meanwhile, the brake caliper housing slides along the guide pin under the hydraulic reaction to drive the outer brake pad to come into contact with the brake disc, causing friction to decelerate the vehicle. A parking motor is also mounted on the rear brake caliper assembly. When the parking motor is working, the piston extends outwards, this forces the internal/external brake pads to clamp the brake disc for stable parking.

Operation

Schematic Diagram of IBS Brake System

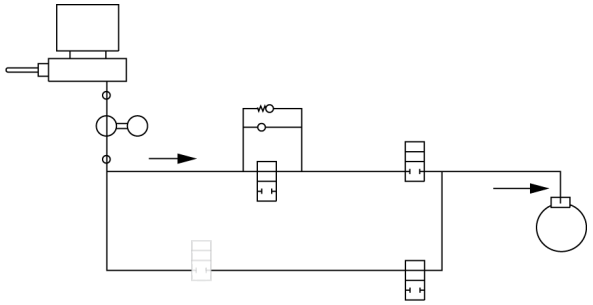


S2410119

1. Oil Return Valve
2. Oil Inlet Valve
3. Relief Valve
4. Master Cylinder Isolation Valve
5. Pressure Sensor
6. Brushless Motor
7. Simulator

Normal Braking

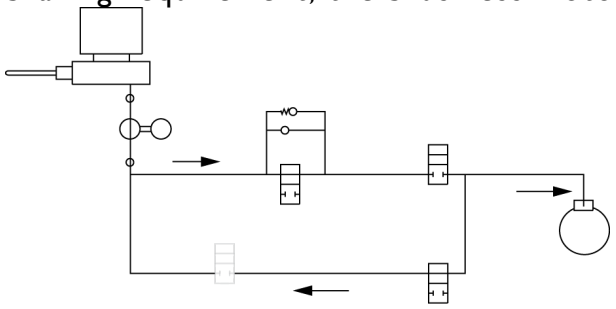
During normal braking, the shut-off valve is energized and closed, and the brake fluid cannot flow to the caliper; meanwhile, the pedal simulator solenoid valve is energized and opened, the brake fluid flows to the simulator, and the driver's static pedal feel is provided by the pedal simulator. The master cylinder displacement sensor and the master cylinder pressure sensor monitor the driver's braking request at the same time, perform calculation through the built-in software model, and send the required pressure buildup request to the brushless motor. The brushless motor works to build up pressure for the four caliper wheel cylinders. As shown below.



S2410115

Regenerative Braking

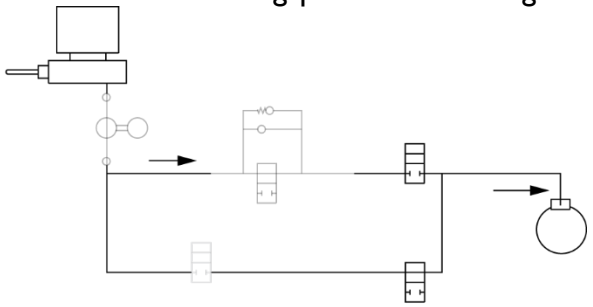
During regenerative braking, the shut-off valve is energized and closed, and the brake fluid cannot flow to the caliper; meanwhile, the pedal simulator solenoid valve is energized and opened, the brake fluid flows to the simulator, and the driver's static pedal feel is provided by the simulator. The master cylinder displacement sensor and the master cylinder pressure sensor monitor the driver's braking request at the same time, and perform calculation through the built-in software model. If the capacity of the motor meets the braking requirement, the brushless motor will not work. As shown below.



S2410116

Failure Braking Mode

When the electrical module fails completely, the shut-off valve is normally open in the power-off state. The driver depresses the pedal to generate the braking pressure through the TMC, which builds up pressure for the four caliper wheel cylinders. As shown below.



S2410117

The above-mentioned processes are continuously carried on during the IBS IBS operation until the vehicle is regulated to the optimum driving condition.

Application of Electronic Park Brake

When the vehicle is stationary, the electronic park brake can be applied at any time, regardless of the start switch position.

Pull the EPB switch upward until the indicator in the EPB switch illuminates. It sends a signal "Apply Brake" to the EPB module. The module receives the request and controls the rear brake actuator to apply the brake, and the indicator in the EPB switch and the indicator in the instruments pack kit illuminate.

If the red indicator in the EPB switch and the red indicator in the instruments pack kit illuminate, it means the parking brake has been applied.

If the red indicator in the instruments pack kit flashes, it means that the parking brake has failed.

If the green indicator in the instruments pack kit illuminates, it means that the Auto Hold function is active.

If the yellow EPB malfunction indicator lamp in the instruments pack kit remains ON, it means that the electronic park brake system is faulty.

Release of Electronic Park Brake

To manually release the electronic park brake, the module should receive the following signals:

- Start Switch State
- Brake Lamp Switch Signal
- Electronic Park Brake Switch Signal

With the vehicle in the "ON/RUNNING" state, if the module receives the "Brake Lamp Switch" signal indicating that the brake pedal has been depressed and the EPB switch release signal, it will control the parking actuator to release the parking brake.

When the indicator in the EPB switch and the indicator in the instruments pack kit turns off, it means that the parking brake has been released.

Start Assist Function

The EPB can automatically judge the driver's intention of leaving, and automatically release the parking brake.

When the vehicle starts off on a slope, the EPB will release the electronic park brake by judging the slope value and motor torque output to prevent slope slipping.

The following conditions must be met to activate the start assist function:

- The driver seat belt has been fastened
- The vehicle is running
- The shift lever is in D or P gear
- The accelerator pedal is depressed

When the accelerator pedal is depressed, the EPB module will control the park actuator to release the park brake by judging the torque value.

This function is different from the hill start assist function HHC .

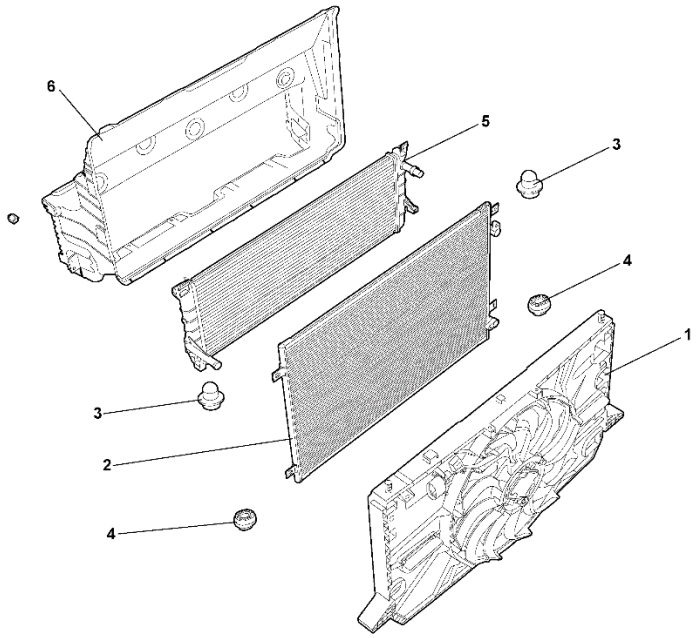
Emergency Braking Function

In case of an emergency while driving, such as the vehicle cannot be stopped by depressing the brake pedal, the vehicle can be decelerated by pulling up and holding the EPB switch.
Holding the EPB switch in the on or off position will provide continuous signal (rather than momentary application/release signal) to the EPB module.

Pulling up and holding the EPB switch will provide continuous "Application" signal. The EPB module analyses this data and initiates an emergency braking process.
Releasing the EPB switch or depressing the accelerator pedal will cancel the emergency braking process.
During emergency braking, the EPB system will prevent the rear wheels from locking by controlling the application force of the parking

brake actuator.

Cooling System

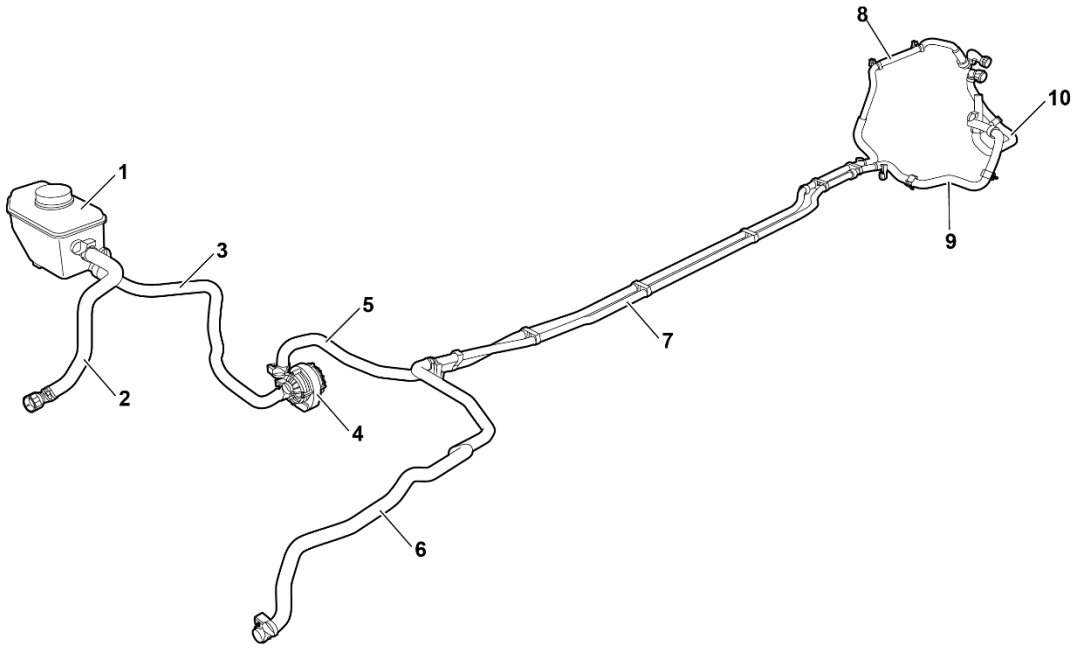


S3120240

1. Cooling Fan
2. Condenser
3. Upper Shock Pad
4. Lower Shock Pad
5. Condenser
6. Wind Scooper Assembly

Cooling System

Cooling Pipeline EDS

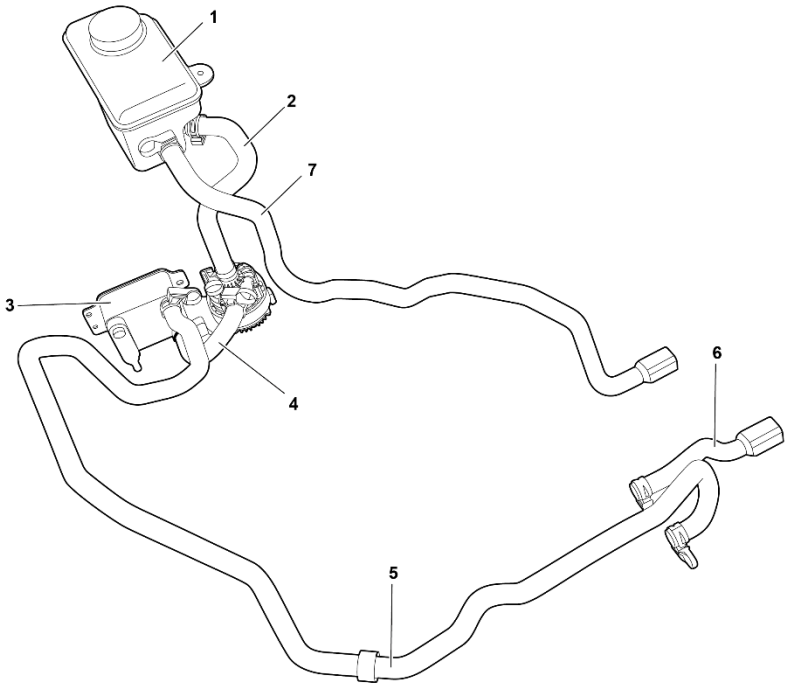


S3120238

1. Drive Motor Control Module Expansion Tank
2. Pipeline Assembly - Low Temperature Radiator to Expansion Tank
3. Pipeline Assembly - Drive Motor Control Module Expansion Tank to Water Pump
4. Drive Motor Control Module Water Pump
5. Pipeline Assembly - Electronic Water Pump to Combined Charging Unit - Electronic Water Pump to CCU
6. Pipeline Assembly - Motor to Radiator
7. Pipeline Assembly - Cooling System
8. Pipeline Assembly - Electronic Water Pump to Combined Charging Unit
9. Drive Motor Water Outlet Pipe Assembly
10. Pipeline Assembly - Combined Charging Unit to Drive Motor Control Module

Cooling System

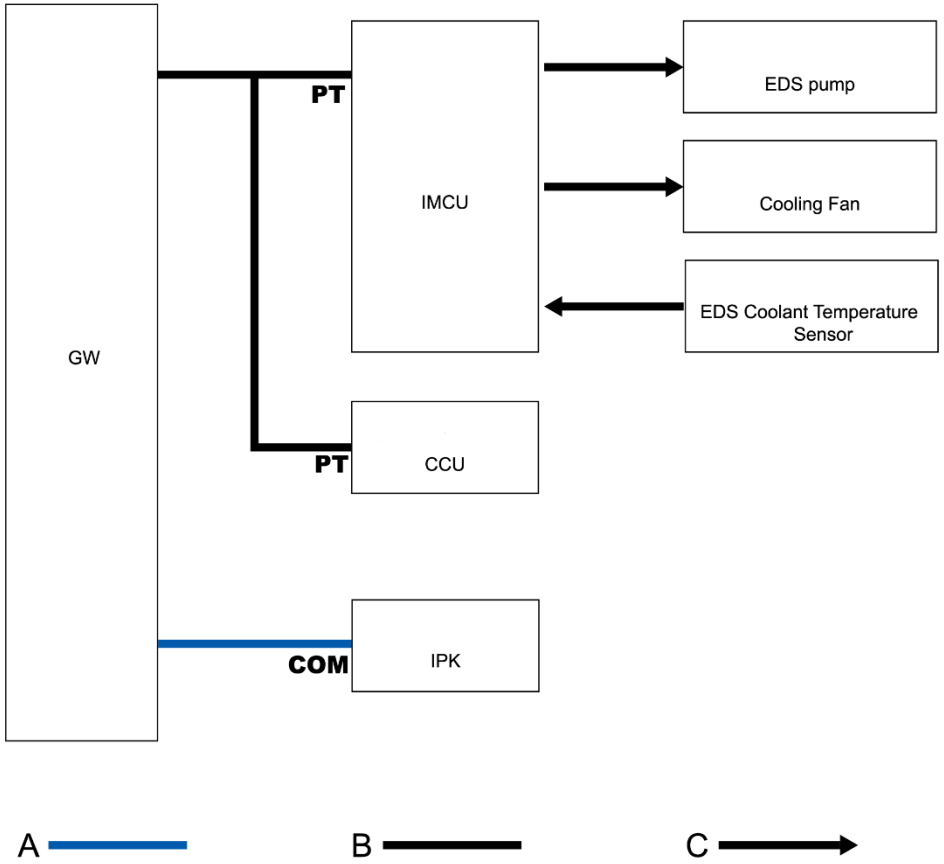
Cooling Pipeline ESS



S3120239

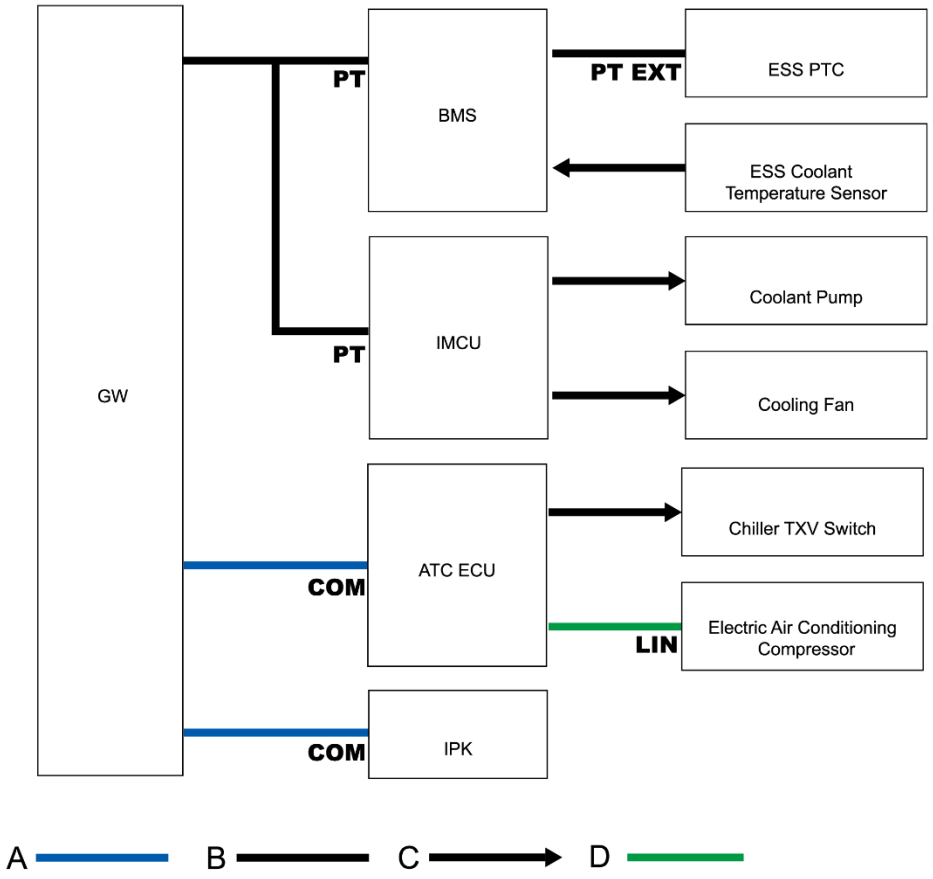
1. Battery Cooler Expansion Tank
2. Pipeline Assembly - Battery Cooler Expansion Tank to Water Pump
3. Power Battery Cooler Assembly
4. Pipeline Assembly - Water Pump to Battery Cooler
5. Pipeline Assembly - Battery Cooler to Power Battery Heater
6. Pipeline Assembly - Power Battery Heater to Power Battery
7. Pipeline Assembly - Power Battery to Battery Expansion Tank

System Control Diagram
Electric Drive Unit Cooling



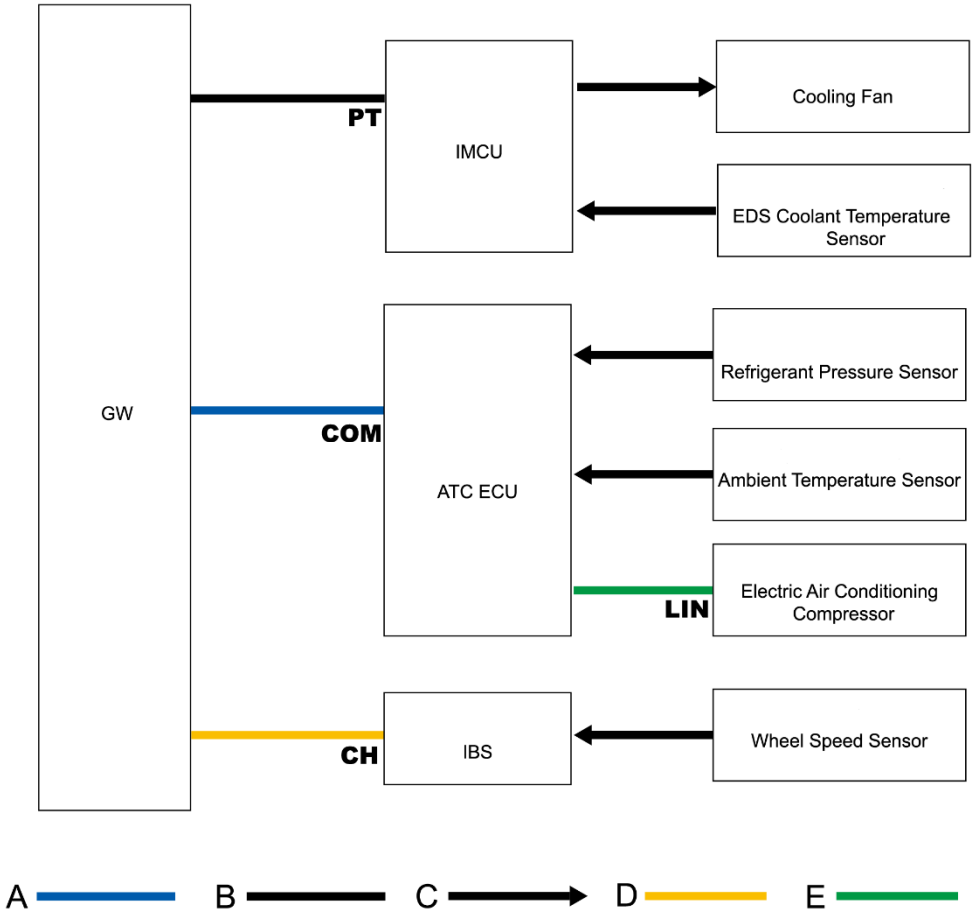
S3121028

HV Battery Pack Cooling



S3121029

Cooling Fan Control



S3121030

Overview

The cooling system is divided into 2 separate systems, namely the electric drive unit cooling system and HV battery pack cooling system. The cooling system utilizes the principle of heat conduction, and the coolant is circulated in the individual cooling systems to keep the combined charging unit (CCU), electric drive system (EDS) and battery at an optimum operating temperature.

Cooling System Components

Coolant

The coolant is composed of water, antifreeze (glycol type) and a little additive. The water quality will directly affect the property of the coolant. Coolant made of water with high hardness and much corrosive ion (for example, chloride ion, sulfate ion) can cause rust and scaling on the heat transfer surface and severe corrosion on the metal.
The coolant provides the anti-freeze, anti-boiling, anti-corrosion, anti-rust and anti-foam functions.
To keep its optimum efficiency, the coolant shall be replaced regularly.

Coolant Pump

The coolant pump drives the coolant to flow.
The electric drive unit cooling pump circulates the electric drive unit coolant by its operation.
The battery cooling pump circulates the battery cooling system coolant by its operation.

Coolant Hose

The rubber coolant hose delivers coolant among all components. The coolant hose is fixed to each component by spring clamps.

Expansion Tank

The expansion tank is used to store and supplement coolant in the system.
The level mark on the expansion tank is used to easily check the coolant level. When the coolant is below the MIN mark, refill and maintain the level between MIN and MAX to ensure normal operation of the cooling system.

Front-end Cooling Module

The cooling module consists of the radiator, condenser and cooling fan.
The radiator is used to cool the coolant, the condenser is used to cool the refrigerant, and the cooling fan is used to control the heat exchange speed between the radiator and the condenser.
The bottom of the radiator is located in the rubber bushing supported by the bracket fixed on the front longitudinal beam, and the top is in the rubber bushing supported by the bracket of the upper radiator beam.
The condenser is in front of the radiator, and the cooling fan is behind the radiator.

Battery Chiller

The battery chiller is a key component of the battery cooling system, and is responsible for regulating the temperature of the battery coolant.
The battery chiller consists of the following components: battery chiller core, battery chiller expansion valve, battery chiller bracket, refrigerant intake and exhaust pipe, coolant inlet and outlet hard pipe, chiller bracket shock pad, O-ring and mounting bolts.

Coolant Temperature Sensor

The coolant temperature sensor is on the cooling pipe, which is used to detect the temperature of the coolant.
The coolant temperature sensor is an NTC (Negative Temperature Coefficient) thermistor which contacts with the coolant and is part of the bleeder circuit.

Operation
Electric Drive System (EDS) Cooling

Coolant Circulation
The coolant of electric drive cooling system is circulated by the EDS coolant pump. The heat from the EDS, CCU, etc. is transferred to the radiator through coolant, and to the atmosphere through the airflow blown by the cooling fan.
The coolant circulates from the port of the EDS water pump back to the water pump inlet via the CCU, EDS, and radiator. The expansion tank of the cooling system is used to store and supplement coolant required by the system.

Coolant Temperature Control
When the vehicle is supplied with high voltage, the EDS cooling pump starts operation at low speed. As the temperature in the coolant circulation components increases, the coolant pump speeds up. Meanwhile, the EDS coolant temperature sensor detects the coolant temperature of the entire system. As the coolant temperature rises continuously, the cooling fan rotates at an appropriate speed to provide the required air volume for the radiator to dissipate heat.

Cooling System Alarm
When the EDS coolant temperature sensor detects excessive coolant temperature, an alarm message will be displayed on IPK.

The EDS system may also illuminate the motor overheat MIL.

High-voltage Battery Pack (ESS) Thermal Management

To ensure the operation effect of high-voltage battery pack, it is necessary to effectively and fully manage the temperature of the high-voltage battery pack through external cooling or heating.

Coolant Circulation

The coolant of high-voltage battery pack is circulated by the battery coolant pump. The coolant of high-voltage battery pack circulates from the port of the battery water pump back to the water pump inlet via the battery heater (if any), battery chiller, high-voltage battery pack and battery coolant expansion tank.

High-voltage Battery Pack (ESS) Cooling

The ESS battery cooling cycle can be started during fast charging and vehicle driving.
The heat generated by the battery pack is transferred to the battery chiller via the coolant. The battery chiller is cooled by the refrigerant.

Water pump control: The high-voltage battery pack contains multiple battery temperature sensors that send signals to BMS, which communicates with IMCU through the gateway to turn on or off the battery water pump. When the maximum battery temperature is greater than or equal to a certain value, the IMCU turns on the battery water pump; when the maximum battery temperature is less than a certain value, the IMCU turns off the battery water pump.
Battery chiller control: When the battery water pump is turned on and the battery coolant temperature is greater than the threshold, the A/C controller opens the expansion solenoid valve on the battery chiller, so that the refrigerant flows through the battery chiller to cool down the coolant. When the battery water pump is turned off, or the battery coolant temperature is less than or equal to a certain value, the A/C controller will close the expansion solenoid valve on the battery chiller.

When there is no compressor ON request in the passenger compartment, the compressor is turned on after the expansion solenoid valve of battery chiller is opened; after the compressor is turned off, the expansion solenoid valve of battery chiller is closed. If the cooling requirements of the passenger compartment and battery cannot be met at the same time, the system will prioritize the battery cooling over the passenger compartment cooling.

High-voltage Battery Pack (ESS) Heating (If fitted)

The ESS battery heating cycle can be started during fast charging under low temperature.

The high-voltage battery heater (PTC) heats the battery coolant, which transfers the heat to the battery through rotation of the water pump for the purpose of heating the battery.

Water pump control: When the minimum battery temperature is less than a certain value, the IMCU turns on the battery water pump; when the minimum battery temperature is greater than or equal to a certain value, the IMCU turns off the battery water pump.

High-voltage battery heater (PTC) control: When the battery water pump is turned on, the high-voltage battery heater (PTC) receives the PT EXT signal from BMS to turn on the heating function, and adjusts the output power in real time to warm up the high-voltage battery pack in an optimal manner; when the battery temperature rises to a certain value, the BMS controls the battery heater (PTC) to stop heating before turning off the water pump.

Battery Thermal Management System Alarm

When the BMS detects excessive battery temperature, it will transfer the information to IPK, which will display the relevant alarm prompt or illuminate the alarm lamp.

Cooling Fan Control

Cooling Fan Control

The PWM cooling fan is controlled by the IMCU. When the cooling fan operates, the IMCU controls the PWM module, so that the cooling fan operates at 8 speeds within the duty ratio range of 92% to meet different cooling load requirements.

Cooling fan ON and OFF after high voltage is applied:

Cooling fan ON - If any of the following conditions is met, the cooling fan is turned on:

The EDS cooling pump is turned on, and the EDS coolant temperature is 55℃ or above;

The compressor is turned on, and the A/C pressure is 0.22 Mpa or above.

Cooling fan OFF: The above conditions for turning on the cooling fan are not met.

Cooling fan ON and OFF after high voltage is off:

Cooling fan ON: The EDS coolant temperature is 63℃ or above;

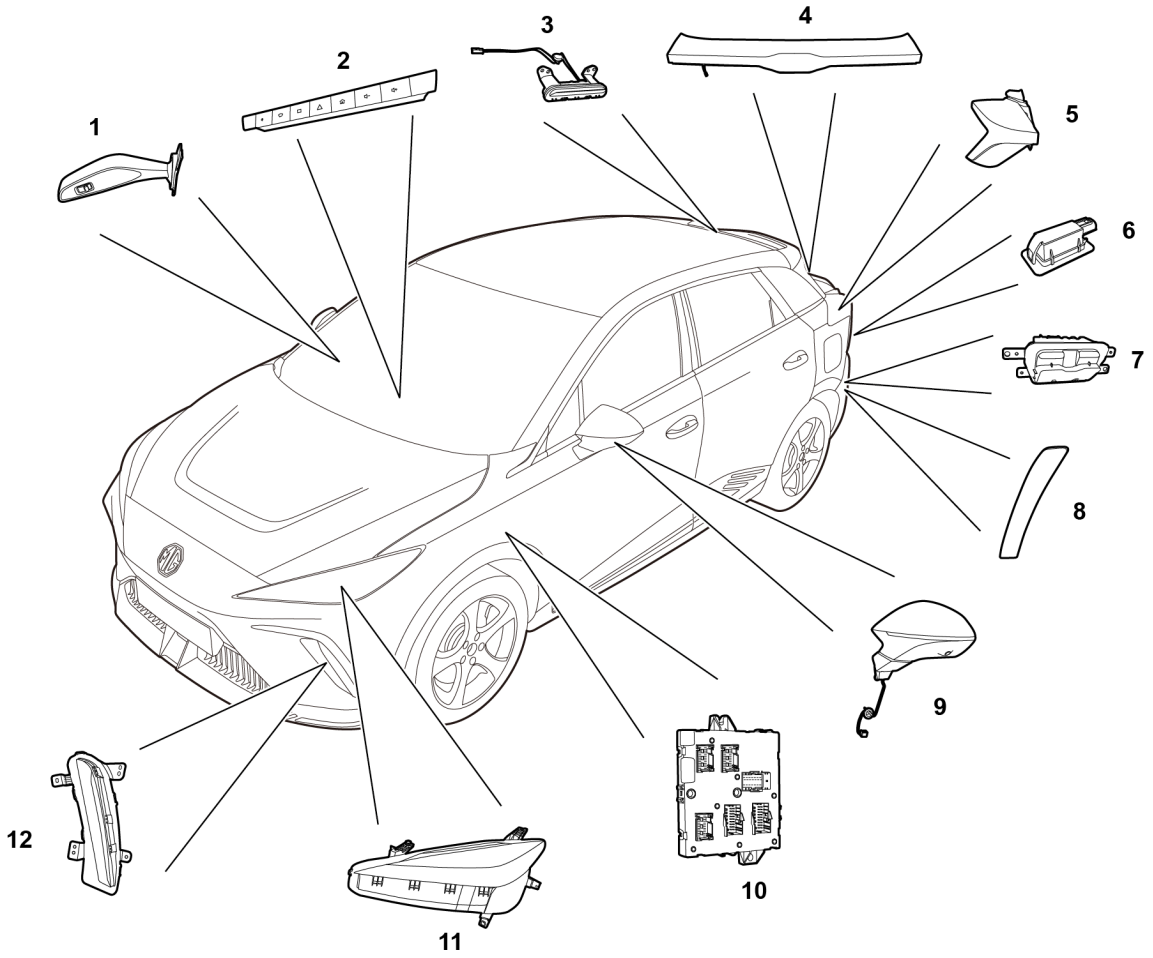
The ambient temperature is 5℃ or above for 120 seconds.

The ambient temperature is < 5℃ for 60 seconds.

Speed change of cooling fan after turned on when high voltage is applied:

The speed of cooling fan is determined by the EDS coolant temperature, ambient temperature, A/C refrigerant pressure and vehicle speed.

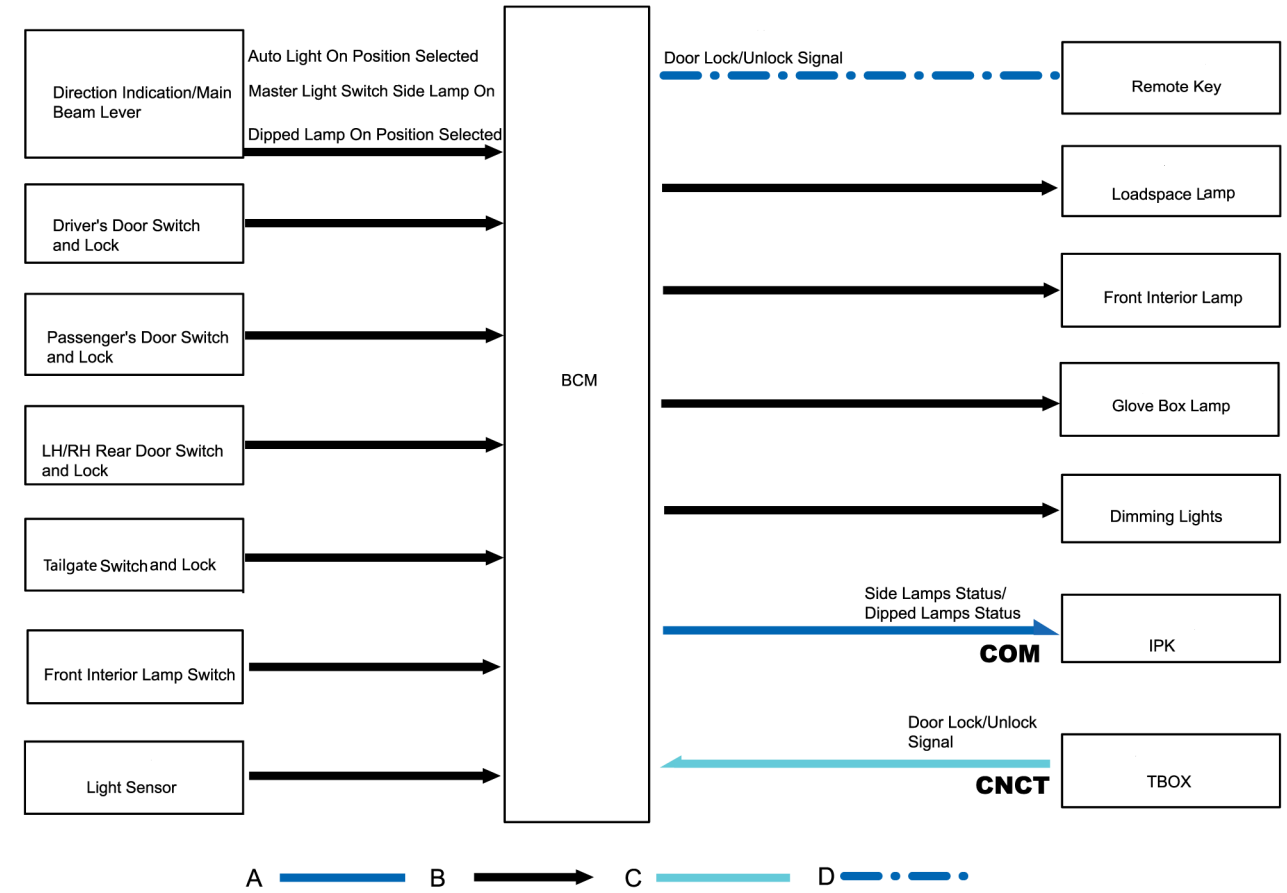
System Layout
External Lighting



S6510995

1. Light Stalk Combination Switch
2. Hazard Warning Lamp Switch
3. High-mounted Stop Lamp
4. Through-type Rear Width Lamp
5. Tail Lamp
6. Rear License Plate Lamp
7. Rear Fog Lamp
8. Reflex Reflector
9. Side Direction Indicator Lamp
10. Body Control Module
11. Headlamp
12. Front Direction Indicator Lamp

System Control Diagram

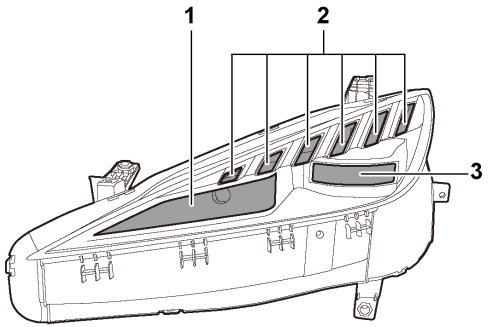


S4410156

Description
Overview
The exterior lighting system includes all external lamps, which are controlled by the master light switch and auto lamp control sensor. Exterior lighting system includes:

- Headlamp
- Front Direction Indicator Lamp
- Tail Lamp
- Through-type Rear Width Lamp
- Rear License Plate Lamp
- High-mounted Stop Lamp
- Rear Fog Lamp
- Side direction indicator lamp

Headlamp
Headlamp (Low Configuration)

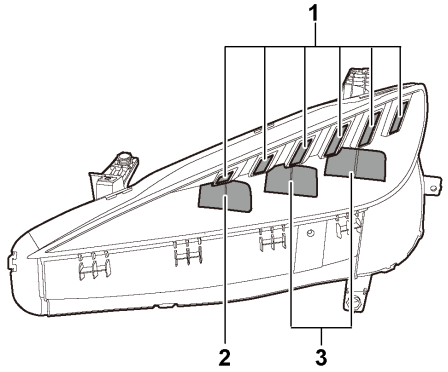


S6514225

1. Direction Indicator Lamp (LED)
2. Daytime Running Lamp / Width Lamp (LED)
3. High/Low Beam (LED)

The headlamp has 5 retaining bolts, 1 of which is fitted on the front-end module, 1 is fitted on the front bumper side bracket, 1 is fitted on the fender, and 2 are fitted on the front bumper beam.
The headlamp assembly includes the high/low beam, daytime running lamp, width lamp and direction indicator lamp, which are all LED lamps.

Headlamp
Headlamp (high configuration)

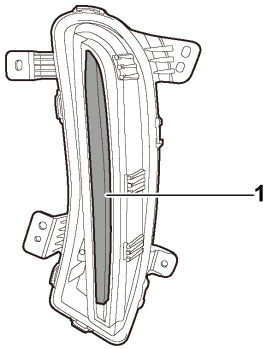


S6514226

1. Daytime Running Lamp / Width Lamp (LED)
2. High Beam (LED)
3. Low Beam (LED)

The headlamp has 5 retaining bolts, 1 of which is fitted on the front-end module, 1 is fitted on the front bumper side bracket, 1 is fitted on the fender, and 2 are fitted on the front bumper beam.
The headlamp assembly includes the high/low beam, daytime running lamp and width lamp, which are all LED lamps.

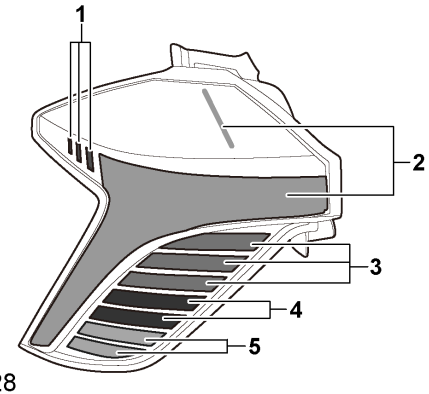
Front Direction Indicator Lamp



S6514227

1. Direction Indicator Lamp (LED)

The front direction indicator lamp is fixed to the front bumper assembly with 4 screws.
The front direction indicator lamp assembly includes the direction indicator lamps (LED).
Tail Lamp

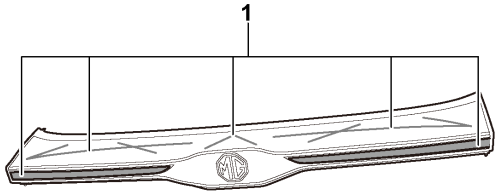


S6514228

1. Side Marker Lamp (LED)
2. Rear Width Lamp (LED)
3. Rear Direction Indicator Lamp (LED)
4. Reverse Lamp (LED)
5. Brake Lamp (LED)

The tail lamp is fixed on the bodyside panel with 2 bolts.
The tail lamp assembly includes side marker lamp, rear width lamp, reverse lamp, brake lamp and rear direction indicator lamp. The rear width lamp is located above the tail lamp assembly, the side marker lamp is at the upper left of the tail lamp, the brake lamp is at the bottom of the tail lamp assembly, the rear direction indicator lamp is in the middle part of tail lamp assembly, and the reverse lamp is located at the lower part of tail lamp assembly.

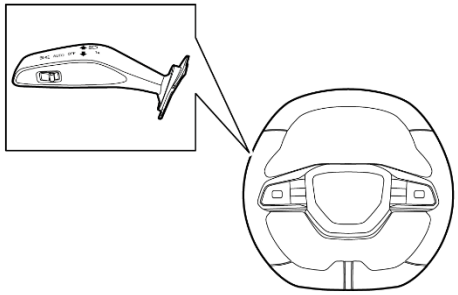
Through-type Rear Position Lamp (If equipped)
Through-type Rear Position Lamp



S6514224

1. Rear Width Lamp (LED)
The through-type rear width lamp is fixed on the tail gate with 9 nuts.
The through-type rear position lamp assembly includes the width lamp (LED).
Rear License Plate Lamp
Both rear license plate lamps are fitted on the through-type rear width lamp, which are located at both sides of the tailgate switch, with bulbs inside (TBD).
Side Direction Indicator Lamp
The side direction indicator lamp (LED) is fixed on the exterior rearview mirror.
High-mounted Stop Lamp
The high-mounted stop lamp (LED) is in the upper part of the rear window, and it is fixed to the spoiler with 2 nuts, which can be seen when removing the spoiler.

Master Light Switch



S6514193

The master lighting switch is located at the left side of the steering wheel, which is used for controlling the external lighting.

Operation

Exterior Lighting Control and Monitoring

The BCM controls the following exterior lighting:

- High Beam Headlamp
- Low Beam Headlamp
- Rear Fog Lamp
- Reverse Lamp
- License Plate Lamp
- Width Lamp/Daytime Running Lamp
- Direction Indicator Lamp/Hazard Warning Lamp
- Brake Lamp/High-mounted Stop Lamp

Automatic Light Control

When the touch switch is in "AUTO" position, the light sensor will turn on/off the headlamp automatically by sensing the intensity of the outside light (visible light).

When the switch is in "AUTO" position for night driving, the following lamps will:

- When the vehicle power OFF, the low beam headlamp and the width lamp do not illuminate.
- When the vehicle power ON, the width lamp illuminates.
- When the vehicle power ON, the low beam headlamp and the width lamp illuminate.

Smart High Beam (if equipped)

Under automatic control, when the low beam is turned on, the front view camera module (FVCM) will monitor the light signal in front of the vehicle and transmit it to the BCM . The BCM controls on/off of the high beam, and the smart high beam indicator light on the instrument pack comes on.

The smart high beam function will be activated when a combination of the following conditions are met:

1. The touch switch is in "AUTO" position and the low beams are automatically turned on.
2. The vehicle is traveling at a speed of over 40km/h.
3. The rear fog lamps are not ON.

When under automatic control and the low beam remains on, if the road ahead is dark, the system will turn on the high beam. The high beam will switch to the low beam automatically when any of the following conditions occurs:

- The headlamp of the approaching vehicle from the opposite direction is detected by the front view camera module (FVCM).
- Tail lamps of the vehicle ahead in the same direction are detected by the front view camera module.
- The surroundings are bright enough and no high beam is required such as street lamps.
- The vehicle speed is reduced to below 40km/h.

When under automatic control, the working state of manual switching of high/low beam is:

- With the smart high beam function activated, toggle the high/low beam shift switch consecutively in 2s, the system will not exit the smart high beam function.
- With the smart high beam function activated, toggle the high/low beam shift switch twice consecutively with an interval more than 2s, the smart high beam function will be disabled. Toggle the high/low beam shift switch consecutively in the next 2s or restart the vehicle and place the touch switch in "AUTO" position again, the smart high beam function can be re-activated.

Note: The intelligent high beam function can be activated up to three times in a starting cycle.
The smart high beam function cannot be switched automatically in the following conditions and manual switching of high/low beam is required:

- Sensor view is affected by severe weather such as dense fog, heavy rain, heavy snow, etc.
- Driving in the moonlight or in the circumstances with weak road lighting ahead, or in the areas with poor light but lots of buildings.
- Driving on the high-reflection road, for example, after the rain, snow or other high-reflection conditions.
- When there are high-reflection objects near the road such as traffic signs.
- Distinct light source, such as external devices, exists in the vicinity of the windshield sensor, resulting in sensor dazzling.
- The windshield is dirty, broken or view-blocked due to objects in front of the sensor.
- The lamplight of other vehicles cannot be detected due to the missing, broken, blocked or partly blocked lamp, or other causes.
- The headlamp and tail lamp light of other vehicles cannot be detected due to high/low sensor view during the vehicle's driving uphill/downhill an abrupt slope, with loads or in a pit.
- Driving on a curving road or on a mountain road.

Brake Lamp

The brake lamp switch through outputs sent to the BCM.

Emergency Brake Lamp

The brake lamp or hazard warning lamp will flash under the following conditions:
1. The brake lamp switch inputs the activation signal.
2. IBS System sends the corresponding activation signal.
When the emergency brake is activated, if the hazard warning lamp is working, the emergency brake lamp will not flash.
If the activated hazard warning lamp causes failure of the emergency brake lamp, the emergency brake lamp will not flash again after the hazard warning lamp is canceled unless the above conditions are met.

The emergency brake lamp can be activated only when the vehicle speed exceeds 50km/h. After the emergency brake lamp is activated, when the activation signal of the IBS /hard brake disappears and the vehicle speed is greater than 2km/h, the emergency brake lamp will go out after illumination for 2s. With the emergency brake lamp activated, when the activation signal of the IBS /hard brake disappears and the vehicle speed is less than 2km/h, the emergency brake lamp will go out after illumination for 5s.
With the vehicle speed less than 10km/h for more than 1s, if the emergency brake lamp goes out, the hazard warning lamp will be activated automatically; before the vehicle speed drops below 10km/h, if the emergency brake lamp stops flashing, the hazard warning lamp will not be activated automatically even if the vehicle speed is already below 10km/h. If the hazard warning lamp is activated, press the hazard warning lamp switch or keep the vehicle speed above 20km/h for more than 5s or restart the vehicle, and the hazard warning lamp will go out.

When the IBS system cannot receive any activation signal of the hard brake, the BCM can illuminate the emergency brake lamp via the acceleration signal of IBS.

Brake Lamp Activation Request from Other Systems

When the BCM receives the brake lamp activation request signal from the IBS or FVCM , the BCM will illuminate the brake lamp according to the valid signal.

Direction Indicator Lamp

When the vehicle power on and the light stalk switch is shifted to left/right turn position, the BCM flashes the corresponding direction indicator lamp by identifying the switch status of the direction indicator lamp. Then the direction indicator lamp on the instrument pack flashes and provides the current status of the direction indicator lamp for the driver by acoustic warning.

Rear Fog Lamp

When the vehicle power on, the low beam headlamp is enabled, then the activation of the rear fog lamp switch can illuminate the rear fog lamp. When the rear fog lamp switch or the low beam headlamp is disabled, the rear fog lamp goes out. If the rear fog lamp is already activated at the time of engine start, it will remain ON.

Hazard Warning Lamp

The hazard warning lamps are comprised of the front/rear direction indicator lamps and side direction indicator lamps.
The hazard warning lamp switch is marked with a triangle, which is a touch switch. When the hazard warning lamp is activated, the triangle mark will flash. When the width lamp or headlamp is enabled, the triangle mark dims but still flashes. The hazard warning lamp can be activated manually regardless of current position of the start switch.

Operation Priority of Direction Indicator Lamp and Hazard Warning Lamp

If the direction indicator lamp switch is enabled when the hazard warning lamp is working, the direction indicator lamp will cancel the hazard warning lamp. Then, the hazard warning lamp will still flash after the direction indicator lamp switch or the start switch is turned off.
If the hazard warning lamp switch is enabled when the direction indicator lamp is working, the hazard warning lamp will replace the direction indicator lamp. The direction indicator lamp will resume after the hazard warning lamp is disabled.

The hazard warning lamp can be activated automatically under the following situations:
In case of impact, when the BCM detects an impact signal, it will activate the hazard warning lamp automatically for warning. Accidental activation of the hazard warning lamp during an impact can be canceled by pressing the hazard warning lamp switch for more than 5s.

Low Beam Headlamp

When the vehicle power on, and the instrument panel touch switch is turned to the low beam position, the BCM closes the low beam relay and illuminates the low beam.

High Beam Headlamp

When the vehicle power on, the BCM closes the high beam relay and illuminates the high beam headlamp by identifying the status of the light stalk switch.

Width Lamp

When the touch switch is in "Auto" mode, width lamp position or low beam headlamp position, the width lamp illuminates. When only the width lamp is turned on, the daytime running lamps can be illuminated for the headlamps to supplement the light source.
When the touch switch is in " AUTO " mode, if the BCM receives the "Low Outside Light Intensity" signal from the light sensor, it will illuminate the width lamps automatically.

Reverse Lamp

When the vehicle power on, and the IMCU detects that the shift lever is in R position, it will send reverse signal to the BCM through the CAN bus. Once the BCM determines the signal is valid, it illuminates the reverse lamp immediately. When the BCM detects that the signal is invalid (the vehicle power off or the shift lever is not in the "R" position), it will turn off the reverse lamp.

Additional Functions

Vehicle Locating Function

This function helps the driver to quickly locate his vehicle with the body lamp at night. The response mode of the vehicle locating function can be set: (Lamps Only/Lamps + Horn). After the vehicle is locked for several minutes, the vehicle locating function is enabled and the audible and visual warning is triggered by pressing the LOCK button on the remote key. When the LOCK button is pressed again, the vehicle locating function can be disabled. Press the UNLOCK button to cancel the vehicle locating function.

Follow Me Home
When the driver vehicle power on and is about to leave the vehicle, the Follow Me Home function can control the timed illumination of the dipped beam and width lamp to illuminate the area around the vehicle. The duration of the illumination (0-90s) can be set according to individual needs (increase at an increment of 30s). If the door is opened after the Follow Me Home function timer is working, the timer will repeat the operation.

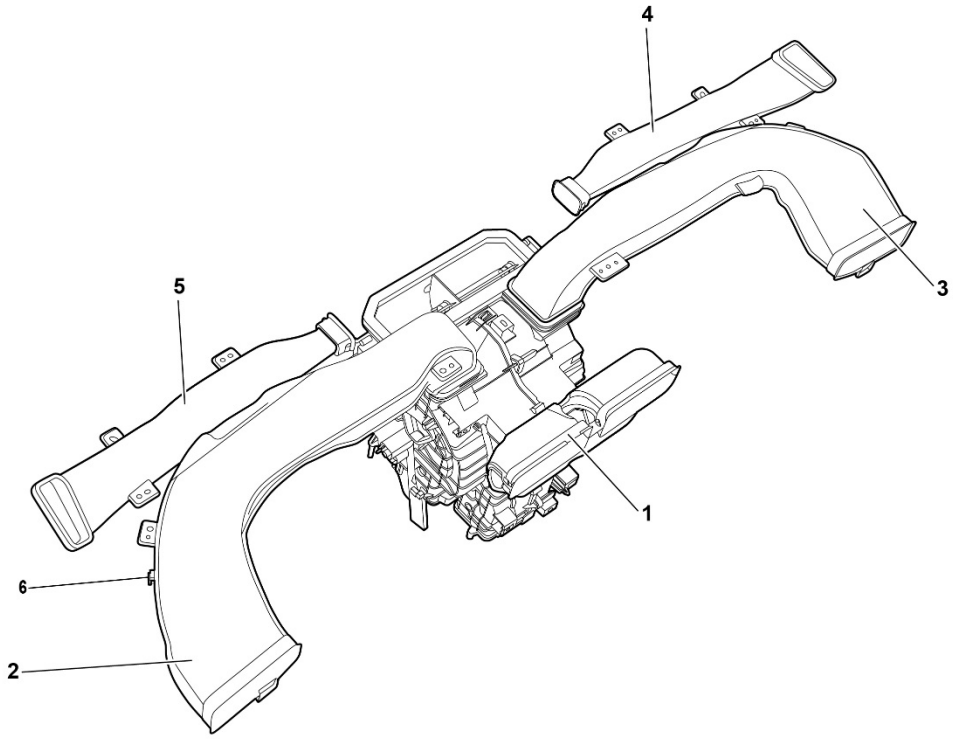
The BCM can identify the status of the Follow Me Home function according to the activation signal of this function.
The Follow Me Home function can be set by manual mode as follows:
After the vehicle power off, turn the light stalk switch to the steering wheel, the system enters the Follow Me Home mode.
With the Follow Me Home activated, pull the light lever switch the Follow Me Home function.
When the enabled start switch, alternator failure or battery over discharge is detected, the Follow Me Home function cannot work properly.

License Plate Lamp
The license plate lamp is controlled by the BCM. When the touch switch is in width lamp position or headlamp position, the license plate lamp illuminates.

Daytime Running Lamp
The BCM controls the daytime running lamp via the HSD circuit. When the vehicle power on, and the light sensor determines that it is daytime, the daytime running lamp will illuminate. When the low beam is turned on, the daytime running lamp goes out automatically.

Lamp of Security System
When a valid request signal of external locking is received and then the vehicle security system is enabled and the vehicle is locked or enters the complete anti-theft state, the BCM will control the direction indicator lamps to give 3 flashes.
If the anti-theft function of the security system is disabled, the direction indicator lamps give 1 flash.
If the vehicle is not fully locked (bonnet, tailgate and doors are open), the direction indicator lamp will not flash.

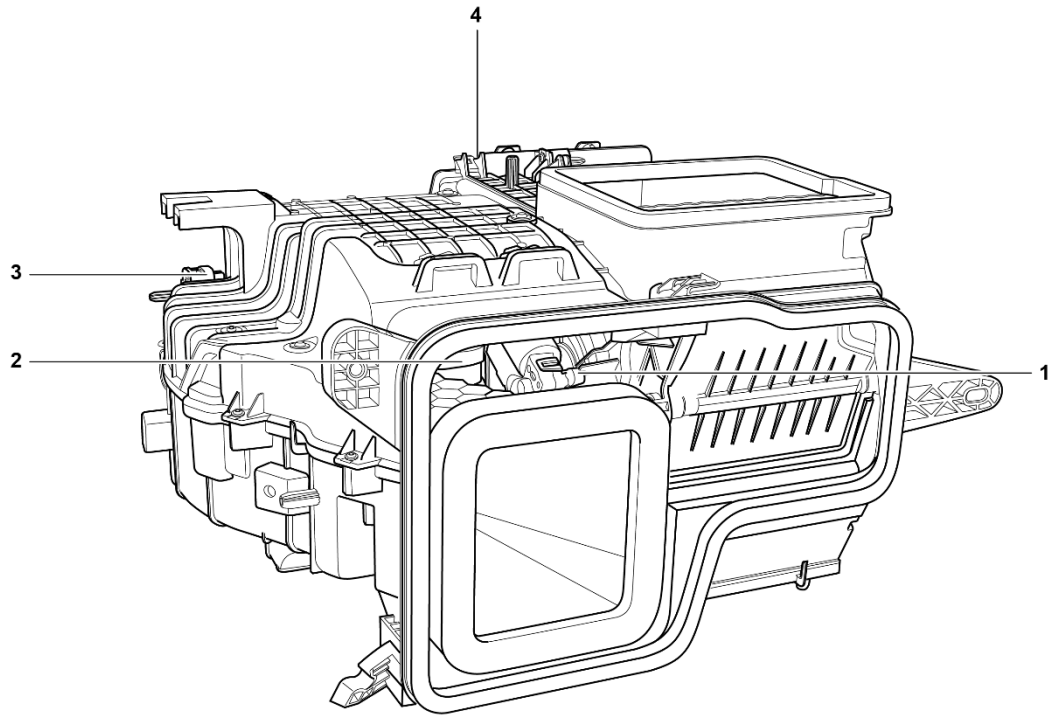
System Layout
Air Duct



1. Instrument Panel Air Duct - Centre
2. Instrument Panel Air Duct - Left
3. Instrument Panel Air Duct - Right
4. Side Defrost Air Duct - Right
5. Side Defrost Air Duct - Left
6. A/C Box Face Air Outlet Temperature Sensor

S3210111

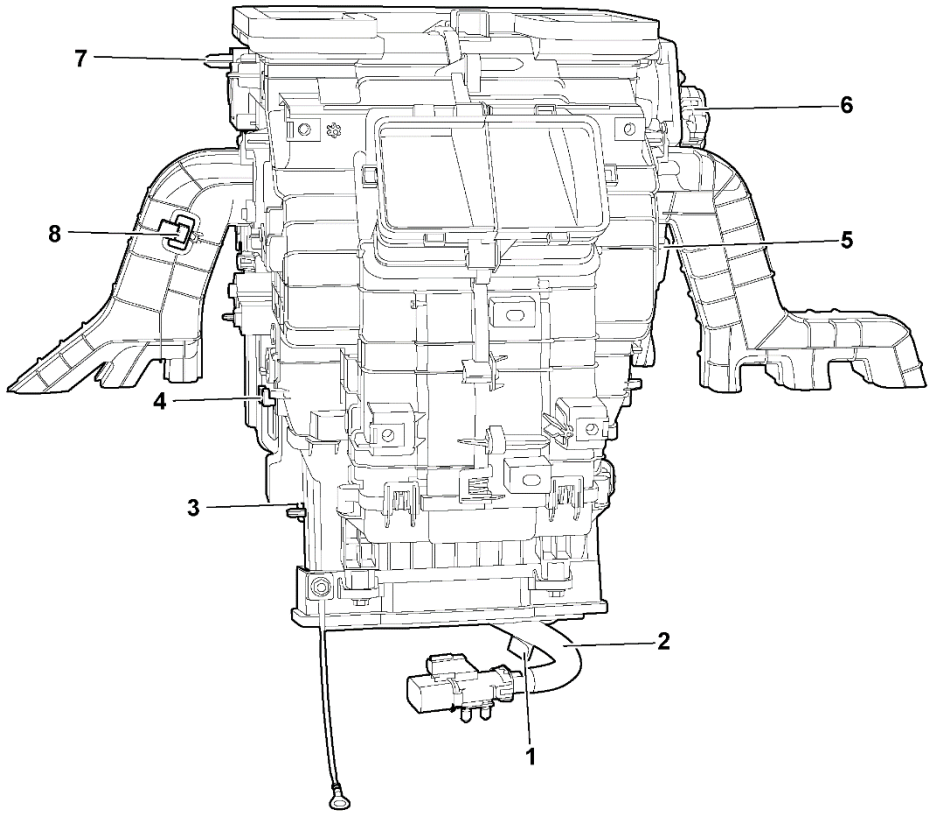
A/C Air Inlet Box



1. Internal/External Circulation Damper Actuator
2. Blower Assembly
3. A/C Air Inlet Box Harness
4. A/C Filter Element Cover

S3210113

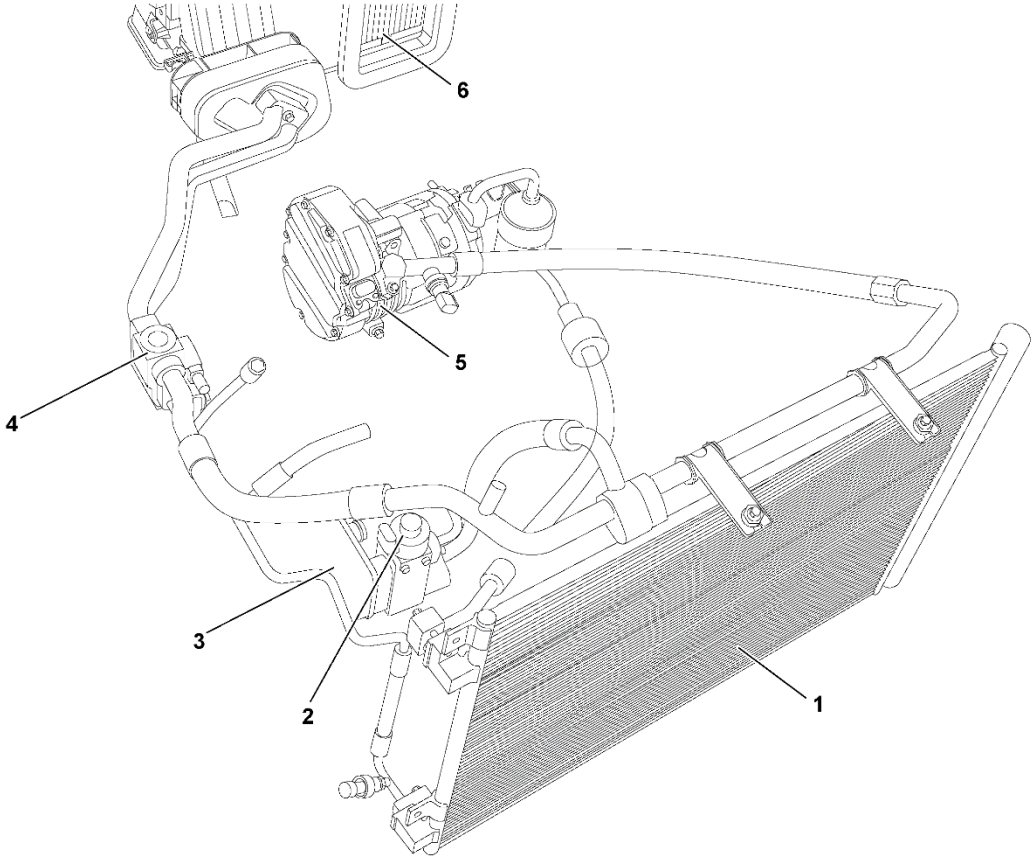
A/C Distribution Box



S3210112

1. Drain Pipe
2. Electric Heater
3. Evaporator Assembly
4. PTC Temperature Sensor
5. Temperature Damper Actuator
6. Mode Damper Actuator
7. Mode Damper Actuator
8. Footwell Air Outlet Temperature Sensor

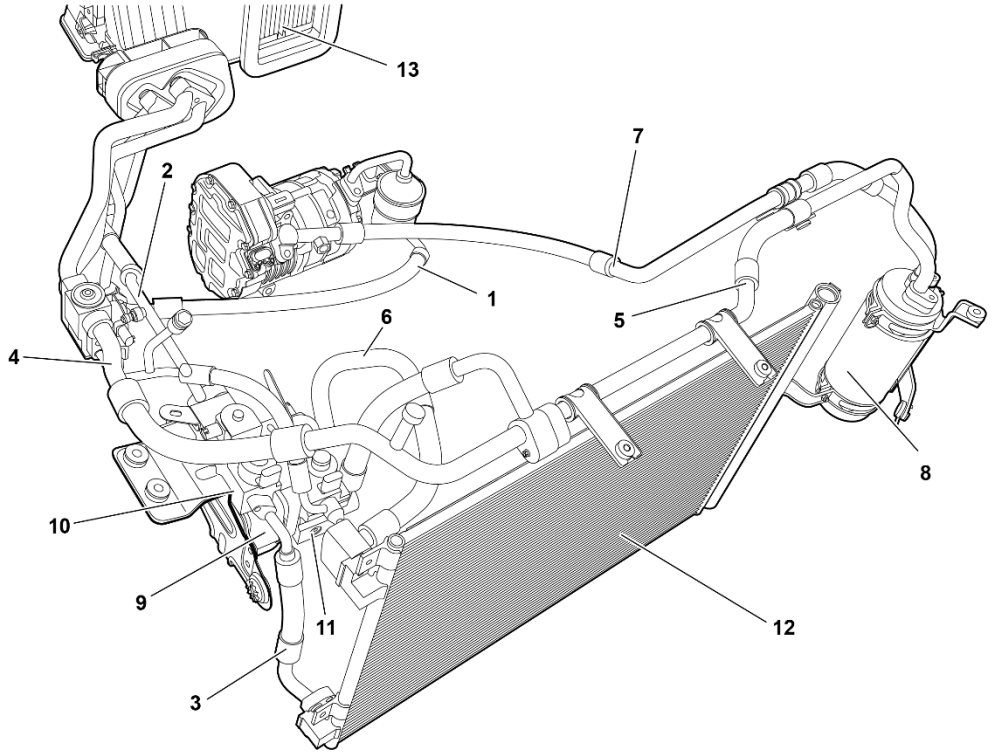
Cooling System Components - Non-thermal Pump



1. Condenser
2. Electronic Expansion Heating Valve Assembly
3. Chiller
4. A/C Expansion Valve
5. A/C Compressor Assembly
6. Evaporator Assembly

S3210114

Cooling System Components - Thermal Pump (Non-UK)



S3210125

1. Pipeline Assembly - A/C Compressor to Internal Condenser
2. Pipeline Assembly - Internal Condenser to External Condenser
3. Pipeline Assembly - A/C Condenser to Evaporator
4. Evaporator Pipe Assembly
5. Pipeline Assembly - Evaporator to A/C Gas-liquid Separator Assembly
6. Pipeline - A/C Heat Pump System Valve Integration Module to Condenser
7. Pipeline Assembly - A/C Gas-liquid Separator to Compressor
8. A/C Gas-liquid Separator
9. A/C Heat Pump System Valve Integration Module
10. Electronic Expansion Bypass Valve Assembly
11. Electronic Expansion Heating Valve Assembly
12. Condenser
13. Evaporator Assembly

Overview

HVAC: HVAC is used to control the interior air temperature, humidity, cleanliness and airflow in an optimum state, provide a comfortable ride for the occupant and relieve travel fatigue; meanwhile, it creates a good working condition for the driver and plays an important role in ensuring safe driving.

According to the setting on the control panel, the blower provides power source, fresh air or interior air filtered by A/C filter flows through the A/C box before being heated or cooled, and supplies to the windscreen or passengers via the air duct.

The entire A/C system consists of ventilation, cooling, heating and control components. It contains the A/C filter assembly, A/C box assembly (heater core or electric heater, evaporator, interior condenser, etc.), air duct, A/C controller, control panel, etc.

Ventilation Components

Ventilation components, consist of the A/C filter, A/C air duct, A/C box (divided into air inlet box and distribution box, including the housing, damper, damper actuator, blower, etc.) and relief valve, etc.

A/C Filter

The A/C filter is used to filter fine particles such as dust and pollen to improve the quality of the air flowing into the cabin.

The A/C filter is fitted on the A/C box assembly; it shall be checked on a regular basis, and replaced when necessary.

A/C Air Duct

The instrument panel central air duct and defrost air duct are fitted to the instrument panel.

4 air outlet assemblies in the instrument panel allow occupants to control the flow and direction of air distribution to face. Each vent assembly incorporates movable vanes to control direction.

The front footwell air outlet is fitted in the port beside the A/C box assembly.

A/C Box Assembly

The A/C box assembly includes the air inlet box and distribution box.

The distribution box contains the blower, internal/external/fresh air circulation actuators, etc.; the distribution box contains the A/C air filter, heater core or electric heater, interior condenser, electric heater, evaporator core and control damper, etc.

The passage in the A/C box assembly introduces air into the A/C box and divides it into three parts, air is supplied to the air outlets of "face", "footwell" and "defrost". An internal/external/fresh air circulation damper is mounted in the air inlet box assembly, which adjusts the interior or exterior air as the circulating air. The drain outlet at the bottom of the box body directs condensed water from the box body to the lower side of the vehicle.

Damper Actuator

The damper is fitted in the A/C box assembly to control the source of inlet air, the outlet air temperature and the air distribution direction.

Recirculation damper: the damper actuator drives the recirculation damper to open and close the fresh and recirculating air inlets so as to control the inlet air.

Temperature damper: the damper actuator drives the temperature damper to change the mixing ratio of the cold/warm air so as to control the temperature of the A/C outlet air.

Mode damper: the damper actuator drives the mode damper to change the air passing through the A/C box and air ducts so as to meet different users' needs, such as, face, footwell, windscreen, etc.

Blower

The blower is the power source of the whole ventilation system, which is used to drive interior air circulation or introduce fresh air into the vehicle.

The blower is fitted in the air inlet box assembly. Control of the blower air volume can be realized by using the button on the control interface to control the PWM duty ratio.

Relief Valve

The relief valve facilitates the smooth flow of the air through the passenger compartment. When the blower introduces fresh air or the doors are closed, the relief valve will open to maintain the air pressure inside the vehicle, which can protect the eardrums of the occupants to a certain extent.

The relief valve is located at both sides of the trunk, which allows air in the passenger compartment to be discharged to the covered area between the body and rear bumper. The relief valve is an effective check valve and each relief valve port is composed of a grille covered by a soft rubber damper. The relief valve opening degree can be automatically adjusted according to the pressure difference between the passenger compartment and the external environment.

Heater Components

They provide heat source for the A/C heating. The model comes standard with an electric heater, and the heat pump system is optional. The heat pump system is included in the same section with the refrigeration system, because both systems share relevant components. On models with heat pump system, to reduce the power loss of the large battery, and increase the driving range of the vehicle, the heat pump heating is first performed under the premise of meeting the related heating demand of the passengers, and take the electric heater as an assist for heating according to different conditions.

High-voltage Electric Heater (HV PTC)

The A/C controller controls the on/off of the electric heater and the heating level according to the settings on the A/C interface and different working conditions, and its working state will not be displayed on the A/C display.
The high-voltage electric heater features low-voltage control and high-voltage power supply. The A/C controller controls the heating level of the high-voltage electric heater via the LIN bus according to the heating requirements.
Refrigeration System (& Heat Pump System)
Both the refrigeration principle and the heat pump principle utilize the state change of the refrigerant to absorb or release heat to the air inside the vehicle.

On models with heat pump system, the refrigeration system and the heat pump system share a system in which the heat transfer medium is a refrigerant. When the passengers in the vehicle have different temperature demands, the controller performs different flow direction controls of the refrigerant by turning on or off the relevant solenoid valves after operating the relevant cooling or heating button to achieve functions such as cooling, heating, dehumidification and cooling, and dehumidification and heating.
The entire system includes the compressor, external heat exchanger, interior condenser, evaporator, expansion valve, solenoid valve, associated sensors and control system (A/C controller and heat pump controller), etc.

Refrigeration Principle

The refrigeration principle is compression-type evaporative heat absorption. By the action of the compressor, a low-temperature and low-pressure refrigerant is compressed into a high-temperature and high-pressure refrigerant, so that the volume of the vapor is reduced, the pressure is increased, and it is cooled into a liquid refrigerant after passing through the condenser, and it passes through the expansion valve, and rapidly evaporates and expands to absorb the temperature of the air inside the vehicle to achieve the cooling effect. The system comprises a compressor, a condenser, TXV, A/C pipeline and an evaporator. The system is a closed loop which uses the refrigerant as the heat transfer medium. Add A/C oil to the refrigerant to lubricate the internal components of the compressor.

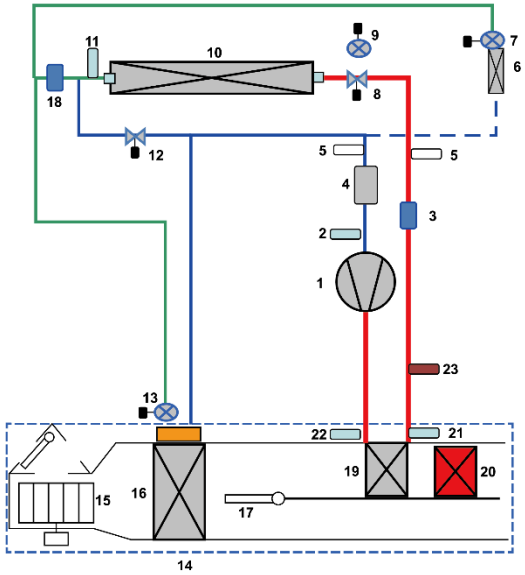
Heat Pump Principle

Heat Pump is a device that transfers the heat energy of a low-level heat source to a high-level heat source. It is also a new energy technology that has received worldwide attention.

Water flows from a high place to a low place, and heat is transferred from a high temperature object to a low temperature object. This is a natural law. However, in the real life, people utilize pumps to pump water from low places to high places for the needs of agricultural irrigation, domestic water use, etc. Similarly, in today's increasingly energy-intensive world, in order to recover heat from low-temperature hot gases normally discharged into the atmosphere, and low-temperature hot water discharged into rivers, etc., the heat pump is used to transfer heat energy from a low-temperature object to a high-temperature object, and the high temperature object is used to heat water or for heating to make full use of heat.

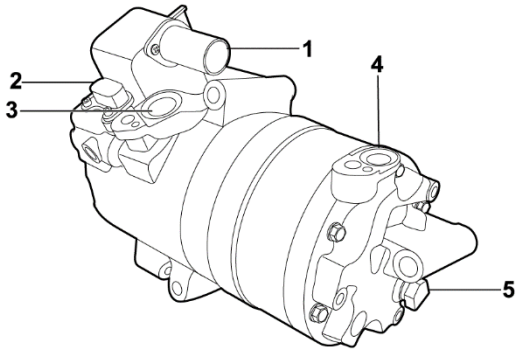
The heat pump technology medium used in the vehicle's air conditioner is a refrigerant. The compressor circulates the refrigerant, when the refrigerant passes through the external heat exchanger, it absorbs the temperature of the air outside the vehicle. After the vapor is compressed by the compressor, its pressure and temperature rise, and the heat is brought into the vehicle through the interior condenser to achieve heating effect.

A/C System Schematic Diagram - Heat Pump



1. Compressor
2. Compressor Intake Air Temperature/Pressure Sensor
3. Filter Valve
4. Gas-liquid Separator
5. Filler Port
6. Battery Chiller
7. Electronic Expansion Valve
8. Bypass Valve
9. Electronic Expansion Valve
10. External Heat Exchanger
11. External Heat Exchanger Outlet Temperature Sensor
12. Heating Valve
13. Thermostatic Expansion Valve
14. A/C Box Assembly
15. Blower
16. Evaporator
17. Damper
18. Filter Valve
19. Interior Condenser
20. High Pressure PTC
21. Interior Condenser Outlet Temperature Sensor
22. Interior Condenser Inlet Temperature Sensor
23. Refrigerant Pressure Sensor

Compressor

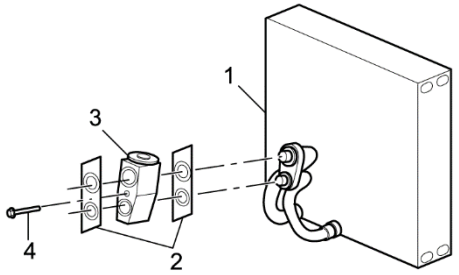


S3110071

1. High Pressure Compressor Harness Interface
2. Low Pressure Connector
3. Air Intake Port
4. Exhaust Port
5. Relief Valve

The compressor is the power source of refrigerant circulation.
The compressor compresses the low pressure/low temperature vapour from the evaporator and converts it into the high pressure/high temperature gas refrigerant of the condenser.
With fixed displacement, the compressor, under the mounting bracket of the transmission, provides the A/C system with required amount of refrigerant by the change of high-voltage motor speed.

Thermostatic Expansion Valve (TXV) TXV and Evaporator

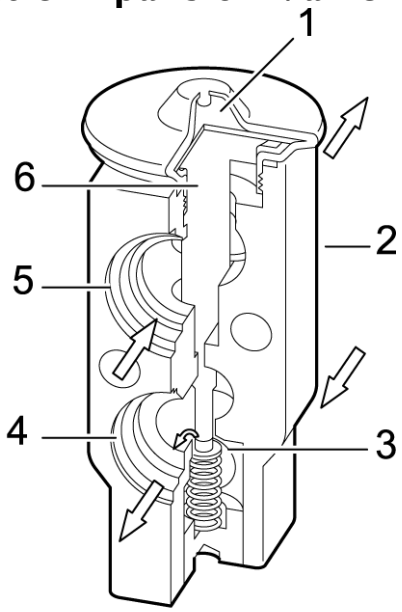


1. Evaporator
2. O-ring
3. TXV
4. Bolt

S3210198

The TXV regulates the flow of the refrigerant and matches the refrigerant flow with the heat load of the air passing through the evaporator core. The TXV is fitted on the inlet and outlet ports of the evaporator. The valve consists of an aluminum housing containing inlet and outlet passages. A metering valve is fitted in the inlet passage and the metering valve is controlled by a temperature sensitive tube connected to a diaphragm. The top of the diaphragm is filled with refrigerant and senses evaporator outlet pressure and the tube senses evaporator outlet temperature. By regulating the opening of the thermostatic expansion valve, the force can be balanced, this keeps a proper degree of superheat for the evaporator outlet and balances the refrigerant flow and the thermal load of the air.

Thermostatic Expansion Valve



S462011

1. Membrane
2. Housing
3. Metering Valve
4. Inlet Passage from Evaporator
5. Outlet Passage from Evaporator
6. Temperature Sensitive Tube

The liquid refrigerant flows from the metering valve to the evaporator. The metering valve reduces the pressure and temperature of the refrigerant, changes the solid stream of refrigerant into a fine spray improving the evaporation effect. As the refrigerant passes through the evaporator, it absorbs heat from the ambient air flowing through the evaporator core. The increase of the temperature causes the refrigerant to vaporize and increases its pressure.

The temperature and pressure of the refrigerant from the evaporator drive the diaphragm and temperature sensitive tube to move and regulate the metering valve opening, thereby controlling the volume of the refrigerant flowing through the evaporator. The warmer the air flowing through the evaporator core, the more heat available to evaporate refrigerant, and this allows more refrigerant to pass through the metering valve.

Evaporator

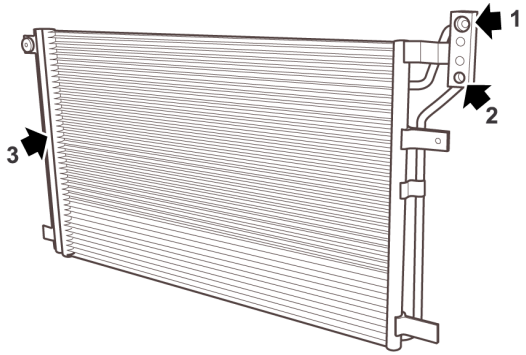
The evaporator is in the air inlet of the heater assembly and absorbs heat from the exterior or recirculated inlet air. Low pressure and low temperature refrigerant changes from liquid to vapour in the evaporator, absorbing large quantities of heat during this process.

Interior Condenser

The interior condenser is fitted in the A/C box.

When the compressed high-temperature and high-pressure refrigerant flows through the interior condenser, it heats the air inside the vehicle brought by the blower, thereby providing heat required by the passengers.

Condenser



S3410254

1. Air Intake Port
2. Liquid Outlet Port
3. Condenser

The condenser transfers the refrigerant heat into the ambient air and changes the refrigerant vapour from the compressor into liquid. The condenser also removes moisture and solid impurities from the refrigerant with its drying module and functions as a reservoir for liquid refrigerant so as to accommodate changes of heat load in the evaporator.

With the impact effect and/or cooling fan, the air passing through the heat exchanger absorbs heat from the refrigerant and changes the refrigerant from a vapour to liquid. The condenser cools and liquifies the refrigerant before it enters the modulator. In the modulator, most of the remaining gas in the refrigerant is separated. The refrigerant uses the desiccant and filter to remove moisture and particles before entering into the secondary cooler. The refrigerant is further cooled as it flows through the secondary cooler, this results in the refrigerant from the condenser outlet to the evaporator is almost 100% converted into liquid.

External Heat Exchanger

The external heat exchanger is used to make heat interaction with the air outside the vehicle.
Based on different refrigerant cycles, the external heat exchanger can act as an evaporator or condenser.
The external heat exchanger is fitted behind the front bumper beam.

A/C Pipeline

Aluminum A/C pipelines connect the system components together with O-rings between the connections to ensure a secure seal. To maintain a similar flow velocity in the system, the diameter of the refrigerant lines may vary so as to suit the two pressure/temperature modes. The pipelines with larger diameters are fitted in the low pressure/temperature mode and those with smaller diameters are fitted in the high pressure/temperature mode, and integrate the refrigerant refill port into the A/C pipelines so as to facilitate the system service.

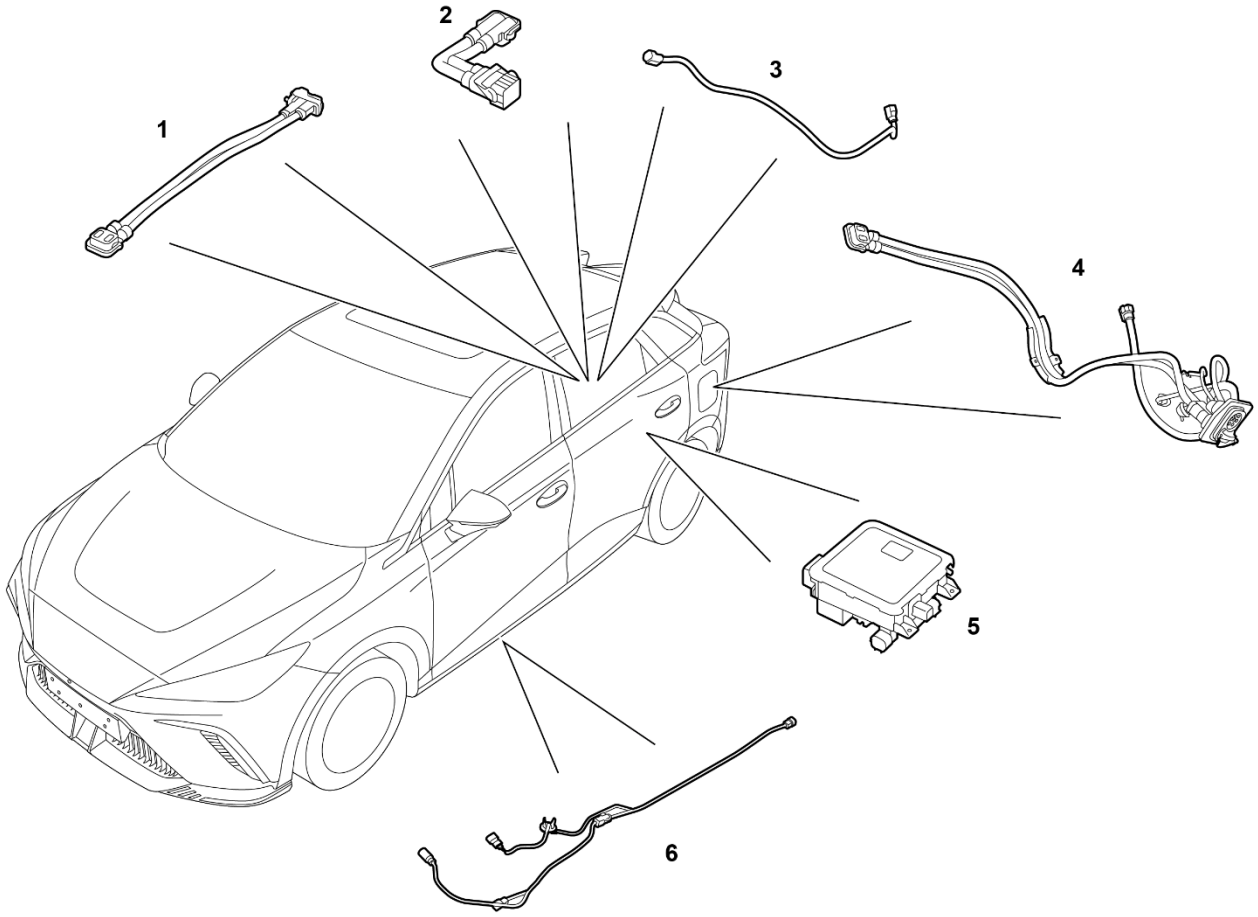
Electronic Expansion Valve

The electronic expansion valve is a throttling control element that can preset the program, which belongs to the electronic regulation mode. It uses the electrical signals generated by the regulated parameters to control the voltage or current applied to the expansion valve, thereby achieving the purpose of adjusting the liquid supply. EXV is also a key element for multiple connections. Compared with the traditional thermostatic expansion valve, the electronic expansion valve has a larger adjustment range, quick and sensitive action, precise adjustment, and high stability and reliability.

Solenoid Value

The solenoid valves are fitted on the A/C pipeline, by controlling the on/off of the relevant actuators, to achieve the purpose of controlling the flow direction of the refrigerant.
The relevant solenoid valves include heating solenoid valve, refrigeration solenoid valve, bypass solenoid valve, dehumidification solenoid valve, etc.

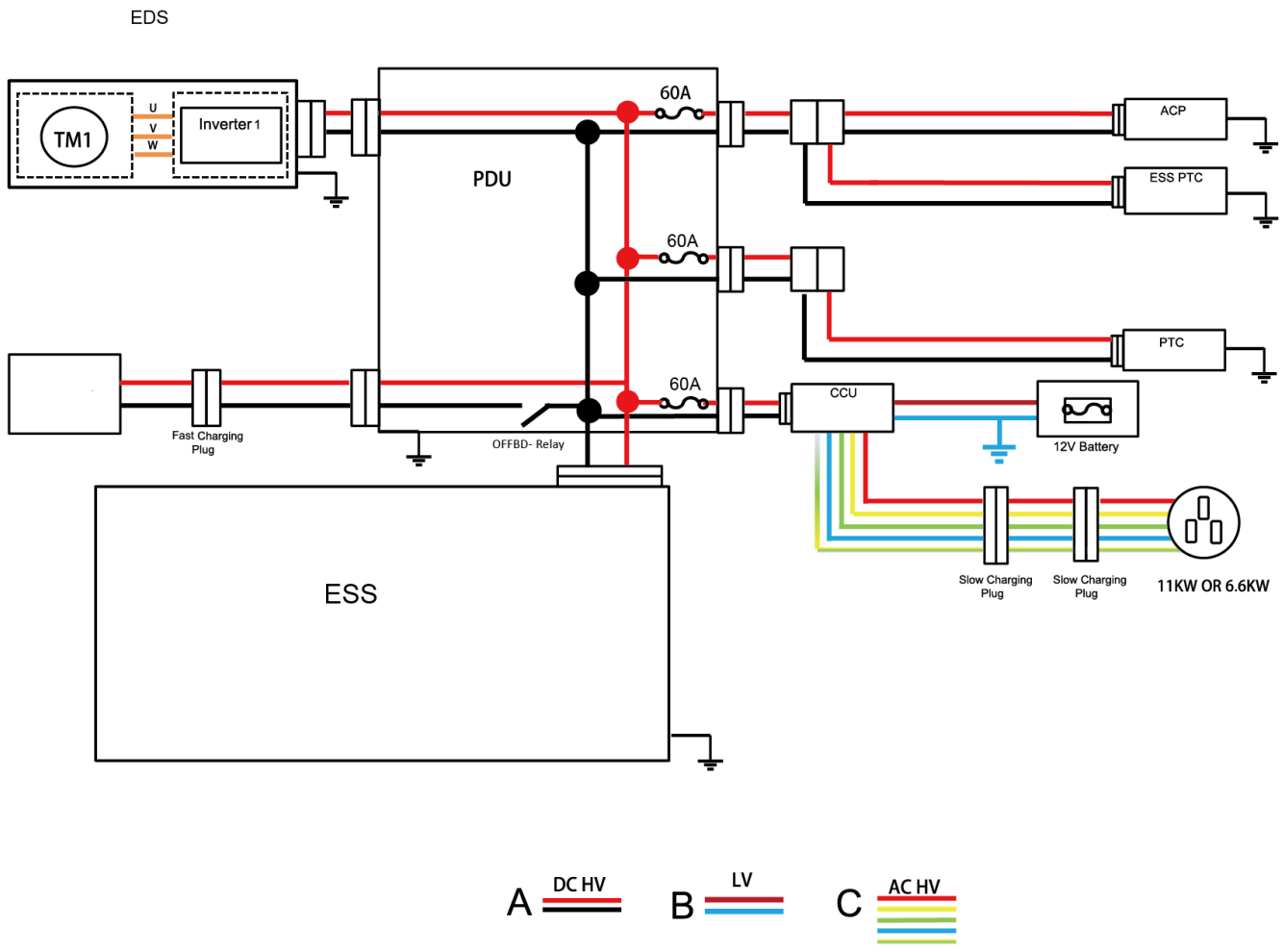
System Layout
HV Harness



S1121213

1. HV Harness - HV Power Distribution Unit to Electric Drive Transmission
2. HV Harness - HV Power Distribution Unit to HV Battery Pack (ESS)
3. HV Harness - HV Power Distribution Unit (PDU) to Combined Charging Unit (CCU)
4. Charging Port
5. HV Power Distribution Unit
6. HV Harness - HV Power Distribution Unit to Front Compartment

System Control Diagram



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Description

High-voltage Power Distribution Unit (PDU)

The high-voltage power distribution unit (PDU) is located at the rear part of the vehicle. Its main function is to transmit the electric energy of HV battery pack passing through the PDU to the electric heater, electric A/C compressor, HV battery pack heater and intelligent motor control unit (IMCU), realizing the transmission of electric energy. The HV battery pack is slowly charged at the slow charging port through CCU and then flowing through PDU; and it is fast charged at the fast charging port through PDU.

HV Harness - HV Power Distribution Unit (PDU) to Combined Charging Unit (CCU)

The HV harness - HV power distribution unit (PDU) to combined charging unit (CCU), located at the rear part of the vehicle, is fitted between the CCU and the PDU. Its main function is to transmit external charging current through the CCU to the PDU.

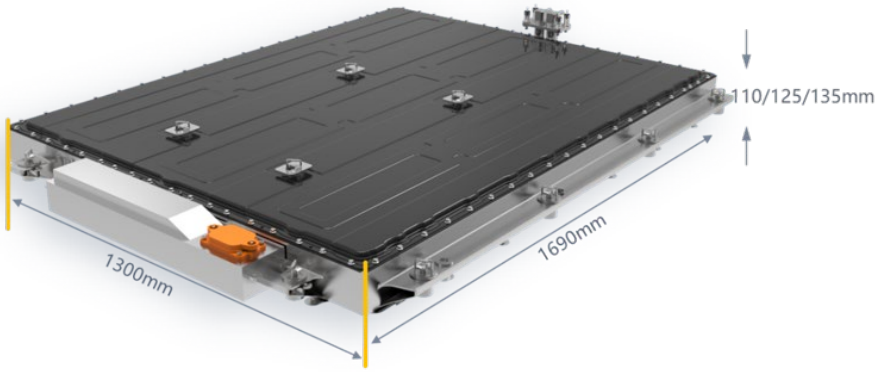
HV Harness - HV Power Distribution Unit to Electric Drive Transmission

The HV harness - HV power distribution unit (PDU) to front compartment, located at the rear part of the vehicle, is fitted between the PDU and the electric heater, and the electric A/C compressor and the HV battery pack heater. Its main function is to transmit HV DC power of the HV battery passing through the PDU to the electric A/C compressor, electric heater and HV battery pack heater to drive the compressor to work.

HV Harness - HV Power Distribution Unit to HV Battery Pack (ESS)

The HV harness - HV power distribution unit to HV battery pack (ESS), located above the HV battery pack, is fitted between the HV battery pack and the PDU. Its main function is to transmit DC power of HV battery pack to the PDU and charge the HV battery via the fast charging port.

ESS Energy Storage System-NCM 64/LFP 51

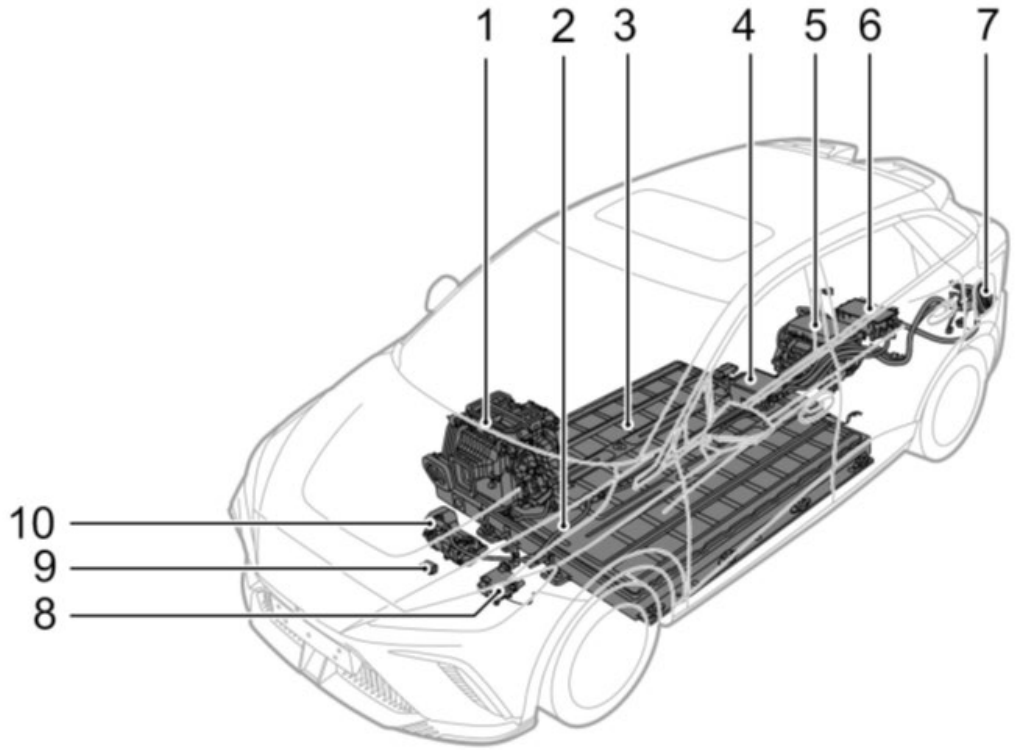


Items	Parameters	Parameters
Type	LFP	NCM
Rated energy	51 KWh	64KWh
Norminal capacity	156Ah	169.5Ah
Protection grade	IP67	IP67
Rated voltage	327V	380V
Total voltage range	260-379.6	291.2-452.4
Weight	398.7Kg	408.6Kg
Battery cell arrangement	1 Parallel 104 serial	1 Parallel 104 serial

EDU Electric Driving Unit

Items	Parameter Values
Traction motor type	three-phase permanent magnet synchronous motor
Continuous power/peak power	68/150 Kw(64Kwh battery)
Continuous power/peak power	54/125Kw(51Kwh battery)
Peak torque	250 Nm (64Kwh battery)
Peak torque	250 Nm (51Kwh battery)
Rated speed/Max speed	8000/17000 rpm(64Kwh battery)
Rated speed/Max speed	8000/17000 rpm(51Kwh battery)
Protection grade	IP 67
Total gear ratio	10.53
Final drive ratio	3.65
Mass (without oil)	59Kg
Lubricating oil	Shell E-Fluids E6 iX(SL2808)
Dry total volume	0.75L

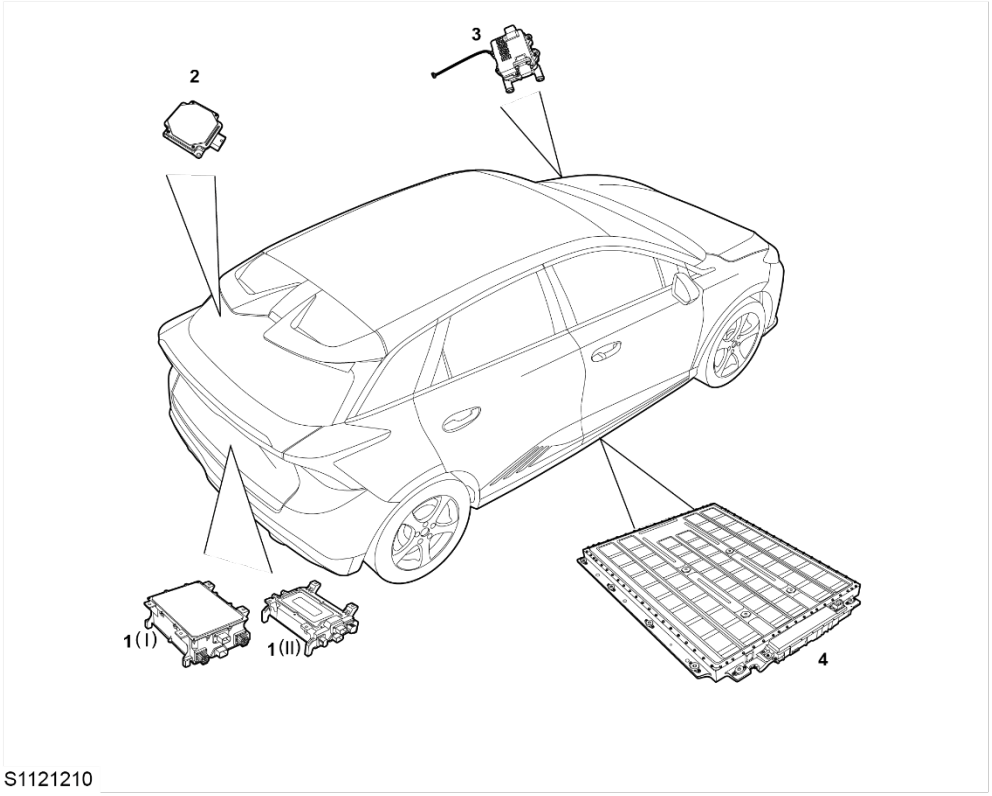
The High Voltage System Component Layout



1 Electric Heater
2 High Voltage Harness
3 High Voltage Battery (ESS)
4 Power Distribution Unit (PDU)
5 Electric Drive Transmission
6 Combined Charging Unit (CCU)
7 Charging Port
8 HV Battery Heater
9 Manual Service Disconnect (MSD)
10 Electric A/C Compressor

HV Battery Pack and Charging System

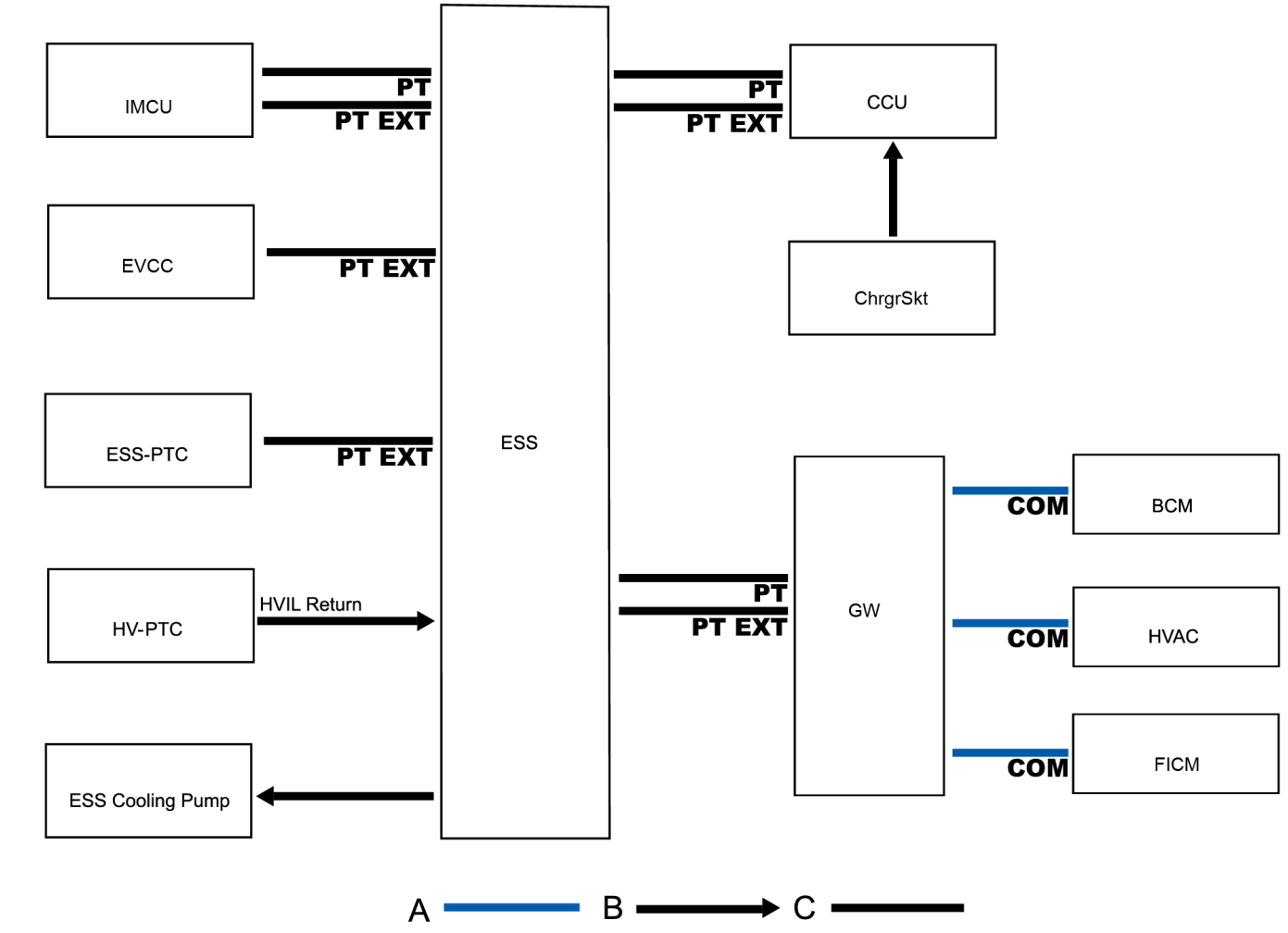
System Layout



S1121210

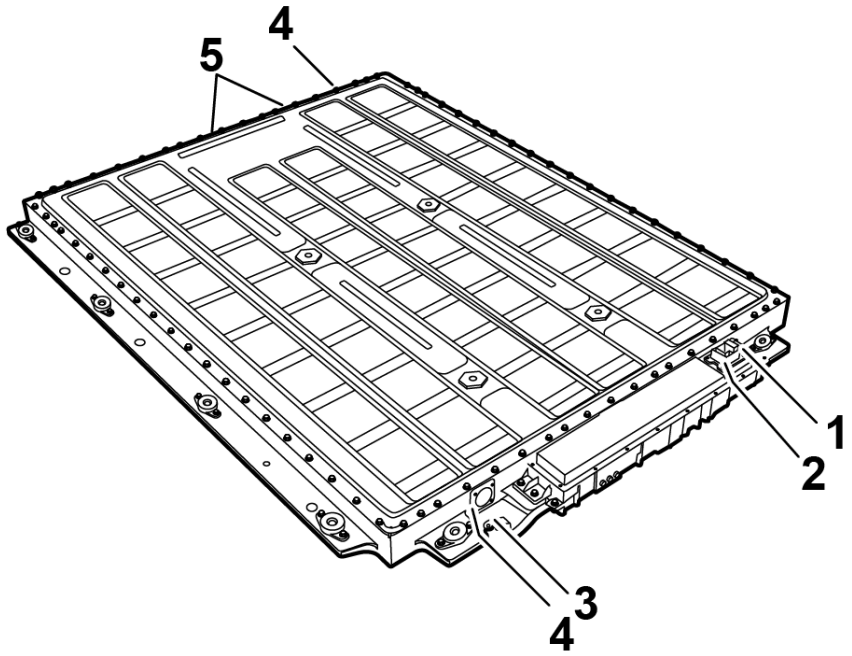
1. (Ⅰ) Combined Charging Unit - 11KW (If equipped); (Ⅱ) Combined Charging Unit - 7KW (If equipped)
2. Electric Vehicle Communication Control (EVCC)
3. Battery Heater (PTC)
4. High-voltage Battery Pack (ESS)

System Control Diagram



S1121218

High-voltage Battery Pack

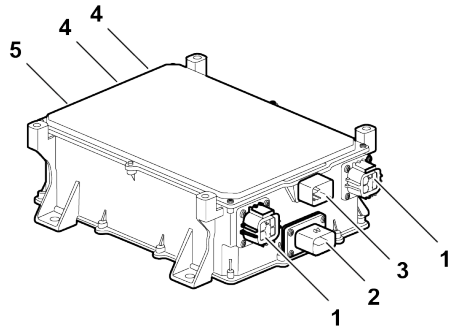


1. Vehicle Low-voltage Connector
2. Vehicle High-voltage Connector
3. Battery Pack Ground Wire
4. Pressure Switch *\Relief Valve
5. Cooling Water Pipes

High-voltage Battery Pack Composition

1. Battery module: contains 104 battery cells;
2. Battery management system (BMS): BMS is integrated in EDM module. It evaluates the status of the battery pack based on the collected information such as voltage, temperature and bus current of battery cell in the battery pack, estimates the remaining battery level, the remaining mileage of pure electric driving and the life status of the battery pack in real time, manages the on-board charging and the off-board charging, and provides battery pack information for the vehicle control unit to respond to the vehicle high-voltage loop on-off command so as to provide energy for the vehicle.
3. Electrical distribution module (EDM): controls the output of all high-voltage circuits in the battery pack through the main positive, main negative, and pre-charging relays.
4. High/low voltage harness and connector.
5. Cooling system: water-cooled.
6. Case.

Combined Charging Unit (CCU)



1. Vehicle High-voltage Connector
2. Positive Cable Connector
3. Vehicle Low-voltage Connector
4. Cooling Water Pipe Inlet/Outlet
5. Ground Wire

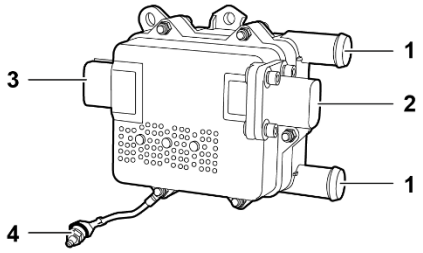
S1121198

The combined charging unit (CCU) is connected with the high-voltage battery pack. AC electricity provides electric energy for the high-voltage battery pack through the charging port and the CCU. The CCU also converts high-voltage DC power into low-voltage DC power, to supply power to the low-voltage 12V battery and low-voltage electrical appliances.

Charging Port

The charging port is connected to CCU and PDU. It is installed in the left rear of the vehicle.

Battery Heater (PTC)



S1121199

1. Cooling Water Pipe Inlet/Outlet
2. Vehicle High-voltage Connector
3. Vehicle Low-voltage Connector
4. Battery Heater Ground Wire

The battery heater is used to heat the battery at low temperature. When charging at low temperature, the heater can shorten the fast charging time of high voltage battery.

Operation

High-voltage Battery Pack Function Operation

1. Communicate with the vehicle and CCU respectively via independent CAN networks.
2. Provide the status of the high-voltage battery pack to the IMCU, control the on/off status of different high-voltage relays to realize the on/off of various high-voltage circuits and finally realize the management of charging and discharging and the indication of high-voltage battery pack battery status.
3. Charging management: charge the high-voltage battery pack through the AC charging port with the CCU, and provide a reserving charging function.
4. Thermal management function: Thermal management of high-voltage battery pack is realized by coolant.
5. High voltage safety management: Realize insulation resistance detection, high voltage interlock detection and collision detection functions, and process fault detection management and handling mechanism.
6. Realize connection line detection between CCU module and non-CCU module and control the indication of vehicle charging state.

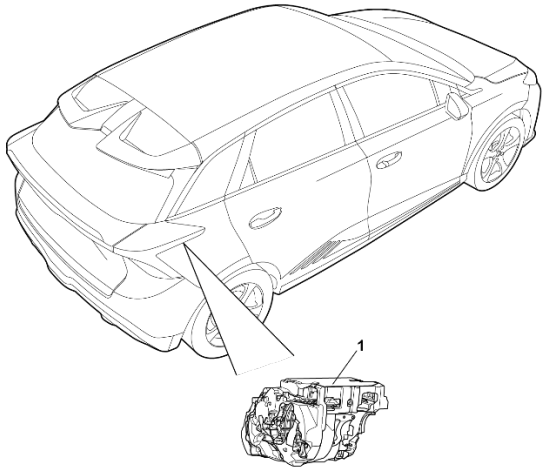
Combined Charging Unit (CCU) Function Operation

1. The basic working principle under charging condition is: AC power is converted into high-voltage DC and low-voltage DC power after filtering, rectification, correction, voltage reduction or voltage rise in the CCU, and charge the power battery and battery respectively.
2. Under driving conditions: The high-voltage DC power inside the power battery is converted to 12V low-voltage power after filtering, rectification, and voltage reduction, and charges the battery.
3. High voltage safety: Provide output reverse connection protection, high-voltage port residual voltage control, and fault self-shutdown function.
4. Thermal management: cool down by coolant.

High Voltage Battery Heater Function Operation

1. Provide CAN communication with battery management system.
2. In the maximum power range for high-voltage battery circulating water heating, heating power according to the needs of battery management system.
3. Self-protection: Provide self-protection function of heater to avoid damage of parts under bad working conditions, including over/under voltage protection, over current protection, over temperature protection and communication loss protection.
4. High temperature safety: Provide the function of dry-burning temperature limit.

EDU



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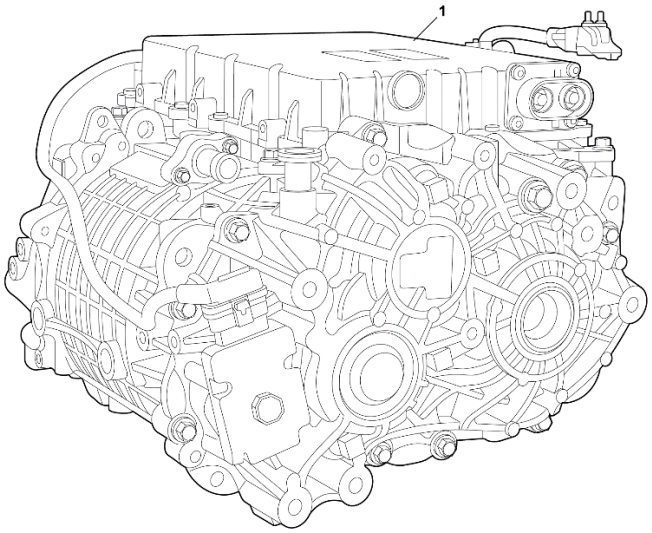

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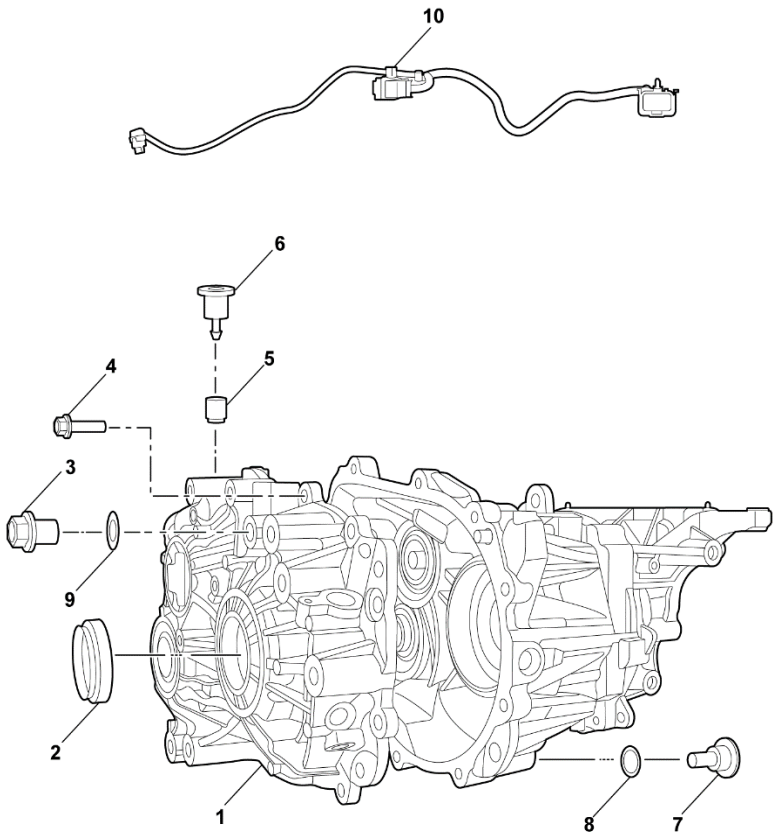


S1210192

1. Transmission Housing
2. Differential Oil Seal
3. Oil Filler Bolt
4. Bolt - Transmission Housing to Integrated Housing
5. Sealing tube - Vent Plug Assembly
6. Vent Plug Assembly
7. Oil Drain Plug
8. Gasket - Oil Drain Plug
9. Gasket - Oil Filler Plug
10. Low Voltage Harness

Description

Overview

The model is equipped with the electric drive unit shaft A. The shaft A is equipped with a two-stage reducer.

Reducer Housing

The reducer housing is cast from die-cast aluminum. The motor housing and the right housing of the reducer share the same housing structure. The reducer housing is equipped with an oil filler plug and drain plug, and both of them are sealed with an aluminum washer. The reducer is filled with lubricating oil to lubricate the internal components using a splash method.

Input Shaft

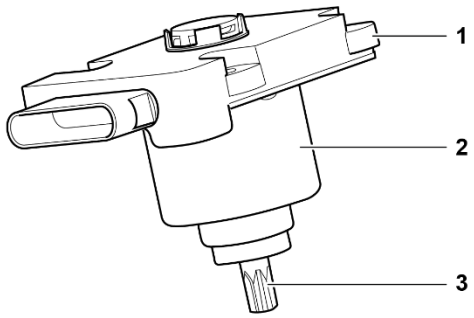
The input shaft motor meshes with the spline and transmits the motor power to the differential through the input shaft and intermediate shaft. The input shaft is supported in the housing by bearings.

Intermediate Shaft

The intermediate shaft is supported in the housing by bearings, which is used to transfer torque and increase the gear ratio.

Differential

The differential housing supports the planetary shaft, planetary gear and sun gear. The differential assembly is supported by bearings in the transmission housing.
Electronic Park Motor Control Unit



1. Electronic Park Motor Control Unit (EPMCU)
2. Parking Motor
3. Parking Motor Spline

S1214849

The electronic park motor control unit (EPMCU) integrates the control module, park motor, sensors and other components, which is fixed to the outside of the left housing of the reducer by four bolts. The spline at the front end of the park motor is used with the park shaft gear on the park mechanism assembly fixed in the reducer. When EPMCU receives the P gear signal, the park motor operates, drives the park pawl on the park mechanism assembly, and lock the park gear on the input shaft to realize the park function.

Drive Motor

The drive motor is a three-phase AC motor, which is controlled by the intelligent motor control unit (IMCU).

Intelligent Motor Control Unit (IMCU)

The ECU is an electrical control component that controls the drive motor, which communicates with the IPK, BCM and other controllers via the high-speed CAN.

Operation

Reducer Assembly

The drive system drives the input shaft to change the rotation speed and direction by the motor speed regulation and the motor reversing principle, thereby changing the speed of the drive gear and reverse gear.
When the gear shift control mechanism is in D gear, the torque is directly transmitted from the drive motor to the reducer input shaft, and to the intermediate shaft gear and the final drive driven gear through the input shaft gear, and finally to the drive shaft. The vehicle speed is changed by changing the motor speed after starting or during driving.

Differential

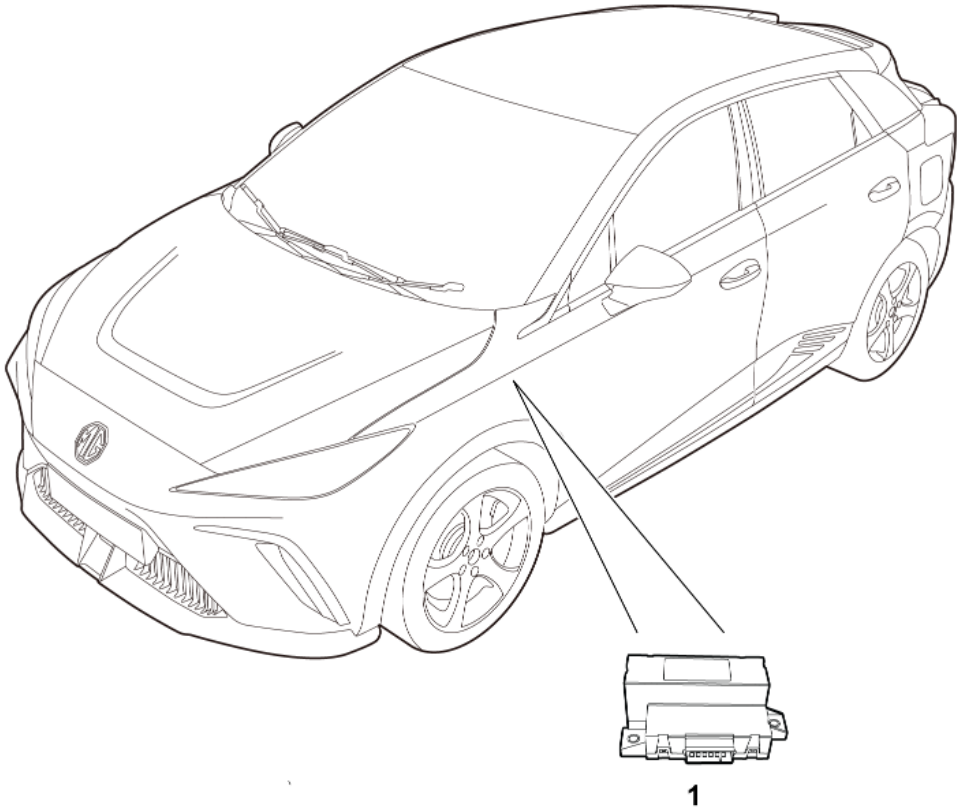
The differential allows the wheels to rotate at different speeds when the intermediate shaft torques are the same. The pinion integrated with the intermediate shaft is engaged with the final drive driven gear of the differential assembly. When the wheels move forward in straight line, the torque will be applied to the whole assembly and the planetary gear does not rotate. The torque is transmitted to the wheels through the drive shafts. When the vehicle takes a turn, the inner wheels will pass a shorter distance at a lower speed. Thus it drives the planetary gear to rotate, and the outer sun gear offers a higher speed to the outer wheels.

Precautions for Operation of Drive Motor

Since the drive motor works in a high voltage and high current environment, attention must be paid to the following during operation:

1. Collision, drop and squeezing against human body shall be avoided during product transportation and fitting.
2. The storage environment shall be dry. The environmental requirements for unpacking the motor are: temperature within -25 ℃ ～ +55 ℃ , and humidity within 10% ～ 70%RH.
3. The insulation inspection must be performed for the motor before fitting and use (For specific operations, refer to PEB the removal/refit content)
4. Before the motor is fitted and used, the motor output shaft shall be able to rotate freely. Check the appearance of the motor to make sure that the housing is free of damage or abnormal deformation.
5. Before the motor is fitted and used, check that the conductive part of the three-phase harness and the heavy-current interface of the motor are clean and free of foreign matters or grease.
6. The low-voltage connector is plastic, which shall be protected from direct collision with or stress by hard objects during fitting.
7. The motor rotor is strongly magnetic, so that other components than high and low voltage cover plates shall not be removed and refitted.

System Layout



1. Crash Power Module

Description
Battery
Battery Instruction

All vehicles are equipped with a 12V maintenance-free lead-acid battery on the left side of the front compartment, which is fitted on the battery tray and fixed by the battery pressing plate. The battery electrodes are of post type using clamp-type connection.

Warning: Battery fluid (electrolyte) contains sulphuric acid. It may cause severe burns if it gets on your skin or in your eyes. Wear protective clothing and a face shield. If electrolyte gets on your skin or clothes, immediately rinse it off with water. If electrolyte gets in your eyes, immediately flush eyes with water for at least 15 minutes and seek medical help.

The battery has three main functions. Firstly, it provides power for starting the vehicle. Secondly, it is used as a voltage regulator of the electrical system. Lastly, it can provide energy for the electrical demand in a certain amount of time.

Compared with the conventional battery, the packaging battery has following advantages:

- There is no need to add water during the entire life cycle of the battery.
- It adopts the overcharge protection measures. If the voltage applied to the battery is too high, it will not receive the excessive current as the conventional battery will. For the conventional battery, if the battery continues to be charged when the voltage is too high, air leakage will occur, causing fluid loss.
- Compared with the conventional battery, self discharge does not tend to occur for this kind of battery. This is especially important when the battery is not used for a long time.
- It is more reliable to provide power for the cigar lighter and smaller electrical appliance.

Battery Charging

When the vehicle is not started, long-time operation and abnormal use of electrical appliance, vehicle electric leakage and long-time parking, or malfunction in the charging system may cause the battery charging failure, resulting in battery lack of power, or even vehicle start failure. In this condition, the battery needs to be charged.

Caution: During battery charging or jump start, the negative cable should be connected to a good body grounding point, instead of battery negative terminal.

Battery appearance check before charging:

- If the battery case is broken or there is a leak, DO NOT charge the battery and replace it after finding the reason.
- If the battery terminal post is broken, DO NOT charge the battery and replace it after finding the reason.
- The bulged battery due to over discharging or over charging, CAN NOT be charged. The battery should be replaced.
- Before charging, clean the terminal post, and remove the oxide skin from the surface. And apply some butter on the terminal post to avoid electric corrosion.

Charging precautions:

- PLEASE wear the safety goggles.
- Keep ventilation and normal temperature when charging.
- DO NOT smoke when charging, and avoid introduction of kindling material.
- Before charging, connect the positive cable first. After charging, disconnect the negative cable first.

Battery charging operation:

- Connect the positive pole of charger to that of battery, and connect the negative pole of charger to that of battery. If the battery is not removed from the vehicle, PLEASE connect the charger negative pole to a good ground point on the body.
- Ensure the battery terminal posts are clean, and the charging circuit is well connected.
- For the common vented battery, it is recommended to charge the battery using a constant voltage at the maximum voltage limit of 16.0 ± 0.1V and the maximum current limit of 25A. When the charging current is less than 2A, it indicates that the battery is fully charged.
- During charging, if the battery temperature rises above 40℃, the charging must be stopped until the battery temperature drops to the room temperature.
- DO NOT charge the battery below 0℃.

For the battery with a voltage less than 11.0V, at the early stage of charging, it may appear that the battery cannot be charged. Due to serious power lack of battery, the specific gravity of sulfuric acid in the battery is too small, the liquid is close to pure water, and the internal resistance of the battery is too high. As the battery is charged, the specific gravity of sulfuric acid in the battery rises, and the charging current can gradually return to normal.

Battery Test

The battery can be tested with common battery tester available in the after-sales market, such as Midtronics series battery tester. If the tester type does not match, the measured data can not be used as basis to judge the battery's status.

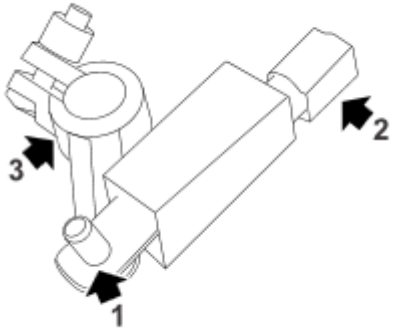
Battery Replacement

Caution: When removing the battery, ensure that the alarm is disarmed and the start/stop switch is off. Always disconnect the negative terminal first, then the positive terminal. When refitting the battery, always fit the positive terminal first, then the negative terminal.

Refer to "Battery - Remove/Refit" when replacing the battery.

When charging/discharging the battery with external device or during jump start, take care not to connect the external cable directly to the battery negative pole, but connect it to a good ground point on the body. Otherwise, it may result in inaccurate battery power calculation.

Electronic Battery Sensor



Such model is equipped with the EBS . As shown in the figure, the EBS is fitted on the negative battery terminal post with a negative battery terminal clamp (3), and connected with the negative battery cable by a bolt (1). The power of EBS is supplied by KL30 (normally on), and it is connected with the LIN bus through the connector (2).

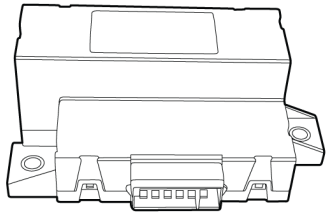
The EBS is an electronic sensor, which is used to monitor the voltage, current and temperature information of the battery, and send these internal data and information to the gateway through the LIN bus, so that it executes reliable power limitation strategy when the battery is always in a good charge and service life condition.

Caution: In order to avoid reducing the precision and service life of the battery, do not remove the EBS from the negative battery cable, except for replacing the battery. When removing or fitting the EBS, be careful to ensure that it does not get damaged.

Caution: After the EBS has been refitted on the battery, it takes at least 4 hours for EBS to obtain the exact status information of the battery.

Caution: For electrical related fault maintenance and power-off operation, it only needs to disconnect the negative cable from the EBS, instead of directly disconnecting the negative terminal. So it can take less time for EBS to obtain the exact status information of the battery.

Crash Power Module



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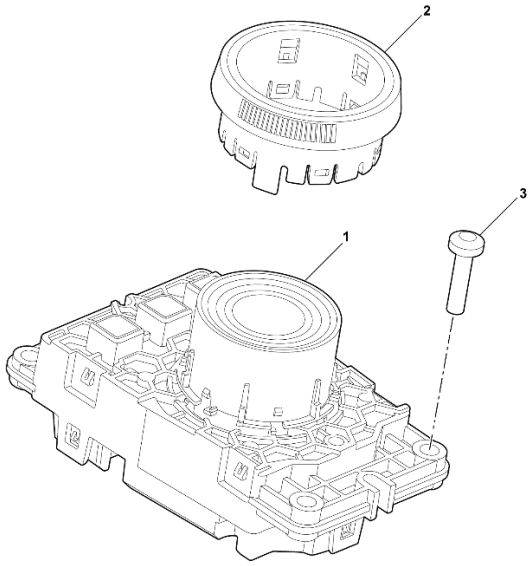
The Crash Power Module (CPM) is a super-capacitor mounted on the driver side of the vehicle and connected in series with the low-voltage battery and the Body Control Module (BCM), and is a normal power supply module. When the vehicle is in a collision and the battery is disconnected, it can still provide power to the BCM unlock function to help passengers evacuate from the vehicle.

Gear shift Control

Control Module Function



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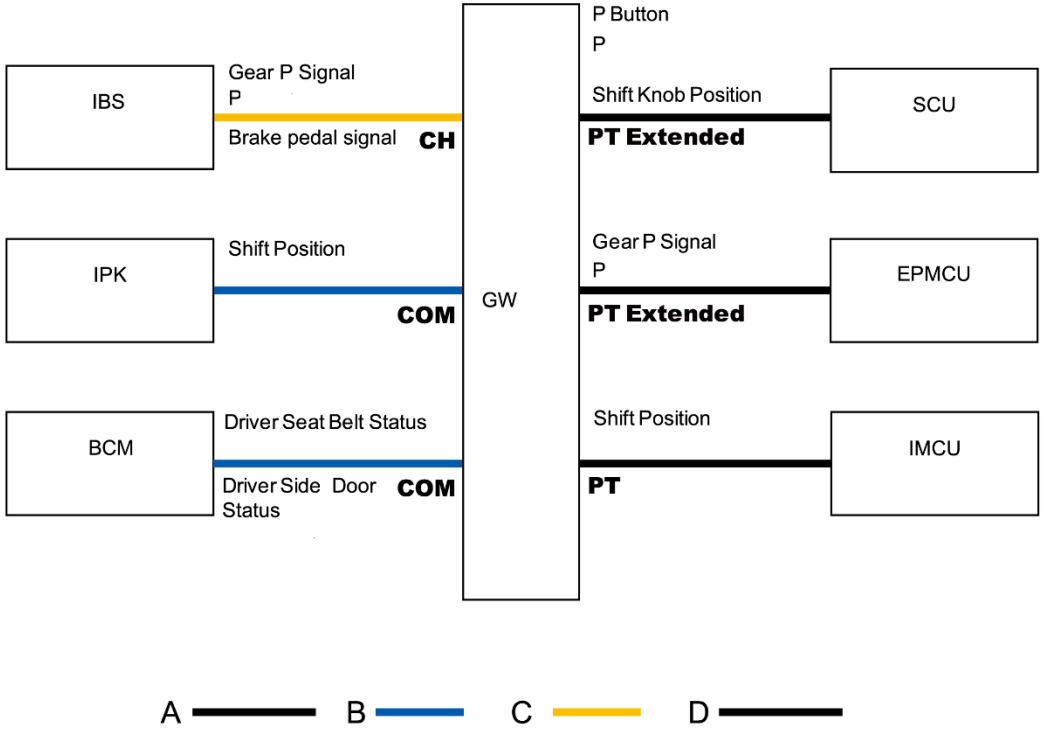


S1211106

C

Overview

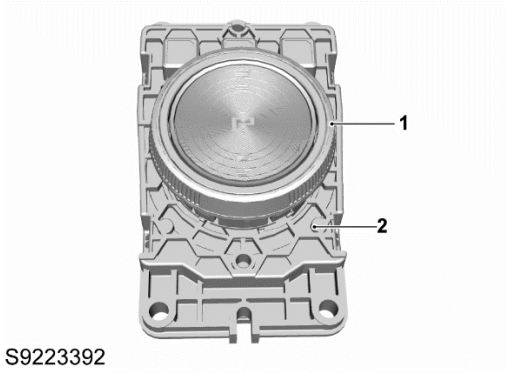
Function of gear shift control mechanism:

1. Collect current gear information
2. Output shift position signal

The gear shift control mechanism exchanges information with other external ECUs via the Powertrain Expansion CAN bus, mainly the intelligent motor control unit (IMCU) and the electronic park motor control unit (EPMCU) integrated in the electric drive unit. The R, N and D gear information is obtained by reading the signal from the gear position sensor in the gear shift control mechanism, while the P gear position signal can be triggered by pressing the P gear button on the gear shift control mechanism.

The collected R, N and D position information is sent to the IMCU through the Powertrain Expansion CAN bus; the P gear position information is sent to the EPMCU through the Powertrain Expansion CAN bus.

Gear Shift Control Mechanism



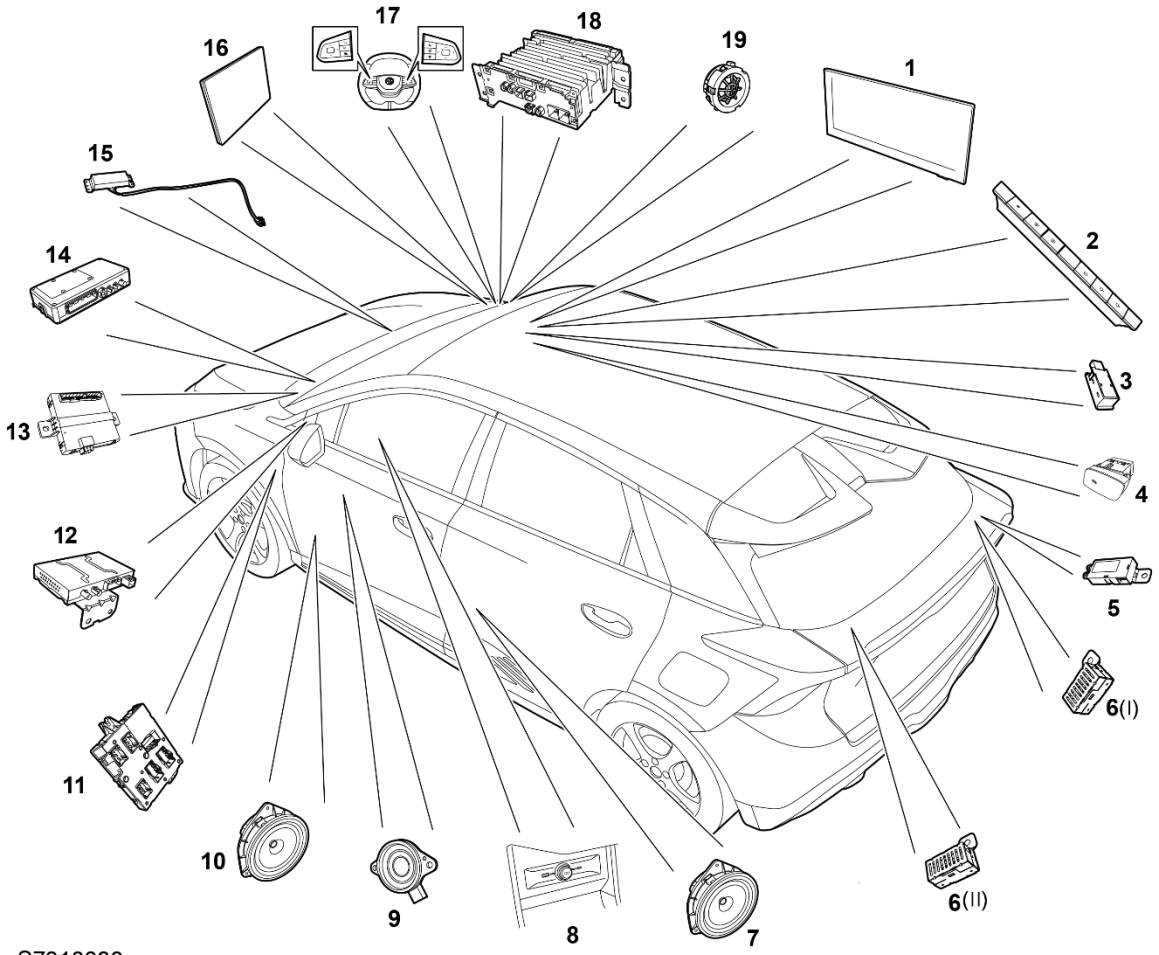
The gear shift control mechanism integrates the SCU and P gear button, which is fixed on the centre console by bolts.

1. Shift Knob Trim Ring
2. Gear Shift Control Mechanism

Gear Signal Collection

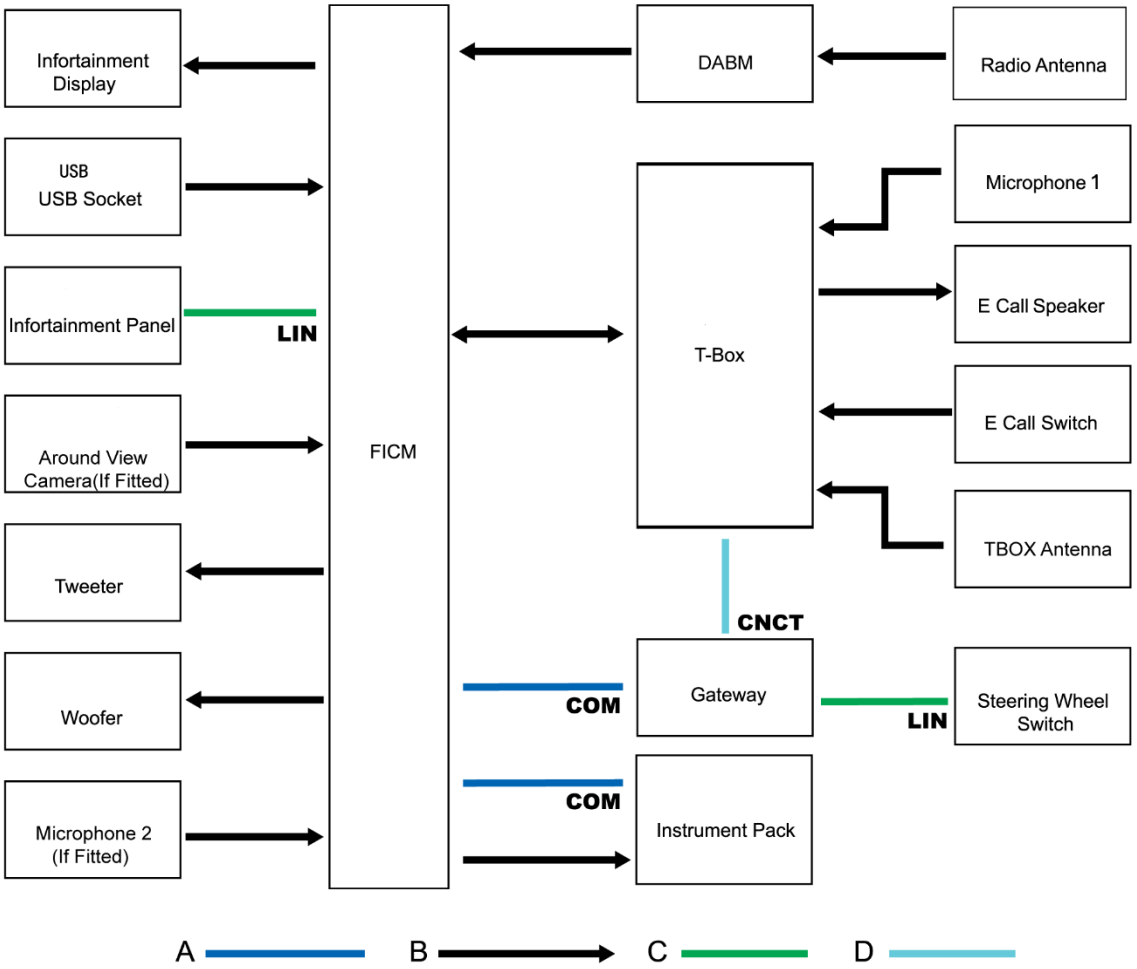
A Hall rotation angle position sensor is encapsulated in the chip for sensing the gear information on the circuit board of SCU. When the knob is rotated, the sensor in the chip senses the angle position of the shift lever to determine the R, N and D positions.

System Layout
Infotainment Layout



1. Entertainment Display
2. Entertainment Control Button
3. Microphone
4. Emergency Call Switch
5. Antenna Amplifier
6. (Ⅰ) Right Radio Antenna Coil; (Ⅱ) Left Radio Antenna Coil
7. Rear Door Woofer
8. USB Socket
9. Emergency Call Speaker
10. Front Door Woofer
11. Body Control Module
12. Digital Audio Broadcasting (DAB) Module
13. Gateway
14. Communication Module
15. Communication Antenna
16. Instrument Pack
17. Steering Wheel Entertainment Switch Button
18. Entertainment Mainframe
19. Front Tweeter

System Control Diagram
Entertainment System Control Diagram



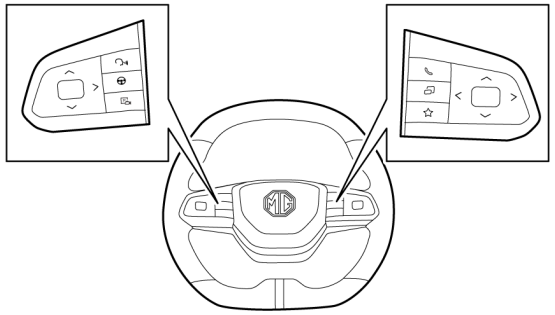
S7310084

Description
Overview

1. Low configuration entertainment mainframes supports radio, USB, Bluetooth phone, video and other functions.
2. High configuration entertainment mainframes supports radio, USB, Bluetooth phone, video, navigation, 4G network and other functions.

Audio Control Button on Steering Wheel

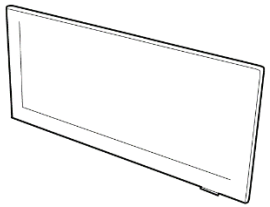
The audio device can be controlled by the remote switch on the steering wheel. These function buttons allow the most common functions in the ICE system to be used in a much more convenient manner.



S7313390

Display

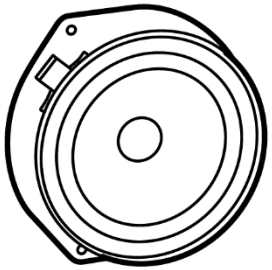
The display shows the audio information and relevant information.



S7313416

Woofer

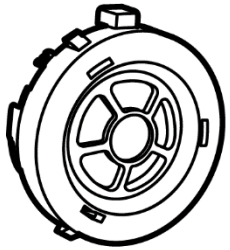
The woofers are in the four vehicle doors, which are fixed on the door panel by 3 screws.



S7313401

Tweeter

The front tweeter is fitted in the front door quarter window and fixed with clips.



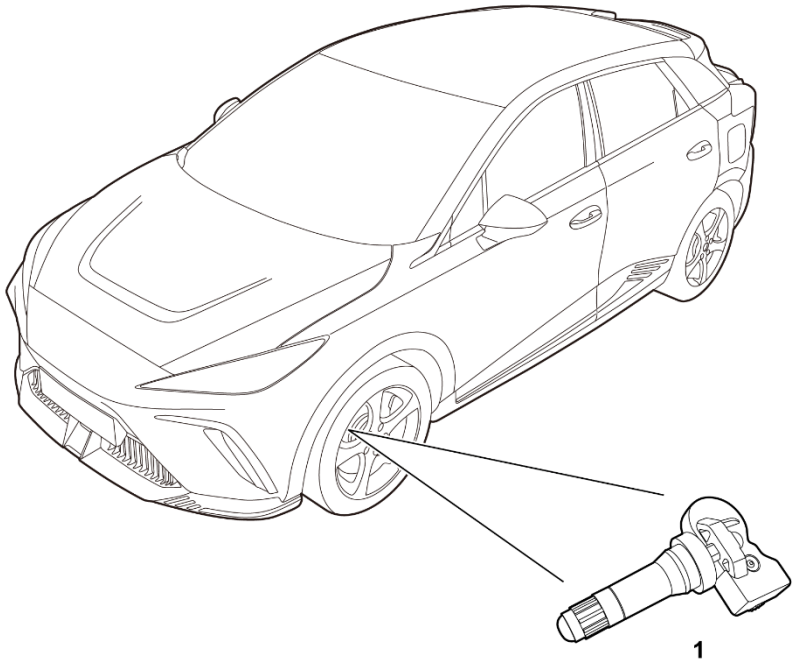
S7313400

Communication Antenna

The communication antenna is fitted on the instrument desk.

S7313411

Tyre Pressure Monitoring System (TPMS)



S2320020

1. Tyre Pressure Sensor × 4

Description

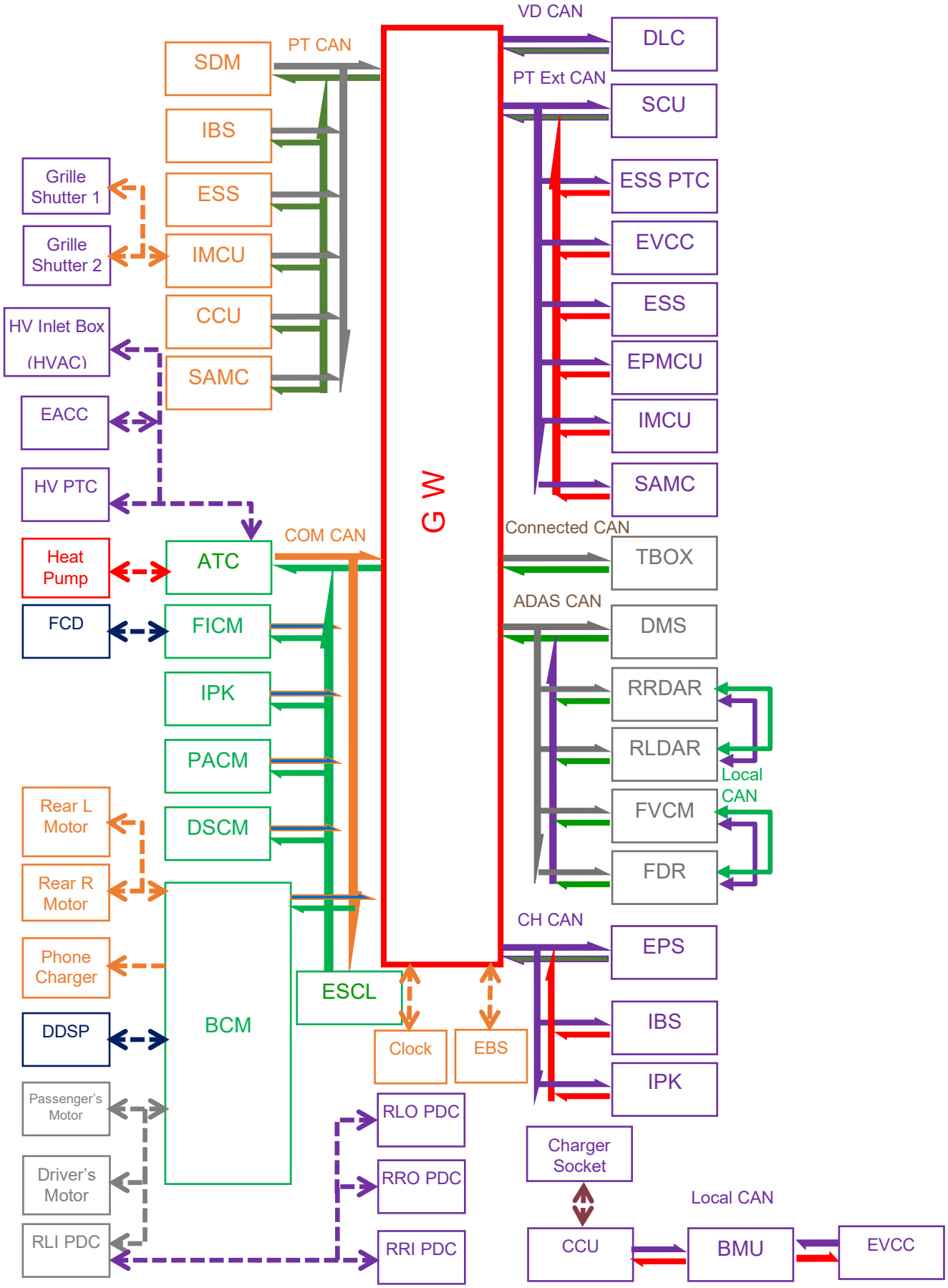
The tyre pressure monitoring system consists of a body control module and tyre pressure sensors fitted in the valve stems of the four wheels. Each tyre pressure sensor features an electromechanical device for pressure and temperature measurement and has a unique serial number for identifying the mounting position of the sensor. The driver can view the pressure and position of a tyre on the instruments pack kit. When the pressure of any of the four tyres rises or falls significantly, the instrument TPMS warning lamp will illuminate to remind the driver to check the tyre.

Operation

When the body control module is operating, it receives the wireless signal from the tyre pressure sensor and converts its data into tyre pressure, tyre temperature, tyre position and sensor mode. The body control module sends the obtained tyre pressure, tyre temperature and tyre position data to the instruments pack kit via the CAN bus. When the vehicle is stationary, the sensor does not detect changes in acceleration, and the sensor enters the stationary mode. At this time, the sensor performs pressure sampling at intervals, and no signal is sent if the tyre pressure does not change. As the vehicle speed increases, the sensor detects the changes in acceleration, and enters the rolling mode. At this time, the sensor sends a signal to the module at intervals.
The tyre pressure sensor continuously compares its last sampled pressure with the current sampled pressure. If it detects that the difference between them reaches a certain value in the stationary or rolling mode, it will recheck the pressure to confirm the situation. When the sensor confirms that the tyre leaks quickly, it will send the corresponding wireless signal to the body control module, which will transfer the corresponding information to the instruments pack kit that displays the corresponding alarm message. When the tyre pressure monitoring system detects that the tyre pressure (slowly) drops to the alarm limit, it will display the prompt messages such as Low Tyre Pressure or Check Tyre Pressure on the instruments pack kit.

The indicator lamp and other prompt messages can be turned off by adjusting the tyre pressure to the recommended value or above.
If the power of body control module is cut off or the vehicle battery is disconnected, each tyre pressure monitoring sensor identification code will be reserved, but all the tyre pressure information will be lost, and "——" will be displayed on the instruments pack kit. The vehicle is driven at 40 km/h (25 mph) or above, so that the sensor enters the rolling mode and sends a signal to make the instrument display the current tyre pressure. When the vehicle is stationary, you can also reduce the tyre pressure (by more than 30 kPa) to make the sensor in the stationary mode send a signal, and the instrument will also display the current tyre pressure. The body control module is capable of detecting the internal failure of tyre pressure monitoring system. Read DTCs with an after-sale scan tool, and judge the failure cause according to the definition of failure.

MG4 – CAN BUS Schematic



MG4 – CAN BUS Schematic

PT CAN： Power train CAN

GW: Gate Way

SDM: Sensing Diagnostic Module

IBS: Integrated Brake System

ESS: Energy Storage System

IMCU: Intelligent Motor Control Unit

CCU: Combined Charging Unit

SAMC: Secondary Axle Motor Controller

DLC: Diagnostic Link Connector

BMU: Battery Management Unit

PT Extension CAN

SCU: Shift Control Unit

ESS PTC: ESS Heater

EVCC: Electric Vehicle Charging Control Module

EPMCU: Electric Parking Motor Control Unit

COM CAN: Comfort CAN

ATC: Automatic Temperature Control

EACC: Electronic Air Conditioning Compressor

BCM: Body Control Module

ESCL: Electric Steering Column Lock

FICM: Front Infotainment Control Module

IPK: Instrument Pack

PACM: Pedestrian Alarming Control Module

DSCM: Driver Seat Control Module

TBOX: Telematic BOX

DMS: Driver Monitor System

RRDAR: Rear Right Driving Assistance Radar

RLDAR: Rear Left Driving Assistance Radar

FVCM: Front View Camera Module

FDR: Front Detection Radar

EPS: Electronic Power Steering System

DDSP: Driver's Door Switch Pack

RLI PDC Sensor： Rear Left Inner PDC Sensor

EBS: Electronic Battery Sensor

CH CAN: Chassis CAN

ADAS CAN: Advanced Driving Assistance System CAN