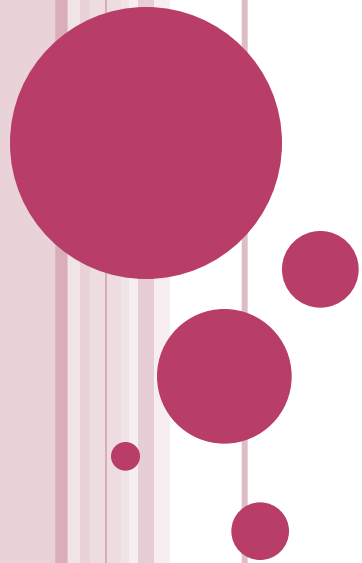# INVERTERS

General concept
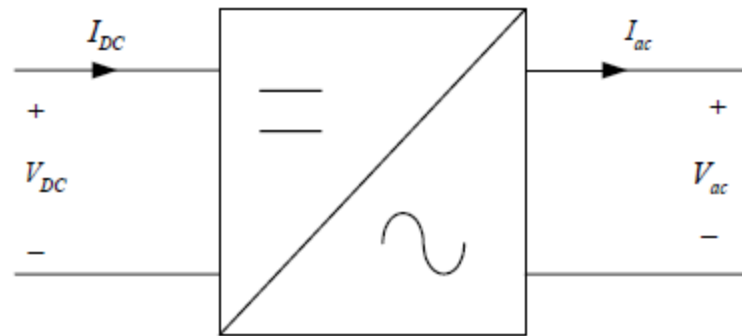
Converts DC to AC power by switching the DC input voltage (or current)in a pre-determined sequence so as to generate AC voltage (or current) output.

APPLICATIONS

- Un-interruptible power supply (UPS)
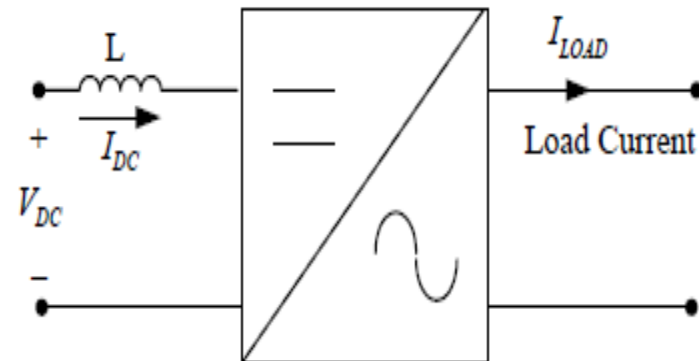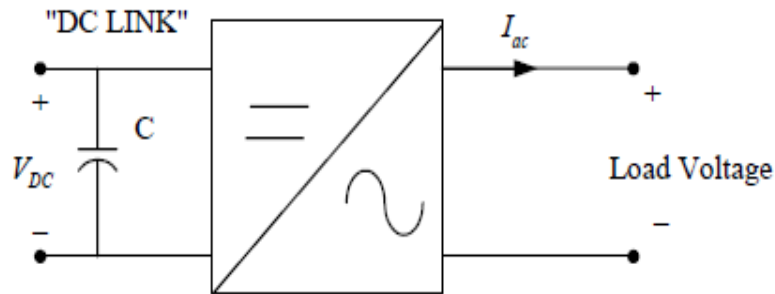- Industrial (induction motor) drives
- Traction
- HVDC

BLOCK DIAGRAM

Types of inverter

- **Voltage Source Inverter (VSI)-a) Square wave**
                                                b) PWM

- **Current Source Inverter (CSI)**

What are the various types of Inverters?

Inverters can be broadly classified into two types. They are

Voltage Source Inverter (VSI)

Current Source Inverter (CSI)

When the DC voltage remains constant, then it is called voltage inverter(VSI) or voltage fed inverter (VFI). When input current is maintained constant, then it is called current source inverter (CSI) or current fed inverter (CFI). Some times, the DC input voltage to the inverter is controlled to adjust the output. Such inverters are called variable DC link inverters. The inverters can have single phase or three-phase output.

A voltage source can be converted to a current source by connecting a series inductance and then varying the voltage to obtain the desired current.

•A VSI can also be operated in current-controlled mode, and similarly a CSI can also be operated in the voltage control mode.

•The inverters are used in variable frequency ac motor drives, uninterrupted power supplies, induction heating, static VAR compensators, etc.
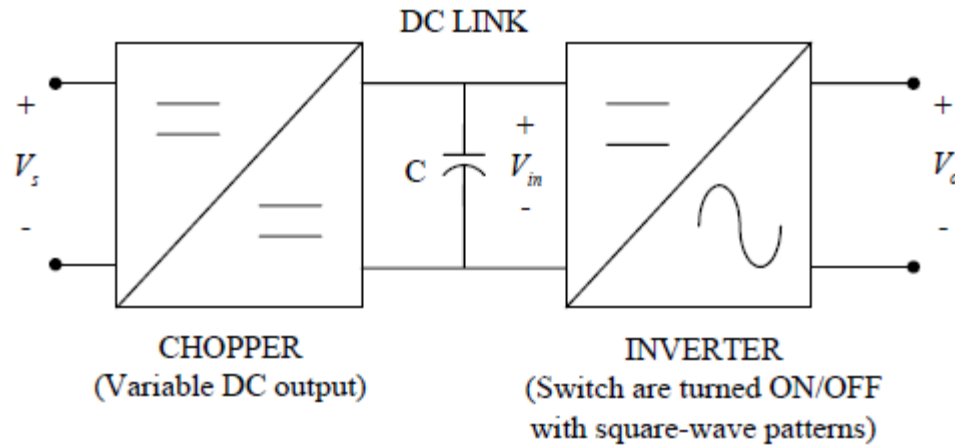
The following table gives us the comparative study between VSI and CSI

VSI	CSI
VSI is fed from a DC voltage source having small or negligible impedance.	CSI is fed with adjustable current from a DC voltage source of high impedance.
Input voltage is maintained constant	The input current is constant but adjustable.
Output voltage does not dependent on the load	The amplitude of output current is independent of the load.
The waveform of the load current as well as its magnitude depends upon the nature of load impedance.	The magnitude of output voltage and its waveform depends upon the nature of the load impedance.
VSI requires feedback diodes	The CSI does not require any feedback diodes.
The commutation circuit is complicated	Commutation circuit is simple as it contains only capacitors.
Power BJT, Power MOSFET, IGBT, GTO with self commutation can be used in the circuit.	They cannot be used as these devices have to withstand reverse voltage.

VOLTAGE SOURCE INVERTER (VSI) WITH VARIABLE DC

DC LINK

V_s

CHOPPER
(Variable DC output)

C V_{in}

INVERTER
(Switch are turned ON/OFF
with square-wave patterns)

V_o

- DC link voltage is varied by a DC-to DC converter or controlled rectifier.

- Generate "square wave" output voltage.

- Output voltage amplitude is varied as DC link is varied.

- Frequency of output voltage is varied by changing the frequency of the square wave pulses

The DC-link quantity is then impressed by an energy storage element that is common to both stages, which is a capacitor C for the voltage DC-link or an inductor L for the current DC-link.