

Variable Frequency Drive(VFD)

Consider a 3 phase squirrel cage induction motor fed by VFD as shown in Fig.1.

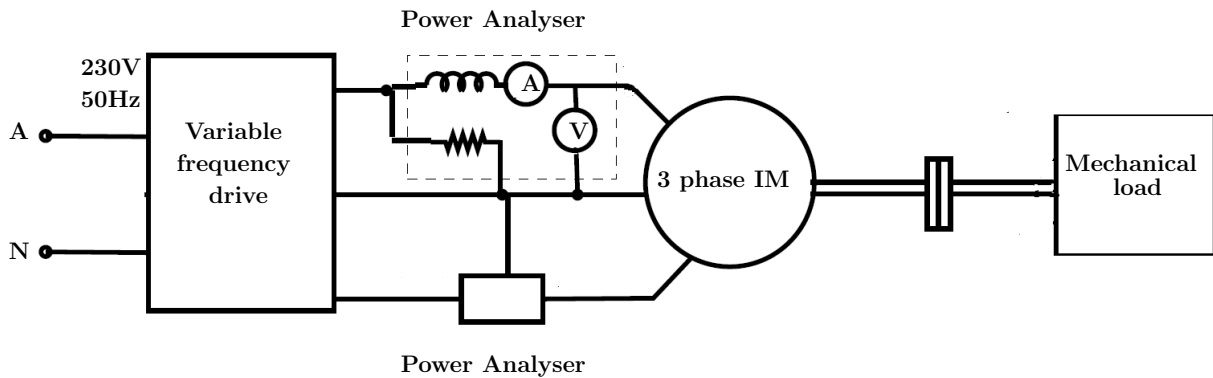


Figure 1: Induction motor fed by VFD

Switch ON the single phase supply and VFD. Set some speed in VFD and press RUN button.

- Observe the waveforms at the output of the VFD. How is it different from the normal supply we give to the motor?
- Capture the line-line voltage using a storage oscilloscope and observe its harmonic spectrum for different set speeds.
- Note the change in the harmonic spectrum with different set speeds. What is actually happening inside a VFD for different speed setting?

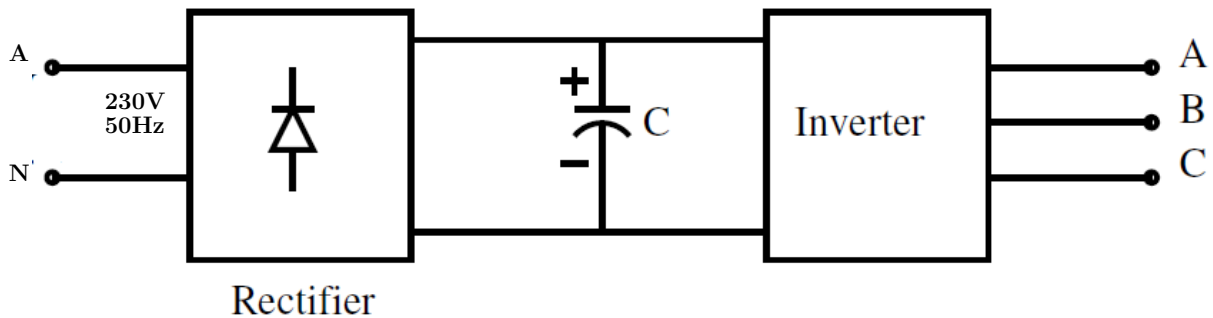


Figure 2: Internal block diagram of VFD

Theory

The VFD consists of a diode rectifier and Inverter connected back to back shown in Fig.2. The single phase 230V 50Hz supply is rectified by a diode rectifier. The capacitor connected at the output of the rectifier maintains a constant dc link voltage for the inverter. The inverter accepts the frequency and voltage input from the user and generates 3 phase voltages of desired frequency and magnitude. The controller inside VFD keeps the ratio V/f constant upto synchronous speed of the motor. Above synchronous speed, voltage is kept constant (why?).

References

- [1] G. K. Dubey. *Fundamentals of Electrical Drives*, Alpha Science International Ltd., 2001.