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Measurement and Test Solution

DC CURRENT MEASUREMENT IN ELECTROMOBILITY

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DC Current measurement - where is the industry now

With increasing importance of electromobility and growing network of fast DC charging stations, there is also a need to precisely measure electricity used for charging
While all global infrastructure is based on AC, and the legal measurement chain (meters, verification and calibrations tools) and processes are standardised, this is not the case with DC currents measurements.
Operators of DC charging networks solve this issue by different approaches (fixed fee per session, measuring time spent charging...) but none of them is accurate and there are many influences, that distort charging quantity (available network potential, charge of the battery, temperature...)

There is increasing need to introduce accurate measuring system of DC currents in order to offer clients fair payment system based on the real consumption.

Challenges to be adressed

Legislation

- there is no common legal framework on European/global level yet, despite German standard ('pre-standard' initiated by the German DKE (Committee on Electronics and IT), called the *Anwendungsregel* VDE-AR-E-2418-3-10) already presented and USA metrology is also preparing Section 3.40 of Handbook 44 of the NIST (National Institute of Standards and Technology), by the DMS (Division of Measurement Standards)
- Each country has its own set of rules and conditions

Measuring devices

- according to latest market research existing available products are based on train technology
- that means they are not in a size that should suit sleek, modern design of current charging stations
- technical limitations to retrofit on existing chargers due to its closed sensor design

Measuring and verification chain

- as the DC measurement is a source of data for invoicing, it is a subject to strict metrology requirements
- It means that all DC electric meters have to be checked and their measurements accuracy needs to be verified on regular basis
- This requires new set of measurement tools for technicians on site and in the laboratory

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What is Applied Precision position

Established in 1992 in Bratislava, Slovakia, Applied Precision Ltd. is a specialist in development and production of precise electricity meter test and calibration tools suitable for automated tests as well as portable devices.

Patented technologies, in house HW and SW development and production under ISO 9001:2015 certification ensure highest quality standards and customer satisfaction.

Our customers are national test institutes, electric meter producers, distribution companies from more than 60 countries all over the globe.

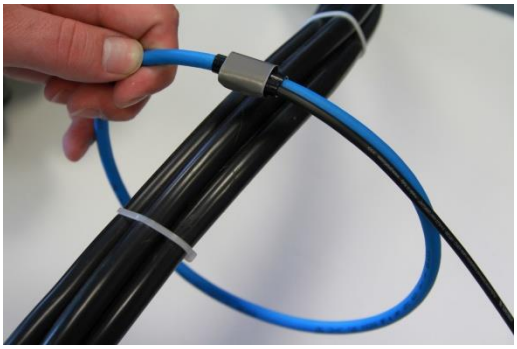
Latest development has led to creation of breakthrough tool for measurements of DC currents, very much suitable for fast charging stations

Its patented (US patent US 7 847 543 B2, European patent EP 1960796) working method uses principle of integration of magnetic field with magnetic fiber. Detailed scientific study and experimental evaluation was published in IEEE Transactions on Instrumentation and Measurements vol.66 NO 8, aug.2017 under the title „Magnetic Fiber Integrator and its Application in Precision Noninvasive DC Current Sensor"

It is built to comply with 'pre-standard' initiated by the German DKE (Committee on Electronics and IT), called the *Anwendungsregel* VDE-AR-E-2418-3-10

Practical use

As for the practical use description, it is a noninvasive precision sensor for DC current measuring (i.e. for exact measurement of electric current used for fast charging of electric vehicle thus calculating exact value for invoicing)



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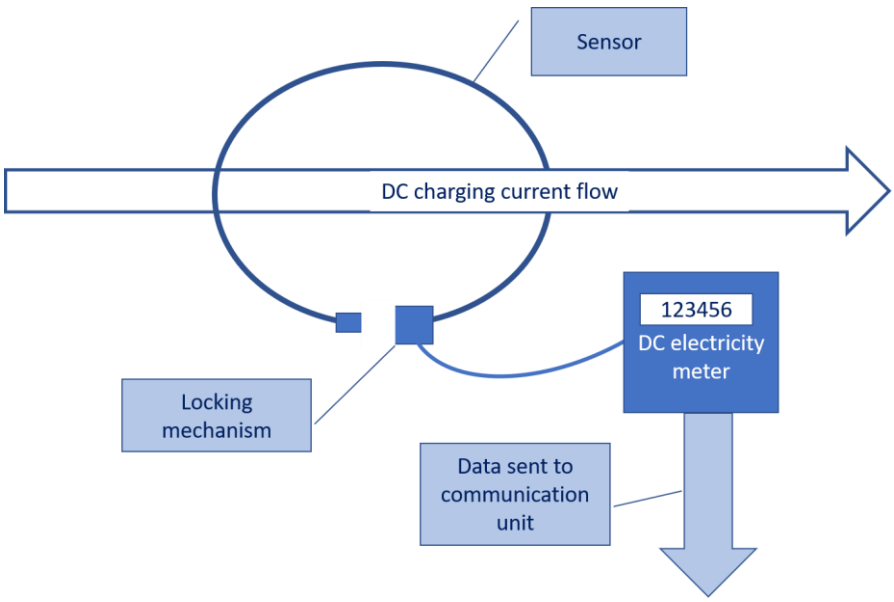
How does it work

Noninvasive sensor is placed around charging cable and measures DC currents charging the vehicle. Values are measured by DC electricity meter which then sends data to communication unit that process them for invoicing



Advantages

- Noninvasive, open loop design means it can be easily integrated in current design of charging stations
- It can be easily retrofitted into whole range of existing installed charging stations
- Communication ports at A/D converter and used data protocols allow easy integration to existing management SW solutions and to invoicing modules
- Reference precision up to 0.005%
- With currents range up to kA it is suitable for full range of DC charging stations
- Very low energy consumption and low running costs
- Small size means easy placement in the charging station – no design changes needed

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Product line

DC Sensor

- Can be used with own DC electricity meters or installed and used with third party products

DC Electricity meter (in development)

- Discussion with DC EV charging stations producers is needed in order to understand their requirements for data flow (which data and in what format are necessary for their invoicing and station management software solutions)

DC on site measurement systems (in development)

- Hand tools for technicians performing tests of sensors and electricity meters at the place where DC charging stations are built
- Accuracy classes have to be defined by legislation
- Simple lightweight devices for quick verification and tests of the network
- Tools with own precise power sources for exact tests and measurements of places where no „last mile“ was laid yet

DC laboratory systems (in development)

- High precision (up to 0,005%) test and calibration tools for development of DC electricity meters
- Automated production systems for tests and calibration of mass produced DC electricity meters

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