

dataTec

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AVL Active Load Cabinet™ for Inverter Hardware Development

**Enabling a wide range of
high-voltage functional tests
for R&D applications**

THE CHALLENGE

Inverter hardware needs to be tested under realistic electrical load conditions before software and system integration. Shorter development cycles and growing testing demands increase the pressure to identify design issues early and use test capacity efficiently.

Early-stage functional testing often uses passive loads that stress the unit under test with reactive power. Therefore, components such as switches and diodes are not exposed to realistic electrical loading conditions, while the DC side of the inverter is not stressed with active power.

Consequently, hardware faults may remain undetected until later integration stages when additional components and interactions complicate troubleshooting.



THE SOLUTION

The AVL Active Load Cabinet (ALC) is an active load for functional testing and validation of high-voltage power electronics. It enables early hardware testing with active power and can be integrated into existing test environments through open communication interfaces.

In R-L Mode, the ALC operates as an adjustable resistive-inductive load. The parameters can be adjusted during operation to test a variety of operating points, inverters and applications through parameterization instead of hardware changes. Compared to passive loads, this enables more representative electrical stressing with active and reactive power. This makes R-L Mode suitable for functional testing, hardware characterization, thermal investigations, and lifetime testing.

Additional operating modes extend the testing scope. Current source modes support hardware-focused testing, including sensorless applications, while Four-Quadrant Mode enables motor and generator operation. Parameterized load characteristics represent different electrical environments without physical e-machines or setup modifications, supporting a wide range of testing tasks with a single flexible product.

YOUR ADDED VALUE

Fast Test Start

Start testing quickly with a simple setup. Only four parameters need to be defined to start the testing process.

Dynamic Parameter Adjustment

Adjust parameters during operation to quickly change electrical test conditions without rebuilding the physical setup.

Low Facility Requirements

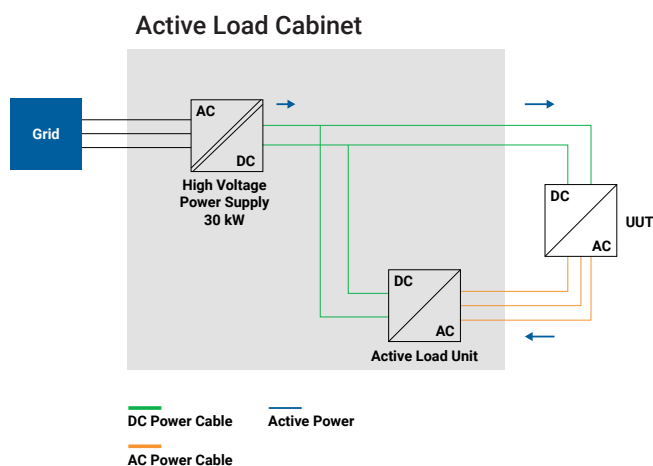
Operate the setup with only a 30 kW AC power connection and a water cooling connection.

Flexible Functional Test Coverage

Extend functional testing with different operating modes, including R-L Mode, Current Source Mode, and Four-Quadrant Mode.

Active-Power Testing Across Four Quadrants

Operate across all four quadrants of the torque/speed plane, including motor and generator operation.



The ALC and the UUT share the same DC link. The power supply unit integrated into the ALC supplies both the UUT and the ALC itself.

COMMON TECHNICAL DATA

Recommended min. UUT DC Voltage in V_{DC}	300
Maximum UUT DC Voltage in V_{DC}	1,000
Power (AC) in kW	Depending on the operating point and UUT
Ratio overload capacity - nominal load	1:20 at nominal load
Maximum power loss (ALC + UUT) in kW	30 or 60
Switching frequency UUT in kHz	up to 20
Fundamental frequency in Hz	up to 1,000
Interfaces	Automation system: EtherCAT, Ethernet, XCPonEthernet; Safety system: Profinet (optional)
Rotor position sensor options	Digital encoder sensor emulator, active magnetic sensor emulator, resolver sensor emulator

TECHNICAL DATA CONFIGURATION DEPENDENT

	Single ALC	High-Current Config.	2x3 - Phase Bi-Axle Config.
Continuous Phase Current in A_{RMS}	560	1,120	2 x 560
Overload Phase Current in A_{RMS}	800	1,600	2 x 800
Virtual Resistance in Ohm	0...100	0...50	2 x (0...100)
Virtual Inductance in μH	50...1,000	25...500	2 x (50...1,000)

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