IRS SYSTEMENTWICKLUNG GMBH

High Current Measurement 3kA

Precise current measurements in the range of 0,1A..3kA

24.08.2020

IRS Systementwicklung GmbH
Pfaffenthanner Weg 5 • 93179 Brennberg
www.irs.systems | info@irs.systems

Description

Batteries in automotive applications must be continuously monitored to make sure that the battery is in a healthy state. A weak battery must be detected, and consumer loads should be deactivated if possible - especially, when the Start/Stop-feature is used extensively in city traffic, leading to heavy stress of the battery.

Health monitoring in the car includes continuous voltage-, temperature- and finally current measurement directly at the battery poles. Currents may reach several 100 Amps for various consumers and the starter-generator. Battery sensors must keep up with those high currents and must be tested accordingly. Accuracy of the sensor element must be proved by calibration during development, validation, and production.

Thus, IRS provides a system to measure the applied current both for validation tests and calibration of the sensors. Both low currents in the range of 0,1A and very high currents up to 3kA can be validated precisely.

Key Facts

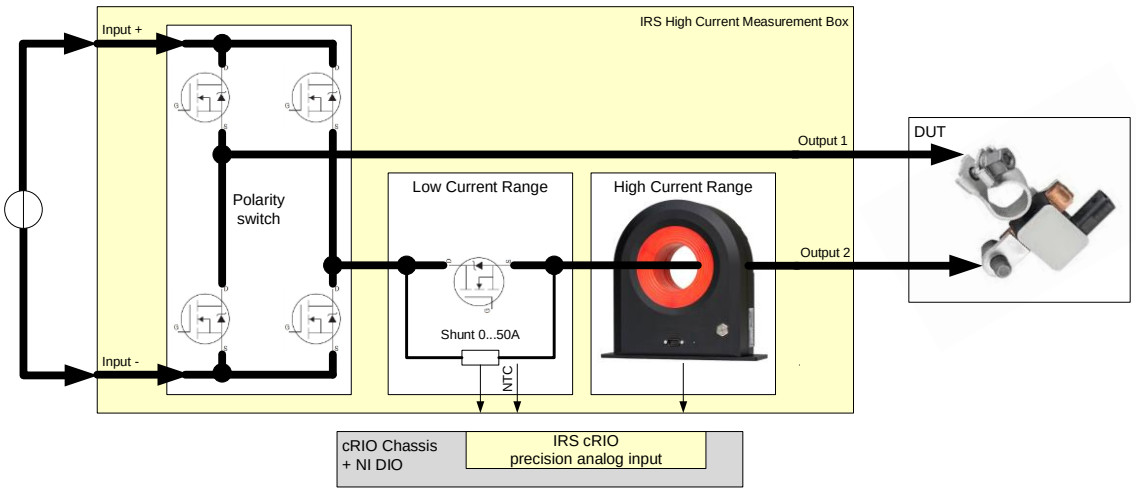
- Precise measurement equipment for test and calibration
- Measurement range +-3kA, 500A continuous current
- Voltage range 20V
- 1kS/s sample rate
- high accuracy @ 32-bit resolution.
- Dual range with automatic range selection
- Polarity reversal included

IRS Systementwicklung GmbH
Pfaffenthanner Weg 5 • 93179 Brennberg
www.irs.systems | info@irs.systems

Use Cases

Technical Description

The following picture shows the basic setup of the High Current Measurement Box (HCMB):

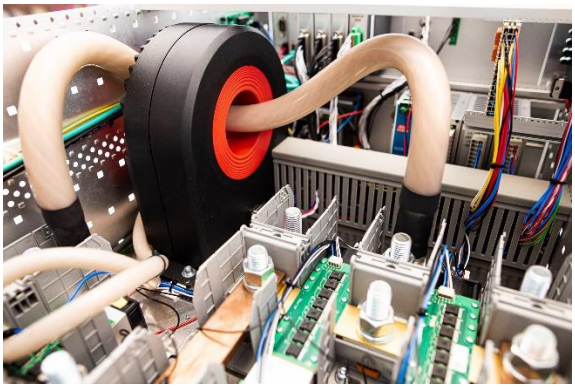


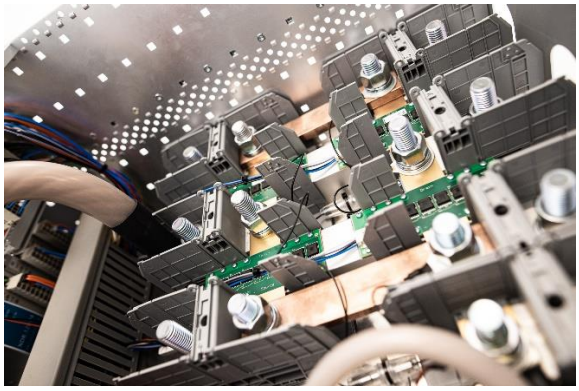
An external standard power supply feeds the energy into the HCMB. Via the integrated polarity switch either positive or negative current may be selected. The current passes the two measurement stages for currents below and above 50A and is finally output to the DUT. Please note that the power supply only has to provide enough voltage for covering the voltage drops on DUT and HCMB.

IRS Systementwicklung GmbH
Pfaffenthanner Weg 5 • 93179 Brennberg
www.irs.systems | info@irs.systems

High current switches

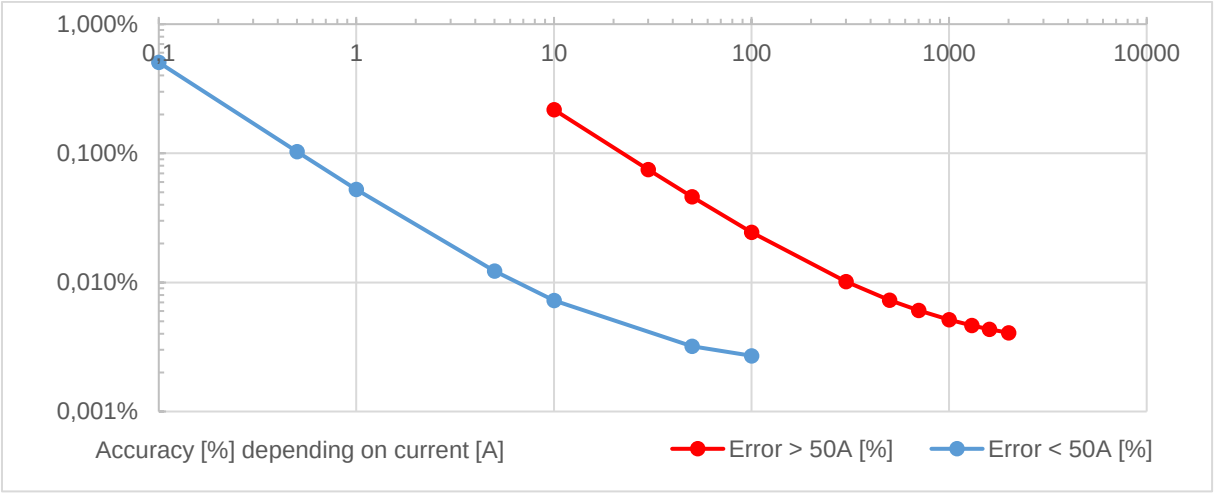
High current semiconductor switches for reverse polarity and range selection are designed by IRS. The switches are implemented as printed circuit boards with integrated copper layer, yielding very low voltage drops. Monitoring of temperature sensors ensures that the switches are in safe operation area.





Measurement ranges

For high currents up to 3kA a high precision current converter is applied with a basic accuracy of 10ppm. To increase accuracy at the lower end of its measurement range, a second measurement stage with shunt resistor is implemented for currents below 50A. To make sure that the accuracy is maintained, the shunt resistor is temperature controlled via Peltier element.



IRS Systementwicklung GmbH
Pfaffenthanner Weg 5 • 93179 Brennberg
www.irs.systems | info@irs.systems

Data acquisition

As data acquisition platform, NI Compact-RIO has been chosen. Standard NI modules are used for digital IO and voltage monitoring. Configuration, capturing of status, waveforms and measurement values is done via Ethernet. For Windows, a control software is available for the user, who may use the system in different software setups:

- Included test panel (LabVIEW)
- LabVIEW API
- DLL API for C# or other programming languages

To enable high accuracy data acquisition for the measured current, an IRS analog input module with 32-bit ADCs has been developed. With the IRS module, the software has full access to all features of the ADC including internal calibration settings.

Technical Data

	Min	Typ	Max	Unit
DC voltage range (drop voltage)	0		20	V
DC Current (Typ=continuous / max=for 20 seconds)		500	2000	A_{RMS}
Current measurement range	-3000		3000	A_{pk}
Accuracy Full scale of measured value @ 1….3000A		0,005	0,1	%
Sample rate		1		kS/s
Path resistance (input to output)		0,5		mΩ

IRS Systementwicklung GmbH
Pfaffenthanner Weg 5 • 93179 Brennberg
www.irs.systems | info@irs.systems