

Nidec

Conversion

POWER QUALITY

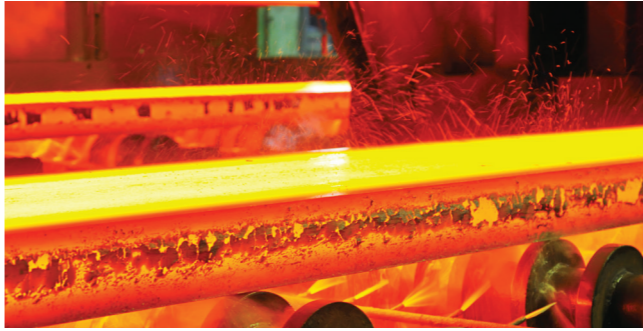


WE DELIVER TURNKEY SOLUTIONS WORLDWIDE

**OVER 9 GVAR POWER INSTALLED
> 75 PROJECTS ACROSS THE GLOBE**

Our expertise spans a wide range of industries including:

- Metals/mining
- Renewable Energy
- Oil & Gas
- Utility/grid
- Transportation



Electric arc furnaces and rolling mills in the steel industry



Transmission and distribution, renewables' integration, smart grid applications in the energy sector



Wrapper, conveyors, crushers in mining industry



Voltage support systems in railway's traction lines



NIDEC CONVERSION IN POWER QUALITY

Nidec is your partner for Power Quality. Whether you are facing Power Quality issues in industrial applications, in renewables or transmission & distribution, our highly qualified engineers will help you from network study to complete design of the system.

Whether Greenfield or Brownfield projects our solution enhance grid stabilization and productivity. We have developed a full range of products including SVC, Statcom and LV Statcom devices.

FULL SOLUTION PROVIDER

- Feasibility studies
- Basic and detail system design
- Modeling, network analysis
- Project management
- Civil work
- Delivery
- Functional performance tests
- Installation, as well as commissioning, on-site testing and maintenance
- Training of personnel

A robust economy requires stable and regular flows of electricity. Grid operators need voltage support for mitigation of voltage dips and sags, particularly on weak or congested grids, to deliver electrical power to consumers reliably and effectively. Industrial companies on the other hand need to be compliant with the Grid Operator's rules to avoid disturbance to the grid. Typical issues of plants on weak and on isolated grids are Power Factor Control, Load Balance, Flicker Mitigation, Harmonic Mitigation. The use of Power Quality systems helps reach stabilized voltage and harmonics mitigation, solving these issues for all stakeholders.



MARKETS & APPLICATIONS

Main Benefits:

INDUSTRY:

- Up to 15% more power transfer capacity
- Up to 20% less line losses
- Higher and steadier grid voltage
- No reactive power fees
- Flicker mitigation: reduction factor up to 5 (mitigation values above 5 can be reached after dedicated analysis)
- Harmonic mitigation on selected harmonic order
- Increasing on production performances: increase in castings up to 4 per day and electrodes consumption reduction

UTILITIES AND GRID:

- Higher and constant power factor: according to Grid operator requirement, up to unity power factor
- Less than 1% of residual current unbalance
- Flicker mitigation: reduction factor up to 5 (mitigation values above 5 can be reached after dedicated analysis)
- Improvement of voltage transient stability
- POD feature
- Voltage support feature

LV STATCOM FOR WIND FARM



PYRÉNÈES ORIENTALES (FRANCE)

The challenge:

To provide voltage support for 100 MW Wind Farm in Pyrénées Orientales (France).

The solution:

In order to help 100 MW wind farm to achieve grid code compliance in term of steady state reactive power supply, voltage control and dynamic grid stability, it was decided to add a Hybrid Compensation System (RPCS): D-Statcom, MSCs (Mechanically Switched Capacitors) and MSRs (Mechanically Switched Reactors).

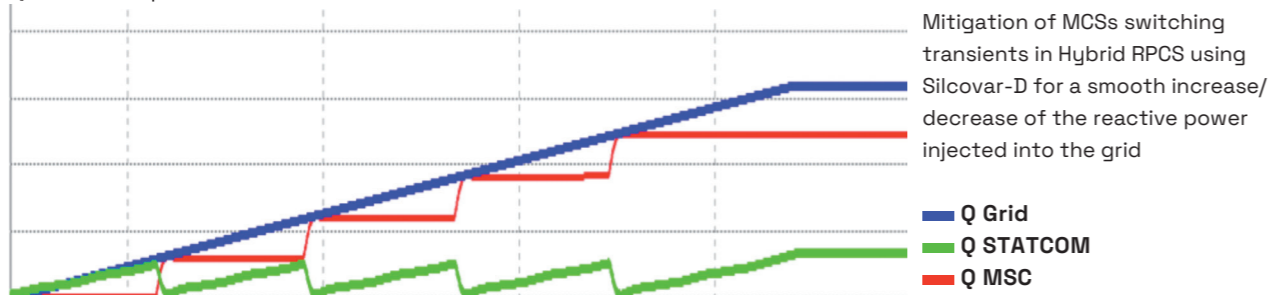
The main advantages delivered from Nidec's solution:

- Increase of dynamic grid stability: reactive power support always available, even with Wind Farm out of service
- 70% less power losses compared to Wind Farm with full reactive capability thanks to Hybrid RPCS
- Reactive power steady state error lower than 0.5%
- Fast response time: step response from $-Q$ to $+Q$ in less than 4 ms
- Low equipment cost: cost effective solution thanks to Hybrid RPCS

Scope of supply:

RPCS, able to operate in the reactive power range $[-26; +32]$ MVar at 33kV, with dynamic control of 3 MSCs and 2 MSRs.

Q - Reactive power



TAILOR MADE SOLUTIONS

We study your challenges to meet your specific needs

Nidec offers significant experience in engineered-to-order solutions. Whether you are looking at installing new equipment or revamping existing facilities, our highly qualified team of engineers have the expertise in power solution design to deliver the best tailored solutions to solve your technical and economic problems due to poor Power Quality.

Nidec is recognized for its depth of experience and know-how in the design phase of power quality solutions. Our team carefully study the phenomena and carry out the required analysis and calculations to enhance system's stability and performance.

Our design expertise covers the optimal sizing and selection of technology (SVC, CSRT, MV Statcom and LV Statcom), the design and implementation of the digital control system as well as the design and implementation of the main components.

FROM NETWORK STUDY TO COMPLETE DESIGN OF THE SYSTEM

Collecting data from customers

- Single line diagrams and information about network, plant and industrial process
- Characteristics of installed devices
- Technical requirements
- Grid Codes and/or other rules to be compliant with

Analysis and common calculations

- Use of state of the art tools for:
 - Electromagnetic transients' simulation
 - Harmonics' analysis
 - Grid fault analysis.

Design of Reactive Power Compensation system

- Sizing calculations
- Definition of all RPCS components:
 - Power Electronic converters
 - Protection devices
 - Metering instruments
 - Transformers
 - Auxiliary systems.

Detailed Engineering Design

- RPCS single line diagram
- Schematics
- 3d drawings
- Layout drawings
- Planning of manufacturing
- Testing
- Delivery and commissioning.

Support to the customer

- Nidec experience and tools for:
 - Interface to Civil Works
 - Structures' design
 - Earthing grid
 - MV/HV components
- Assembly supervision
- 24/7 service support

PRODUCTS YOU CAN RELY ON



Silcovar D

Technical Data Summary:

- Suitable for demanding applications
- Reactive Power rating: From ± 0.5 MVAR to ± 10 MVAR and up to $[0; 20]$ MVAR
- Max rated voltage: any Medium Voltage level with standard transformer
- Rated frequency: 50/60Hz
- Cabinet and container solutions
- Cooling: forced ventilation/Water
- Modular and flexible solution: scalable to different power and voltage levels
- Suitable for redundant operation

Common Applications:

- Steel, Mining, Oil&Gas
- Renewables
- Utilities
- Traction

Key features:

- Very low total harmonic distortion
- Fast and stable response time of current control
- Fast active and reactive load current extraction
- Fast power factor correction
- Fast compensation of negative sequence of load current
- Mitigation of switching transient of capacitor filter
- Active damping and mitigation of grid voltage oscillation
- Voltage support and mitigation of voltage dips

Silcovar H

Technical Data Summary:

- Suitable for demanding applications
- Reactive Power rating: From $\pm 2,6$ MVAR to ± 300 MVAR. Greater Power than 300 MVAR can be reached with customized solutions, please contact Nidec
- Maximum rated voltage 40 kV. Greater voltage ratings than 40 kV can be reached with customized solutions, please contact Nidec
- Rated frequency: 50/60Hz
- Container, Cabinet and Building solutions
- Cooling: Air forced or Water
- Modular and flexible solution: scalable to different power and voltage levels
- Suitable for redundant operation

Common applications:

- Heavy industries such as Melt Shop with Electrical Arc Furnace
- Renewables
- Utilities
- Traction

Key features:

- Flicker mitigation and Selective Harmonic mitigation
- POD function
- Very low total harmonic distortion
- Fast and stable response time of current control
- Fast active and reactive load current extraction
- Fast power factor correction
- Fast compensation of negative sequence of load current
- Mitigation of switching transient of capacitor filter
- Active damping and mitigation of grid voltage oscillation
- Voltage support and mitigation of voltage dips

SILCOVAR H IS A MEDIUM VOLTAGE STATCOM THAT CAN IMPLEMENT THE FUNCTION OF "GRID FORMING + ENERGY STORAGE" IN DELTA CONNECTION CONFIGURATION

Silcovar C

Technical Data Summary:

- Well-proven technology
- Reactive Power rating: up to 330 MVAR. Greater power ratings than 330 MVAR can be reached with customized solutions, please contact Nidec
- Maximum rated voltage 35 kV. Greater voltage ratings than 35kV can be reached with customized solutions, please contact Nidec
- Cooling: Water
- Rated frequency: 50/60Hz
- Electrically and Light Triggered Thyristors (BCT, PCT, LTT)

Common applications:

- Electric arc furnaces and rolling mills
- Transmission lines

Key features:

- Flicker mitigation
- Low total harmonic distortion
- Fast active and reactive load current extraction
- Power factor correction
- Compensation of negative sequence of load current
- Voltage support

Silcovar T

Technical Data Summary:

- Outdoor panel solution:IP 54
- Reactive Power rating: up to 5,4 MVAR (greater value can be offered after dedicated analysis)
- Cooling: Air Forced
- Rated frequency: 50/60Hz
- IGBT Technology

Common applications:

- Renewable
- Transmission and distribution
- Rolling mills,steel,Mining,Oil&Gas, etc..
- Utilities

Key features:

- N-1 Power redundancy
- Modular power design
- Pollution degree 3
- Power factor correction
- Voltage support

SPECIAL SIZES AND GREATER POWER RATING CAN BE PROVIDED UPON REQUEST



Personalized assistance
Long term maintenance
agreement global
support

Nidec Conversion

Nidec Conversion is the business platform of Nidec Group.

Nidec is a global manufacturer of electric motors and drives, founded in 1973.

In 2012 Nidec acquired Ansaldo Sistemi Industriali Spa establishing Nidec ASI. Later that year they also acquired Avtron Industrial Automation in North America. Nidec ASI is specialized in providing innovative power control and system solutions for hundreds of customers worldwide while Avtron built its reputation in reliable drive systems and encoders.

In 2016 Nidec ASI assumed responsibility for Nidec Conversion, confirming its commitment and innovation in Industrial Power and Automation. Now as the global industrial platform leader, the company is helping to shape the future of the industrial sector.

Our solutions are used in a wide range of commercial and industrial applications, including Power Quality.

Customer Proximity remains one of our strongest commitments.

Our capabilities extend to personalized assistance to meet customer's need. Our staff of highly qualified supervisors, as well as our Service Engineering team, are available to oversee complex interventions should the need arise.

Nidec guarantees original manufacturers' spare parts for the life of your equipment and offers a wide range of personalized contracts for preventive and predictive maintenance which are tailored around your needs and production schedule.

Nidec has over 180 subsidiaries and affiliates across the globe, providing manufacturing, sales and service support to Nidec's extensive customer base.



