

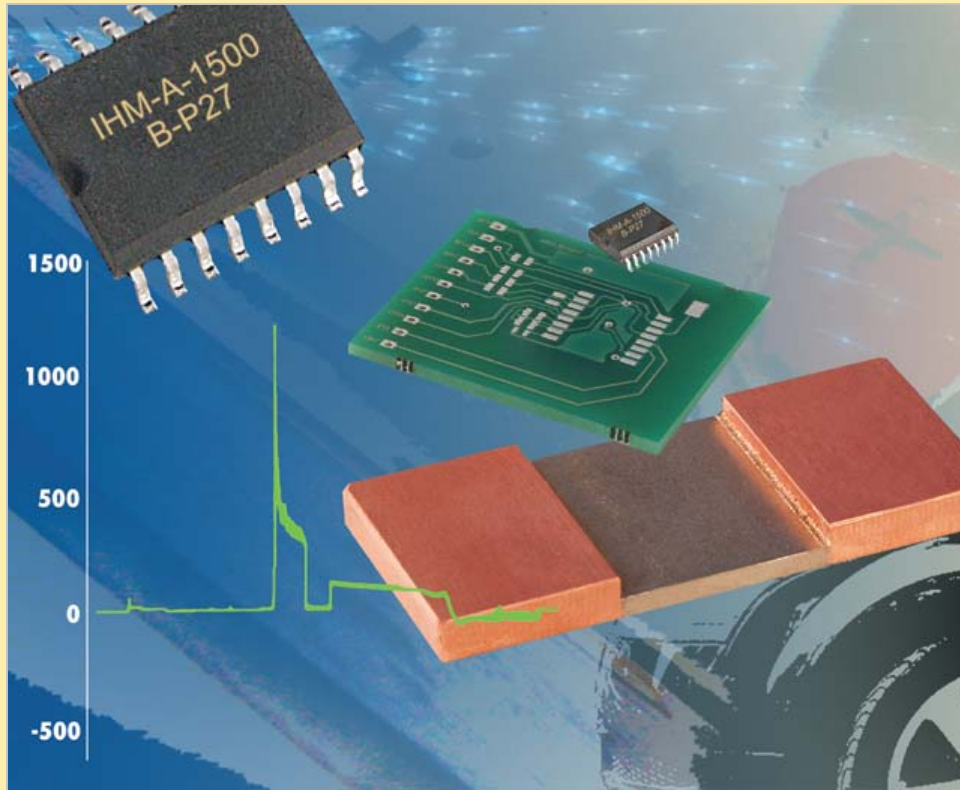


Sensor modules for Battery- and Power- Management in passenger cars and trucks

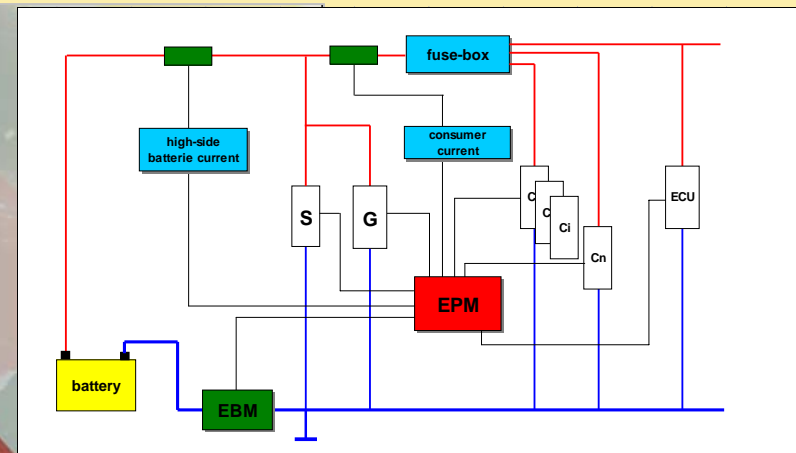
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Current measurement with precision shunts :



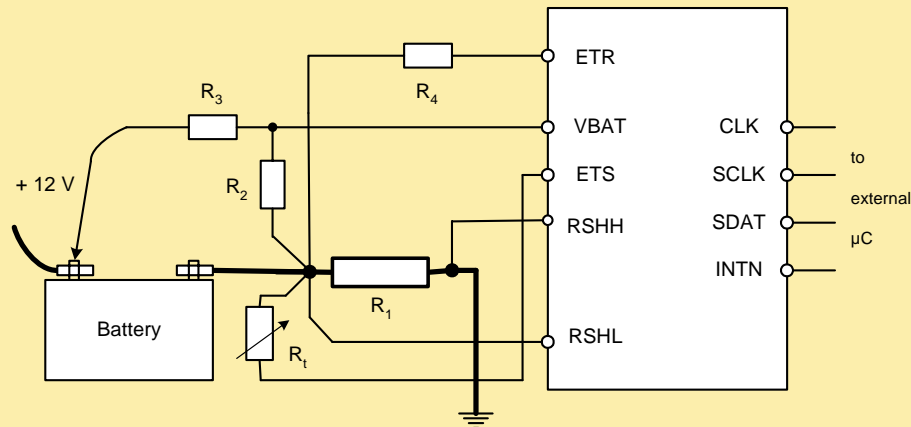
| | |
|--------------------|-----------------------------|
| Current | : 1 mA to 1500 A |
| Voltage | : 20 V, res. 1 mV |
| Temperature | : -40 to 120 °C. res. 0.1°C |



The detailed data for current, voltage and temperature of the battery is a very essential prerequisite for any mathematical algorithm to calculate the SOC and SOH and the state of function (SOF) of the battery (lead or Li-Ion).

This in term can help to increase the lifetime of the battery, improve the overall energy management in the car and eventually can help to reduce the gasoline consumption.

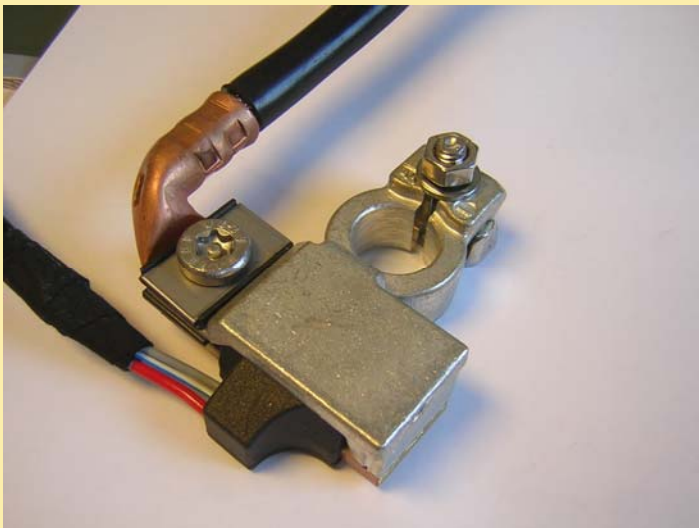
battery monitoring



The new solution consist of a high precision shunt with resistance values between 50 and 100 μ Ohm and a PC-board which is directly mounted onto the shunt.

A high precision, offset free, 16-Bit data acquisition system performs all the low level measurements with high speed and precision.

The big advantage of the shunt solution compared to the well known magnetic sensors is its much better accuracy in combination with the huge dynamic range (1500A down to a few mA). In addition it is not only a current sensor but a complete measurement system which delivers calibrated digital data for current, voltage and temperature via a serial bus (i.e. LIN or CAN) to the power management controller.



advantages of battery monitoring



control the flow of energy

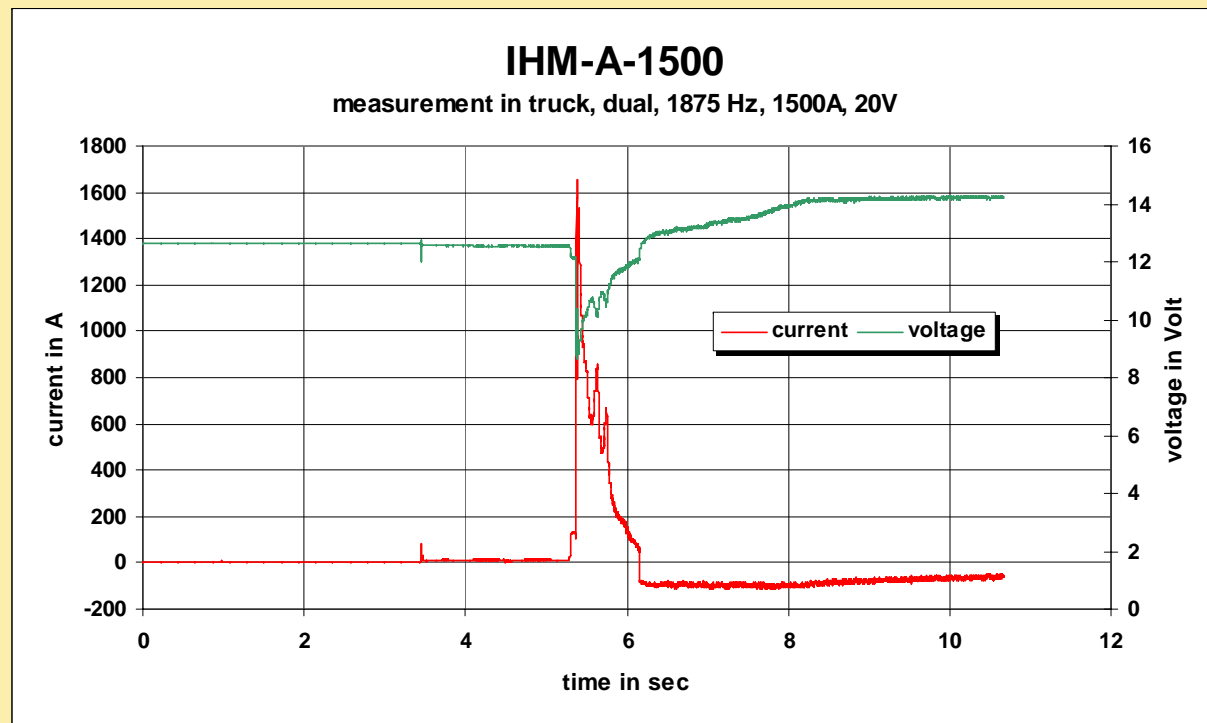
- current measurement (diagnosis for battery, generator, consumers,..)
- battery voltage, generator voltage
- Battery mtemperature measurement

in all situations

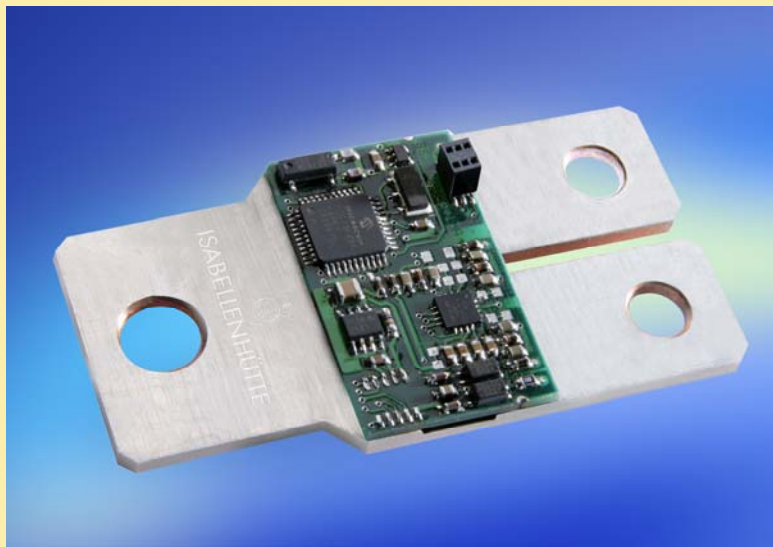
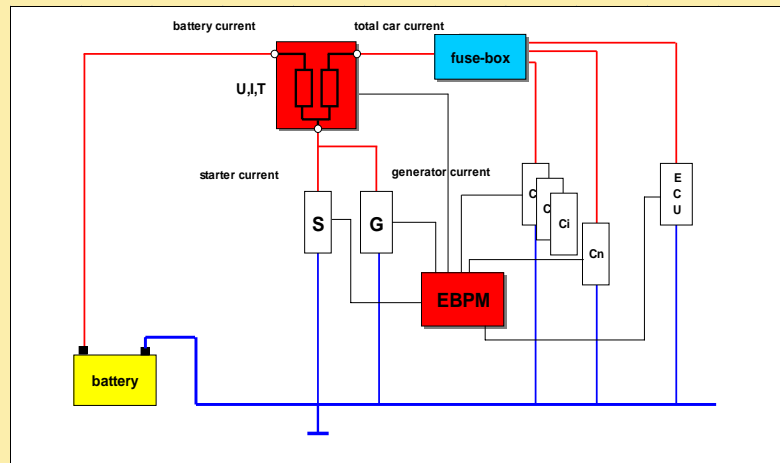
- idle mode
- motor starter
- running condition

resulting in

- no break-down on the road due to dead battery
- Increased lifetime of the battery
- no early safety replacement necessary
- idle current control in sleep mode
- better power management resulting in less gasoline consumption



combined measurement of battery- and vehicle-current



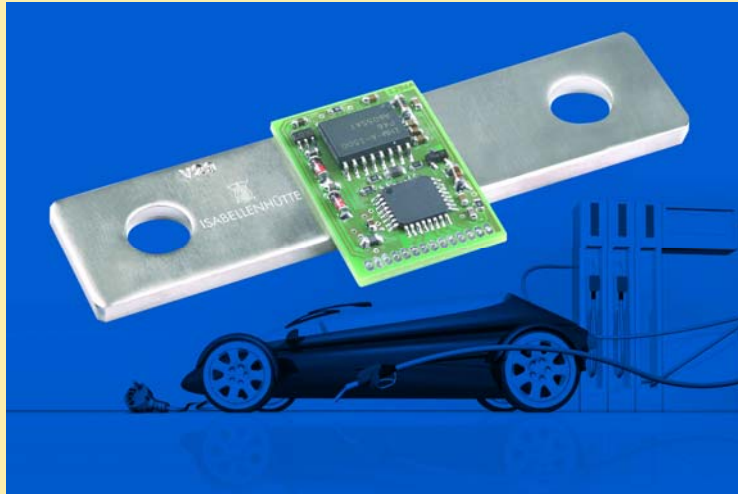
For a full power and battery management it will be necessary to measure not only the battery current but also the current which is consumed in the vehicle or generated by the alternator.

The hardware of such module consists of a double shunt which is connected at a suitable central location on the high side as shown. The electronic circuit differs only very little from the battery monitoring solution.

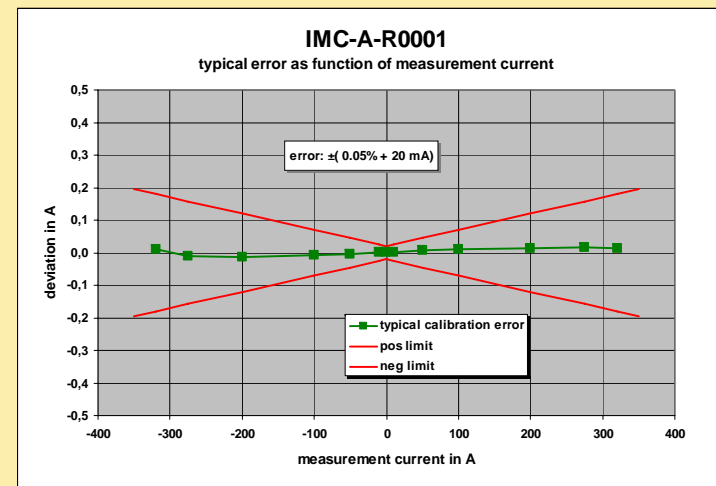
In this case the controller can also handle electronic fuses and safety switches which disconnect the battery from the car.

Developments are ongoing to integrate all these functions in the power distribution box with bus bar interconnections and CAN interface to other modules.

IVT-module for Li-Ion batteries



The Li-Ion battery needs a very special battery management with synchronous single cell voltage monitoring and charge balancing as well as a very precise measurement of the charging and discharging current and a high precision measurement of the stack voltage in addition to the battery temperature.



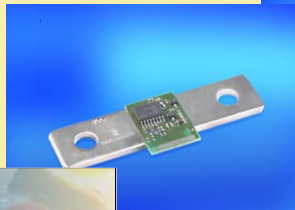
Current, voltage and temperature measurements are combined in the so called IVT-module. Fully isolated versions are available which communicate with the main battery control unit via SPI-interface.

Isabellenhütte

specialist for high precision current measurement



customer designed solutions
power- and battery management
in hybrid and full electric cars



IMC-x

IMS

Shunt
+ ISA-ASIC



IHC
current modul
300 .. 2000 A



IUR
laboratory measurement
system, data logger I,V,T

high precision data acquisition
modules for battery and power
management and laboratory
applications

summary



The IVT-modules are designed for all applications in battery and power management in cars, trucks and special vehicles

- high resolution
- high linearity
- high sampling rates
- high flexibility due to many special features
- low noise
- no offset
- galvanic isolation
- low cost

literature :

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3. Th.Otto, low-Ohmic CSR for Automotive Designs, EPN, nov. 2003
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