terminal and a negative DC terminal, where the input node is connected to the first AC input terminal via a first input inductor,
- an output device connected between an output node, the positive DC terminal and the negative DC terminal, where the output node is connected to the first AC output terminal via an output inductor;
- a common device connected between the common node, the positive DC terminal and the negative DC terminal, where the common node is connected to the second AC input terminal via a common inductor;
- a control device for controlling the switches of the output device and the common device;
- a DC device is connected between the positive DC terminal and the negative DC terminal;
where the output device comprises first and second output switches;
where the first output switch is connected between the output node and the positive DC terminal and the second output switch is connected between the negative DC terminal and the output node;
where the common device comprises first and second common switches;
where the first common switch is connected between the common node and the positive DC terminal and the second common switch is connected between the negative DC terminal and the common node;
where the second AC input terminal is connected to the second AC output terminal;
where the input device comprises first and second diodes and a bi-directional switch connected between the input node and the common node, where the control device is also controlling the bi-directional switch. Further, the first diode is connected with its anode to the input node and its cathode to the positive DC terminal, the second diode is connected with its anode to the negative DC terminal and its cathode to the input node and where the first and second diodes are fast recovery diodes.

In one aspect, the bidirectional switch comprises a first BS switch and switch diodes (DBS1, DBS2, DBS3, DBS4). Here, a drain terminal of the first BS switch is connected to an anode of a first switch diode and to an anode of a second switch diode; a source terminal of the first BS switch is connected to a cathode of a third switch diode and to a cathode of a fourth switch diode; a cathode of the first switch diode and an anode of the third switch diode is connected to the first node; a cathode of the second switch diode and an anode of the fourth switch diode is connected to the second node; a control terminal of the first BS switch is connected to the control circuit.

In one aspect, the bidirectional switch comprises a first BS switch and a second BS switch, each comprising control terminals connected to the control circuit.

where the first diode (Din1) is connected with its anode to the input node (11) and its cathode to the positive DC terminal (DCP), the second diode (Din2) is connected with its anode to the negative DC terminal (DCN) and its cathode to the input node (11) and where the first and second diodes (Din1, Din2) are fast recovery diodes.

2. AC-AC converter device according to claim 1, where the bidirectional switch (BS) comprises a first BS switch (S1) and switch diodes (DBS1, DBS2, DBS3, DBS4).

3. AC-AC converter device according to claim 2, where:
- a drain terminal (DS1) of the first BS switch (S1) is connected to an anode of a first switch diode (DBS1) and to an anode of a second switch diode (DBS2);
- a source terminal (SS1) of the first BS switch (S1) is connected to a cathode of a third switch diode (DBS3) and to a cathode of a fourth switch diode (DBS4);
- a cathode of the first switch diode (DBS1) and an anode of the third switch diode (DBS3) is connected to the first node (11);
- a cathode of the second switch diode (DBS2) and an anode of the fourth switch diode (DBS4) is connected to the second node (22);
- a control terminal (GS1) of the first BS switch (S1) is connected to the control circuit.

4. AC-AC converter device according to claim 1, where the bidirectional switch (BS) comprises a first BS switch (S1) and a second BS switch (S2), each comprising control terminals (GS1, GS2) connected to the control circuit.

5. AC-AC converter device according to claim 4, where a drain terminal (DS1) of the first BS switch (S1) is connected to the first node (11), a drain terminal (DS2) of the second BS switch (S2) is connected to the third node (22), a source terminal (SS1) of the first BS switch (S1) is connected to a source terminal (SS2) of the second BS switch (S2).

6. AC-AC converter device according claim 5, where a source terminal (SS1) of the first BS switch (S1) is connected to the first node (11), a source terminal (SS2) of the second BS switch (S2) is connected to the third node (22), a drain terminal (DS1) of the first BS switch (S1) is connected to a drain terminal (DS2) of the second BS switch (S2).

7. AC-AC converter device according claim 1, where the DC device (Cdc) is a capacitor or a battery.

8. AC-AC converter device according claim 7, where the DC device comprises an additional DC source.

9. AC-AC converter device according claim 1, where the common switches (Sc1, Sc2) are MOSFETs or IGBTs with an antiparallel diode.