



Power Protection Products, Inc.



We are glad you are here, its almost time to “Learn about Sag Ride Through”.

While you are waiting, subscribe to our Podcast channel, The Power Grid





Providing an educational environment for training, testing, and evaluation of today's power quality and data center solutions and equipment.

P3 leads Customer Education through Power Quality University (PQU)

- Highly Qualified, Expert Instructors
- Practical, Relevant Topics
- Continuing Education Credits (CEU's)

Upcoming Events

Surge Protection Devices - Friday, September 11 – 9 AM – 11 AM

Power Quality Monitoring- Thursday, September 17– 12 PM – 1 PM



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Sag Ride Through



Presented by



www.powerqualityuniversity.com

Introductions to P3 Hosts

Presenter: Brian Branigan
Host Karah Butac





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P3 sponsors all PQU Seminars



P3 is the industry's trusted and respected advisor for critical power, cooling and energy solutions.





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DATA CENTERS

Providing industry knowledge, product expertise, & technological innovation over a broad portfolio of products and services to our customers across a wide range of industries and applications.

To achieve zero downtime, scale the data center to meet ever changing requirements, and reduce energy costs, you need the most reliable and efficient power and cooling infrastructure available.

Modular & Scalable Data Center Equipment
Systems that grow and change with your modern Data Center.

Traditional Data Center Equipment
Systems built around existing older equipment.

We can provide both
Modular / Scalable and Traditional
Data Center Equipment





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INDUSTRIAL POWER SOLUTIONS

Power Quality Specialists with expertise in your Power Quality needs.

Industrial Power Quality, doesn't just happen. It takes technical expertise, investment in products and facility coordination to achieve the desired levels of Power Quality. With experience in both new construction and retrofit installations, P3 can help you select and install the correct products.



We provide Industrial Power Quality Solutions

Surge Protection Devices

Harmonic Mitigating Transformers

Power Factor Correcting Capacitors



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Power Quality Monitoring

System analysis and evaluation of power quality issues to provide solution recommendations for the best possible performance from your existing power system.

The ability to quickly identify and remedy power quality problems will lengthen the life of electrical equipment and improve power system availability.



Our engineering technicians will help you understand your unique facility power system.



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Service Plans & Support Services

Service plans and support services that provide maintenance, parts, & service necessary to ensure the best possible performance from your existing power system.

We offer customized, flexible, full-service packages that offer hassle-free system maintenance to improve uptime at predictable cost which include technical support, preventive maintenance, quick on-site response, and remote monitoring.

- Service Plans
- Energy Management Services
- Power & Cooling Analysis
- Data Center Assessments
- Project Management
- Battery Replacement

We provide top quality maintenance service & support



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How P3 Operates

We use core values to guide us

Core Values

- Blaze The Trail
- Do the Right Thing
- Be Humble and Honest
- Create a Positive Influence



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This webinar will be recorded



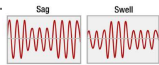
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What causes a voltage Sag/Swell?

Sag:

- Motor starting
- Utility system faults
 - High Winds
 - Lightning
 - Tree contact
 - Animal contact

Swell:

- Large load changes
- Abrupt reduction in load
- Power line switching
- System faults
- Loose or poor connections

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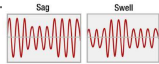
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Why correct for Sags/Swells?

- Voltage sags **lasting less than 100 milliseconds** can cost manufacturing facilities and industrial process as much as outages lasting several minutes
- Damage equipment or cause equipment to damage themselves
- Disrupt manufacturing processes
- Can cause damage to product
- Sag Ride Through power conditioner protects your plant from costly voltage sags. (size up to 3600kVA)

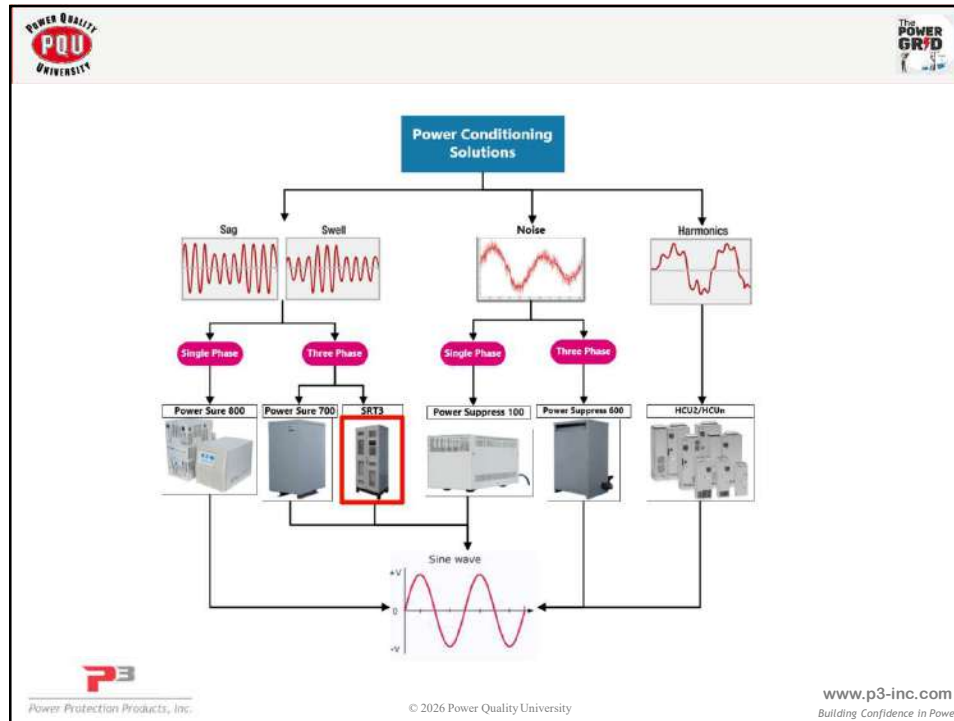
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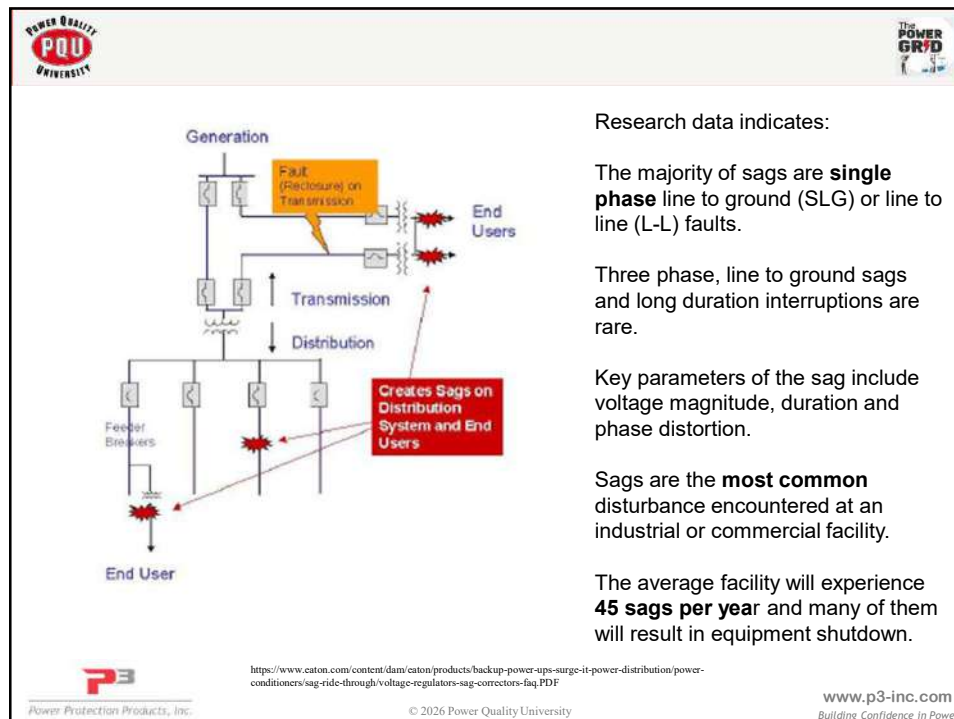
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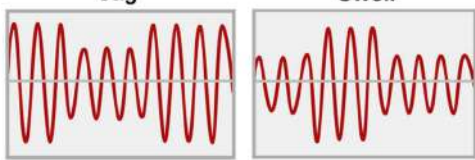
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Sag Swell



10% voltage dips or 10% surge
in voltage above or below the
recommended usage.



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How does the SRT work?

The SRT power conditioner is a series connected active voltage compensation device.

The unit normally operates in an online, a high efficiency (~99%) mode continuously monitoring input voltage. When a sag disturbance is detected, **the unit reacts in under 2 milliseconds** (sub-cycle), injecting the voltage required to correct the sag or provide momentary outage ride-through.

The series connected transformer produces a clean stabilized voltage output.

The device is able to correct even the deepest sags. Input voltage can vary by as much as -63%.

Installed in the distribution system and in front of critical loads to stop sags. Normally the device is only required to provide correction for **3 to 15 cycles** while the sag exists

No minimum load is required to operate the SRT and there are no restrictions on the system's available fault current.

The SRTs unique design accommodates nonlinear loads and **applications with high inrush** current or momentary overloads.



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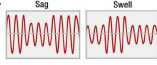
Key Focus

- - High dollar value products sold
- - Critical applications
- - Continuous process industry

Equipment or processes

- Manufacturing process controllers
- Variable speed drives
- Robotics
- Motor conductors
- Telephone systems
- HID lighting
- HVAC controls
- Medical equipment







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- The SRT provides fast accurate protection against sags and swells as well as continuous voltage regulation.
- The SRT can be installed at the medium voltage level to protect the customer's whole facility or at the low voltage level for specific equipment or process protection.

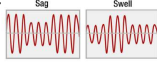
Key SRT features

- Very high efficiency
- Internal failsafe bypass
- Small dimensions
- No batteries or capacitors
- Modular

Key customer benefits:

- Low cost of ownership
- Low maintenance
- Reliable power quality protection







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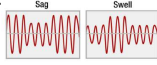
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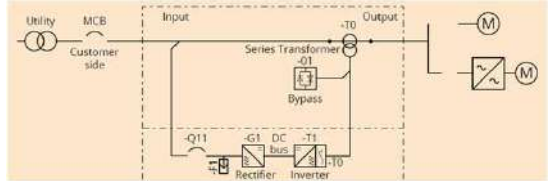
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- Basic principle is to **inject a correction voltage** in series with the supply voltage to make up for errors (sags) in the supply.
- To do this it must have:
 - A mechanism for series voltage injection – the **transformer**
 - A power source for the inverter stage – the **rectifier**
 - A voltage source for the transformer – the **inverter stage**
 - A **bypass** mechanism to manage fault currents and provide security





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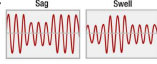
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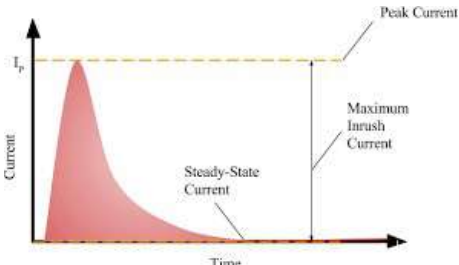
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- SRT overcurrent is rated 2000% for 200ms
 - 500% for 1s
- May need to be upsized to handle single large motor inrush, depending on the size.
 - If drives or soft starts are utilized then this typically eliminates the need to upsize.







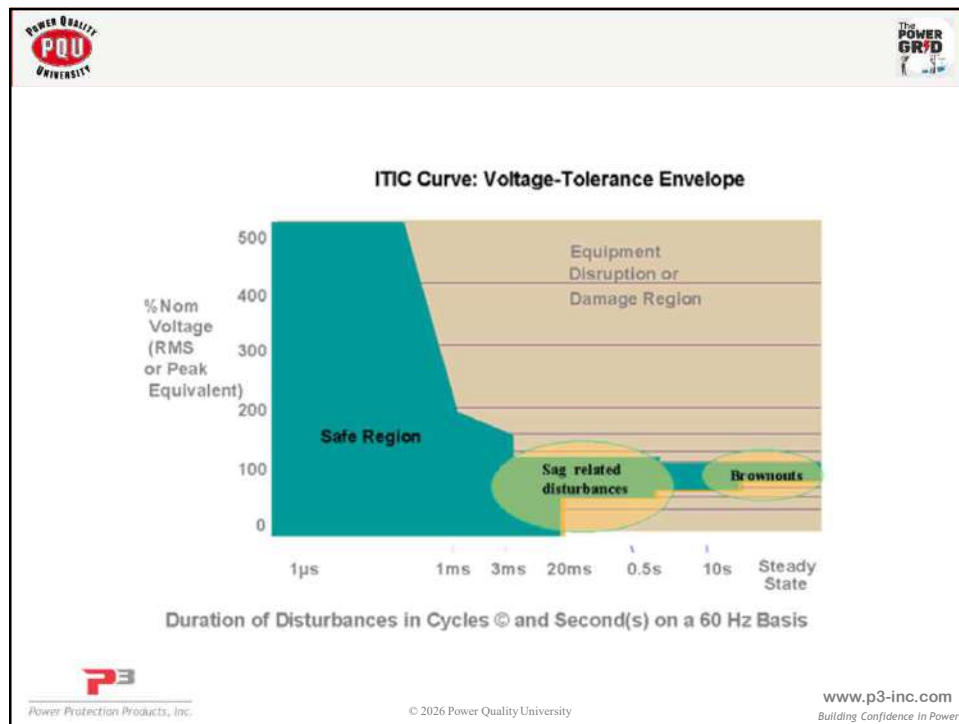
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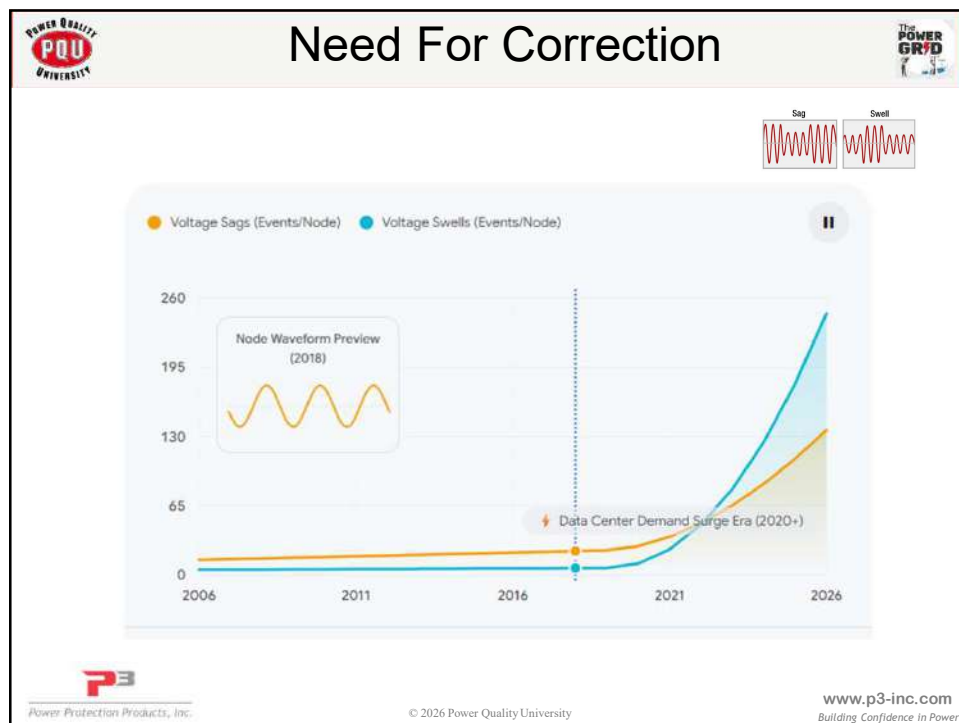
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Sag Ride Through



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Need For Correction



From a pure power quality perspective, data centers act as massive, concentrated sources of electrical pollution. Because they rely heavily on specialized electronics and heavy machinery, they introduce specific electrical disturbances into shared distribution lines that can degrade power quality for nearby homes and businesses. [1]

- **Non-Linear Loads:** Data centers are packed with millions of server power supplies and Uninterruptible Power Supply (UPS) systems. These are "non-linear" loads, meaning they draw current in short, sharp pulses rather than a smooth, continuous wave
- **Waveform Distortion:** These current pulses distort the ideal 60 Hz sinusoidal voltage wave on the local grid. This creates high-frequency electrical noise called harmonics.
- **Impact on Neighbors:** Nearby residential and commercial neighbors receive distorted power. This causes household appliances to run less efficiently, makes LED lights flicker, and can cause local utility transformers on the street to dangerously overheat and fail prematurely.
- **Rapid Cooling Changes:** Data center cooling systems feature massive chillers, pumps, and fans. When these giant motors suddenly cycle on or off to adjust to server heat, they cause immediate voltage drops (sags) or voltage spikes (swells) on the shared local line.
- **Switching Transients:** If a data center rapidly switches its power source—such as moving its entire load from the utility grid to massive on-site battery banks or diesel generators during a storm—it creates high-energy transient spikes. [1]
- **Impact on Neighbors:** These sudden voltage fluctuations can cause nearby residential electronic devices to glitch, reset, or suffer permanent hardware damage over time. [1, 2]



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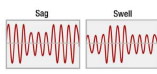
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Need For Correction





Specifically, the rise of high-density AI clusters—has made computing infrastructure both a primary cause of voltage sags and its most vulnerable victim.

As the electrical equipment market tied to US data centers is projected to surge from roughly \$20 billion to \$65 billion between 2026 and 2030, **Ride-through systems have transitioned from "optional insurance" into critical infrastructure.**

Power Grid Demand
Grid feeders are running much closer to their maximum thermal capacities. When a grid operates near its limit, standard grid disturbances (like a lightning strike or a routine utility switching event) propagate much further and **cause deeper voltage sags down the line.**

Micro Grids
Simultaneously, the rapid integration of intermittent renewable energy sources (wind and solar) introduces inherent voltage variability. Sag ride-through equipment acts as a buffer, shielding the data center from an increasingly unstable external macro-grid



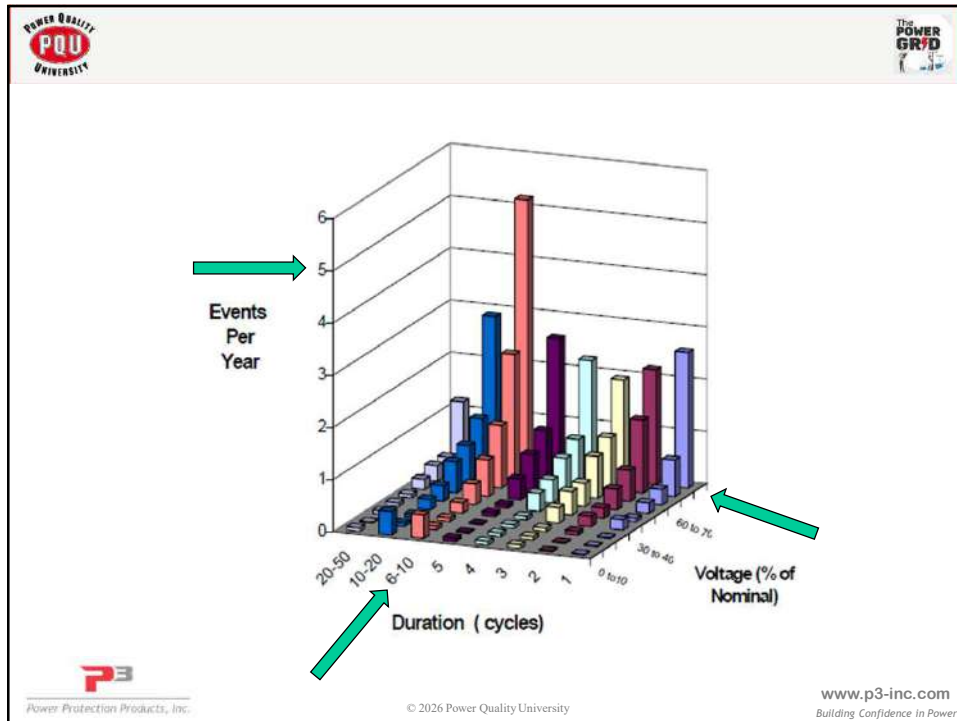
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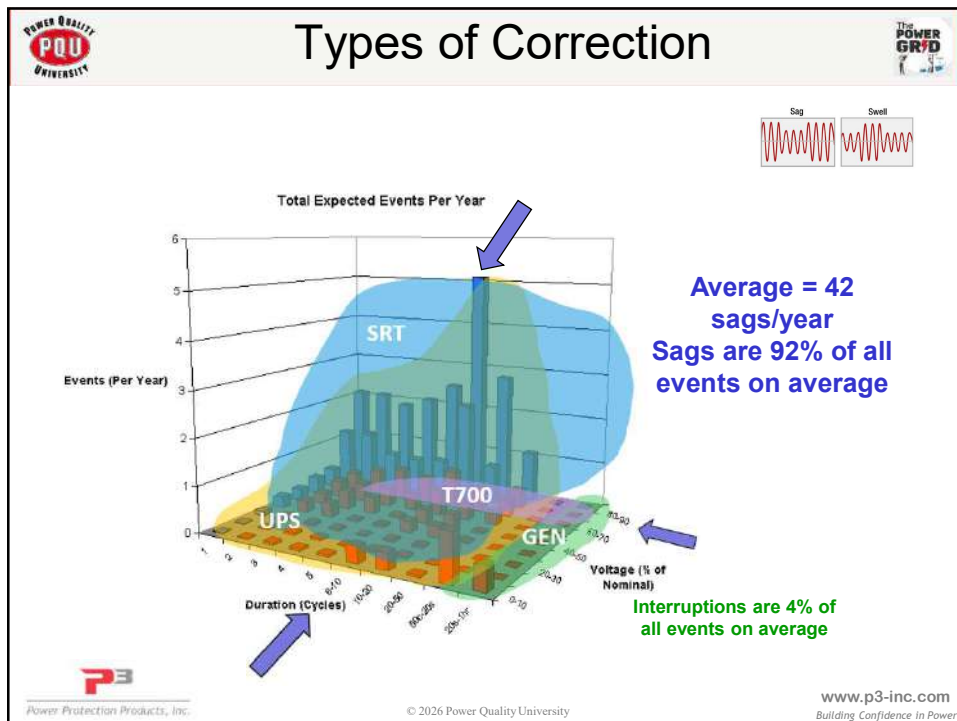
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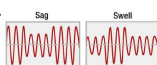
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SRT Configurator





Catalog numbering system

SRT3 0225 480 4 KK

Product	kVA rating			Voltages	Correction %	Options
SRT3 - Sag Ride Through SRTS - Continuous Regulator	20% correction	30% correction	40% correction			
	0500	0400	0225	208 - 230 V	2 - 20%	KK - Top cabinets
	1200	0900	0300	480 - 550 V	3 - 30%	T - Top entry cabinet
	1800	1200	0400	600 - 690 V	4 - 40%	
	2400	1600	0600			
	3000	2000	0750			
	3600	2400	0900			
			1200			
			1500			
			1800			

● SRTS only available with 20% correction while SRT3 is available with 20% or 40% correction.

Notes:
NEMA 4 option available upon request, additional cost will be incurred.
Some units may require wood crating for shipping, additional shipping costs may be added.
External three-breaker maintenance bypass is recommended. This is available for quote upon request.



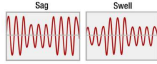
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SRT vs. UPS



SRT

- For Voltage Sags or swells
- Essential loads
- Industrial, mechanical loads
- Applied in systems with high Inrush, harmonic and varying loads
- 99% efficiency at all loads
- **Typically, larger loads (Avg. 1500kVA)**
- Complete facility or production line protection
- Small footprint
- Low maintenance

UPS

- For Outages
- Computer loads
- Stable loads
- <92% at operating loads
- Typically, Smaller loads
- Dedicated load protection
- Large due to battery
- High maintenance cost



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SRT



Sag



Swell



SRT

- Regulates +10% to -40% Volts in for a +/- 1% Volts out
 - up to 30 seconds
 - +/-10% continuous regulation
- Initial response time <140µs
- Complete response time <2/16 cycle
- Modular for future expansion
- MV options available
- Larger kVA options

Power conditioning product aid

—SRT3



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Call to Action

Sag Ride Through can be a challenging task

ARE **YOU** UP FOR
THE **CHALLENGE**

- Do a PQ Study to determine size
- Find the space, Breakers and CT locations needed
- Budget, Plan and Execute

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What You Need to Know Before Using SAG Ride-Through Devices
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Achieve Optimal Power Quality with SAG Ride-Through Devices
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