

# Aviation Power Systems – Monitoring and Troubleshooting

## Introduction

Most of the world distributes power at 50 or 60 Hz. However, there are certain specialized applications that distribute power at other frequencies, such as aviation and naval systems. While 400 Hz is used to improve system efficiency, it will challenge most power monitoring instruments, since most measure at 50 or 60 Hz only. A misapplication of a 50/60 Hz instrument on a 400 Hz application will most likely result in inaccurate measurements, inconsistent instrument behavior, and loss of time and money when testing studies are conducted that do not yield useful data. 400 Hz measurements require an instrument that has been specifically developed to accommodate 400 Hz fundamental frequency and its associated measurement and synchronization requirements.



*A typical jetway will have a 60-400 Hz solid state or M-G set power converter for “shore power” when it docks*

## Why use 400 Hz?

Aircraft electrical components operate on many different voltages, but most aircraft systems use 115 volts AC at 400 Hz or 28 volts DC. 400 Hz offers several advantages over 50/60 Hz, namely by allowing smaller, lighter power supplies to be used for military hardware, commercial aircraft operations and computer applications. Reducing the space and weight requirements of electronic equipment improve aircraft thrust and fuel burn.

Along with the higher frequency and advantages of the 400 Hz system comes more sensitivity to voltage drop problems—both resistive and reactive. Thus, in order to properly test and monitor the performance of aviation power systems, you need an instrument that can fully function at both 50/60 and 400 Hz (AC) as well as on DC systems.



*Dranetz-BMI PowerXplorer® PX5-400 with its intuitive color touch screen and super simple setups, measures and monitors AC and DC power, 50/60 and 400 Hz*

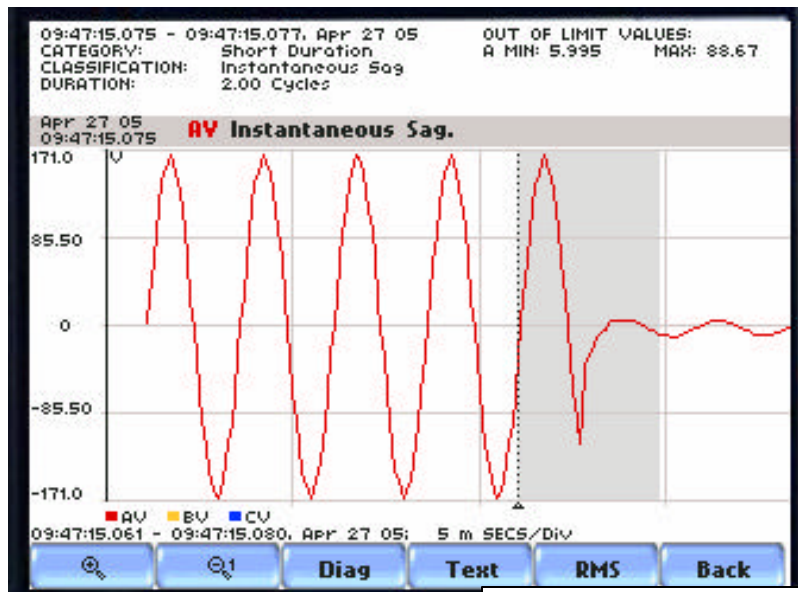
## Power monitoring with the PX5-400

400 Hz power systems have the same concerns of traditional 50/60 Hz systems, yet many users don't know that an advanced tool is available to help them. Power quality, demand and energy are important in any application regardless of power frequency. With the introduction of the PX5-400 users can apply industry-leading Dranetz-BMI monitoring technology to these more specialized applications. As an example, aviation power distribution reliability can involve three main components: the aircraft, jetway and ground equipment. Any link in this chain that doesn't perform to expectations can cause failures that may result in delays, lost productivity and lost revenues. Therefore, it is important to have the tools available to quickly resolve any problems to reduce the economic impact of interruptions in service.

The PowerXplorer PX5-400 uses digitized high-speed sampling to capture and analyze microsecond-wide transients (Dranetz 658-like and BMI 8800-like). Transients, generated by fast-switching electronics, computer systems, aircraft components, and load transfer are immediately characterized as impulsive or oscillatory and detailed for further analysis. The PowerXplorer PX5-400 has a built-in event characterizer that labels events to directly support troubleshooting and the gathering of survey data—for improving power quality and equipment reliability, as well as for matching the requirements and susceptibilities of that equipment to the incoming supply.



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*This voltage sag was recorded by a PX5-400 measuring the 400 Hz aircraft supply from a jetway at a major east coast airport.*

## Beyond Power Quality

In many cases airport gates are rented or leased to airlines. The cost of energy consumed by an airplane while parked at the gate is intended to be included in the fees charged to the airlines. However, in many cases owners estimate energy usage and do not measure actual aircraft consumption for the purposes of adjusting fees accordingly. A Boeing 777 consumes more electricity than a regional jet and owners need to make sure contracts and pricing is based upon actual usage and not estimates. The PX5-400 demand and energy monitoring capabilities can be used by airport authorities, ground maintenance teams and airlines to easily conduct power consumption surveys to measure actual usage making the information readily available to adjust billing/contracts accordingly. Such surveys can range from short term spot checks to long duration monitoring sessions.

## PX5-400 Aviation Power Applications

- Power quality troubleshooting
- Real-time 50/60 or 400 Hz monitoring
- Power system performance testing
- Preventive or just-in-time maintenance
- Testing of AC/DC systems
- Power consumption billing and allocation
- Compliance with Mil std 1399 testing

