

How it Works

Xenon Strobe Beacons

Xenon strobes work by pushing the energy stored in a capacitor through a xenon flash tube to produce a very short burst of high intensity light.

Our xenon beacons consist of 4 key elements:

1. Power supply
2. Flash capacitor
3. Clock circuit
4. Xenon flash tube

Power Supply

The power supply converts the incoming power source to around 320Vdc to charge the flash capacitor to its working voltage. Circuitry is optimised to the expected incoming supply; e.g. 12-24Vdc, 115Vac, 230Vac and so on.

Flash Capacitor

The flash capacitor acts as a storage bucket for the energy required by the flash tube. Ideally, the flash capacitor **charges as slowly** as possible between flashes to limit the current drawn from the incoming power source and **discharges as fast** as possible through the xenon flash tube to provide the most intense pulse of light achievable.

Clock Circuit

The clock circuit provides the necessary signal to cause the xenon flash tube to flash. deegree Xenon Strobe beacons typically use a micro-controller or timer I.C. to generate the clock signals. Use of a micro-controller allows full control of flash speed and flash pattern as well as monitoring on board speed/function switches and external control signals when required.

Xenon Flash Tube

Xenon flash tubes work by discharging the energy stored in a capacitor through a special flash tube filled with xenon gas to produce a very short burst of high intensity white light. Most xenon flash tubes are equipped with a capacitive trigger electrode - e.g. a wire wrapped around the tube, or a silver conductive coating on the outside of the glass.

How the xenon tube produces its flash

1. The flash capacitor is charged by the power supply to around 320Vdc.
2. The xenon flash tube remains non-conductive even when the capacitor is fully charged, and therefore does not flash.
3. A smaller capacitor is discharged through a special trigger coil to generate a trigger pulse.
4. The pulse generated by the trigger coil (typically 5 to 10 kV) is enough to ionize the xenon gas inside the flash tube.
5. The xenon gas suddenly becomes a low resistance and causes the energy stored in the flash capacitor to discharge through the flash tube resulting in a short duration flash of light. The typical flash duration of our xenon beacons is around 0.2 milliseconds.

For a typical strobe beacon, the trigger circuit includes timing components to generate a repetitive pulse at, say, once every second, such that the beacon produces a continuous string of flashes 60 times a minute.

Xenon strobes can flash at slower rates than this with no problems, but there is a limit if we want them to flash faster - xenon tubes for warning beacons have a typical maximum flash rate of 4 flashes per second, plus it takes a finite amount of time to charge up the flash capacitor to its maximum voltage. Therefore, most xenon strobe beacons have a maximum flash rate of typically 2 or 3 flashes per second.

