





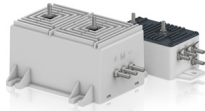




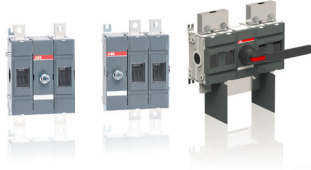


# Low-voltage products and solutions for solar energy





## Global product offering

Always ready to meet any new demand from the market, 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, consumer units and enclosures suitable for outdoor installation, all specially designed for these applications. ABB can also provide a range of “plug & play” solutions, ie 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.

Product / Offering	Benefits and features
<p data-bbox="107 653 386 680"><b>Fuse disconnectors E 90 PV</b></p> 	<p data-bbox="602 653 1528 800">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 x 38 mm gPV cylindrical fuses. The main features of E 90 PV fuse disconnectors include:</p> <ul data-bbox="602 806 1528 1100" style="list-style-type: none"> <li>- 90° opening handle for an easy insertion of fuse even wearing gloves or using the thumb</li> <li>- Only 17 mm difference in depth between open and closed position</li> <li>- 25 mm<sup>2</sup> terminals with knurled cage for a better cable clamp</li> <li>- Fully compatible with electrical screwdrivers</li> <li>- Pozidriv screws for flat or cross screwdrivers</li> <li>- Lockable in open position through standard padlocks, for a safer maintenance</li> <li>- Sealable in closed position with lead seals to prevent unauthorized access</li> <li>- Cooling chambers and ventilation slots improve heat dissipation</li> <li>- Available with indicator LED lights to signal if the fuse is blown</li> </ul>
<p data-bbox="107 1129 363 1184"><b>Miniature circuit-breakers S204 M UC Z</b></p> 	<p data-bbox="602 1129 1528 1247">The S204 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. However, use of these components establishes circuit-breaker polarity, thus they must be powered in a specific direction.</p>
<p data-bbox="107 1283 472 1310"><b>Miniature circuit-breakers S800 PV-S</b></p> 	<p data-bbox="602 1283 1528 1430">The S800 PV-S modular miniature circuit-breakers can be used in networks up to 1200 VDC (4-poles execution). The S800 PV-S circuit breakers and its range of accessories (auxiliary contacts, undervoltage releases, motorized commands) allow for a wide spectrum of configurations. The main features of the S800 PV-S circuit breakers include:</p> <ul data-bbox="602 1436 1528 1549" style="list-style-type: none"> <li>- Interchangeable terminals</li> <li>- Central trip safe disconnection of all poles</li> <li>- Contact status displayed for each pole</li> <li>- Polarity independent wiring</li> </ul>
<p data-bbox="107 1577 363 1631"><b>Switch-disconnectors S800 PV-M, S802 PV-M-H</b></p> 	<p data-bbox="602 1577 1528 1724">The S800 PV-M modular switch-disconnectors can be used in networks up to 1200 VDC (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. The main features include:</p> <ul data-bbox="602 1730 1528 1822" style="list-style-type: none"> <li>- Interchangeable terminals</li> <li>- Contact status displayed for each pole</li> <li>- Polarity independent wiring (fro S800 PV-M only)</li> </ul>

Product / Offering	Benefits and features
<p data-bbox="107 113 386 163"><b>High performance miniature circuit-breaker S804U-PVS5</b></p> 	<p data-bbox="592 113 1534 199">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. The breaker is tested acc. to UL489B for 1000 V d.c.</p>
<p data-bbox="107 262 365 289"><b>Current sensors ES range</b></p> 	<p data-bbox="592 262 1534 499">As components get smaller but more powerful, installing current sensors is becoming a real problem. But with ES range, the whole thing is child's play. By being the first in the field to offer these smaller current sensors that maintain your high-performance objectives, ABB met the challenge of giving you the space you always needed. Once again ABB lead the field by giving installers a chance to choose between two ways of fastening sensors: horizontally or vertically. This flexibility means that ES sensors can be installed in any position. This is a major breakthrough that greatly simplifies the task of systems integrators. The ES range is the ideal way of reducing the size of equipment.</p> <p data-bbox="592 506 836 533">The main features are:</p> <ul data-bbox="592 539 1534 651" style="list-style-type: none"> <li>- Plastic case and insulating resin are self-extinguishing</li> <li>- Fixing holes in the case moulding for two positions at right angles</li> <li>- Direction of the current: A primary current flowing in the direction of the arrow results in a positive secondary output current from terminal M.</li> </ul> <p data-bbox="592 657 803 684">Primary connection</p> <ul data-bbox="592 690 1534 772" style="list-style-type: none"> <li>- Hole for primary conductor</li> <li>- The temperature of the primary conductor in contact with the case must not exceed 100°C</li> </ul> <p data-bbox="592 779 836 806">Secondary connection</p> <ul data-bbox="592 812 1534 894" style="list-style-type: none"> <li>- Molex type HE14 connector</li> <li>- JST connector (ref.: B3P-VH)</li> <li>- 3 x 200 mm cables (cross section 0.38 mm<sup>2</sup>)</li> </ul>
<p data-bbox="107 926 365 953"><b>Voltage sensors VS range</b></p> 	<p data-bbox="592 926 1534 1129">To push the performance barriers back ever further, VS sensors are made 100% electronic. Our sensors are the first ones on the market to incorporate this innovation. They prove themselves every day and give their users the edge in a broad range of applications. This guarantees you unbeatable dynamic performances that give optimal slaving of customer equipment while complying with the latest standards in force. VS sensors are perfect for use in sectors such as solar, railways, mining and control in hazardous environments. The main features are:</p> <ul data-bbox="592 1136 1534 1436" style="list-style-type: none"> <li>- Coated electronic circuit</li> <li>- Plastic case and insulating resin are self-extinguishing</li> <li>- Direction of the current: a positive primary differential voltage (UHT+ - UHT- &gt; 0) results in a positive secondary output current from terminal M</li> <li>- Protections: <ul data-bbox="625 1287 1144 1377" style="list-style-type: none"> <li>- of the measuring circuit against short-circuits</li> <li>- of the measuring circuit against opening</li> <li>- of the power supply against polarity reversal</li> </ul> </li> <li>- Burn-in test in accordance with FPTC 404304 cycle</li> <li>- Tightening torque for M5 terminal studs (N.m): 2 N.m.</li> </ul> <p data-bbox="592 1442 820 1470">Primary connection</p> <ul data-bbox="592 1476 755 1503" style="list-style-type: none"> <li>- 2 M5 studs</li> </ul> <p data-bbox="592 1509 966 1537">Standard secondary connections</p> <ul data-bbox="592 1543 1031 1570" style="list-style-type: none"> <li>- 4 M5 studs and 3 Faston 6.35 x 0.8</li> </ul>
<p data-bbox="107 1583 386 1640"><b>String monitoring Current Measurement System (CMS)</b></p> 	<p data-bbox="592 1583 1534 1738">The CMS string monitoring 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, e.g., caused by contaminated or damaged panels and to quickly implement appropriate countermeasures. Main use is for string monitoring in combiner boxes to detect failures on PV strings.</p> <p data-bbox="592 1745 706 1772">Benefits:</p> <ul data-bbox="592 1778 1161 1885" style="list-style-type: none"> <li>- Small sizes</li> <li>- High accuracy</li> <li>- Quick installation start up time</li> <li>- Freely selectable amount of measurement points</li> </ul>

Product / Offering	Benefits and features
<p data-bbox="107 113 324 163">Switch-disconnectors OTDC16...32</p> 	<p data-bbox="592 113 1534 226">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 1, 2, or 3 PV circuits within the same footprint area. The main features of the OTDC16...32 disconnect switches include:</p> <ul data-bbox="592 233 1534 682" style="list-style-type: none"> <li>- Patented design of DC main contacts offer:</li> <li>- Low temperature rise for minimal contribution to overall heat-rise within any enclosure.</li> <li>- High operational performance, 32A up to 1000V, in high ambient temperatures.</li> <li>- Increased energy efficiency</li> <li>- Compactness and modularity: allow for consistent and optimized mounting in switchboard equipment, therefore reducing implementation costs and increased space savings.</li> <li>- DINrail, base, or door-mounted versions for simple installation in a variety of enclosure designs.</li> <li>- Compliant with many global standards, including UL 508i.</li> <li>- OTDC16...32US versions are factory pre-connected for single-wire breaking applications.</li> <li>- Enclosed OTDCP16...32 versions are suitable for outdoor use in harsh environments.</li> </ul>
<p data-bbox="107 743 527 793">Switch-disconnectors 1000 VDC and up to 1600A: OTDC100...1600</p> 	<p data-bbox="592 743 1534 919">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 1000 VDC. 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. The main features of the OTDC100...1600 switch-disconnectors include:</p> <ul data-bbox="592 926 1534 1129" style="list-style-type: none"> <li>- Compactness: thanks to the patented DMB (Dual Magnetic Breaking) technology, the switches reach 1000 VDC with only 2 poles and a small footprint</li> <li>- Easy to install: connections are simple and independent from polarity, for providing greater wiring flexibility. The operating mechanism can be located between the poles or on the left side of the switch</li> <li>- Factory-installed or jumper kits available</li> <li>- Safety: Visible contacts allow a clear indication of position</li> </ul>
<p data-bbox="107 1163 365 1247">Switch-disconnectors 1500 VDC and up to 500A: OTDC250...500</p> 	<p data-bbox="592 1163 1534 1276">The OTDC series of switch-disconnectors is also available for operating voltages up to 1500 VDC from 250A to 500A. Up to two separate 1500 VDC circuits can be operated with a single device. The main features of the OTDC250...500 switch-disconnectors include:</p> <ul data-bbox="592 1283 1534 1493" style="list-style-type: none"> <li>- Compactness: thanks to the patented DMB (Dual Magnetic Breaking) technology, the switches reach 1500 VDC with only 3 poles and a small footprint</li> <li>- Easy to install: connections are simple and independent from polarity, for providing greater wiring flexibility. The operating mechanism can be located between the poles or on the left side of the switch</li> <li>- Factory-installed or jumper kits available</li> <li>- Safety: Visible contacts allow a clear indication of position</li> </ul>
<p data-bbox="107 1528 503 1579">Switch-disconnectors and automatic circuit-breakers Tmax PV</p> 	<p data-bbox="592 1528 1534 1671">Tmax PV line has been developed specifically for solar application. 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 jumper kit provided by ABB, bringing the following benefit to the customer:</p> <ul data-bbox="592 1677 1534 1942" style="list-style-type: none"> <li>- Easy and safe installation</li> <li>- Several electrical configurations</li> <li>- Wiring diagrams for poles connection in series already tested in ABB laboratories.</li> <li>- The main features of the Tmax PV line include:</li> <li>- Complete offer for a large range of current and voltage</li> <li>- Compliant with the most important standard, IEC 60947-3 and UL489B</li> <li>- Availability of the three and four poles in fixed versions</li> <li>- Suitable for use in extreme condition thanks to operating temperature from -25°C up to 70 °C</li> </ul>

Product / Offering	Benefits and features
<p data-bbox="107 113 402 140"><b>Contactors (for DC switching)</b></p> <p data-bbox="139 142 381 170">GAF &amp; IOR bar contactors</p>  <p data-bbox="139 415 316 443">Standard AF range</p> 	<p data-bbox="597 142 1518 380">The GAF range is dedicated to DC switching. Based on the A range, these are reliable and modern contactors. IOR.-CC, IORR.-CC, IORE.-CC and IORC.-CC contactors with increased insulation, are used for controlling DC power circuits, at voltages <math>U_e \leq 1500</math> V DC (time constant <math>L/R \leq 7.5</math> ms). For operational voltage <math>U_e &gt; 1500</math> V DC or time constant <math>L/R &gt; 7.5</math> ms please contact your ABB referent. 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.</p> <p data-bbox="597 415 1485 470">The A and AF ranges are standard, general purpose block contactors for reliable remote switching of both AC and DC circuits.</p>
<p data-bbox="107 569 357 623"><b>Surge protective devices OVR PV, OVR TC</b></p> 	<p data-bbox="597 569 1518 623">ABB offers a wide range of surge protection devices specifically designed for photovoltaic systems. The main features of the OVR PV SPDs include:</p> <ul data-bbox="597 632 1518 953" style="list-style-type: none"> <li>- OVR PV T1 and T2 version</li> <li>- Auto-protected from end-of-life short circuits up to 10 kA DC thanks to the integrated thermal protection with direct current breaking capacity</li> <li>- Pluggable cartridges for easy maintenance, no need to disconnect the line</li> <li>- Auxiliary contact for remote signaling of line status ("TS" version)</li> <li>- Absence of short circuit follow current — absence of risk for reversed polarity</li> <li>- "Y" configuration for a safer protection</li> <li>- Bottom wiring to improve safety when there are humidity issues inside the enclosure</li> <li>- QS Quick Safe® Technology. Fast disconnection in case of end of life of the SPD avoiding thermal runaway</li> </ul> <p data-bbox="597 961 1534 1073">With increasing request of monitoring systems, OVR TC data line SPDs are the right choice to protect the monitoring lines of the PV plants from surges. They are installed in series with the network and have removable cartridges, making maintenance simple, without having to cut the power to the telecommunications line.</p>
<p data-bbox="107 1115 316 1190"><b>Insulation monitoring devices ISL-A 600, ISL-C 600</b></p> 	<p data-bbox="597 1115 1534 1373">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. The ISL-C 600 is a 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>

## Product / Offering

### Combiner boxes for solar photovoltaic installations



## Benefits and features

In a photovoltaic system, the modules are arranged in strings and fields depending on the type of inverter used, the total power and the technical characteristics of the modules. The connection of modules in series is made on the modules themselves, while the parallel connection of the strings is realized in the so-called “string boxes” that accommodate, along with the interconnection systems, also the overcurrent protection devices, disconnectors and surge protection devices. In medium and large sized systems, the string boxes form subsystems that can be standardized according to the number of strings, voltage and rated current.

ABB offers four different product ranges, each dedicated to specific installation conditions with typical configurations.

#### String boxes

The installation of a photovoltaic system often occurs in complex logistic situations, critical from the environmental and time perspective. The availability of tested and certified pre-assembled components allows the installer to avoid unnecessary on site assembly, wiring and certification activities for the string boxes. String boxes enclose functions such as string protection, protection against overvoltage and disconnect, with components suitable for the string’s various voltage levels and the number of connected strings.

#### Multi-output string boxes

The development and the increasingly frequent adoption of multi-string inverters has made it necessary to reduce the costs and the space occupied by the string boxes, to bring together in a single switchboard the protective devices and disconnectors of multiple strings intended to be connected to a specific inverter input. Multi-string inverters resolve in an easy and cost-effective manner system conditions characterized by modules installed in different leaning and exposure positions or minimize the problems related to systematic shading of parts of the system.

#### String boxes for monitoring

The string monitoring is an important function in running medium and large size installations, since it allows to improve the manufacturability and maintenance of the system. ABB offers a series of pre-wired string boxes for all installation conditions: they are equipped both with devices necessary for string protection, surge protection and disconnection, and with useful devices for string monitoring.

#### Interface boxes

To improve installation logistics operations, ABB developed specific interface boxes for installations subject to CEI 0-21 standard. Also in this case the right choice allows to make available to the designer and the installer predefined solutions on the basis of the system power, equipped with general switch, fuseholder, interface relay, interface device, power supply system with energy storage, auxiliary contacts and control coil for the support device.

### Connection devices PV connectors










With a voltage rating going up to 1500V dc IEC and 1000V dc UL, ABB’s MC4-EVO2 PV connectors can be installed in any environment including commercial, industrial and residential rooftop PV installations. They enable to connect the DC circuits from the inverter to the PV modules, in compliance with the standards IEC 62852:2014 and UL 6703. 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.


### Connection devices Distribution blocks



The DBL distribution blocks are adapted to the most recent solar inverters 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. 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. Finally it saves up to 50% rail space compared to conventional distribution bars.



Product / Offering	Benefits and features
<p>Rapid Shutdown PV Vault</p> 	<ul style="list-style-type: none"> <li>- Application: Residential &amp; Small Commercial Rooftop</li> <li>- Meets NEC 690.12-2014, UL 1741 and CSA C22 requirements</li> <li>- 600VDC/20amps or less</li> <li>- Connects 2 to 4 strings/arrays</li> <li>- Dual MPPT outputs maintain the benefits of inverter channels</li> <li>- NEMA 4X enclosure permits 0-90 degree</li> <li>- Discharges PV array within 10 seconds</li> <li>- Local On/Off selector switch</li> <li>- Quick installation with two connections</li> </ul>
<p>PV solar tables</p> 	<ul style="list-style-type: none"> <li>- Built-to-order solutions can be customized for any PV module style, size, orientation and quantity</li> <li>- Tested and value-engineered to use the lightest gauge steel and fewest mounting piers to meet your projects' structural requirements at the lowest cost</li> <li>- Labor-saving Superstrut® solar table Ccamps, PV module clamps and cable hangers</li> </ul>
<p>Rooftop solar mounting systems</p> 	<ul style="list-style-type: none"> <li>- Custom design-to-order solutions</li> <li>- Can be used in a portrait or landscape orientation</li> <li>- Enables fast, easy installation with a unique "dragon-tooth" design</li> <li>- Quick and easy rooftop grounding and bonding applications</li> </ul>
<p>Modular Metal Framing System and Accessories</p> 	<ul style="list-style-type: none"> <li>- Available in 10' and 20' lengths in 14-gauge stainless steel</li> <li>- Available in a wide variety of other materials and finishes</li> <li>- Threaded rod and an assortment of accessories to complete the installation</li> <li>- Tolerant of extreme environments and corrosion resistant for long life</li> </ul>
<p>Solar panel hold down clamps, fittings, grounding</p> 	<ul style="list-style-type: none"> <li>- Application: residential &amp; commercial rooftop</li> <li>- Hold down clamps and grounding washers</li> <li>- Corrosion resistant materials</li> <li>- Ease of installation – slotted design</li> <li>- Works with all brands of solar panels</li> </ul>
<p>Ty-Rap cable edge solar clips</p> 	<ul style="list-style-type: none"> <li>- Application: residential &amp; commercial rooftop, solar panel wire management</li> <li>- U-Style cable management parallel to frame</li> <li>- W-Style for extra cable capacity Hold down clamps and grounding washers</li> <li>- Holds up to four #10 AWG solar cables</li> <li>- Corrosion resistant materials</li> <li>- Temperature rated. -85 to +194 degree F</li> <li>- Heat stabilized nylon 6.6 option rated -85 to +220 degree F</li> <li>- Quick and easy installations – no tools required</li> <li>- 90 degree installation available</li> </ul>
<p>Cable ties, tools and accessories</p> 	<p>ABB offers a full range of premium cable ties &amp; tools including:</p> <ul style="list-style-type: none"> <li>- Ty-Rap® weather-resistant nylon 12 cable ties for long life in direct (UV) sunlight and chemical environments.</li> <li>- Nylon 12 is a lower, moistureabsorbing material than Nylon 6.6, and the effect of water on properties is much less. For use in temperatures ranging from -40°F to 185°F (-40°C to 85°C)</li> <li>- Stainless steel cable ties: steel alloys available for enhanced corrosion protection and all quick, easy installation and secure locking</li> </ul>

Product / Offering	Benefits and features
<p data-bbox="107 113 480 140"><b>Deltec® cable tie and support system</b></p> 	<ul style="list-style-type: none"> <li data-bbox="602 113 1219 140">– Designed to perform a minimum of 20 years outdoors</li> <li data-bbox="602 142 1511 201">– Strap and body: weatherable acetal; offers superior resistance to sunlight, moisture and salt environments</li> <li data-bbox="602 203 1336 231">– Locking device: marine-grade, corrosion-resistance copper alloy</li> <li data-bbox="602 233 1300 260">– Continuous use temperature: -85°F to 194°F (-65°C to 90°C)</li> <li data-bbox="602 262 1300 289">– Installation temperature range: -30°F to 150°F (-34°C to 66°C)</li> <li data-bbox="602 291 1468 319">– Minimum tensile strength: standard 250 lbs. (1,211 N), Slim 180 lbs. (820 N)</li> <li data-bbox="602 321 1003 348">– Continuous load: 20 lbs. (9.07 kg)</li> </ul>
<p data-bbox="107 386 354 413"><b>Flexible conduit systems</b></p> 	<p data-bbox="602 386 1528 533">ABB is the global leader in non metallic and metallic cable protection systems &amp; glands led by the PMA &amp; Adaptaflex and T&amp;B Fittings brands of highly engineered nylon conduits and fittings. Our cable protection systems are designed to offer protection in extreme temperatures, demanding outdoor applications and offer excellent liquid ingress protection to secure continuous operation.</p>

Please note: This is ABB's global offering and some products might not be available in your country. Refer to [abb.com](http://abb.com) for your location.

# Contact us

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