Power Quality

The Overlooked Productivity Variable

LISTEN. THINK. SOLVE.®

Allen-Bradley • Rockwell Software

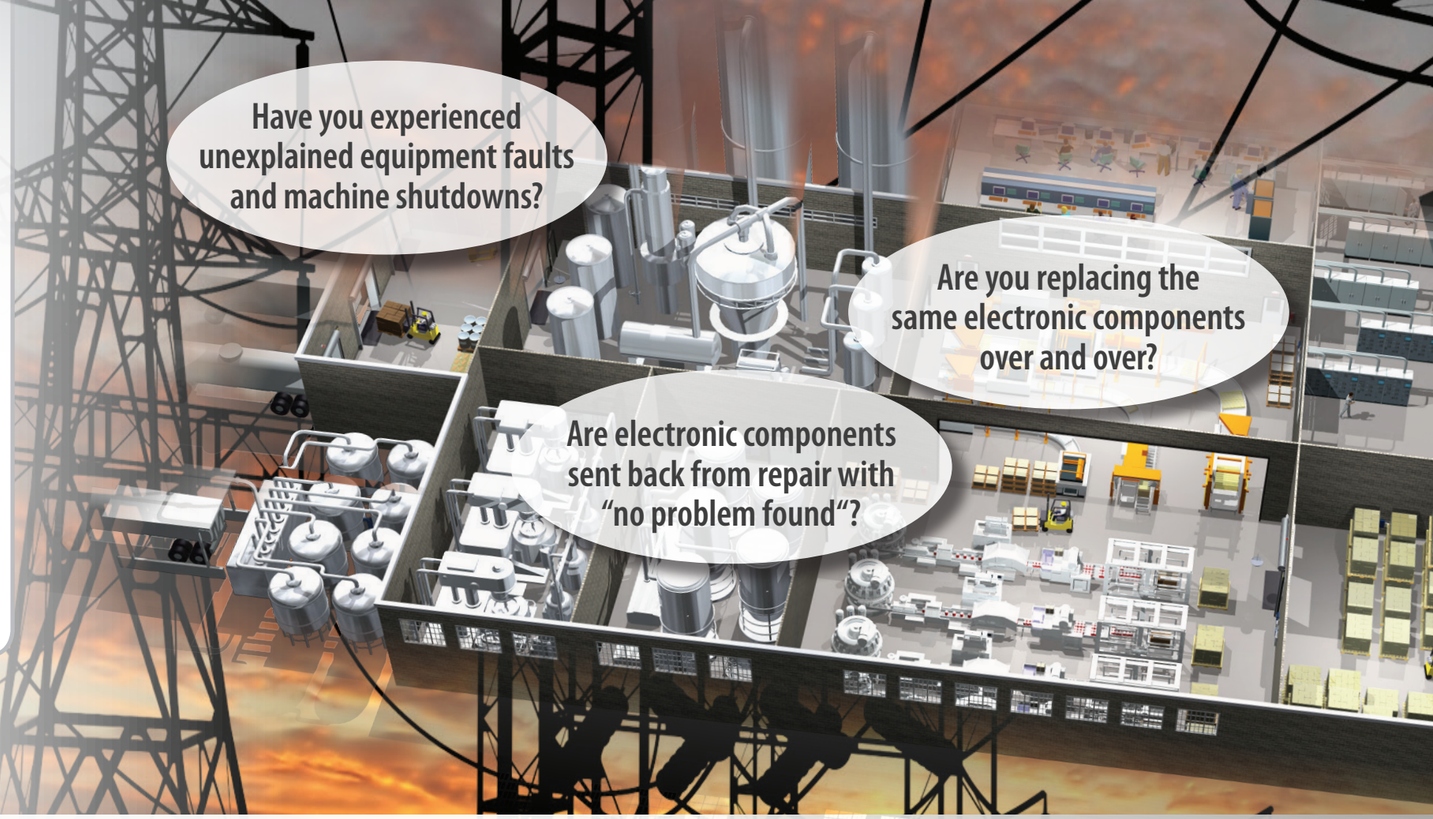
Rockwell Automation

Up to 70 percent of unexplained downtime is caused by power quality problems.

Chances are that your facility is affected

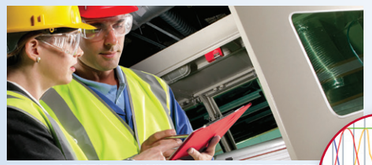
Irregularities in your facility's power are often a hidden source of unplanned downtime. Poor power quality can have a negative impact on both the performance and the life expectancy of electronic components used in many discrete and process applications.

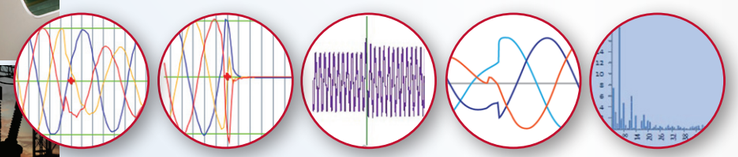
From transients to voltage sags, the Allen-Bradley power quality portfolio consists of plant-wide to individual process- and machine-level products that help you identify and mitigate power issues – to increase your uptime.



Power Quality Events	Definition*	Symptom
SAG	Variation below nominal RMS voltage of 10-80% with a duration of a half cycle up to 1 minute.	Controller faults and system crashes, Dropped or damaged relay coils.
SWELL	Variation above or the nominal RMS voltage of 10-80% with a duration of a half cycle up to one minute.	Data loss, Hardware damage.
TRANSIENT	Momentary non-uniform changes in voltage or current (less than one cycle).	Data loss, Lower life expectancy of electronic components.
OVERVOLTAGE	Steady state voltage event of more than 110% nominal voltage for one minute or longer.	PC memory loss, Equipment damage or shutoff.
UNDERVOLTAGE	Steady state voltage event of less than 90% nominal voltage for one minute or longer.	PC or controller data corruption, Data loss, Damaged relay coils, Erratic equipment behavior.
INTERRUPTION	Complete loss of line power.	System crash, Unplanned shutdown.
HARMONICS/NOISE	Harmonics/Noise are non-useful voltages and currents that are the result of non-linear electric load. Harmonics/Noise impact the waveform, creating complexity and non-uniformity to sinusoidal electrical circuits.	High levels of harmonic distortion can cause overheating, failure of electronic equipment, incorrect readings on meters and faulty operation of protective relays.

* Per IEEE 519, 1159 and IEC 61000-4-30.





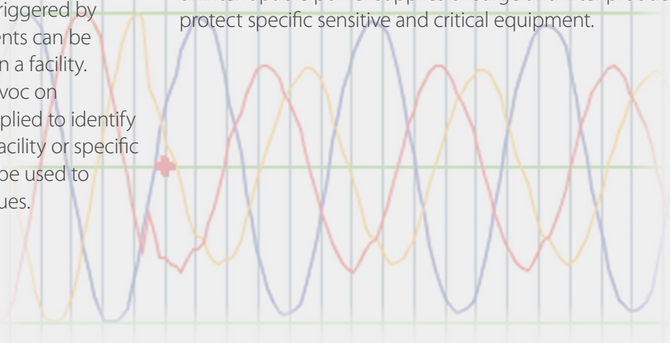
Identification: We can help find out how power quality is affecting you.

The first step towards improved performance is understanding the power quality issues that are affecting your production and control equipment.

Power quality events are usually brief – they may not even cause your lights to flicker – making them easy to overlook and difficult to diagnose. Some events are triggered by severe weather patterns; more localized events can be caused by new or existing equipment within a facility. Yet, these easy-to-miss events can wreak havoc on production. Monitoring solutions can be applied to identify power disturbances impacting your entire facility or specific areas and equipment. This information can be used to analyze the root causes of power quality issues.

Mitigation: We can help you improve your power quality.

Once you know how power quality events are affecting your production and you've analyzed the monetary impact, it is time to consider how to fix the problem. Mitigation strategies can be facility-wide voltage sag correctors, which correct the most common and brief voltage sag events, to uninterruptible power supplies or surge and filter products to protect specific sensitive and critical equipment.

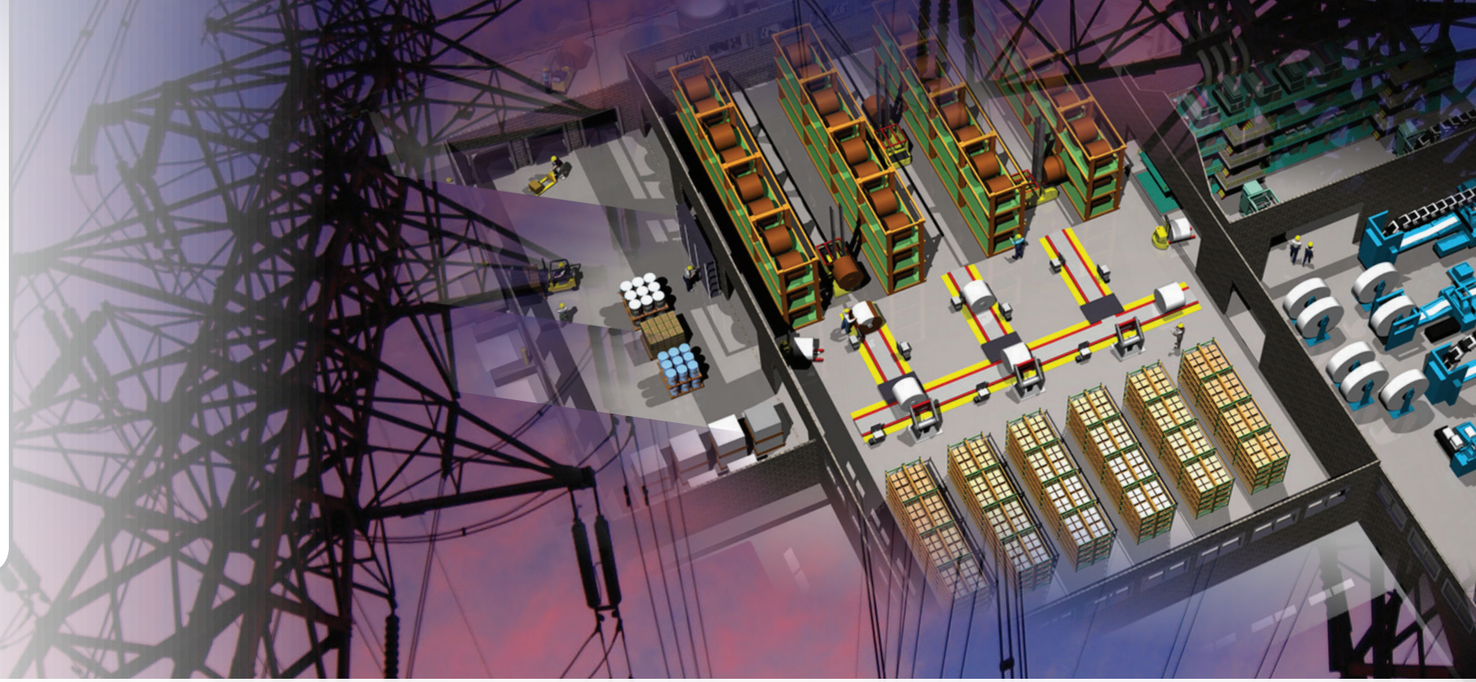


Identification and Analysis

Products for diagnosing power quality issues

Power quality problems can originate from both inside or outside your facility. Rockwell Automation provides products that enable you to evaluate incoming power as well as perform in depth analysis at specific points within your facility.

Power quality events are is not easy to detect. An effective monitoring solution is the first step toward understanding how much of your down time, and its associated costs, can be attributed to power quality issues.



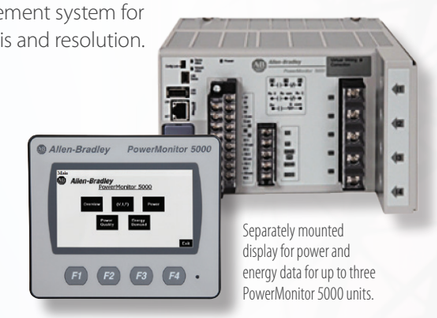
i-Sense®/i-Grid® Intelligent Network

The i-Sense voltage event monitor is ideal for analyzing the feed into your facility with limited investment. Voltage quality data is viewed on the i-Grid cloud-based application, which means, there is no software to install-, or maintain.

Instant event e-mail and text notifications will keep power quality data at your fingertips.

PowerMonitor™ 5000

Measuring current and voltage, the PowerMonitor 5000 calculates an extensive array of power quality information to help you understand issues coming into and throughout your facility. This information can be incorporated into your power management system for detailed analysis and resolution.

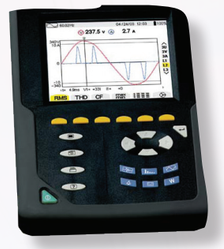


Separately mounted display for power and energy data for up to three PowerMonitor 5000 units.

PowerPad™

The PowerPad enables mobile power quality metering for real time monitoring and analysis. This hand held product is ideal for auditing your facility's power quality issues.

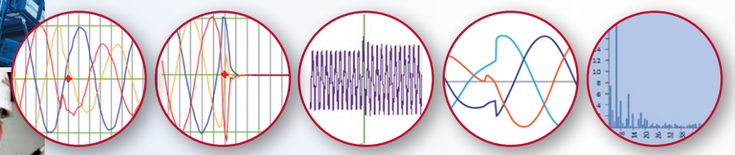
This information can be immediately analyzed to determine if there are issues or if permanent monitoring is required.



Side-by-side comparison proves value of addressing power quality

In a major automotive engine plant, automated equipment and assembly lines were mysteriously shutting down 12 to 20 times a year. Plant managers suspected poor power quality. Because of the serious impact on productivity, discussions reached the governor's office, and the utility company was asked to install premium voltage. Utility officials explained that the premium feed could cost millions and would not solve the real problem – voltage sags. Four i-Sense intelligent voltage sensors quickly confirmed that voltage sags were the true cause of the problem.

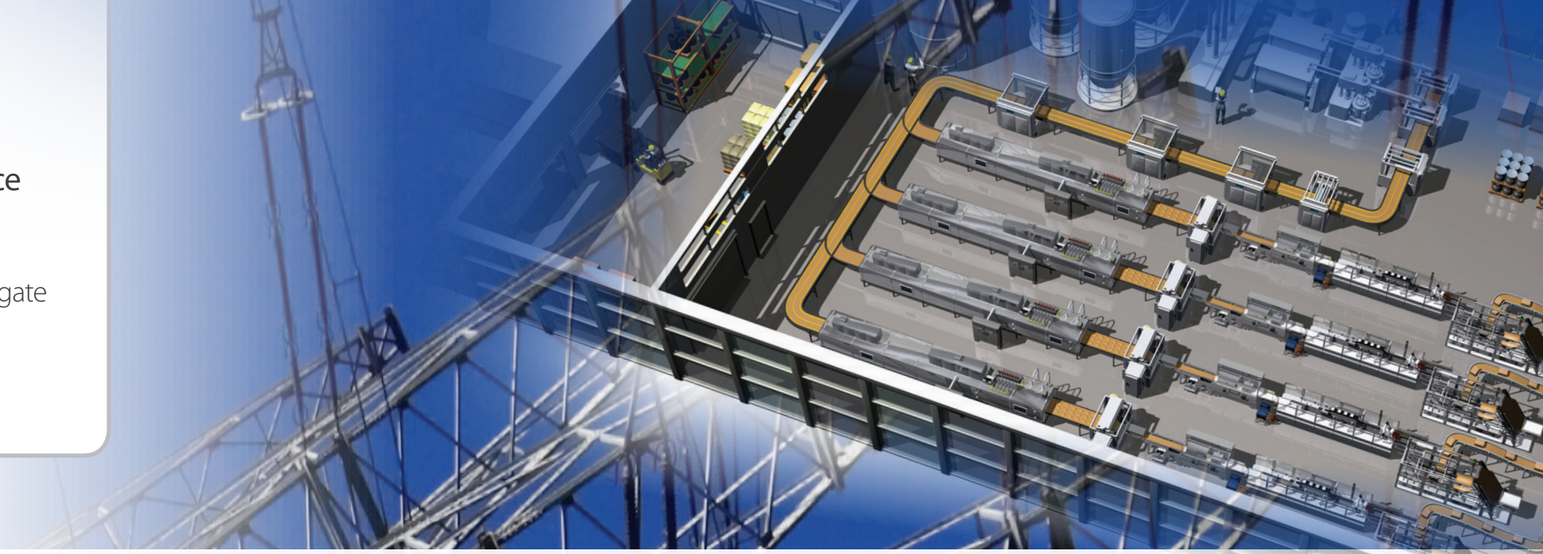
A ProDySC dynamic sag corrector was installed on an assembly line, and unscheduled downtime stopped – for two years and counting. By contrast, other lines, not protected by a DySC product, maintained a projected average of 12-20 events per year.



Mitigation

Now that you've located the issues, apply the remedy at the source

Once you have determined the impact of power quality on your production, Rockwell Automation brings expertise and Allen-Bradley products that can mitigate the problems and help you avoid the consequences associated with power quality issues.

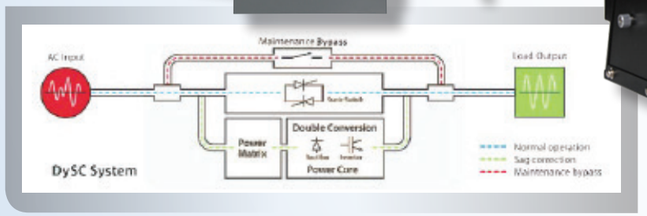


DySC® Voltage Sag Protectors

Solutions to Voltage Sags

The DySC is a scalable, battery-free solution that protects devices from voltage sags and short interruptions that account for the vast majority of events impacting production.

DySC products are 99% efficient and virtually maintenance-free.



Industrial UPS

Fast Recovery from Power Failures

The 1609 is uniquely designed for the industrial market to provide back-up AC power to the control cabinet. The 1609 will bridge dips, sags, or brief losses of power.

If necessary, the 1609 will provide enough time to facilitate a safe shut-down of your industrial PC, PLC, data logging HMI, or any other critical device in the control scheme.

- Replaceable Battery & Surge Module
- Hard Wired Power
- Panel or DIN Rail Mount
- Remote on/off enables UPS to be deactivated when servicing electrical panel
- Battery status monitor via dry contact, serial port or optional Ethernet port
- Expandable Battery Capacity

Surge and Filter Protection

Designed to Meet Industrial Protection Requirements

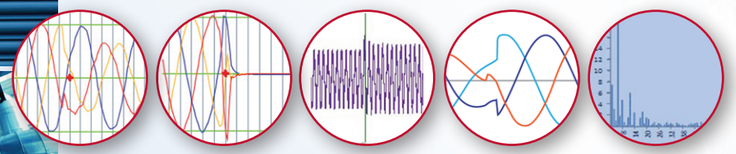
Any load switching that creates a spark has the potential to produce damaging transients within your system. These transients can destroy equipment if not addressed. Motors, drives, contactors, and capacitor banks switching are just a few examples of transient sources.

Surge and filter protection products are crucial for protection against internally generated transient and high frequency noise.

Down time reduced 30-50% – profits up accordingly

An international producer of food and beverage products faced major challenges caused by voltage sags: 10-15 major voltage sag events a year were causing stoppages on aseptic lines, where lost sterility required an eight-hour chemical re-cleaning and re-sterilization process after each power event. On a bakery line, ovens lost product and were a fire safety concern.

Initially, the company suspected automation failure. When efforts to correct this proved unsuccessful, Rockwell Automation installed i-Sense intelligent sensors, revealing the precise correlation between downtime and voltage sags. A MegaDySC to protect the entire process and five smaller DySC sag correctors resulted in a 30%-50% reduction of total downtime, with significant and substantial gains in productivity, efficiency and profit.



Power Issue	Sag	Under/Over Voltage	Interrupt	Harmonics	Transients	Frequency
Products to Identify and Understand Power Quality Problems						
i-Sense*/i-Grid	√	√	√			
PM 5000 M5	√	√	√		√	√
PM 5000 M6	√	√	√	√	√	√
PM 5000 M8	√	√	√	√	√	√
PowerPad	√	√	√	√	√	√
Products to Mitigate Power Quality Problems						
1609-B, -D UPS	√	√	√	√	√	
1608 Mini DySC	√		√**			
1608 Pro DySC	√		√**			
1608 Mega DySC	√		√**		√	
4983 Surge Protector				√	√	
4983 Filter				√		

*i-Sense can correlate power issues to external i-Sense monitors through i-Grid Intelligent Network . **Handles interrupts up to five seconds in duration. See technical specifications for details.

Rockwell Automation, Inc. (NYSE:ROK), the world's largest company dedicated to industrial automation, makes its customers more productive and the world more sustainable. Throughout the world, our flagship Allen-Bradley® and Rockwell Software® product brands are recognized for innovation and excellence.

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www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

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