Reactive power compensation solutions

Enhancing power quality
POWER ECONOMY is one of the market leaders in the Middle-East region for more than a decade in design, engineering, manufacture and supply of a wide range of low, medium and high voltage products & solutions that enhance the quality & reliability of power from LV to EHV systems.

Our Reactive Power Compensation, Distribution, Control & Protection, Automation and Metering solutions are developed through constant research and market innovation and cater to the needs of power transmission and distribution networks in Middle-East and Africa.

We offer solutions for both conventional & smart power networks in the domestic and international T&D business.

At Power Economy, we strongly believe that our success and growth are direct derivatives of ‘Customer Satisfaction’ achieved through quality products delivered within time and cost frame.

Our solutions, developed through constant innovation and research, benefit the customers by cutting down costs, improving efficiency and help them to achieve almost nil downtime.

We always ensure our innovation leads to environmental preservation through our energy-efficient products along with long term corporate responsibility efforts.

Power Economy assures quality of all its products and services. Business process of Power Economy is certified for ISO: 9001-2008 by TUV NORD.

Who we are?

Products & solutions

Our motto is ‘Customised solutions through Engineering excellence’.

Our products and solutions are designed and manufactured by a team of highly experienced technocrats and developed with components sourced mainly from manufacturers in Europe, Japan and US & also reputed firms from rest of the world. This ensures not just quality and reliable power distribution but sets the benchmark for overall power quality in any region we work with.

- Reactive power compensation
- MV power distribution
- LV power distribution
- Control & protection
- Substation automation
- Advanced metering
- Site support
- Training facility

Manufacturing facility

- 16000 sq.m. State-of-the-art manufacturing facility in the industrial city of Abu Dhabi, UAE
- ERP system for work flow control and project management

People

- Core design team with more than 350 man-years of experience in power sector across all the 3 continents - Asia, Europe and North America.
- 150+ qualified workforce with more than 75 engineers.

Design

- PSCAD & ETAP for switching and harmonic study
- ELEC DES & AUTOCAD for Drawings & BOM preparation
- Maxwell 2D for magnetic field plots
Reactive power compensation solutions

- Solution for primary and secondary distribution systems of 3.6kV to 36kV voltage level
- Indoor or outdoor type installations with metal enclosed and open rack designs
- Current inrush limiting and detuned type designs with air or iron core reactors
- Fixed or switched type of designs with automatic control
- Low capacity Air core shunt reactors
- Type tested solutions as per IEC60871, IEC62271-200 and IEC60076-6
- Customised solutions engineered as per specific needs

Features

- Outdoor or Indoor type enclosures with steel base frame
- Outer skeleton of welded angle frame
- Cladding by 2/3mm sheet steel doors and covers painted with epoxy or polyester powder paint
- Gaskets used for providing required IP rating in outdoor type designs
- Canopy provided by additional steel sheets on top providing natural air column for heat protection
- All cable termination on bottom with aluminium gland plates
- Open rack and pole mounted solutions with high creepage distances
- Internally or externally fused capacitor units
- Type tested switching devices validated for back to back switching capability
- Naturally cooled enclosures with high IP ratings
- Electrical & mechanical interlocks for safe operation
- Option of stages to be segregated with through type bushings
- Option of outdoor type detuning reactors to be installed in separate FRP enclosure
- Indoor control and Protection panel engineered for specific protection and control needs

Solutions

- Outdoor metal enclosed capacitor banks with air core series reactors
- Indoor metal enclosed capacitor banks with iron core series reactors
- Control and protection panels for capacitor banks
- Outdoor and Indoor capacitor banks of open execution type
- Outdoor capacitor banks for rural electricity distribution
- Air core reactors
- Iron core reactors
- Indoor metal enclosed automatic LV capacitor bank

Technical particulars

<table>
<thead>
<tr>
<th>Parameter</th>
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</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>3.6kV to 36kV</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>50Hz/60Hz</td>
</tr>
<tr>
<td>Rated peak withstand current</td>
<td>up to 80kA peak</td>
</tr>
<tr>
<td>Rated short time withstand current</td>
<td>up to 31.5kA/3sec</td>
</tr>
<tr>
<td>Power frequency withstand voltage</td>
<td>up to 70kV (60sec)</td>
</tr>
<tr>
<td>Lightning impulse withstand voltage</td>
<td>up to 170kV peak</td>
</tr>
<tr>
<td>Degree of protection for enclosure</td>
<td>up to IP55</td>
</tr>
<tr>
<td>Maximum design ambient temperature</td>
<td>up to 55°C</td>
</tr>
</tbody>
</table>
Type testing

The capacitor bank solutions are type tested, as relevant for following tests as per IEC60871 and IEC62271-200. Our Rectors are type tested as per IEC60076-6.

- Short time withstand current test on main circuit
- Short time withstand current on earth circuit
- Impulse voltage withstand test
- Power frequency voltage withstand test
- Temperature rise test
- Ingress protection test
Impulse voltage withstand testing

Verification of basic insulation levels for lightning impulse voltage withstand can be verified at in-house impulse test laboratory of Power Economy. The test setup can test till 800kV, 60kJ of lightning impulse. Capacitor banks are tested as type test on busbars for impulse voltage withstand. All reactors are tested as routine test for withstand of lightning impulse for the required BIL.
Outdoor type enclosures supplied by Power Economy are verified for stringent ingress protection requirements of IP54 and IP55. Type test is conducted on metal enclosures for validation of required IP rating. The in-house ingress protection test lab is equipped to test up to digit 6 for dust and up to digit 5 for water protection.
Temperature rise testing

Capacitor bank solutions can be type tested for temperature rise test. The test setup can inject till 5000A of busbar currents. Temperature from thermocouples are recorded using automatic temperature data logger.
Power Economy has built ultra modern training centre along with functional display centre to provide hands on training to its client. The main training room suitable for 30 trainees is installed with modern audio visual system for providing class room trainings.

The training centre is also attached with a functional display centre with products connected to simulated supplies. The training centre is equipped to provide complete multi-dimensional trainings to client on subjects of application, operation, control, protection and maintenance of various Power Economy products.
Outdoor metal enclosed capacitor banks with air core series reactors

General specification

These designs are intended for outdoor installation of capacitor bank solutions and are well suitable for multistage configuration. Due to the advantage of natural cooling these can be installed outside the substation building saving considerable cost. The factory assembled capacitor banks in metal enclosures of high ingress protection results in less installation cost and maintenance.

The outdoor metal enclosed capacitor banks are equipped with air core series reactors which can be of detuning or inrush current limiting type. Detuning reactors are installed outside the metal enclosures and can be provided with non-metallic housing for wild life protection and aesthetic.

Control, alarm and protection functions are provided by well engineered indoor panel of floor standing or wall mounted type.
Outdoor metal enclosed capacitor banks with air core series reactors

As installed

Outdoor metal enclosed capacitor banks can be installed in various conditions depending on layout and location of substation. Below are some of the typical installation cases:

- On ground with chain fence for operational safety
- On roof top for space saving in compact substations
- With reactors in FRP enclosures generally preferred in residential areas for aesthetic

Outdoor metal enclosed 12kV, 6MVAr @ 11kV, Multi stage switched, capacitor banks with air core series reactors at 33kV/11kV substation.
Indoor metal enclosed capacitor banks with iron core series reactors

General specification

These designs are intended for indoor installation of capacitor bank solutions and are well suitable for multistage configuration. Being in indoor environment forced cooling is required which is mostly provided by building air conditioning. The iron core reactors can be installed inside or outside the capacitor bank enclosure. The factory assembled capacitor banks in metal enclosures results in less installation cost and maintenance.

The indoor metal enclosed capacitor banks are equipped with iron core series reactors for detuning requirements. In case of inrush current limiting requirements reactors are of air core design.

Control, alarm and protection functions are provided by well engineered indoor panel of floor standing or wall mounted type which is installed in separate location for operational safety.

General specification
Indoor metal enclosed capacitor banks with iron core series reactors

As installed

Indoor metal enclosed capacitor banks can be installed in various conditions depending on layout and location of substation. Below are some of the typical installation cases:

- In separate room for operational safety. In this case control and protection panel is installed outside the room
- In bays with chain fence separating the capacitor banks.
All Power Economy capacitor banks of metal enclosed designs are supplied with specifically engineered control and protection panel with dedicated automatic power factor or voltage controller. Sophisticated control, alarm and protection schemes can be provided to meet requirements of client specifications. Control and protection panels can be of floor or wall mounted type.

Multistage capacitor banks are protected by dedicated and exclusively designed protection relay which takes care of harmonic currents flowing into capacitors using true rms based over-current protections and neutral unbalance protection with natural unbalance compensation. Control and protections panels can also be installed with communication equipment based on substation requirements.
Outdoor and Indoor capacitor banks of open execution type

General specification

These designs are intended for both outdoor and indoor installation with switching by substation switchgears. Capacitor banks are made of series and parallel connected capacitor units on insulated/floating frames. The single phase capacitor bank and reactor can either be installed as vertical stack or in side by side arrangement.

Open execution type capacitor banks are well suitable for bulk compensation at higher voltage levels including EHV system and can be designed to suit client specifications. These can be of inrush current limiting or detuned design. Multistage concept in open execution is also possible with dedicated switching module of outdoor installation type.

Control, alarm and protection functions are provided by well engineered indoor panel of floor standing or wall mounted type which is installed in separate location for operational safety.
Outdoor and Indoor capacitor banks of open execution type

As installed
Open execution capacitor banks can be installed in various conditions depending on layout and location of substation. Below are some of the typical installation cases:

- In separate room for operational safety. In this case control and protection panel is installed outside the room.
- In bays with chain fence separating the capacitor banks.
- As individual installation with chain fence for operational safety.
Outdoor capacitor banks for rural electricity distribution

General specification

These designs are outdoor installation and are well suitable for small to medium capacity reactive power compensation for rural distribution lines. These simpler and cost effective designs can be of either pole mounted or pad mounted type.

The pole mounted solutions are factory assembled and can be installed on single or H pole of wood, concrete or steel material and are associated with drop-out fuses and automatic power factor controller.

Pad mounted capacitor banks can also be of medium capacity and are factory assembled. Being on ground they are easy to access for installation, operation and maintenance purpose. Also for higher ratings they can be provided with dedicated over-current and neutral unbalance protections along with remote communication equipment.
Air core reactors

Air core reactors are suitable for indoor/outdoor installation. Reactor coils are braced between top and bottom aluminium spiders. These reactors are mounted on porcelain post insulators. These are single phase units, which can arranged in stacked or trefoil layout to make 3-phase reactors.

Inrush current limiting type reactors are also air core type with installation on epoxy resin cast/Porcelain insulators and are suitable for indoor/outdoor installation.

Applications of air core reactors

- Detuning reactors
- Neutral grounding reactors
- Inrush current limiting reactors
- Low capacity shunt reactors

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<td>Rated frequency</td>
<td>50Hz/60Hz</td>
</tr>
<tr>
<td>Power frequency withstand voltage</td>
<td>20kVrms up to 95kVrms</td>
</tr>
<tr>
<td>Lightning Impulse withstand voltage</td>
<td>60kV peak to 250kV peak</td>
</tr>
<tr>
<td>Design ambient temperature</td>
<td>35°C to 55°C</td>
</tr>
<tr>
<td>Conductor</td>
<td>Copper/Aluminium</td>
</tr>
<tr>
<td>Insulation</td>
<td>Polyester/Fibre Glass</td>
</tr>
<tr>
<td>Encapsulation</td>
<td>Epoxy resin/Polyurethane</td>
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</tbody>
</table>
Iron core reactors

Iron core reactors can be installed on floor or inside the enclosure of capacitor bank. High grade magnetic material laminates are used to prepare core material, which is then assembled in 3-phase magnetic circuit. Prewound single phase poles are then installed to make 3-phase reactors. Polyester film coated copper/Aluminium conductors are used to prepare winding. After coil testing, these are finished with varnish and painted before final tests.

All reactor designs are verified by type testing impulse voltage withstand and temperature rise. All manufactured reactors are subject to routine tests as required by applicable IEC standards.

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<tbody>
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<td>3.6kV to 12kV</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>50Hz/60Hz</td>
</tr>
<tr>
<td>Power frequency withstand voltage</td>
<td>20kVrms upto 38kVrms</td>
</tr>
<tr>
<td>Lightning Impulse withstand voltage</td>
<td>60kV peak to 95kV peak</td>
</tr>
<tr>
<td>Design ambient temperature</td>
<td>35°C to 40°C</td>
</tr>
<tr>
<td>Conductor</td>
<td>Copper</td>
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<tr>
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Indoor metal enclosed automatic LV capacitor bank

These designs are of indoor installation and are well suitable for small to medium capacity reactive power compensation for low voltage distribution substations. Steady state reactive power compensation solutions are provided with contactor for stage switching and also MCCB is used for short circuit and over-current protection. Thyristor switching is used for dynamic reactive power compensation type capacitor banks.

Both the above designs can be of multiple stages with detuning series reactors of iron core design. Incoming to the capacitor bank can be either cable or busduct. MCCB and Isolator are provided on incoming supply for protection and isolation purpose.

Low voltage contactor switched 500kVar, 6 stage capacitor bank with iron core detuning reactors

Low voltage thyristor switched 1500kVar, 14 stage capacitor bank with iron core detuning reactors
Site Support

Power Economy offers a broad range of field support services. As a customer you may have diverse needs on site service, based on the type and size of your electrical installation. These are well addressed by Power Economy’s SITE SUPPORT team.

We have a team of committed and competent engineers who can offer quality service and value through proper analysis and requirement within your framework.

The host of services offered are well tailored to customer needs and their equipment lifecycle phase.

› 24/7 Support
› Corrective & Preventive Maintenance outsourcing
› Site Appraisal
› Spares Management
› Training
› Telephonic Support
› Site inspections
› Power quality and verification services with harmonic analysis and recommendation for improvement
› Upgradation, revamping, retrofitting and modification of the existing system.
› Extensions and adaptations to the existing system
› Replacements
› Service Agreements to ensure uninterrupted operations
› Trainings programs customized to your needs
› Reduce operation costs by outsourcing corrective and preventive maintenance to us
› System improvement and equipment performance study
› Extension, Upgrades and Retrofits
› Site installation and Testing & Commissioning
› Emergency on-site repairs
Outdoor metal enclosed, 6MVar @ 11kV detuned capacitor bank for ADPC, UAE

Indoor metal enclosed, 1500kVAR, Thyristor switched, LV detuned capacitor bank for Sohar Steel, Oman

Outdoor metal enclosed, 5MVar @ 11kV detuned capacitor bank for MZEC, Oman

Outdoor metal enclosed, 20MVar @ 33kV detuned capacitor bank for OETC, Oman

Outdoor 38kV air core detuning reactors for SEWA, UAE

Pole mounted, 800kVAR @ 11kV capacitor bank for AADC, UAE
Outdoor metal enclosed, 6MVAr @ 11kV detuned capacitor bank for ADWEA, UAE

Open execution, 7MVAr @ 13.8kV detuned capacitor bank for SEC, KSA

Outdoor metal enclosed, 8MVAr @ 11kV detuned capacitor bank for ADWEA, UAE

Outdoor metal enclosed, 12MVAr @ 11kV detuned capacitor bank for ADWEA, UAE
### Customers

#### Utilities
- Abu Dhabi Water & Electricity Authority (ADWEA), UAE
- Abu Dhabi Distribution Co (ADDC), UAE
- Al Ain Distribution Co (AADC), UAE
- Abu Dhabi Transmission & Despatch Company (TRANSCO), UAE
- Muscat Electricity and Distribution Co (MEDICO), Oman
- Mazoon Electricity and Distribution Co., Oman
- Oman Electricity Transmission Company, (OETC), Oman
- Saudi Electrical Co., K.S.A.
- National Electricity Corporation, Sudan
- Abu Dhabi Ports (ADPC), UAE
- Emirates Nuclear Energy Corporation (ENEC), UAE

#### Oil & Gas
- Abu Dhabi Company for Onshore Oil Operation (ADCO), Abu Dhabi
- GASCO, Abu Dhabi
- NPCC, Abu Dhabi
- Occidental Petroleum Corporation
- Egyptian Petrochemicals Co., Egypt
- Formosa Petrochemicals Corporation, Taiwan
- Mazoon Electricity and Distribution Co., Oman
- Petroleum Development, Oman
- Oman Oil refineries & Petroleum Industries (ORPIC), Oman
- Borouge, Abu Dhabi
- Kuwait Oil Company, Kuwait

#### Contractors
- Larsen & Toubro (L&T)
- ETA GROUP
- Bahwan Engineering Group
- Galfar Engineering & Contracting SADG
- Ghantoot Group
- Ajaber Group
- National Contracting Company (NCC)
- Siemens
- ABB
- Alstom
- Hyundai
- Inabensa

#### Industries
- Petrochemical units
- Cement production units
- Aluminium production units
- Sugar manufacturers
- Steel melt shops & rolling mills
- District Cooling
- Water pumping stations

#### Commercial
- Hotel complexes
- Office complexes
- Residential complexes
- Shopping malls