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Battery Storage Simulator

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Sustainable energy will radically change the way we handle our energy supply. The fluctuating supply will require storage solutions that can store and deliver energy on a daily basis. With the advance of lithium ion batteries, battery storage containers (BSC) have become a viable storage solutions and they are in great demand. Controllab provides simulation technologies to that will significantly speed up and lower the price of BSC testing.

Battery Storage Container

A BSC is in essence a collection of battery units, connected to a power conversion unit. When it is economical the batteries will be charged from the grid and discharged to the grid vice versa. To make the container operate properly a number of components are required:

- Battery Unit (BU): The BU contains the actual lithium ion cells that store the electric energy.
- Battery Management Unit (BMU): The BMU monitors the health of the BU and guides the (dis)charging.
- Battery Array Management Unit (BAMU): An array with BU's is controlled by the BAMU.
- Power Conversion System (PCS): A PCS converts the DC voltage of the battery arrays into an AC voltage.
- Heating, Ventilation, Air Conditioning (HVAC): Keeps the container at a predefined temperature.
- Fire Extinguisher: In case of a fire, the extinguisher will automatically be activated.
- Energy Management System (EMS): The energy management system is the core of the battery container. It determines when to (dis)charge and runs the remote communication.

Simulator

Testing the EMS is done by connecting it with the grid. This power connector is costly and potentially dangerous in case of short circuits or when the grid is not synchronized. Controllab delivers a battery storage simulator (BSS) to test the EMS without connection to the grid. The BSS emulates all the components of the BSC and is driven by scripts. This allows you to automatically test and verify the correct operation of the EMS.

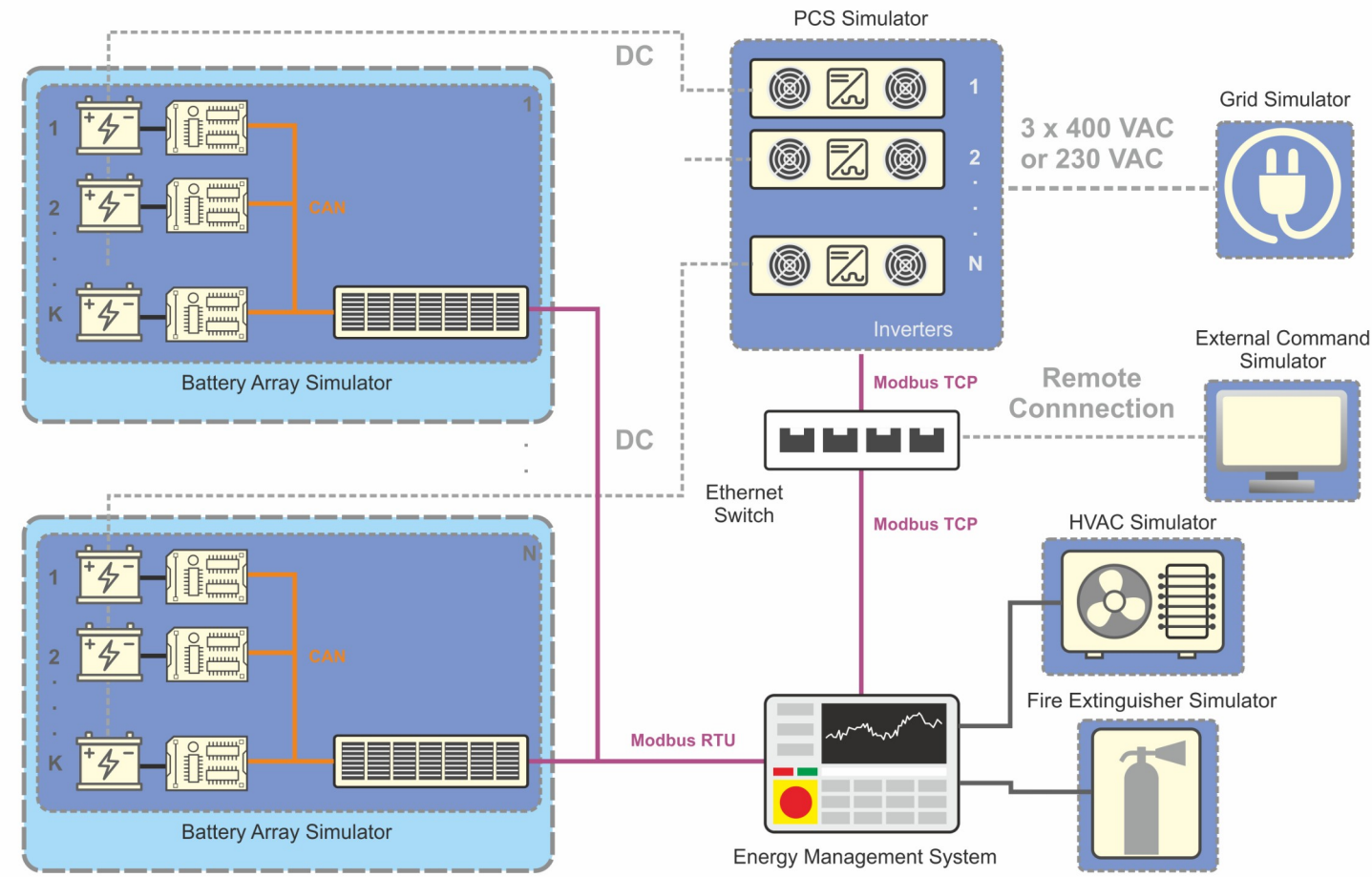
Components

The simulator replaces the main components of the BSC and connects them with your EMS. The battery array simulator, replaces an array of batteries, BMU's and the BAMU. The simulator has an interface to the EMS and handles the interaction over this interface. The EMS can give commands to the BAMU to change settings, and read actual values like the highest and lowest cell temperature, the highest and lowest cell voltages, overall state of charge, array current, array voltage, and array power (both during charging and discharging).

The PCS simulator emulates the inverters and way of operation: charging, discharging, off-grid and heat generation. Some of the variables that are emulated are the DC voltage and current, AC voltage, current, active power, and power factor. The grid simulator allows the various ways that a BSC can operate, like Energy Trading, Peak Shaving and Island Mode. The HVAC simulator and the Fire Extinguisher Simulator emulate the container environment.

Contact Us

If you are interested in our Battery Storage Simulator or require similar simulation technologies, please contact us. Controllab is specialized in the design and testing of complex control systems. The company has a large experience in model based design and HIL simulation.



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