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Media information

Electric mobility: The small charging in between – Safe charging with the right charging cable for mode 2

Mennekes, global supplier of industrial plugs and sockets and developer of the worldwide standardized charging plug “Type 2” which is recommended for use across the whole of Europe, is introducing in partnership with Siemens, a new generation of mode 2 charging cables. The new charging cables for charging on common household plugs and sockets, such as the SCHUKO® socket, combine safety and comfort with an attractive enclosure design. The charging cable was developed by Mennekes and Siemens together and is produced collaboratively.

Various charging modes

Electric vehicles can be charged in different charging modes. These differ with respect to safety devices, communication with the vehicle and charging capacity, among other things. For safety reasons, the majority of vehicle manufacturers choose mode 3 charging. Compatible charging for the vehicle is achieved by charging mode 2 in combination with a common household socket.
These charging modes are defined as follows in IEC 61851:

Mode 2 Charging
Charging is carried out from a common household socket (e.g. SCHUKO® or CEE) with a control and protection device integrated into the charging cable. The charger device is integrated in the vehicle.

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Mode 3 Charging

Mode 3 charging is the safest way to charge a vehicle. It is carried out on charging stations with a specialised charging device in accordance with IEC 61851, the so-called “Electrical Vehicle Supply Equipment” (EVSE), i.e. the charging infrastructure. The charging device is built into the vehicle. PWM communication, fault current and over current protection, switchoff and a specific charging socket are all prescribed in the charging station.

Mode 3 charging at a charging station is the safest way to charge a vehicle.
In its position paper dated 4 May 2012, the European Automobile Manufacturers' Association (ACEA) recommends mode 3 charging for publicly accessible charging stations, and mode 2 charging for charging at home, should no mode 3 charging station be available.

Higher practical standards

As described above, the standards for the charging infrastructure for mode 3 charging are clearly defined.
In mode 2, the connection is carried out using a household, industrial or "camping" socket. However, the use of normal household installations for the charging connection of electric vehicles poses certain risks which had not been completely taken into account by the previous solutions. The charging connections and their supply lead must be suitable for steady currents of up to 16A. This is, however, in all practicality, not universally ensured. There are still household installations without fault current protection devices and sockets with supply lines that – under permanent load – heat up dangerously due to a low cable cross section. The consequences can be serious.

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The user must be able to depend on a safe and reliable charging process, since the vehicle is often charged overnight.
In collaboration with Siemens, Mennekes has developed a mode 2 charging cable, which monitors the various parameters exceeding the normal standards, such as the temperature in the SCHUKO® plug on the infrastructure side, or the present of the protective conductor, thereby making mode 2 charging considerably safer.

Mode 2 functions in accordance with IEC 61851

For mode 2, the norm prescribes a mobile device for raising the switched protective earth level (SPE-PRCD). Furthermore, a communication device (PWM Module) is required with the vehicle for the power setting and for fulfilling the security standards. These components are combined in the so-called "In Cable Control and Protecting Device" (IC-CPD).
The IC-CPD, which is integrated into the charging cable, controls the protective conductor connection and transmits the limit value for charging current to the vehicle. In case of error or power failure, the charging process is immediately interrupted to protect both user and electric vehicle.

Additional beneficial functions

Mode 2 charging cables by Mennekes and Siemens are equipped with additional features for added safety and comfort. Thus, the mode 2 charging cable is a mobile charging station for home and outdoor using.

- Adjustable maximum charging current
  The user has the option of adjusting the charging current to the existing

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infrastructure. In this way he can, as a precaution, reduce the charging current on external sockets to 10A, 8A or 6A. The value is selected by a button and saved automatically in the device. Even when the device has a power failure or is switched off, this value is still saved.
In addition, LEDs inform the user of the adjusted charging current upper limit and display malfunctions.

- Automatic resumption of the charging process
  A normal IC-CPD is switched off after an error or power failure and must be reactivated manually. Therefore, when overnight charging is planned, the battery could still be empty the following morning.
  This is not the case with the Mennekes/Siemens solution. The IC-CPD permanently tests the infrastructure-related voltage. If there is still any current at the wall socket, the IC-CPD initiates a test sequence, establishes communication with the vehicle and ensures a safe recharging of the vehicle battery.

- Multi-level temperature management
  Thanks to multi-level temperature management, overcharging of not only the IC-CPD, but also the wall socket, is prevented. Temperature monitoring within the IC-CPD ensures that no overheating occurs therein. A second temperature sensor in the protective contact plug minimises the risk of overheating the wall socket.
  As soon as a temperature of 55°C is measured in the IC-CPD or the wall socket, the electronics reduce the charging current automatically to 6A using the PWM Module.

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If the temperature continues to increase, the IC-CPD will interrupt the charging process when 65°C is reached. Once the temperature has returned to 45°C, the charging process is resumed after a successful self-test.

- Detecting faulty wiring
  The intelligent IC-CPD also detects faulty wiring of the infrastructure-side socket and, in addition, controls the incoming protective conductor before charging begins.

- Detecting a welded or frozen relay
  A further feature for added security is Relay Welding Detection: If a relay is welded or frozen, this is detected by the electronics, the circuit is broken and the user is informed by an illuminated display.

- Slender, practical and robust
  Mode 2 charging cables never fail to convince with their appealing design. Thanks to the new enclosure format, the charging cable with integrated IC-CPD can be easily and compactly rolled up, since both bushes are fed out of the enclosure at an angle. Thus the charging cable requires less storage space.
  The stable enclosure can be driven over by a car just like the charging connector and passes the test with a wheel load of 500kg. In practice the enclosure is exposed to more intensive environmental influences than plugs and connectors.
  In day-to-day use, it is not out of the question for the enclosure to lie on the ground, covered in dirt, or even to be left in a puddle.

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For this reason it is exceedingly robust and stable designed and both, plug and charging connector, fulfil safety class IP44. The protective contact plug is bent 90 °. The cable therefore does not protrude and there is less strain on the wall socket. Mode 2 charging cables are available with combined German/French protective contacts, British standard and 3-pin CEE plugs.
The charging current can be reduced incrementally from 13A to 10A, 8A or 6A. The version with CEE plugs will enable a maximum charging current of 16A.

Conclusion

As long as there is no comprehensive charging infrastructure, charging cables for mode 2 charging are an alternative. Even if we come to a nearly comprehensive charging infrastructure, they act like the spare jerry can of the electric vehicle.
With the new Mode 2 charging cables, Mennekes and Siemens are offering a comfortable and above -standard charging solution for home and away. All functions are operated intuitively. Particular emphasis is placed on the automatic resumption of the charging process after a power failure or error as it protects from unpleasant surprises the following morning. A further top feature is multi-level temperature management, which also enables safe charging on older home installations and prevents the wall socket from heating up excessively.

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Pictures:

Picture 1: Mode 2 charging cable

Mennekes and Siemens have developed a new generation in mode 2 charging cables for the safe charging of electric vehicles.

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Picture 2: Mode 2 charging cable IC-CPD display

The IC-CPD offers a plethora of additional beneficial functions, which far exceed the normal standards.

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Picture 3: Mode 2 charging cable

Thanks to its new design, the charging cable can be easily rolled up and stored to save space.

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Kirchhundem, 2013
Printing free of charge, copy requested.

MENNEKES Elektrotechnik GmbH & Co. KG was founded in 1935 and is the developer of the German standards draft for charging couplers as well as leading manufacturer of industrial plugs and sockets. The company has a global presence with subsidiaries and representations in more than 90 countries and employs nearly 1,000 people worldwide. The product range comprises standardised plugs and sockets in over 11,000 different variants and designs as well as charging couplers for electric vehicles, which where awarded with the first VDE test seal ever. We take an integrated approach towards electric mobility and develop components like charging plugs, charging cables and vehicle inlets as well as complete charging stations for commercial and private application. The solutions thus fulfil perfectly the requirements of car manufacturers, electric utilities and consumers. In the past business year, the MENNEKES Group achieved a consolidated turnover of more than 115 million Euros. More than half of the turnover is made in export.

More information at www.MENNEKES.and at Facebook, Twitter and YouTube .

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