



Power Innovations
INTERNATIONAL, INC.

Application Note 5201

Power Quality for Harsh Rugged Exploration Environment

Introduction

Exploration for oil and other resources often dictates extreme locations and conditions in which equipment must operate. Often the main source of power is from generators, which produce inherently poor power. Modern exploration equipment is sensitive to poor power quality, while its use demands excellent power quality to operate accurately and efficiently.

Outdoor environments can be extreme, harsh, and demanding. These harsh environments vary in extremes of temperature and humidity, from the cold of the arctics to the heat and humidity of the tropics.

In addition to operating in harsh environmental conditions, it is also necessary to move or transport equipment in these rugged environments, causing additional stress and vibration.

For these reasons, UPQ™ is now a standard among most of the major oil exploration companies, and the use of UPQ is growing daily.

Application Problem

Power quality, durability (certified rugged), serviceability, and price are all critical factors in the oil exploration industry. Wherever exploration and research equipment is deployed, the environment is extreme and the power requirements are critical. Failures are costly. One hour of downtime can cost hundreds of thousands of lost time and money. In addition, exploration equipment is subjected to environmental and use extremes.

Stress

Operating exploration equipment in remote locations and under extreme conditions can create stress or vibrations in the multiple “g” range. Gravitational forces are measured in multiples of normal (1g). Military pilots can experience gravitational forces of up to 6gs in an airplane, and it is reported that a 14g force is deadly. The forces placed upon rugged equipment in many applications can be in excess of the 14g level.

Humidity

Because many of the extreme outdoor environments in the exploration industry cannot be controlled, humidity can range anywhere from 0% to 100%.

Today’s sensitive electronic exploration equipment requires a new standard of power to provide pure and consistent power regardless of the quality of input power or other external forces.

In addition, exploration equipment is used worldwide. Equipment for power protection must be customized to site input and output requirements, and have the flexibility to deliver multiple voltage output levels. Exploration equipment power must accept and adapt to world standards for any combination of 50Hz, 60 Hz, and 400 Hz.

Rugged Exploration

APPLICATION PROBLEM

Modern rugged exploration equipment demands excellent power quality to operate accurately and efficiently.

SOLUTION

The Q-RX™ system was designed for rugged and harsh exploration requirements.

ADVANTAGES

- **Stress**
- **Humidity**
- **MIL-STD 167 - Vibration Standards**
- **MIL-STD 810E - Shock Standards**
- **MIL-STD 810 - Thermal and Humidity Standards**
- **Local and Remote Management**

The Solution

Downtime in the exploration industry is unacceptable because of data loss, expense, and unacceptable loss of time. That is why an increasing number of exploration power applications are supplied with Q-RX™ (ruggedized) Uninterruptible Power Quality™ (UPQ) systems from Power Innovations.

UPQ is an unprecedented new standard that began with traditional Uninterruptible Power Supply (UPS) technologies, and then moved forward to address critical modern power issues, while still providing traditional UPS backup functions. Power Innovations Q-RX systems also comply with U.S. military standards for rugged and harsh environments.

Extreme Environmental Requirements

Many exploration applications are constantly on the move in environments with extremes in vibration, temperature, shock, humidity, and air quality. Power Innovations developed its Q-RX (rugged) Series of UPQ systems to meet the military standard requirements for these extreme environmental conditions, which makes them ideal for the exploration industry as well. Q-RX systems comply with the following U.S. military standards:

Vibration and Shock Testing

MIL-STD-167 (Mechanical Vibrations for On-Ship Board Systems) – Q-RX systems meet or exceed this vibration standard from 4 to 50 Hz. The operational and non-operational vibration tests deliver up to 2g forces for two to four hours.

MIL-STD-810E (Environmental Test Methods and Engineering Guidelines) – Q-RX systems meet or exceed this shock standard. In each axis, multiple positive and negative shocks are induced up to 30g forces for levels ranging from 2g to 30g.

Thermal and Humidity Testing

MIL-STD-810 – Q-RX systems meet or exceed this environmental standard. The systems operate in freezing temperatures of -22°F (-30°C), sweltering temperatures up to 140°F (60°C), and even in condensing humidity.

Extreme Environmental Applications

Military applications for Q-RX systems include critical power applications on Navy ships and in battle-tested vehicles. Meeting or exceeding MIL-STDs 167, 810 and 810E allows these Q-RX units to keep these vehicle systems powered under the harshest battlefield conditions. Companies in the oil exploration industry use Q-RX systems, both on land and on ocean rigs, to turn unstable generator power into reliable and quality power. The MIL-STD certifications on the Power Innovations Q-RX systems have made them attractive in numerous other rugged applications besides military and exploration. As an example, Power Innovations products are used to convert power to 50Hz for the testing of commercial satellites before they are launched.

Conclusions

Without pure, clean, reliable power, the ability for sensitive equipment to perform up to stringent exploration standards is, at best, severely impaired. This precision equipment needs the perfect quality power supplied by Power Innovations Q-RX systems to accurately perform its functions.

Powering Life

Powering Miracles
Powering Peace of Mind
Powering Life's Connections
Powering the Human Spirit
Powering Freedom
Powering Innovation



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