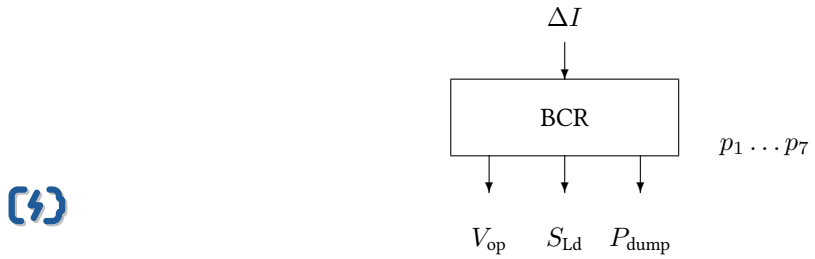
Block BCR

The BCR block simulates a battery charge regulator. The battery voltage is kept within given limits by dumping power and switching off the load, respectively.



Name	BCR
Function	se0024
Inputs	1
Outputs	3
Parameters	7
Strings	0
Group	L

Inputs

1 Difference between the positive (energy production) and negative (load, storage) currents of the system components in the iteration loop

Outputs

1 Operating voltage V_{op} / V has to be connected to a TOL block
2 Load switch (on (1), off (0)) has to be connected to a TOL block
3 Dumped power P_{dump} / W in case of high voltage

Parameters

1 Voltage limit V_{min}^{1} / V at which the load is switched off
2 Voltage limit V_{min}^{2} / V at which the load is switched on again
3 Voltage limit V_{max} / V from where surplus power is dumped
4 Current tolerance ΔI_{max} / A for the deviation of ΔI from zero
5 Maximum number of iterations N_{max}
6 Voltage V_{fail} / V which will be set in the case when the number of iterations has reached N_{max}
7 State of the load switch S_{Ld} which will be set, when the number of iterations has reached N_{max}

Strings

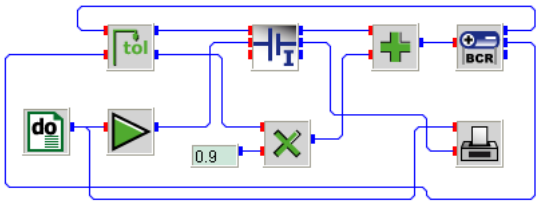
None

Description

The block keeps the operation voltage of a battery in a given range between V_{min}^{1} and V_{max}, by switching the load on/off or by dumping surplus power. This is done by varying the operation voltage U_{op} until the currents of the system components included in the loop are in balance, i.e. $|\Delta I| \leq 0 \pm \Delta I_{\text{max}}$.

The intervall between V_{min}^{1} and V_{max} is used as an iteration intervall which limits the range, in which the algorithm looks for a new output voltage V_{op}. The iteration stops when $|\Delta I| \leq \Delta I_{\text{max}}$ (or if the number of iterations reaches N_{max}). The load switch operates with an hysteresis.

bcr.vseit



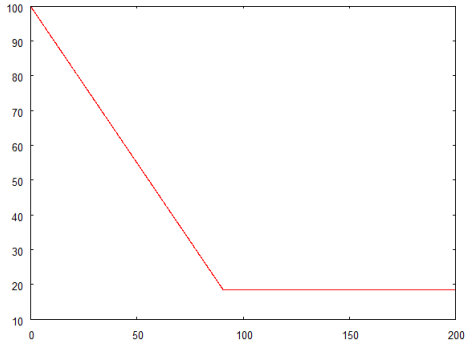
A fully charged single cell battery with a nominal capacity of 100 Ah with and simulated by a BTI block shall be dicharged at a constant current of 0.9 ampere. In order to protect the battery from deep discharge the BCR block controls the voltage range with the parameters set to a voltage limit load switch off of 2 V.

A DO block varies a time signal from zero to 200 hours in steps 0.1 hours, i. e., 6 seconds. A GAIN block with factor 1000 is used to converts the hours into a signal in seconds as required by the BTI block.

Since the BCR block requires that the sum of the input currents must finally (i. e., at the end of the iteration) be equal to zero, the SUM block adds the discharge current and the battery current. Since battery discharge current is negative by definition the load current must be taken as positive. Therefore the load current is set to 0.9 A by the CONST block and not -0.9.

When the lower battery voltage level of the battery is reached, the second output of the BCR block is set to zero. Via the TOL block this signal is multiplied into the discharge current and hence the discharge current becomes zero, i. e., the load is switched off.

The battery capacity during the simulated period is displayed by the PLOT block.



See also Block BTI, BTV.