

Note

This application note only applies to following device series:

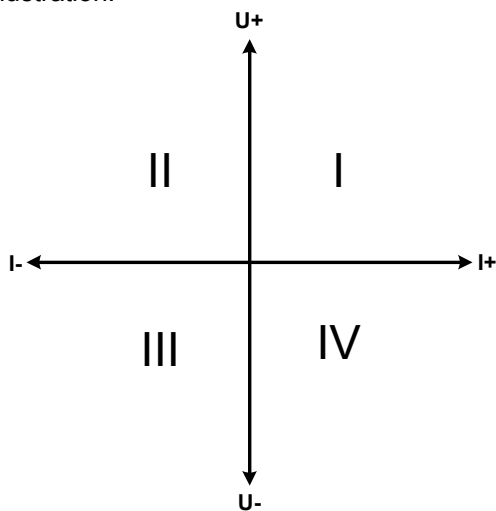
- EL 9000
- PS 8000 2U, PS 8000 3U, PS 8000 DT
- PSI 8000 2U, PSI 8000 3U, PSI 8000 DT
- PS 9000 (analog, until 2012)
- PSI 9000 (old series until 2012)

This operation mode is related to the connection of a power supply as voltage source and an electronic load as current sink. The source and the sink are alternatively in operation in order to test a component or application (E.U.T), like for example a battery.

The user can decide whether to control the system manually, to control only the load, which is the master unit in this case, or both devices. We recommend to use the load as master and to connect the power supply via the Share bus, which will define the output voltage of the power supply.

Two-quadrants operation is only applicable for constant voltage operation (CV).

Illustration:

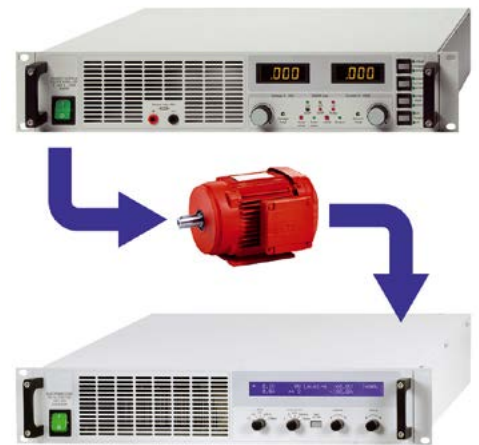


When combining a source and a sink, only quadrants I + II can be realised. It means, only positive voltage and current are possible. The positive current comes from the source (quadrant I), or in some cases it might come from the E.U.T, and the negative current flows into the sink (quadrant II).

The power supply, being slave in this connection, is normally adjusted to a maximum output voltage and current, which could also be done via analog or digital interface. The electronic load is recommended to run in CV operation. The load will then control the power supply via the Share bus.

Typical areas of application:

- Test of fuel cells
- Capacitor tests
- Tests of applications with motors
- Electronic device and component tests, where a higher voltage dynamics is required

**Warning**

When using a power supply of series PS 8000 3U or PSI 8000 3U, following applies additionally:

The load controls the power supply via the Share bus connection. In case the load fails (defect, mains blackout) or is switched off by power switch, the output voltage of the power supply will rise to the maximum, no matter what has been adjusted. This could lead to damage of an E.U.T. due to too high voltage.

This effect can only be avoided by adjusting the overvoltage protection (OVP) to a level that is acceptable for the E.U.T. In such a case, the OVP would then switch off the DC output and protect the E.U.T.

The sequence of switching the devices on is also important:

- Always switch on the electronic load first and wait for the load to be ready for operation
- Switch on the DC input of the load
- Then switch on the power supply
- Make sure the OVP is set correctly on the power supply
- Do not use the fast regulation feature „FastReg“ of the load EL 9000

Example: Charging and discharging of a battery with 24V/400Ah (as depicted below, see figure)

Power supply PS 8080-120, adjusted to: $U_{max} = 28.5V$, $I_{max} = 50A$, $P_{max} = 3000W$

Electronic load EL 9080-200, adjusted to: $I_{max} = 100A$, $P_{max} = 2400W$, $U = \text{variable}$ (PC controlled)

Assumption: the battery has an idle voltage of 26V before the test

1. Discharging the battery down to 24V --> Set voltage of the load to 24V, power supply output and load input are on

Reaction: the electronic load will discharge the battery with max. 100A resp. 2400W, in order to get the voltage down to 24V. During this period, the power supply won't provide output current, because the electronic load sets the power supply output voltage via Share bus to the battery voltage. The e-load will step down the discharge current in order to keep the 24V constant.

Once the battery voltage reaches 24V with the discharge current being 0A, the adjusted 24V battery voltage is held constant. If necessary, also by charging the battery from the power supply.

2. Charging the battery to 27V --> Set the voltage on the e-load to 27V

Reaction: the power supply will now charge the battery with max. 50A. The charging current will go down while the battery voltage rises, as a reaction to the internal resistance of the battery, which changes. During this period, the e-load will draw no current. Once the battery voltage reaches 27V, the power supply will only provide trickle charge current for the battery.

3. Set e-load to 40V

Reaction: the power supply will now charge the battery up to max. 28.5V, because the power supply setting still is 28.5V. This demonstrates how important it is to know the allowed parameters for the E.U.T and to adjust the values on both devices, power supply and e-load accordingly and thoroughly, in order to avoid damage to the E.U.T.

