

SUNPAL POWER CO., LTD.

Solar Tracker



1. Solar Tracker Advantage

- ❖ 1. The solar tracker uses high-precision astronomical algorithm to calculate the sun's angle, combined with a high-performance microcontroller (DSP core), to make the system calculate the position accurately and reliably and to adapt to a wide range of operating environments without the interference of rainy days.
- ❖ 2. Selection of international first-line brand inclination sensor, real-time closed-loop feedback tracking angle, automatic tracking, without human intervention.
- ❖ 3. Self-developed back tracking algorithm to further improve the efficiency of power generation to ensure that the solar panels has always been working in the shadowless state, increase the solar power generation and prolong its service life.
- ❖ 4. Tracker with aviation plug, easy installation and commissioning, with manual control mode, you can manually adjust the tracking angle, the controller has a power station running, stop, night return status indicator.
- ❖ 5. Strong anti-interference ability of the system, severe electromagnetic interference in the photovoltaic area to ease, its excellent electromagnetic compatibility design, to ensure the system's high reliability operation.

1. Solar Tracker Advantage

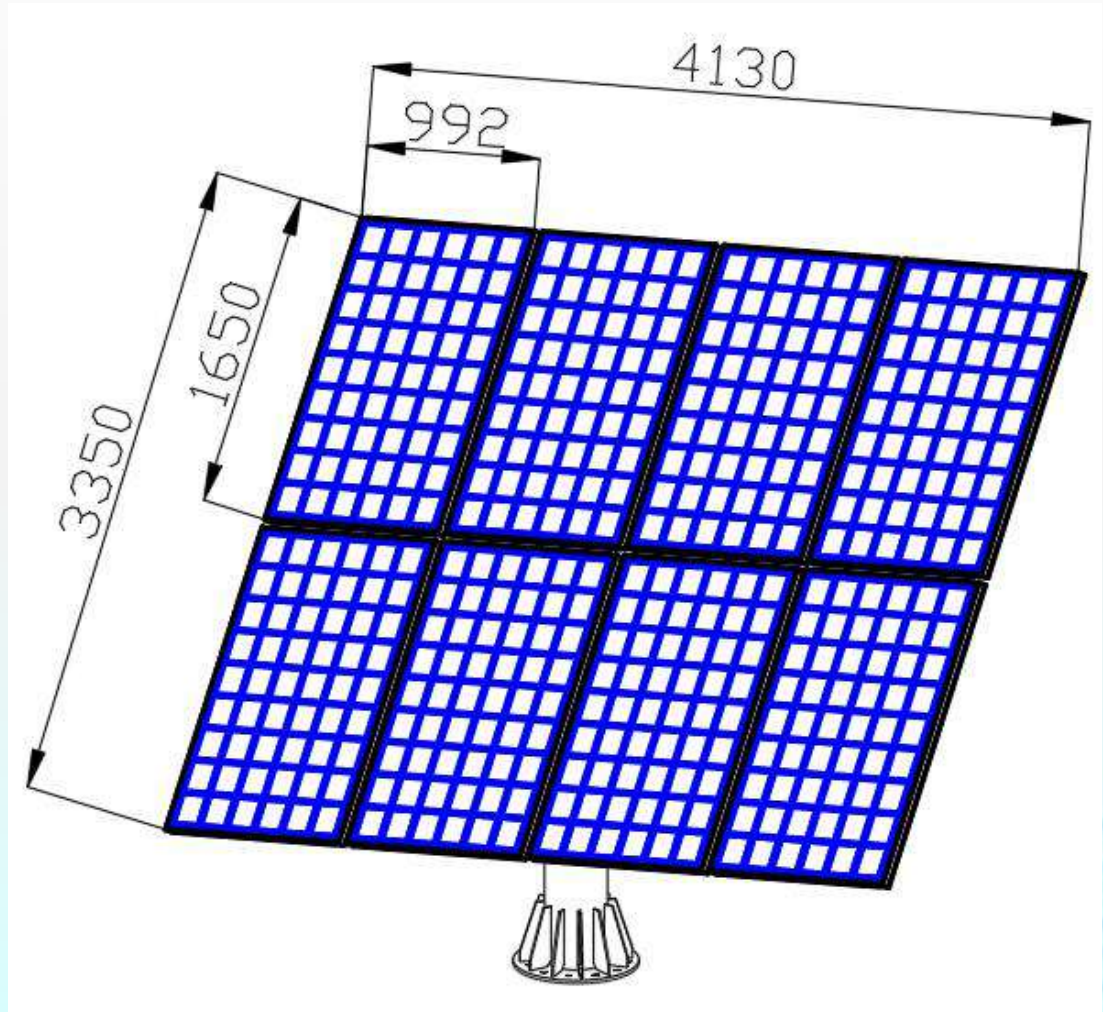
- ❖ 6. Wind-resistant design, automatically flat to the initial position at night, the system has a wind speed protection interface, support for external wind speed sensor, at any time to control the system into the mechanical maximum wind conditions.
- ❖ 7. The system has a spare battery, to ensure that no data loss of the system power failure, automatically enter the running state after powering on.
- ❖ 8. System in $-40 \sim +70$ degrees stable operation, no cumulative error
- ❖ 9. RS485-MODBUS standard communication interface, the computer software can read the device at any time the following information:
 - ❖ (1)Sun angle, inclination angle, operating status.
 - ❖ (2)Actuator, inclination, limit, communications fault alarm.
 - ❖ (3)Remote start, stop, reset, manual, wind, snow, rain.

2. Parameters---Dual Axis

Project	Value	Project	Value
Control Method	Astronomical	Iphone APP	Optional
Accuracy	$\leq 1^\circ$	Back Tracking	YES
Azimuth tracking	$-120^\circ \sim +120^\circ$	Elevation tracking	$0^\circ \sim 60^\circ$
Normal wind	17mS	Angle feedback	YES
Temperature ($^\circ\text{C}$)	$-40^\circ\text{C} \sim +70^\circ\text{C}$	Input voltage	AC:220V 50/60HZ
Consumption (KW.h)	≤ 0.5	GPS positioning	Optional
Design lift	≥ 25 years	Data protection	YES
Remote function	YES	Communication	RS485-MODBUS
Wind protection	Optional	Limit protection	YES
Standards	GBT 29320-2012	Protection degree	IP65
Certification	CE,CQC, ISO9001, ISO14001, OHSAS18001		

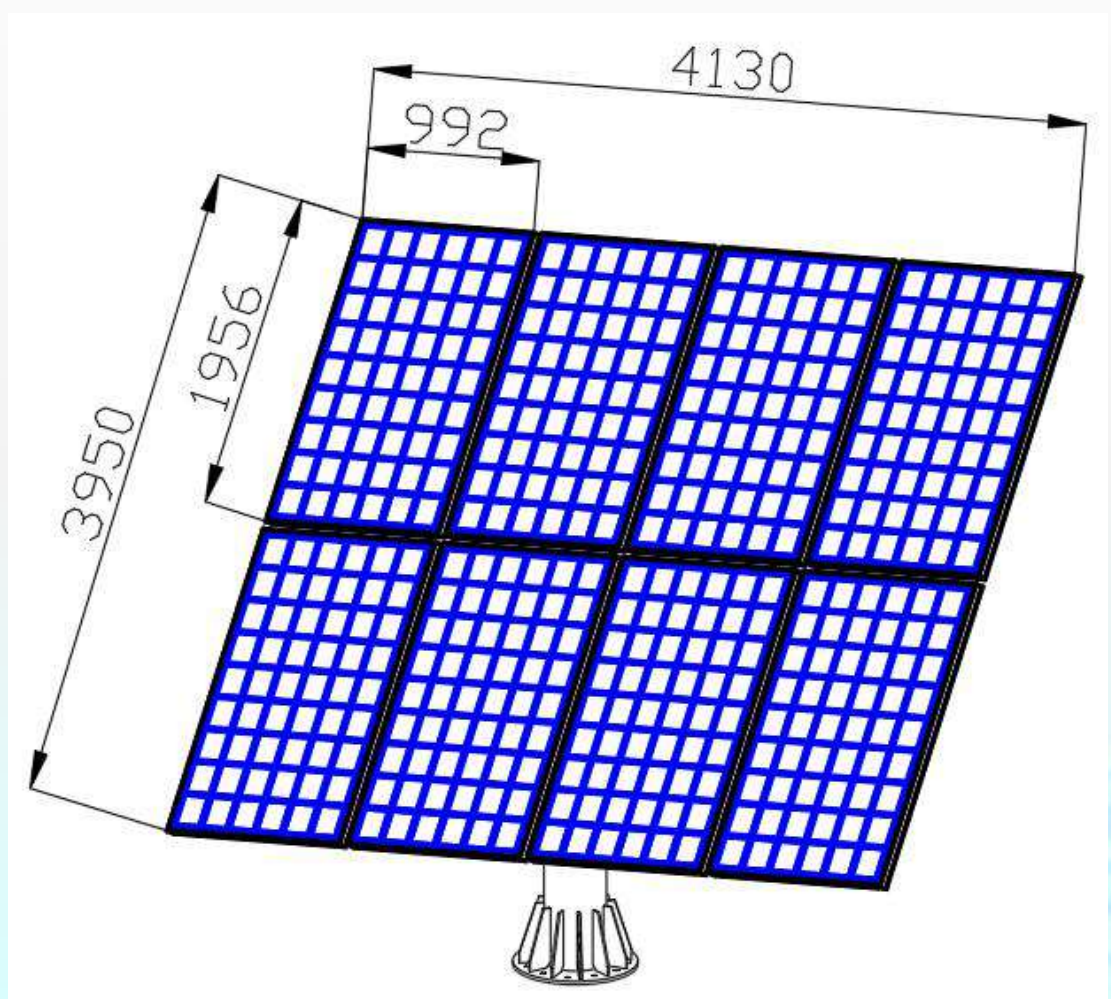
3. Specification---Dual Axis-8P-1650-992

2~2.4KW Dual Axis	
Project	Value
Module num	8 pieces
Module power	250~300
Module size	1650*992
Design life	≥25 years
Anti-corrosion	Hot Galvanizing
Bracket area	15m ²
Material	Q235 Steel
Weight	≥350KG
Package	Bubble film



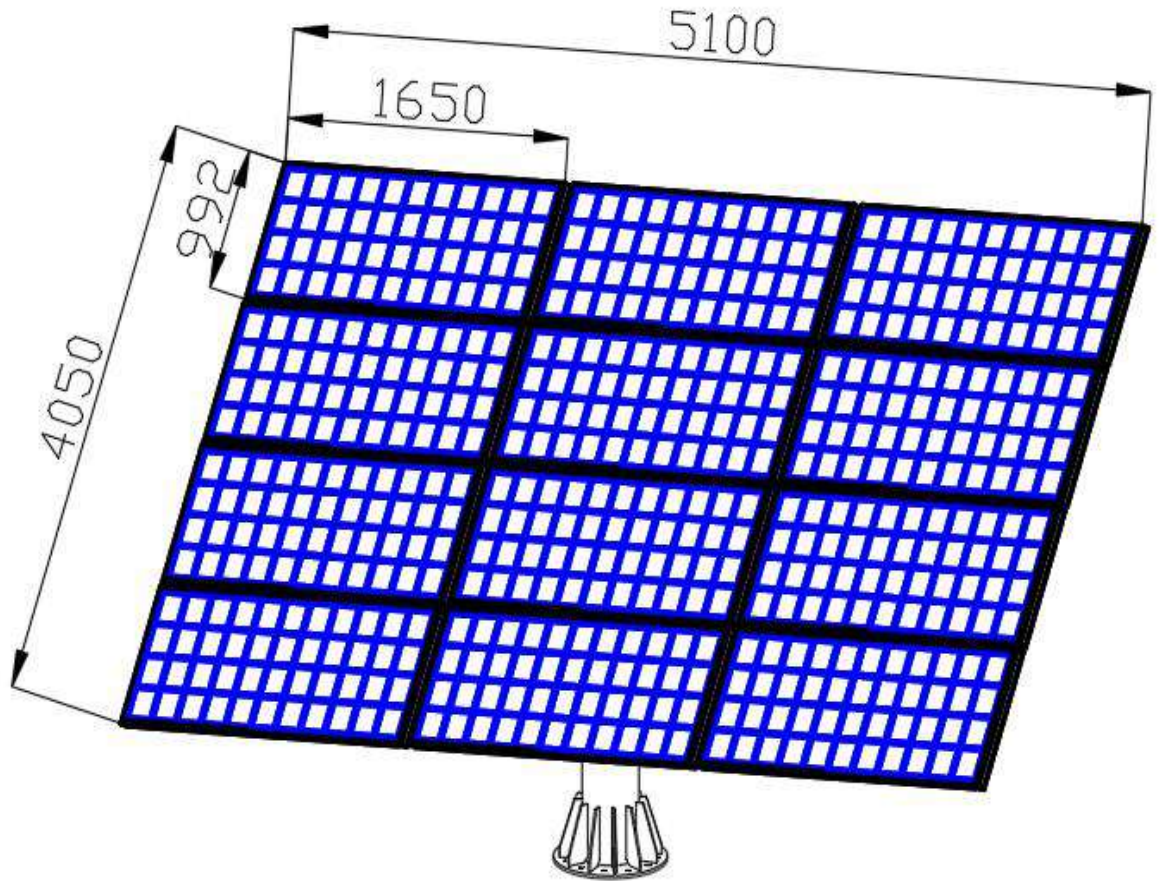
3. Specification---Dual Axis-8P-1956-992

2.4~2.6KW Dual Axis	
Project	Value
Module num	8 pieces
Module power	300~360
Module size	1956*992
Design life	≥25 years
Anti-corrosion	Hot Galvanizing
Bracket area	18m ²
Material	Q235 Steel
Weight	≥420KG
Package	Bubble film



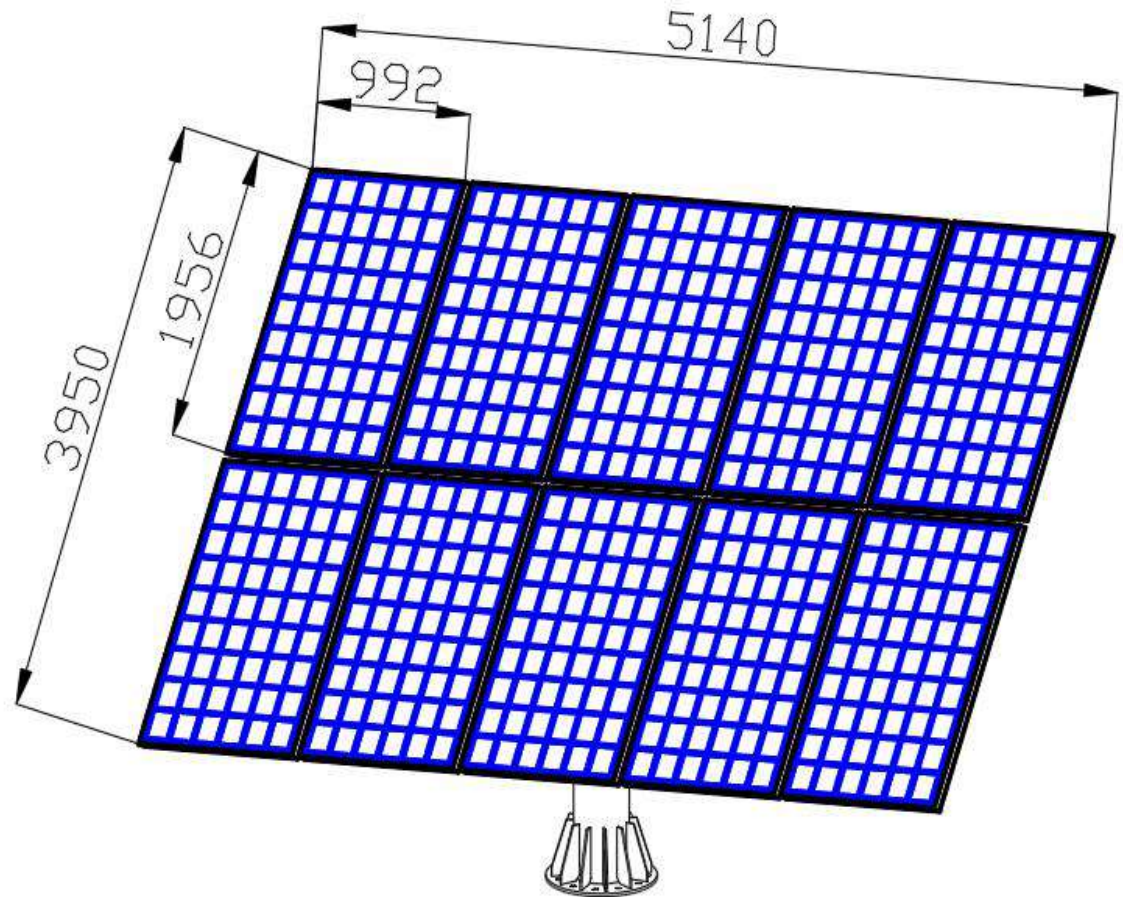
3. Specification---Dual Axis-12P-1650-992

3~3.6KW Dual Axis	
Project	Value
Module num	12 pieces
Module power	250~300
Module size	1650*992
Design life	≥25 years
Anti-corrosion	Hot Galvanizing
Bracket area	20m ²
Material	Q235 Steel
Weight	≥500KG
Package	Bubble film



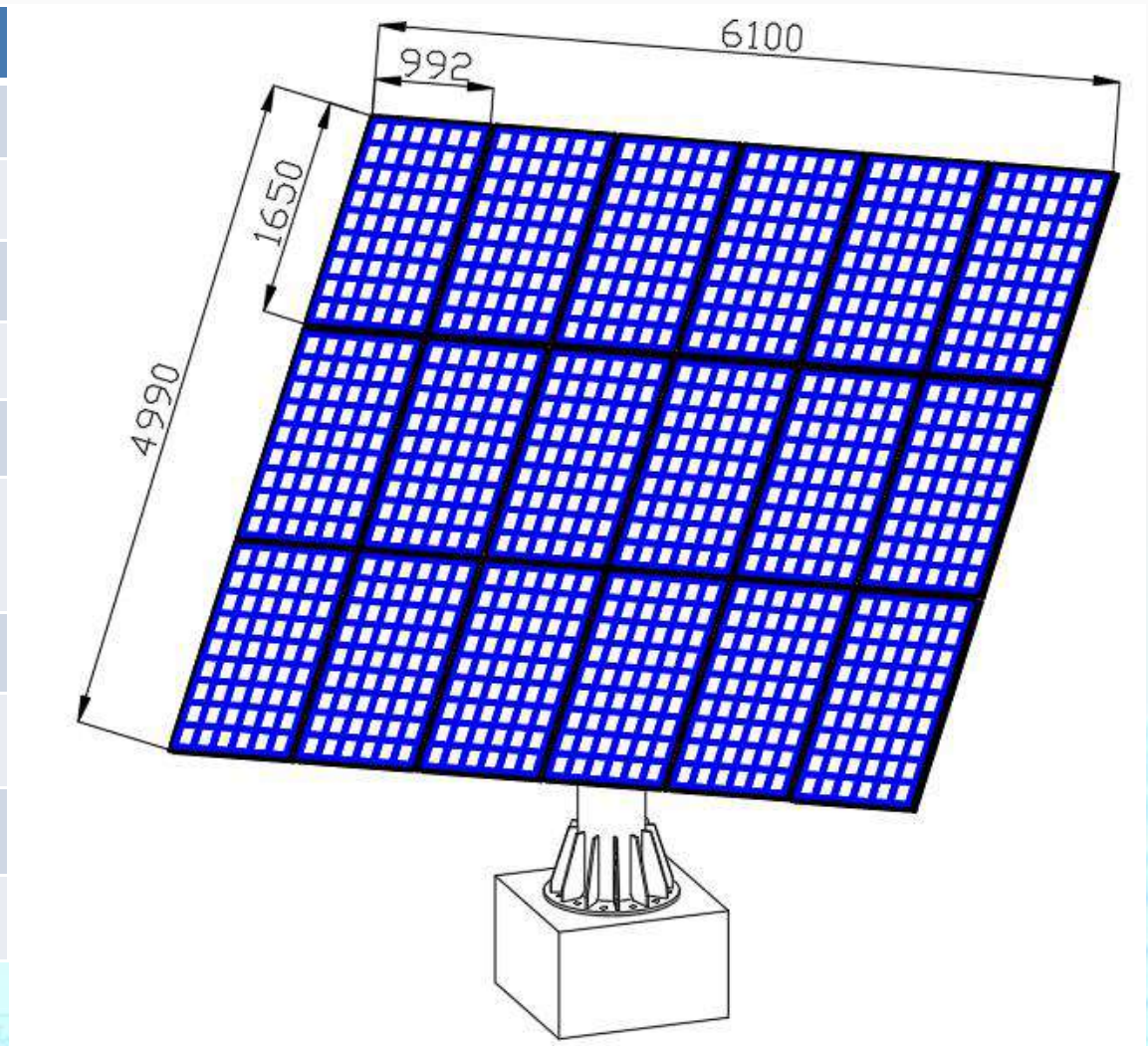
3. Specification---Dual Axis-10P-1956-992

3~3.6KW Dual Axis	
Project	Value
Module num	10 pieces
Module power	300~360
Module size	1956*992
Design life	≥25 years
Anti-corrosion	Hot Galvanizing
Bracket area	20m ²
Material	Q235 Steel
Weight	≥500KG
Package	Bubble film



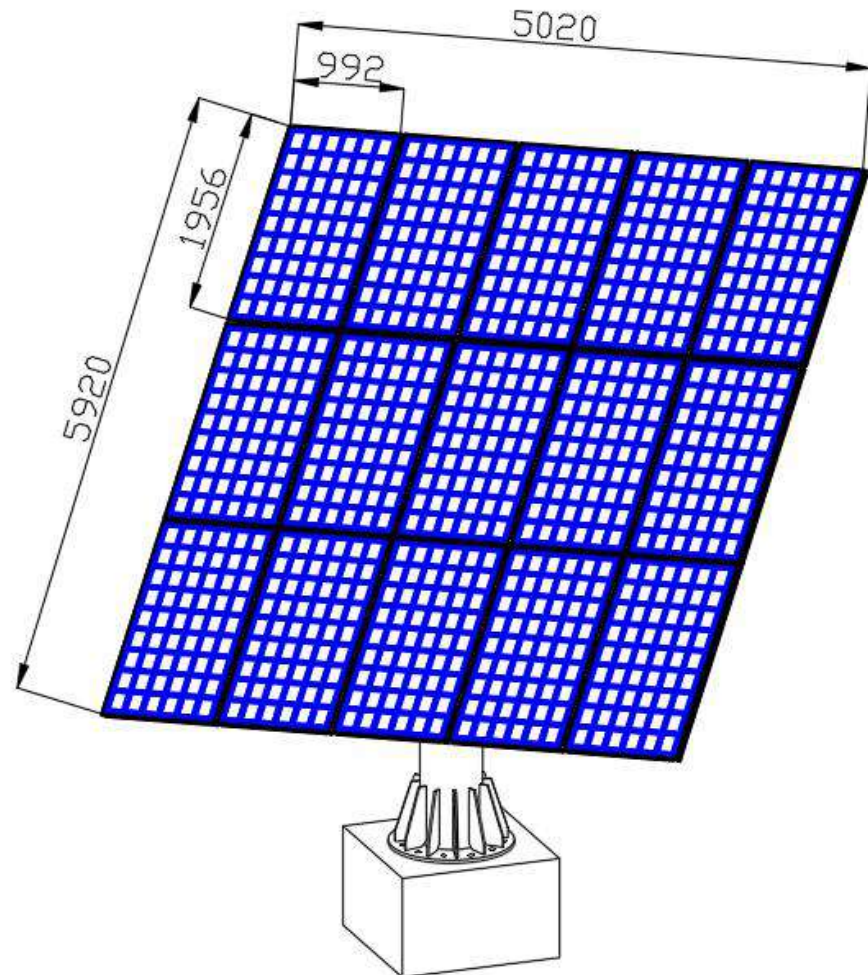
3. Specification---Dual Axis-18P-1650-992

4.5~5.4KW Dual Axis	
Project	Value
Module num	18 pieces
Module power	250~300
Module size	1650*992
Design life	≥25 years
Anti-corrosion	Hot Galvanizing
Bracket area	30m ²
Material	Q235 Steel
Weight	≥850KG
Package	Bubble film



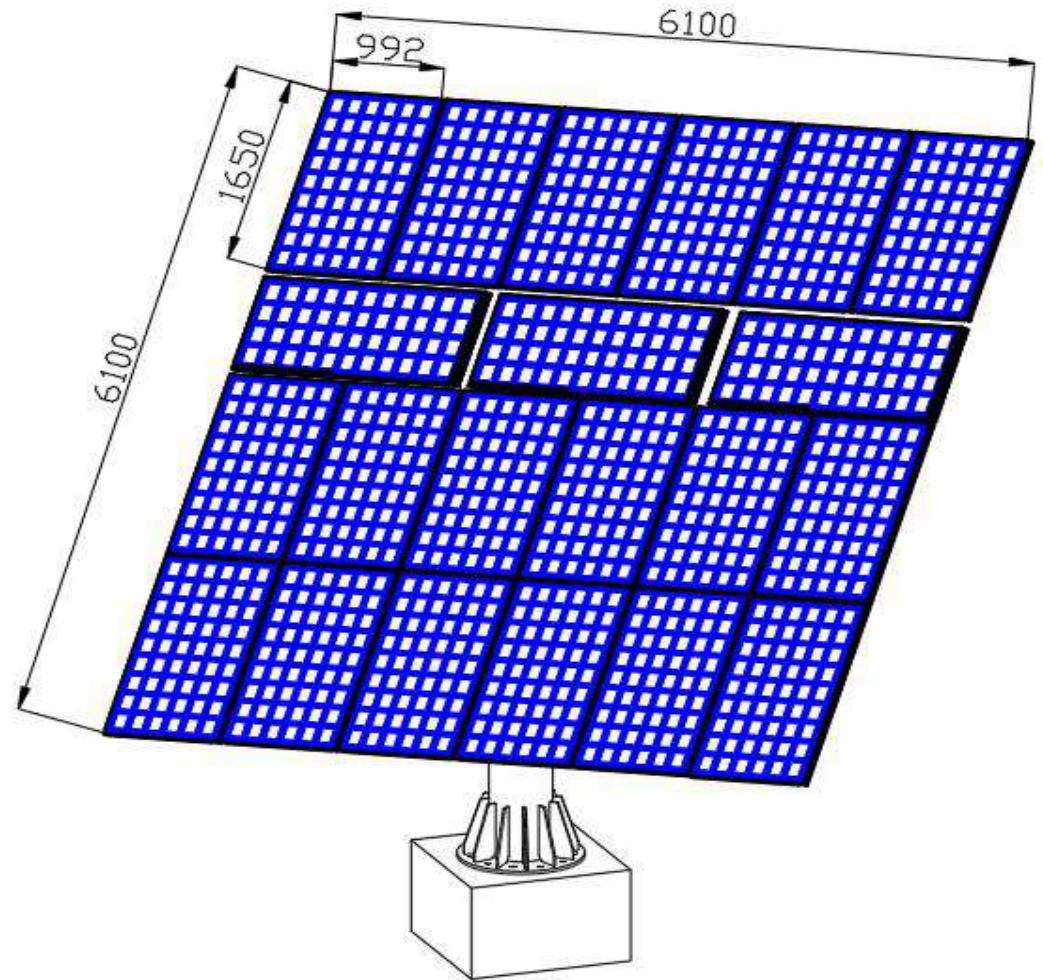
3. Specification---Dual Axis-15P-1956-992

4.5~5.4KW Dual Axis	
Project	Value
Module num	15 pieces
Module power	300~360
Module size	1956*992
Design life	≥25 years
Anti-corrosion	Hot Galvanizing
Bracket area	30m ²
Material	Q235 Steel
Weight	≥850KG
Package	Bubble film



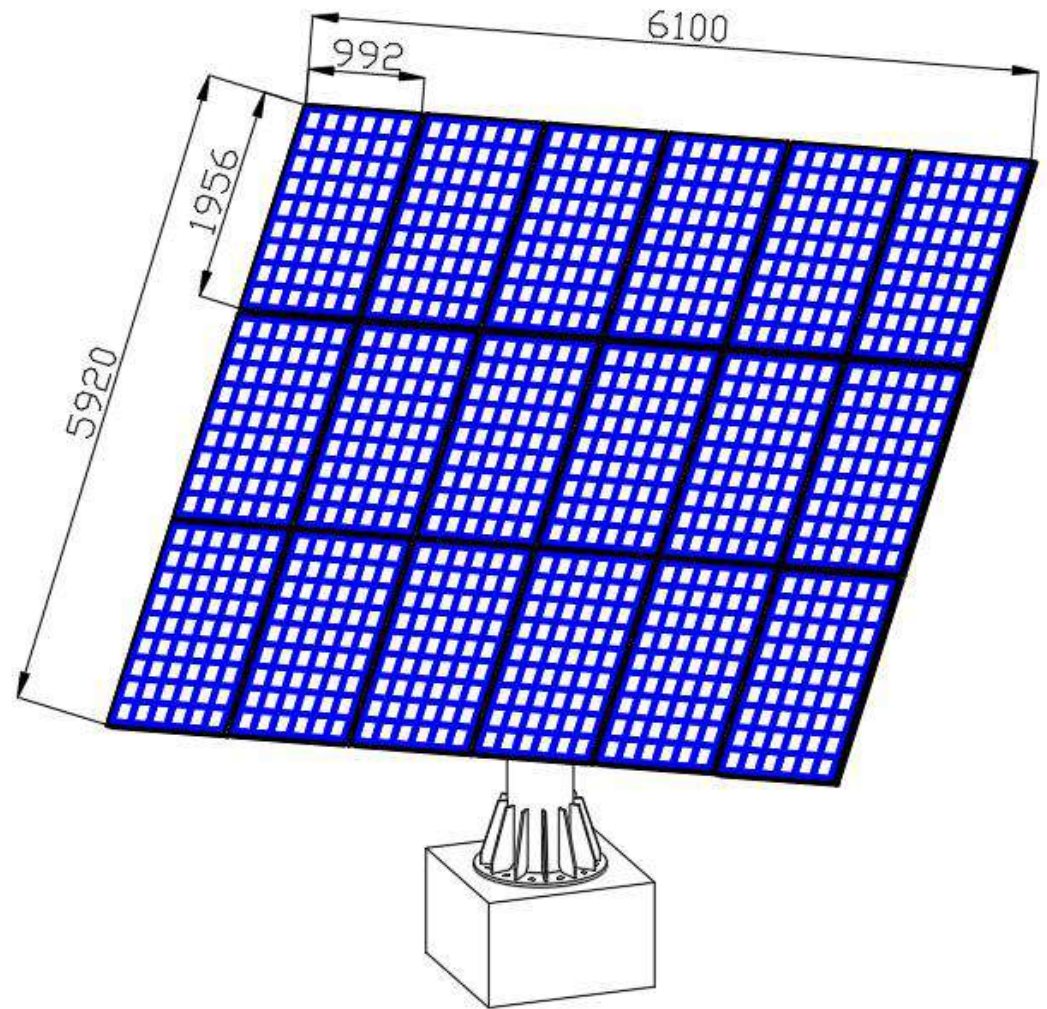
3. Specification---Dual Axis-21P-1650-992

5~6.5KW Dual Axis	
Project	Value
Module num	21 pieces
Module power	250~300
Module size	1650*992
Design life	≥25 years
Anti-corrosion	Hot Galvanizing
Bracket area	33m ²
Material	Q235 Steel
Weight	≥900KG
Package	Bubble film



3. Specification---Dual Axis-18P-1956-992

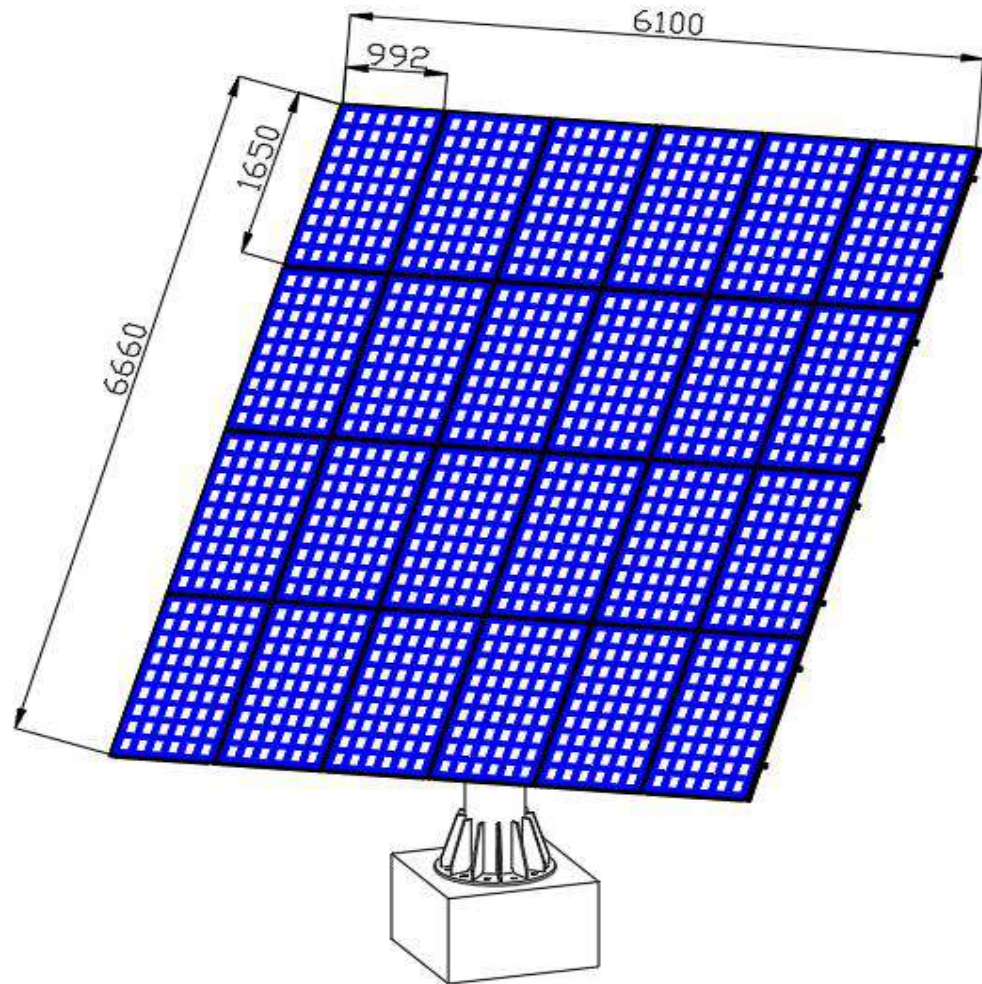
5~6.5KW Dual Axis	
Project	Value
Module num	18 pieces
Module power	300~360
Module size	1956*992
Design life	≥25 years
Anti-corrosion	Hot Galvanizing
Bracket area	33m ²
Material	Q235 Steel
Weight	≥900KG
Package	Bubble film



3. Specification---Dual Axis-24P-1650-992

6~7.2KW Dual Axis

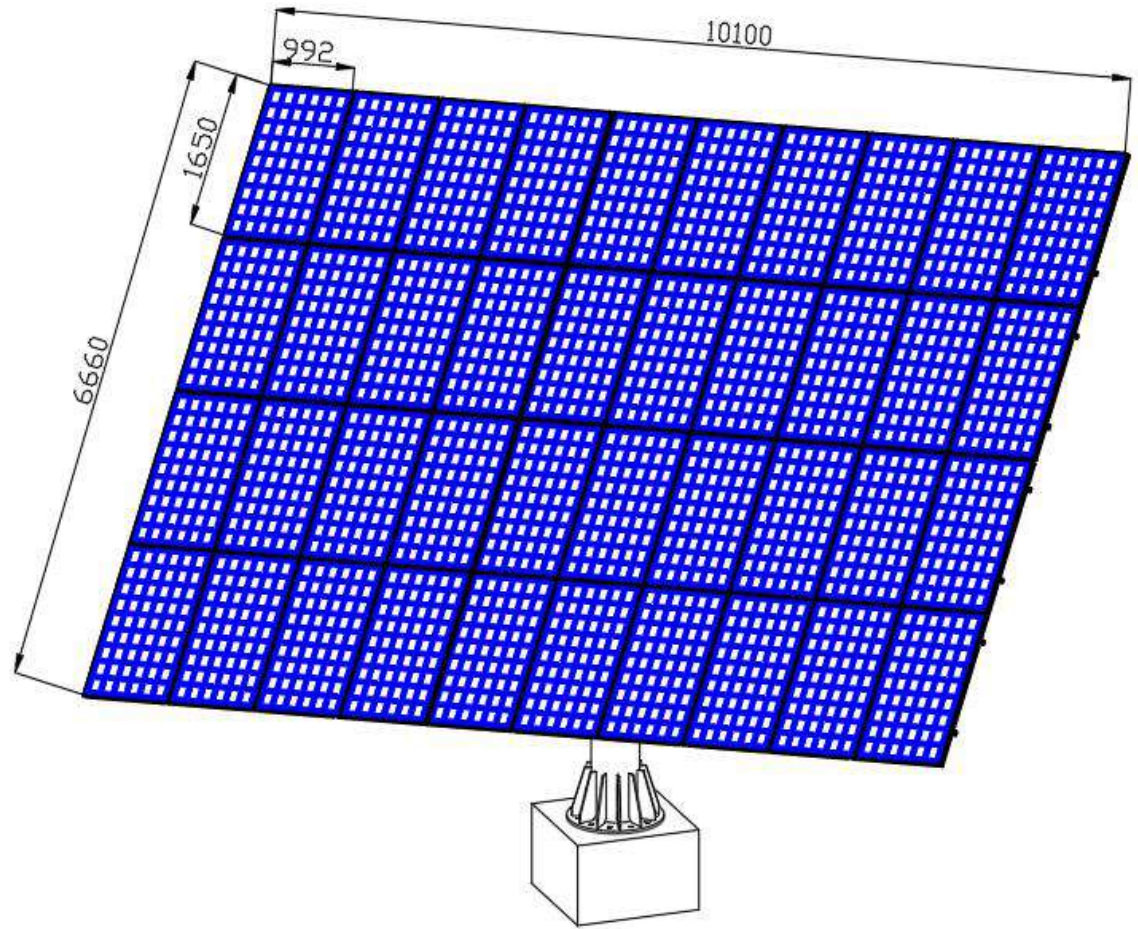
Project	Value
Module num	24 pieces
Module power	250~300
Module size	1650*992
Design life	≥25 years
Anti-corrosion	Hot Galvanizing
Bracket area	40m ²
Material	Q235 Steel
Weight	≥1100KG
Package	Bubble film



3. Specification---Dual Axis-40P-1650-992

10~12KW Dual Axis

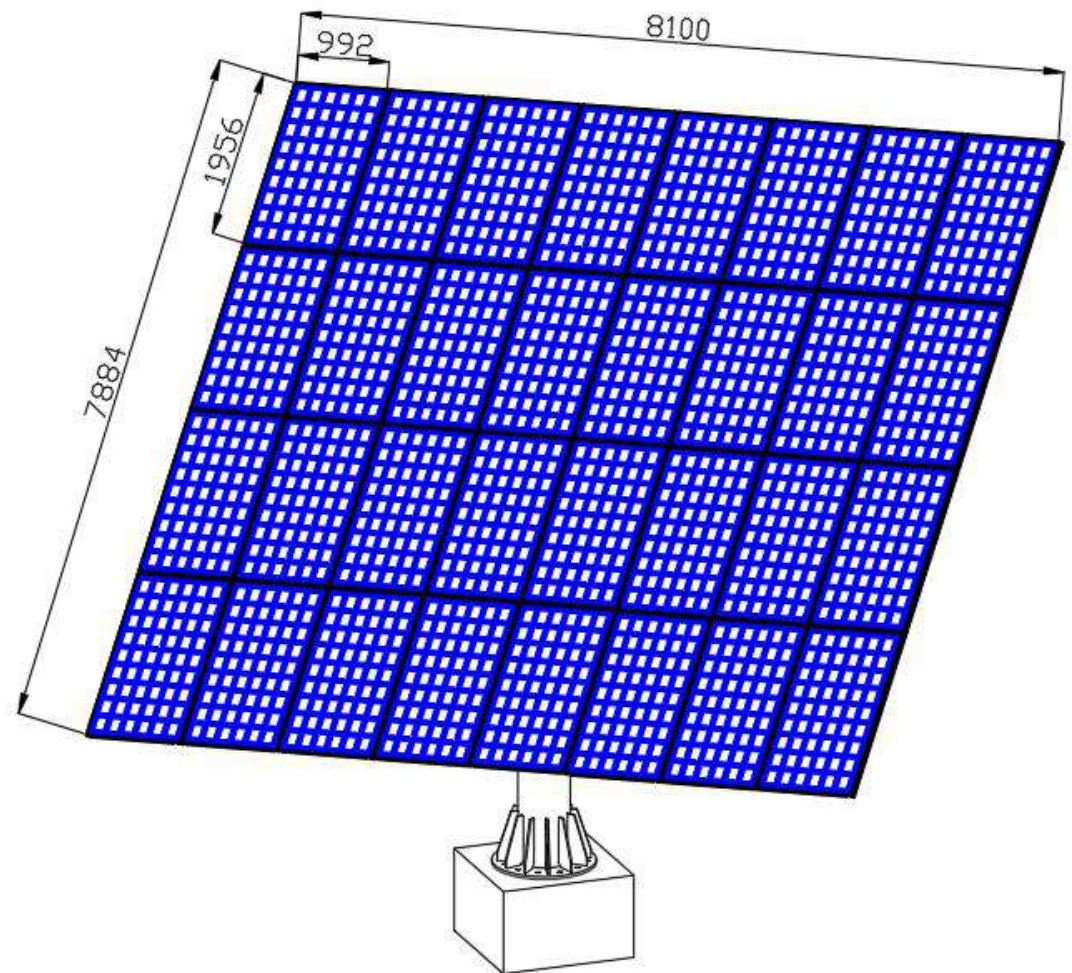
Project	Value
Module num	40 pieces
Module power	250~300
Module size	1650*992
Design life	≥25 years
Anti-corrosion	Hot Galvanizing
Bracket area	66m ²
Material	Q235 steel
Weight	≥2600KG
Package	Bubble film



3. Specification---Dual Axis-32P-1956-992

9.6~11.5KW Dual Axis

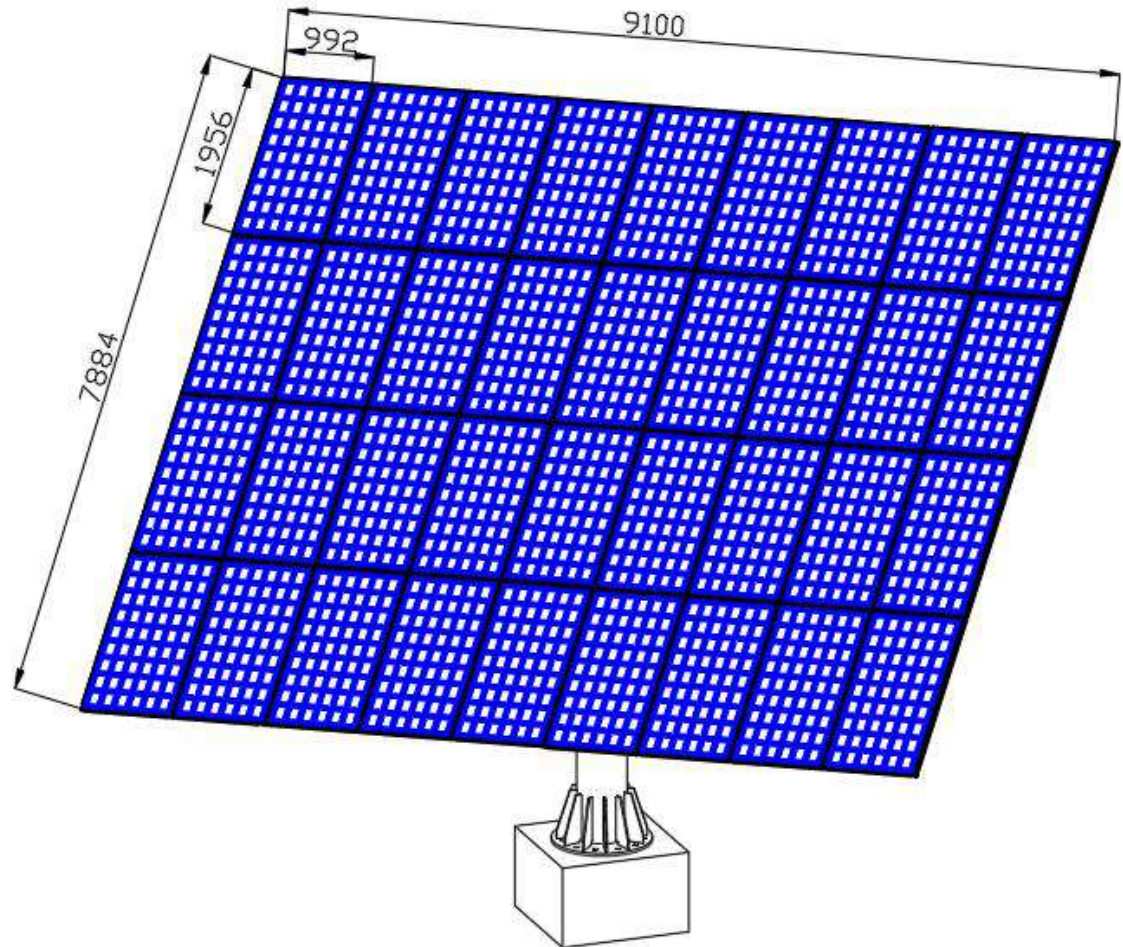
Project	Value
Module num	32 pieces
Module power	300~360
Module size	1956*992
Design life	≥25 years
Anti-corrosion	Hot Galvanizing
Bracket area	65m ²
Material	Q235 Steel
Weight	≥2400KG
Package	Bubble film



3. Specification---Dual Axis-36P-1956-992

11~13KW Dual Axis

Project	Value
Module num	36 pieces
Module power	300~330
Module size	1956*992
Design life	≥25 years
Anti-corrosion	Hot Galvanizing
Bracket area	70m ²
Material	Q235 Steel
Weight	≥2600KG
Package	Bubble film



4. Case---Dual Axis



Jiangxi 2.59MW solar tracker, bracket area about 100 square meters and 60 pieces of 1650 * 992mm solar panels, the climate is humid, frequent rainfall, located in the tuyere.

4. Case---Dual Axis



20KW solar tracker in Jinan , bracket area about 120 square meters, solar tracker with 72 pieces 1650 * 992 mm solar panels, the tracker is located in Jinan Garden Expo, so far has the largest stand-alone capacity at world's dual axis solar tracker.

4. Case---Dual Axis



US 10MW dual axis solar tracker, the bracket area about 20 square meters, tracker installed 12 pieces 1650 * 992mm solar panels, complex and changing climate conditions, frequent typhoons and snow.

4. Case---Dual Axis



Shandong 1MW dual axis solar tracker, the bracket area about 80 square meters, tracker installed 48 pieces 1650 * 992mm solar panels, complex and changing climate conditions, frequent typhoons and snow.

4. Case---Dual Axis



4. Case---Dual Axis



4. Case---Dual Axis



4. Case---Dual Axis



4. Case---Dual Axis



4. Case---Dual Axis

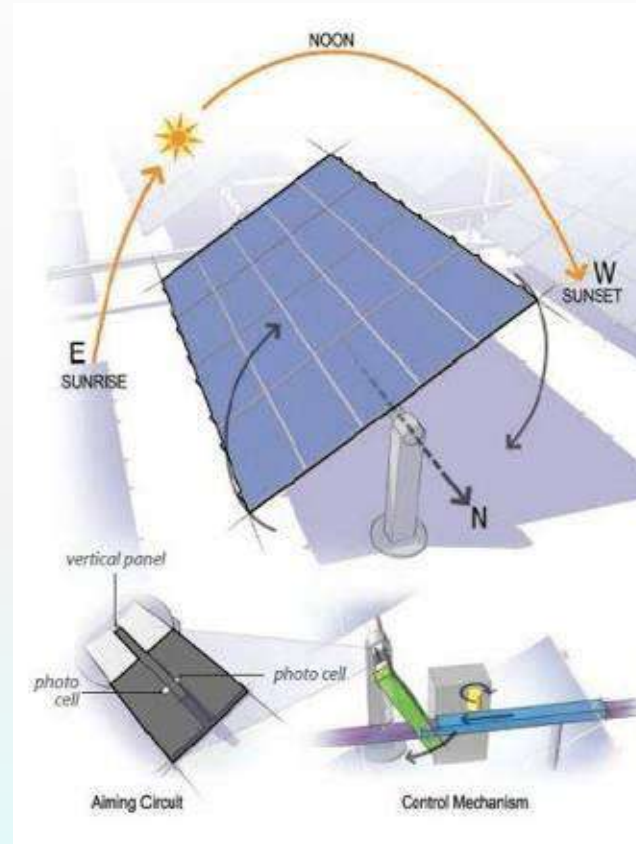
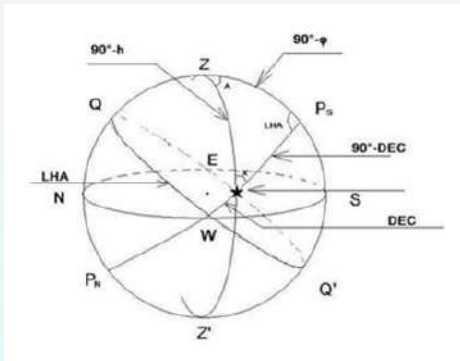


5. Increase Power Generation



Dual axis solar tracker than the solar mounting system to increase power generation 20 ~40%.

6. Increase power generation



The solar tracker uses high-precision astronomy algorithm to calculate the angle of the sun, combined with high-performance microcontroller (DSP core), using international first-line brand tilt sensor, real-time closed-loop feedback tracking angle, automatic tracking, without human intervention.

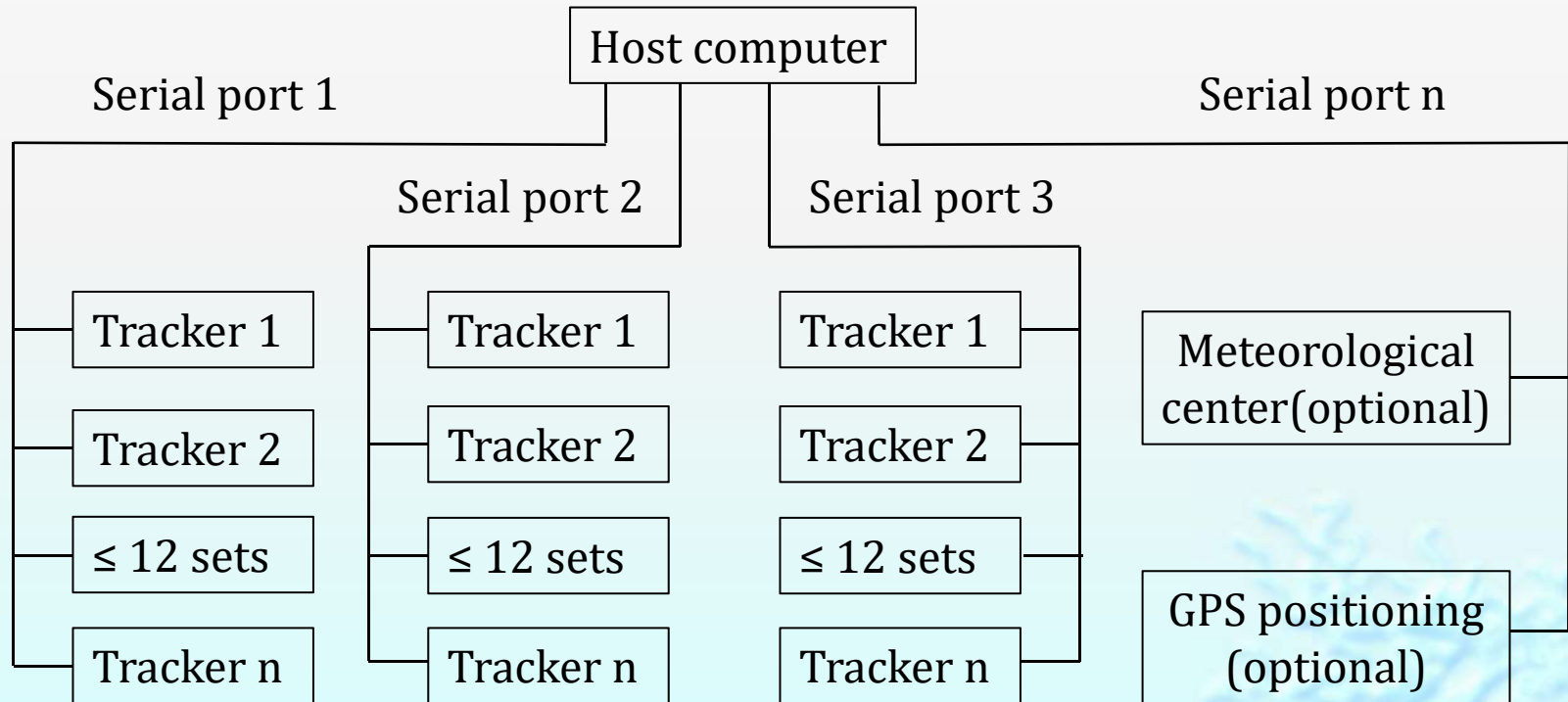
7. High-quality materials



Materials use Q235B steel with above 85um Hot-dipped zinc galvanization to ensure the 25 years life. Adapt to all kinds of outdoor environment.

8. Host computer network

- Based on RS485-Modbus communication, solar tracker provides data acquisition, remote control, fault alarm and other functions. Hardware interface connection diagram is as follows:



9. Remote

Controller built-in support for Ethernet or GPRS communication gateway , remote Internet pages or mobile phone APP real-time view of tracking data



10. Back Tracking---Overview

- ❖ When the tracking system is pivoted to the limit and the angle of the sun is exactly at the shadow of the array, the array no longer tracks toward the sun, but rather remains shadowless with each other to keep the solar elevation low When the array between the shading of each other.
- ❖ As the sun just rises and the array is almost parallel to the horizon, as the sun's angle increases, the array continually tweaks the angle, which means it keeps shrinking the angle difference between the array and the sun's light. When the sun's elevation is equal to just the shadowless angle When this difference is zero. That is, the angle of the array is equal to the angle of the sun, from then on, the sun's height is greater than just no shadow angle using a simple tracking method.
- ❖ As shown below:

10. Back Tracking---Diagram

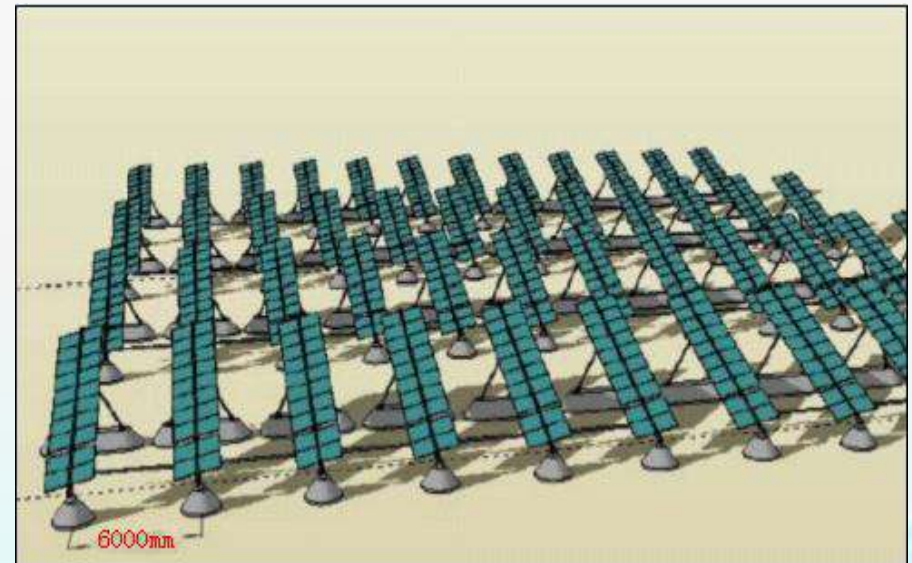
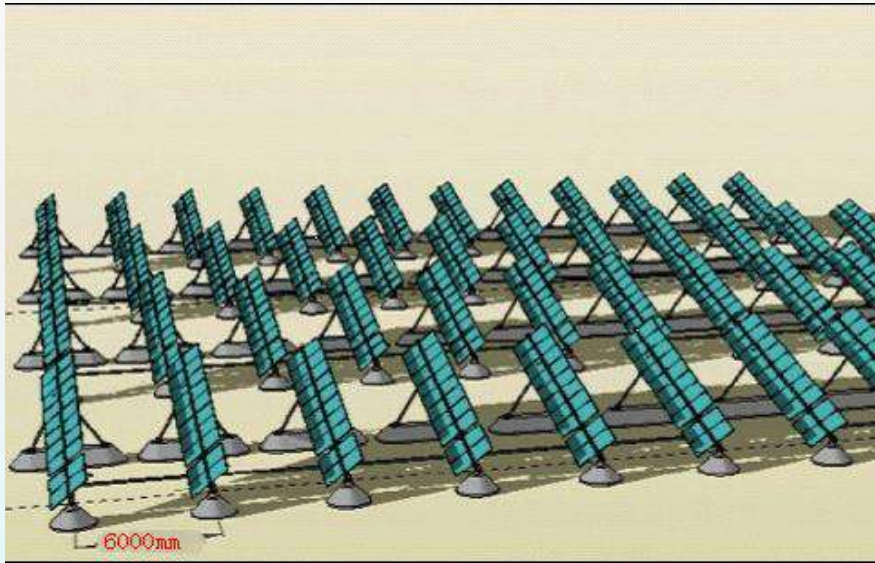


Figure 1 without back tracking, shading between the solar panels
Figure 2 with back tracking, no shade between the solar panels

10. Back Tracking---Compare

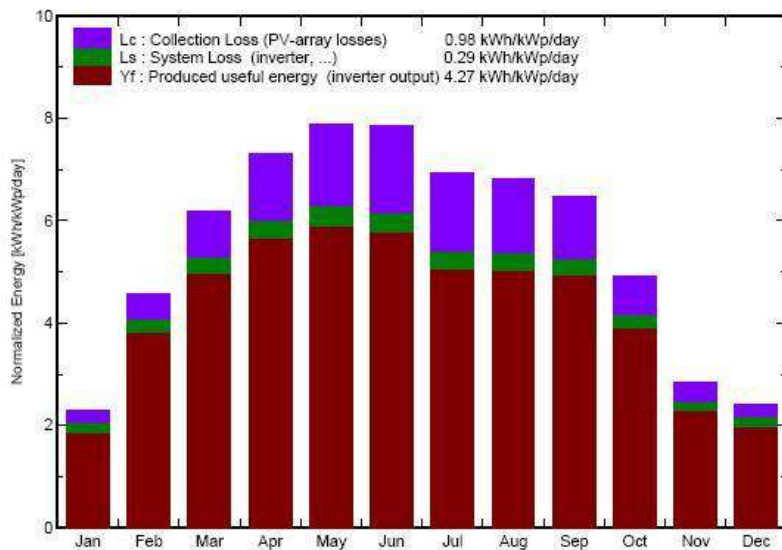
PVSYST software simulation, Ningxia 10MW single axis solar tracker without back tracking power generation capacity

Main simulation results

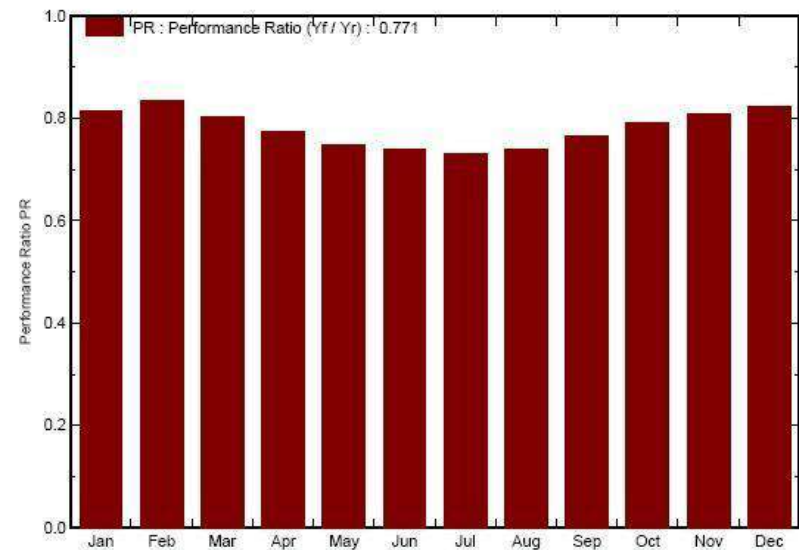
System Production

Produced Energy 17001419kWh/year Specific prod. 1700 kWh/kWp/year

Normalized productions (per installed kWp): Nominal power 10000 kWp



Performance Ratio PR



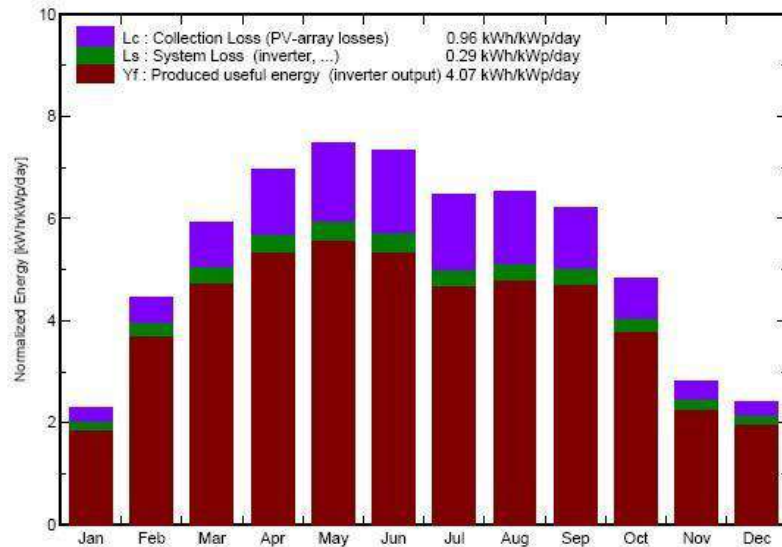
10. BackTracking---Compare

PVSYST software simulation, Ningxia 10MW single axis solar tracker with back tracking, 4.5% higher than without back tracking, according to the data around the estimated back tracking and normal tracking can be increased by 2% to 6%

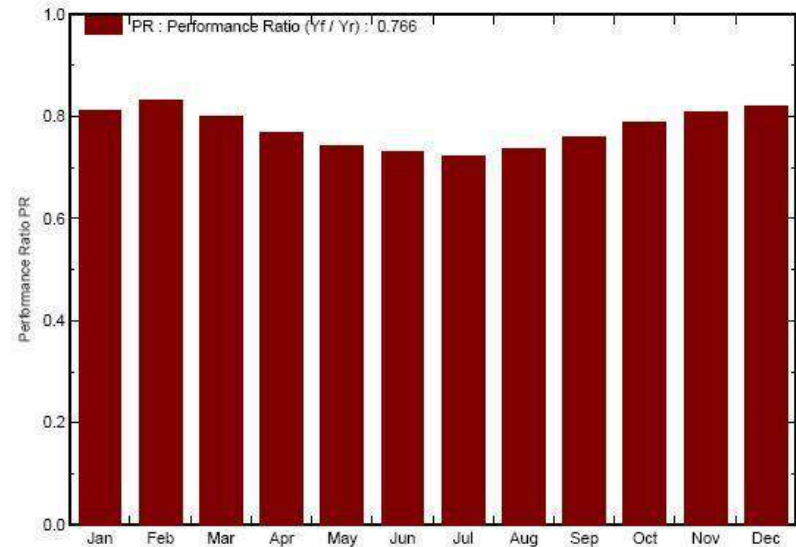
Main simulation results
System Production

Produced Energy 17783485 kWh/year **Specific prod.** 1778 kWh/kWp/year

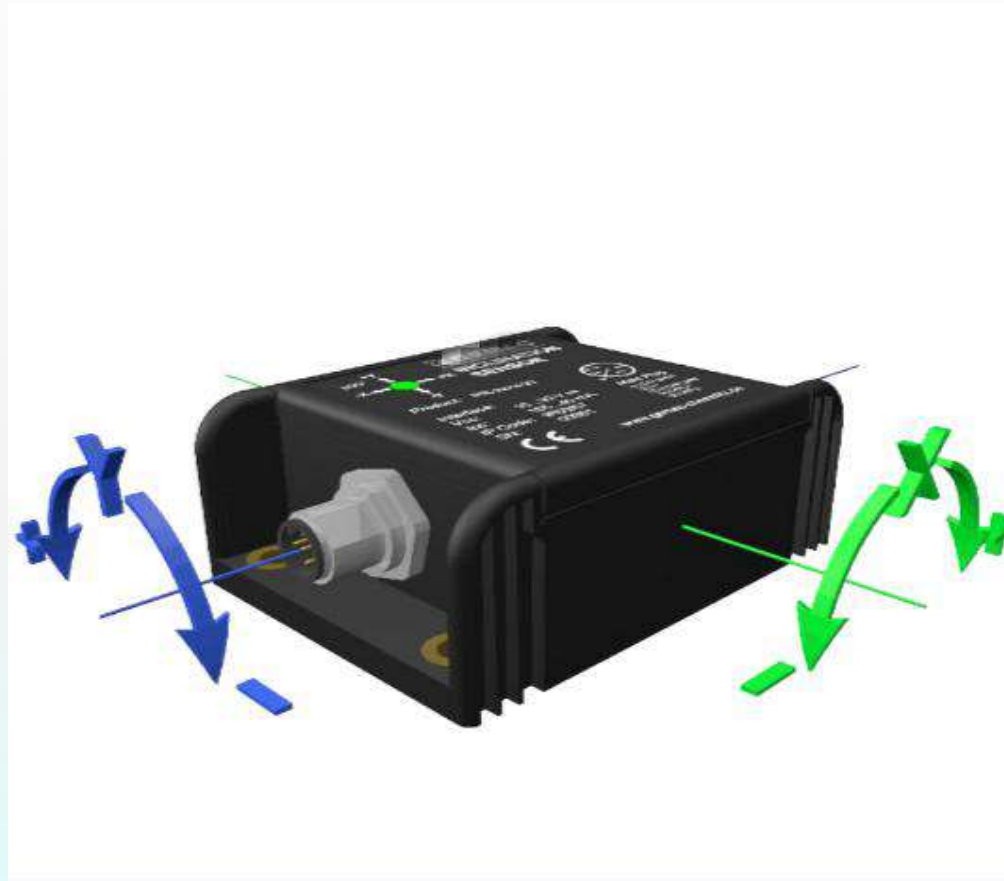
Normalized productions (per installed kWp): Nominal power 10000 kWp



Performance Ratio PR

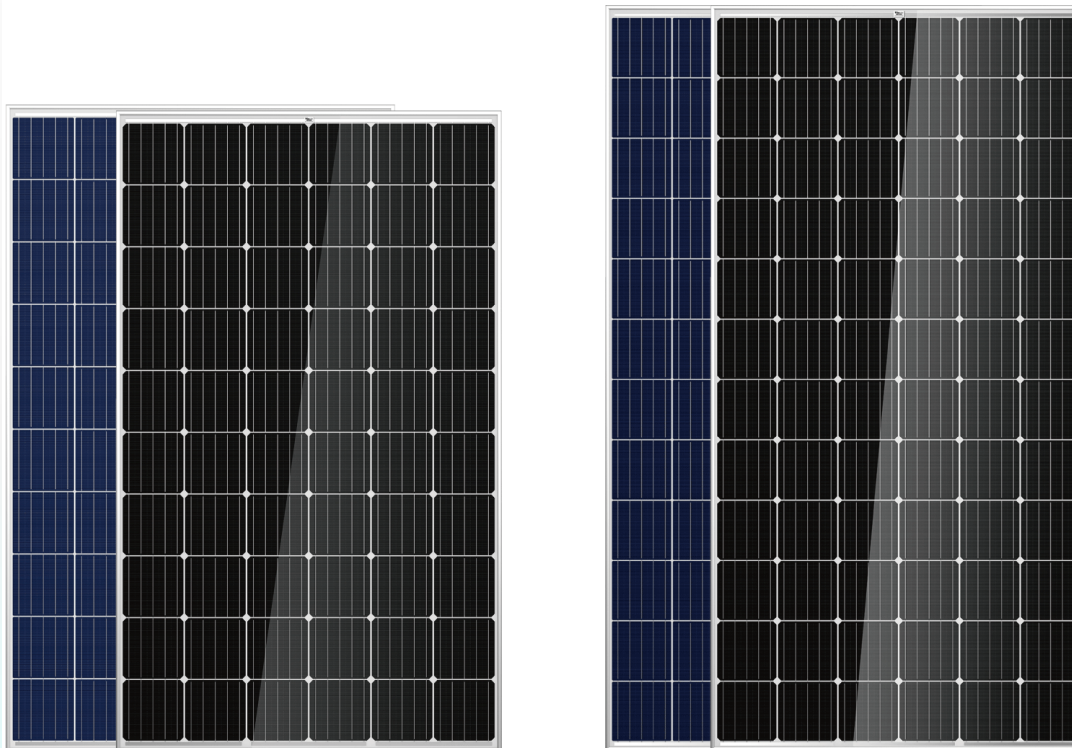


11. Smart-Automatic Positioning



Solar Tracker uses international brand tilt sensor, intelligent identification of rotation angle, without manual debugging angle.

12. Adapt Various Module Sizes



The company's proprietary design module and bracket locking parts, compatible with any PV module specifications.

13. Rotation Angle Protection

- ❖ The safe operation of the angle is related to the entire system safe and reliable operation of the core issues, especially the wind and rain and other inclement weather, so the system design soft and hard limit protection mode.
- ❖ Software limit protection: The system sets the maximum positive and negative rotation angle, and real-time judgment angle feedback angle, when the rotation angle reaches the preset maximum angle, the system stops rotating.
- ❖ Hardware limit protection (optional): In normal working condition, the system is equipped with position sensor, if the sensor is triggered during system running, the actuator will stop running

14. Company Profile



SUNPAL is a high-tech enterprises, setting design; manufacture; sales and service in one. The company has 17 years of solar tracker design experience and in 2005 successfully designed China's first dual axis solar tracking system.

14. Company Profile



Our Factory covers an area of about 266400 square meter. A total investment of about 100 million US dollars.

14. Company Profile



Our workshop with high intelligence and automated production workshop, the company annual production capacity of 800MWp solar tracker.

14. Company Profile



Our warehouse using the ERP enterprise resource planning and OA office automation. To ensure that the entire production process is quality control, finished storage and waiting for delivery.

14. Company Profile



Our company implementation of the 6S site management. Improve efficiency, ensure quality, make work environment neat and orderly, prevention-oriented and ensure safety.

15. Certification



16. Customer Photo



Many buyers showed strong interest in our company's pv tracking system and a buyer placed an order during the exhibition in Jordan.

16. Customer Photo



Authorized dealers of the Middle East visited the booth during the exhibition and gave detailed feedback on the demand for our products in the local market. We promise that no matter the size of installed capacity, it can be customized according to customer's requirements.

16. Customer Photo



16. Customer Photo



Indian customers visited our company and discussed the technical issues in depth with us . They inspected the factory scale and process ability, fully affirmed and praised the technical level and production capacity ,and signed long-term cooperation agreement at once.

16. Customer Photo



Pakistan, Uganda and Lebanon customers visited our company and discussed the technical issues in depth with us . They inspected the factory scale and process ability, fully affirmed and praised the technical level and production capacity ,and signed long-term cooperation agreement at once.