



## **UPS SYSTEMS** FOR INDUSTRIAL APPLICATIONS





## Industrial plants and energy continuity

**Interruptions or anomalies in the power supply represent a significant risk factor for any industrial setting**, as it may compromise the safety of personnel, **cause sudden disruption to production processes, and lead to direct economic losses.**

Plant downtime can also result in irreversible damage to production equipment, material waste, interruptions to ongoing processes (e.g. mechanical processing) and increased costs related to the restoration of normal operations.

Poor power quality (PQ) is one of the main causes of inefficiency, downtime, and damage in modern industrial environments. According to the latest data provided by the **Electric Power Research Institute (EPRI)**, manufacturing companies in industrialized countries suffer on average **40 000–60 000 USD in losses per year per plant, with peaks exceeding 90 000 USD** in the most sensitive sectors, such as chemicals, pharmaceuticals, and semiconductors.

In some extreme cases, a single PQ event can generate damages exceeding 3 million USD, especially in particularly critical environments.

In stark contrast, service sectors (such as offices, financial institutions, or retail businesses) are much less impacted. Annual losses for these sectors are between **10 000 to 20 000 USD**, with damages primarily related to temporary data outages or IT disruptions.

Susceptibility to network disruptions is lower, as is dependence on continuous production processes.

The difference is not only quantitative but also qualitative: while in the industrial sector, PQ problems compromise the safety, productivity, and integrity of assets, in the service sector the effect is mainly limited to operational comfort or the usability of IT systems.



Investing in electrical protection solutions such as **industrial UPS units with isolation transformers** is highly recommended in the production sector to drastically reduce the risk of downtime and ensure resilience, efficiency, and protection of production equipment.

In many cases, an uncontrolled power outage can trigger a chain of negative events that extends far beyond the machinery downtime: equipment deterioration, delivery delays, energy waste, and logistical inefficiencies that directly impact operator safety, customer service, and the company’s reputation.

According to the **International Energy Agency (IEA)**, the cost of electrical outages and anomalies globally exceeds **100 billion USD a year** in industrialized countries. It is therefore evident how **power supply quality is not just a technical issue, but a strategic factor that directly impacts the competitiveness of companies.**

COMPARISON: INDUSTRIAL VS SERVICES SECTOR

| Scope                 | Industrial processes       | Services / Offices            |
|-----------------------|----------------------------|-------------------------------|
| Average annual cost   | ~40 000 – 60 000 USD/plant | ~ 10 000 – 20 000 USD/company |
| Short break (1 s)     | ~ 1477 USD                 | Significantly lower           |
| Losses from PQ events | ~ 6700 USD/year            | Noticeably lower              |
| Impact on turnover    | Up to 10% annually         | On average 2–5%               |

Source: data from EPRI (Electric Power Research Institute).



## The strategic role of industrial UPS in high-risk sectors

In demanding environments like Oil & Gas, mining, petrochemical plants, power stations, steelworks, and cement factories, industrial UPS systems are not optional—they are **essential to ensure continuous operations, safety, and efficiency.**

Each sector faces specific power challenges:

- **Oil & Gas:** offshore platforms exposed to salt, humidity, and extreme temperatures.
- **Steel and cement plants:** subject to high vibrations, dust, and sudden voltage fluctuations.
- **Power and chemical plants:** require advanced protection and redundancy to ensure safety and operational continuity.
- **Manufacturing and food processing:** demand high automation, reliability, and power quality to maintain productivity and product integrity.

Even brief outages can cause serious losses. In plastic plants, power loss may solidify materials inside pipes; in bottling lines, any disruption to production translates into immediate revenue loss.

Power interruptions or quality degradation can lead to:

- **Critical equipment failure,** affecting data, controls, and recovery costs.
- **Extended production downtime,** disrupting workflows and delaying deliveries.
- **Higher operation & maintenance costs,** due to unplanned restarts and increased wear.
- **Lower production efficiency,** where even short outages affect entire cycles.
- **Safety and environmental hazards,** especially in chemical or energy sectors where failures may cause critical events.



## UPS solutions for critical environments

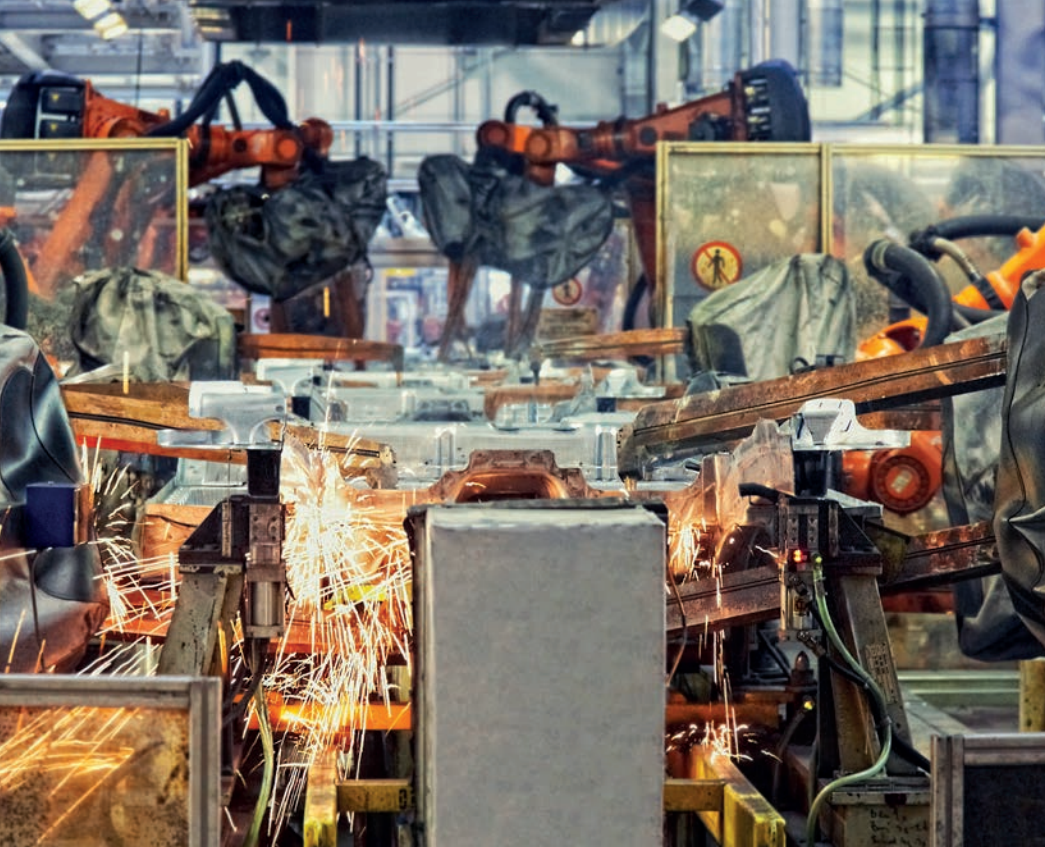
Industrial UPS systems are designed to operate in harsh environments where they will be subjected to:

- **Extreme temperatures**
- **High humidity**
- **Exposure to liquids and dust**
- **Environmental risks**

UPS installed in these environments generally adopt **ON LINE double conversion technology with an isolation transformer**. In the presence of network disturbances, such as voltage anomalies, **the UPS ensures power continuity by instantly drawing on its batteries**.

In the event of prolonged interruptions or low batteries, **load power supply can be maintained by external auxiliary sources**, such as generators or alternative network lines, whose management and switching is entrusted to the electrical system infrastructure.





In the industrial context, the use of a **UPS WITH ISOLATION TRANSFORMER** represents a **high value design choice**.

This solution allows the UPS output to be electrically isolated from the rest of the network, **protecting sensitive loads from the most frequent electrical disturbances in industrial environments**, such as transient voltage surges, voltage variations and sags, electromagnetic interference, harmonics, flickers, and power interruptions.

A UPS with a transformer also allows for better sizing of downstream protections, greater mechanical robustness and an extended operating life, making it **ideal for installations in harsh environments subject to vibrations, dust, chemical agents, and thermal fluctuations**.

The integration of an isolation transformer in industrial UPS provides different benefits:

#### **1) Galvanic isolation**

Transformer presence grants intrinsic galvanic isolation that ensures that no DC current leakage can flow towards the load, even in the event of a hardware fault within the UPS DC/DC converter or inverter stage as well as a malfunction in its control circuits.

#### **2) Dual power supply**

The presence of a transformer makes it possible to supply the UPS with two separate mains and neutral arrangements: one for the rectifier stage without neutral connection and the other one for the bypass.

This grants independent RCD installation for the two lines and limit the risk of transferring to the load the common disturbances via neutral cable since rectifier stager operates neutral free.

#### **3) Non-linear/Unbalanced load**

Transformer design also plays a crucial role guaranteeing full electrical compatibility and suitable for powering sensitive and nonlinear loads. Transformer configurations such as Delta/Zig-Zag effectively confine third-order harmonics within the secondary transformer windings. This results in a reduction in the current flowing through the primary windings and by reflection to



the inverter stage with an overall benefit for the component operating to a lower temperature and thus prolonging their lifespan.

A transformer also helps whenever **the load is unbalanced**, since the current at the primary winding result better distributed amongst the three phases, limiting once again to overload one phase rather than another and the aging consequences for the components.

#### **4) Shorth circuit performances:**

Equally important is the transformer's contribution to short-circuit performance. By providing high fault current availability between phase to neutral at the UPS output, the transformer ensures rapid and selective operation of downstream protection. This characteristic is fundamental in complex industrial distribution systems, where reliable fault discrimination and coordination of protective devices are essential for operational safety and continuity.



Industrial UPS must be compatible and ensure smooth interaction with generator sets: thanks to the **POWER WALK-IN** function, a controlled and progressive start-up of the rectifier is allowed. This mechanism avoids inrush current surges and reduces stress on the upstream source, be it the grid or the generator.

Power Walk-in is divided into two configurable parameters:

- **Power Walk-in delay:** initial delay before the rectifier starts drawing current.
- **Power Walk-in duration:** duration of the ramp-up of the input current up to the nominal value.

This management is essential in systems with multiple **UPS in parallel**, where sequential starting allows the load to be distributed in a balanced way, avoiding absorption peaks that could compromise the stability of the generator.

During the entire start interval (delay + duration), the rectifier is not yet providing all the required power, and the batteries continue to partially support the load.

To further optimize the transition between the grid and the generator, it is possible to temporarily reduce battery charging, reducing the overall load on the source.

This function is particularly useful in the presence of limited power generators or in configurations where there are **multiple UPS and/or gensets**. Correct configuration of the Power Walk-In parameters, combined with adequate sizing of the generator (typically  $\geq 1.5$  times the UPS power), **ensures a smooth, stable and safe transition, even in critical operating conditions.**



In industrial plants, energy demands are often high, with peaks in consumption during the start-up of engines and machinery. Therefore, **it is crucial to choose a UPS that can effectively handle these current surges without difficulty.**

Features like **STATIC AND DYNAMIC PEAK SHAVING** offer significant advantages in the industrial sector, **optimizing energy consumption and reducing operating costs.** By limiting peaks in grid absorption, the company can avoid increased tariffs and penalties, while also ensuring greater stability of the electricity supply. Furthermore, **intelligent power management helps prevent power surges, improving the reliability of the production lines and protecting sensitive equipment.**

In some industrial sectors such as printing, metalworking, heavy load handling, machine tools, cranes, pumps, elevators, and compressors, energy flows back into the grid when these devices decelerate or stop, causing electrical instability, surges, and possible damage to sensitive equipment.

In this case a **UPS WITH POWER ABSORBER (PWA)** represents **a necessary solution to ensure power continuity and avoid unwanted blockages.**

To prevent regenerative energy from causing operational problems, the **UPS WITH INTEGRATED PWA** safely diverts this energy to a dedicated circuitry, where it is converted and dissipated.

This protects the UPS itself, as well as downstream equipment, by keeping voltages within safe limits.

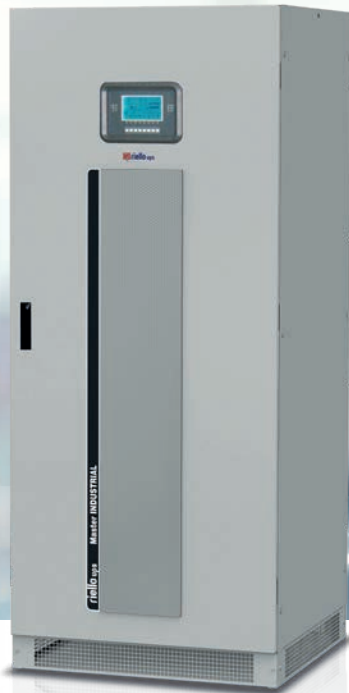
The result is no unexpected shutdowns, no damage to batteries or inverters, and continuous load protection.

**Riello UPS offers dedicated solutions to safely manage regenerative energy generated by braking loads.**

## Differences between conventional UPS and industrial UPS

Industrial UPS units differ substantially from conventional solutions (i.e. offices, data centers, IT) in **robustness, operational life, environmental tolerance and ability to handle severe electrical disturbances in the network**. They are designed to operate continuously even in uncontrolled conditions and to withstand high mechanical and thermal stresses.

|                              | CONVENTIONAL UPS                                                                                              | INDUSTRIAL UPS                                                                                                                                     |
|------------------------------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
|                              |                              |                                                                 |
| AVERAGE DURATION             | 10-12 years.                                                                                                  | 15 years (15+ with dedicated maintenance programs).                                                                                                |
| INSTALLATION ENVIRONMENT     | Offices, Data Centers, IT.                                                                                    | Industries, critical plants.                                                                                                                       |
| ENVIRONMENTAL PROTECTIONS    | Use in environments with stable temperature (up to 40°C), humidity non-condensing and free from contaminants. | Suitable for environments with temperature changes, high humidity and the presence of vibrations, dust or aggressive agents, electric instability. |
| STRUCTURE                    | Compact, modular, suitable for installations in controlled environments.                                      | Rugged, designed to withstand mechanical shock, environmental stress and extreme conditions.                                                       |
| DESIGN AND INSTALLATION      | Standard configurations with limited customization options for indoor applications.                           | Customized solutions based on technical specifications with a comprehensive design approach and tailored testing.                                  |
| GALVANIC ISOLATION           | Optional, or external installation of isolation transformers required.                                        | Built-in isolation transformers..                                                                                                                  |
| CERTIFICATIONS OF PROTECTION | IP20 as standard.                                                                                             | IP30, IP31, and IP42 (easily implemented), seismic protection.                                                                                     |
| MAINTENANCE & SERVICING      | Standard technical support with basic documentation and predefined SLAs.                                      | Dedicated support with targeted maintenance programs, technical training, and detailed specific documentation.                                     |



## Costs and benefits: TCO and ROI of Industrial UPS

When choosing between a standard UPS and one designed for industrial environments, it is essential to consider the entire life cycle of the investment.

**Industrial UPSs offer significant advantages in terms of total cost of ownership (TCO) and return on investment (ROI), especially in complex environments where reliability and continuity are essential requirements.**

Industrial UPS units, although more expensive in the initial phase, have a lower TCO in the medium-to-long term and a higher ROI.

**Investing in a system designed for mission-critical environments means protecting infrastructure, ensuring operations, and strategically optimizing business resources.**

### MAIN ECONOMIC BENEFITS

- **Extended operating life**

This allows you to reduce annual depreciation and spread costs over a much longer period.

- **Reduced and plannable maintenance**

Reinforced components, robust architecture and options such as dust filters and card

tropicalization ensure a lower frequency of interventions overtime, greater predictability and reduction of unplanned costs.

- **Guaranteed business continuity**

Industrial UPSs are capable of operating in harsh and critical environments, minimizing the risk of production process interruptions, with positive impacts on the efficiency and reliability of the entire line.

- **Higher ROI in strategic areas**

In high-risk environments such as oil and gas, energy, chemical plants, or steel mills, adopting industrial UPS systems helps protect high-value assets, reduce failures, and ensure business continuity, with a faster return on investment.

- **Adaptability and modularity**

Each system has unique characteristics: industrial UPS systems can be custom design configured, scalable, and compliant with industry regulations.

# Riello UPS Industrial Uninterruptible Power Supplies

Riello UPS offers a complete range of solutions for critical industrial environments, including:

## MONOLITHIC SOLUTIONS

### MULTI SENTRY (MST)



UPS with DSP-controlled IGBT rectifier and three-level NPC (Neutral Point Clamped) inverter for maximum protection and energy savings, designed for applications with critical loads and harsh environments.

- **From 160 to 200 kVA**
- **High efficiency up to 96.2%**
- **Zero impact**
- **Flexibility of use**
- **Advanced communication**

**3:3** 160-200 kVA/kW



ONLINE



Energy Share



Service 1st start



SmartGrid ready



Supercaps UPS



USB plug

### MASTER MPS (MPM-MPT)



Transformer-based UPSs, available in various versions with three-phase or single-phase output, with options for reducing input harmonics, offer protection and power quality for critical loads, industrial processes, telecommunications, security systems and electro-medical equipment.

- **EFFICIENCY CONTROL Mode (ECM)**
- **Robust and reliable**
- **Galvanic isolation**
- **High overload capacity**
- **Hot System Expansion (HSE)**

**3:1** 10-100 kVA

**3:3** 10-200 kVA



ONLINE



Lithium compatible



Service 1st start



SmartGrid ready



Supercaps UPS

### MASTER HP E MASTER HE (MHT-MHE)



UPS with IGBT transformer and rectifier minimize the impact on the electrical grid and the oversizing of generators. (Master HP also available in a UL/CSA version).

- **Maximum efficiency**
- **Output power factor 1 (HE models)**
- **IGBT rectifier**
- **Galvanic isolation**
- **High overload capacity**
- **Hot System Expansion (HSE)**

**3:3** Master HP 100-600 kVA  
Master HE 100-800 kVA



ONLINE



Lithium compatible



Service 1st start



SmartGrid ready



Supercaps UPS

## MASTER INDUSTRIAL (MIM)



UPS with 220 Vdc DC bus and with input and output isolation transformers, suitable for environments more demanding installations, characterised by vibrations, mechanical stress and dust such as manufacturing and petrochemical processes, electrical distribution and power plants.

**3:1** 30-80 kVA  
BUS 220 VDC



ONLINE



Service  
1st start

- **Bus voltage 220 Vdc**
- **Galvanic isolation of input and output**
- **High short circuit current**
- **Redundant ventilation**

## MASTER FC400 (MFC)



Frequency converter with 400 Hz output, galvanic isolation, and high short-circuit current, which ensures reliable protection for airport, military, and naval applications by isolating the load from mains disturbances. (Also available in a UL/CSA version).

**3:3** 30-125 kVA



ONLINE



Service  
1st start

- **Frequency converter:  
from 50/60 Hz to 400 Hz**
- **Output voltage:  
208 V - three-phase + N**
- **Galvanic isolation**
- **Battery backup on demand**

## POWER ABSORBER (PWA)



Integrated solution for dissipating regenerative energy generated by loads such as elevators, cranes, machine tools, and pumps, ensuring UPS operational continuity even in the presence of power returns.

**3:3** Master MPS PWA 30-80 kVA  
Master MHT PWA 100-400 kVA



ONLINE



Lithium  
compatible



Service  
1st start



SmartGrid  
ready



Supercaps  
UPS

- **Automatic and safe dissipation of regenerated energy**
- **Engineered and turnkey solution**
- **Integrated into the UPS design**
- **Also available in parallel configurations for increased capacity**

# MODULAR SOLUTIONS

## SENTRYUM RACK (SRM-SRT)



ON LINE UPS for critical environments, available in a standalone version, adaptable to standard cabinets, or in a modular cabinet configuration from 20 to 160 kVA/kW. It supports single-phase or three-phase inputs and outputs, automatically adapting to the UPS power supply (single-phase or three-phase) without manual intervention.

- **High adaptability to input voltage**
- **Modular Plug & Play solution**
- **Suitable for standalone and modular installations**
- **Total flexibility**
- **Color graphic touch screen display**

**1-3:1** 20-160 kVA/kW  
**1-3:3** 20-160 kVA/kW



ONLINE



Service  
1st start



SmartGrid  
ready



USB  
plug

## SENTRYUM RACK MARINE (SMM-SMT)



ON LINE UPS designed to ensure power continuity in critical maritime environments (DNV Type Approval according to DNV-CG-0339 August 2021), available in a version adaptable to standard cabinets, or in a modular cabinet configuration from 20 to 160 kVA/kW. It supports single-phase or three-phase inputs and outputs, automatically adapting to the UPS power supply (single-phase or three-phase) without manual intervention.

- **High adaptability to input voltage**
- **Compatible with marine environments**
- **High performance, high strength steel cabinet**
- **No need for free space around the cabinet**
- **Modular Plug & Play solution**
- **Suitable for standalone and modular installations**
- **Total flexibility**
- **Graphic touch screen display on both the module and the front door of the cabinet**

**1-3:1** 20-160 kVA/kW  
**1-3:3** 20-160 kVA/kW



ONLINE



Service  
1st start



SmartGrid  
ready



USB  
plug

### THESE MODELS OFFER:

- **Longevity and reliability:** lifespan up to 15 years (15+ with dedicated maintenance programs).
- **Environmental resistance:** availability of options for advanced IP protection against dust and liquids and special certifications.
- **Advanced maintenance:** monitoring and predictive diagnostic systems.



## Riello UPS Maintenance and Technical Support

Riello UPS guarantees a complete service for maximum operational efficiency:

- **Preventive maintenance:** regular checks to prevent breakdowns.
- **Predictive maintenance:** advanced monitoring and data analysis to prevent failures before they occur.
- **Efficient technical support:** immediate assistance to resolve any operational issues.
- **Remote monitoring:** Real-time monitoring of UPS performance with advanced diagnostics.

Choosing an industrial UPS system is a strategic decision for protecting critical infrastructure.

Relying on robust solutions suited to harsh environments helps reduce downtime, ensure energy efficiency, and ensure maximum protection for production processes.

**Riello UPS offers a broad portfolio of solutions for all critical industrial applications, designed to meet the specific needs of each sector with reliability, flexibility, and technological innovation.**



**Service**



## Why Riello UPS?

Made in Italy technology for excellent results

Global player

Offers 360° customer-focused services

Smart and sustainable energy

### WHY CHOOSE RIELLO UPS?

Riello UPS designs and manufactures its UPS systems in Italy, ensuring direct control over quality and reliability, closely monitoring the entire production, sales, and after-sales service cycle. **Our company is leader in Italy and among the top 5 companies worldwide in the UPS market.**

We develop solutions featuring innovative, cutting-edge technologies, ready for smart electricity distribution grids, which represent the future of energy.

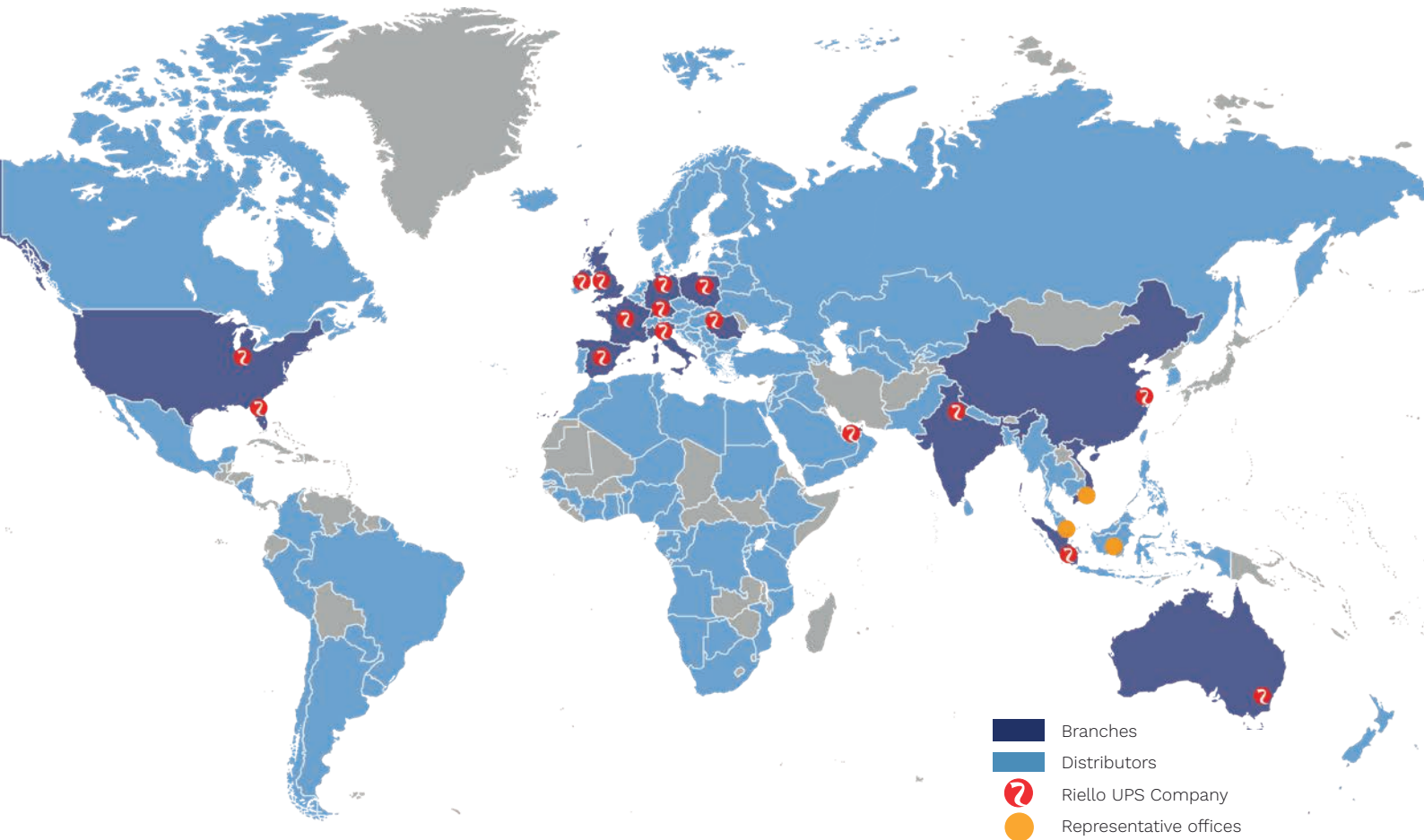
Our comprehensive, award-winning range of UPS systems includes **24 product lines suitable for every situation.**

Thanks to our two research centers in Legnago (Verona) and Cormano (Milan), examples of excellence in Italy and around the world, we continuously innovate our product portfolio, keeping it at the top for performance, reliability, and competitiveness.

**Riello UPS has 15 legal entities and subsidiaries worldwide and distribution and service channels in over 90 countries.**

For more information:

**[www.riello-ups.com](http://www.riello-ups.com)**



INTELLIGENT ENERGY RIELLO UPS  
 “RELIABLE POWER FOR A SUSTAINABLE WORLD”  
 IS THE RIELLO UPS PHILOSOPHY CONDENSING  
 IN A FEW SIMPLE WORDS - A GLOBAL BRAND  
 CONSTANTLY SEARCHING FOR THE MOST  
 INNOVATIVE SOLUTIONS.

Among the most difficult challenges in the UPS world is that of **minimize energy operating costs without compromising device efficiency levels.**

The entire range of Riello ON LINE UPS, from 1 kVA upwards, is fully compliant with the **Code of Conduct (CoC)** for UPS energy efficiency (2021-2023) classification published by CEMEP in agreement with the Joint Research Center of the European Commission. Compared to standard UPS, **Riello UPS solutions are more efficient and guarantee energy savings** which translates into a rapid return on investment and a significant reduction in carbon dioxide emissions to the benefit of the environment.





## References

Our customers, the best guarantee of quality

Riello UPS is the partner of choice for thousands of customers worldwide. Here are some significant examples of major companies that have chosen Riello UPS technology and solutions, resulting in highly successful case histories.

### Italy

- Pirelli, Milan
- Ilva SpA
- Luxottica
- La Doria SpA
- Patheon
- Danieli
- Enel
- Snac Pemex Milan

### Germany

- Audi
- Infineon, Dresden
- EON

### China

- San An Optoelectronics, Xiamen
- Shanghai Huali Microelectronics
- Beijing Oriental Electronics

### Spain

- Electrolux
- Yell Spain

### Romania

- Pirelli
- Continental

### India

- HT Media

### Nigeria

- Coca Cola

### Belgium

- Delhaize

### Bangladesh

- Partex Condensed Refinery

### Hungary

- Quality Pack

### Switzerland

- Iwb Basel

### Croatia

- Hep NDC

### Poland

- Statoil

### South Africa

- Eskom

## Case History

Protecting production at the HELL ENERGY can factory

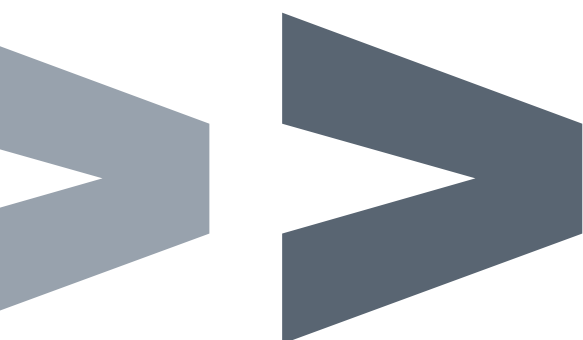
Quality Pack, part of the HELL ENERGY energy drink group, is the first plant producing aluminum beverage cans in Hungary. Today, Quality Pack is capable of producing 6,000 pieces per minute, and any power outages or power surges could result in a huge waste of time and costs.

**For this reason, the company then required a supply of UPS to protect industrial equipment, capable of producing approximately 100 aluminum cans per second.**

In this successful case, the Master HE solution was chosen because the production lines are powered by electric motors with high peak loads. Riello UPS's task was to provide HELL's production lines with 5 minutes of backup time, reaching 10 MW of total power; for this reason, 20 Master HE 500 kW units were installed.

The HELL ENERGY Hungary project was developed in two phases and includes approximately 50 tons of electronic components (UPS) and 80 tons of batteries. The aim of the project was to **provide energy without interruptions or power surges** that could stop the production of aluminum cans. The entire system has been operational for years, without any interruption, since the first installation phase took place on May 1, 2017, a success Riello UPS is proud of.





**RPS S.p.A. - Member of the Riello Elettronica Group**

Viale Europa, 7 - 37045 LEGNAGO (Verona) - Italy  
T +39 0442 635811 - [www.riello-ups.com](http://www.riello-ups.com)

