

Universal Technical Laboratory Equipment Needed?

Versatile Solution provided by Regatron AG

Keywords

Programmable Solar Array Simulation, Bidirectional DC Power Source for Electrical Energy Storage Testing and Simulation, EM (Electro Mobility), Drive Train Testing and Simulation, TC.ACS Programmable Bidirectional AC Grid Simulation, Simulation and Research on Smart Grid Structures, HIL (Hardware-In-The-Loop), Investigations and Research on Complex Physical Grid Structures.

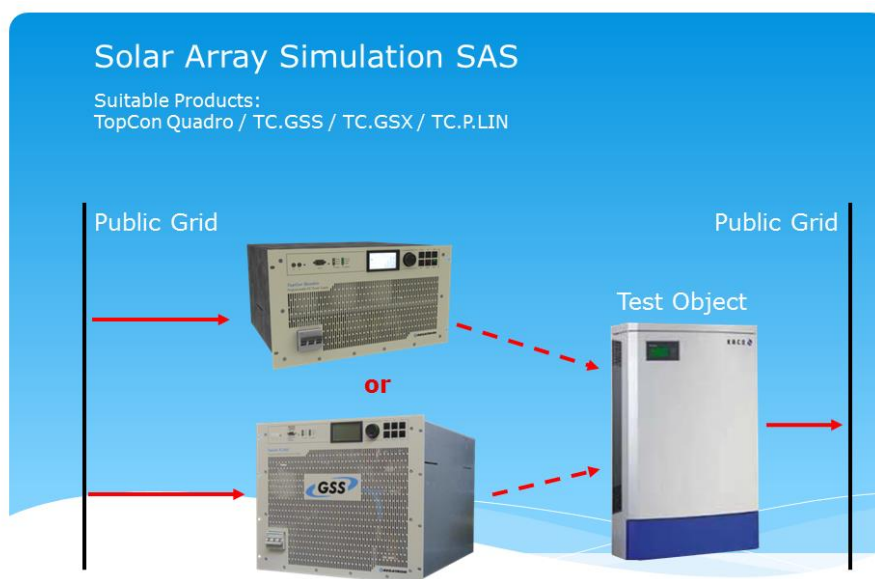
The Challenge

Renovation of the technical laboratory of a University called for equipment suitable to cover contemporary complexes of energy problems like additive energy production, storage and distribution. Furthermore, simulation and research on complex dynamic processes should be possible as well as testing of third party energy equipment against the respective national and international regulations.

Regatron AG decided to break up the complex requirement into several use cases in order to facilitate the customer to define the respective functional extent as also real technical data as the envisaged power level, voltages and currents.

By this, an appropriate laboratory equipment with a maximum of flexibility, good fit to the individual requirements as also well balanced power levels could be composed mainly using Regatron power supplies and Regatron-made system integration in a turn-key solution.

Use Case 1



Solar Array Simulation

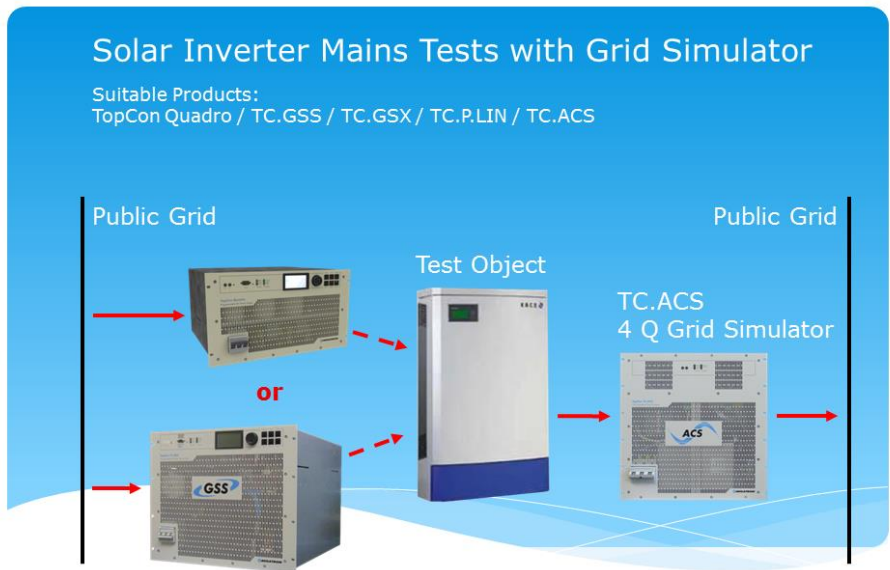
TopCon Quadro as also bidirectional TC.GSS power supplies provide full Solar Array Simulation capability alongside with all relevant DC applications.

The powerful SASControl application software enables the user for well documented programmable Solar Inverter tests and R&D activities.

Use Case 2

Inverter Test Including Grid Simulation

The full 4-quadrant grid simulator TC.ACS complements the solar array simulation as a universal tool for all relevant grid anomaly test sequences.



Use Case 3



Battery Test and Simulation

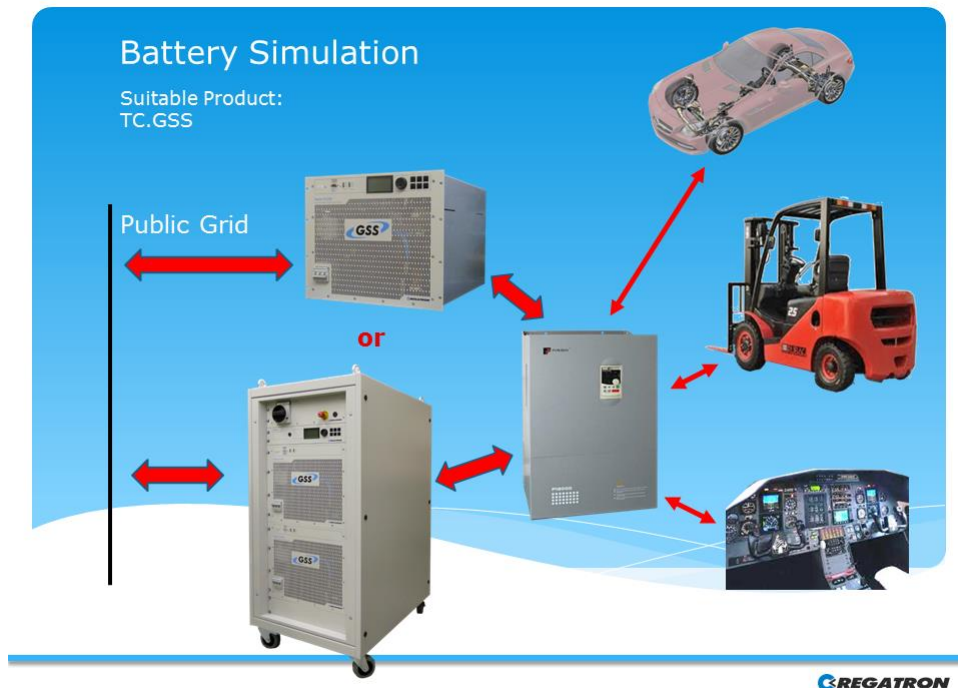
Bidirectional TopCon TC.GSS power supplies allow for testing and simulation of all kind of electrical storage elements like batteries, capacitors, EDLC's (supercaps).

Of course, also fuel cells may be tested while fully regenerating the energy back to the grid.

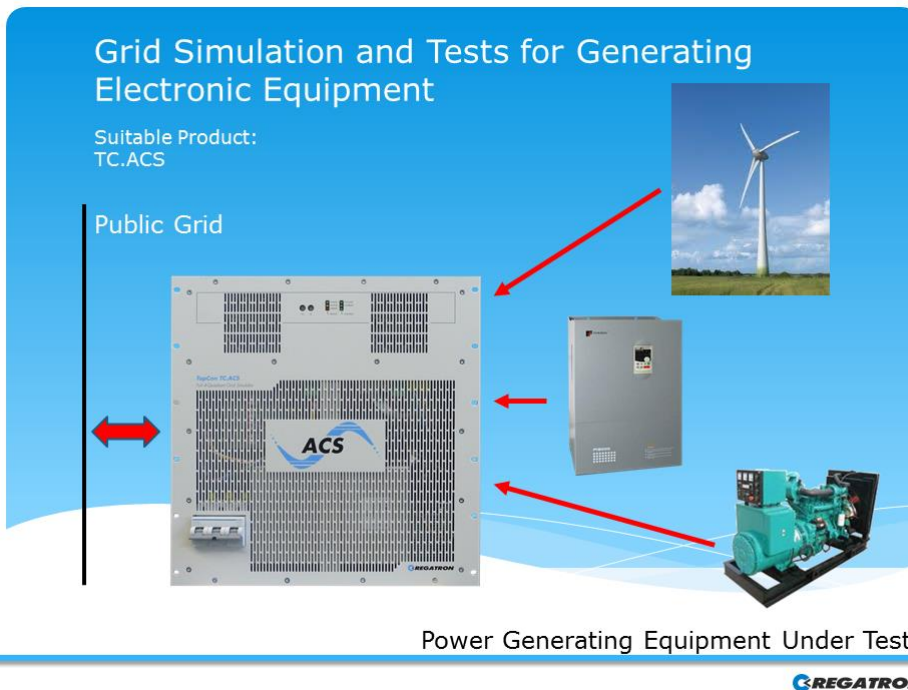
Use Case 4

On-board electrical system test and simulation

Bidirectional Power supplies TopCon TC.GSS are the solution even for simulation and powering of Electro Mobility and airborne vehicle on-board power systems.



Use Case 5



General Grid Simulation

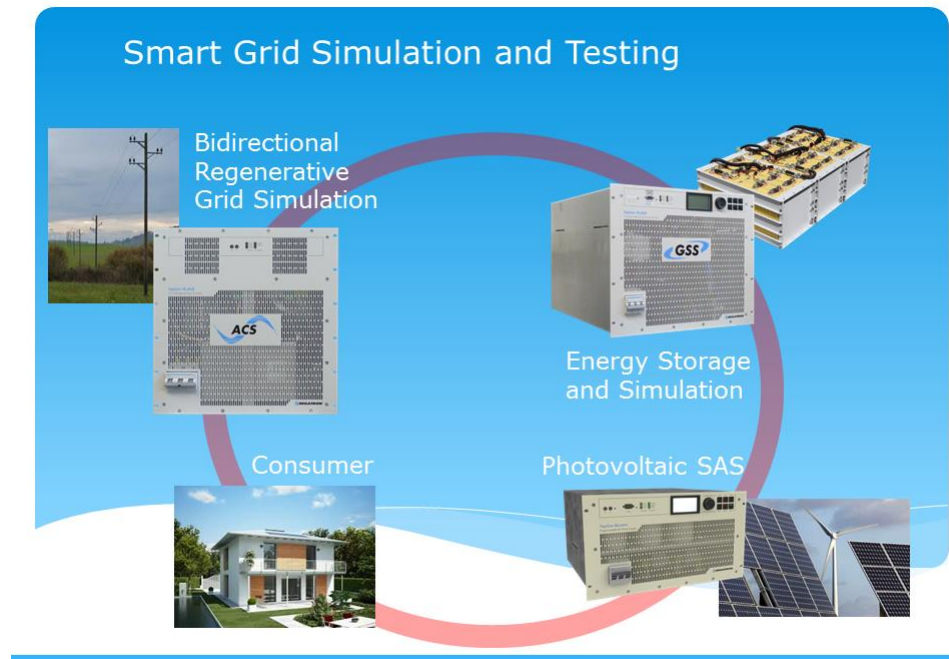
TopCon TC.ACS allows for establishing of all imaginable grid situations for R&D and simulation work on generating and regenerating electrical equipment.

Versatile software tools like a programmable sequencer, a Fourier tool or the 3-phase amplifier mode widens up the field of operations within the laboratory.

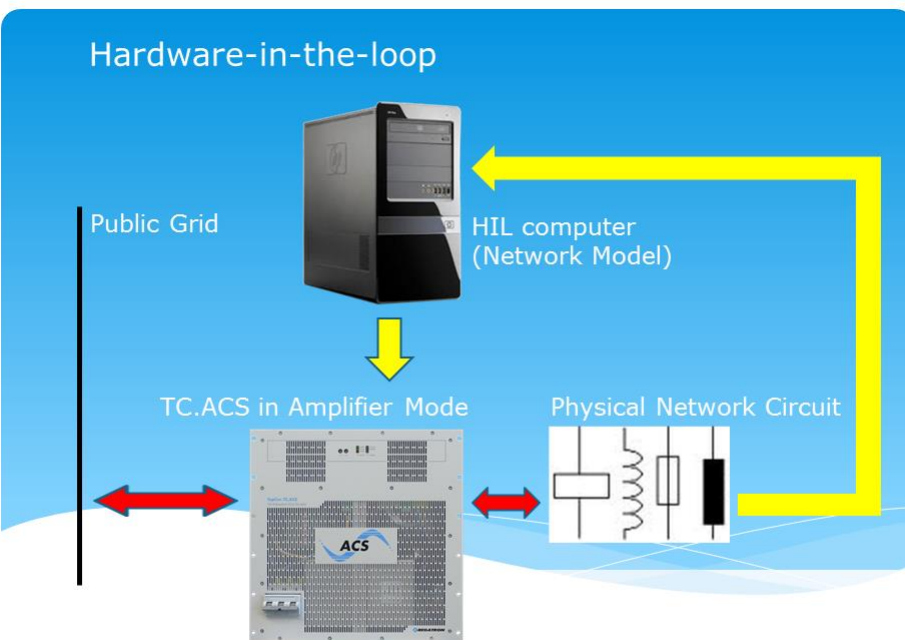
Use Case 6

Smart Grid Simulation

By combining Regatron power supplies with a grid simulator, a complete model of a Smart Grid can be built up. Thus, intensive studies on the dynamic behaviour of grids are made possible.



Use Case 7



Hardware-in-the-loop

The universal grid simulator TC.ACS may also be operated in an 'Amplifier Mode'. Due to this, computer generated data may be fed directly into the three amplifier inputs in order to generate 3-phase output to a dedicated physical network. This allows the user to examine the dynamic characteristics of the given network structure.



Conclusion

Regatron power supplies are an ideal solution for general laboratory equipment. Due to the exceptional functionality, not only the usual laboratory work is covered. The high degree of programmability allows for a wide field of more complex applications, mainly supported by specialized application software.

Contrary to many other power supply manufacturers, Regatron power supplies are specially designed for modular use:

- ✓ enhance your system power at a later time upon your needs
- ✓ connect the power modules either in parallel, in serial or even in a mixed-mode
- ✓ establish a multi-load system by controlling multiple individual loads with a single set value
- ✓ use the built-in programmable function generator TFE to modulate or 'dynamize' the output
- ✓ reach within the MegaWatt range by controlling big TopCon arrays with one MAC-controller
- ✓ stay open for future challenges with an updateable and fully parameter-controlled system

A proposal for a basic equipment power level

For a multitude of lab setups the following power level will be a good choice, without supposing significant electrical environment complexity in terms of grid capacity, laboratory air management and installations:

64 kW/1000V / TopCon Programmable DC power: 2 x TC.P.32.500.400 as DC source

- gives a 1000VDC/80A source for powerful central inverter tests (series connection)
- gives a 400VDC/160A source for central inverters high current types (parallel operation)

64 kW/400V / TopCon TC.GSS Bidirectional power: 2 x TC.GSS.32.600.400 bidirectional DC source

- gives a 800VDC/100A bidirectional source for drive trains, battery simulation and tests
- gives a 400VDC/200A bidirectional source for drive trains, battery simulation and tests

50 kVA/3x400VAC Grid Simulation: 1 x TC.ACS.50.400.400

- gives a 50kVA full 3-phase grid simulator with up to 72 Arms each phase
- may act as an asymmetric 1- or 2-phase load
- may act as DC power source at reduced power level
- may be operated as a 3-phase bidirectional power amplifier

By adding modules, the power level may be increased selectively step by step upon the customers' needs.