

# Modular Systems solar portfolio overview

## Power Collection and Grid Connection products



# Modular Systems solar portfolio

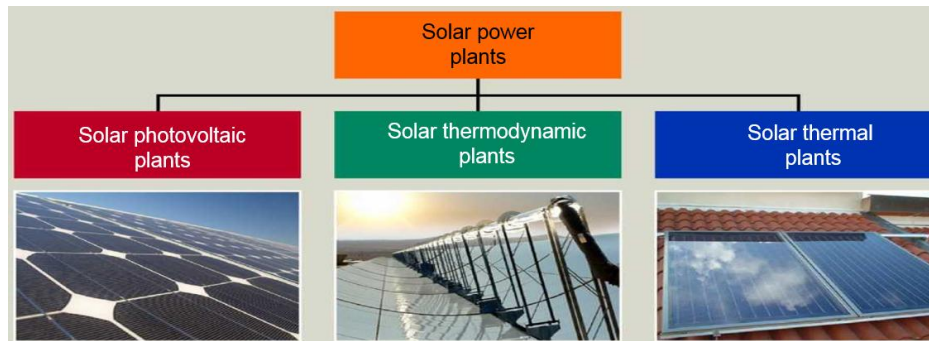
## Solar power - definition

Solar power is the conversion of sunlight into electricity. Sunlight can be converted directly into electricity using photovoltaics (PV), or indirectly with concentrating solar power (CSP), which normally focuses the sun's energy to boil water.

Many countries have started to build solar power plants, replacing other sources of energy generation.

Since solar radiation is intermittent, solar power generation is usually combined either with storage or other energy sources to provide continuous power.

Solar power requires collecting the power from the panels, converting to AC, stepping up to a transportable and useable voltage level and protecting all electrical equipment. In small installations, this power can be used directly, while in larger installations, the power is collected at multiple points and connected to the grid through a separate substation.



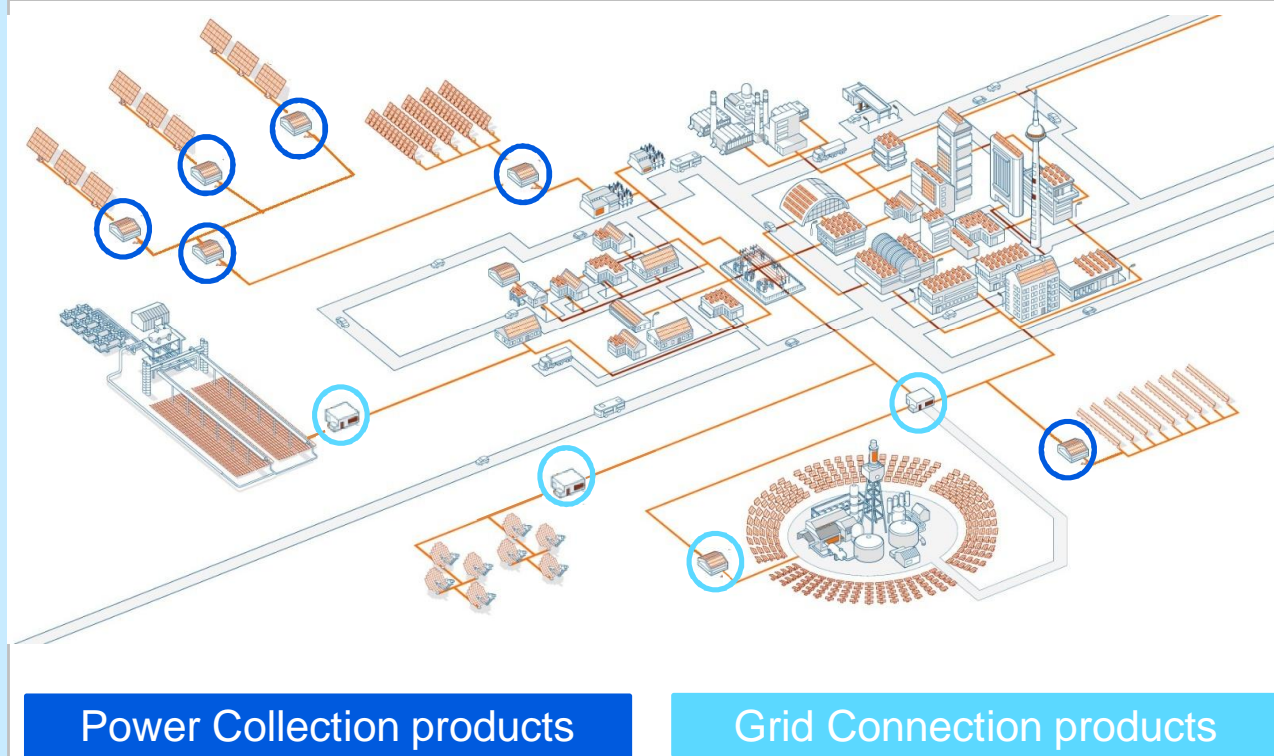
## Green designs for solar power

# Modular Systems solar portfolio

## Solar Power Collection and Grid Connection points

### Power Collection products

The Power Collection product portfolio is designed to collect power from the solar strings and transform it to suitable AC medium voltage power.



### Grid Connection products

The Grid Connection product portfolio is designed to collect AC power from multiple Power Collection points and connect them to the grid.

**Green designs for solar power**

# Modular Systems solar portfolio

## Solar Power Collection and Grid Connection products

Power Collection products are factory assembled, routine tested and available in several layouts:

**Secondary Skid Units (SSU)** – Most economic solution for solar Power Collection



**Secondary Enclosed Units (SEU)** – Offering completely assembled solutions with optimized footprint, including transformer and MV switchgear. Optionally indoor inverter can be used with SEU units.



**Compact Secondary Substations (CSS)** – Internal arc tested for highest safety levels, highly recommended for public installations



Grid Connection products are available in various factory assembled and routine tested packages:

**E-Houses** – Metal enclosed buildings for safety and simple maintenance



**Skid-mounted substations** – An economic option with easy access to equipment



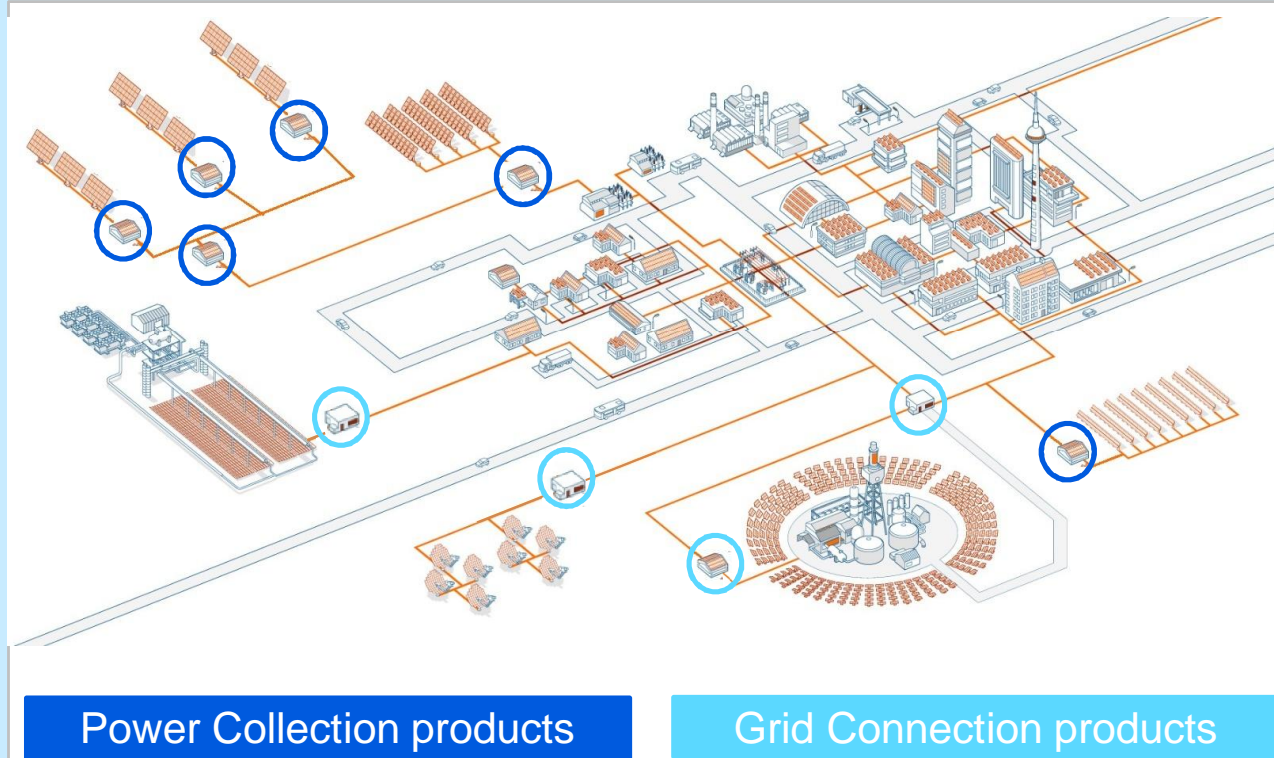
**Green designs for solar power**

# Modular Systems solar portfolio

## Grid Connection products

### Grid Connection products:

The Grid Connection product range is designed to collect power from the Power Collection units and connect it to the grid. Grid Connection products include MV primary switchgear; while auxiliary transformers, ancillary equipment, step up transformers and HV equipment are all options depending on the installation.



### Grid Connection product advantages:

- Minimized engineering time
- Lower site installation time
- Pre-assembled and tested resulting in reduced commissioning time
- Products designed specifically for the local utility applications and standards

**Green designs for solar power**



# Grid Connection products

## E-House

E-House solutions are steel buildings that house the MV switchgear, control and communication panels. This solution protects the operator from the environmental conditions as well as restricts close access to the equipment for non authorized personnel without additional fencing. The enclosure can also house auxiliary equipment, safety devices and communication equipment. A step-up transformer can be installed internally to reduce wear and simplify maintenance.

### Typical equipment:

- MV switchgear
- Control and communication panels
- Oil or dry transformer (optional)

### Benefits:

- High level of reliability and safety for equipment and personnel
- Simple and quick installation – pre-test units at the factory, drop in place and connect cables
- All ABB designs are green to support the environment
- Safety interlocking designs available
- SCADA ready packages available
- All equipment contained in the solar modules are type-tested according to their relevant standards
- Minimized engineering time
- Products designed specifically for the local utility applications and standards
- Restricted access to switchgear area
- Protection from environment
- Walk in solution for ease of maintenance

## E-House



**Green designs for solar power**

# Grid Connection products

## Skid-mounted Substation

Skid-mounted solutions offer easily accessible MV switchgear panels in outdoor enclosures mounted on a stiff, metal, skid base. Switching operations are performed externally to provide the most compact design. The solution can also include a step up transformer mounted on the same skid base.

Typical equipment:

- MV switchgear in outdoor enclosure
- Dry or oil transformer (optional)

Benefits:

- High level of reliability and safety for equipment and personnel
- Simple and quick installation – pre-test units at the factory, drop in place and connect cables
- All ABB designs are green to support the environment
- Safety interlocking designs available
- SCADA ready packages available
- All equipment contained in the solar modules are type-tested according to their relevant standards
- Minimized engineering time
- Products designed specifically for the local utility applications and standards
- Compact footprint
- Economic solution
- Quick access reduces maintenance time

### Skid-mounted substation



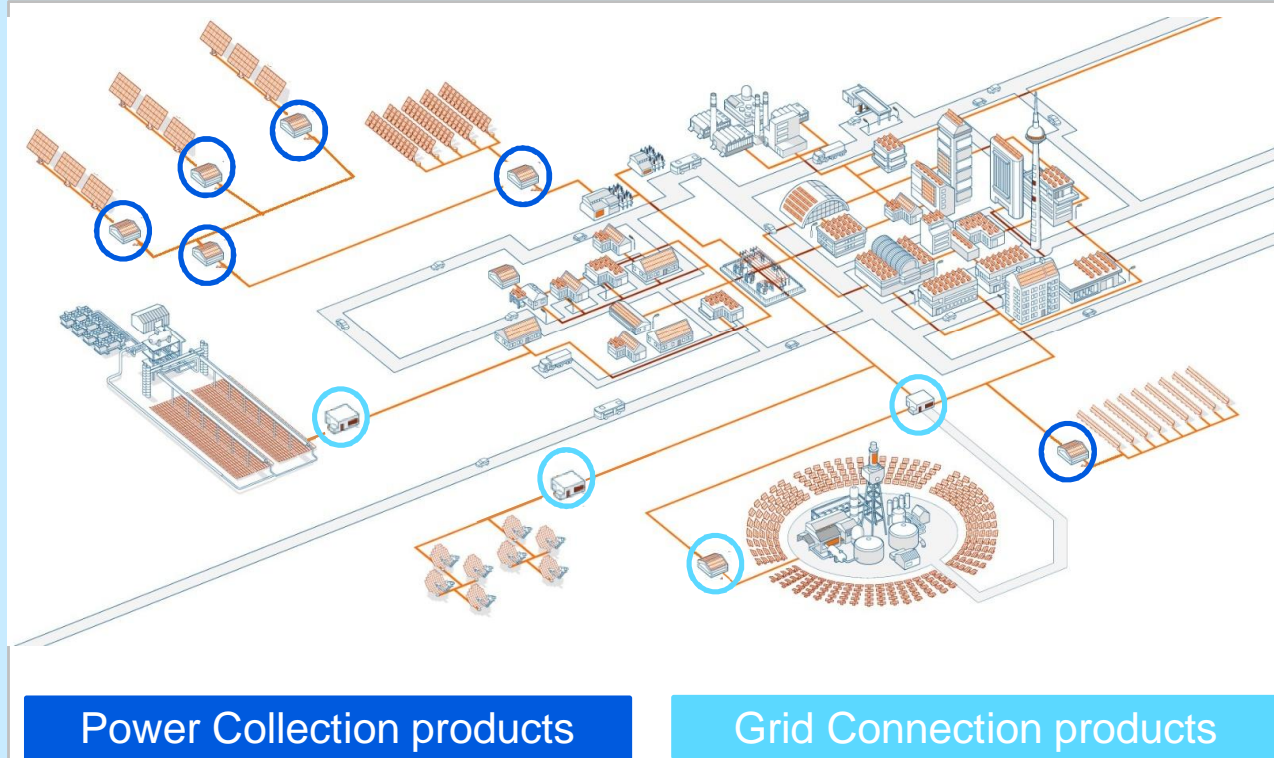
**Green designs for solar power**

# Modular Systems solar portfolio

## Power Collection products

### Power Collection products:

Power Collection products transform voltage and distribute it in Medium Voltage networks. ABB has a wide portfolio to address different installation locations and technical configurations.



### Power Collection product advantages:

- Green and ecofriendly
- Compact footprints
- Economic solutions
- Shorter installation times
- Factory tested
- Safety oriented

**Green designs for solar power**



# Power Collection products

## Secondary Skid Unit

The SSU is a skid-mounted, compact solution. It is the most economical way to offer Power Collection and transform AC low voltage to medium voltage. Pre-assembled and factory-tested solutions assure minimized site works reducing risks and time. A popular option in the SSU is to cover the transformer with steel mesh giving efficient cooling and increased safety (SSU-P).

Typical equipment:

- SF6 or Air insulated switchgear up to 40.5 kV
- Oil or dry type transformer up to 3500 kVA

Optional equipment:

- Automation for remote monitoring and control
- Switch with fuse to reduce costs in lower rated installations
- Dry type transformer to increase safety

Benefits:

- Simple and quick installation – pre-test units at the factory, drop in place and connect cables
- Pre-engineered products to reduce time to quote and supply, while reducing risks
- Engineered for efficient cooling in order to extend the life of the equipment
- All ABB designs are green to support the environment
- No exposed live parts, more safe for operator and personnel
- SCADA ready
- All equipment contained in the solar modules are type tested according to their relevant standards
- Easy access to equipment for visual inspection and service
- Open-air cooling for maximum efficiency
- Compact and easily transportable
- Economic solution
- Locking system for MV compartment to prevent unauthorized entry

### Secondary Skid Unit (SSU)



### Secondary Skid Unit-P (SSU-P)



**Green designs for solar power**

# Power Collection products

## Secondary Enclosed Unit

Secondary Enclosed Units provide fully assembled solutions, including (optional) inverter, transformer and medium voltage equipment, to decrease site works and site assembly time. This product is recommended when the inverter is required to be installed in the same enclosure or when it is preferred to protect the equipment from the environment.

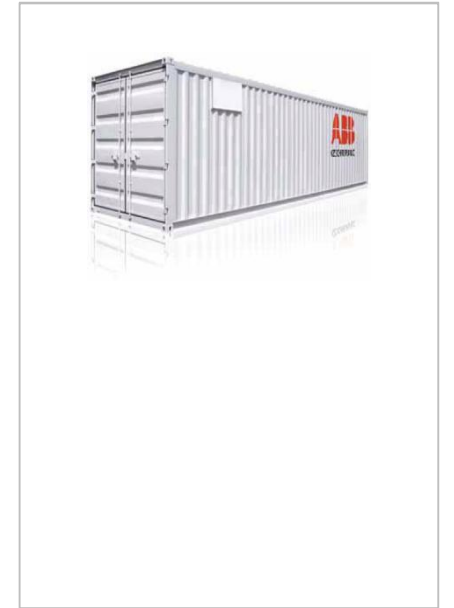
Typical equipment:

- SF6 or Air insulated switchgear up to 40.5 kV
- Oil transformer up to 3500 kVA or dry type up to 2500 kVA
- Inverter – optionally installed internally or separately

Benefits:

- Simple and quick installation – pre-test units at the factory, drop in place and connect cables
- Pre-engineered products to reduce time to quote and supply, while reducing risks
- Engineered for efficient cooling in order to extend the life of the equipment
- All ABB designs are green to support the environment
- No exposed live parts, more safe for operator and personnel
- SCADA ready
- All equipment contained in the SEU are type tested according to their relevant standards
- Robust and reliable – proven components from a single source
- Compact and easily transportable
- Optional oil collection pit for environmental protection
- Internal maintenance available
- Equipment protected from environment
- Economic solution
- All doors are lockable to prevent unauthorized entry
- Any inverter can be installed internally or connected externally, as required

### Secondary Enclosed Unit (SEU)



**Green designs for solar power**

# Power Collection products

## Compact Secondary Substation

The CSS solution is IEC/AS/GB tested according to the standards for prefabricated substations IEC 62271-202 or applicable. Solutions are internal arc tested as recommended for high safety for public and service personnel. For Power Collection, they typically contain MV switchgear and a transformer; compartmented and electrically segregated for safety. The transformer is protected from direct environmental elements like sun radiation, snow, sand, and also from unintended entry, plus the CSS includes an oil pit to collect any leakage for an environmentally safe product.

Typical equipment:

- SF6 or Air insulated switchgear up to 40.5 kV
- Oil transformer up to 3500 kVA or Dry up to 2500 kVA

Major options:

- Walk-in for simple maintenance vs non Walk-in for compact size
- Multiple enclosure material options - see following slide

Benefits:

- Simple and quick installation – pre-test units at the factory, drop in place and connect cables
- Pre-engineered products to reduce time to quote and supply, while reducing risks
- Engineered for efficient cooling to extend life of equipment
- All ABB designs are green to support the environment
- No exposed live parts, more safe for operator and personnel
- SCADA ready
- All equipment contained in the solar modules are type tested according to their relevant standards
- High level of reliability and safety for equipment and personnel(internal arc tested IAC-AB)
- Type tested according to IEC/AS/GB standards for prefabricated substations, IEC 62271-202 or applicable
- Fully enclosed solutions
- All doors are lockable to prevent unauthorized entry
- Glass Reinforced Polyester (GRP) housings to meet demanding environmental conditions
- Enclosures are compartmented and electrically segregated for safety
- CSS designs include an oil collection pit for environmental protection in case of oil leakage
- Separate access entries to MV and transformer

### Compact Secondary Substation (CSS)



**Green designs for solar power**



# Power Collection products

## Compact Secondary Substation

The CSS product portfolio has 3 different enclosure material types:

- GRP – Glass fiber Reinforced Polyester, is capable to withstand high environmental requirements. The patented double layer design keeps sun radiation impact lower than any other enclosure material, extending life of internal equipment.
- Steel – Steel portfolio is most economical solution and it is flexible to make changes in the footprint if required.
- Concrete – Concrete portfolio is robust in design. But, it has limitations in transport and layout changes.

**A simple comparison between the different enclosure materials shows that remote site locations, thermal challenges and increasing ratings are proving the benefits of the GRP design.**

	GRP	CONCRETE	STEEL
Corrosion resistance	++	++	-
Modularity	++	-	++
Strength	++	++	+
Weight	++	-	++
Weathering	++	+	+
Thermal properties	++	+	-
Maintenance	++	++	-

**Green designs for solar power**

# Modular Systems solar portfolio

## Power Collection products

Pre-designed solutions are available for optimized designs and quicker delivery. Power ratings are aligned with the most common inverter power ratings in the market. The solutions are equipped with medium voltage switchgear, SafeRing CCV configuration (cable loop with breaker and relay protection). The transformer includes standard integrated protection for pressure and gas(RIS). Product datasheets are available with an overview of other options available. Pre-designed solutions for power collection are shown below:

	Secondary Skid Unit				Secondary Enclosed Unit		Compact Secondary Substation			
Style number	SSU-S-1510- OCCV-4000	SSU-S-2410- OCCV-3000	SSU-S-2410- OCCV-4000	SSU-S-2410- OCCV-2000	SEU-S-1510- OCCV-4000	SEU-S-2410- OCCV-3000	CSS-S-1510- OCCV-4000	CSS-S-2410- OCCV-3000	CSS-G-1510- OCCV-4000	CSS-G-2410- OCCV-2000
Enclosure type	Skid	Skid	Skid	Skid	Steel	Steel	Steel	Steel	GRP	GRP
Overall parameters										
Length x width x height, mm	3400 x 2550 x 2800	3400 x 2550 x 2800	3400 x 2550 x 2800	3400 x 2550 x 2800	6100 x 2600 x 2440	6100 x 2600 x 2440	3950 x 2200 x 2700	3950 x 2200 x 2700	4500 x 2470 x 2810	4500 x 2470 x 2810
Est. weight (metric tons)	8	9.5	9	9	13	13	11.5	13	12	12
MV switchgear										
Switchgear type	SafeRing CCV				SafeRing CCV		SafeRing CCV			
Protection Relay	REJ603	REJ603	REJ603	REJ603	REJ 603	REJ 603	REJ603	REJ603	REJ603	REJ603
Transformer										
Transformer type	oil immersed				oil immersed		oil immersed			
Power rating, kVA	1500	2400	2400	2400	1500	2400	1500	2400	1500	2400
LV Voltage level, V	300 to 400	300 to 400	300 to 400	300 to 400	300 to 400	300 to 400	300 to 400	300 to 400	300 to 400	300 to 400
MV Voltage level, kV max	13.8	40.5	13.8	24	13.8	40.5	13.8	40.5	13.8	24
Standard protection	RIS				RIS		RIS			



SSU



SEU



GRP



CSS

**Green designs for solar power**

# EPMV solar products

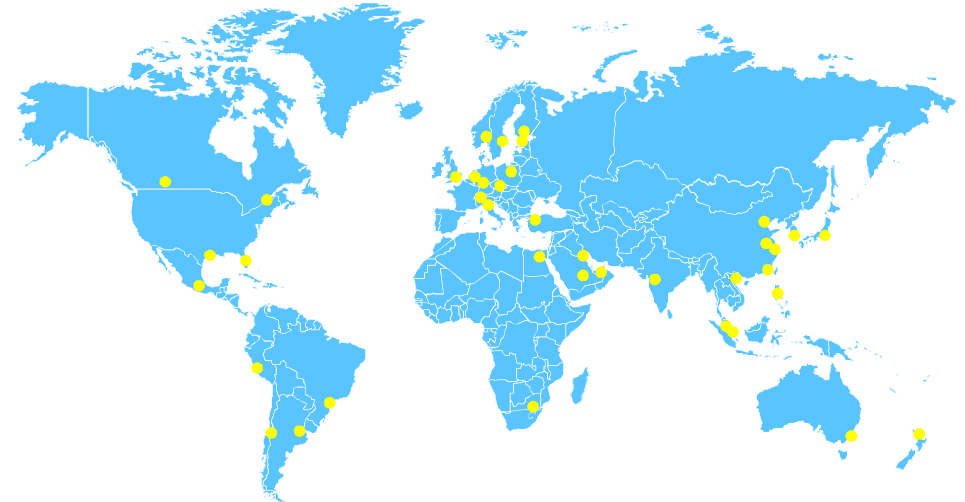
## Summary

- ABB's EPMV solar portfolio covers a wide range of applications and needs
- Pre-designed solutions are selected to fit with the most common inverter ratings in the industry
- ABB has a long experience in these products and the solar segment
- Wide footprint supports delivery to customers in an optimum way
- Service units all over the world to support with installation and commissioning and after sales service

Contact ABB for further information and to discuss your specific needs:

---

ABB Inc.  
Email : [get.ph@ph.abb.com](mailto:get.ph@ph.abb.com)



**Green designs for solar power**



Power and productivity  
for a better world™

