

PROINSO

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PROINSO is a company that focuses its business activity in the field of Renewable Energy, and more specifically on Engineering Services and Material Supplies provided to the area of Photovoltaic Solar Energy Connected to the Grid.

PROINSO is the official distributor of **mecasolar** dual-axis solar trackers and of the electronic inverters used in **SMA Technologie AG** photovoltaic installations.

mecasolar is a company dedicated to the design, manufacture and distribution of state-of-the-art dual-axis solar tracking systems, which makes it possible to increase photovoltaic solar energy production by more than 35% with respect to fixed installations and which offers a 10 year GUARANTEE on parts and workmanship.

1. MODELS AND ADVANTAGES THAT MAKE THE DIFFERENCE

- Dual-axis solar trackers and 11 kWp (9.9 kW power rating); easy to install and start-up with minimum maintenance needs. The complete diagram is attached (Appendix I).
- Simple construction work with no excavation work or heavy machinery required.
- Adaptable to all types of photovoltaic module powers.

MS TRACKER 10

- "V"-shaped metal structure and grills for 11 kWp panels.
- PLC tracker mounted in independent electrical panel, fully wired, including motor protector, PLC power supply, varistors, etc. The electric diagram is attached (Appendix II).
- Foundation on surface footing that does not require any excavation.
- Simple and quick on site tracker assembly.
- Three phase gearmotors on both axes.
- Hook-up/connection panel for storing protectors.

MS TRACKER 10 PLUS

- "V"-shaped metal structure and grills of up to 11 kWp.
- PLC tracker mounted in independent electrical panel, fully wired, including motor protector, PLC power supply, varistors, etc. The electric diagram is attached (Appendix II).
- Foundation on surface footing that does not require any excavation.
- Simple and quick on site tracker assembly.
- Three phase gearmotors on both axes.
- Hook-up/connection panel with protectors (magnetothermic and differential switches and surge protection) installed and wired. The electric diagram is attached (Appendix II).
- 3, 3300 3 kWn SMA Sunny Boy inverters for outdoors, IP65



2. TECHNICAL EQUIPMENT AND CHARACTERISTICS

SOLAR TRACKER – *Metallic structure and frame enabling 2-axis (azimuth and vertical) solar tracking with movement supplied via three phase gearmotors.*

MS TRACKER 10 – TECHNICAL CHARACTERISTICS	
Structure	Hot dipped galvanized steel metallic structure
Maximum module surface area	85 m ²
Maximum photovoltaic power	11 kWp (as a function of module power and number of modules)
Tracking technology	PLC astronomical programming
Wind protection system	Programmable; Horizontal positioning at wind speeds of greater than 70 km/h
Tracker height	3,300 mm (from the foundation and in horizontal position)
Weight without modules and foundation	2,000 kg (3,000 kg)
Foundation	Surface foundation of reinforced concrete
Tracking Axes	2 axes: azimuth and vertical
Angles of rotation	Azimuth: -120° to 120° Vertical: 0° to 60°
Azimuth rotation:	Rotates on the cogged crown wheel, activated by way of electric planetary gearmotors
Vertical	By way of a linear actuator with electro-mechanical activation
Power supply to motors	400 V three phase
Power usage of motors	100 kWh/year
Automation	Totally independent PLC, on each tracking system, with possible remote control and interconnection
Bearing and turn regulation	Cogged crown wheel. Motorised bearing for azimuth tracking activated by planetary reducer and an adjustable brake motor that allows for sliding when facing extremely strong winds and which protects the transmission.
Electrical cabinets for PLC and protection	Metallic, weather tight, fully wired IP66. Includes motor protections
Maintenance	Yearly revision of mechanical and electrical parts
Anti-theft system	Alarm upon module disconnection (OPTIONAL)
Monitoring	On site, Ethernet, Internet (Optional)
Guarantee	10 years on Parts and Workmanship

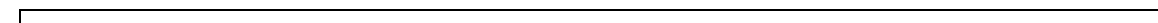


<i>Subject to modifications by the manufacturer.</i>	
MS TRACKER 10 PLUS - Technical Characteristics	
Same as for MS TRACKER 10 plus the following:	
Inverters	3 monophase inverters, IP65, installed and fully wired for 3.3 kW average
Protections	Includes electrical protections (magnetohermic and differential switches and surge protection)
Guarantee	Tracker guarantee: 10 years on Parts and Workmanship Inverters guarantee: 5 years
<i>Subject to modifications by the manufacturer.</i>	

ELECTRONIC INVERTER – The offer for the **MS TRACKER 10 PLUS** includes 3 SMA Sunny Boy SB3300 current inverters with a power rating of 3300 W.

SMA SUNNY BOY SB 3300 – TECHNICAL CHARACTERISTICS	
INPUT	
Maximum DC Power ($P_{dc, max}$)	3820 W
Maximum DC Voltage ($V_{dc, max}$)	500 V
Photovoltaic voltage range, MPPT (V_{MPP})	200 V – 500 V
Max. input current ($I_{PV, max}$)	20 A
DC distortion factor (U_{ss})	< 10%
Operating temperature range	-25 to 60 °C
Max. No. of strings (in parallel)	3
DC separator device	ESS connector
Varistors with temperature control	Yes
Grounding contact check	Yes
Protection against inverse polarisation	Short-circuit diode
OUTPUT	
Maximum AC Power ($P_{AC, max}$)	3600 W
Average AC Power ($P_{AC, av}$)	3300 W
Non-linear distortion coefficient for the grid current	< 4%
Average AC voltage ($V_{AC, av}$)	220 V – 240 V
Average AC frequency ($f_{AC, av}$)	50 Hz / 60 Hz
Power factor, $\cos \phi$	1





Resistance to short circuits	Yes, current regulation
Connection to grid	AC connector
Performance Coefficient	
Max. performance coefficient	95.2 %
European performance	94.4 %
Level of Protection	
According to DIN EN 60529	IP65
Mechanical Parameters	
Width / Height / Depth (mm)	450 / 352 / 236
Weight	41 kg
<i>Subject to modifications by the manufacturer.</i>	

PHOTOVOLTAIC MODULES:

This offer **does not include** photovoltaic modules.

The **mecasolar** MS TRACKER 10 and 10 PLUS trackers permit the installation of all types of modules of any brand, size and power rating.

PROINSO offers a wide range of photovoltaic modules from different manufacturers and of various powers.

Module positioning over the grill is designed once the technical characteristics of the modules to be installed are known. In no case should this exceed 11.50 m long by 7.30 m high, and the positioning established should be verified by PROINSO personnel.

Likewise, the framework and bolting necessary to secure the modules to the frame is optional and is not included in the price of the trackers.



3. TRACKER CHARACTERISTICS

3.1. SOLAR TRACKER

MS TRACKER 10 and 10 PLUS trackers follow the sun as a result of the astronomical programming. The incorporated PLC activates the gearmotors, which line the photovoltaic surface up perpendicular to the sun rays, maximising electric energy generation; it also permits situating the tracker in a nocturnal position and putting it in the optimal position for the evening hours in order to begin the daily work cycle.

Likewise, the PLC controls the signal coming from an anemometer (common to the whole photovoltaic field), and if there are strong winds, it will move the tracker into defence position situating the photovoltaic surface horizontally.

Said anemometer is not included in the tracker assembly supplied.

The PLC will be programmed by **mecasolar** personnel, who will give special consideration to the geographical coordinates, topographical characteristics and particular weather conditions of the solar field location.

3.2. SHADOWS

To avoid having shadows or other elements that cast shadows hanging over the trackers, distances of 29 m in the E-W direction and 23 m in the N-S direction should be maintained between the tracker axes.

Accordingly each tracker virtually occupies 660 m², achieving a power density of 17 Wp/m².

3.3. FOUNDATION



MS TRACKER 10 and 10 PLUS trackers should be installed on a 4000 mm diameter, 600 mm high reinforced concrete footing. The diagram is attached (Appendix III).



This footing requires no excavation work, and it is only necessary to clean off the terrain, removing the top layer of vegetation and levelling the ground.

Foundation characteristics and technical drawings are provided when its supply is secured. Likewise, technical drawings and technical assistance will be provided for making the foundation moulds and templates.

If necessary to modify the foundations due to specific terrain characteristics (data to be provided by the client), **PROINSO** will facilitate new footing dimensions; a service included in the price of the tracker.

3.4. TRANSPORT AND ASSEMBLY

Transport and assembly of the trackers is optional and is not included in the sales price.

MS TRACKER 10 and 10 PLUS trackers are shipped mounted, and the final assembly along with the machinery and personnel necessary for execution is the responsibility of the client; **PROINSO** offers technical assistance for final assembly on site.



Frame with crossbeams over the central body of the tracker.



The tracker is transported in 3 parts:

- 1 central body (V shaped structure)
- 1 grill frame to hold modules
- 11 crossbeams ("C" profiles)



Tracker assembly comprises the following:

1. Placing the central body on the foundation footing. This is done by lining the anchor bolts, preset in the foundation footing, up with the pre-tapped holes on the base of the tracker. Then, the nut and the locknut are tightened securing the tracker to said anchor bolts.
2. Securing the crossbeams ("C" profiles) to the frame. Each of the eleven crossbeams bolted to the frame supports prepared for that purpose. Accordingly, the grill is assembled allowing for the placement of the photovoltaic modules.
3. Hoisting and placing the grill on the central body. The grill formed by the frame and the crossbeams should be installed on the central body, inserting 3 pins on the frame's rotation axes.

Bolting for fastening the crossbeams and the rotation stud bolts are included with the tracker supplied. Neither the anchor bolts nor the nuts are provided with the footing.

During tracker assembly, lift equipment must be used to place the central body of the footing and to secure the frame over the tracker body. Said machinery used in the assembly of the trackers will be the client's responsibility.

3.5. START UP

Tracker start-up is included in the prices considered in this offer.

PROINSO will execute the tracker start-up once installation is complete. During this phase, start-up protocol, including the pertinent tests and verifications, will be followed.

After start-up, the document verifying reception and start-up at the facility will be issued.

3.6. MONITORING

Photovoltaic monitoring is not included in the price.

Monitoring offered by PROINSO consists of collecting data from the SMA Sunny Boy inverters and monitoring that data via a Webpage. Hardware and software necessary as well as system start-up is included along with installation over the existing channelling.



3.7. GUARANTEE



mecasolar MS TRACKER 10 and 10 PLUS trackers come with a 10 year guarantee on parts and workmanship. This guarantee neither includes inverters nor the modules that are installed as part of the photovoltaic installation (refer to the guarantee offered by the various manufacturers of this equipment).

During the guarantee period, **mecasolar** (or a company expressly authorised by **mecasolar**) will repair or replace all parts or pieces, in the briefest period possible and in the location set by **mecasolar**, which impede normal operation of the equipment due to defects in quality or fabrication.

This is subject to an annual revision to be executed by **mecasolar** (or a company expressly authorised by **mecasolar**) each year over the guarantee period. The price for said revision is not included in the tracker price (See optional Services). If the verifications are not executed, this guarantee is null and void.

This revision shall consist of an annual visit to the solar plant where the trackers are located. **mecasolar** (or a company expressly authorised by **mecasolar**) shall visually check the trackers to verify their correct status and the optional operation of the different elements of the solar trackers as well as compliance with the instructions provided in the tracker Maintenance Manual.

Conditions for this revision are provided in the document, "General Conditions of Solar Tracker Guarantee".

Neither photovoltaic production nor photovoltaic installation performance guarantees, incorporating the **mecasolar** MS TRACKER 10 and 10 PLUS, are included.

3.8. MAINTENANCE

Together with the trackers, a Maintenance Manual will be provided that provides the forecasted maintenance tasks that should be followed to assure the correct operation of the tracker.



4. PRICES AND SALES CONDITIONS

4.1. TRACKERS

TRACKER - meca solar MS TRACKER 10	
Quantity	Price
From 1 to 9 trackers	14,000 €/Unit
From 10 to 50 trackers	13,500 €/Unit
From 51 to 100 trackers	13,000 €/Unit
More than 100 trackers	12,500 €/Unit

Prices are subject to be modified. 16% VAT not included.

TRACKER - meca solar MS TRACKER 10 PLUS	
Quantity	Price
From 1 to 9 trackers	18,700 €/Unit
From 1 to 50 trackers	18,100 €/Unit
From 1 to 100 trackers	17,500 €/Unit
More than 100 trackers	16,900 €/Unit

Prices are subject to be modified. 16% VAT not included.

PAYMENT METHOD

Wire transfer:

- 10 % upon signing the contract
- Rest, weekly invoicing at the week of maturity

DELIVERY PERIODS

Maximum, 1 month from date the order is confirmed.
Maximum per client, 100 units/month

Delivery planning will be specified based on:

- accepting of the order
- receiving the payment to the account
- planning the construction project

VALIDITY OF THE OFFER

Offer is valid for 60 days after the date on which it is issued.

4.2. OPTIONAL SERVICES

FRAMEWORK AND SECURING THE MODULES

The photovoltaic modules should be mounted on the solar tracker frame by bolting it into the metal framework.

FRAMEWORK FOR SECURING THE MODULES TO THE TRACKER FRAME	
Supply track, joints and all bolting necessary to secure the module in place. Installation not included.	
Quantity	Price
From 1 to 9 trackers	780 €/tracker
From 10 to 50 trackers	760 €/tracker
From 51 to 100 trackers	740 €/tracker
More than 100 trackers	720 €/tracker
The quantity and characteristics of this framework will depend on the modules and their positioning as defined for each specific installation. These prices are based on a configuration for 63 modules and 200 m of track. Parts included. Prices are subject to be modified. 16% VAT not included.	

TRANSPORTING TRACKERS

Transportation offered is optional, and it consists of transportation of the trackers from the **mecasolar** facilities to the photovoltaic field location, provided on the appropriate transportation medium.

The trackers are transported, stacked on semis, requiring 3 vehicles for every 8 trackers.

The following tracker transport prices are offered for orders of more than 10 trackers. Please consult for other cases.

Unloading the trackers on site will be the client's responsibility along with obtaining the machinery and the personnel necessary to perform these tasks.

Distance	Price
Up to 100 km	250 €/tracker
From 100 to 300 km	300 €/tracker
From 300 to 500 km	400 €/tracker
From 500 to 750 km	500 €/tracker
More than 750 km	600 €/tracker
Throughout all Spain. Transportation insurance included. Prices are subject to be modified. 16% VAT not included.	



TRACKER ASSEMBLY

Assembling the trackers consists of setting the tracker up on the foundation (previously prepared by the client) using a small telescopic crane and mounting the frame on the central body of the tracker. Then, the "C" profiles will be mounted to complete the frame, finalising solar tracker assembly.

This does not include mounting or fastening the framework necessary to secure the photovoltaic modules.

Final tracker assembly and installation over the foundation. This does not include the machinery necessary, which must be provided by the client.	
Quantity	Price
From 1 to 9 trackers	260 €/tracker
From 10 to 50 trackers	240 €/tracker
From 51 to 100 trackers	220 €/tracker
More than 100 trackers	200 €/tracker
Throughout all Spain. Per diem and transportation included. Prices are subject to be modified. 16% VAT not included.	

ANNUAL SUPERVISION

Consistent preventive supervision in a yearly visit to the solar field. Visual check up and verification of the status and operation of the equipment comprising the tracker.

This annual revision is not considered optional as it is necessary in order to maintain the validity of the 10 year guarantee offered by **mecasolar**. It is associated with the product. The manufacturer does not supply trackers unless this option is agreed on.

Quantity	Price
From 1 to 9 trackers	50 €/tracker
From 10 to 50 trackers	50 €/tracker
From 51 to 100 trackers	50 €/tracker
More than 100 trackers	50 €/tracker
Prices are subject to be modified. 16% VAT not included.	



MONITORING SMA SUNNY BOY INVERTERS

Installation and monitoring system start-up for the SMA Sunny Boy inverters via a GSM modem with data being stored on a Web server.

To be installed with existing channels.

Quantity	Price
Installation for 100 kW (10 trackers)	1000 €
Per diem and transportation included. Prices are subject to be modified. 16% VAT not included.	

PAYMENT METHOD for optional services

Wire transfer

- 10 % upon Signing the contract
- Rest, weekly invoicing at the week of maturity

DELIVERY PERIODS

Delivery planning will be specified apart from:

- accepting of the order
- receiving the payment to the account
- project execution periods

VALIDITY OF THE OFFER

- Offer is valid for 60 days after the date on which it is issued.



5. INSTALLATIONS PERFORMED WITH MECASOLAR

5.1. PHOTOVOLTAIC FIELD “MURILLO EL FRUTO”

Developer: OPDE

Photovoltaic field with 168 MS TRACKER 10 PLUS trackers in Murillo el Fruto (Navarra).

5.2. PHOTOVOLTAIC FIELD “CINTRUÉNIGO”

Developer: OPDE

Photovoltaic field with 168 MS TRACKER 10 PLUS trackers in Cintruénigo (Navarra).

5.3. PHOTOVOLTAIC FIELD “MENDAVIA”

Developer: HELIOS SOLAR

Photovoltaic field with 166 MS TRACKER 10 PLUS trackers in Mendavia (Navarra).

5.4. PHOTOVOLTAIC FIELD “MURCHANTE”

Developer: HELIOS SOLAR

Photovoltaic field with 166 MS TRACKER 10 PLUS trackers in Murchante (Navarra).

5.5. PHOTOVOLTAIC FIELD “VALENCIA DE MOMBUEY”

Developer: VALSOLAR

Photovoltaic field with 78 MS TRACKER 10 PLUS trackers in Valencia de Mombuey (Badajoz).

5.6. PHOTOVOLTAIC FIELD “LAS PORTUGUESAS”

Developer: VALSOLAR

Photovoltaic field with 404 MS TRACKER 10 PLUS trackers in Badajoz (Badajoz).

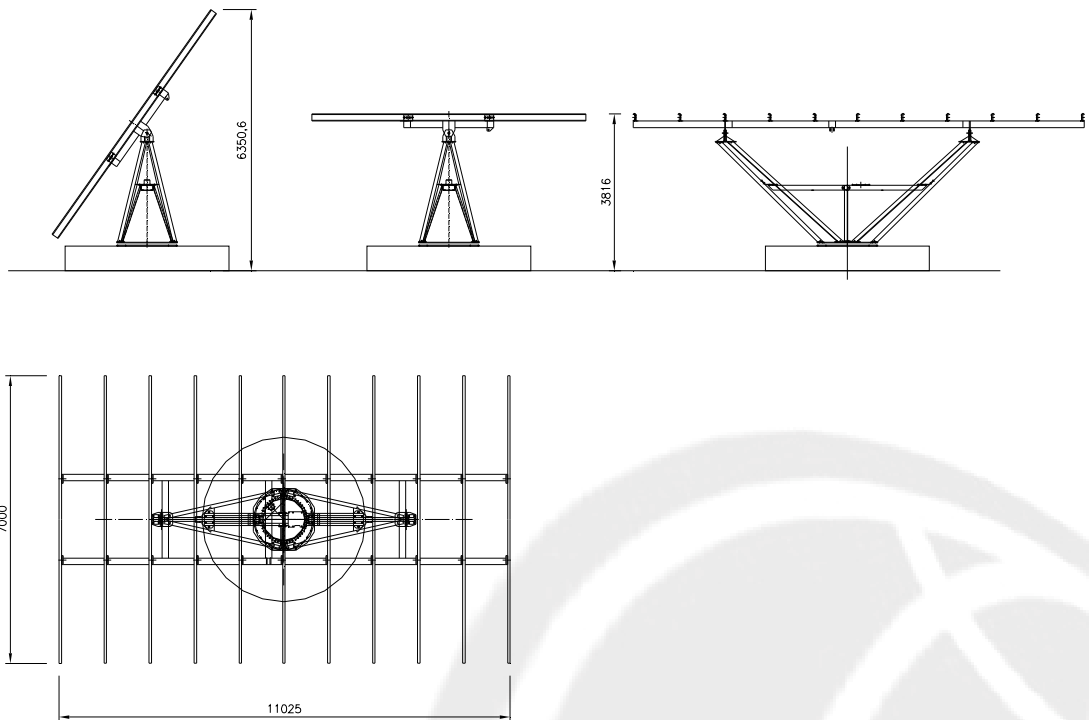
5.7. PHOTOVOLTAIC FIELD “ALLEPUZ”

Developer: ALLEPUZ SOLAR

Photovoltaic field with 13 MS TRACKER 10 PLUS trackers in Allepuz (Teruel).

APPENDICES

APPENDIX I – Technical Drawing of the Tracker



APPENDIX II – Electrical Drawings for the Tracker

Figure No. 1, Technical Drawing of Protections and Gearmotor Control



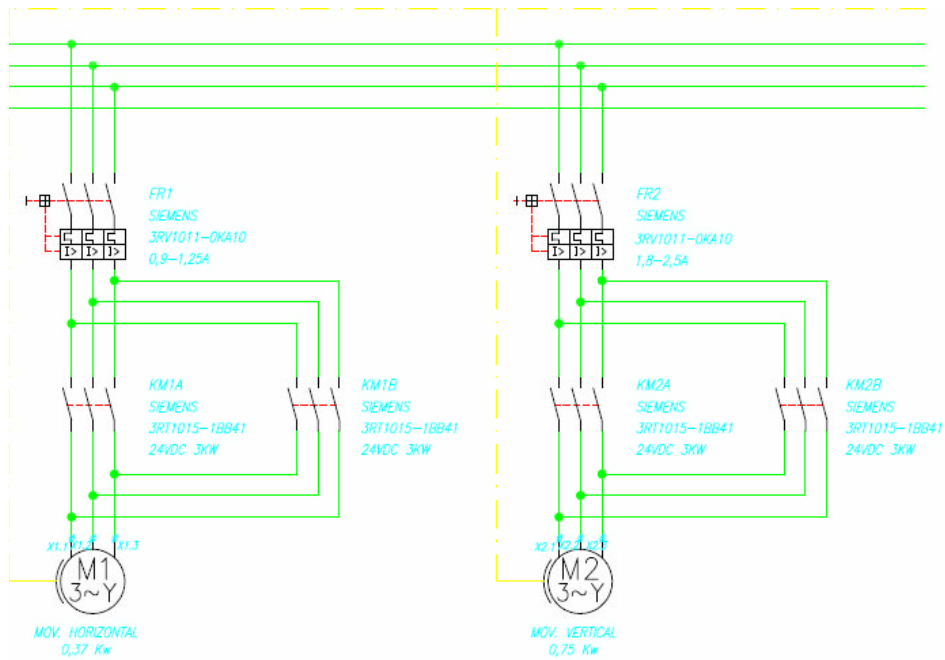
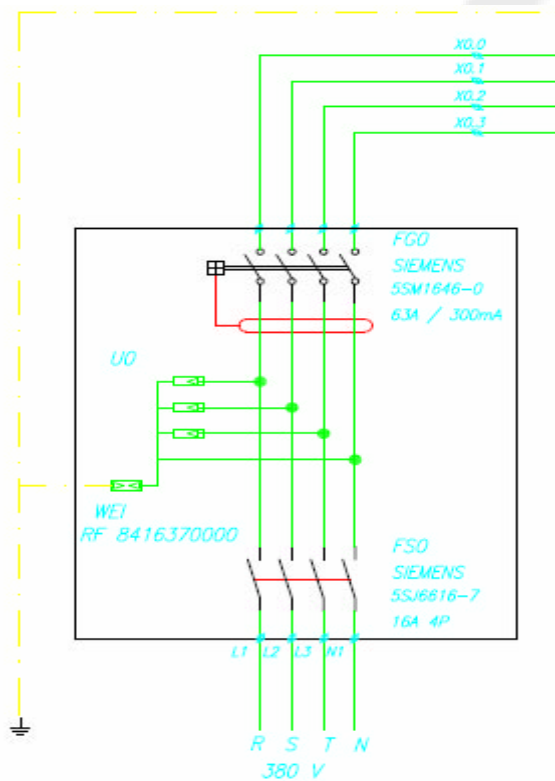
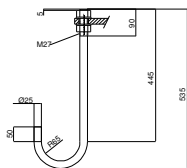
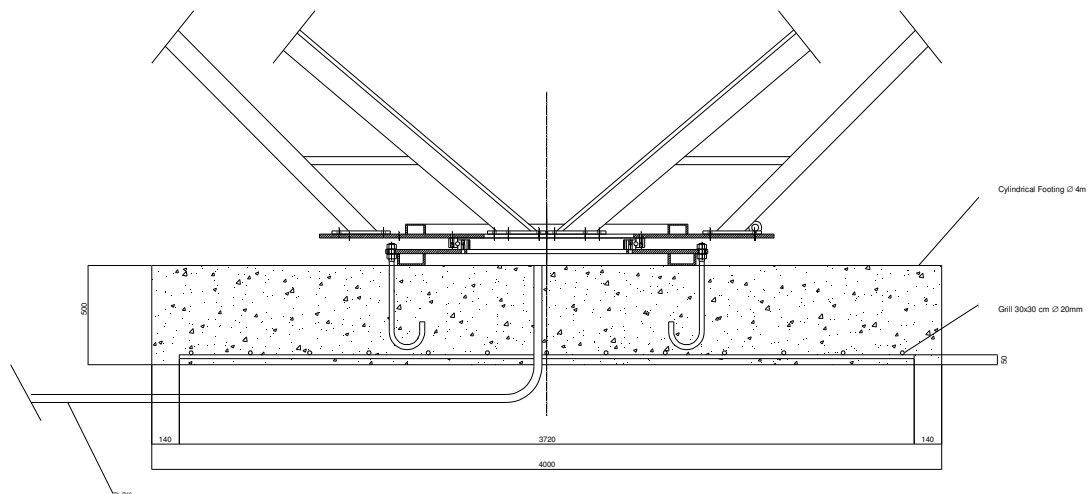


Figure No. 2, Technical Drawing of Power Protections Only for the MS TRACKER 10 PLUS Model



APPENDIX III – Technical Drawing of the Foundation Footing



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Concrete HA-25/p/40/IIa
Footing volume 6.3 m³
Corrugated steel B 500-S
Anchor: A-42B

