EFASOLAR PVStation Solutions
Efacec is a century-long experienced company in providing power conversion product solutions, we develop advanced fully integrated photovoltaic converter stations, covering the entire electric conversion chain for photovoltaic power plants.

EFASOLAR PVStation solution is highly competitive for large photovoltaic plants. A complete solution with in-house developed products, according to the highest efficiency and reliability standards, achieved through solar inverters, medium voltage switchgear, transformer, energy automation solutions and the enclosure.

With an entirely integrated approach, we are also able to provide photovoltaic grid-connection substations and interface solutions to the grid operator dispatch through its energy automation solutions.

Seeking for the highest performance during the EFASOLAR PVStation lifetime, optionally support services are available from base maintenance to a 24/7 protection approach and a multiple after sales packages assuring high availability and performance of our products.

---

**EFASOLAR PVStation Solutions**

Efacec Inverter

- **Rated Power**
  - 0,25 MW
  - 0,50 MW
  - 1 MW
  - 1,46 MW
  - 2 MW
  - 2,2 MW
  - 2,33 MW
  - 2,52 MW
  - 3 MW
  - 3,49 MW
  - 4 MW
  - 4,46 MW

Efacec MV Transformer

- **Rated Power**
  - ≤ 36 kV

Efacec MV Switchgear

- Configurable Blocks
- Metering
- Compact
- Modular

**After Sales**

- Hotline
- Maintenance
- Life Cycle Warranty Options

---

**Enclosure**

- Concrete / Metal
- Modular Padmount / UL
- Container 20ft. / 40ft.

**Efacec SCADA Monitoring System**

- Power Plant Controller
- String Monitoring Integration
- Dispatch / DNO / ISO Interface
- High Reliability System (Hot-standby Redundancy)
- User Friendly Web based HMI

---

**Rated Power**

<table>
<thead>
<tr>
<th>1,00 MW</th>
<th>2,00 MW</th>
<th>3,49 MW</th>
<th>4,00 MW</th>
<th>4,66 MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x 500M</td>
<td>2 x 1000</td>
<td>3 x 1165</td>
<td>4 x 1000</td>
<td>4 x 1165</td>
</tr>
<tr>
<td>2 x 575 kV</td>
<td>2 x 1200 kV</td>
<td>3 x 1400 kV</td>
<td>2 x 1200 kV</td>
<td>4 x 1400 kV</td>
</tr>
<tr>
<td>2 x 1084 A</td>
<td>2 x 1600 A</td>
<td>3 x 1950 A</td>
<td>4 x 1600 A</td>
<td>4 x 1950 A</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>16</td>
<td>12</td>
<td>16</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>1000 kVA</td>
<td>2000 kVA</td>
<td>1 x 3490 kVA</td>
<td>2 x 2000 kVA</td>
<td>2 x 2300 kVA</td>
</tr>
<tr>
<td>2 x IS + CIS / IS + CIS</td>
<td>2 x IS + CIS / IS + CIS</td>
<td>2 x IS + CIS / IS + CIS</td>
<td>2 x IS + CIS / IS + CIS</td>
<td>2 x IS + CIS / IS + CIS</td>
</tr>
<tr>
<td>36 kV</td>
<td>36 kV</td>
<td>36 kV</td>
<td>36 kV</td>
<td>36 kV</td>
</tr>
<tr>
<td>Concrete / Container / Modular / Padmount UL</td>
<td>Concrete / Container / Modular / Padmount UL</td>
<td>Concrete / Container / Modular / Padmount UL</td>
<td>Concrete / Container / Modular / Padmount UL</td>
<td>Concrete / Container / Modular / Padmount UL</td>
</tr>
</tbody>
</table>

---

*Note: configurations available upon request.*
EFASOLAR PVStation 20ft Container

Efacce worldwide transportable and compact PVStation solution.

The best solution for large scale PV power plant where the transportation is a key point. With his standard container size is a plug & play solution for any kind of installation in any local conditions type.

**Customer Benefits**
- 20ft solutions up to 2,33 MVA
- Reduced transportation and installation cost
- Plug & play solution
- Configurable MV switchgear functions
- High efficiency cooling system

**Key Benefits**
- All Efacce equipment are manufactured in-house
- Efacce single source for technology
- One single warranty for entire PVStation
- One service support for all products
- Robust and high quality container

**Electrical**
- DC input
- Number of independent MP3 inputs: up to 14
- DC output: up to 2,33 MVA
- Rated power: up to 2,33 MVA
- Grid frequency: 50 / 60 Hz
- Grid rated voltage: from 6,6 kV up to 36 kV
- Power factor: 1,0 / 0,8 inductive to 0,8 capacitive
- Transformer: Efacec MV Switchgear
- Inverter: Efacec Inverters
- Transformer: Efacec LV/MV Transformer
- Inverter: Communication Board
- Transformer: LV/LV Transformer
- Transformer: Efacec Dry type / Efacec Oil immersed
- Transformer: MV Switchgear
- Transformer: MV Switchgear functions (Star topology, 2x IS + CIS (fuse) / 2x IS+DC (breaker) + Protection Relay panel, Ring topology, 2x IS + CIS (fuse) / 2x IS+DC (breaker) + Protection Relay panel)
- Protective devices: DC disconnect device, Motor-drive switch disconnector, DC overvoltage protection: Type II surge arrester, AC disconnect device: Fuse / Circuit breaker, AC overvoltage protection: from 75 kV to 180 kV
- Protective devices and protective functions included: Underfrequency, Overfrequency, Short circuit on the output, Overtemperature, Asymmetrical current, DC unbalance strings, and others

**General data**
- Enclosure type: 20ft HC Container
- Dimensions (WxLxH): 2438 x 6058 x 2896 mm
- Weight: ≤ 22 ton
- Standard temperature range: -20 ºC ... +60 ºC / -4 ºF ... +140 ºF
- Max. permissible value for relative humidity (noncondensing): ≤ 95%
- Cooling concept: Energy efficient air forced cooling system
- Altitude for rated conditions / Maximum operating altitude above sea level: 1000 m / 3000 m
- Protection degree: Inverter and MV switchgear compartments: IP 54 / Transformer compartment: IP21

**Options**
- Inverters: DC fused inputs configurable, Optical-Fiber communication ports
- LV/MV Transformer: Transformer alarm contacts (thermometer, DGPT or others)
- MV Switchgear: MV circuit breaker (DC function), CTs and VTs in MV modules, MV protection relay with progressive auto-recloser
- Others: UPS, Communications board, Air conditioning, Auxiliary transformer for trackers supply, Dust protection filter levels, Meteorological Station, Efacs Monitoring systems, Efacec Management solutions, Intrusion and fire detection systems, external lighting systems,和 others

---

(1) Other configurations can be used.
(2) Power factor > 0,98 at rated output voltage and power load > 15%.
(3) The adjustable range can be extended and other values can be configured.
(4) Other configurations can be used.
(5) Please consult the EFASOLAR inverter technical information about the power derate with temperature within the indicated operating range.
(6) Please consult Efacce with the specific operating conditions in order to characterize an eventual derate with altitude.
(7) Several rated power are available up to 30 kVA.
EFASOLAR PVStation 40ft Container

The right solution for utility scale PV power plant for overseas projects. This Efacec PVStation standard container size is a plug & play solution for all kind of projects, with several cooling options, covering all environmental conditions.

Customer Benefits
- 40ft solutions up to 4,66 MVA
- Standard transportation
- Plug & play solution
- Configurable MV switchgear functions
- High efficiency cooling system

Key Benefits
- All Efacec equipment are manufactured in-house
- Efacec single source of technology
- One single warranty for entire PVStation
- One service support for all products
- Robust and high quality container

EFASOLAR Inverters
(from 500 kVA to 1165 kVA)

Isolated with sandwich and anti-corrosion treatment

EFASOLAR PVStation 40ft Container

High efficiency cooling system to withstand severe weather conditions

Efacec MV Switchgear
(Configurable functions up to 36 kV)

Protection grid

Efacec LV/MV Transformer
(Dry type or Oil Immersed)

Transformer oil containment

Electrical

DC input
- Number of independent MPP inputs: 4
- Number of DC basis options: up to 24
- Rated power: up to 4,66 MVA

Rated frequency: 50 / 60 Hz

Grid nominal voltage: 6,6 kV up to 36 kV

Power factor / Displacement power factor: 1,0 / 0,8 inductive to 0,8 capacitive

Equipment
- Inverter: digital inverters
- LV/MV Transformer: Efacec Dry type / Efacec Oil immersed
- MV Transformer: standards
- MV Switchgear: Efacec Fluofix / Efacec Normafix (up to 36 kV)
- MV Switchgear functions
  - Star topology: IS + CIS (fuse) / IS + 2x CIS (fuse) / IS + DC (breaker) / IS + 2x DC (breaker) + Protection Relay panel
  - Ring topology: 2x IS + CIS (fuse) / 2x IS + 2x CIS (fuse) / 2x IS + DC (breaker) / 2x IS + 2x DC (breaker) + Protection Relay panel

Protection devices
- DC disconnect device: Motor-drive switch disconnector
- DC overvoltage protection: Type II surge arrester
- AC disconnect device: Fuse / Circuit breaker
- AC overvoltage protection: from 75 kV to 180 kV

Other protective devices and protective functions included
- Protective devices and protective functions included
- Protective devices and protective functions included
- Protective devices and protective functions included

General data
- enclosure type: 40ft HC Container
- dimensions (W x L x H): 2438 x 12116 x 2896 mm
- weight: ≤ 28 ton
- standard temperature range: -20 ºC ... +60 ºC / -4 ºF ... +140 ºF
- max. permissible value for relative humidity (noncondensing): ≤ 95%

Cooling concept
- Energy efficient air forced cooling system

Altitude for rated conditions / Maximum operating altitude above sea level: 1000 m / 3000 m

Protection degree
- Inverter and MV switchgear compartments: IP 54
- Transformer compartment: IP21

Others
- Earth circuit, illumination, power outlets, safety equipment, transportation parts, anti-corrosion treatment.

Optional
- Inverters: DC fused inputs configurable, Optical-Fiber communication ports
- LV/MV Transformer: Transformer alarm contacts (thermometer, DGPT or others)
- MV Switchgear: MV circuit breaker (DC function), CTs and VTs in MV modules, MV protection relay with progressive auto-recloser

Others
- UPS, Communications board, Air conditioning, Auxiliary transformer for trackers supply, dust protection filter levels, Meteorological Station, Efacec Monitoring systems, Efacec Management solutions, intrusion and fire detection system, external lighting system and others

(1) Other configurations can be used.
(2) Power factor > 0,98 at rated output voltage and power load > 15%.
(3) The adjustable range can be extended and other values can be configured.
(4) Other configurations can be used.
(5) Please consult the EFASOLAR inverter technical information about the power derate with temperature within the indicated operating range.
(6) Please consult Efacec with the specific operating conditions in order to characterize an eventual derate with altitude.
(7) Several rated power are available up to 30 kVA.
PVSStation with improved robustness with all Efacec equipment in a plug & play mode.

Full solution designed to support the most severe weather conditions to ensure the highest performance. It is a robust solution with fast installation, easy maintenance allowing to minimized the OPEX and maximize the energy generation.

Customer Benefits

- Solutions up to 2 MVA
- Reliability and Robustness solution
- Low temperature variation inside PVSStation
- Plug & play solution
- Configurable MV switchgear functions

Key Benefits

- All Efacec equipment are manufactured in-house
- Efacec single source of technology
- One single warranty for entire PVSStation
- One service support for all products
- Ready to integrate more Efacec products

---

### Technical Specifications

**Electrical**

- **DC input**
  - Number of independent MPP inputs: 4
  - Number of AC input sources: up to 12

- **DC input**
  - Rated power: up to 2 MVA
  - Rated frequency: 50 / 60 Hz
  - Rated voltage: 6,6 kV up to 36 kV

- **PV Tracker**
  - Power factor: > 0,98 at rated output voltage and power load > 15%

**Equipment**

- **Inverter**
  - Efacec Inverters
  - Rated voltage: up to 36 kV

- **Transformer**
  - Efacec LV/MV Transformer
  - Transformer standards: IEC 60076 standard (Ecodesign normative optional)
  - Transformer oil containment

- **Switchgear**
  - Efacec MV Switchgear
  - MV Switchgear functions: Star topology

**Protective devices**

- DC disconnect device
- AC disconnect device
- Overvoltage protection from 75 kV to 180 kV

**Other protective devices and protective functions included**

- Auxiliaries overvoltage protection, Ground fault monitoring, Overvoltage, Undervoltage, Overfrequency, Underfrequency, Anti-islanding, Reverse Polarization, Short circuit on the output, Overtemperature, Asymmetrical current, DC unbalance strings, and others

**General data**

- **Enclosure type**
  - Concrete

- **Dimensions (WxLxH)**
  - 4500 / 5500 / 6500 / 7500 / 8500 x 2520 x 2600 mm

- **Weight**
  - ≤ 35 ton

- **Standard temperature range**
  - -20 ºC ... +60 ºC / -4 ºF ... +140 ºF

- **Max. permissible value for relative humidity (noncondensing)**
  - ≤ 95%

- **Cooling concept**
  - Energy efficient air forced cooling system

- **Altitude for rated conditions / Maximum operating altitude above sea level**
  - 1000 m / 3000 m

**Equipment Optional**

- **Inverters**
  - DC fused inputs configurable, Optical-Fiber communication ports

- **LV/MV Transformer**
  - Transformer alarm contacts (thermometer, DGPT or others)

- **MV Switchgear**
  - MV circuit breaker (DC function), CTs and VTs in MV modules, MV protection relay with progressive auto-recloser

- **Others**
  - UPS, Communications board, Air conditioning, Auxiliary transformer for trackers supply, Dust protection filter, METEOROLOGICAL STATION, EFACEC MONITORING systems, EFACEC MANAGEMENT solutions, Intrusion and fire protection systems, External lighting systems and others

---

(1) Other configurations can be used.
(2) Power factor = 0,98 at rated output voltage and power load > 15%
(3) The adjustable range can be extended and other values can be configured.
(4) Other configurations can be used.
(5) Please consult the EFASOLAR inverter technical information about the power derate with temperature within the indicated operating range.
(6) Please consult Efacec with the specific operating conditions in order to characterize an eventual derate with altitude.
(7) Several rated power are available up to 30 kVA.
EFASOLAR PVStation Modular

With concrete or metallic solution these PVStation are designed to simplify the transport operation in projects with difficult access, or correspondance with particular requirements. The local integration of the outdoor transformer and the inverters and MV switchgear enclosure(s), ensures the necessary flexibility in terms of logistics and compliance with local requirements, while maintaining the high level of performance and reliability.

### Customer Benefits
- Solutions up to 4,66 MVA
- Flexible solution
- Reliability and Robustness solution
- Customization available to each project
- Configurable MV switchgear functions

### Key Benefits
- All Efacec equipment are manufactured in-house
- Efacec single source of technology
- One single warranty for entire PVStation
- One service support for all products
- Modular blocks to simplify the transportation

---

**EFASOLAR Inverters** (from 500 kVA to 1165 kVA)

**Efacec Concrete or 20ft / 40ft Container enclosure**

---

**General Data**

- **Enclosure**
  - Concrete or 20ft / 40ft Container
- **Weight**
  - ≤ 35 ton
- **Standard temperature range**
  - -20 ºC ... +60 ºC / -4 ºF ... +140 ºF
- **Max. permissible value for relative humidity (noncondensing)**
  - ≤ 95%
- **Cooling concept**
  - Energy efficient air forced cooling system
- **Altitude for rated conditions / Maximum operating altitude above sea level**
  - 1000 m / 3000 m
- **Protection degree**
  - Inverter and MV switchgear compartments: IP 54 / Transformer: IP65
- **Features**
  - Auxiliary circuit transformer
    - 230 V, 50/60 Hz
  - Auxiliary circuit board
    - 10 fields
  - **Photovoltaic DC**
    - Transformer of appropriate size
  - **Communication protocol**
    - Modbus TCP / RTU
  - **Lighting solution**
    - Indoor lighting and outdoor lighting solutions
  - **Others**
    - Earth circuit, Illumination, power outlets, Safety equipment, transportation parts, anti-corrosion treatment

**Optional**

- **Inverters**
  - DC fused inputs configurable, Optical Fiber communication ports
- **MV Switchgear**
  - SF circuit breaker, SF6, air, and 420 in MV switchgear, air protection relay with progressive auto-recloser
- **Others**
  - UPS, Communications board, Air conditioning, busbar transformer for trackers supply, short protection filter

---

**Technical Data**

- **Payment power**
  - up to 4,66 MVA
- **Rated power**
  - up to 4,66 MVA
- **Grid frequency**
  - 50 / 60 Hz
- **Grid rated voltage**
  - from 6,6 kV up to 36 kV
- **Power factor**
  - / Displacement power factor
  - 1,0 / 0,8 inductive to 0,8 capacitive

---

**Equipment**

- **Inverter**
  - Efacec Inverters
- **LV/MV Transformer**
  - Efacec Oil immersed
- **Transformer standards**
  - IEC 60076 standard (Ecodesign normative optional)
- **MV Switchgear**
  - Efacec Fluofix / Efacec Normafix (up to 36 kV)

**MV Switchgear functions**

- **Star topology**
  - IS + CIS (fuse) / IS + 2x CIS (fuse) / IS+DC (breaker) / IS+ 2x DC (breaker) + Protection Relay panel
- **Ring topology**
  - 2x IS + CIS (fuse) / 2x IS + 2x CIS (fuse) / 2x IS+DC (breaker) / 2x IS+ 2x DC (breaker) + Protection Relay panel

**Protective devices**

- **DC disconnect device**
  - Motor-drive switch disconnector
- **DC overvoltage protection**
  - Type II surge arrester
- **AC disconnect device**
  - Fuse / Circuit breaker
- **AC overvoltage protection**
  - from 75 kV to 180 kV

**Other protective devices and protective functions included**

- Overvoltage, Undervoltage, Overfrequency, Underfrequency, Anti-islanding, Reverse polarization, Short circuit on the output, Overtemperature, Asymmetrical current, DC unbalance strings, and others

---

**Presentation Information**

- **Additional configurations can be used.**
- **Power factor > 0,98 at rated output voltage and power load > 15%**
- **The adjustable range can be extended and other values can be configured.**
- **Other configurations can be used.**
- **Please consult the EFASOLAR inverter technical information about the power derate with temperature within the indicated operating range.**
- **Please consult the Efacec technical information about the power derate with altitude.**
- **Several rated power are available up to 10 MW.**