HV Battery Pack and Its Charging System

Specification

Torque

Description	Value
Bolt-ESS to Body	90-110Nm
Nut-ESS ground to Body	7-10Nm
Bolt-CCU to Body	19-25Nm
Bolt-CCU ground	7-10Nm
Nut-Charging harness ground Nut	7-10Nm
Bolt-PTC to Body	7-10Nm
Nut-PTC ground Nut	7-10Nm

Parameters

High-voltage Battery Pack Parameters

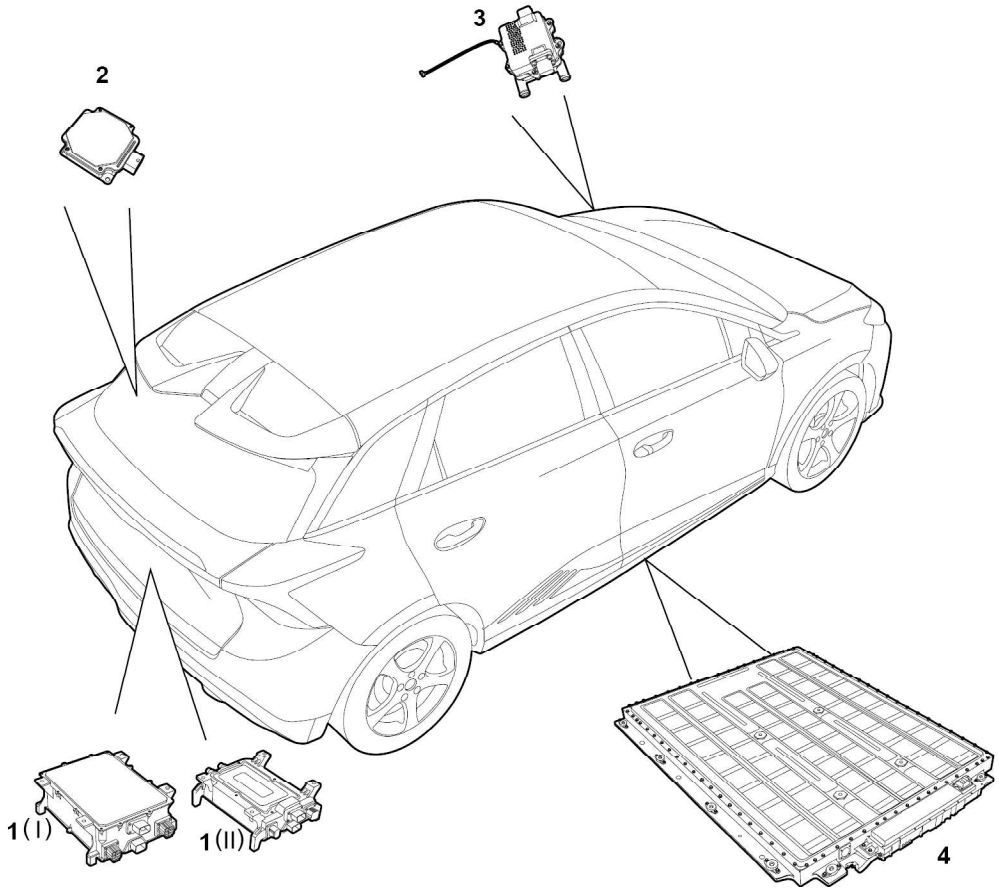
Item	Parameter Values		
Rated energy, kWh	51	64	77
Nominal capacity, Ah	156	169.5	195
Rated voltage, V	327	380	380
Voltage range, V	260-379.6	291.2-452.4	302.4-469.8
Weight, kg	398.7	408.6	447
Battery Cell Arrangement	1P104S	1P104S	1P108S
Protection Grade	IP67	IP67	IP67

Combined Charging Unit Parameters

	Item	7kW	11kW
High voltage end	Input voltage, V	85-265	85-265
	Maximum input current, A	32A	32A
	Maximum output current, A	24	33
	Output voltage range, Vdc	220-290	220-490
	Maximum input power, KW	NA	NA
	Maximum output power, KW	6.6	10
Low voltage end	Output voltage range, V	9-16	9-16
	Peak output power, KW	3	3
	Rated output power, KW	3	2.5
	Protection Grade	IP67	IP67

Description and Operation

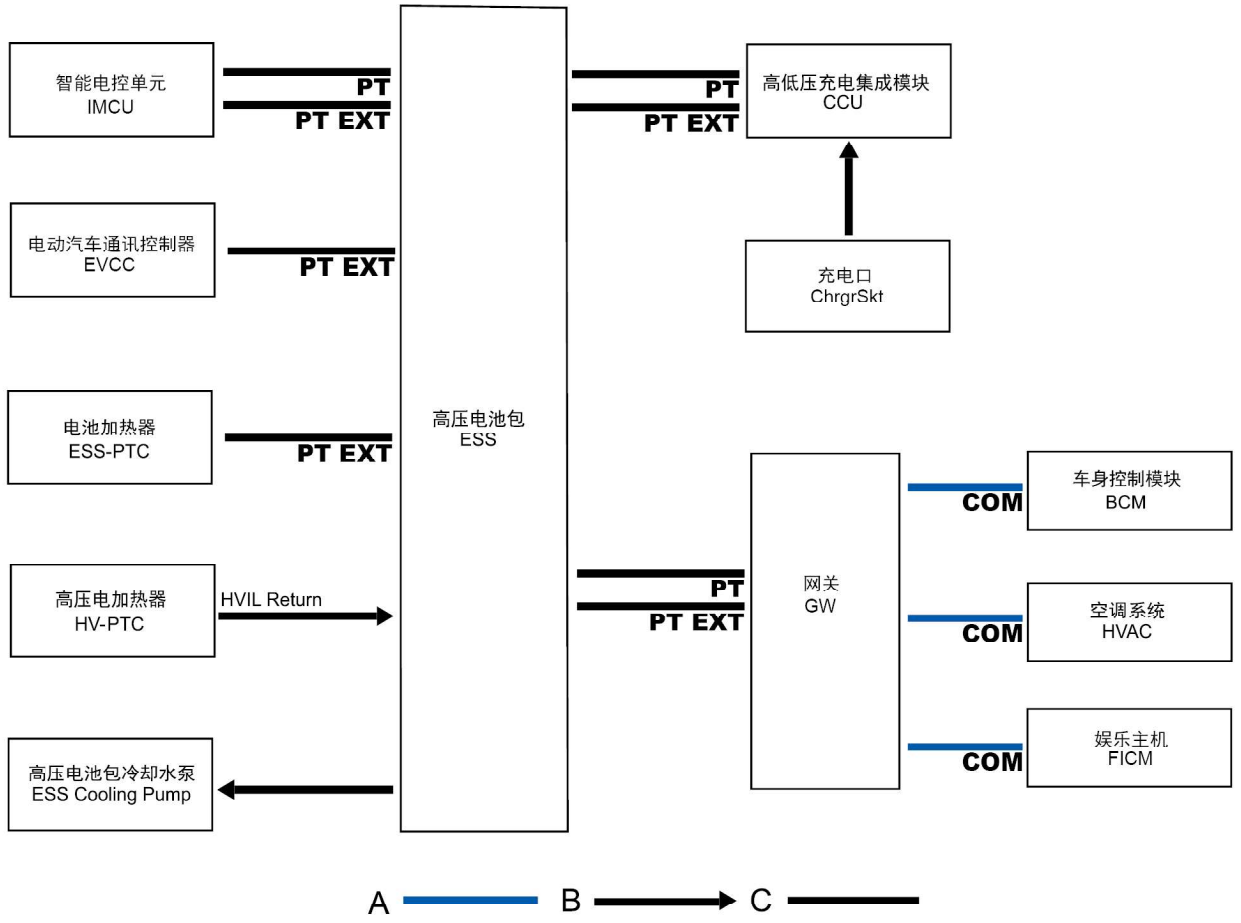
System Layout



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

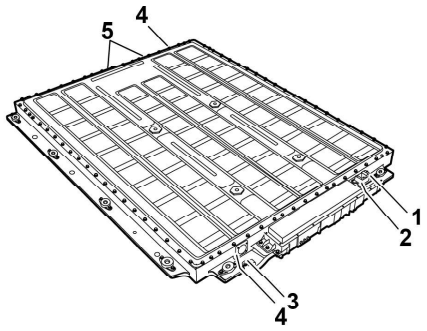


S1121218

A = Comfort CAN Bus; B = Hard Wire; C = Power/Powertrain Expansion HS CAN Bus

Description

High-voltage Battery Pack



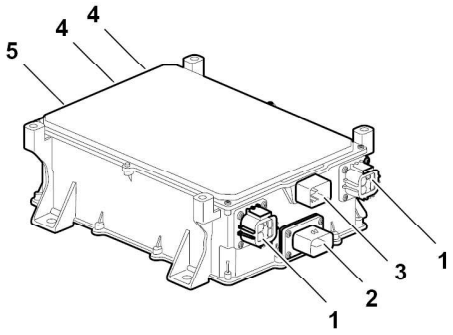
S1121200

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

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 precharging relays.
4. High/low voltage harness and connector.
5. Cooling system: water-cooled.
6. Case.

Combined Charging Unit (CCU)



S1121198

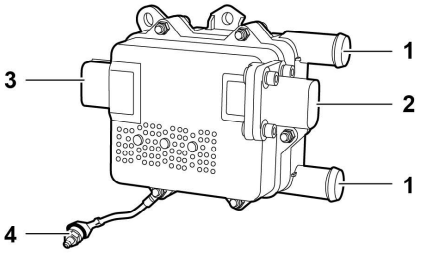
1. Vehicle High-voltage Connector
2. Positive Cable Connector
3. Vehicle Low-voltage Connector
4. Cooling Water Pipe Inlet/Outlet
5. Ground Wire

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.

Battery Pack Maintenance

The battery pack should be regularly charged and discharged using special equipment SMIL-SE-001(E75060C-0330SAIC) for maintenance .

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

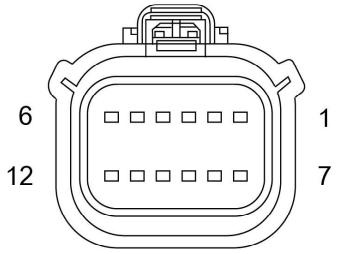
1. The basic working principle under charging condition is: AC power is converted into high-voltage DC and low-voltage DC power after filtering, rectification, correction, voltage reduction or voltage rise in the CCU, and charge the power battery and battery respectively.
2. Under driving conditions: 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.

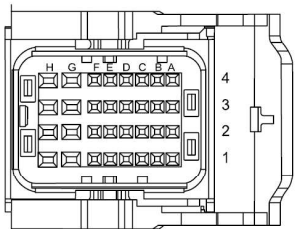
Detailed Information List of Component Pins

End View and Pin Information of High-voltage Battery Pack Harness Connector BY015



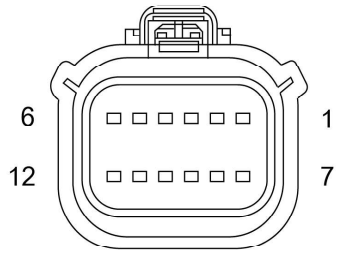
Pin No.	Description
1	KL30.1
2	Ground 1
3	KL30.2
4	-
5	Powertrain CANFD_H
6	Powertrain CANFD_L
7	Powertrain Expansion CANFD_H
8	Powertrain Expansion CANFD_L
9	BMS Cal CAN_H
10	BMS Cal CAN_L
11	
12	Pressure switch wake-up hard wire signal

End View and Pin Definition of CCU Harness Connector BY029



Mark No.	English Name
A1	HVIL_Battery Heater_Rtn
B1	OffBdChrgrWkup
C1	Powertrain CANFD_H
D1	OffBdChrgrPlugOn
E1	OffBdChrgrNgtvSnsr+
F1	CCU_LIN1
G1	OffBdChrgrNgtvRelay_HSD
H1	KL30
A2	Charging Wake-up
B2	OBCSktPstvSnsr+
C2	Powertrain CANFD_L
D2	ChrgrSktSnsr-
E2	-
F2	-
G2	-
H2	-
A3	OnBd Chrgr(CP)
B3	OnBd Chrgr(CC)
C3	HVIL_Electric A/C Compressor_Rtn
D3	-
E3	-
F3	-
G3	OffBdChrgrNgtvRelay_LSD
H3	OBCSktLckEnb+
A4	-
B4	-
C4	HVIL_Src
D4	HVIL_High-voltage Power Distribution Unit_Rtn
E4	PDU_RtnQ
F4	OBCSktLckSts+Q
G4	Ground Q
H4	OBCSktLckEnb-Q

End View and Pin Information of Battery Heater Harness Connector FC017



Pin No.	Description
1	-
2	-
3	-
4	Powertrain Expansion CAN_H
5	Powertrain Expansion CAN_L
6	Charging Wake-up
7	-
8	-
9	Ground
10	KL.30
11	High voltage interlock source output
12	High voltage interlock return input