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Specifications of charge-discharge motor controller for electric vehicles

电动汽车用充放电式电机控制器技术条件

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Annex:

References, names and dates of implementation of 42 automotive industry standards

No.	Standard reference	Standard name	Standard reference being substituted	Date of implementation
301	QC/T 727-2017	Instrument for automobile and motorcycle	QC/T 727-2007	2017-10-01
302	QC/T 803-2017	Oxygen sensor for automobile	QC/T 803.1-2008	2017-10-01
303	QC/T 1072-2017	Automotive gear position sensor		2017-10-01
304	QC/T 1073.1-2017	Automotive acceleration sensors - Part 1: Line acceleration sensors		2017-10-01
305	QC/T 1074-2017	Technical Specification for Automobile Parts Remanufacturing Products Cylinder Head		2017-10-01
306	QC/T 1075-2017	Technical conditions for metal honeycomb carriers for exhaust gas catalytic converters		2017-10-01
307	QC/T 777-2017	Technical conditions for electromagnetic fan clutch of automobile	QC/T 777-2007	2017-10-01
308	QC/T 1076-2017	Continuously variable transmission (CVT) performance requirements and test methods		2017-10-01
309	QC/T 1077-2017	Terminology and definition of automatic transmission control for automobiles		2017-10-01
310	QC/T 1078-2017	Advertising vehicle		2017-10-01
311	QC/T 1079-2017	Attract the pressure truck		2017-10-01

Specifications of charge-discharge motor controller for electric vehicles

1 Scope

This Standard specifies the requirements for terms and definitions, classification, technical requirements, inspection and test methods as well as marks, packaging, transport and storage of charge-discharge motor controller for electric vehicles.

This Standard is applicable to the charge-discharge motor controller for electric vehicles that can be externally charged (hereinafter referred to as the controller).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 191, *Packaging and storage marks*

GB/T 2900.33, *Electrotechnical terminology - Power electronics*

GB/Z 17625.6-2003, *Electromagnetic compatibility - Limits - Limitation of emission of harmonic currents in low-voltage power supply systems for equipment with rated current greater than 16A*

GB/T 18384.3-2015, *Electrically propelled road vehicles - Safety specifications - Part 3: Protection of persons against electric shock*

GB/T 18487.1-2015, *Electric vehicle conductive charging system - Part 1: General requirements*

GB/T 18487.2-2001, *Electric vehicle conductive charging system - Electric vehicles requirements for conductive connection to an A.C/D.C. supply*

GB/T 18488.1-2015, *Drive motor system for electric vehicles Part 1: Specification*

GB/T 18488.2-2015, *Drive motor system for electric vehicles - Part 2: Test methods*

a mode of controller drive motor

3.8 islanding

a status that when the grid loses pressure, the controller still keeps supplying power to a certain part of the line in the loss-of-voltage network

4 Requirements

4.1 General requirements

4.1.1 The controller shall have the communication and fault diagnosis functions required by the vehicle.

4.1.2 The technical requirements of the controller in drive motor mode can be found in GB/T 18488.1-2015.

4.1.3 The technical requirements of the controller in G2V mode can be found in QC/T 895-2011.

4.2 Electrical performance

4.2.1 Operating voltage

4.2.1.1 When the voltage of the vehicle power battery is within the specified range, the output current harmonic of the controller in V2G mode shall meet the requirements of GB/Z 17625.6-2003. The DC current component shall not exceed 1% of its AC rating.

4.2.1.2 When the vehicle power battery voltage is within the specified range, the controller shall be able to output a phase voltage of 220V in V2L mode with a relative error of ±10%.

4.2.1.3 When the vehicle power battery voltage is within the specified range, the controller shall be able to output a phase voltage of 220V in V2V mode with a relative error of ±15%.

4.2.2 Frequency range

4.2.2.1 In V2G mode, the frequency change of the grid-connected voltage is in the range of 50Hz ± 1Hz.

4.2.2.2 In V2L mode, the controller can output voltage frequency in the range of 50Hz ±1Hz.

4.2.2.3 In V2V mode, the controller can output voltage frequency in the range of 50Hz ±1Hz.

less than 1min under 110% rated load; the continuous and reliable operation at 125% rated load current is not less than 10s.

4.2.9 Charging and discharging

Under the specified product technical conditions, the controller shall have the following functions:

a) be able to refer to Annex A.1 process to achieve power supply to the external load;

b) be able to refer to Annex A.2 process to achieve vehicle charging function;

c) be able to refer to Annex A.3 process to feedback the power of the vehicle energy storage device to the grid.

4.2.10 Protective function

4.2.10.1 Overcurrent protection

The controller shall be overcurrent protected when the specified current is exceeded.

4.2.10.2 Overvoltage protection

When the grid voltage exceeds the requirements of 4.2.1, the controller shall turn off the output and give an alarm.

4.2.10.3 Under-voltage protection

When the grid voltage is lower than the value specified in 4.2.1, the controller shall turn off the output and give an alarm.

4.2.10.4 Short circuit protection

When the controller is short-circuited before starting, it shall not start after power-on. In the process of working, when the output is short circuit, the output shall be turned off and an alarm prompt is given.

4.2.10.5 Over temperature protection

If the controller temperature exceeds the temperature protection point setting value, it shall automatically enter the over temperature protection state and reduce the power operation or stop. After the controller temperature returns to normal, it shall be restored.

4.2.10.6 Reverse protection

In the charging or discharging mode, when the DC terminal of the controller is

5.1.1 Environmental conditions

The test environmental conditions are required to be:

a) Temperature: 23°C ± 5°C;

b) Relative humidity: 45%~75%;

c) Air pressure: 86kPa~106kPa.

5.1.2 Measuring apparatus and instrument

5.1.2.1 Range

All measuring instrument ranges shall be able to effectively cover the range to be measured. All measuring instrument ranges shall be changed with the measured resistance, voltage or current. The pointer or meter reading shall be within the measuring range.

5.1.2.2 Accuracy

The accuracy requirements of measuring instruments and meters shall meet the following requirements:

a) universal gauge for measuring dimensions: division value is not greater than 1mm;

b) Vernier caliper: measurement accuracy is not less than 0.01mm;

c) thermometer: with appropriate range, the division value is not more than 1°C; the calibration accuracy is not lower than 0.5°C;

d) resistance meter: the accuracy of the meter for measuring resistance shall be no less than level 0.5;

e) ammeter: the accuracy of the meter for measuring current shall not be less than level 0.5;

f) voltmeter: the accuracy of the meter for measuring voltage shall be no less than level 0.5, and the internal resistance shall be no less than 10MΩ.

5.2 Electrical performance

5.2.1 Operating voltage

Make the controller work in the drive motor mode and the charging or discharging mode, adjust each input voltage. The controller shall be operated for 1min under the conditions of 4.2.1 respectively.

instructions.

8.1.1.2 Each accessory product shall have the following permanent signs: manufacturer's logo and production lot of product.

8.1.2 Packaging mark

The basic content of packaging mark shall include:

a) product logo content related to delivery: product name and trademark, product model, specification;

b) manufacturer name, full address, zip code and phone number;

c) date of production (number) or production lot;

d) reference to standard that product implements;

e) packaging, storage and transport pictorial marks shall comply with the provisions of GB/T 191;

f) text of transport work:

- volume of the package (length × width × height);

- number of products in each box;

- total mass of each box of products.

g) marks of moisture proof, fire prevention, no inversion, careful handling.

8.2 Packaging

8.2.1 Product packaging considerations:

a) moisture proof, anti-vibration and dustproof requirements;

b) relative requirements suitable to transport and loading-unloading;

c) there shall be temporary rust protection measures for the joint parts of the ferrous metal parts without pre-packaging of the products before packaging;

d) each product is packaged with moisture-proof materials and then placed in the packaging box. Spare parts shall be loaded. The packaging shall be firm to ensure that there is no damage during normal transport.

8.2.2 The packing box shall be firm. The product shall not be shaken in the box, and it shall not be damaged by machinery during transport, loading and

Status C	680 Ω/0.5 W [a]	-	Closed	The vehicle interface' is fully connected and discharging for V2V with a cable capacity of 16A.
Status C'	680 Ω/0.5 W [a]	2.7 kΩ/0.5 W [b]	Disconnected	The vehicle interface is in a semi-connected state.
Status D	220 Ω/0.5 W [a]	-	Closed	The vehicle interface' is fully connected and discharging for V2V with a cable capacity of 32A.
Status D'	220 Ω/0.5 W [a]	3.3 kΩ/0.5 W [b]	Disconnected	The vehicle interface is in a semi-connected state.
Status E	100 Ω/0.5 W [a]	-	Closed	The vehicle interface' is fully connected and discharging for V2V with a cable capacity of 63A.
Status E'	100 Ω/0.5 W [a]	3.3 kΩ/0.5 W [b]	Disconnected	The vehicle interface is in a semi-connected state.
NOTE: [a, b] The accuracy of the resistors RC' and R4' is ±3%.				

A.2.2.2 Confirm if the discharging connection device has been fully connected.

The power supply control unit of the discharging vehicle places the CP at +12V or outputs a 100% PWM duty cycle. Simulate the power supply mode in GB/T 18487.

If the discharging vehicle is fault free and the power supply interface is fully connected, switch from the +12V state to the PWM connection state. Power supply control device sends out PWM signal. The power supply control device determines whether the discharge connection device is fully connected by measuring the voltage value of the detection point 1 or the detection point 4.

A.2.2.3 Power supply equipment is ready.

The power supply control device determines whether the charging vehicle is ready by measuring the voltage value of the detection point 1. When the peak voltage of the detection point 1 is the voltage value corresponding to the state 3 in Figure A.3, the discharge vehicle starts to discharge.

A.2.2.4 Terminate discharging process.

In addition to the passive termination of the discharge process caused by the failure of the vehicle or the connection device, the discharging vehicle shall have the setting or operation measures for artificially terminating the discharge process.

The state transition of the V2V control guiding circuit is shown in Figure A.3.

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