POWER QUALITY

INNOVATIVE SOLUTIONS FOR INDUSTRIAL AND DISTRIBUTION GRIDS.

POWER QUALITY – SOLUTIONS FOR GRID EFFICIENCY IMPROVEMENT, LOSS REDUCTION AND VOLTAGE STABILIZATION.

Improving grid efficiency, stabilizing voltage and reducing losses – that is what we have been using our expert knowledge for over 15 years. Our customized low- and medium-voltage solutions are built to optimize industrial and distribution grids. Our innovative system concepts cut investment costs when connecting renewable energy sources and reduce energy costs for industrial energy-intensive processes, such as steel, paper, chemical, cement and automotive industries.

Reactive power and harmonic in industrial grids

The industrial use of large drives, powerful converters, electro-chemical processes etc. results in an increased demand for reactive power at the connection point. Purchasing reactive power from energy suppliers results in high energy costs. A large number of cables, transformers and cable connections are used in the process, which reduces grid efficiency. Our passive compensation systems and filter circuits provide the reactive power where it is needed, improve supply reliability and cut energy costs.

Voltage stability in the distribution grid

The decentralized, volatile feed-in of renewable energies into the distribution grid aggravates voltage stability in the medium- and low-voltage grid and requires costly grid expansion. Our voltage regulated distribution transformers are the answer as they increase the capacity of the grid. They facilitate to use existing structures and avoid laborious expansion efforts.

Voltage drops, imbalance and flicker

Highly dynamic loads, such as those encountered in electric arc furnaces, result in milliseconds ranging voltage drops and imbalanced conditions. Modular, dynamic MR compensation systems (active filter / SVC / STATCOM) respond to variable grid loads in real time and guarantee optimal, balanced grid conditions with minimal use of reactive power and reduced harmonics at all times. Flicker effects are also compensated.

Grid resonance and overcompensation

Extensive cable networks for connecting offshore projects, in urban grids, extensive road and railway tunnels etc. represent particular challenges for management of reactive power, voltage stability and resonance avoidance. Inductive compensation systems, filter circuits, active filters and STATCOMs from MR ensure interference-free energy supplies in grids with a high cable content.

MR SOLUTIONS – EVERYTHING FROM ONE SOURCE.

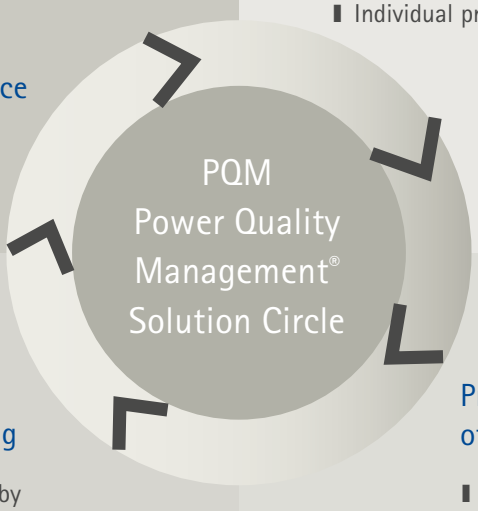
Turnkey projects – from problem detection to commissioning.

Project start
Capture of grid data

- Detailed problem assessment with the customer
- Grid measurements at the connection point

Grid study
Production of design

- Configuration and design according to international standards (EN / IEC / IEEE)
- Individual, technical component specifications
- Individual production specifications



End of project
Demonstration of solution performance

- Detailed conformity measurements on site
- Performance guarantee
- Handover to the customer

Installation and commissioning

- System installation by authorized specialists
- Installation supervision and commisioning by MR engineers

Production of components and systems

- Production of components following MR production specifications at QA-certified production sites
- Highest possible quality standard due to MR process monitoring

Experts on site

We offer our customers comprehensive solution expertise in all areas of industrial and distribution grid applications. Our integral approach to business ensures that optimized low- and medium-voltage solutions are individually developed for customer applications. We call this Power Quality Management® or PQM for short.

We are the competent contact for our customers in all project phases from the start to handover. From the first consultancy session to a successful commissioning and the demonstration of performance, experienced engineers assist our customers on every step of the way. By actively helping to shape all project phases, we use defined feedback loops to influence all active processes. This greatly improves quality and provides significant customer benefits.

We are the competent contact for planners, decision-makers, energy providers, producers, builders and standardization officers.

OUR EXPERTISE ENSURES YOUR BENEFITS.

Individual service and support.

The range of our services:

- Network consulting, including definition of measures to ensure supply quality
- Grid analyses (grid measurements, grid simulations) with state-of-the-art measurement technology and high-performance simulation systems
- Operating and control strategies for distribution and industrial grids

Our project services:

- Monitoring of construction sites and assistance with assembly
- Commissioning
- Conformity measurement

Seminars and committee work:

- Running seminars and advanced training courses for our customers, planners, decision-makers, standardization officers
- Our specialists provide national and international committees with the latest technical input and thereby contribute to publications and standardization work.

As well as from our experts, you benefit from the support of experienced, international sales and project specialists.

FROM THE COMPONENT TO THE SYSTEM.

Reliably functioning systems are always based on the interplay between high-quality components. Our components are used for reactive power compensation in static and dynamic systems.

THYRO C and THYRO A power controllers

Thyristor power controllers are used to dynamically adapt the relevant compensation power in low-voltage systems. Special thyristor switches are available for inductive and capacitive applications.

Power capacitors

Power capacitors provide capacitive reactive power and are therefore a starting point for improving the power factor. Low-voltage capacitors are used in the power range of up to 25 kvar per item. Capacitors for medium voltage are developed and produced individually for the application. The capacitors can either be fitted with internal winding fuses or pressure-operated relays. Medium-voltage capacitors can be used up to 24 kV with limiting performances of max. 900 kVar.

Choke coils

Choke coils are used in low- and medium-voltage applications. Detuning of compenstion systems prevents compensation systems prevents the occurrence of resonance caused by harmonics. In medium voltage systems, a wide range of three phase iron core coils with up to 13,8 kV are used as standard for housing systems and/or internal installation. Single-phase iron-core coils can be used for up to max. 33 kV. Individually produced air-core coils are used for outdoor systems.

Individual and precise optimization of our systems to suit your application.

Reactive power controllers

At the heart of our compensation solutions lie control modules which regulate our passive systems and perform dynamic control of our active components. The devices are used in low- and medium-voltage applications. With these components real-time control is possible as well.

Assemblies

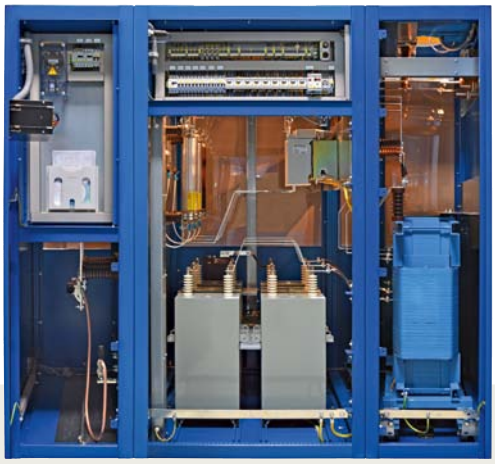
Compensation modules, which parameters can be set individually, are available for low-voltage applications up to 1 kV. Alongside use in MR systems, they can also be found as independent units in existing cabinet systems.

Reactive power control systems

Passive systems are installed under conditions marked by high harmonic loads. Due to their robust characteristics they ensure improved ratios in such environments. Dynamic control systems on the other hand are very well suited to highly volatile loads.

GRIDCON® SYSTEMS – FUTURE-PROOF SOLUTIONS.

Reliability from experience. MR's GRIDCON® series provides future-proof solutions for industrial and distribution grid applications. GRIDCON® systems are based on type-tested system platforms. GRIDCON® systems can be extended at any time thanks to their modular structure and ability to be adapted to any application. Their ease of service and need for virtually no maintenance allows them to be used in industrial and distribution grid applications.



GRIDCON® ACF

The active filters in the GRIDCON® ACF series are tested 4th generation devices. They are characterized by the use of 125 A modules with a maximum operating voltage of 800 V.

The main element in the active filter is a 3-level IGBT circuit with a clear performance advantage for filter frequencies up to the 51st harmonic, higher dielectric strength up to an operating voltage of 800 V and reduced emission of harmonic flows into the grid. The 4 x 125 A modular structure with max. 800 V and loss-optimized design with < 2.5% long-term losses is unique on the market.

GRIDCON® POCO(X)

The modular compensation systems of the GRIDCON® POCO(X) series form the basis for conventional compensation systems of up to 20 kV. Individual step capacities of up to max. 5 Mvar can be integrated in the POCOM / POCOS / POCOL systems in a restricted design.

The POCOS system was particularly developed to meet the requirements of fault arc protection (IAC type testing) and has been successfully tested up to 50 kA /0.5 s.

GRIDCON® Transformer

The voltage regulated distribution transformer, GRIDCON® Transformer, has an integrated tap-changer which ensures stable voltage levels. In terms of its dimensions, it is no different from a regular distribution grid transformer. Its primary technology requires no maintenance over its entire life spanning several decades.

THE BEST REFERENCES FROM AROUND THE WORLD.

Static and dynamic systems from MR are used all round the world. Our systems are used in turnkey projects, for example in the oil & gas, steel, cement, paper, chemicals and automotive industries. Utilities and energy suppliers rely on innovative opportunities provided by the voltage regulation of intelligent substations.

Project-planning of an intelligent substation including feed-in and E-mobility

The importance of substations as decentralized control units in the distribution grid will increase in intelligent future grids. MR developed, designed and started one such station in Oberursel, Germany as a pilot project. The project involved integrating a voltage regulated distribution transformer, a compensation system and battery storage as new components. This allows substations to ensure a high-quality supply of energy from voltage stability to harmonic compensation for its section of the grid.
By integrating generation systems and E-mobility connections directly in the station, brief periods of independent system operation are also possible. As well as providing the components, we were responsible for project planning, development, installation and commissioning of the station.

Reliable medium-voltage filter circuits for oil & gas applications under extreme ambient conditions

The technology of gas liquefaction plants is based on operating powerful converters. Reliable static filter circuits are required to guarantee smooth operation in line with valid electrical standards. Such filter circuits are used under all climatic conditions. Special designs are needed in areas with tropical storms etc.

Maschinenfabrik Reinhausen provides grid studies, electrical and mechanical system designs, and system production, installation and start-up. Typical multi-stage filter circuit systems are installed in 6/11/33 kV systems for up to 25 Mvar.

GRIDCON® systems: Saving energy and compensating for grid faults

GRIDCON® ACF and GRIDCON® SVC systems provide the basis for technical solutions to dynamic control work in low- and medium-voltage systems. For everything from analysis of the job in hand to implementation of a customized solution, GRIDCON® ACF and GRIDCON® SVC systems help to make efficient use of the available resources and to feed in renewable energy with little system perturbation. At the heart of MR's solutions lies dynamic control of reactive power supply according to specific requirements and compliance with voltage features in industrial and distribution grids.

MR's active filter systems of the GRIDCON® ACF series are an efficient and innovative hardware and software platform for reliable and accurate compensation of dynamic disturbances such as variable reactive power demand, dynamic harmonic loading or voltage fluctuations in any distribution networks.

The GRIDCON® ACF series is MR's fourth generation of active filter technology. This new generation, with its 3-level technology for the power-electronic hardware platform and its modular system, is a milestone in active filter system technology.

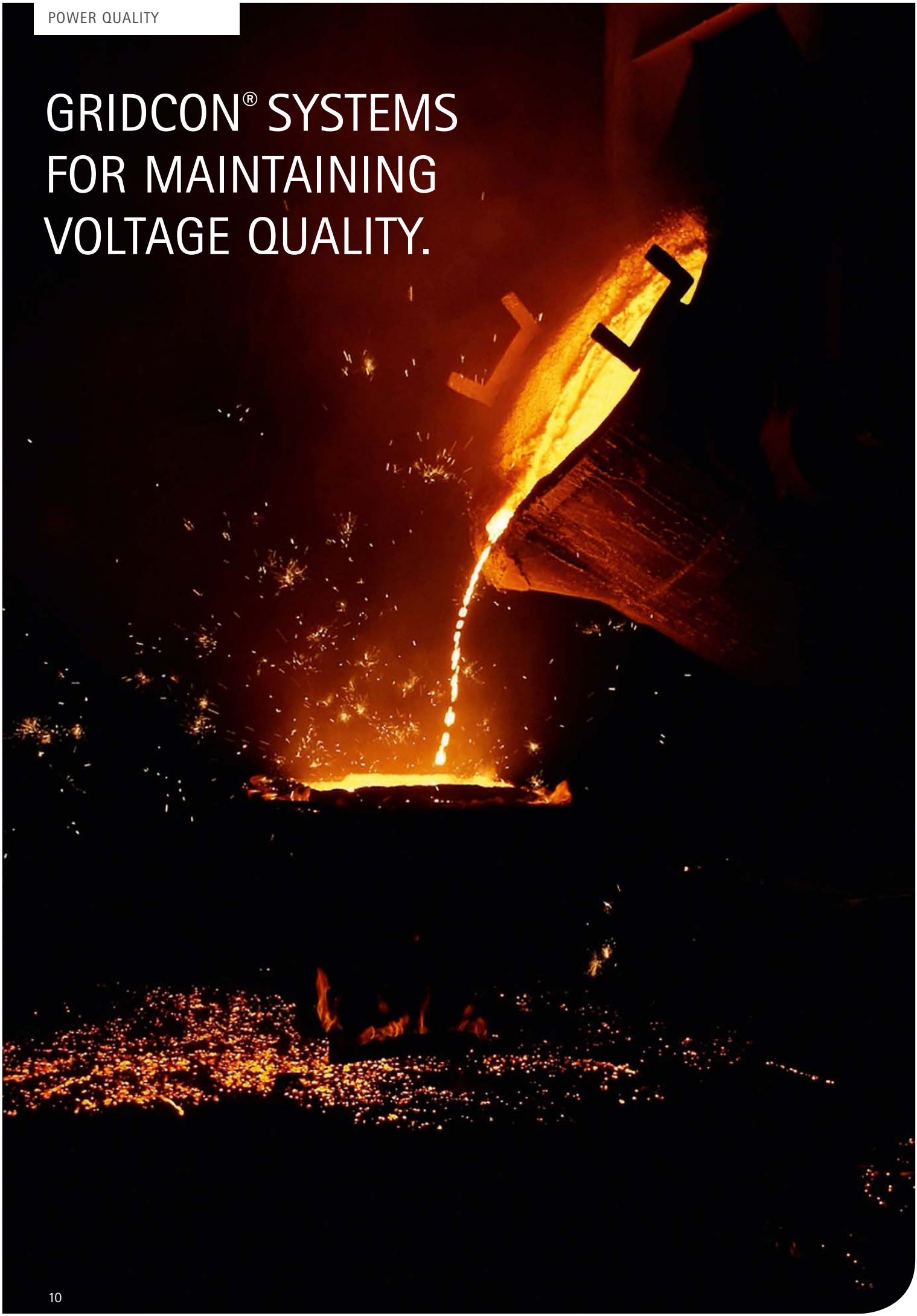
GRIDCON® SVC – Powerful solutions for discerning industrial customers

The modular hardware and software platform of the GRIDCON® SVC control, coupled with high-quality technology for the active part, provides attractive solutions for dynamic compensation systems in a power range of up to 150 Mvar. One example is a complete 20kV-20Mvar system for a steel plant application.

Modularity as a system concept – GRIDCON® ACF. Solutions for low- and medium-voltage applications

Thanks to the modular system concept, GRIDCON® ACF systems can provide solutions for a wide range of applications. Here is an example of an active filter application for a 25 kV railway power supply of 25 kV-2000 var (cap.) / 800 kvar (ind.) to compensate the dynamic reactive power demand and system perturbation caused by drives of various locomotives. The technical solution is based on 690 V power modules which are connected to the 25 kV rail power system using a suitable coupling transformer. Complete 20 kV-20 Mvar system for a steel plant application.

GRIDCON® SYSTEMS FOR MAINTAINING VOLTAGE QUALITY.



MORE POWER, MORE VALUE.

Power Quality Management – more efficiency, more protection from losses in the grid.

Large area of application and high power

- GRIDCON® systems are developed and configured especially for the customer's operating conditions
- GRIDCON® systems are used for static and dynamic compensation, and voltage regulation in low- and medium-voltage grids

Fit for future applications

- GRIDCON® systems are future-proof: Type-tested system platforms with a modular structure ensure scope for expansion
- GRIDCON® systems can be adapted and are therefore prepared for changed grid conditions

Maximum operational reliability

- GRIDCON® systems are developed in line with the "German engineering standard"
- Each system is individually tested before delivery

Low life cycle costs

- A design optimized in dialog with the customer guarantees disturbance-free system operation. Reduced downtimes and loss-optimized systems guarantee low operating costs.

Ease of service and operation

- GRIDCON® systems have a modular structure and require virtually no maintenance
- Our experienced specialist staff is available for commissioning and servicing.

Simple integration

- GRIDCON® systems are factory-tested and supplied ready for connection
- Very easy to integrate in the customer network. Working with the customer, MR assists with the interface engineering needed.

Flexible adaptation

- GRIDCON® systems have a modular structure and freely configurable controls. Adaptation to changed grid conditions and flexible expansion are therefore guaranteed

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THE POWER BEHIND POWER.