

## AN6143

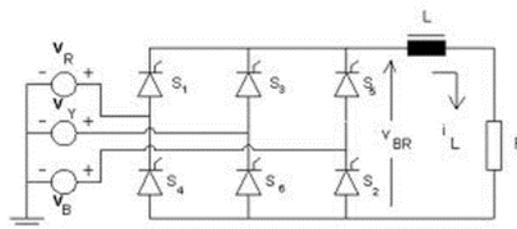
When I replace obsolete products in my equipment with modern replacements, do I need to replace all the devices in parallel in an arm?

### Application Note

Replaces AN6143-1

AN6143-2 November 2022 (LN42260)

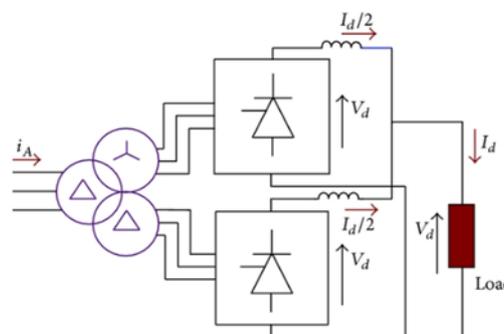
Figure 1 shows a simple 3-phase bridge where one thyristor (per arm) is capable of carrying the current that is required to obtain the full output rating of the bridge.



**Figure 1. 3-phase fully controlled rectifier**

If a higher current rating is required then either larger devices are used, if available, or devices are used in parallel. These devices are specially selected to have similar forward voltage drops at the operating current so that they each take approximately the same current. A modern replacement for an obsolete thyristor will not have the same forward voltage drop characteristic and so if it is the only device replaced in multi-parallel device arrangement then it will upset the current sharing. In all probability the modern device will have a lower forward voltage drop at the operating current and so it will take a disproportionate amount of the current and may well burn out. Therefore, in the case where the thyristors S1 to S6 in figure 1 are actually parallel connected thyristors then all the devices in any individual switch (arm) must be of the same type.

Bridges connected in parallel usually have phase shifted inputs to produce a smoother output and are fed from different secondary windings of a transformer. In this way the thyristors in any corresponding arm in each bridge are NOT directly connected in parallel.



**Figure 2. A 12-pulse bridge rectifier consisting of two phases shifted 6-pulse bridges with connected outputs**

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## HEADQUARTERS OPERATIONS

DYNEX SEMICONDUCTOR LIMITED  
Doddington Road, Lincoln, Lincolnshire, LN6 3LF  
United Kingdom.  
Phone: +44 (0) 1522 500500

Web: <http://www.dynexsemi.com>

## CUSTOMER SERVICE

Phone: +44 (0) 1522 502753 / 502901

e-mail: [powersolutions@dynexsemi.com](mailto:powersolutions@dynexsemi.com)