



EMERSON[™]
Industrial Automation

Photovoltaic Solutions

High efficiency grid tie inverter
solutions from 90kWp and
solar tracker systems



**CONTROL
TECHNIQUES**

www.controltechniques.com



World class Photovoltaic solutions from 90kWp

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 employing over 1700 staff. Our unique grid tie inverter technology utilises cost effective, mass produced modules that are proven to give market leading reliability and efficiency.

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.

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.





Industry leading cost per kWp for Photovoltaic solutions

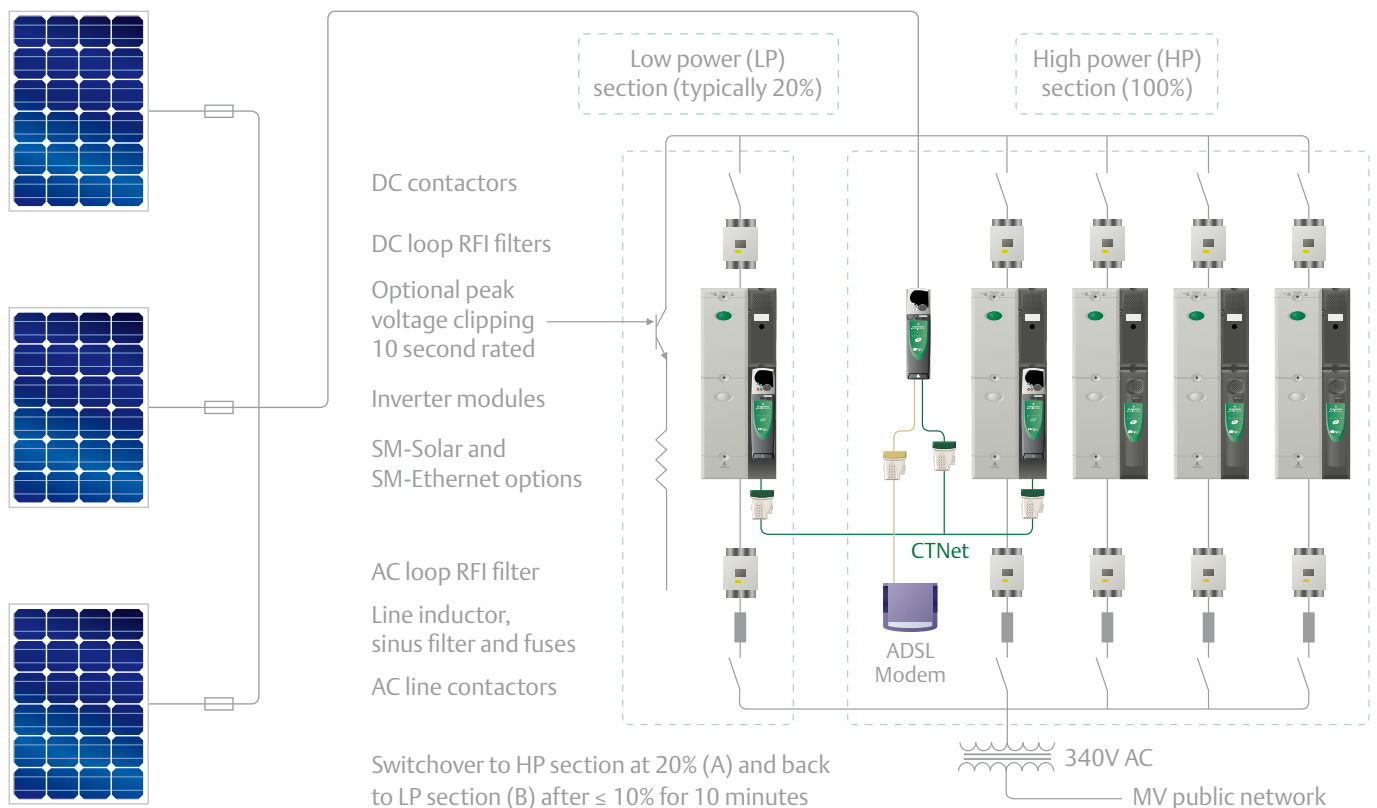
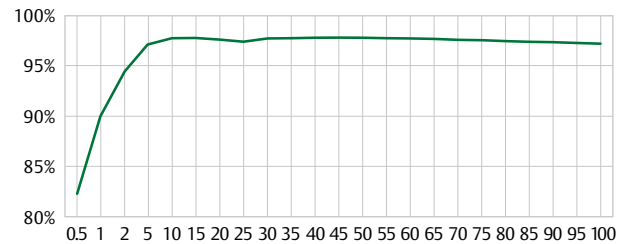
Our power conversion systems are designed to maximise efficiency across varying radiation intensities, typically achieving 97% to 98%. This is achieved using the following key methods:

Inverter teaming operation

To enhance system efficiency over a wide radiation range, 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.



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 array together with a 350kW teaming 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 100mm plinth).



Fast availability

As each system is constructed from a small number of variants of mass produced modules, products are usually available from stock or 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.

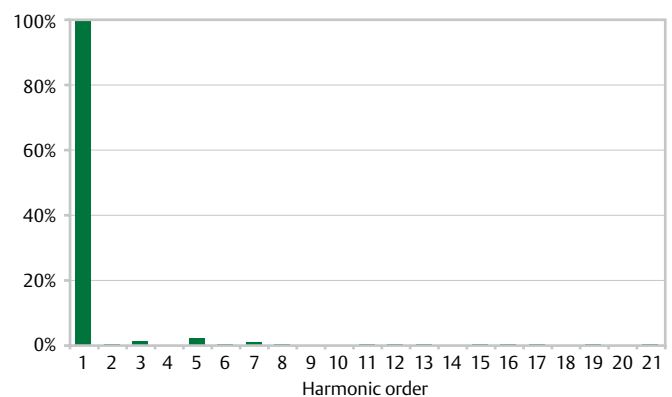
Assured performance

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 an AC & DC RFI filter set 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.

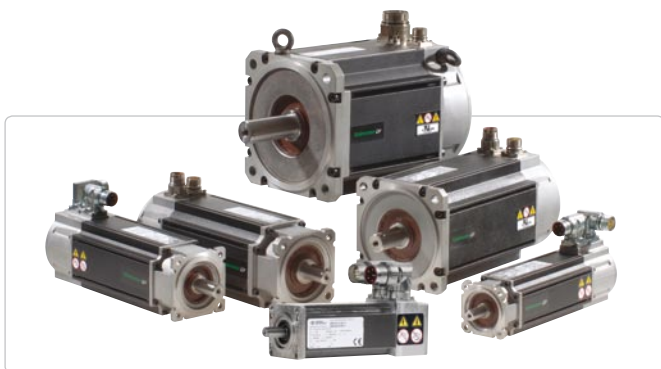


Complete control solutions

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

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.



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.

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.

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



References

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



DRIVING THE WORLD...

Control Techniques Drive & Application Centres

AUSTRALIA
Melbourne Application Centre
T: +613 973 81777
controltechniques.au@emerson.com

Sydney Drive Centre
T: +61 2 9838 7222
controltechniques.au@emerson.com

AUSTRIA
Linz Drive Centre
T: +43 7229 789480
controltechniques.at@emerson.com

BELGIUM
Brussels Drive Centre
T: +32 1574 0700
controltechniques.be@emerson.com

BRAZIL
Emerson do Brazil Ltda
T: +5511 3618 6569
controltechniques.br@emerson.com

CANADA
Toronto Drive Centre
T: +1 905 201 4699
controltechniques.ca@emerson.com

Calgary Drive Centre
T: +1 403 253 8738
controltechniques.ca@emerson.com

CHINA
Shanghai Drive Centre
T: +86 21 5426 0668
controltechniques.ch@emerson.com

Beijing Application Centre
T: +86 10 856 31122 ext 820
controltechniques.ch@emerson.com

CZECH REPUBLIC
Brno Drive Centre
T: +420 541 192111
controltechniques.cz@emerson.com

DENMARK
Copenhagen Drive Centre
T: +45 4369 6100
controltechniques.dk@emerson.com

FRANCE*
Angoulême Drive Centre
T: +33 5 4564 5454
controltechniques.fr@emerson.com

GERMANY
Bonn Drive Centre
T: +49 2242 8770
controltechniques.de@emerson.com

Chemnitz Drive Centre
T: +49 3722 52030
controltechniques.de@emerson.com

Darmstadt Drive Centre
T: +49 6251 17700
controltechniques.de@emerson.com

GREECE*
Athens Application Centre
T: +0030 210 57 86086/088
controltechniques.gr@emerson.com

HOLLAND
Rotterdam Drive Centre
T: +31 184 420555
controltechniques.nl@emerson.com

HONG KONG
Hong Kong Application Centre
T: +852 2979 5271
controltechniques.hk@emerson.com

INDIA
Chennai Drive Centre
T: +91 44 2496 1123/
2496 1130/2496 1083
controltechniques.in@emerson.com

Pune Application Centre
T: +91 20 2612 7956/2612 8415
controltechniques.in@emerson.com

Kolkata Application Centre
T: +91 33 2357 5302/2357 5306
controltechniques.in@emerson.com

New Delhi Application Centre
T: +91 11 2 576 4782/2 581 3166
controltechniques.in@emerson.com

IRELAND
Newbridge Drive Centre
T: +353 45 448200
controltechniques.ie@emerson.com

ITALY
Milan Drive Centre
T: +39 02575 751
controltechniques.it@emerson.com

Reggio Emilia Application Centre
T: +39 02575 751
controltechniques.it@emerson.com

Vicenza Drive Centre
T: +39 0444 933400
controltechniques.it@emerson.com

KOREA
Seoul Application Centre
T: +82 2 3483 1605
controltechniques.kr@emerson.com

MALAYSIA
Kuala Lumpur Drive Centre
T: +603 5634 9776
controltechniques.my@emerson.com

REPUBLIC OF SOUTH AFRICA
Johannesburg Drive Centre
T: +27 11 462 1740
controltechniques.za@emerson.com

Cape Town Application Centre
T: +27 21 556 0245
controltechniques.za@emerson.com

RUSSIA
Moscow Application Centre
T: +7 495 981 9811
controltechniques.ru@emerson.com

SINGAPORE
Singapore Drive Centre
T: +65 6468 8979
controltechniques.sg@emerson.com

SLOVAKIA
EMERSON A.S
T: +421 32 7700 369
controltechniques.sk@emerson.com

SPAIN
Barcelona Drive Centre
T: +34 93 680 1661
controltechniques.es@emerson.com

Bilbao Application Centre
T: +34 94 620 3646
controltechniques.es@emerson.com

Valencia Drive Centre
T: +34 96 154 2900
controltechniques.es@emerson.com

SWEDEN*
Stockholm Application Centre
T: +468 554 241 00
controltechniques.se@emerson.com

SWITZERLAND
Lausanne Application Centre
T: +41 21 637 7070
controltechniques.ch@emerson.com

Zurich Drive Centre
T: +41 56 201 4242
controltechniques.ch@emerson.com

TAIWAN
Taipei Application Centre
T: +886 22325 9555
controltechniques.tw@emerson.com

THAILAND
Bangkok Drive Centre
T: +66 2962 2092 99
controltechniques.th@emerson.com

TURKEY
Istanbul Drive Centre
T: +90 216 4182420
controltechniques.tr@emerson.com

UAE*
Emerson FZE
T: +971 4 8118100
ct.dubai@emerson.com

UNITED KINGDOM
Telford Drive Centre
T: +44 1952 213700
controltechniques.uk@emerson.com

USA
California Drive Centre
T: +1 562 943 0300
controltechniques.us@emerson.com

Charlotte Application Centre
T: +1 704 393 3366
controltechniques.us@emerson.com

Chicago Application Centre
T: +1 630 752 9090
controltechniques.us@emerson.com

Cleveland Drive Centre
T: +1 440 717 0123
controltechniques.us@emerson.com

Florida Drive Centre
T: +1 239 693 7200
controltechniques.us@emerson.com

Latin America Sales Office
T: +1 305 818 8897
controltechniques.us@emerson.com

Minneapolis US Headquarters
T: +1 952 995 8000
controltechniques.us@emerson.com

Oregon Drive Centre
T: +1 503 266 2094
controltechniques.us@emerson.com

Providence Drive Centre
T: +1 401 541 7277
controltechniques.us@emerson.com

Utah Drive Centre
T: +1 801 566 5521
controltechniques.us@emerson.com

Control Techniques Distributors

ARGENTINA
Euro Techniques SA
T: +54 11 4331 7820
eurotech@eurotechsa.com.ar

BAHRAIN
Emerson FZE
T: +971 4 8118100
ct.bahrain@emerson.com

BULGARIA
BLS - Automation Ltd
T: +359 32 968 007
info@blsaautomation.com

CENTRAL AMERICA
Mercado Industrial Inc.
T: +1 305 854 9515
rsaybe@mercadoindustrialinc.com

CHILE
Ingeniería Y Desarrollo
Tecnológico S.A
T: +56 2741 9624
idt@idt.cl

COLOMBIA
Sistronic LTDA
T: +57 2 555 60 00
sistronic@telesat.com.co

CROATIA
Zigg-Pro d.o.o
T: +385 1 3463 000
zigg-pro@zg.htnet.hr

CYPRUS
Acme Industrial Electronic
Services Ltd
T: +3572 5 332181
acme@cytanet.com.cy

EGYPT
Samiram
T: +202 7360849/
+202 7603877
samiramz@samiram.com

FINLAND
SKS Control
T: +358 207 6461
control@sksf.fi

HUNGARY
Control-VH Kft
T: +361 431 1160
info@controlvh.hu

ICELAND
Samey ehf
T: +354 510 5200
samey@samey.is

INDONESIA
Pt Apikon Indonesia
T: +65 6468 8979
info.my@controltechniques.com

Pt Yua Esa Sempurna
Sejahtera
T: +65 6468 8979
info.my@controltechniques.com

ISRAEL
Dor Drives Systems Ltd
T: +972 3900 7595
info@dor1.co.il

KENYA
Kassam & Bros Co. Ltd
T: +254 2 556 418
kassambros@africaonline.co.ke

KUWAIT
Emerson FZE
T: +971 4 8118100
ct.kuwait@emerson.com

LATVIA
EMT
T: +371 760 2026
janis@emt.lv

LEBANON
Black Box Automation
& Control
T: +961 1 443773
info@blackboxcontrol.com

LITHUANIA
Elinta UAB
T: +370 37 351 987
sigitas@elinta.lt

MALTA
Mekanika Limited
T: +35621 442 039
mfrancica@gasan.com

MEXICO
MELCSA
T: +52 55 5561 1312
melcsamx@iserve.net.mx
SERVITECK, S.A de C.V
T: +52 55 5398 9591
servitek@data.net.mx

MOROCCO
Leroy Somer Maroc
T: +212 22 354948
lsmaroc@wanadoopro.ma

NEW ZEALAND
Advanced Motor Control. Ph.
T: +64 (0) 274 363 067
info.au@controltechniques.com

PHILIPPINES
Control Techniques
Singapore Ltd
T: +65 6468 8979
info.my@controltechniques.com

POLAND
APATOR CONTROL Sp. z o.o
T: +48 56 6191 207
drives@apator.torun.pl

PORTUGAL
Harker Sumner S.A
T: +351 22 947 8090
drives.automation@harker.pt

PUERTO RICO
Powermotion
T: +1 787 843 3648
dennis@powermotionpr.com

QATAR
Emerson FZE
T: +971 4 8118100
ct.qatar@emerson.com

SAUDI ARABIA
A. Abunayyan Electric Corp.
T: +9661 477 9111
aec-salesmarketing@
abunayyanguroup.com

SERBIA & MONTENEGRO
Master Inzenjering d.o.o
T: +381 24 551 605
master@eunet.yu

SLOVENIA
PS Logatec
T: +386 1 750 8510
ps-log@ps-log.si

TUNISIA
SIA Ben Djemaa & CIE
T: +216 1 332 923
bendjemaa@planet.tn

URUGUAY
SECOIN S.A.
T: +5982 2093815
secoin@secoin.com.uy

VENEZUELA
Digimex Sistemas C.A.
T: +58 243 551 1634

VIETNAM
N.Duc Thinh
T: +84 8 9490633
infotech@nducthinh.com.vn