EMERSON

Unidrive SPV Photovoltaic Inverter Solutions

Highly efficient grid tie inverters from 70kWp and solar tracker systems

CONTROL TECHNIQUES

www.controltechniques.com

World class Photovoltaic solutions from 70kWp

Control Techniques are technology and service leaders for high efficiency power conversion and control solutions for photovoltaic energy schemes. Our systems are backed by manufacturing and engineering centres globally. We are part of Emerson who have over 140,000 employees worldwide and more than 125 years of experience in technology and engineering, creating solutions for the benefit of our customers. Our unique grid tie inverter technology utilises cost effective, mass produced modules that are proven to give market leading reliability and efficiency.

The ideal project partner

Our global support network provides you with assistance through each project phase. Control Techniques understand the processes and challenges you face in specifying, purchasing and delivering photovoltaic systems. We will provide you with the information, support and services that ensure you can deliver fully optimised solutions on time and within budget.

Over 12 MW per day, every day

For 35 years Control Techniques has specialised in power control and conversion. We currently manufacture more than 12MW of inverters per day worldwide. Our intelligent scalable technology ensures optimum efficiency for best return of investment.

EMERSON

Industry leading Photovoltaic solutions

Our power conversion systems are designed to maximise efficiency across varying radiation intensities, typically achieving 97% to 98%. This is achieved using the following key methods:

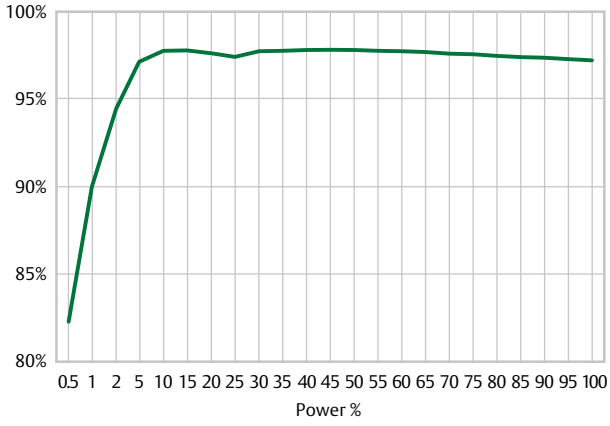
System operation

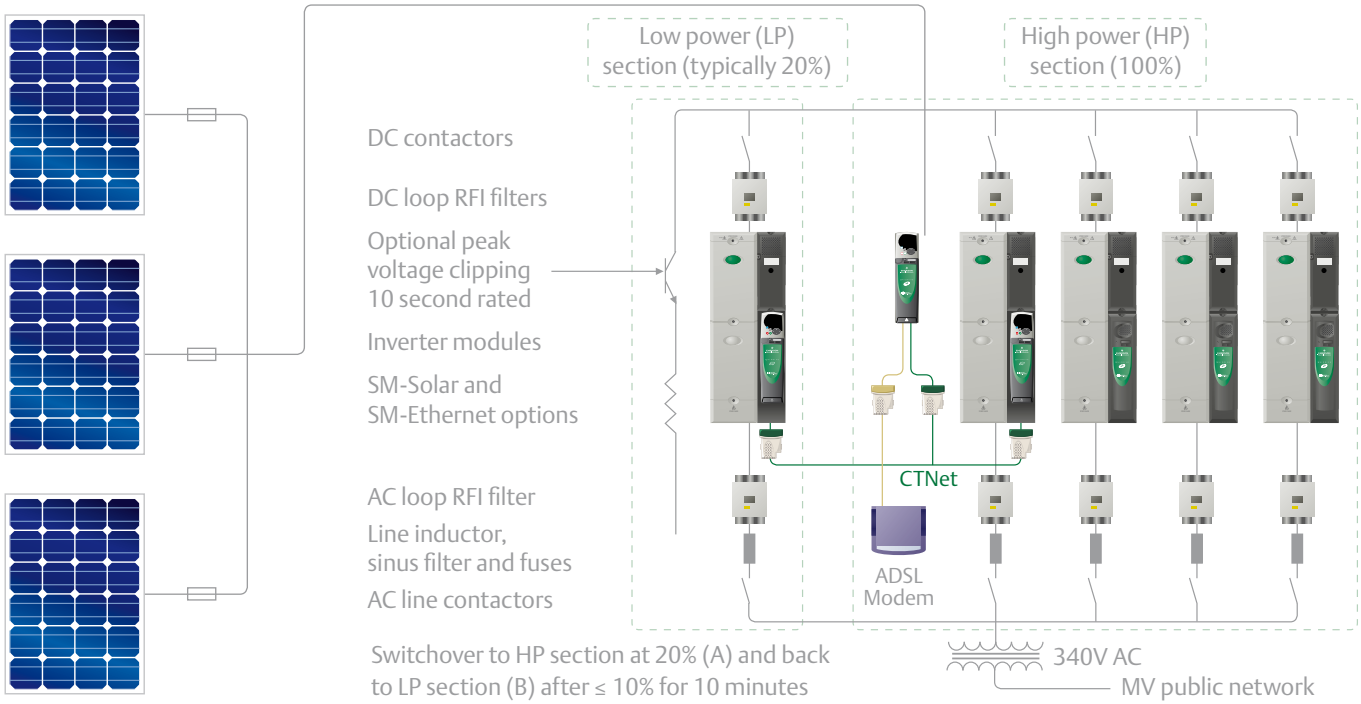
To enhance system efficiency over a wide radiation range on inverters over 700kWp (400V), a separate smaller inverter is used during low light conditions and a larger inverter automatically switches in above a defined threshold. The small inverter is typically rated at 20% of array peak power, and the larger inverter at 100%.

Maximum Power Point Tracking (MPPT)

The control strategy constantly adjusts the DC input voltage set-point whilst monitoring the power produced to find the optimum point on the curve with steady state efficiency around 99.5%.

System efficiency





Standard modular solutions

Control Techniques grid tie inverters are modular, allowing us to design a specific solution to match your requirements:

Proven reliability

Control Techniques grid tie inverters are proven in thousands of mission critical applications worldwide. They are designed and manufactured using cutting edge processes to deliver class leading reliability and system availability.

System control

Control Techniques grid tie inverters boast 3 undedicated option slots which typically host co-processors, additional I/O and fieldbus communications ports. Our system supervision and MPPT algorithms are executed on the SM-Applications (Solar) processor which, via multiport RAM, communicates directly with the main processor in the inverter.

Built-in redundancy

Inverter modularity enables redundancy to be incorporated within the system. If one inverter is unavailable due to servicing or failure, the other modules continue to operate, thus minimizing lost power generation

Future expandability

If your requirements change, your system can be designed for future expansion to increase capacity.

Protection

Control Techniques grid tie inverters include a number of safety features as standard:

- Over and under voltage
- Over current
- Over temperature
- Phase loss and imbalance

Compact

Control Techniques grid tie inverters have been designed using advanced thermal modeling techniques to ensure that maximum reliability is achieved with the most compact dimensions. Each module is built on a rigid SMC chassis to reduce dimensions and weight, making them easy to handle and service.

The picture below shows a complete solution for a 1.6MW field together with a 350kW inverter for low light conditions. The complete system dimensions including the control section are 6000 wide x 2100* high x 800 deep (mm) (*including a 200mm plinth).

Fast availability

As each system is constructed from a small number of variants of mass produced modules, products are available on short lead times.

Custom solutions

Kublank project, Meridian (Germany)

Our modular inverter design to 1750kWp provides excellent flexibility. This allows our system designers to readily engineer custom power and control configurations precisely matching customer requirements. For large arrays we can accurately match the peak power of the inverter to the array which reduces the cost. Off grid solutions are also available.

Inverter configuration

In systems larger than 175kWp where multiple inverter modules are utilized, arrays are connected to a substantial common DC bus. Feeds to the inverter modules are taken from the bus via semiconductor fuses, DC loop contactors and DC loop RFI filters. The AC loop of each inverter module is taken to the AC bus through an RFI filter and semiconductor fuses.

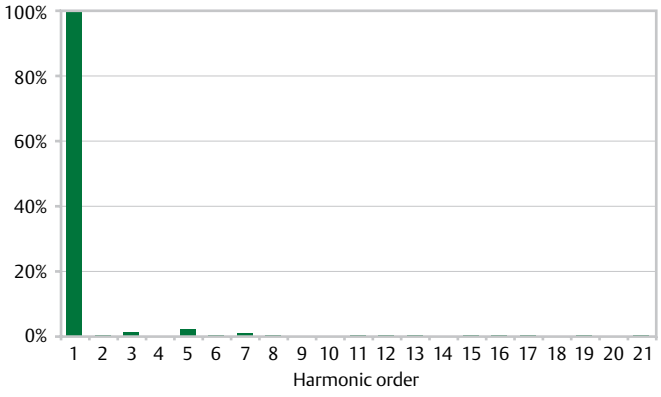
Assured performance

Photovoltaic installations are designed for an operational life of 20 years. First class performance and product reliability build confidence, whilst worldwide support and optional performance packages deliver customer assurance during the whole life of the product.

Easy connection to public electricity supplies

Control Techniques grid tie inverters achieve a high quality sinusoidal output with only 1 to 2% total harmonic voltage distortion THD(V). This allows compliance with local harmonics regulations for connection to the public electricity supply. High specification switching frequency filters and AC & DC filter sets ensure electrical disturbances from the inverter are kept to an absolute minimum.

Typical Control Techniques grid tie inverter current harmonic spectrum



Worldwide system monitoring

Control Techniques grid tie inverters can optionally communicate using Ethernet, allowing remote system monitoring and diagnostics via the internet.

Complete control solutions

Control Techniques engineers are able to offer a complete solution for monitoring and control of photovoltaic systems, including:

Asset management
Our engineers are able to design systems that incorporate system control and data acquisition (SCADA) to monitor and control the complete system, including photovoltaic arrays.

Solar tracking
Control Techniques drives and matched motors can be incorporated into your system for solar tracking. This provides you with a single source for all power conversion and control equipment.

Typical Control Techniques drives and geared motors used for intelligent solar tracking

Renewable energy portfolio

Control Techniques are committed to offering solutions for all renewable energy sources. Along with photovoltaic systems we have significant experience in power conversion for wind, tidal and wave energy schemes.

References

An installed base of photovoltaic generation extending to many megawatts already provides Control Techniques with the necessary creditability to compete in this fast moving market.

Inverter data and standards

Common input data	
Voltage range	500V to 800V
Maximum DC voltage	830V (1000V*)
DC voltage ripple	<1%

Common output data	
AC nominal output voltage	3 x 340V
Current distortion	<3%
Supply frequency	Supply frequency (Hz) +/-10%
Power factor	Adjustable CosPhi

Common system data	
Switching concept	PWM, IGBT
Night time power consumption	<50W
Steady state accuracy of MPP tracking system	>99%
Minimum output	<2%
Ambient temperature	0 to 40°C (32 to 104°F)
Relative humidity	95% non condensing
Degree of Protection	IP00/ IP2X
Panel type	Rittal TS8

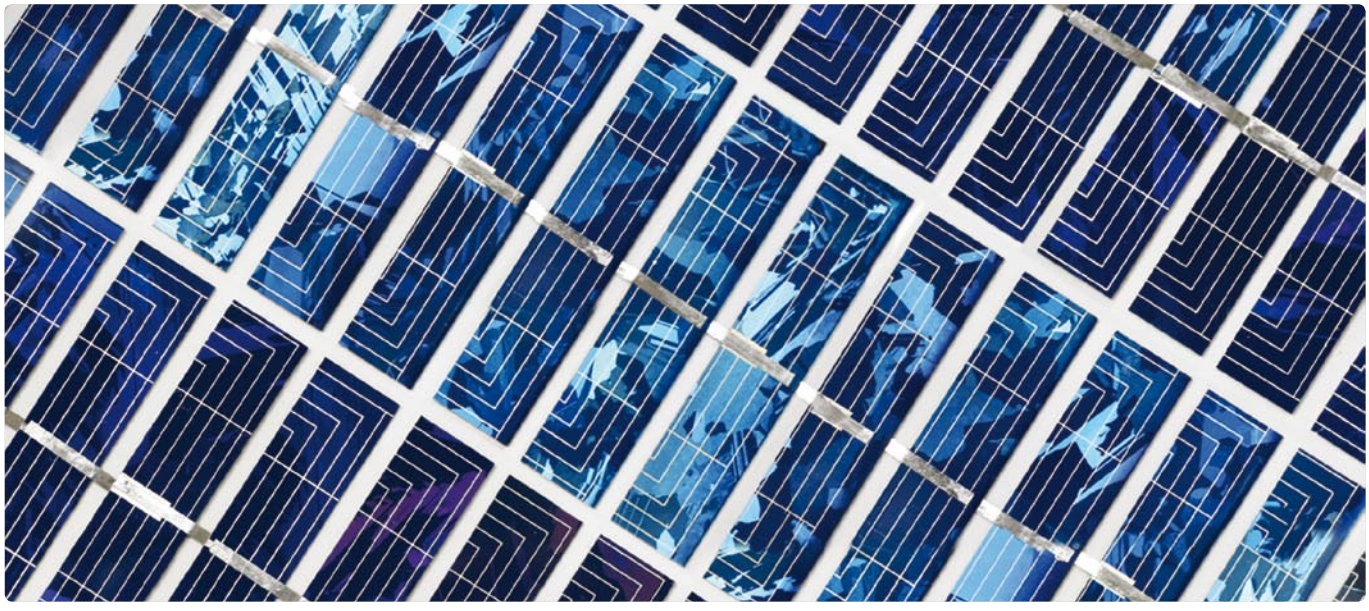
*Dimensions exclude the optional chopper section which is required if the open circuit voltage exceeds the over voltage trip level.

Standards

- IEC, EN 60204-1 Low Voltage Directive
- BGV A3
- EN 50081-2 89/336/EWG
- IEC 61006-6-2
- IEC/EN 61800-3
- EN55011
- UL1741 (pending)
- IEEE1547 (pending)
- IEEE 519 (pending)

Inverter selection (3 x 340V output)				
Model	Rated AC current	Apparent power	European efficiency	Dimensions (W x H x D)
	A	kWp	%	mm
SPV 145	248	145	96.6	1200 x 2200 x 1000
SPV 175	300	175	97.3	1200 x 2200 x 1000
SPV 350	600	350	97.3	1600 x 2200 x 1000
SPV 530	900	530	97.3	2000 x 2200 x 1000
SPV 700	1200	700	97.6	3200 x 2200 x 1000
SPV 880	1500	880	97.6	3600 x 2200 x 1000
SPV 1060	1800	1060	97.6	4000 x 2200 x 1000
SPV 1230	2100	1230	97.6	4800 x 2200 x 1000
SPV 1410	2400	1410	97.6	5600 x 2200 x 1000
SPV 1590	2700	1590	97.6	6000 x 2200 x 1000

Efficiency data is calculated assuming a symmetrical supply voltage and unity power factor
H includes 200mm mounting plinth



DRIVING THE WORLD...

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