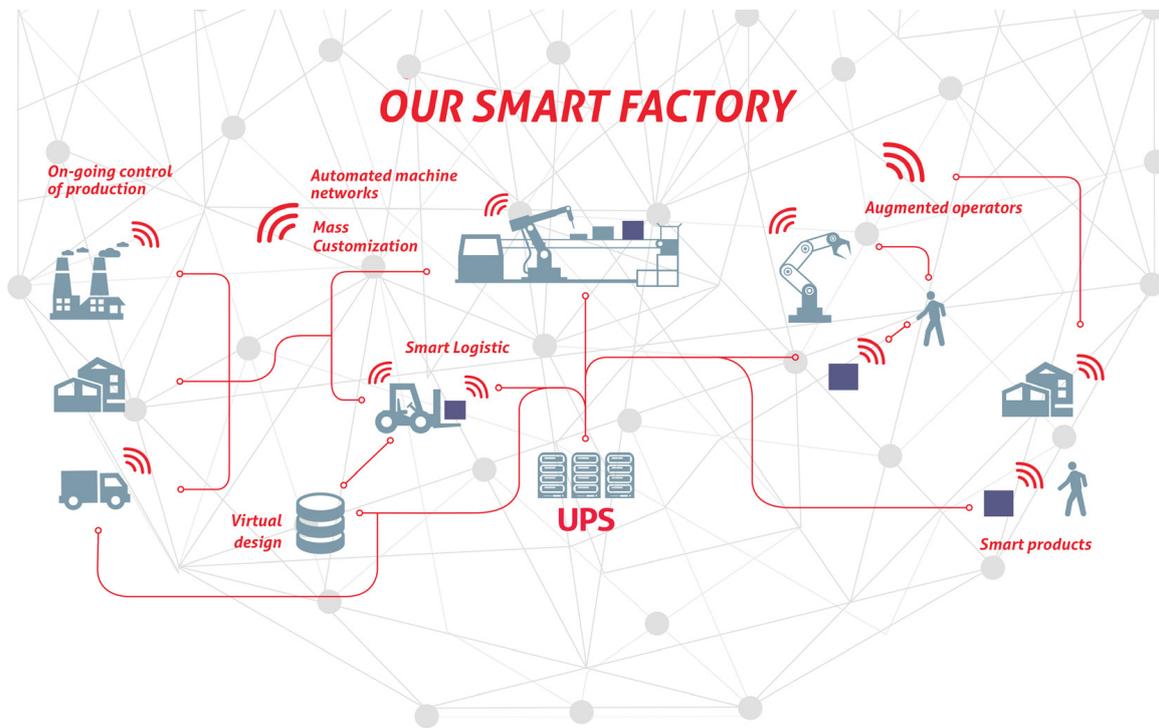


RIELLO UPS: POWER CONTINUITY FOR INDUSTRY 4.0

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1 Introduction

Industry 4.0 is seen as the fourth industrial revolution and is focused on linking physical and cyber networks as one system that enables real-time information flows. Embracing the 'Internet of Things' (IoT), 'Big Data', and automation promises to drive forward improvements in products, processes, and supply chains across smart factories, data centres, and other important areas of life such as healthcare.

It incorporates the 3 key concepts:

- Smart production: new technologies that promote greater collaboration across all elements of the production chain, namely operators, machines, and instruments.
- Smart services: secure and reliable digital infrastructures and techniques that allow for integrating systems, plus all the structures that encourage data flows and supplier-customer collaboration not just with each other,

but with external facilities (e.g. roads, hubs, waste management).

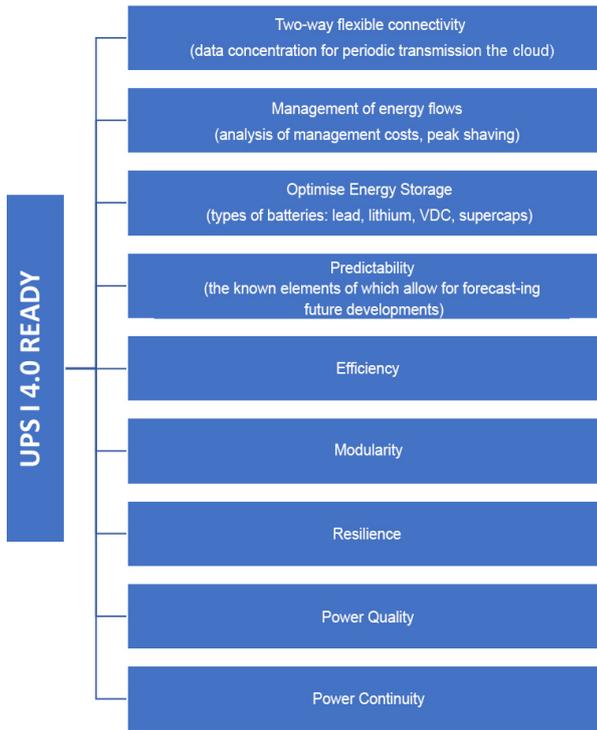
- Smart energy: all the above aims are pursued with an eye on reducing energy consumption by creating more efficient systems and minimising waste.

2 RIELLO UPS - Industry 4.0 READY

The principles underpinning Industry 4.0, and the increasing requirement for maximum digital interconnectivity, will rely on the power continuity that uninterruptible power supplies helps to provide.

In so many ways RIELLO UPS devices and services are already embracing many of the overriding characteristics required to enable the integration, management, and analysis of data flows – modularity, efficiency, two-way connectivity – meaning it is well-placed to help bridge the physical and digital divide.

How RIELLO UPS devices are Industry 4.0 READY



3 UPS for Smart Production

Two-way flexible connectivity (concentration of data and transferring it to the cloud): hardware will increasingly merge into software and vice-versa: hardware, software, and data networks – all these components will become more and more integrated. This evolution is already being seen in the technologies surrounding us: the IoT, telemetry systems, and more. Broadly speaking, stand-alone systems are fading into history, as everything becomes more interconnected.

A product such as a UPS, which is essentially designed to provide power continuity for sensitive and critical loads, must be able to interact with surrounding systems, provide information and receive commands remotely, manage its services in a flexible and intelligent manner based on timely requirements, and perform self-diagnosis.

The Industry 4.0 revolution, and the way it changes products, work procedures, and our way of life, will only occur with integrated connections involving networks – which exchange information – software – which provides ‘intelligent’ services – and most of all hardware – which is the backbone of these services.

Another essential feature is the compatibility with the main INTERCONNECTION systems:

- SNMP
- TCP/IP
- HTTP
- MODbus
- Profibus
- BACnet

Data concentration and its periodic transferral to the cloud is delivered through RIELLO CONNECT. This is a remote cloud-based management service that enables both clients and engineers based in technical help centres to remotely monitor and control Riello UPS systems in real-time.

Data security with Riello Connect is guaranteed by several advanced features: encryption between the user’s web-browser and the cloud server; encryption between the Riello Connect gateway and the server; secure user authentication including two-step verification; and different access rights for different users. Riello Connect is a geographically redundant system on several distributed servers in multiple locations – this increases its availability whilst minimising the potential for any loss of data.

Modularity

Modularity is the practice of breaking a system and its components down into smaller elements – modules – that function as a whole when combined together.

In practice, each individual power module of a UPS has its own hardware and controlling parts that enables it to work alongside other modules to create a much larger and more powerful overall system. The power modules connected in parallel are controlled uniformly by the various UPS modules. Thanks to the removal of the master-slave model, which was once common practice to manage parallel UPS devices, the possibility of there being a single point of failure in the system is eliminated. Because modular systems offer great flexibility, the installed power can easily be increased or decreased depending on load requirements, providing in-built ‘scalability’.

The modular concept provides financial savings in the factory, data centre, or hospital as there’s a lower initial investment cost. The organisation can simply “Pay as you grow” by adding in extra power modules to the racks as and when required.

Alternatively, automatic load management is equally straightforward if the applied loads ever decrease, for example, when equipment is replaced with systems that consume less power. Only the number of actual power modules required for the load, plus Redundancy N+1, needs to be activated.

Resilience

An essential attribute. Power systems or networks must be able to react to any abnormal operating conditions or critical events. The temperature of the main components in a Riello UPS system is constantly monitored to flag-up possible problems and units are configured to provide redundancy if there's ever a fault or failure. Power modules are controlled by separate, independent multi-microprocessors, along with multiple communication buses, to guarantee maximum robustness.

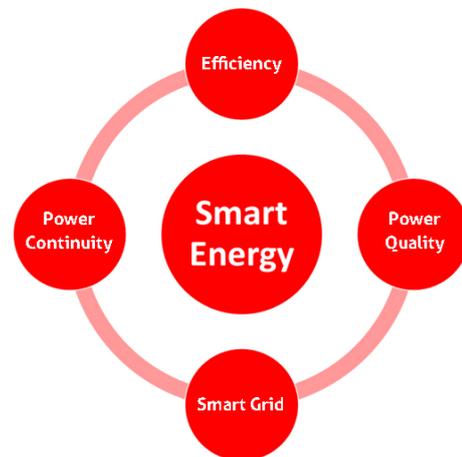
4 UPS for Smart Services

Predictability

With a whole host of information available on its general operating conditions such as ambient temperature, heat sinks, and applied loads, it is possible to predict – and even fix – many potential UPS system failures before they ever take place. For example, data analysis can forecast when batteries and capacitors may need replacing if they are operating at excessively high temperatures.

Sensors can also pick up the presence of dust in heat sinks or detect any unusual activity in the ventilation system, triggering alerts that enable vital maintenance to be undertaken before a potentially minor problem gets out of hand. And by exploiting the extensive information on the network's electrical and load parameters managed by the UPS system, it's possible to create reports highlighting the electrical stress of the applied load (i.e. harmonic currents, resonance, micro-interruptions, frequency variations) that cause premature deterioration of all sensitive components or, even more dangerously, their immediate failure.

5 UPS for Smart Energy



Efficiency

Reducing energy consumption is a crucial day-to-day challenge for all organisations, from manufacturing and transport through to health care and data centres. Embracing Industry 4.0 and its associated advances in technology are said to provide opportunities for energy savings of as much as 15-20%, offering a significant return on investment for early-adopters and considerable savings over time.

UPS systems can have a significant impact on this drive for greater efficiency through both overall technological progress – newer models are more efficient – and specific 'Energy Saving' operating modes. Through this function, it is the UPS that decides whether to adopt the ON-LINE or ECO modes based on analysing the quality of the mains power, which can result in up to 99% efficiency performance. In parallel systems, the 'Efficiency Control System' (ECS) allows the UPS to switch from ON to OFF automatically, reducing the total energy dissipated by the system while guaranteeing the load supply and redundancy.

Smart grids

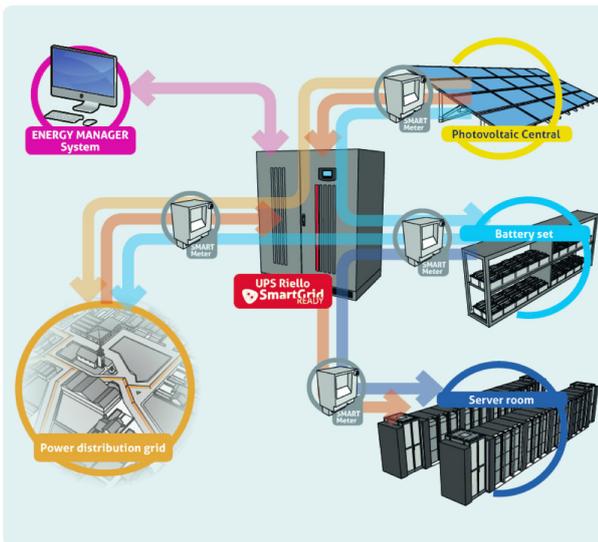
Smart grids bring together electricity and telecoms networks to provide a modern concept of power transmission and distribution ideal for integration with Industry 4.0 technologies, products, and control systems. Enabling two-way communications between the utility and its customers, the smart grid helps to manage the behaviour of all connected users generating power from both traditional sources and renewable alternatives such as solar or wind.

The UK already has more than 4 GW of power stored in UPS units. And with the shift to a demand response model, there are huge untapped opportunities to harness its storage potential even more. Lithium-Ion (Li-Ion) UPS batteries have a much greater power density than the more traditional sealed lead acid (SLA) varieties, allowing longer autonomies and a faster recharge rate without sacrificing valuable space.

In effect, this means a UPS battery can be used to generate and store an energy surplus during off-peak periods when the cost is lower, which can either be used in peak periods or power outages, or even sold back to the National Grid on demand. It will require something of a change of mindset in the traditionally risk-averse power protection sector, but the potential benefits in terms of corporate social responsibility and even as an additional source of future income need to be seriously championed.

Power Quality and Power Continuity

A clean, reliable, and consistent power supply free of interruptions and disturbances is absolutely crucial to the fortunes of Industry 4.0.



All the benefits in terms of smarter products, smarter processes, and smarter supply chains that increased automation and interconnectivity will bring are intertwined with the reliability of the mechanical, electronic, and digital components required to deliver these outcomes.

Installing a modern, efficient UPS system is the simplest and most effective solution to guarantee a reliable, continuous, and high-quality power supply to smart factories, data centres, and hospitals. Acting as the interface between the mains and the load, the UPS helps balance out any anomalies such as under or overvoltage, harmonics, or micro-interruptions, and provide the vital insurance policy when the mains supply fails.

6 Conclusion

It is clear the move to Industry 4.0 offers huge opportunities, not just in the obvious shift to autonomous systems and advances in manufacturing, but in areas such as healthcare, where the IoT is already assisting the management of chronic Non-communicable diseases (NCDs) and robotics has the scope to provide crucial support to an increasingly elderly population.

As we move into this exciting period, the role of uninterruptible power supplies and providers such as Riello UPS will be crucial in making sure the increased demands on the nation's power networks, along with Industry 4.0's unquenchable desire for data, are supported by the robust, efficient power protection that ensures all elements of society can benefit.



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