LV5+ Solar Power Station

Plug & play solution for efficient, cost effective and dispatchable solar power

ge.com/renewableenergy/hybrid
GE has accumulated more than 7.5 gigawatts of total global installed base for its solar inverter technology, and was the first to introduce 1,500-volt to the solar market.

Today, building on this proven technology, GE’s new LV5+ Solar Power Station brings GE’s technology leadership together with its system integration capabilities to deliver a complete solar power station solution.

The LV5+ Solar Power Station provides a smart solution that is embedded with technology to help significantly reduce capital expenditure, operating expenses and ensure more reliable plant performance.

The levelized cost of electricity (LCOE) produced by solar power has come down by more than 70 percent since 2010 — and GE is focused on continuing the quest to further optimize the LCOE with innovative technology built on more than 120 years’ experience in the power sector.
Unlocking new value with integrated containerized solar power station to reduce CAPEX, OPEX and ensure more reliable plant performance

GE’s LV5+ Solar Power Station Helps to Optimize the Total Cost of Ownership for Solar Operations

Main features:
- 2.7 - 3.5 MW output power
- 
-25°C to +50°C operating temperature range, with cold weather option (-35°C)
- Installation altitude of 2000m (up to 4000m upon request, with derating)
- High efficiency
- Low maintenance air-cooling system
- Plug & play
- Night time disconnect option
- Direct outdoor installation
- Standard 20ft ISO high cube container for optimized logistics and installation
- Fibre-optic SCADA interface
- Digital APM ready

With GE’s system approach, our integrated power station helps solar developers and EPC’s to reduce their ‘total installed cost’, start-up risks and to improve the overall reliability of the solar power station assets.

Pre-assembled, and pre-tested for plug & play power
GE’s containerized LV5+ Solar Power Station solution allows for optimized logistics and installation. Equipment arrives onsite pre-fabricated and factory tested with integrated transformer, inverter and MV switchgear, allowing simple plant commissioning.

Made to withstand extreme environments
Conditions such as sand, dust, snow, hail or rain can shorten the lifespan of electrical components and harm the reliability of the equipment, causing lengthy and costly interruption to operations.

Featuring a reliable and robust air cooling system with air-to-air heat exchangers, GE’s LV5+ Solar Power Station helps to ensure dependable, virtually maintenance-free operation in most hot or harsh environments.

Innovative night time disconnect option
Grid connected equipment can consume ‘no-load’ power during night time hours, adding up to large costs over the PV plant lifetime. Embedded with smart controls, the LV5+ Solar Power Station uses this technology to eliminate no-load transformer losses at night.

Based on our calculations over 25 years from a 100 MW plant, this innovative night time disconnect option can enable OPEX savings of up to 15 GWh across the solar plant lifetime.

Digitally ready
GE’s solar solutions are compatible with GE’s Digital Solar APM, to improve solar asset return on investment and reduce operating risk. GE’s advanced digital solutions can help enable predictive, proactive and performance-based maintenance and operation cycles with significant reductions in associated operating expenses.

GE’s integrated plant level control system, SunIQ™, brings together real-time plant-wide data visualization, data analysis, and troubleshooting with plant level operational control to enhance grid integration of solar and improve solar power plant efficiency.
GE’s LV5+ Solar Power Station
up to 3.5 MW output power

**LVS® SOLAR INVERTER**
- 2.7 - 3.5 MW, high density
- Multiple DC & AC voltage ratings for optimum value
- 1500 Vdc voltage level
- Advanced grid features and reactive power control day and night for grid stabilization
- IEC and UL compliance

**MV STEP UP TRANSFORMER**
- Available for 22 / 33 / 34.5 kV
- Standard and high efficiency option
- Oil filled: Mineral - ONAN (Standard) Biodegradable - KNaN (Option)
- Extended monitoring available
- Night time disconnect option for eliminating the main transformer no-load losses during night

**DIGITALLY READY**
- Extended monitoring
- Advanced diagnostics for optimal performance monitoring
- Digital twin technology for lifecycle management
- Easily connect to Digital Solar APM software for increased energy production and reduced O&M costs
- Available with integrated plant level control system, SunIQ™ to further improve solar power plant efficiency.

**ROBUST OUTDOOR CONTAINER**
- Standard 20ft ISO high cube container solution for optimized logistics and installation
- Outdoor rated: IP 54 / NEMA3 (Inverter & RMU)
- Suitable for harsh environments
- Efficient, low maintenance air cooling
- Hermetically sealed power control unit
- COR-TEN steel with high performance C4 paint finish
- Mounting options: Piers / Pad / Gravel

**ELECTRICAL INTEGRATION**
- Pre-integrated and pre-tested
- Plug & play solution for reduced installation & commissioning times
- Ease of maintenance
- Up to 24 DC inputs
- Medium voltage AC connections
- Customer auxiliary power distribution
- Externally accessible LV & communications customer interface
- Fibre-optic SCADA interface

**TRANSPORTATION PANELS**

**ROBUST OUTDOOR CONTAINER**

**LV Panel**

**LVS® Solar Inverter**

**MV Step-Up Transformer**

**Robust Outdoor Container**
LV5+ Solar Power Station Data

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Units</th>
<th>LV5+ 1560 Solar Power Station</th>
<th>LV5+ 1563 Solar Power Station</th>
<th>LV5+ 1566 Solar Power Station</th>
<th>LV5+ 1569 Solar Power Station</th>
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</thead>
<tbody>
<tr>
<td><strong>Input Data</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>MPPT Range</td>
<td>Vdc</td>
<td>853 - 1300</td>
<td>895 - 1300</td>
<td>938 - 1300</td>
<td>980 - 1300</td>
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<td>Max Permissible DC Voltage</td>
<td>Vdc</td>
<td>1500</td>
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<tr>
<td>Max Continuous DC Current (at 35°C / 50°C)</td>
<td>Adc</td>
<td>4000 / 3200</td>
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<td>Max DC Short Circuit Interrupt Rating</td>
<td>Adc</td>
<td>12000</td>
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<td>Number of MPPT</td>
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<td>Number of DC Inputs</td>
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<tr>
<td><strong>Output Data - Medium Voltage</strong></td>
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<tr>
<td>Transformer HV / LV Connection</td>
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<tr>
<td>Efficiency at 100% Load (Standard / High)</td>
<td>%</td>
<td>98.8 (Standard) / 99.1 (Option)</td>
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<tr>
<td>Active AC Output Power (Pf=1)^1</td>
<td>MW</td>
<td>3.08 / 2.73</td>
<td>3.23 / 2.87</td>
<td>3.40 / 3.00</td>
<td>3.54 / 3.14</td>
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<tr>
<td>AC Output Voltage</td>
<td>kVdc</td>
<td>22 / 33 / 34.5</td>
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<tr>
<td>Max AC Current (at 50°C)</td>
<td>Aac</td>
<td>27 / 48 / 46</td>
<td>76 / 51 / 48</td>
<td>80 / 53 / 51</td>
<td>83 / 56 / 53</td>
</tr>
<tr>
<td>Max AC Current (at 35°C)</td>
<td>Aac</td>
<td>82 / 55 / 52</td>
<td>86 / 57 / 55</td>
<td>90 / 60 / 57</td>
<td>94 / 63 / 60</td>
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<tr>
<td>Grid Frequency</td>
<td>Hz</td>
<td>50 / 60</td>
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<tr>
<td>Power Factor (Pf) Range</td>
<td></td>
<td>0 - 1</td>
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<tr>
<td>Current Harmonic Distortion (THD)</td>
<td>%</td>
<td>&lt;3</td>
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<tr>
<td>Medium Voltage Cable</td>
<td></td>
<td>Designed for 630 mm² / 1500 MCM max</td>
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<tr>
<td><strong>Efficiency &amp; Auxiliary Power</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Efficiency (Max / EU / CEC)^2</td>
<td>%</td>
<td>97.8 / 97.6 / 97.7</td>
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<td></td>
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<tr>
<td>Inverter Efficiency (Max / EU / CEC)^3</td>
<td>%</td>
<td>98.5 / 98.6 / 98.7</td>
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<tr>
<td>System Nighttime Aux Power^7</td>
<td>W</td>
<td>≤ 700</td>
<td></td>
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<tr>
<td><strong>Interfaces</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Plant Control Interface / PLC</td>
<td></td>
<td>EtherNet/IP / Modbus TCP, OPCUA, EGD</td>
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<tr>
<td>Programming / Diagnostic Interface</td>
<td></td>
<td>EtherNet/IP / Modbus TCP, OPCUA</td>
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<tr>
<td>Extra Analog and Digital I/O</td>
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<td>Option</td>
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<tr>
<td><strong>Features and Options</strong></td>
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<tr>
<td>Cooling</td>
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<td>Air Cooled</td>
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<tr>
<td>Emergency Shut Down</td>
<td></td>
<td>Included</td>
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<tr>
<td>Mounting Options</td>
<td></td>
<td>Piers / Pad / Gravel</td>
<td></td>
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<tr>
<td>Array Configurations Supported</td>
<td></td>
<td>Negative Pole Grounded or Floating</td>
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<tr>
<td>Ground Fault Monitoring</td>
<td></td>
<td>Standard for Grounded Arrays, Option for Floating Arrays</td>
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<tr>
<td>Nighttime Transformer Disconnect</td>
<td></td>
<td>Option</td>
<td></td>
<td></td>
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<tr>
<td>Nighttime VAR Function</td>
<td></td>
<td>Option</td>
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</tr>
<tr>
<td>Insulation Monitoring</td>
<td></td>
<td>Option</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Disconnect AC Side</td>
<td></td>
<td>Motorized AC Circuit Breaker</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

^1 At nominal voltage, ideal grid conditions, and PF=1 (at 50°C)
^2 Up to 5 times per lifetime
^3*No active power reduction - Altitude <= 2000m, grid voltage ± nominal voltage
^4*Operating will apply according to PQ curves
^5*Includes auxiliary power losses
^6*Includes all environmental controls enabled DC link de-energized and without main transformer with both buses, no inverter loss. For inverter only auxiliary needs
^7*No heating, no cooling, without environmental controls enabled DC link de-energized and without main transformer with both buses, no inverter loss. For inverter only auxiliary needs
^9*No heating, no cooling, without environmental controls enabled DC link de-energized and without main transformer with both buses, no inverter loss. For inverter only auxiliary needs
^10*Cold weather option on request
^11*Maximum wind speed without derating 81 kph / 50 mph

LV5+ Solar Power Station

**Specifications**

- **Units**: LV5+ 1560 Solar Power Station
- **Switch-Disconnect DC Side**: Motorized DC Switch
- **Oversvoltage Protection, DC and AC**: Included - IEC 61643-1 Class II / UL 1449
- **Main Power Transformer Oil Type**: Mineral - ONAN (Standard) / Biodegradable - KNaN (Option)
- **Oil Containment**: Option
- **Aux Power for Tracker / Customer Loads**: Option (up to 100 kVA)
- **Door Interlocking System**: Option
- **Weather Station**: Option
- **Noise (at 1m / 10m)^4**: dB(A) ≤ 85 / ≤ 75
- **Weight**: kg / lbs approx. 17000 / 37480

**Protection Rating and Ambient Conditions**

- **Operating Temperature Range**: °C -25 to +50
- **Storage Temperature Range**: °C -40 to +65
- **Cold Weather Option^5**: °C -35 to +50
- **Humidity**: % 5 - 100 (rated for outdoor installation)
- **Maximum Altitude without Derating^6**: m / ft 2000 / 6562
- **Seismic Zone**: Zone 2B ASCE 7 / IBC
- **Maximum Wind Speed^7**: kph / mph 250 / 155
- **Snow Load**: ASCE 7
- **NEMA Rating / IP Class**: NEMA 3 / IP54 (Inverter & RMU)

**Standards**

- **Electromagnetic Compatibility (EMC)**: EN 61000-6-2, 62920 / CiSPr 11
- **Certifications**: IEC, CE, UL 1741 SA

**Power Station Size**

**Dimensions**

<table>
<thead>
<tr>
<th>Units</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>m / ft</td>
<td>6.1 / 20ft</td>
<td>2.4 / 8</td>
<td>2.9 / 8.5</td>
</tr>
</tbody>
</table>

**Weight (kg / lbs)^8**: approx. 17000 / 37480
Serving a global customer base with local expertise and extensive installed base

With GE, you do not simply acquire a powerful piece of kit—you gain a partner committed to making your venture a success through its entire lifetime. From facilitating financing to project management, maintenance and repair, we coordinate and combine resources, partnerships and expertise every step of the way—helping our customers to reduce risk, protect assets, maximize productivity and optimize O&M costs. GE’s customized service agreements, available throughout the entire lifecycle of the plant, include:

Remote Operations Center
Provides continuous monitoring and diagnostics services 24 hours a day, 365 days a year. Our digital solutions can enable continuous tracking of key operating parameters and detects abnormal conditions. GE technicians can then troubleshoot or reset the equipment remotely, in real-time.

Planned Maintenance
 Routinely service equipment and keep solar power equipment running, resulting in superior fleet performance.

Unplanned Maintenance
 Monitor, troubleshoot and repair equipment, using predictive analytics to boost uptime and lifecycle production and reduce downtime.

Parts Plan
Provide full range of offerings to cover preferred levels of spare parts service. Our forecasting capability, driven by fleet-wide parts consumption data configuration and management knowledge, can even help to predict what you may need.

Availability Guarantee
GE, as your solar partner, offers a range of partnership models designed to achieve investable returns without compromising on quality. GE’s equipment and bankability ensures optimal development costs and can include availability guarantees tailored to the respective financing and customer requirements.

Complete Project Solutions with Service Offering for Solar

More than 7.5 GW total installed base

1st to introduce 1500 V technology

- 4680+ MW
- 1100+ MW
- 290+ MW
- 1000+ MW
- 340+ MW
About GE Renewable Energy

GE Renewable Energy is a $15 billion business which combines one of the broadest portfolios in the renewable energy industry to provide end-to-end solutions for our customers demanding reliable and affordable green power. Combining onshore and offshore wind, blades, hydro, storage, utility-scale solar, and grid solutions as well as hybrid renewables and digital services offerings, GE Renewable Energy has installed more than 400+ gigawatts of clean renewable energy and equipped more than 90 percent of utilities worldwide with its grid solutions. With nearly 40,000 employees present in more than 80 countries, GE Renewable Energy creates value for customers seeking to power the world with affordable, reliable and sustainable green electrons.

For more information on GE’s LV5+ Solar Power Station and Solar Solutions, please visit www.ge.com/renewableenergy/hybrid