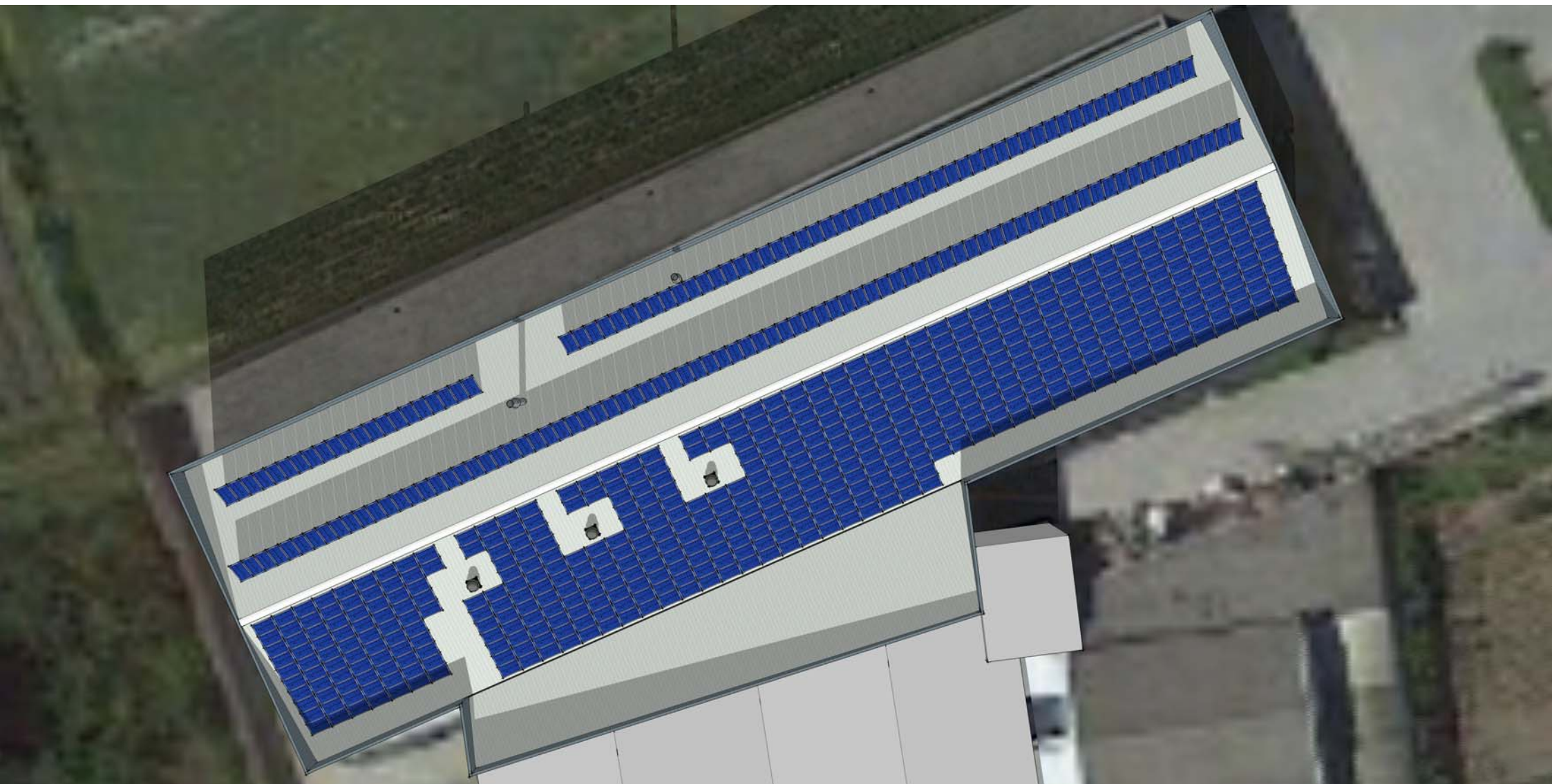
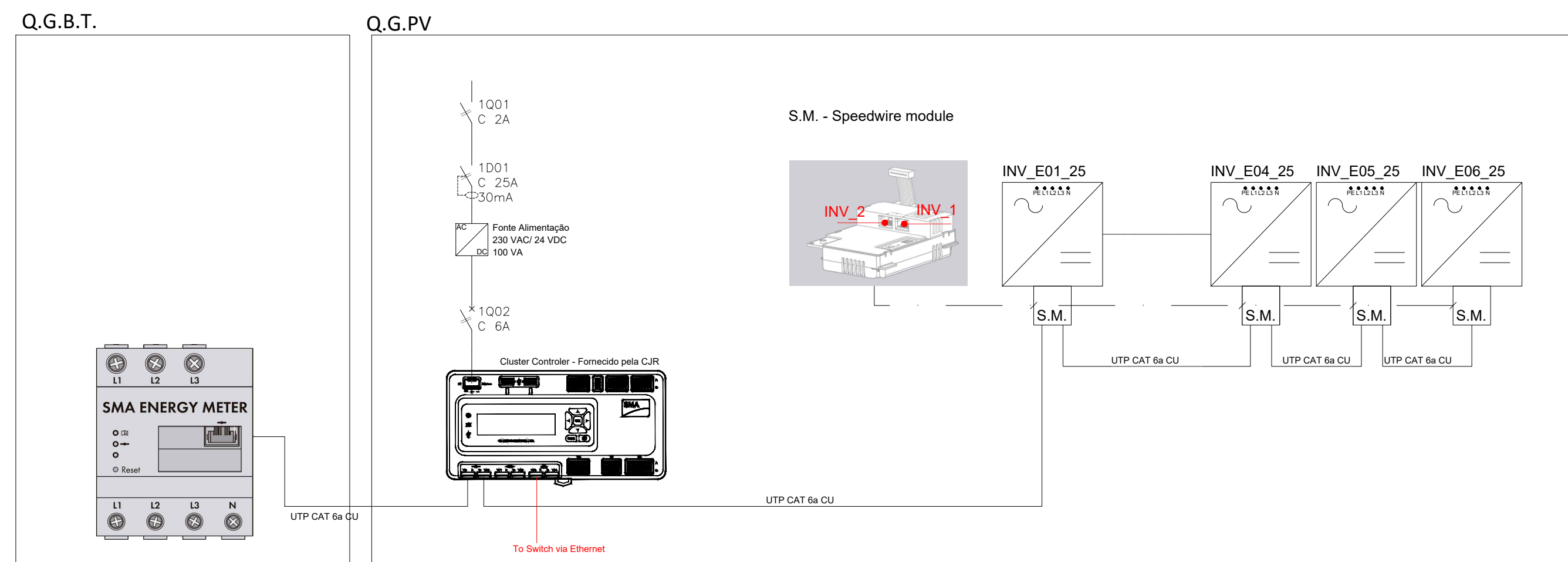
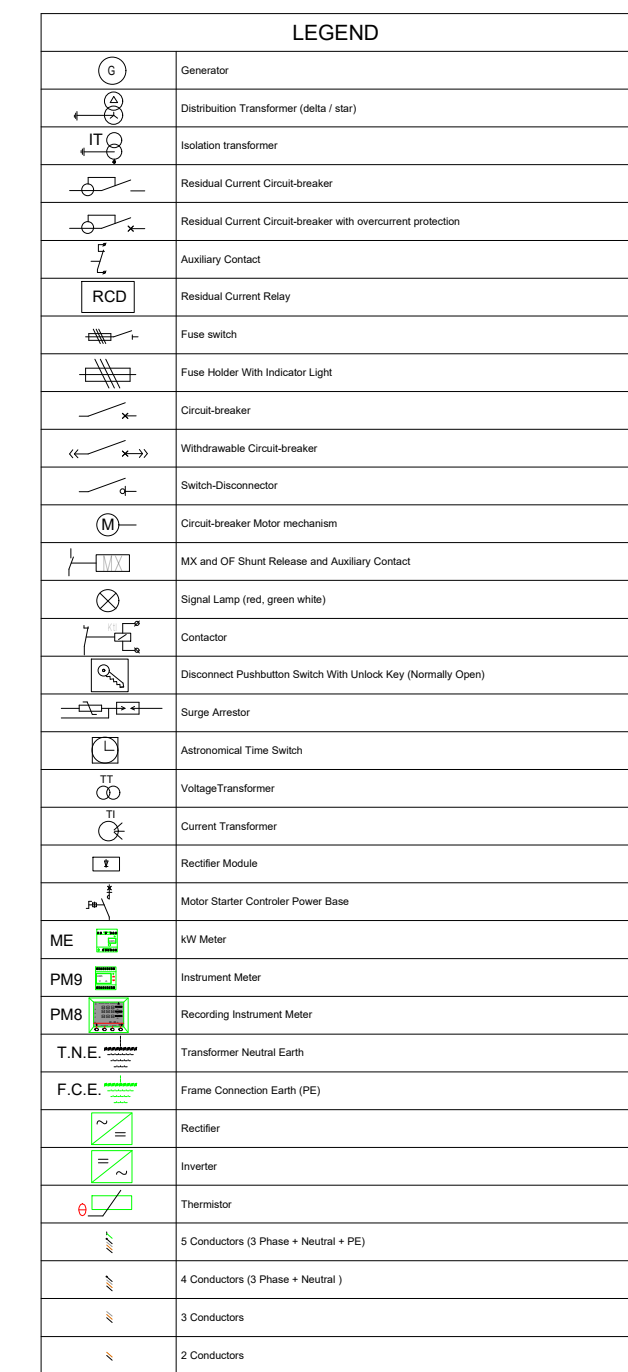


### **3. ANEXOS**

#### **PEÇAS DESENHADAS**

- Esquema Unifilar AC
- Esquema Unifilar DC
- Disposição Módulos FV





VER.	DATA	DESCRIÇÃO
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REQUERENTE

AUTORIA E COORDENAÇÃO:

PROYECTOS DE ESPECIALIDADE

PROJECTISTAS  
Miguel Costa, eoa

PROJECTO, PROJEK

ESPECIALIDADE, WORK: FASE, PHASE  
INST. EQUIP. ELECTRICOS - LEVANTAMENTO EXISTENTE

PROJ.DESIGN	DES. DRAWN	VERIF.VERIF	APROV. APROV
MC	MC	-	-

DESCRIÇÃO, DESCRIPTION	ESCALA, SCALE
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## ESQUEMA UNIFILAR

DATA DATE	REF. INFORMÁTICA DRAWING FILE
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FEV 2016

COD. PROJ.	PROJ. CODE	DES. NÚMERO	DRAWING NUMBER	VER.
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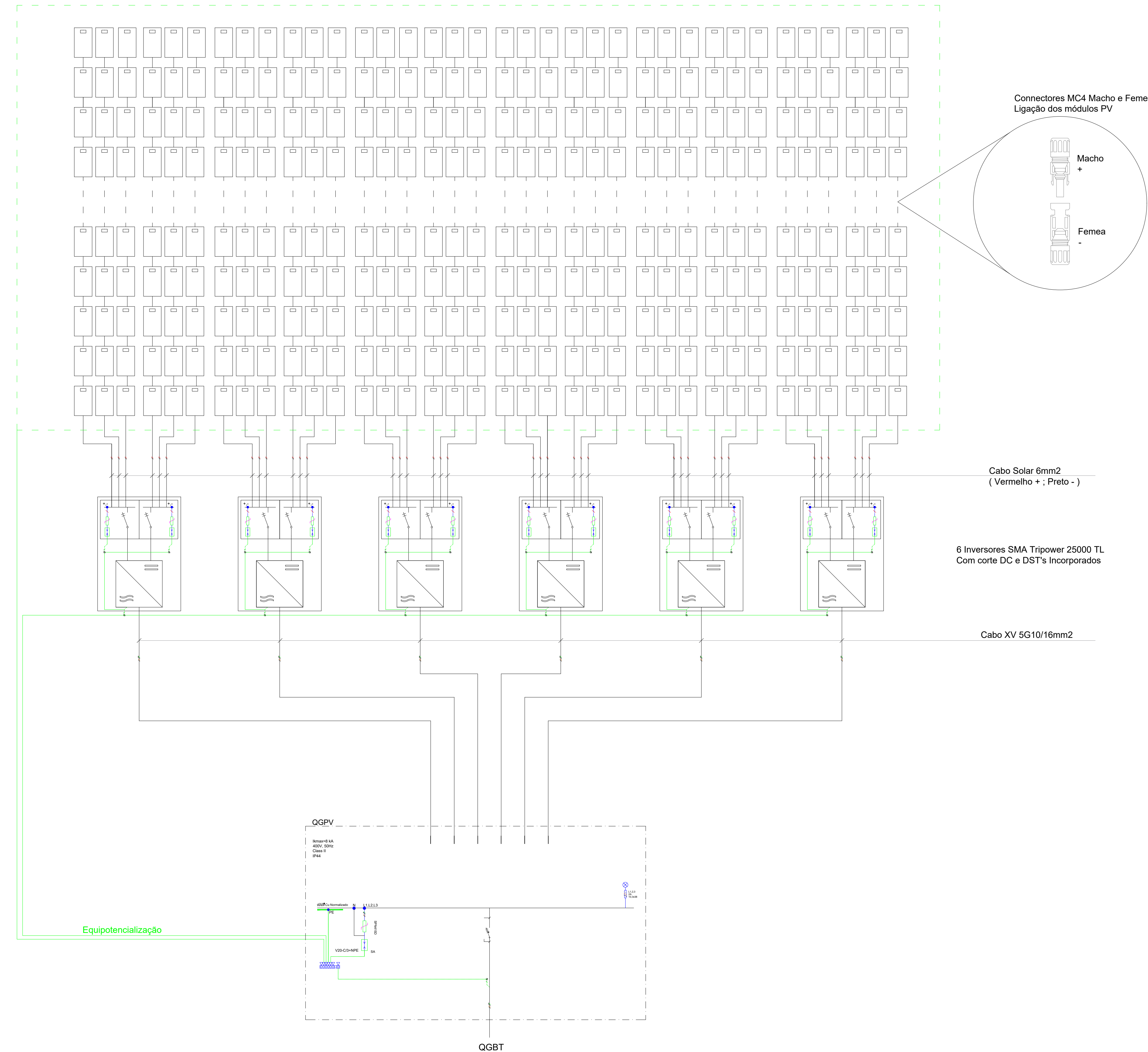
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Miguel Costa . TELEF: +351 91 6685495 . Email: costa.imiguel@gmail.com

ESTE DESENHO É PROPRIEDADE DOS AUTORES, NÃO PODENDO SER UTILIZADO, REPRODUZIDO, NO TODO OU EM PARTE, OU COMUNICADO A TERCEIROS SEM A SUA AUTORIZAÇÃO EXPRESSA.



GERADOR FV 165,24 kWp  
648 Módulos FV REC 255PE



VER.	DATA	DESCRIÇÃO

**REQUERENTE:**

AUTORIA E COORDENAÇÃO:

PROJETOS DE ESPECIALIDADE:

PROYECTISTAS:  
Javier Costa, eoz

PROJECTO, PROJECT

ESPECIALIDADE, WORK	FASE, PHASE
---------------------	-------------

PROJ. DESIGN	DES. DRAWN	VERIF. VERIF	APROV. APROV
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[illegible]

A. SCALE

### ESQUEMA UNIFILAR DC

DATA DATE	REF. INFORMÁTICA DRAWING FILE
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COD. PROJ.	PROJ. CODE	DES. NÚMERO/DRAWING NUMBER	VER.
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PT | F | S | S | 0 | 3 | F | I | - | | | 0 | 0 | A

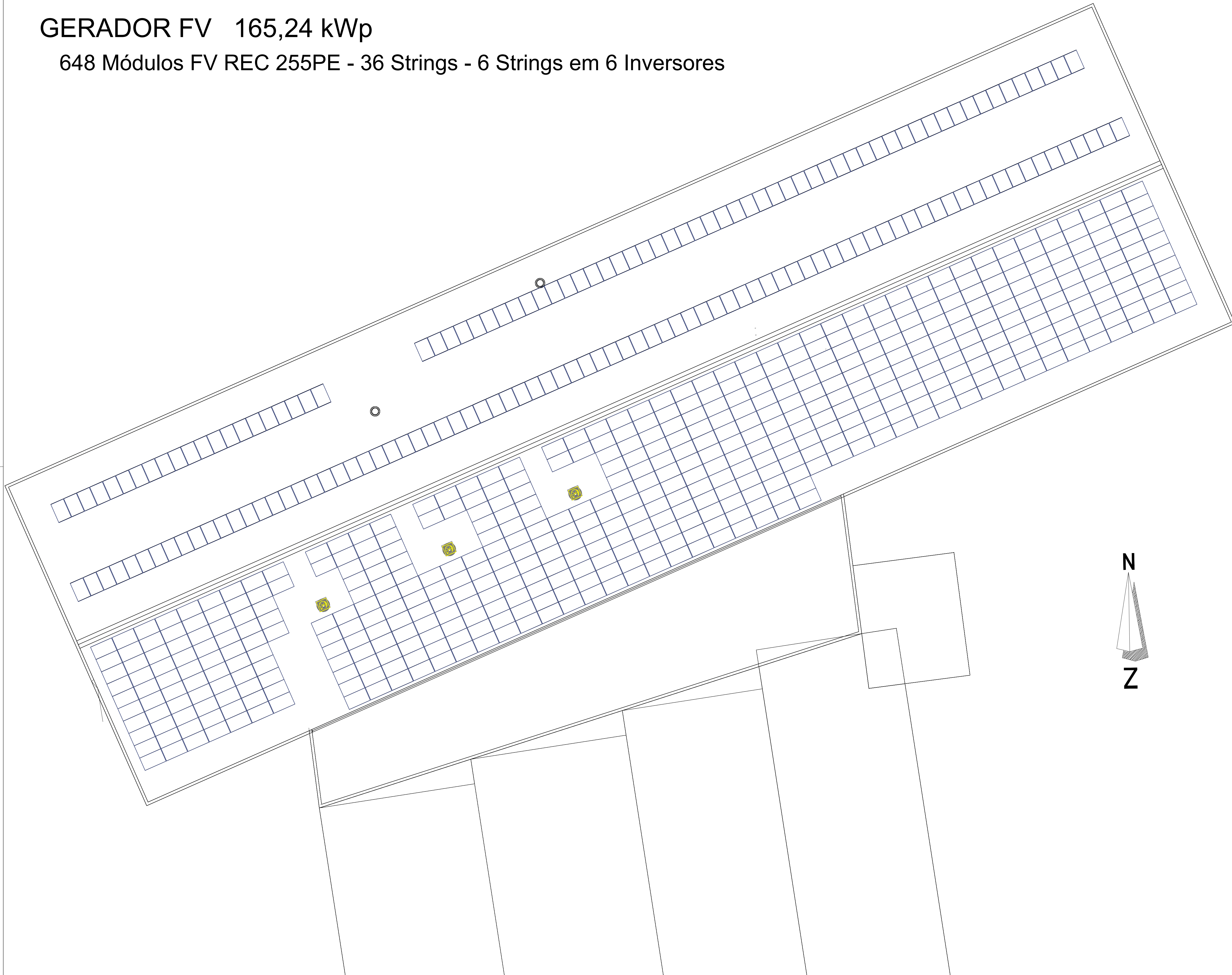
(Miguel Costa) TEL: +351 91 6685495 Email: costa.fmiquel@gmail.com

ESTE DESENHO É PROPRIEDADE DOS AUTORES. NÃO PODEMOS SER UTILIZADO, REPRODUZIDO, NO TODO OU EM PARTE, OU COMUNICADO A TERCEIROS SEM A SUA AUTORIZAÇÃO EXPRESSA.



GERADOR FV 165,24 kWp

648 Módulos FV REC 255PE - 36 Strings - 6 Strings em 6 Inversores

[illegible]

## **EQUIPAMENTOS**

- Fichas técnicas, certificados, informações

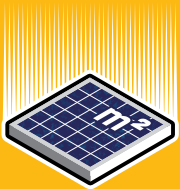


## HIGH PERFORMANCE SOLAR PANELS

# REC PEAK ENERGY SERIES

REC Peak Energy Series panels are the perfect choice for building solar systems that combine long lasting product quality with reliable power output.

REC combines leading standards of design and manufacturing to produce high-performance solar panels with uncompromising quality.



**MORE POWER  
PER M<sup>2</sup>**



**ROBUST AND  
DURABLE DESIGN**

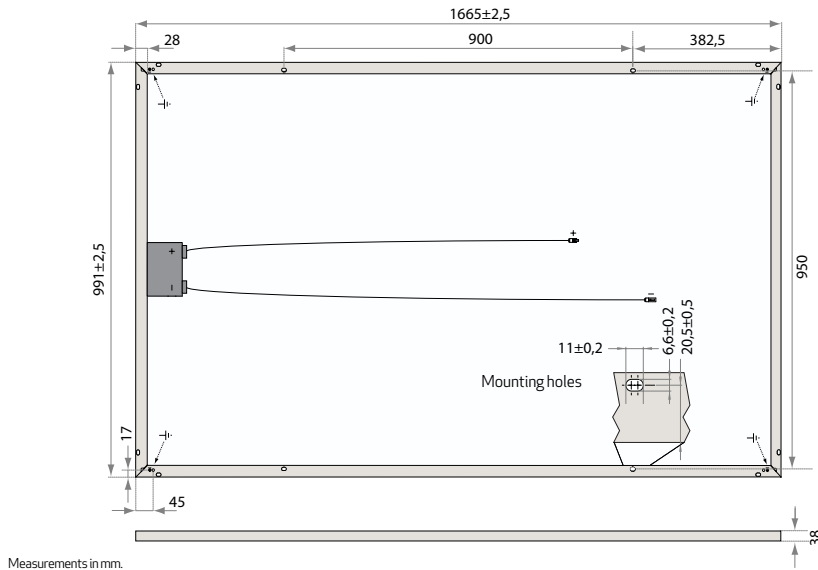


**100%  
PID FREE**



**OPTIMIZED FOR ALL  
SUNLIGHT CONDITIONS**

# REC PEAK ENERGY SERIES



ELECTRICAL DATA @ STC	REC240PE	REC245PE	REC250PE	REC255PE	REC260PE	REC265PE
Nominal Power - $P_{MPP}$ (Wp)	240	245	250	255	260	265
Watt Class Sorting - (W)	0/+5	0/+5	0/+5	0/+5	0/+5	0/+5
Nominal Power Voltage - $V_{MPP}$ (V)	29.7	30.1	30.2	30.5	30.7	30.9
Nominal Power Current - $I_{MPP}$ (A)	8.17	8.23	8.30	8.42	8.50	8.58
Open Circuit Voltage - $V_{OC}$ (V)	36.8	37.1	37.4	37.6	37.8	38.1
Short Circuit Current - $I_{SC}$ (A)	8.75	8.80	8.86	8.95	9.01	9.08
Panel Efficiency (%)	14.5	14.8	15.2	15.5	15.8	16.1

Values at standard test conditions STC (airmass AM1.5, irradiance 1000 W/m<sup>2</sup>, cell temperature 25°C).  
At low irradiance of 200 W/m<sup>2</sup> (AM1.5 and cell temperature 25°C) at least 95.5% of the STC module efficiency will be achieved.

ELECTRICAL DATA @ NOCT	REC240PE	REC245PE	REC250PE	REC255PE	REC260PE	REC265PE
Nominal Power - $P_{MPP}$ (Wp)	177	181	183	187	190	193
Nominal Power Voltage - $V_{MPP}$ (V)	27.3	27.7	27.8	28.0	28.2	28.4
Nominal Power Current - $I_{MPP}$ (A)	6.48	6.52	6.58	6.68	6.74	6.80
Open Circuit Voltage - $V_{OC}$ (V)	34.1	34.4	34.7	34.8	35.0	35.3
Short Circuit Current - $I_{SC}$ (A)	7.02	7.06	7.11	7.18	7.23	7.29

Nominal operating cell temperature NOCT (800 W/m<sup>2</sup>, AM1.5, windspeed 1 m/s, ambient temperature 20°C).

## CERTIFICATIONS



IEC 61215, IEC 61730 & UL 1703; MCS,  
IEC 62716 (Ammonia Resistance) IEC 61701 (Salt Mist - severity level 6), IEC 60068-2-68 (Blowing Sand)

**take-way**  
for an easy way  
take-e-way WEEE Compliant  
Recycling scheme

## WARRANTY

10 year product warranty  
25 year linear power output warranty  
(max. degradation in performance of 0.7% p.a.)  
See warranty conditions for further details.

16.1% EFFICIENCY  
10 YEAR PRODUCT WARRANTY  
25 YEAR LINEAR POWER OUTPUT WARRANTY

## TEMPERATURE RATINGS

Nominal operating cell temperature (NOCT) 45.7°C (±2°C)  
Temperature coefficient of  $P_{MPP}$  -0.40 %/°C  
Temperature coefficient of  $V_{OC}$  -0.27 %/°C  
Temperature coefficient of  $I_{SC}$  0.024 %/°C

## GENERAL DATA

Cell type: 60 multi-crystalline  
3 strings of 20 cells with bypass diodes  
Glass: 3.2 mm solar glass with anti-reflection surface treatment  
Back sheet: Double layer highly resistant polyester  
Frame: Anodized aluminum (silver)  
Junction box: IP67 rated  
4 mm<sup>2</sup> solar cable, 0.9 m + 1.2 m  
Connectors: Multi-Contact MC4 (4 mm<sup>2</sup>)

## MAXIMUM RATINGS

Operational temperature: -40 ... +85°C  
Maximum system voltage: 1000 V  
Maximum snow load: 550 kg/m<sup>2</sup> (5400 Pa)  
Maximum wind load: 244 kg/m<sup>2</sup> (2400 Pa)  
Max series fuse rating: 25 A  
Max reverse current: 25 A

## MECHANICAL DATA

Dimensions: 1665 x 991 x 38 mm  
Area: 1.65 m<sup>2</sup>  
Weight: 18 kg

**Note!** Specifications subject to change without notice.

Celebrating its 20th anniversary in 2016, REC is a leading European brand of solar panels. Through integrated manufacturing from polysilicon to wafers, cells, panels and turnkey solar solutions, REC strives to help meet the world's growing energy needs. Founded in 1996, REC is a Bluestar Elkem company with headquarters in Norway and operational headquarters in Singapore. REC concluded 2015 with 2000 employees worldwide, 1.3 GW solar panel production capacity, and annual revenues of USD 755 million.



www.recgroup.com



STP 20000TL-30 / STP 25000TL-30



#### Efficient

- Maximum efficiency of 98.4%

#### Safe

- DC surge arrester (SPD type II) can be integrated

#### Flexible

- DC input voltage of up to 1000 V
- Multistring capability for optimum system design
- Optional display

#### Innovative

- Cutting-edge grid management functions with Integrated Plant Control
- Reactive power available 24/7 (Q on Demand 24/7)

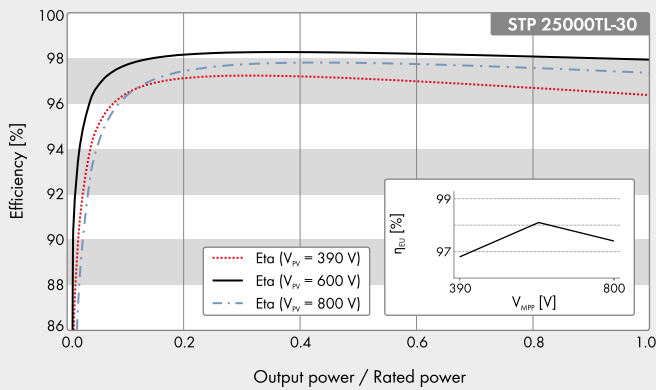
## SUNNY TRIPOWER 20000TL / 25000TL

The versatile specialist for large-scale commercial plants and solar power plants

The Sunny Tripower 20000TL/25000TL is the ideal inverter for large-scale commercial and industrial plants. Not only does it deliver extraordinary high yields with an efficiency of 98.4%, but it also offers enormous design flexibility and compatibility with many PV modules thanks to its multistring capabilities and wide input voltage range.

The future is now: the Sunny Tripower 20000TL/25000TL comes with cutting-edge grid management functions such as Integrated Plant Control, which allows the inverter to regulate reactive power at the point of common coupling. Separate controllers are no longer needed, lowering system costs. Another new feature—reactive power provision on demand (Q on Demand 24/7).

## Efficiency curve



## Accessories



RS485 interface  
DM-485CB-10



Power Control Module  
PWCMOD-10



DC surge arrester (Type  
II), inputs A and B DCSPD  
KIT3-10



Multifunction relay  
MFR01-10

● Standard features ○ Optional features — Not available  
Data at nominal conditions  
State: January 2016

## Technical Data

### Input (DC)

Max. DC power (at $\cos \varphi = 1$ ) / DC rated power
Max. input voltage
MPP voltage range / rated input voltage
Min. input voltage / start input voltage
Max. input current input A / input B
Number of independent MPP inputs / strings per MPP input

### Output (AC)

Rated power (at 230 V, 50 Hz)
Max. AC apparent power
AC nominal voltage
AC voltage range
AC grid frequency / range
Rated power frequency / rated grid voltage
Max. output current / Rated output current
Power factor at rated power / Adjustable displacement power factor
THD
Feed-in phases / connection phases

### Efficiency

Max. efficiency / European Efficiency
---------------------------------------

### Protective devices

DC-side disconnection device
Ground fault monitoring / grid monitoring
DC surge arrester (Type II) can be integrated
DC reverse polarity protection / AC short-circuit current capability / galvanically isolated
All-pole sensitive residual-current monitoring unit
Protection class (according to IEC 62109-1) / overvoltage category (according to IEC 62109-1)

### General data

Dimensions (W / H / D)
Weight
Operating temperature range
Noise emission (typical)
Self-consumption (at night)
Topology / cooling concept
Degree of protection (as per IEC 60529)
Climatic category (according to IEC 60721-3-4)
Maximum permissible value for relative humidity (non-condensing)

### Features / function / Accessories

DC connection / AC connection
Display
Interface: RS485, Speedwire/Webconnect
Data interface: SMA Modbus / SunSpec Modbus
Multifunction relay / Power Control Module
OptiTrack Global Peak / Integrated Plant Control / Q on Demand 24/7
Off-Grid capable / SMA Fuel Save Controller compatible
Guarantee: 5 / 10 / 15 / 20 / 25 years
Certificates and permits (more available on request)

\* Does not apply to all national appendices of EN 50438

## Sunny Tripower 20000TL

20440 W / 20440 W
1000 V
320 V to 800 V / 600 V
150 V / 188 V
33 A / 33 A
2 / A:3; B:3

## Sunny Tripower 25000TL

25550 W / 25550 W
1000 V
390 V to 800 V / 600 V
150 V / 188 V
33 A / 33 A
2 / A:3; B:3

20000 W
20000 VA

25000 W
25000 VA

3 / N / PE; 220 V / 380 V
3 / N / PE; 230 V / 400 V
3 / N / PE; 240 V / 415 V

180 V to 280 V

50 Hz / 44 Hz to 55 Hz
60 Hz / 54 Hz to 65 Hz

50 Hz / 230 V

29 A / 29 A

36.2 A / 36.2 A

1 / 0 overexcited to 0 underexcited

≤ 3 %

3 / 3

98.4% / 98.0%

98.3% / 98.1%

●

● / ●

○

● / ● / —

●

I / AC: III; DC: II

661 / 682 / 264 mm (26.0 / 26.9 / 10.4 inch)

61 kg (134.48 lb)

−25 °C to +60 °C (−13 °F to +140 °F)

51 dB(A)

1 W

Transformerless / Opticool

IP65

4K4H

100%

SUNCLIX / spring-cage terminal

○

○ / ●

● / ●

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● / ● / ●

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ANRE 30, AS 4777, BDEW 2008, C10/11:2012, CE, CEI 0-16, CEI 0-21, EN 50438\*,  
G59/3, IEC 60068-2-x, IEC 61727, IEC 62109-1/2, IEC 62116, MEA 2013, NBR 16149,  
NEN EN 50438, NRS 097-2-1, PEA 2013, PPC, RD 1699/413, RD 661/2007,  
Res. n°7:2013, SI4777, UTE C15-712-1, VDE 0126-1-1, VDE-AR-N 4105, VFR 2014

STP 20000TL-30

STP 25000TL-30





## Easy to Use

- Central monitoring and control of string inverters
- Standardized Modbus interface for use with superior communication devices

## Versatile

- Complies with national and international requirements for grid integration
- Analog and digital interfaces for active and reactive power setpoints

## Professional

- Optimized for industrial applications with robust enclosure and high-quality components
- Sensor technology integration

## Safe

- Immediate email notification in the event of a failure
- Remote monitoring and maintenance via the integrated user interface and Sunny Portal

## SMA CLUSTER CONTROLLER

Professional monitoring and control for decentralized PV systems

Combined with highly efficient SMA inverters, the SMA Cluster Controller is the central communication unit for system monitoring, recording data and controlling large-scale PV plants.

Through a variety of analog and digital in and outputs as well as fast data exchange via an Ethernet-based data interface (e.g., Modbus TCP), a wide range of applications can be realized, from feed-in management to sensor technology integration.

Alongside the standard solution for large-scale commercial PV plants equipped with up to 75 devices, SMA now also offers a version for small-scale commercial PV systems with up to 25 devices.

The SMA Cluster Controller is the professional system interface for power supply companies, direct marketers, service technicians and PV system operators.

Technical Data	SMA Cluster Controller
<b>Communications</b>	
Inverter	Speedwire, 10/100 Mbit/s
Data network (LAN)	Fast Ethernet, 10/100 Mbit/s
Data interfaces	HTTP, FTP, Modbus TCP/UDP, SMTP, Sunny Portal
<b>Connections</b>	
Inverters/data network (LAN)	2 ports/10BASE-T or 100BASE-TX, RJ45, switched
Data storage	2 USB 2.0 high-speed ports, type A
Voltage supply/analog and digital signals	Connector/push-in spring-cage terminal
<b>Max. number of SMA devices</b>	
Speedwire	75/25*
<b>Maximum radio ranges</b>	
Speedwire/LAN	100 m (between two devices)
<b>Voltage supply</b>	
Voltage supply	External power supply unit (available as an accessory)
Input voltage	18 V DC to 30 V DC
Power consumption	Typ. 12 W/max. 30 W
<b>Ambient conditions in operation</b>	
Ambient temperature	-25 °C to +60 °C (-13 °F to +140 °F)
Relative humidity	4% to 95%, non-condensing
Elevation above MSL	0 m to 3,000 m
<b>Display</b>	
Type	LC display, monochromatic, back-lit
Display languages	German, English
<b>Battery</b>	
Internal	1.7 GB as ring buffer
External	USB mass storage (optional, available as an accessory)
<b>USB interfaces</b>	
Quantity/specification/ports	2/USB 2.0 high-speed/type A
<b>Digital inputs</b>	
Quantity	8
Use	Setpoints for active and reactive power
<b>Analog inputs</b>	
Quantity	3 x current signal, 1 x voltage signal
Measurement range	0 mA to 20 mA or 0 V to +10 V
Use	Irradiation measurement, setpoints for active/reactive power or current/voltage measurement
<b>Temperature measurement</b>	
Quantity/sensor type	2 / PT100 / PT1000 (two or four-cable connection)
Measurement range	-40 °C to +85 °C (-40 °F to +185 °F)
Use	Measurement of ambient and cell temperature
<b>Digital outputs</b>	
Quantity/design	3/potential-free relay contacts
Max. load tolerance	48 V DC/30 W
Use	Error message, warning and active power limitation
<b>Analog outputs</b>	
Number/signal current	2/4 mA to 20 mA
Use	Feedback of the active and reactive power setpoints
<b>General data</b>	
Dimensions (W/H/D)	275/133/71 mm (10.8/5.2/2.8 inch)
Weight	0.9 kg (2.0 lb)
Installation site/degree of protection provided by enclosure	Indoors/IP20
Mounting type	Top-hat rail mounting
Status display	LC display, LEDs
Software languages, languages of the manual	German, English, Italian, Spanish, French, Dutch, Portuguese, Greek, Czech
<b>Features</b>	
Operation	Integrated web server, display, keypad
Time	Real-time clock (RTC) with maintenance-free buffering
Advanced functions using the Sunny Portal	PV system and yield monitoring, measured value processing, performance analysis, presentation, status reports, mobile data access
Warranty	5 years
Certificates and approvals	www.SMA-Solar.com
<b>Accessories (optional)</b>	
Top-hat rail power supply unit	Input: 100 V to 240 V AC / 45 to 65 Hz, Output: 24 V DC/2.5 A
USB flash drive	4 GB or 8 GB, highly reliable industrial quality
Type designation	CLCON-10/*CLCON-S-10



EMETER-10



Now also available for applications > 63 A  
thanks to external current transformers.

## Easy to Use

- Quick plug and play installation
- Graphic visualization of current measured values in Sunny Portal

## Flexible

- Space-saving DIN rail mounting in household distribution thanks to compact enclosure
- Flexible use in applications >63 A thanks to external current transformers

- Suitable for universal use regardless of existing energy meter

## High Performance

- Fast three-phase, bidirectional reading of measured values for effective energy management
- Fast Speedwire communication

## SMA ENERGY METER

Universal recording of measured values for intelligent energy management

The powerful measurement solution for intelligent energy management within the SMA Smart Home: The SMA Energy Meter takes phase-accurate and balanced electrical measured values, such as a grid feed-in and purchased electricity meter, and communicates these values via Speedwire. Thanks to its ability to quickly acquire bidirectional measured values, the SMA Energy Meter is the ideal supplier of data for intelligent energy management within the SMA Smart Home. All PV generation data, purchased electricity and grid feed-in can be transmitted via standard Ethernet cable to the Sunny Home Manager, for example, or, in the future, to the Sunny Boy Smart Energy. This, in turn, facilitates optimal energy monitoring, effective load and battery management and reliable active power limitation at the grid feed-in point while taking self-consumption into account.

\* Can also be used in single-phase systems.

