

Connector for EV Quick Chargers

1. INTRODUCTION

With the spread of electric vehicles (EVs), the number of installation of quick chargers is increasing. As the number of the feeding operation using connectors for quick chargers is increasing, the improvement points of the connectors are happening. There are increasing needs for their user-friendliness and safety.

We have developed a “connector for quick chargers”, which is easier to use and safer. In this connector, the customers’ needs, stated above, and the functions in the former model which received favorable reviews are combined (Figure 1).

2. CONSTRUCTION

(1) Intuitive operability

The developed connector inherits the good points of the former model. On top of that, it adopts the “push-on method” in which the operation is intuitive and easy and also the lever operation is easy.

It features an easy operation: When inserting, hold the grip and slide it down. When releasing, pull out the grip, while pushing the release button (Figure 2).

(2) Low insertion force

It succeeded the built-in lever mechanism which can change a small insertion force to a large one. Its insertability is leading the industry.

(3) Safety measures

Direct-current electricity of equal to or larger than 100 A

is flowing during quick charge. When electricity is flowing in the state and the connector is inserted incompletely (incomplete mating), a hazardous situation caused by the arc is predictable. To deal with this problem, a micro switch, which detects the incomplete mating state, is installed in the connector to prevent the charger from carrying electricity in the incomplete mating state.

In addition, we adopted a mechanism in which the release button is locked by an electric solenoid while electricity is flowing. It prevents the connector from releasing accidentally while electricity is flowing. The fail-safe system, in which electricity stops by shutting the control circuit, was adopted again in case the release button is pressed while electricity is flowing.

We enhanced the safety by adding a mechanism in which electricity stops when the electric solenoid is jammed with ice, etc.

(4) Superior mechanical strength

The exterior and the interior of the connector are partially equipped with a metal reinforced material as well as the former model. The reinforced material protects the connector from breaking even when it is pressed by a 2 ton vehicle. Also, the head of the connector is protected by the outside case all the time regardless of the after mating and of the after unmating. Thereby, the resistance to the drop impact of the connector was enhanced.

(5) Release mechanism for abnormal locking

A release mechanism for abnormal locking is used

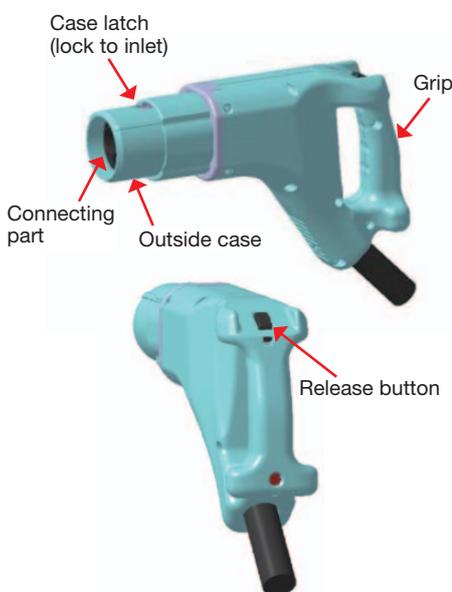


Figure 1 Construction of a connector.

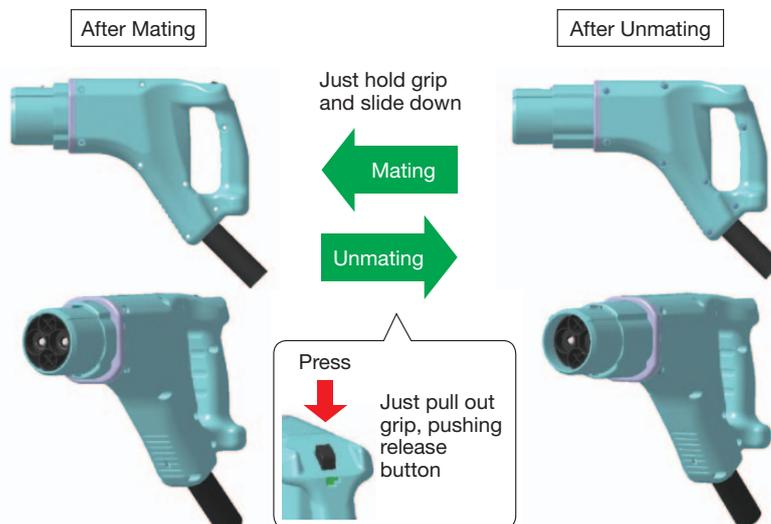


Figure 2 Operation procedure.

when the connector is firmly fixed to the inlet abnormally for any reason. The mechanism was moved from the center of the connector to the grip side to ensure the emergency release operation from the backward of the connector. (A special tool is used for the release operation.)

It also has a safety structure that the connector which was released forcefully will not be able to be used again (Figure3).

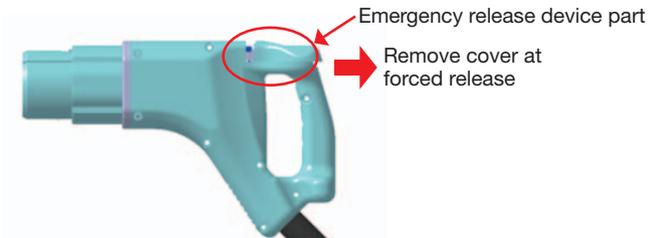


Figure 3 Release mechanism for abnormal locking.

(6) Mating confirmation window

A new mechanism called a mating confirmation window was added. When the charge is disabled by the connector's inner abnormality which can't be confirmed from outside, the color of the window which shows the state of the connector turns red and notify the user of the inner abnormality.

Black: Release state

Green: The connector is normally inserted into the inlet.

Red: Charge is unserviceable. (Electricity must not flow in the connector.)

The LED lamp turns on during charging (Figure 4).

(7) Release button

The material of the release button was changed from metal to plastic so that the operation can be easier in winter. Also, the angle of the release button was changed so that women can press it easily.

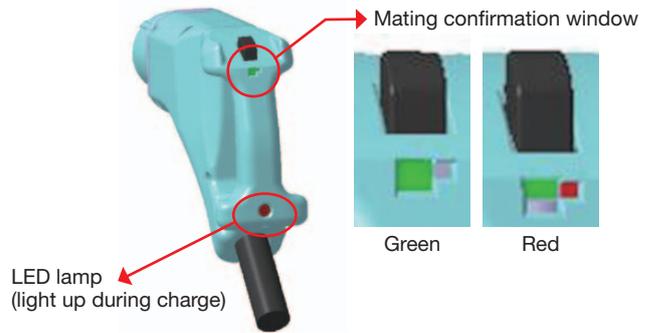


Figure 4 Mating confirmation window.

(8) Grip

The form of the grip was revised to be easily operated with gloves in winter.

3. CONCLUSION

Our company's connector for quick chargers improved the problems of the "hardness of the cable" and the "difficulty in operation", of which the users of electric vehicles felt during charging. We achieved it by using a cable with great flexibility.

The developed connector enhanced the user-friendliness and the safety compared to the existing ones.

We will continue to launch various products in the charging infrastructure related market by making the most use of the knowhow which the Furukawa Group possesses.

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Table 1 Product specification.

<ul style="list-style-type: none"> • CHAdeMO standard specification Ver 1.0 conformity • JEVS G105 (1993) conformity 	
Outline dimensions (release state)	
Number of position	Power: two positions Signal: seven positions
Material	Connector: plastic
Net Weight	Connector: approx. 1.6 kg Cable: approx. 1.4 kg/m