

A mobile test laboratory for WLPT consumption testing

Mobile, time-saving and cost-efficient measurement

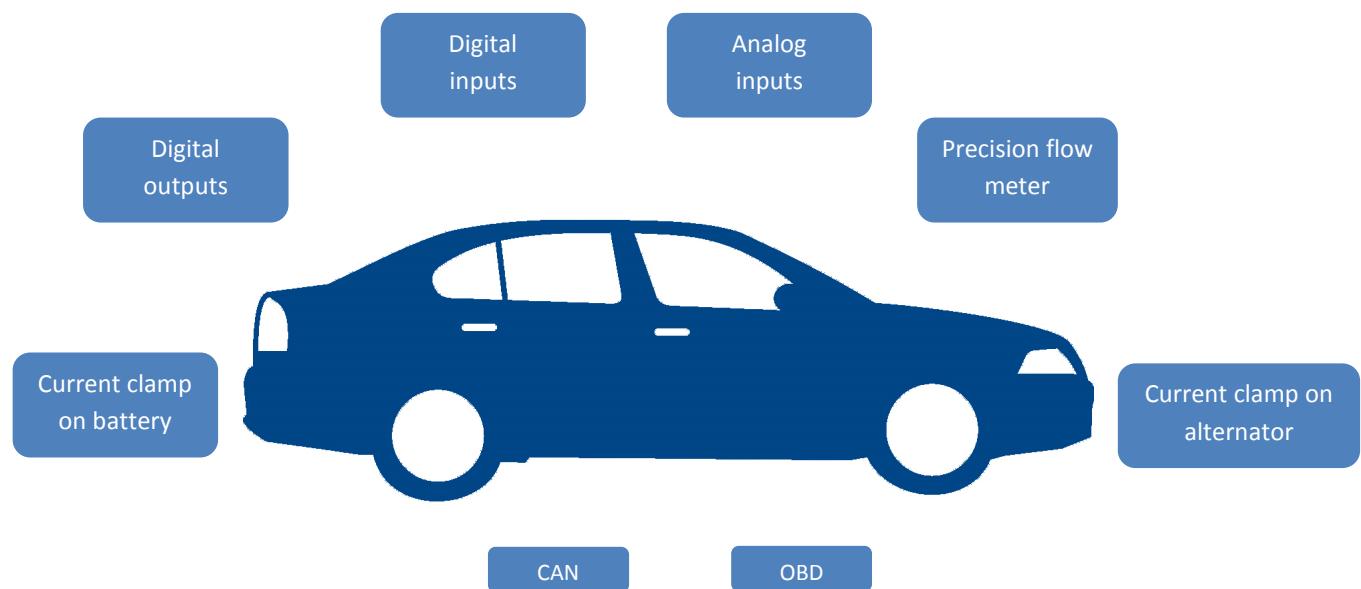


Fig. 1: Measurement box interfaces to the vehicle

The new statutory WLTP test cycle requires a consumption measurement for each variant of a new passenger car model. The measurement procedure used by the EU as the standard for consumption values includes a measurement on the test bench and an RDE test on the road to determine realistic values. In order to cope with this test cycle in a time-saving and cost-efficient manner, imc developed a user-friendly and compact measurement box that works both on the test bench and on the road.

WLTP measurements on the test bench and on the road

Legal requirements for more realistic test conditions

The WLTP measurement (=World Harmonized Light Vehicle Test Procedure) valid within the EU and the corresponding road test RDE (=Real Driving Emissions) record exhaust and consumption values under realistic conditions. The requirements of this new, legally prescribed test cycle also include emissions testing of various model variants. imc counters the additional expense of this mandatory procedure and offers a flexible, cost-effective, standardized and time-saving measurement solution.

A compact measurement box for WLTP testing

imc developed a compact measurement box in order to record and process data in a short period of time both on the test bench and on the test track.

It contains a compact imc C-SERIES DAQ system as well as customer-specific connections for various sensors. Mobile data recording is possible thanks to an integrated rechargeable battery. All components used in the measurement box are CE-compliant and meet ISO guidelines for operating safety.

The user connects to the measurement box via Ethernet or Wi-Fi via a laptop and starts the WLTP application in imc STUDIO. This combines the configuration of the measurement device, data recording and automated data evaluation in one application.



Fig. 1: Easy handling of the imc measurement box



Fig. 2: Connecting to CAN bus and Wi-Fi



Fig. 3: The imc measurement box with laptop in the trunk.

System overview

| imc Measurement Device | Qty. |
|--|------|
| imc C-SERIES 4108 | 1 |
| Features / Modules | |
| Housing type CS 8 analog channels, max. sampling rate 100kHz/channel. Voltage, current, temperature, optional ICP connector and sensor supply. CAN and CAN-FD. Connectivity includes Ethernet, GPS connection, display connection Data storage via CF card slot or PC/network drive PC-independent complex trigger functionality On-board real-time data analysis Autarkic operation without PC, self-start 8 bit digital input/8 bit digital output 4 Pulse counter 4 analog outputs (DAC) | |
| imc Software | |
| imc Online FAMOS Integrated real-time data analysis platform | |
| imc STUDIO Professional / Developer Comprehensive measurement software for the entire test process: measurement, visualization, automation, data analysis; individual adaptations, scripting, application development. | |



Fig. 4: Measurement box in transport case

imc C-SERIES

The imc C-SERIES measurement devices are compact and robust and are suitable for mobile applications. They offer measurement data acquisition with additional control functionality in one system and synchronously acquire analog, digital and CAN-based signals.



Fig. 5: imc C-SERIES model CS 7008 / model CS 4108

Measurement channels and sensors

All models of the imc C-SERIES are equipped as standard with analog inputs, eight digital inputs (DI), eight digital outputs (DO), four analog outputs (DAC) and four counter inputs for recording speeds, angles, etc. (e.g., incremental encoder).

The analog inputs are equipped with differential or isolated precision measurement amplifiers with integrated signal conditioning, anti-aliasing filters and synchronous A/D converters for up to 24 channels.

Depending on the model, the input channels can be digitized with up to 100 kS/s – with an aggregate sampling rate of 400 kS/s per device. For road tests, the imc C-SERIES offers an integrated CAN / CAN FD interface with two nodes for reading and transmitting CAN bus data. Both nodes can be operated flexibly and individually in fast CAN FD mode (max. 8

MBaud) or as standard CAN (OBD single-wire CAN). In addition to the universal models CS-7008 and CL-7016, the imc C-SERIES offers suitable models for almost every measurement task and sensor.

Customer-specific interfaces

It is also possible to equip the imc measurement box with additional customer-specific interfaces.

The measurement box shown here has two additional analog inputs for the connection of current clamps, which measure the current consumption of the battery and alternator. The connections have secure bayonet fasteners. The sensor supply for the current clamps is integrated into the measurement box.

There is also a channel and connection for a flow meter to record the fuel measuring signal.



Fig. 6: The imc measurement box for WLTP testing

Test results in real time with imc Online FAMOS

The imc C-SERIES also includes the real-time system imc Online FAMOS, for demanding real-time analysis and control tasks. imc Online FAMOS is able to perform mathematical calculations and also to realize process controls and test bench automation up to complex control algorithms (incl. PID). Even during the measurement it is possible to display measured values in real time via imc Online FAMOS.



Fig. 7: Autarkic operation of the measurement box in the car

Autarkic testing

The measurement box works with one battery for up to four hours independently of external power sources. A built-in memory records the data for later evaluation. Furthermore, the measurement box has an Ethernet port (optional Wi-Fi transmitter). This establishes the connection to the imc STUDIO WLTP application for configuration of the measurement box and data evaluation.

Conforms to CE and ISO guidelines

All modules of the measurement box are CE-compliant and meet internal factory standards and ISO guidelines. Thanks to the impact-resistant aluminum housing and protective low voltage, the device complies with IP67 and has protection class II. In addition to the operational safety and ease of use, the design of the box is robust and space-saving. The box can be stacked on feet and has a surface on which all connections are accessible from above.

Evaluation in imc STUDIO

Evaluate tests with your own app

The WLTP application in imc STUDIO combines the configuration of the measurement hardware, the data recording as well as the calculation of the measurement channels and their visualization in curve windows in one application. User and display interfaces can be freely designed using drag & drop. Different user modes have therefore been created. A simplified user mode guides the user from the setup of the measurement to the creation of the report via dialog windows. The expert mode, on the other hand, offers the user full access to all functions of the software for parameterizing the various measurement channels.

Connection to external data sources

When setting up the measurement box, imc STUDIO uses a script to access an external data source containing information on the vehicle model and CAN parameter IDs (PIDs) for configuring the measurement channels.

This can be, for example, a connection to Microsoft Excel™ or a database. After the meas-

urement, imc STUDIO automatically evaluates the CAN data contained in the DBC file by filtering it, assigning setpoints, signal names and variable names. Then the visualization of analog and fieldbus measurement data takes place.

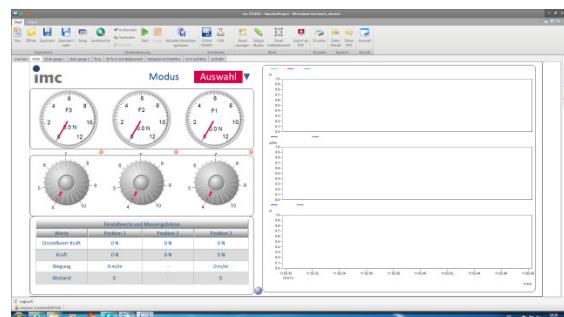


Fig. 8: Screenshot of an imc STUDIO application

Conclusion

For the legally prescribed WLTP consumption measurement on the test bench and on the road, the devices in the measurement cases represent a mobile and robust solution for acquiring measurement data. The combination of the imc C-SERIES with customer-specific connectors in a robust housing covers all required functions and represents a cost-effective measurement solution. The design of the measurement box and the associated WLTP application for consumption measurement are aimed at a simple and time-saving operation. From the configuration of the measurement hardware, to the test sequence control and the evaluation of the data, all stages of the measurement are processed by one application.

In addition to robustness, functionality and efficiency, the imc C-SERIES devices are also future-proof because they are designed to be expandable with reserve channels.