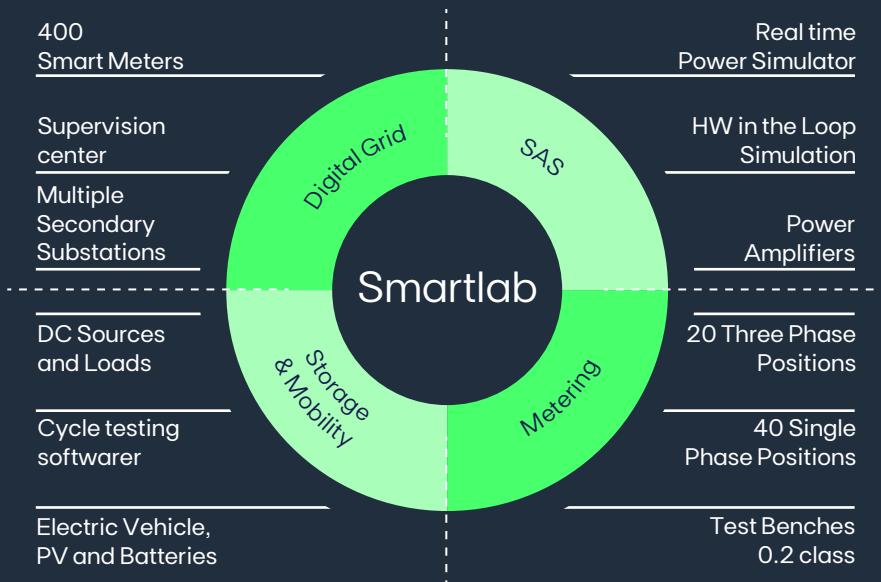edp

Labelec

Center of technical excellence
# Smartlab

# Enabling a smarter power grid

SmartLab is a smartgrid integration facility acting as a testing hub for technology demonstration & validation. This growing infrastructure is placed on the forefront of new technologies for tomorrow's energy systems.

The SmartLab is composed of four different areas: Digital Grid, Metering, Substation Automation Systems and Storage & Mobility.



**Digital Grid**
- 400 Smart Meters
- Supervision center
- Multiple Secondary Substations

**Storage & Mobility**
- DC Sources and Loads
- Cycle testing softwarer
- Electric Vehicle, PV and Batteries

**SAS**
- Real time Power Simulator
- HW in the Loop Simulation
- Power Amplifiers

**Metering**
- 20 Three Phase Positions
- 40 Single Phase Positions
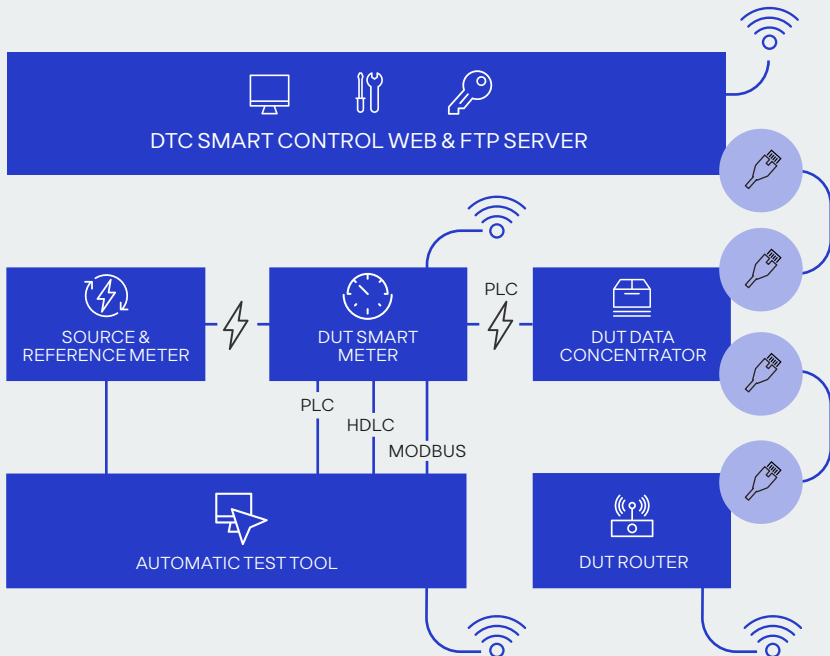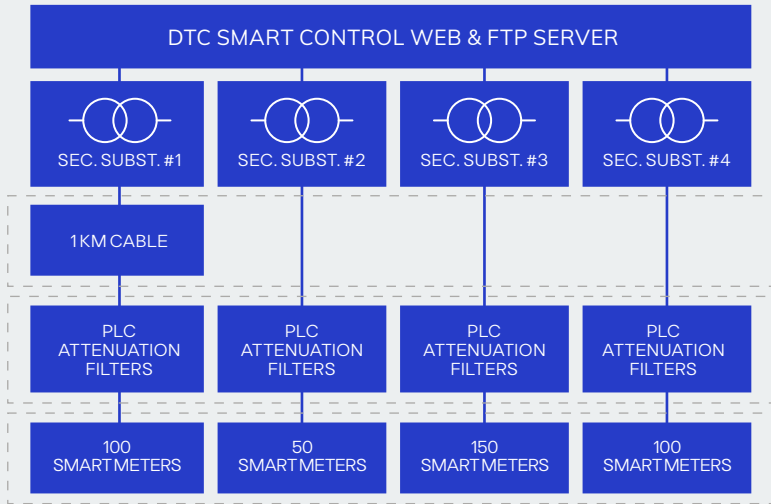- Test Benches 0.2 class

Smartlab

# Digital Grid Lab

Structured in four different areas to simulate a low voltage grid, the Smartlab – Digital Grid Lab offers a broad set of resources to test specific solutions according to client's needs.

## Some examples

- four hundred smart meters (PLC Prime and GPRS) with four Secondary Substations and eight network analyzers
- functional automated tests infrastructure (Hardware and Software) and programmable sources and loads (AC/DC)
- DC smart control software
- supervisory control with data acquisition
- long power cable (1 km-length, splitted into 250 m-segments, to simulate communication over long distances)
- new testing approaches to cibersecurity, covering all smart metering infrastructure.

DTC SMART CONTROL WEB & FTP SERVER

SEC. SUBST. #1 | SEC. SUBST. #2 | SEC. SUBST. #3 | SEC. SUBST. #4

1 KM CABLE

PLC ATTENUATION FILTERS | PLC ATTENUATION FILTERS | PLC ATTENUATION FILTERS | PLC ATTENUATION FILTERS

100 SMART METERS | 50 SMART METERS | 150 SMART METERS | 100 SMART METERS

DTC SMART CONTROL WEB & FTP SERVER

SOURCE & REFERENCE METER

DUT SMART METER

PLC

DUT DATA CONCENTRATOR

PLC
HDLC
MODBUS

AUTOMATIC TEST TOOL

DUT ROUTER

# Metering Lab

The Smartlab - Metering Lab is a reference standard lab in Portugal. Since 2013 it has been recognized by the Portuguese Metrology Institute as a Metrological Verification Body to carry out First Verification Operations of energy meters.

## Main accredited Services

• on-lab meter accuracy
• on-site metering energy audits
• meter clock accuracy.

## Meter quality

• factory acceptance tests
• fraud analysis
• communication performance, meter relay and stress tests
• aging tests.
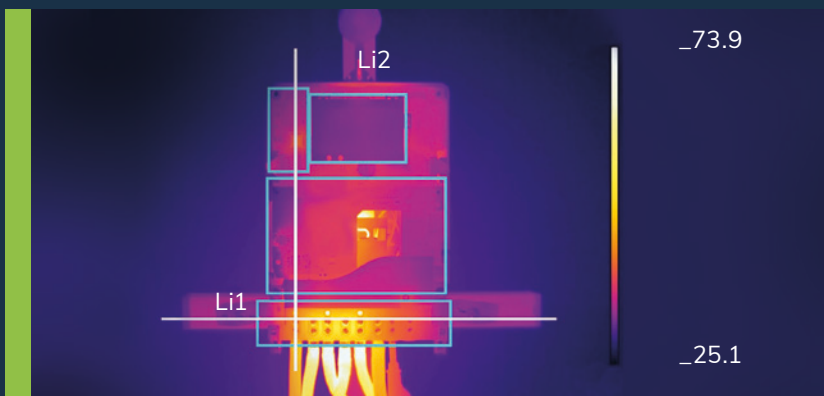
# Storage & mobility lab

The Smartlab – Storage & Mobility Lab is focused on the validation of Electrical Energy Storage Systems (EESS) and Electric Vehicle Charging Systems (EVCS) specifications (both power and communications) and improvement of renewable energy integration. It has a wide range of activities:

- EESS tests according to IEC 62933 part 1
- EVCS tests according to IEC 61851 part 1, 23 and 24
- integration and interoperability tests of EESS, EVCS, photovoltaic systems (PV) and smart appliances in low voltage distribution grid
- functional validation of Home Energy Management Systems (HEMS), PV and battery inverters.
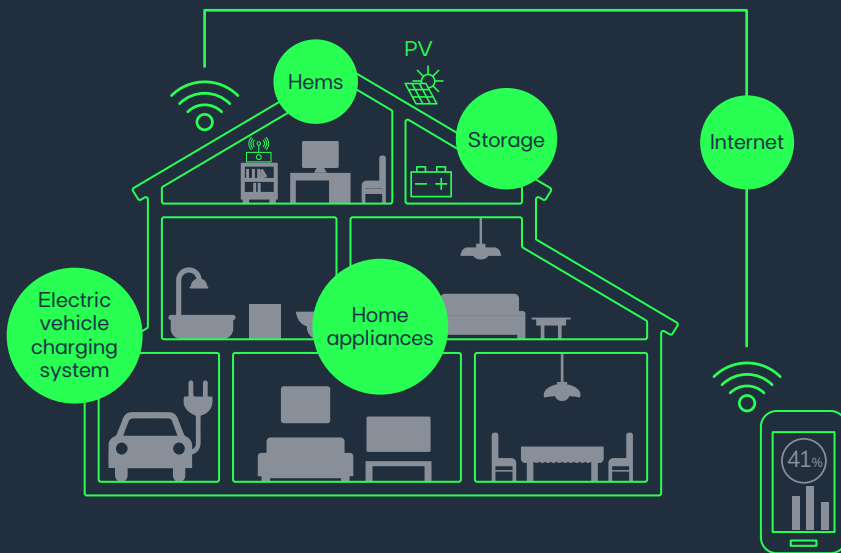
# Substation Automation Systems Lab

Equipped with cutting-edge devices and tools, SMARTLAB–SAS Lab is able to offer the following services and tests:

- basic & detail engineering of Protection and Automation Solutions (PAS) based on client standards and requirements

- IEC 61850 and IEC 61131 engineering

- power system modelling and simulation using hardware-in-the-loop (HIL)

- product / system evaluation — functional validation, performance / conformance testing and Rapid-Control-Prototyping (RCP)

- interoperability testing, protocol testing and multi-vendor IED integration.

## Laboratory architecture
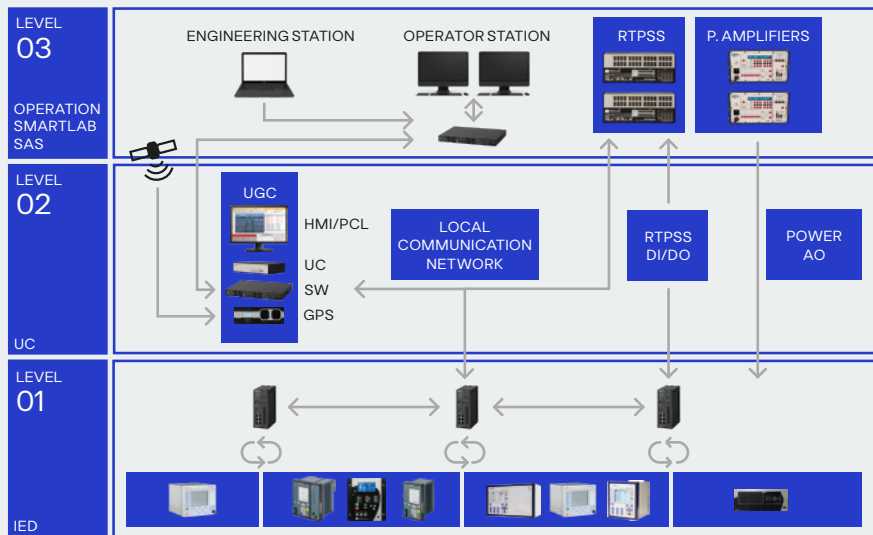
# Equipment and tools

- Real-Time Power System Simulator (RTPSS), combined with power amplifiers, an expansion chassis of up to 12 high performance cores and a software with the ability to perform real-time simulations

- time synchronization hardware used to synchronize all the laboratory equipment and devices under test (DUT) based on the following protocols: NTP, IRIG-B, PPS and PTP

- IEC 61850 software tools.

Qualification
& inspections

edp
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