National Smart Grid Laboratory:

Battery test system

INTENDED USE

- Investigations of :
  - battery performance
  - battery degeneration due to cycling and aging
- Use in National Smart Grid Laboratory test setups as:
  - battery (emulated)
  - variable DC-load or DC-source
    (controlled power, current or voltage source/sink)

MAIN TECHNICAL DATA

- 32 independent channels , each 200V/30A/2.5kW
- Paralleling of channels gives up to 200V/960A/80kW
- Battery energy discharge alternatives:
  - regeneration to grid
  - charge battery on other channel
- Battery measurements:
  - DC internal resistance measurement (DCIR)
  - AC impedance up to 1000Hz (LCR-meter)
- DC side is galvanic isolated from AC grid
- 2-kvadrant operation on DC side:
  - positive and negative current
  - positive voltage
- DC-side protected against:
  - short circuit
  - battery reverse polarity connection
- Test program can be recovered after power outage and test can be continued from the point it was stopped.

SOFTWARE FUNCTIONALITY

- Test cycles can be created and utilized for each channel or channel groups:
  - constant voltage, current or power mode
  - constant resistance mode (discharge only)
  - arbitrary test cycles
  - complex drive cycle testing with dependency on measured voltage or current
  - cycles downloaded from Excel
- Programmable protection functions:
  - high / low battery voltage
  - high current
  - high temperature

COMMUNICATION INTERFACE

- Software system can be remotely controlled via network connection (LAN)
- System hardware can in addition be controlled by Labview driver and SCPI (Standard Commands for Programmable Instruments)

DATA LOGGING

- Logging and storage of measurements (10ms)
- Internal data storage provided to avoid loss of data in the event of loss of power or communication to computer
- Export of logged data to
  - personalized reports
  - files in PDF/CSV/TXT format

LOCATION

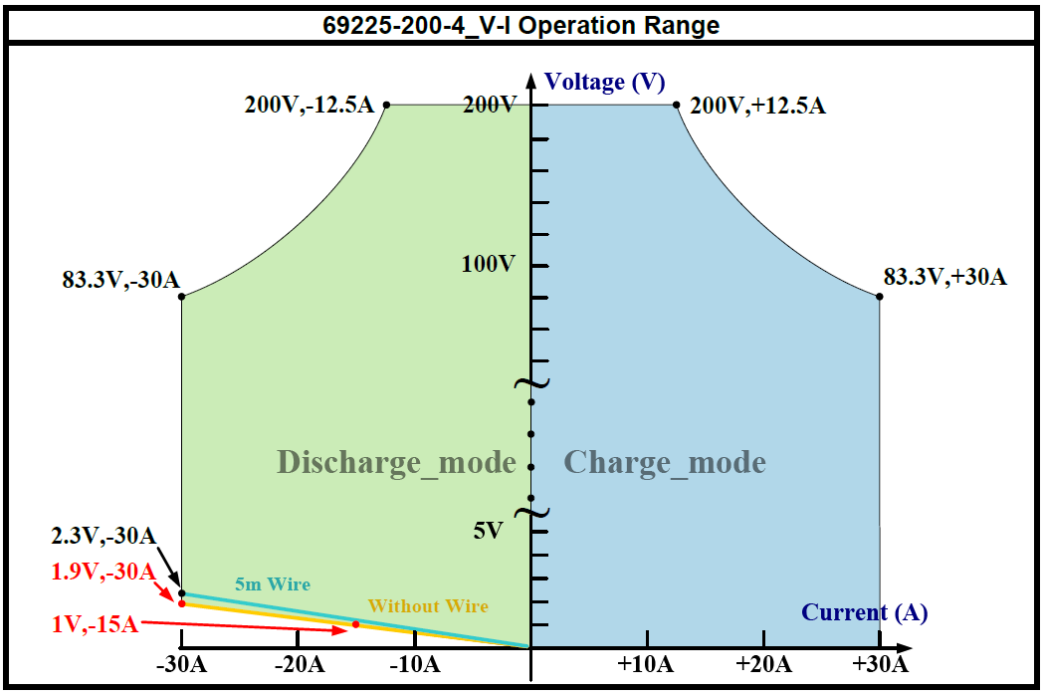
- Energy Laboratory, Room F0057, Elektro building E/F, at NTNU in Trondheim, Norway
- System is equipped with wheels and can (in principle) be moved to other locations if needed
- Climate chamber (0.6m^3) available in same room.
- Battery test system can be integrated in test setups in the main laboratory of the National Smart Grid Laboratory via installed power and control cables.

HIGHER VOLTAGE AND HIGHER POWER

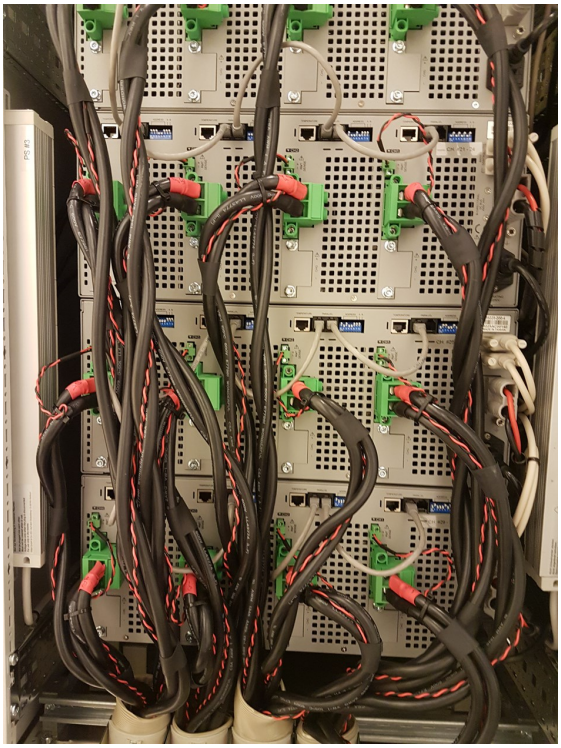
- Tailored test set-ups using in-house power electronic converters and a grid emulator can be used to perform tests that requires higher voltage or higher power.

KONTAKTPERSON:

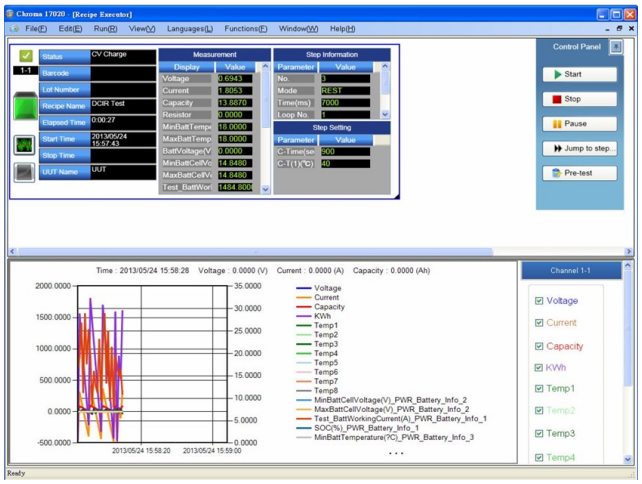
Olve Mo
+47 93 033 997
olve.mo @sintef.no



Operation range



Four wire connection for each channel to allow compensation of voltage drop along cable



Software control

SYSTEM DETAILS

- 1x Chroma 69200-1 Charge/discharge Controller
- 8x Chroma 69225-200-4 Regenerative Charge/ discharge tester 200V/30A/2.5kW/4 Channels
- 8x Chroma DC/AC A691101 Bidirectional controller
- 1x Chroma 11021-K LCR Meter 1kHz
- 1x Chroma A110242 Battery tester ESR Test kit
- Computer with Battery Pro Software