

## Safe power supplies in the process industry

### Certification, redundancy, and functional safety

In the process industry, the requirements placed on system availability and system safety are often more stringent than those in other industries. With the new Plus version in the Quint Power series of power supplies, Phoenix Contact now offers new functions for even greater system availability and operational safety (Figure 1 lead image).



Figure 1 – Lead Image \* High system availability: the Plus version of the Quint Power power supply was primarily developed for use in the process industry

Permanent system availability and high operational safety are of paramount importance in the process industry. Particularly stringent requirements are placed on security of supply wherever the failure of systems would result in high costs or even incidents that would

endanger people and the environment. Whether in the production, transport or processing of oil and gas, or in production plants or *package units* in the chemicals and pharmaceuticals industry, highly complex process systems must satisfy the growing demands on system safety, even under extreme conditions.

For example, the failure of just one controller in a refinery can cause major damage, which is why the devices used here must be particularly safe. The new Plus version of the Quint Power power supplies has a 20 A nominal output current, making it ideal for use in the process industry. With its integrated decoupling MOSFET, it enables safe supply in a redundant setup. In addition, thanks to its double *overvoltage protection (OVP)* in the form of two protective circuits, the Plus version switches the output off in order to protect the consumer against over-voltages. Operational safety is further enhanced by the protective coating and SIL 3 approval.

### Higher system availability, thanks to integrated redundancy

Redundant power supply concepts are used wherever security of supply is of paramount importance. For example, redundant power supply systems are traditionally used in the oil and gas sectors, as well as the chemical industry. In other industries such as glass manufacturing, the failure of the supply voltage can also quickly result in the loss of an entire batch. A redundant power supply concept is also used in power stations and industrial production plants, where every minute of downtime is extremely costly.

To implement redundancy for the 24 V supply, two power supplies are usually switched in parallel and decoupled from one another using external redundancy modules. If one of the power supplies fails, the other takes over.

Different redundancy concepts are used depending on the application requirements – from simple decoupling with passive diode modules right through to an intelligent solution featuring active redundancy modules.

The use of external redundancy modules has become standard in the market, with power supplies in various applications being decoupled



**Figure 2** - Integrated redundancy: the Quint Power Plus version offers great potential for saving space and costs in the system thanks to the integrated decoupling MOSFET

using this method. However, the new Quint Power Plus version with 20 A nominal out-put current is the first power supply to offer an integrated decoupling function, thereby eliminating the need for external modules (Figure 2).

The new Plus version with integrated decoupling MOSFET is suitable for 1+1 and n+1 redundancy in the process industry. This saves a lot of space in the control cabinet. In parallel operation, the power supplies are completely decoupled from one another. In the event of a device fault or failure, the other device automatically takes over the entire power supply and prevents unintentional system downtimes.

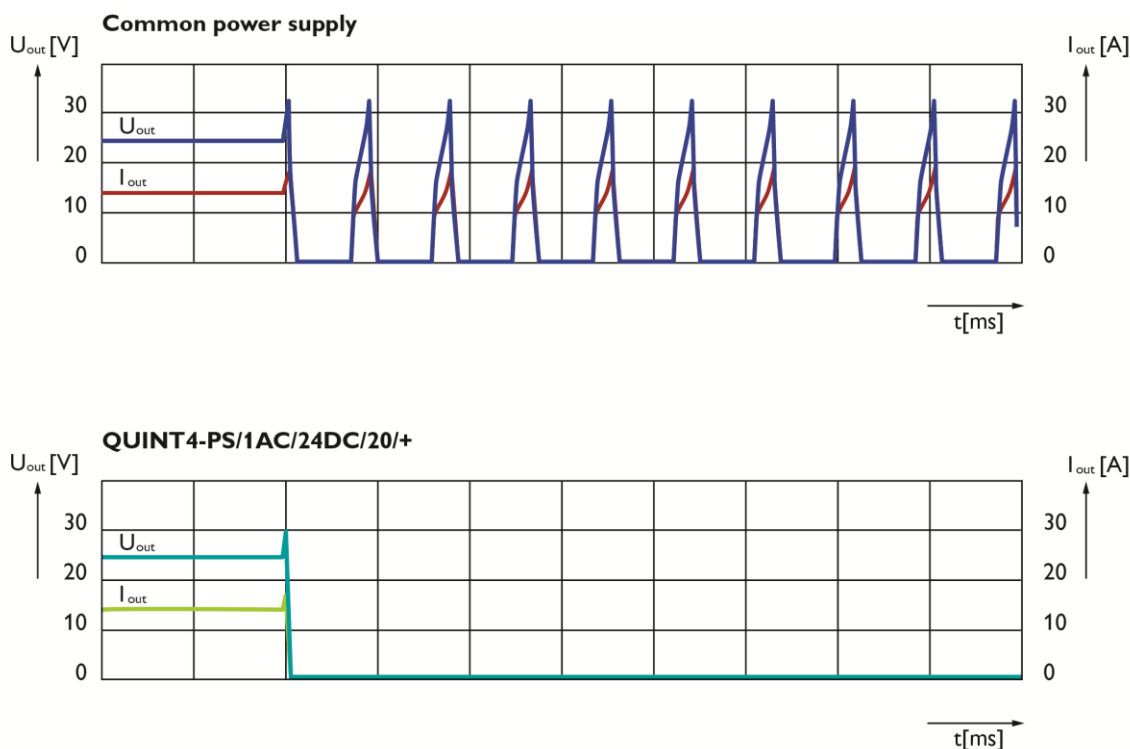
Unlike other marketable standard power supplies with an integrated decoupling function, Quint Power is the only one to provide preventive function monitoring. Individually adjustable signalling thresholds for the output current detect and indicate asymmetrical load distributions or overloads in the event of a fault. This enables the user to swiftly restore redundancy. In the process industry, the control and signalling of faults plays an important role in achieving consistently high system availability.

### **Greater operational safety, thanks to double OVP**

Stable control of the 24 V supply is required in order to guarantee safe supply of the system. Control can be affected by interference from faults caused by internal or external influences. This could be the ingress of impurities, like metal cuttings or conductive dust. Interference can then lead to voltage dips or voltage rises. A voltage dip at the consumer is prevented by a redundant system. In contrast, an unintentional voltage rise leads to an overvoltage at the consumer and endangers system safety. Systems may be damaged or fail completely as a result. To protect consumers against over-voltages of this kind, external overvoltage modules are normally used, e.g., upstream of safety controllers in the process industry.

The Quint Power Plus version protects the consumer against voltage rise as a stand-alone solution; external voltage limitation is not required downstream. In contrast to conventional solutions, in order to protect the consumer in the event that voltage control fails, the Plus version switches the output off by means of double OVP. Phoenix Contact is the first and so far only company to offer this innovation for DIN rail power supply units. In the event of failure, conventional DIN rail power supply units only limit the output voltage to 35 V DC, which can cause damage to the consumer and therefore result in system downtime.

The TÜV-certified double OVP reduces the risk of system downtime considerably. It meets the demands for functional safety (SIL) on the basis of IEC 61508 and IEC 61511, the safety standards for the process industry. With a safety integrity level of SIL 3 and hardware fault tolerance (HFT) = 1, it increases operational safety. In the event of a voltage control fault, the Quint Power Plus version limits the output voltage of the power supply to less than or equal to 30 V DC before the power supply disconnects in order to protect the consumers. In redundant operation, the loads will therefore still be supplied steadily, safely, and reliably (Figure 3).



**Figure 3 - Overvoltage protection (OVP):** unlike conventional power supplies (common power supply, above), the Quint Power Plus version – in this case the QUINT4-PS/1AC/24DC/20/+ (below) – switches the output off in the event of a voltage control fault, thereby reliably protecting consumers against damage resulting from failures

## Use in any weather

Extreme conditions are not uncommon in the process industry, and systems and devices must be able to withstand these. Explosion protection is not just an issue in the chemical and petrochemical industry. Combustible and explosive substances in the form of gas or dust can also be encountered in many other areas.

With its protective coating and ATEX/IECEx approval in accordance with standards IEC 60079-0, IEC 60079-7, IEC 60079-11, and IEC 60079-15, the new Plus version also safely supplies the system in a potentially explosive area (zone 2). Therefore, unlike conventional power supplies, the new Quint Power solution is optimally equipped for use in the process industry. A compliant PCB coating protects against dust, gas, and 100 percent relative

humidity. Use under extreme conditions is also supported by the permitted wide temperature range spanning from -40°C to +75°C – another unique feature of this solution. This level of system safety will be hard to beat (Figure 4).

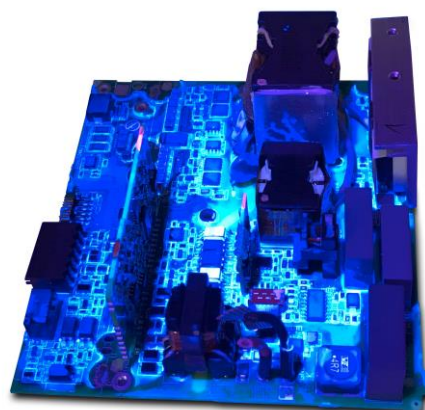
### Summary [optional]

The Quint Power Plus version is ideal for applications that place extreme demands on availability and safety. All types of faults regarding system availability are monitored by the functions included with the Plus version. Thanks to the combination of integrated redundancy, double OVP, and SIL 3 approval, plus the protective coating and ATEX/IECEx approval, Quint Power sets new standards for safe supply in the process industry.

In addition to high system availability, users of the Plus version also benefit from space and cost savings thanks to the simplified layout in the control cabinet. There is no need for additional external modules either, with the reduced wiring effort providing further cost savings.

More information: [www.phoenixcontact.co.uk](http://www.phoenixcontact.co.uk)

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**Figure 4** - Optimised surface: the protective coating on the Plus version provides reliable protection against dust, gas, and humidity – this enables its use in potentially explosive areas