

Electrical Energy Conversion

Laboratory 1: Single-Phase Diode Rectifier

1. Aims

- To experimentally investigate the operation of a half wave and a full wave diode rectifier feeding into various load combinations.
- To calculate output voltages and currents from the rectifier, and to compare these results with theory.
- To explore the impact of source inductance on the rectifier operation.

2. Equipment

- ULK-THY3: 3 Phase Controlled Rectifier Test Set
- ULK-LOD1: DC Load Box
- Digital Oscilloscope
- 2 off Differential Voltage Amplifiers
- 1 off clamp ON current Probe
- General Purpose multimeter set

3. General Test System Description

The 3 Phase Controlled Rectifier Test Set shown in Fig. 1 is a custom designed digitally controlled SCR bridge that can be operated as either a single or a three-phase rectifier, in either half or full wave operation.

The Test Set is powered by an AC supply voltage, either single-phase or three-phase as required, typically provided by a separate single or three-phase variac. It is controlled by an internal Digital Signal Processor that changes mode between half wave and full wave, single-phase and three-phase, as selected by switches on the front panel. Minor wiring configuration changes are also required to swap between half and full wave operation as detailed in these notes. A selectable series inductance can also be included between the AC supply and the SCR bridge to investigate the effect of source impedance on the rectifier operation.

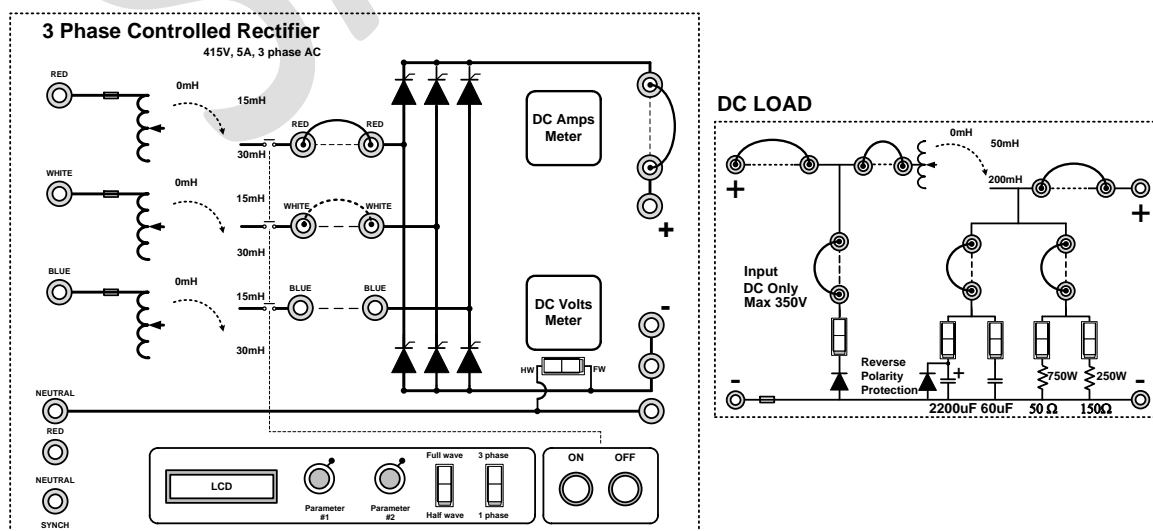


Figure 1: Three-phase Controlled Rectifier Test Set and DC Load Box