

ISOLATION TRANSFORMER VERSES DIODE ISOLATION DEVICES

An isolation transformer is the ultimate form of galvanic isolation and recreates a totally isolated AC supply and eliminates any electrical continuity between AC shore power and the boat. The possibility of symptomless failure is almost zero. A failure will usually result in failure of the AC supply. An isolation transformer is inherently galvanic isolated and although relatively expensive compared to other diode galvanic isolation devices an isolation transformer, provides the ultimate safety and electrolysis protection for shore power connections and are the preferred option for any boat. With a transformer, the shore power is fed to the primary side of the transformer and the boat is connected to the secondary. The fitting of an isolation transformer completely eliminates the need for any alternative galvanic device. It is quite common for incoming earth lead conductors to have a voltage potential which can often be sufficient to force a diode isolator device into a conduction phase. Isolation transformers eliminate all possibilities of any shore voltages causing such a problem

Diode Isolation devices – these are cheap compared to isolation transformers and can fail without symptoms. Such a failure could endanger life by failing open circuit or remove the galvanic protection by failing short circuit.

A further problem with diode isolation devices is that the incoming earth lead conductor could have a voltage on it, this is quite common. The voltage might not be dangerous to life but might be sufficient to force the diode isolation device into conduction. In order to test a diode isolation device one would need an oscilloscope as you would be testing an AC system whilst it is alive. True or total galvanic isolation means that the jetty earth must be galvanically isolated from the vessel earth.

A diode isolation device consists essentially of 4 diodes, 2 inline forward facing and 2 inline backward facing both connected in parallel. The diodes are wired in line with the earth lead between the shore power plug on the jetty and the AC electrical system on the boat. Each diode in the isolator will drop around 0.6 volts before it starts to conduct. So 2 in series will require 1.2 volts before any conduction takes place. There are 2 diodes facing one way and 2 the other way to enable AC currents to flow in both directions (thus tripping the circuit breaker or RCD). This means that the galvanic currents (which are usually between 0.4 and 0.8 volts) which cause galvanic corrosion are blocked from flowing. They would have to exceed 1.2 volts in order for a current to flow. They never exceed this level due to the metals involved and the water