

Chapter 5: Electrics

5.1 Control gear

A wide range of lamps require control gear of some kind to ensure correct running and, in some cases, starting of the lamp. With discharge lamps it is the job of the control gear to limit the current through the lamp whereas with some incandescent lamps the gear is there to reduce the voltage. Some low voltage tungsten lamps need units to supply them with the correct voltage and LEDs need electronics to limit the current going through them.

5.1.1 Ballasts for discharge light sources

General principles

Control gear for discharge lamps has to perform a number of functions:

- limit and stabilises lamp current: due to the negative resistance characteristic of gas discharge lamps (see Section 3.1.2) it is necessary to control the current in the lamp circuit
- ensure that the lamp continues to operate despite the mains voltage falling to zero at the end of each half cycle
- provide the correct condition for the ignition of the lamp: this generally requires the gear to provide a high voltage and in the case of fluorescent lamps requires a heating current to be passed through the electrodes.

As well as these basic functions control gear may also have the following requirements placed on it:

- ensure a high power factor
- limit the harmonic distortion in the mains current
- limit any electromagnetic interference (EMI) produced by the lamp and ballast
- limit the short-circuit and run up currents to protect the lamp electrodes and to help the supply wiring system
- keep the lamp current and voltage within the specified limits for the lamp during mains voltage fluctuations.

With electromagnetic control gear several separate control components may be needed — these may include ballasts, starters, igniters, capacitors and filter-coils.

When electronic control gear is used it is common to integrate all the components into one package. The details of the various circuits used are discussed in the following sections.

Electromagnetic control gear for fluorescent light sources

Choke coils used to be the most common type of current limiting device used with linear and compact fluorescent lamps. The most common circuit is the switch start, see Figure 5.1.