PACIFIC POWER SOURCE
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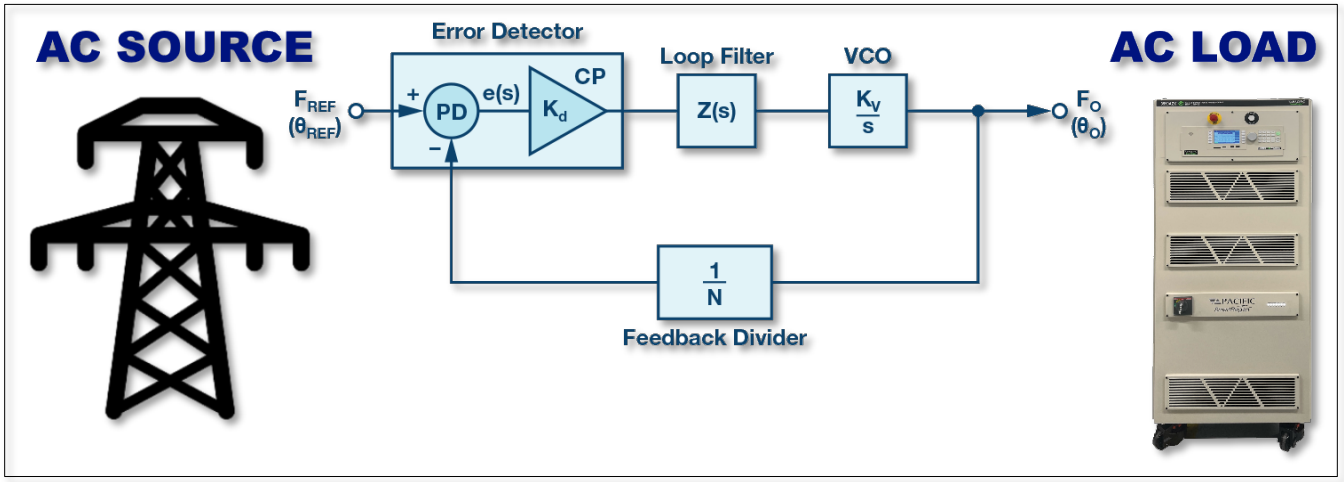
Electronic Load Sync Modes

AZX SERIES



1 Abstract

When using the AZX Series power source as an electronic AC load, it is important to understand the nature of the unit under test and the need for the AC load to synchronize to the AC voltage frequency and phase of the unit being tested. While the AZX load is synchronized to the unit under test, it will operate with no interruptions. If however the unit under test turns off or is disconnected, synchronization is lost due to a lack of input AC voltage to synchronize to. When the unit under test is re-connected, the AC load must synchronize to it again which will take some time to accomplish. This application note explains the two synchronization modes available on the AZX series and how they affect operation of the load during turn on or off events or connection disconnection events.

2 Synchronization Methods

The AZX in electronic load mode synchronizes to the AC input voltage using one of two available methods:

- Double loop Phase Lock Loop method. This method works over a wide frequency range and provides the most accurate phase synchronization. It does take several seconds for this method to lock-in, however. It also takes some time to detect the absence of any or too low AC input voltage to sync to. Once an un-synced condition is detected by the AZX – either because the AC voltage source is disconnected or turned off – the AZX load current is driven to zero.
- Real-time Fast Sync method. This method uses an advanced voltage comparator with hysteresis that can sync and un-sync very fast - in less than half a period of the input frequency. The drawback of this method is that it is not as precise as the double loop PLL with respect to phase angle and the AC input frequency of the unit under test has to be close to the programmed frequency setting of the AZX. Thus, the user needs to program the AZX frequency to the expected AC input voltage frequency for the electronic load to sync up.

The image below shows a scope capture of the AZX load current using the AZX Series internal scope measurement function of a fast synchronization event to a connected AC source being turned on.

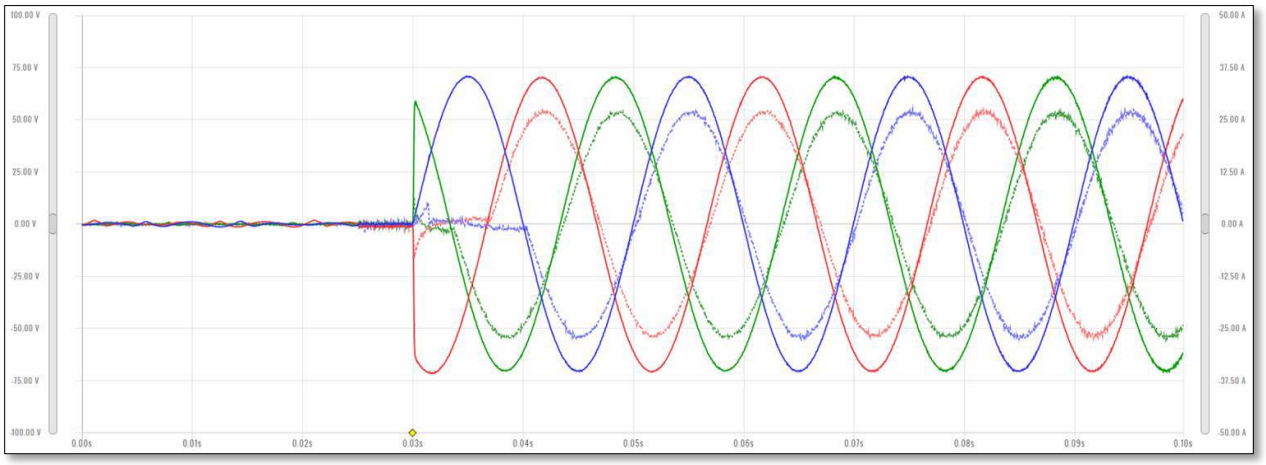


Figure 2-1: Example Synchronization using Fast Sync Mode

3 Automated Test System Applications

For automated test systems where the AZX Series is used as an electronic AC load, the sync mode can be selected using this SCPI command over the LAN, USB or GPIB interface bus:

LOAD:SYNC:FAST[:STATe]# <0|1>

0 to use the double loop PLL and 1 to use the fast sync mode.

The selected sync mode can be queries using the query version of the same command:

LOAD:SYNC:FAST[:STATe]#?

Returns 0 (PLL) or 1 (Fast Sync).

4 Summary

For AC Load applications where disconnection of the AC Source under test is rare, using the PPL mode is recommended as it provides the most precise phase angle and frequency synchronization. This mode is also required in situations where the AC frequency of the unit under test can vary significantly.

For AC load applications where AC source interruptions are common or expected and the AC frequency is stable and known, the Fast Sync mode may be used to allow the load to quickly respond to a turn-on or turn-off event of the unit under test. The tradeoff is reduced phase angle accuracy and the need to set the AZX frequency on the AZX electronic load to the expected frequency from the unit under test (UUT).

5 Customer Support

For application support, contact Pacific Power Source's Customers Service - Toll Free US: +1 (800) 854-2433 / support@pacificpower.com or your local authorized Pacific Power Source distributor.

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