



POCKET GUIDE EV-CHARGING

While electric mobility is gaining more and more momentum, the public debates focus on the range of e-cars and the availability of charging points.

The electrical industry is working on different charging modes, each with its own pros and cons. This Pocket Guide about EV charging lines out how VAC's rich portfolio of high performance magnetic components helps to meet the various R&D challenges that different charging modes bring along.

ADVANCED MAGNETIC SOLUTIONS

VAC[®]
VACUUMSCHMELZE

CURRENT MEASUREMENT – benvac



KEY FEATURES

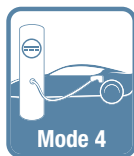
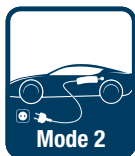
- fault current detection according to IEC 62752, UL 2231 or GB 22794
- two switching outputs according to the switching levels of each standard
- measurement resolution of 0.2 mA

APPLICATION NOTES

By using a VAC differential (DI) current sensor integrated into an IC-CPD or wall box, the EV charging electronics will provide all-current sensitivity and electrical safety at low cost. In case the sensor detects a DC or rms fault current, the corresponding output will change its state.

Design variants with integrated primary conductors for one or three phase systems are available, together with a pass through variant.

benvac is a joint development of Bender GmbH & Co. KG and VACUUMSCHMELZE.



CURRENT MEASUREMENT – CURRENT SENSOR



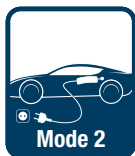
KEY FEATURES

- current sensor series for direct PCB mounting with integrated primary conductors
- wide measurement range of 6A to 100A
- +5V power supply
- closed-loop sensor with magnetic probe and galvanic isolation
- low-cost designs

APPLICATION NOTES

VAC current sensor series offers high accuracy measurement for continuous charging current in very compact design. The sensors cover a wide measurement range and offer an analog linear voltage output. Due to integrated primaries the sensors can be assembled directly onto the PCB.

Higher power range current sensors as panel mounts also available.



CURRENT MEASUREMENT – CURRENT TRANSFORMER

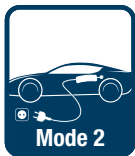


KEY FEATURES

- highest accuracy and high output signal
- easy mounting due to compact and customized designs
- excellent galvanic separation
- anti-tampering types available with magnetic shielding

APPLICATION NOTES

VAC current transformers (CTs) can be used either for simple monitoring purpose or as a measuring unit if used in EV charging application with metering function. The highly linear characteristic curves allow to use the CT as a precise measurement device and a high transformation ratio (e.g. 1:2500) offers the right output voltage for easy signal processing over the whole current range. Special shielded versions of CTs can be used to prevent metering manipulation.



EMC PRODUCTS



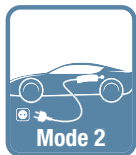
KEY FEATURES

- compact design solutions for high nominal currents
- VAC CMCs fulfil the UL1446 insulation requirements
- environmentally friendly due to high efficiency

APPLICATION NOTES

The general trend to increase switching frequencies in power electronic applications leads to significant network disturbances (EMI). Accordingly, sophisticated EMI filters need to be used following the latest international standards.

VAC offers a broad portfolio of EMC products based on the high permeability nanocrystalline alloy VITROPERM®. The large variety of 1-phase, 3-phase and 4-fold CMCs for various nominal currents, both in upright and low profile design, make them indispensable in EV charging applications.



Mode 2



Mode 3



Mode 4



Inductive

KEY FEATURES

- very low specific power losses
- high excitation levels ≥ 0.8 T
- operating temperature ≤ 150 °C

APPLICATION NOTES

Future AC and DC fast charging solutions (i.e. mode 3 and mode 4) will require medium frequency transformers (MFT) to meet size, weight and efficiency targets. For MFTs, VITROPERM combining very low losses at high excitation levels is ideal. Based on a new production technology cut cores made of nanocrystalline VITROPERM exhibit the lowest power losses in the market.

