

# Battery Performance Testing

## CELL LEVEL

### PEC ACT0550: 80 channels

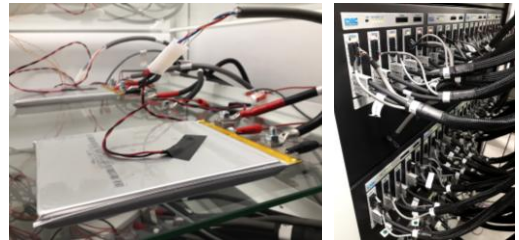
Voltage: 0 V up to 5 V  
 Current: 50 A  
 Parallel: Can be paralleled up to 1000 A

### PEC SBT0550: 24 channels

Voltage: 0 V up to 5 V  
 Current: 50 A  
 Parallel: Can be paralleled up to 600 A

### Digatron MCT 250-06-3 RE: 3 channels

Voltage: -6 V up to 6 V  
 Current: 250 A / 300 A (peak)  
 Parallel: Can be paralleled up to 750 A / 900 A (peak)  
 EIS-Meter: Electrochemical impedance spectroscopy for three channels  
 Other: Tabletop device, can be moved to other premises



Battery cells under test



PEC cell tester (left) and AVL battery pack cyclor / emulator (right)

## MODULE LEVEL

### PEC SBT10050: 12 channels

Voltage: 0 V up to 100 V  
 Current: 50 A  
 Power: 3 kW  
 Parallel: Can be paralleled up to 600 A and 36 kW

## PACK LEVEL

### AVL E-STORAGE

Voltage: 10 V up to 1000 V  
 Current: 600 A  
 Power: 320 kW  
 Container: Temperature range from -32 °C up to +50 °C, includes a liquid cooling circuit with 10 kW cooling/heating power and temperature range of -10 °C up to +45 °C.  
 Mode: Can be used as a battery cyclor or a battery emulator  
 Link: Integrated to the heavy-duty chassis dynamometer infrastructure, can be used to emulate a battery pack



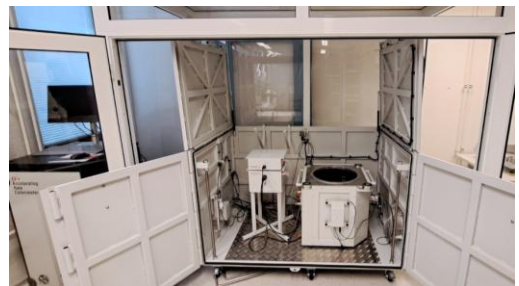
Climate container for battery pack testing



Thermal chamber (left) and interior of the climate container (right)

## OTHER EQUIPMENT

- Three thermal chambers (600 l, 2 x 110 l) for cells and modules
- Two thermal ovens (60 l) for cell testing at high temperatures
- Gamry Reference 3000 potentiostat/galvanostat/ZRA and Reference 30K Booster for EIS measurement up to 20 V and 30 A
- foxBMS 2 development platform for battery management system algorithm development and system integration
- Speedgoat BMS HIL equipment, 12 channels, up to 48 V module
- THT EV+ Accelerating rate calorimeter (ARC) for cell-level safety testing, including nail penetration and crush, short circuit, heat capacity measurement, and gas collection extensions



THT EV+ Accelerating rate calorimeter for cell-level safety testing