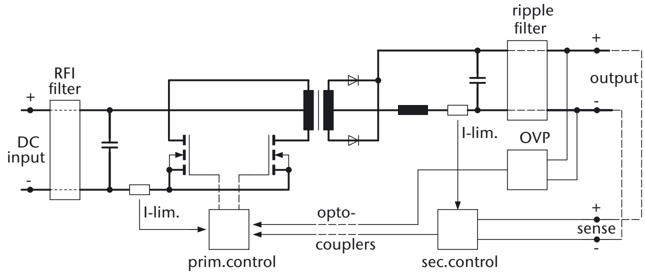
There are various circuit topologies and the selection depends on the requirements, such as low or high input voltage, low or high output voltage, single or multi output, power rating. The following circuits present our common concepts of power conversion.

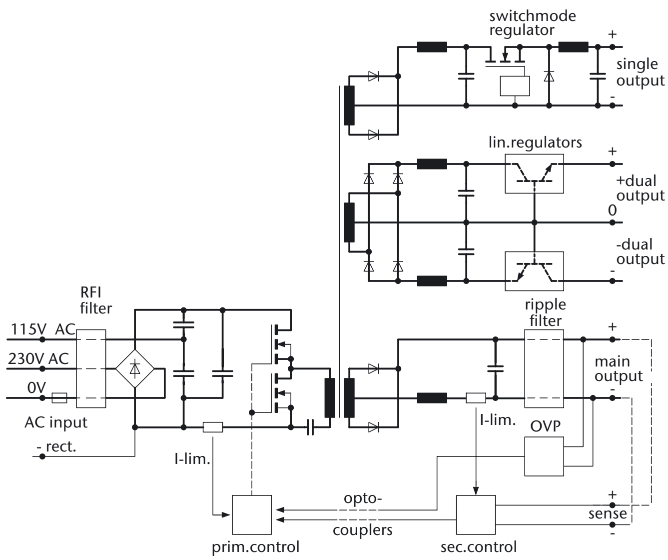
Push Pull Converter

The push pull converter is often used for applications with low input voltage. The switching transistors are alternately conducting with variable pulse-width. At the secondary side, after rectification and filtering, the output voltage is sensed and compared with a reference. The error signal controls via an opto-coupler the primary circuit.



Half Bridge Converter

The following circuit shows, as an example, a converter with dual AC input in a half bridge connection. With the input voltage supplied to the 230 V terminal, the rectifier circuit is a standard bridge connection; supplied to the 115 V terminal the rectifier circuit functions as a voltage doubler circuit. At the secondary side a multi-output system is shown with a switch mode regulator for the single output and linear regulators for the dual outputs. As the voltages induced in the secondary transformer windings track with the voltage of the main output quite inaccurately, additional regulators are normally used for the other outputs. A switch mode regulator is used for higher current as it has lower power losses than a linear regulator.

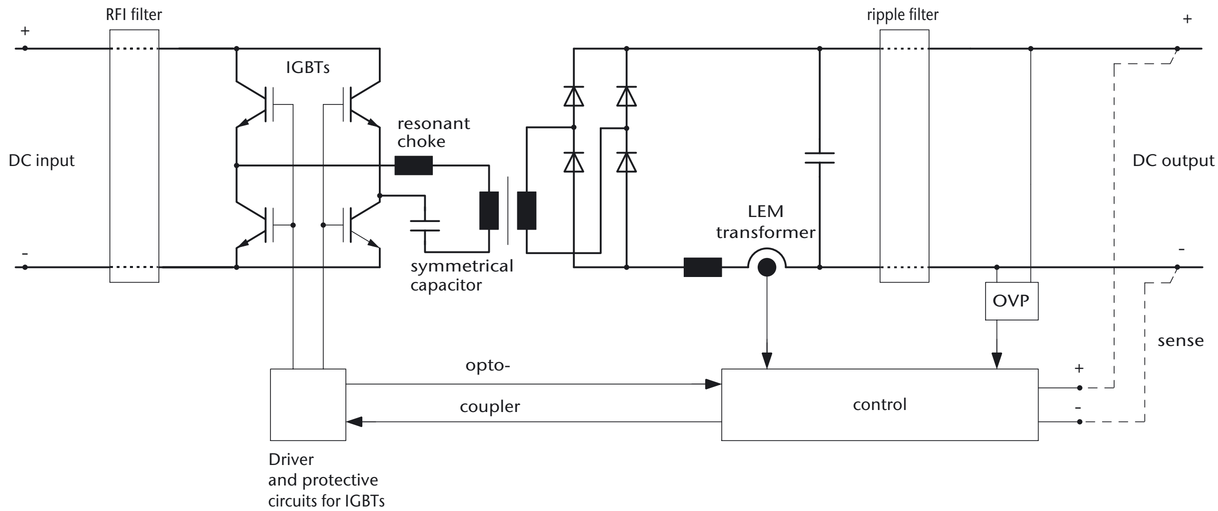


Full Bridge Converter with Zero Voltage Switching (ZVS)

For the higher power modules presented from page 46 to 67 the primary circuit is performed as a full bridge connection with four switching transistors (IGBTs) being controlled by the driver and protective circuits. The special mode of driving the IGBTs in conjunction with the resonant choke and the symmetrical capacitor allows for "zero voltage switching" which improves the efficiency and reduces the switching noise. The input can be designed for both, DC or AC.

At the secondary side of the transformer the voltage is rectified and filtered. Then the output voltage is sensed and compared with a reference, and the error signal controls via opto-coupler the switching transistors on the primary side.

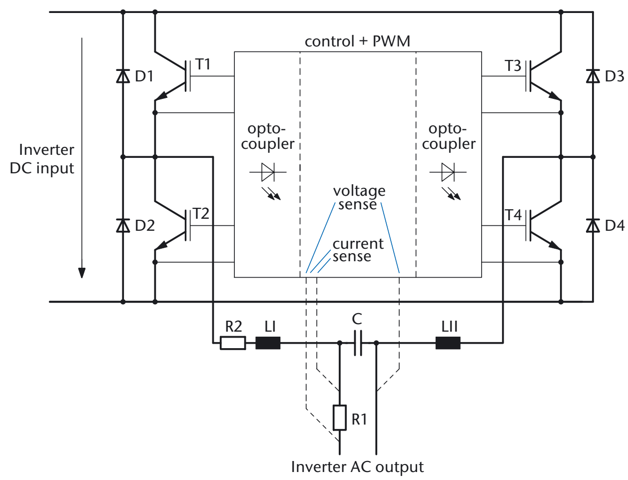
For over voltage protection the OVP circuit senses the output voltage and turns off the switching transistors if a certain level is reached. The circuit automatically returns to operation but is repeatedly switched off and turned on again if the over voltage condition is still present. If the unit does not return to normal operation within a short period of time, it will then be switched off. For current limiting the signal sensed by the LEM transformer starts to reduce the output voltage if the current exceeds a certain limit.



DC/AC Inverter

The diagram beside shows the circuit of an inverter. The DC input voltage is transformed by the power transistors T1-T4 with the parallel connected inverse diodes D1-D4 in a pulse-width modulated square wave voltage. The choke with the windings LI and LII integrates this voltage, and at the capacitor C a sinusoidal output voltage is available. The power transistors are controlled via opto-coupler in such a way that not both transistors of one branch are conducting at the same time. The output voltage is sensed and compared with a reference signal generating the firing pulses for the power transistors. The output current is measured via shunt R1 and limited through the control circuit.

Isolation between input and output and voltage transformation can either be provided by a converter connected to the input of an inverter or by a transformer connected to the output of an inverter (see page 78).



Schaefer, Inc. · 45 South Street, Hopkinton, MA 01748, USA · Tel: 508-435-6400 · Fax: 508-435-6401 · sales@schaeferpower.com · www.schaeferpower.com