

From sun to socket

Global product offering

ABB provides the most comprehensive portfolio of products, systems and solutions along the solar value chain that enable the generation, transmission and distribution of solar power for both on-grid and off-grid applications.

TURNKEY STATIONS

ABB turnkey solutions capitalize on ABB's long expertise in the development and manufacturing of secondary substations and medium-voltage (MV) components.

Product / Offering	Benefits and features	Suggested applications
PVS800-IS inverter station	ABB solutions include complete plug-and-play housings with inverters and MV components, inverter stations for indoor inverters as well as separate MV stations to supplement the outdoor inverters and inverter stations. Turnkey stations are available in power ratings up to 4.6 MVA.	ABB turnkey stations provide customers with pre-engineered, quickly deployable and reliable plug-and-play solutions for utility-scale PV plants.
PVS800/PVS980-MWS megawatt station		
PVS800/PVS980-MVP medium voltage pad mounted solution		
TRIO-50/PVS800/PVS980-MVS medium voltage station		



CENTRAL INVERTERS



ABB central inverters offer high efficiency, reliability and easy-to-maintain industrial design in a compact package. The inverters are supported by ABB's worldwide service and local support, to offer customers a long-term, bankable solution for years to come.

Product / Offering	Benefits and features	Suggested applications
PVS980 central inverter PVS800 central inverter	The high total efficiency, long lifetime and compact, reliable and easy to maintain product design of the inverters provide customers with low level cost of energy (LCOE), helping to maximise the return on investment. Central inverters are available with power ratings up to 2300 kVA. The range of central inverters covers both indoor and outdoor inverters and maximum DC voltages of 1500 V and 1000 V	ABB central inverters are aimed at system integrators and end users who require high performance solar inverters for large photovoltaic (PV) power plants.





STRING INVERTERS

ABB offers one of the broadest portfolios of string inverters currently on the market, including a powerful line of single- and three-phase string inverters for photovoltaic (PV) systems installed in residential and commercial buildings. These products provide small- to medium-sized PV installations with high performance, robust enclosures, ease of installation, and a quick return on investment. ABB's string inverters range from 2 to 60 kW.

Product / Offering	Benefits and features	Suggested applications
Inverters for residential-scale applications: PVI 3.0/4.2 kW PVI 5000/6000 kW UNO-1.2/5.0 kW TRIO-5.8/8.5 kW 	Compact and efficient design, easy to install, expandable monitoring functions, wide input range, high efficiency, high speed and precise MPPT algorithm for real time power tracking and improved energy harvesting	PV residential-scale single and three-phase applications. Residential energy storage solutions.
Inverters for commercial-scale applications PVI-10/12.5 TRIO-20/27.6 TRIO-50/60 TRIO-TM-50/60 	High performance, robust enclosures, easy installation, innovative features to lower the system's Levelized cost of energy and improve Return on investment on commercial solar installations, wall-mountable, horizontal as option for 50/60 kW models.	Decentralized photovoltaic systems for both commercial and utility applications, configuration for rooftop and ground-mounted installations.

MEDIUM VOLTAGE

ABB's range of medium-voltage products for solar applications includes a complete range of switchgear solutions, energy storage modules, compact secondary substations, outdoor apparatus and components, and indoor air-insulated load break switches.

Product / Offering	Benefits and features	Suggested applications
MODULAR SUBSTATIONS		
eHouses 	Metal enclosed buildings provide greater safety, and easier installation, maintenance, engineering and on site testing, all contributing to cost reductions.	eHouses are factory tested, quickly deployable solutions for the connection of utility-scale solar plants to the grid. This solution protects the equipment and the operator against harsh environmental conditions and is restricting access for non authorized personnel without additional fencing.
Skid-mounted substations 	A prefabricated and economic option with easy access to equipment, which normally includes a medium-voltage section, transformer and low-voltage equipment. The skid-mounted substation enables a huge reduction in installation time, including onsite wiring and testing activities.	Skid-mounted substations are a cost-efficient solution for the connection of utility-scale solar plants to the grid. This solution is pre-tested at the factory which is limiting site works to a minimum level.

MEDIUM VOLTAGE

Product / Offering

Benefits and features

Suggested applications

Compact Secondary Substation



Compact Secondary Substations (CSS) are prefabricated and include low voltage switchboard, transformer and medium voltage switchgear. They are internally arc tested for higher safety according to IEC 62271-202, the dedicated Standard. CSS are available with different enclosure materials, including steel, concrete and glass fiber reinforced polyester (GRP). That's why they are suitable for harsh and demanding environmental conditions.

CSS are used to step-up the voltage level after the inverter inside the Power Collection Network of a solar plant. They are internal arc tested to grant the highest safety levels and are highly recommended when installed in public access areas.

Secondary Skid Unit



The Secondary Skid Unit (SSU) is a skid-mounted, compact solution. Pre-assembled and factory-tested, it ensures minimized site works, reducing time and risk. A popular option is to cover the transformer with steel mesh for efficient cooling and increased safety (SSU-P).

Secondary Skid Units are the most economical way to collect and transform AC low-voltage to medium-voltage inside the Power Collection network of a solar installation.

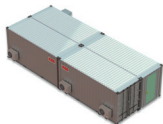
Secondary Enclosed Unit



Secondary Enclosed Units (SEU) provide fully assembled solutions, including a transformer as well as low and medium voltage equipment, to decrease site works and site assembly time.

Secondary Enclosed Units are used for the collection and transformation of AC low-voltage to medium-voltage inside the Power Collection network of a solar installation. The SEU is a cost-efficient solution to protect the equipment against harsh environmental conditions.

EcoFlex eHouse



The EcoFlex eHouse portfolio covers a wide range of designs applicable to various industry segments. Its robust design and construction makes the EcoFlex eHouse easy to transport and install, and ideal for renewable wind and solar applications. Typical configurations consist of medium voltage (MV) switchgear, transformers and low voltage circuit breakers.

EcoFlex eHouses are a versatile solution used in the Power Collection network of solar installations. The modularity of its design enables an optimal solution for any specific site requirements.





Product packaging



Product packaging is the coordinated delivery of a multiple-element product package, including basic interface engineering between products, under a single commercial agreement. It offers risk mitigation, reduced client resources, and simplified project management and commercial agreement.

All products for Solar installations can be bundled to product packages and delivered with reduced client resources with simplified project management and under one commercial agreement.

MEDIUM VOLTAGE

Product / Offering	Benefits and features	Suggested applications
MEDIUM-VOLTAGE PRIMARY DISTRIBUTION		
<p>Gas-insulated switchgear ZX product family</p> 	<p>ZX product family of Gas-Insulated Switchgear (GIS) offers the highest level of protection for medium-voltage distribution switchboards. ZX2 primary distribution switchgear is available in ratings up to 42kV, 40kA and is especially suited for demanding applications in single and double busbar configurations in electric power distribution networks. Also available as a climate-friendly alternative with AirPlus version, it offers the same footprint, safety and reliability but a Global Warming Potential (GWP) lower than 1.</p>	<p>The ZX product family is used inside Grid Connection substations of utility-scale solar plants. The GIS design combines maximal safety for operators with very low maintenance requirements and is ideal for installation in remote locations, under harsh environmental conditions or when the available space is limited.</p>
<p>Air-insulated switchgear UniGear product family</p> 	<p>The UniGear family of IEC switchgear and motor control centers for primary distribution offers a unique opportunity by freely combining different types of panels (UniGear ZS1, UniGear 550, UniGear 500R and UniGear MCC) in the same switchgear, giving the highest flexibility while optimizing footprint. The UniGear product family is available in ratings up to 40.5kV, 50kA. ZS8.4 completes the IEC air-insulated portfolio for less demanding primary switchgear applications.</p>	<p>The UniGear family offers a unique range of primary switchgears to be used inside Grid Connection substations of utility-scale solar plants. The range ensures the chance to meet any local market requirement and customer need.</p>
<p>Air-insulated primary switchgear UniGear Digital</p> 	<p>UniGear Digital is an innovative solution based on air-insulated medium voltage switchgear from the UniGear product family. It makes full use of ABB's Relion® protection and control relays, IEC 61850 communication protocol and advanced sensor technology. This innovative switchgear solution meets also the requirements of the future, with unprecedented flexibility, increased process efficiency, lower operation cost and shorter delivery time. At the same time it offers increased reliability and safety.</p>	<p>Used in the Grid Connection substation of utility-scale solar plants, UniGear Digital range offers various advantages in planning, installation and operation of the solar farm.</p>
<p>VD4 (ADVAC) medium-voltage circuit breakers</p> 	<p>Maximize your productivity with reduced downtimes through product family of VD4 circuit breakers for primary and secondary protection, with a global installed base of over 1.5 million units and 3 times higher performance than the market standard. Optimize your investment with the most compact medium-voltage circuit breaker technology available. Protect your assets with an optimum interface, utilizing the market's widest portfolio of circuit breakers, covering global standards and ratings fitting your specific needs. Up to 46 kV, up to 4000 A, up to 63 kA * ADVAC as ANSI/IEEE specific productline for primary distribution available</p>	<p>VD4 circuit breakers are aimed at operators and manufactures of primary switchgear for the application inside the Power Collection Grids and the Grid Connection substations of utility-scale solar plants.</p>

MEDIUM VOLTAGE

Product / Offering

Benefits and features

Suggested applications

Outdoor circuit breakers



R-MAG® outdoor circuit breaker incorporates a state of the art magnetic actuator mechanism and ABB maintenance-free vacuum interrupters. The use of R-MAG® breaker ensures the reduction of costly maintenance intervals thanks to its increased reliability and provides additional safety to customers and field engineers. This field-proven design is available with different ratings and versions up to 15-38kV, 200kV BIL and 40kA.

R-MAG outdoor circuit breakers are used in outdoor switchyards of the Grid Connection substation of solar installations.

MEDIUM-VOLTAGE SECONDARY DISTRIBUTION

Gas-insulated secondary switchgear



SafeRing/Safeplus is an SF6 insulated ring main unit/compact switchgear platform for the secondary distribution network up to 40,5kV. SafeRing/SafePlus provides a complete, flexible and compact switchgear solution. It is a completely sealed system with a stainless steel tank containing all live parts and switching functions. This ensures a high level of reliability as well as personnel safety and a virtually maintenance-free system.

The compact design and very low maintenance requirements of SafeRing/SafePlus ring main units designate this product for the usage inside the Power Collection network of solar installations e.g. inside ABB inverter turnkey solutions. For smaller utility-scale solar plants they are also a solution inside the Grid Connection substation.

Air-insulated secondary switchgear



The UniSec metal-enclosed air-insulated switchgear is based on a highly flexible, modular concept with fewer parts and standardized solutions that can be readily configured to meet the specific needs of each application. This approach reduces training and maintenance requirements, ensures fast installation and facilitates future expansion to meet changing needs. UniSec offers the highest level of safety with different solutions in terms of Internal Arc classification and Safety Interlocks.

Modularity and flexibility of UniSec are ideal for the Grid Connection of small utility-scale solar plants.

Reclosers



ABB reclosers have over 20 years of proven field performance incorporating innovative technology and unique ABB expertise, including embedded sensors with the highest accuracy and least environmental sensitivity in the market. The reclosers offer increased reliability, unparalleled performance, simple, fast and safe maintenance, and easy integration with multiple controller options.

Reclosers are an ideal solution if the Power Collection grid of a solar plant is realized with overhead lines.





NAL/NALF switch-disconnectors



NAL/NALF switch-disconnectors have a compact, modular design and broad functionality. Rated voltages are up to 36 kV, rated current up to 1250 A. They offer top level performances in air-insulating technology, proven reliability based on over 35 years market presence and wide versatility with modular design, including special version for harsh conditions.

NAL/NALF switch-disconnectors are installed inside the Power Collection network of solar installations, e.g. inside ABB Compact Secondary Substation.

MEDIUM VOLTAGE

Product / Offering	Benefits and features	Suggested applications
SAFETY, PROTECTION & CONTROL		
<p>Protection relays Generator and interconnection protection REG615</p> 	<p>The 615 series is part of ABB's Relion® product family. Generator and interconnection protection REG615 includes:</p> <ul style="list-style-type: none">– 3rd harmonic-based stator earth-fault protection– Generator differential protection– Out-step protection– Underimpedance, underexcitation and overexcitation protection– Reverse power/directional overpower and under-power protection– Directional reactive power undervoltage protection– Low-voltage ride-through protection– Voltage vector shift protection– Wide frequency range for protecting generators during start-up and shutdown– Synchronism and energizing check– Optional arc protection, high-speed outputs, RTD/ma inputs– IEC 61850 Edition 2 and Edition 1 – certified by DNV-GL (KEMA)– HSR and PRP, GOOSE messaging and IEC 61850-9-2 LE– High-accuracy time synchronization with IEEE 1588 v2– IEC 60870-5-103, Modbus® and DNP3 protocols, and Profibus DPV1 with SPA-ZC 302 protocol adapter	<p>Relays of the Relion® family are used for plant control and protection inside the Power Collection Grid and the Grid Connection substations. The broad range of the family ensures a suitable solution for every need. With REG615 ABB offers a dedicated product for generator and interconnection protection.</p>
<p>Arctic product family</p> 	<p>The Wireless Controller and gateways from Arctic Family are compact, solution based devices for the remote control and monitoring of secondary substations such as network disconnectors, load break switches and Ring Main Units (RMUs) in distribution networks. REC603 enables the network control system (SCADA) to wirelessly monitor and control the field devices over the public communication infrastructure (GPRS).</p>	<p>Wireless Controllers of the Arctic Family enable remote control and monitoring of the equipment of the Power Collection network and the Grid Connection substation of the solar installation.</p>
<p>Instrument transformers</p> 	<p>ABB portfolio of instrument transformers includes a wide range of solutions for both indoor and outdoor installations. ABB instrument transformers are available up to 40,5kV:</p> <ul style="list-style-type: none">– up to 6 secondaries available– state-of-the-art insulation material (HCEP) guarantees the reliable operation even in the harsh environmental conditions– fully maintenance-free design	<p>Instrument transformers are used by operators and manufacturers of primary and secondary switchgears and are applicable inside the Power Collection Grid and the Grid Connection substations of solar installations.</p>
<p>Sensors</p> 	<p>Sensors offer a state-of-the-art solution of providing the current and voltage signals which are needed for the protection and measurement of medium voltage power systems. The product portfolio has more than 17 product families and 52 different product variants. The output signal is linear over the whole measuring range. Our sensors open up numerous advantages and benefits for their users such as fast and easy design process, quick delivery time, minimized cost during the life cycle, flexibility, safety and reliability and are able to cover various applications from primary to secondary air- and gas-insulated switchgear.</p>	<p>As an alternative to instrument transformers, sensors are used by operators and manufacturers of primary and secondary switchgear and are applicable inside the Power Collection Grid and the Grid Connection substations of solar installations.</p>

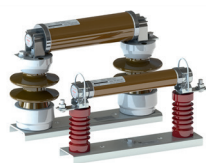
MEDIUM VOLTAGE

Product / Offering

Benefits and features

Suggested applications

Fuses



Protect your assets and optimize your investments with new generation of CEF/CMF fuses family, offering top level breaking performance up to 63kA and significantly lower power losses, comparing to previous versions.

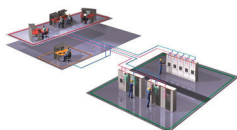
Other important features:

- Integrated Temperature Control Unit (TCU), securing safe usage in all overload conditions
- Standard outdoor sealing and resistance to harsh conditions
- High product quality confirmed by compliance to the latest IEC standards and production on automated line with extended routine test scope

ABB fuses have a special design for each application and are suitable for the protection of distribution transformers (current and non-current limiting), voltage transformers (current limiting only), capacitor banks (current limiting and expulsion) used inside the Power Collection Grid and the Grid Connection substations of solar installations.

ADVANCED SERVICES

MyRemoteCare: analytics, reporting and remote support



MyRemoteCare provides online remote condition monitoring of your electrification assets. The online remote monitoring system enables a condition-based maintenance approach for your electrification assets. MyRemoteCare predicts failures within your assets before they occur preventing costly downtime and repairs, allows for optimized maintenance strategy and spendings, helps extend the life time of your assets and maximize your investment.

MySiteCare: capturing data and diagnosis



MySiteCare provides monitoring and diagnostics for circuit breakers and switchgear. It collects field data of your circuit breaker and switchgear and in turn directly provides local diagnostic information. The unit can also send data collected to MyRemoteCare. MySiteCare assists in predicting failures within your assets before they occur preventing costly downtime and repairs, allows for optimized maintenance strategy and spendings. Retrieving data; wait a few seconds and try to cut or copy again.

Relay Retrofit Program



Relay Retrofit Program provides the integration of advanced protection and communication capabilities with full compatibility of the functions and smooth and controlled replacement of existing relays with modern protection and control relays. The program includes all the devices, accessories, hardware and software tools and documentation (manuals) needed for a timely scheduled and controlled execution of retrofit projects. None or minor modifications are required to the auxiliary compartment door. The ready made wiring harness makes the retrofit step simple. Optimal settings porting from old to new protection relays.

Upgrades of the protection



Smooth and controlled replacement of the obsolete protection relay version with the latest version of the same type. The Maintenance Exchange Unit service provide the devices, accessories, hardware and software tools and documentation needed for a timely scheduled and controlled execution of upgrade projects.

- Lifetime of the switchgear and it's protection solution is extended
- Minimized shutdown time due to fast and easy installation, use of existing configuration and no major re-wiring
- Operating and maintenance personnel can continue to use the same product type with no need for additional training

Replacement of the protection






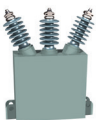

Various Classic/Legacy relays can be used in one-to-one replacements, i.e. the same product type can be used to extend life time of the switchgear and its protection solution.

- use of same relay type enables ease of maintenance
 - no changes required in design, setting and wiring
 - Operating and maintenance personnel continue to use the same product type with no need for additional training
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MEDIUM VOLTAGE

Product / Offering	Benefits and features	Suggested applications
Spares and consumables 	Genuine original spare parts, upgrade kits and service boxes guarantee functionality of installations by using original ABB components, spare parts and kits available for the current and legacy products. Proper stock holdings available for the maintenance and repair activities, a streamlined transaction to ensure fast delivery in case of urgency and fast recovery from failure.	
Maintenance 	Preventive, risk-based and predictive maintenance services keep the assets in optimum condition. Highly competent and skilled ABB personnel is available to ensure the performance and reliability of the medium voltage switchgear for reducing the risk of failure and downtime. Reduce the risk of failure and performance degradation of the equipment. Extend the useful life of the asset and guarantee high levels of plant reliability, safety and efficiency. Minimize the occurrence of serious faults and optimize management of available economic resources.	
POWER QUALITY SOLUTIONS – MEDIUM VOLTAGE		
Open rack shunt bank QBank 	Shunt capacitor banks are primarily used to improve the power factor in the network. They also improve the voltage stability and reduce network losses. Improving the power factor also means a higher power transmission capability and increased control of the power flow. ABB's open rack capacitor bank QBank is available with internally fused, externally fused or fuseless capacitor units. The major advantage of QBank is the compact design, small footprint and easy maintenance.	Open rack reactive power compensation applications
Metal enclosed capacitor bank ABBACUS 	Metal enclosed capacitor bank ABBACUS is a reactive power compensation system with modular fixed or multistage switched capacitor steps that can compensate to a preset power factor. The ABBACUS is a 'one stop shop' solution comprising of an integrated package of ABB's premium range of primary and secondary equipment.	The design of the ABBACUS allows compensation for both electrical distribution utilities and large industrial power users including mining, pulp and paper, chemical, petrochemical, wind farms, plastics and heavy industries.
Metal enclosed capacitor bank EMPAC 	The EMPAC is a metal enclosed fixed capacitor bank installed to provide fixed capacitive reactive power compensation. The EMPAC improves the quality of the electrical supply and the efficient operation of the system. Its installation has other beneficial effects on the system such as: improvement of the voltage at the load, better voltage regulation, reduction of losses and reduction of investments in transmission.	<ul style="list-style-type: none"> – Suitable for applications with little space thanks to its compact design – Available for indoor/outdoor installation – Available with and without SF6 circuit breaker depending on the customer needs – Applications up to 36 kV
Metal enclosed capacitor bank SIKAP 	The SIKAP metal enclosed capacitor bank is a fully insulated and fixed reactive power compensation system. The enclosure covers the live parts and protects the bank from short circuit due to external cause, it also increases personal safety. The SIKAP bank is built with single phase capacitor units, mounted in hot dip galvanized steel racks. The units are connected in series and parallel to achieve desired voltage and power ratings.	Fixed compensation in a wide range of installations, covering climate conditions between from -40°C to +40°C.

MEDIUM VOLTAGE

Product / Offering	Benefits and features	Suggested applications
Harmonic Filter CHARM 	<p>Modern electrical equipment imposes stringent demands on voltage stability and power quality. By installing passive harmonic filters in medium/high-voltage networks, several benefits can be obtained:</p> <ul style="list-style-type: none"> – Higher power factor, improved voltage stability and lower network losses – Filtering of harmonics in the system to acceptable levels – Lowering of resonance problems and amplification of electrical disturbances 	<p>Any small and large medium/high-voltage utility, and industrial installations where harmonics need to be filtered.</p>
Instantaneous stepless power compensator PQCR 	<p>PQCR is a solid state reactive power compensation solution with high reliability and low loss for dynamic and highly fluctuating loads. A single module is rated up to 375 kvar in 3-Ph and 275 kvar in 1-Ph at 415V (or 440V) and is designed with a small footprint. An overall reactive power compensation rating up to 12000 kvar can be reached by paralleling modules in a hybrid topology. PQCR technology works on the principle of Voltage Source Converter (VSC) using high power IGBTs and low loss film capacitors.</p>	<ul style="list-style-type: none"> – Inductive and capacitive loads – Three phase and single phase applications – Highly fluctuating loads (arc furnace loads, spot welding loads, DC drives etc) – Industrial loads fed by weak networks – Railway applications
PowerQuality Filters PQFI-PQFM-PQFS 	<p>ABB's PQF active filters are the best solution to tough power quality problems caused by harmonics, load unbalance and reactive power demand. They offer the following system benefits:</p> <ul style="list-style-type: none"> – Compliance with the strictest power quality regulations thanks to their unique control concept, thereby avoiding penalties and/or refusal by utilities to connect installations to the electrical grid. – Reduced production downtime and/or commercial installation downtime. – Increased system efficiency and reduction of CO₂ emissions. 	<p>ABB's PQF active filters can be applied to small, medium or large applications and are suitable for both industrial and commercial installations in low-voltage networks. They can also be employed in medium-voltage networks through the use of a coupling transformer.</p>
Surge capacitors CHDSU 	<p>Steep fronted waves (lightning or switching surges) can cause damage to the turn-to-turn insulation of rotary machines and transformers. ABB surge capacitors provide premium surge protection for high voltage motors and generators. For a more comprehensive protection scheme, surge capacitors may be used in conjunction with surge arresters.</p>	<ul style="list-style-type: none"> – Protection of motor windings – Protection of transformer windings
Motor Surge protection MSP 	<p>The motor surge protection bank (MSP) provides protection against insulation failure for motors, other rotating machines, and dry-type transformers. This yields assurance of continuous operation of the equipment, the electrical system and the manufacturing process. The primary function of the MSP motor surge protection bank is to guard the winding insulation of the device being protected.</p>	<ul style="list-style-type: none"> – High voltage motors and generators – Dry-type transformers – Motor control centers – Medium-voltage switchgear

MEDIUM VOLTAGE

Product / Offering

Benefits and features

Suggested applications

POWER QUALITY SOLUTIONS- LOW VOLTAGE

Contactor-switched capacitor bank APCQ



ABB's capacitor bank series APCQ provides the ideal power factor correction solution for industrial and commercial networks. The benefits are:

- Solving utility penalty charges due to low $\cos \phi$
- Improving energy efficiency
- Releasing additional capacity or increasing system load without additional equipment
- Increasing service life time of infrastructure

The APCQ low-voltage contactor-switched capacitor bank can be used in industrial and commercial networks buildings. Industry segments where the product can be used include mining, steel, chemicals, pulp and paper, cement, plastics, printing and food industries

Thyristor-switched capacitor bank Dynacomp



ABB's Dynacomp low-voltage thyristor-switched capacitor banks are used for ultra-rapid transient free power factor compensation due to fast varying or large low-voltage connected loads, giving additional benefits of transient-free compensation and voltage dip minimization. With ABB's Dynacomp technology large capacitor steps can be connected to the network very fast.

The Dynacomp low-voltage thyristor-switched capacitor banks can be used in any applications requiring short response times, large number of operations, transient free switching or large amount of reactive power. For example: spot welding machines, cranes, rolling mills and big presses with fast switching loads, lifts and rubber mixers.

Instantaneous stepless power compensator PQCR



PQCR is a solid state reactive power compensation solution with high reliability and low loss for dynamic and highly fluctuating loads. A single module is rated up to 375 kvar in 3-Ph and 275 kvar in 1-Ph at 415V (or 440V) and is designed with a small footprint. An overall reactive power compensation rating up to 12000 kvar can be reached by paralleling modules in a hybrid topology. PQCR technology works on the principle of Voltage Source Converter (VSC) using high power IGBTs and low loss film capacitors.

- Inductive and capacitive loads
- Three phase and single phase applications
- Highly fluctuating loads (arc furnace loads, spot welding loads, DC drives etc)
- Industrial loads fed by weak networks
- Railway applications

PowerQuality Filters PQFI-PQFM-PQFS



ABB's PQF active filters are the best solution to tough power quality problems caused by harmonics, load unbalance and reactive power demand. They offer the following system benefits:

- Compliance with the strictest power quality regulations thanks to their unique control concept, thereby avoiding penalties and/or refusal by utilities to connect installations to the electrical grid.
- Reduced production downtime and/or commercial installation downtime.
- Increased system efficiency and reduction of CO₂ emissions.

ABB's PQF active filters can be applied to small, medium or large applications and are suitable for both industrial and commercial installations in low-voltage networks. They can also be employed in medium-voltage networks through the use of a coupling transformer.

LOW VOLTAGE

ABB has developed a whole range of reliable products dedicated to photovoltaic applications and able to meet all installation requirements, from the strings on the direct current side through to the alternate current grid connection point. ABB product range includes circuit breakers, switch disconnectors, fuse disconnectors and fuses, residual current-operated circuit breakers, grid connection relays, metering devices, surge arresters, enclosures suitable for outdoor installation, all specially designed for these applications. ABB can also provide a range of “plug & play” solutions, i.e. finished, wired and certified string boxes able to suit the requirements of a vast range of installations: from individual strings for residential applications to large photovoltaic plants.

Combiner boxes for solar photovoltaic installations



- Plug and play
- Widest range to address residential, commercial and utility scale installations in 1000V and 1500VDC
- Global availability ensuring on-site delivery at any part of the world
- Mechanical features: IP66, IK10, GWT 750°C, UV and chemicals resistant
- Electrical features: double insulation (Class II), Ui/Ue: 1000V DC/1500V DC
- Wide range (in terms of number of strings and monitoring systems)

Combiner boxes are used when strings of converters are connected in parallel. The combiner box accommodates the interconnection systems, the overcurrent protection devices, disconnectors and surge protection devices. For utility-scale installations, the combiners are equipped with monitoring devices to measure the current, voltage and temperature to ensure the availability of the strings and maximize generation.

Rapid shutdown PV vault



- Meets NEC 690.12-2014, UL 1741 and CSA C22 requirements
- 600VDC/20amps or less
- Connects 2 to 4 strings/arrays
- Dual MPPT outputs maintain the benefits of inverter channels
- NEMA 4X enclosure permits 0-90 degree
- Local On/Off selector switch
- Quick installation with two connections

Application: residential and small commercial rooftop. Discharges PV array within 10 seconds.

Fuse disconnectors E 90 PV



- 90° opening handle for an easy insertion of fuse even wearing gloves or using the thumb
- Only 17 mm difference in depth between open and closed position
- 25 mm² terminals with knurled cage for a better cable clamp
- Fully compatible with electrical screwdrivers
- Pozidriv screws for flat or cross screwdrivers
- Lockable in open position through standard padlocks, for a safer maintenance
- Sealable in closed position with lead seals to prevent unauthorized access
- Cooling chambers and ventilation slots improve heat dissipation
- Available with indicator LED lights to signal if the fuse is blown

The E 90 PV series of fuse disconnectors has been designed for up to 1000 VDC applications in DC-20B category. The E 90 PV series is specifically focused on overcurrents protection of photovoltaic systems. It provides a reliable, compact and effective solution due to its 10.3 × 38 mm gPV cylindrical fuses.





Miniature circuit breakers S204 M UC Z







The S200 M UC Z range of miniature circuit breakers features permanent magnets on the internal arcing chutes able to extinguish an electric arc of up to 440 V DC acc. to IEC 60947-2 with Icu = 10 kA. The use of these components establishes circuit breaker polarity, thus they must be powered in a specific direction

The S 200 M UC Z is the ideal solution for both DC and AC applications.

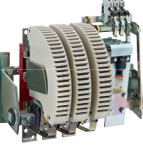


LOW VOLTAGE

Product / Offering	Benefits and features	Suggested applications
Miniature circuit breakers S800 PV-SP 	<ul style="list-style-type: none">– Interchangeable terminals– Central trip safe disconnection of all poles– Contact status displayed for each pole– Polarity independent wiring	The S800 PV-SP modular miniature circuit breakers can be used in networks up to 1200 VDC (4-poles execution). The S800 PV-SP circuit breakers and its range of accessories (auxiliary contacts, undervoltage releases, motorized commands) allow for a wide spectrum of configurations.
Switch disconnecter S800 PV-SD, S802 PV-M-H 	<ul style="list-style-type: none">– Interchangeable terminals– Contact status displayed for each pole– Polarity independent wiring (for S800 PV-M only)	The S800 PV-SD modular switch disconnectors can be used in networks up to 1200V DC (4-poles execution), while the S802 PV-M-H polarized switch disconnectors are specially designed for networks up to 1000 V DC. Both switch disconnectors and their range of accessories (auxiliary contacts, undervoltage releases, motorized commands) allow for a wide spectrum of configurations.
High performance miniature circuit breaker S804U-PVS5 	The breaker is tested according to UL489B for 1000V DC.	The new S804U-PVS5 is for string protection in photovoltaic systems. In case of reverse currents, the breaker will trip. Thus, the PV generator will not be damaged.
String monitoring current measurement system (CMS) 	<ul style="list-style-type: none">– Small sizes– High accuracy– Quick installation start-up time– Freely selectable amount of measurement points	The string monitoring CMS increases the efficiency of your photovoltaic system. The easy-to-integrate system enables you to immediately detect either a defective string or a loss in performance, for example caused by contaminated or damaged panels, and to quickly implement appropriate countermeasures. The CMS's main use is for string monitoring in combiner boxes to detect failures on PV strings.






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Switch disconnectors OTDC16...32 	<ul style="list-style-type: none"> – Patented design of DC main contacts – Low temperature rise for minimal contribution to overall heat-rise within any enclosure. – High operational performance, 32A up to 1000V, in high ambient temperatures. – Increased energy efficiency – Compactness and modularity allow for consistent and optimized mounting in switchboard equipment, therefore reducing implementation costs and increased space savings. – DINrail, base, or door-mounted versions for simple installation in a variety of enclosure designs. – Compliant with many global standards, including UL 508i. – OTDC16...32US versions are factory pre-connected for single-wire breaking applications. – Enclosed OTDCP16...32 versions are suitable for outdoor use in harsh environments 	OTDC16...32 disconnect switches are available up to 32 amperes and 1000V. The modular structure offers a simple and cost effective solution for disconnecting up to 1, 2, or 3 PV circuits within the same footprint area.
Switch disconnectors 1000V DC and up to 1600A: OTDC100...1600 	<ul style="list-style-type: none"> – Compactness: thanks to the patented DMB (Dual Magnetic Breaking) technology, the switches reach 1000 VDC with only 2 poles and a small footprint – Easy to install: connections are simple and independent from polarity, providing greater wiring flexibility. The operating mechanism can be located between the poles or on the left side of the switch. – Factory-installed or jumper kits available – Safety: Visible contacts allow a clear indication of position 	The OTDC series of switch-disconnectors is available with nominal currents from 100 to 1600 A. Two poles in series provide compact performance up to 1000V DC. Up to three 1000 V circuits can be operated with a single device. In large inverter applications combining separate inputs into a single output, up to 1500 A 1000 V duties can be operated with a single six-pole OTDC500.
Switch disconnectors 1500V DC and up to 500A: OTDC250...500 	<ul style="list-style-type: none"> – Compactness: thanks to the patented DMB (Dual Magnetic Breaking) technology, the switches reach 1500 VDC with only 3 poles and a small footprint. – Easy to install: connections are simple and independent from polarity, providing greater wiring flexibility. The operating mechanism can be located between the poles or on the left side of the switch. – Factory-installed or jumper kits available. – Safety: Visible contacts allow a clear indication of position. 	The OTDC series of switch-disconnectors is available for operating voltages up to 1500V DC from 250A to 500A. Up to two separate 1500V DC circuits can be operated with a single device.
Switch disconnectors and automatic circuit breakers Tmax PV 	<ul style="list-style-type: none"> – Easy and safe installation – Several electrical configurations – Wiring diagrams for poles connection in series already tested in ABB laboratories <p>The main features of the Tmax PV line include:</p> <ul style="list-style-type: none"> – Complete offer for a large range of current and voltage – Compliant with the most important standards, IEC 60947-3 and UL489B – Availability of the three and four poles in fixed versions – Suitable for use in extreme conditions thanks to operating temperature range from -25°C up to +70 °C 	Tmax PV line has been developed specifically for solar applications. Tmax PV circuit-breakers are available up to 1000 A and 1000 V DC whereas switch disconnectors are available up to 1600 A and 1500 V DC. The biggest innovation of the Tmax PV range is the availability of a jumper kit provided by ABB.





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<p>Contactors (for DC switching)</p> <p>– GAF & IOR bar contactors</p>  <p>– Standard AF range</p> 	<ul style="list-style-type: none"> – For GAF & IOR bar contactors, the poles must be connected in series. For the 63 to 500 A contactor ratings, the blow-out coil will be rated as the actual service current rating. Auxiliary contacts: 1 N.O. + 1 N.C. available – AF range optimizes logistics and cut administration costs with fewer product variants to handle. – Access global support and use the same products in all parts of the world – A reduction of the coil's energy consumption by 80% lets you save energy – Secure your uptime by letting the AF technology overbridge voltage drops and sags 	<p>The GAF range is dedicated to DC switching. IOR..-CC, IORR..-CC, IORE..-CC and IORC..-CC contactors with increased insulation are used for controlling DC power circuits, at voltages $U_e \leq 1500$ V DC (time constant $L/R \leq 7.5$ ms). For operational voltage $U_e > 1500$ V DC or time constant $L/R > 7.5$ ms please contact your ABB referent. The AF range is made of standard, general purpose block contactors for the reliable re-moteswitching of both AC and DC circuits.</p>
<p>Surge protective devices</p> <p>OVR PV, OVR TC</p> 	<ul style="list-style-type: none"> – OVR PV T1 and T2 version – Auto-protected from end-of-life short circuits up to 10 kA DC thanks to integrated thermal protection with direct current breaking capacity – Pluggable cartridges for easy maintenance, no need to disconnect the line – Auxiliary contact for remote signaling of line status ("TS" version) – Absence of short circuit follow current — absence of risk for reversed polarity – "Y" configuration for a safer protection – Bottom wiring to improve safety when there are humidity issues inside the enclosure – QS Quick Safe® Technology. Fast disconnection in case of end of life of the SPD avoiding thermal runaway 	<ul style="list-style-type: none"> – OVR PV T1 and T2 version – Auto-protected from end-of-life short circuits up to 10 kA DC thanks to the integrated thermal protection with direct current breaking capacity – Pluggable cartridges for easy maintenance, no need to disconnect the line – Auxiliary contact for remote signaling of line status ("TS" version) – Absence of short circuit follow current — absence of risk for reversed polarity – "Y" configuration for a safer protection – Bottom wiring to improve safety when there are humidity issues inside the enclosure – QS Quick Safe® Technology. Fast disconnection in case of end of life of the SPD avoiding thermal runaway

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<p>Insulation monitoring devices ISL-A 600, ISL-C 600</p> 	<ul style="list-style-type: none">- The ISL-C 600 is an insulation monitoring device for IT distribution networks up to 760 VAC (1100 VAC in three phase networks with neutral).- The ISL-A 600 version is an insulation monitoring device for DC IT networks up to 600 VDC.	<p>In IT electrical distribution networks with isolated neutral, and in PV networks particularly, the high insulation impedance prevents earth faults from generating currents that would dangerously elevate the potential of exposed conductive parts. Therefore, in case of earth leakage, in an IT network it is not necessary to interrupt the supply, but it is still essential to monitor the insulation level in order to detect faults and restore optimal functioning of the system.</p>
<p>Connection devices – PV connectors MC4-EVO2</p> 	<p>MC4-EVO2 connectors connect the DC circuits from the inverter to the PV modules, in compliance with IEC 62852:2014 and UL 6703 standards. Their housing is made in impact-resistant polyamide and can withstand UV radiation, salt spray and ammonia vapors. MC4-EVO2 connectors are fully compatible with MC4-type PV connectors.</p>	<p>MC4-EVO2 connectors connect the DC circuits from the inverter to the PV modules, in compliance with IEC 62852:2014 and UL 6703 standards. Their housing is made in impact-resistant polyamide and can withstand UV radiation, salt spray and ammonia vapors. They are fully compatible with MC4-type PV connectors.</p>
<p>Connection devices – distribution blocks</p> 	<p>The reversible cover facilitates identification and wiring tasks, and the modular and touch proof design eliminates the need for bus bars, isolators, fasteners or protection screens. Lastly, they save up to 50% rail space compared to conventional distribution bars.</p>	<p>The DBL distribution blocks are adapted to the most recent solar inverter requirements with a voltage rating going up to 1500V DC IEC (1000V DC UL). They provide the benefit of 3 configurations in 1 single product: grouping several inputs into one output for DC applications, or single and multipole splitting for AC power applications.</p>
<p>Modular metal framing system and accessories</p> 	<ul style="list-style-type: none">- Available in a wide variety of other materials and finishes- Tolerant of extreme environments and corrosion resistant for long life- Available in 10' and 20' lengths in 14-gauge stainless steel	<p>Threaded rod and an assortment of accessories to complete photovoltaic installations.</p>
<p>Solar panel hold down clamps, fittings, grounding</p> 	<ul style="list-style-type: none">- Hold down clamps and grounding washers- Corrosion resistant materials- Ease of installation: slotted design- Works with all brands of solar panels	<p>Residential and commercial rooftops</p>

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<p>Ty-Rap cable edge solar clips</p> 	<ul style="list-style-type: none">– Hold down clamps and grounding washers– U-Style cable management parallel to frame– W-Style for extra cable capacity– Holds up to four #10 AWG solar cables– Corrosion resistant materials– Temperature rated –85°F to +194°F– Heat stabilized nylon 6.6 option rated –85°F to +220°F– Quick and easy installations – no tools required– 90 degree installation available	Residential and commercial rooftops, solar panel wire management
<p>Cable ties, tools and accessories</p> 	<p>Nylon 12 is a lower moisture absorbing material than Nylon 6.6, and the effect of water on its properties is much less. For use in temperatures ranging from –40°F to +185°F (–40°C to +85°C). Stainless steel cable ties: steel alloys available for enhanced corrosion protection and quick, easy installation and secure locking.</p>	ABB offers a full range of premium cable ties and tools, including Ty-Rap® weather-resistant nylon 12 cable ties for long life in direct (UV) sunlight and chemical environments.
<p>Deltec® cable tie and support system</p> 	<ul style="list-style-type: none">– Strap and body: weatherable acetal offers superior resistance to sunlight, moisture and salt environments.– Locking device: marine-grade, corrosion-resistance copper alloy.– Continuous use temperature: –85°F to +194°F (–65°C to +90°C)– Installation temperature range: –30°F to +150°F (–34°C to +66°C)– Minimum tensile strength: standard 250 lbs. (1,211 N), Slim 180 lbs. (820 N)– Continuous load: 20 lbs. (9.07 kg)	Designed to perform a minimum of 20 years outdoors.
<p>Flexible conduit systems</p> 	<p>Our cable protection systems are designed to offer protection in extreme temperatures and demanding outdoor applications, and offer excellent liquid ingress protection to secure continuous operation.</p>	ABB is the global leader in non-metallic and metallic cable protection systems and glands of highly engineered nylon conduits and fittings.

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