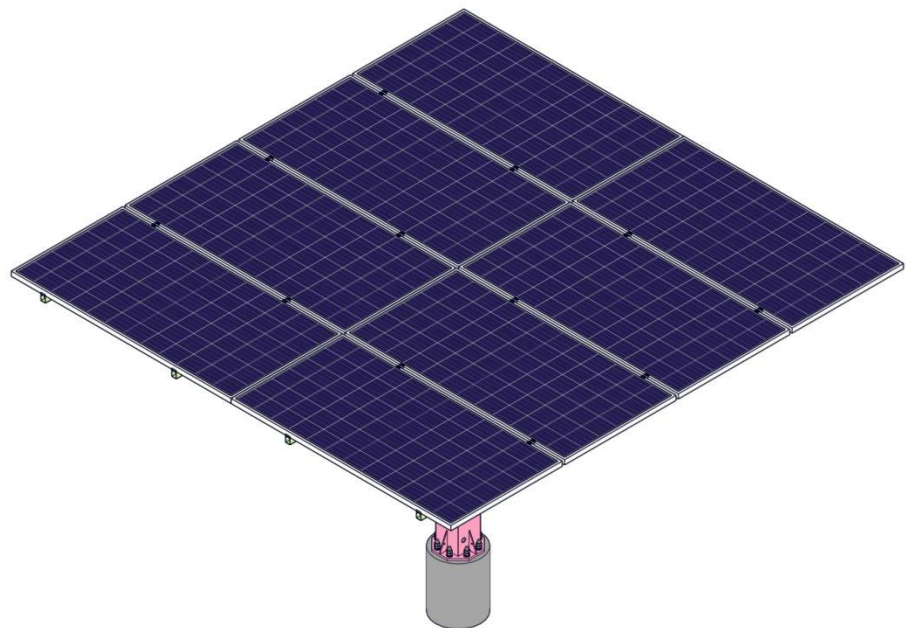


2020

ZRS-08B Tracking System

Installation Manual

(Northern Hemisphere)



PATENTS PROD

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INTRODUCTION

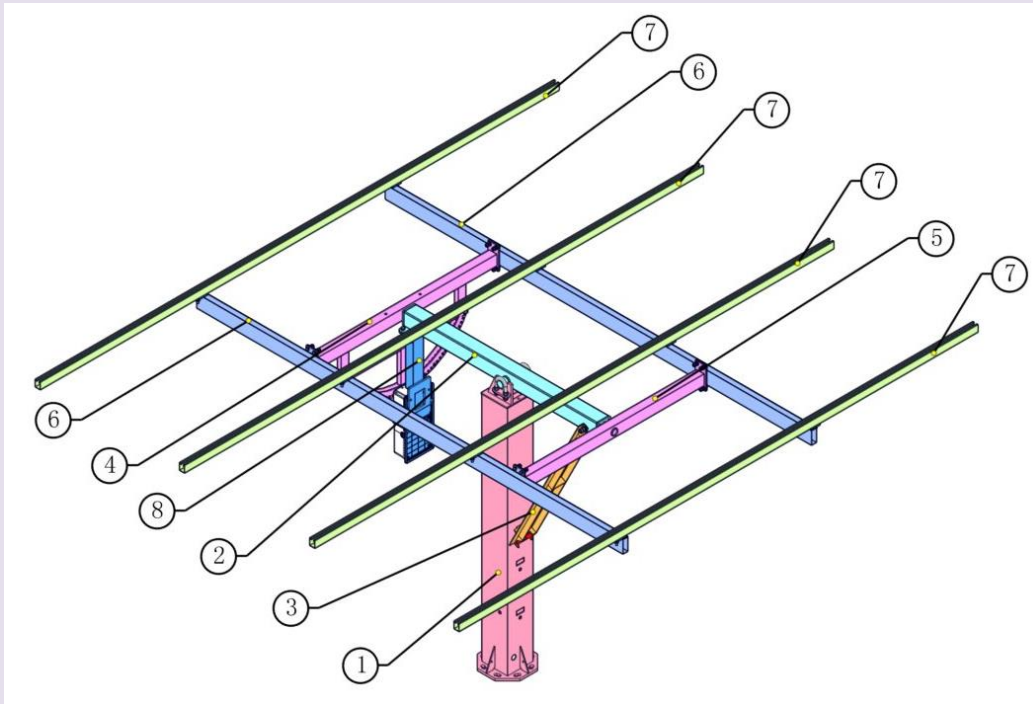
This manual provides important information about constructing the necessary concrete foundation, and the assembly of the tracking mechanism. Be sure to retain this manual for future reference. Read it carefully & thoroughly **before** starting the installation. We and our re-sellers accept no responsibility for your failing to follow these instructions. Use proper tools and follow good safe work practices to avoid injury during assembly. Always wear safety helmet to prevent head injury.

We own IPR (**Intellectual Property Rights**) on the solar tracking system we manufacture and distribute, with more than 40 patents at home and abroad, any patent infringements will be prosecuted to the fullest extent of the law.

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Part I. ZRS-08B Tracking System Structure Chart



Drawing (1) System structure chart

Main parts of ZRS-08B solar tracking system

Item	Description	Weight	Dimension(mm)	Quantity
1	Vertical pole	53.3 KGS	1959*200*200	1 pc
2	Cross shaft	17.7 KGS	1518*100*100	1 pc
3	Elevation adjusting pole	6.5 KGS	1200*181*40	1 pc
4	Primary beam	22.6 KGS	1412*590*60	1 pc
5	Secondary beam	10.5 KGS	1412*60*80	1 pc
6	Longitudinal beam	16.1 KGS	3310*100*40	2 pcs
7	U-shaped beam	11.3 KGS	4030*52*41	4 pcs
8	Driving system	20.0 KGS	815*201*97.5	1 pc
Total		208 KGS	0.29 m ³	13 pcs

Part II. Connecting Screws and Clamps Details

Item	Specification	Description	Quantity
S1	M20 double nut, flat & spring washer	For foundation bolts	8 sets
S2	M16 U-shaped bolt, 4 nut, 2 flat washer	Hardware for cross shaft & vertical pole	2 sets
S3	M16*150 bolt, double nut, flat & spring washer	Hardware for elevation adjusting pole & cross shaft	1 set
S4	M20*280 T-shaped bolt, nut, flat washer	Hardware for elevation adjusting pole & vertical pole	1 set
S5	M12*40 bolt, double nut, flat & spring washer	Hardware for Longitudinal beams & primary/secondary beam	16 sets
S6	M12*40 bolt, double nut, flat & spring washer	Hardware for Longitudinal beam & U-shaped beam	8 sets
S7	M14*60 bolt, double nut, flat & spring washer	Hardware for driving system & cross shaft	4 sets
SE	M8*80 bolt, double nut, 2 flat washer, spring washer, 2 end clamp, M12 flat washer	Hardware for solar panels & U-shaped beam ends	8 sets
SS	M8*100 bolt, double nut, flat & spring washer, middle clamp, wide anti-slip clamp, M12 flat washer , M8*20 double bolts, ,2 flat washer,2nuts	Hardware for solar panels & U-shaped beams	6 sets
SM	M8*100 bolt, double nuts, flat & spring washer, middle clamp, M12 flat washer;	Hardware for solar panels & U-shaped beams	4 sets
SH	M8*50 inner hexagonal bolt, 1 spring washer,1 plastic wing nut, 1 middle clamp ;	Hardware for solar panels & U-shaped beams	2 sets

For ‘double nuts’, please fasten the first nut, then fasten the second nut.

Part III: Tools Required for Installation (Self-prepared by users)

No.	Tools	Spec.	Quantity	Remarks
1	Open spanner	13/14	2	M8 screws
2	Open spanner	17/19	2	M12 screws
3	Socket head wrench	10	2	M12 hexagon socket bolt
4	Open spanner	20/22	2	M14 screws
5	Open spanner	22/24	2	M16 screws
6	Open spanner	30/32	1	M20 screws
7	Adjustable spanner	10 Inch	2	Crescent adjustable wrench
8	Screwdriver	3#	1	Electric debugging (flat head or cruciform)
9	Rubber Hammer		1	Facilitate the installation
10	Double ladder or Scaffolding		2	or use small crane

Part IV. Concrete Foundation

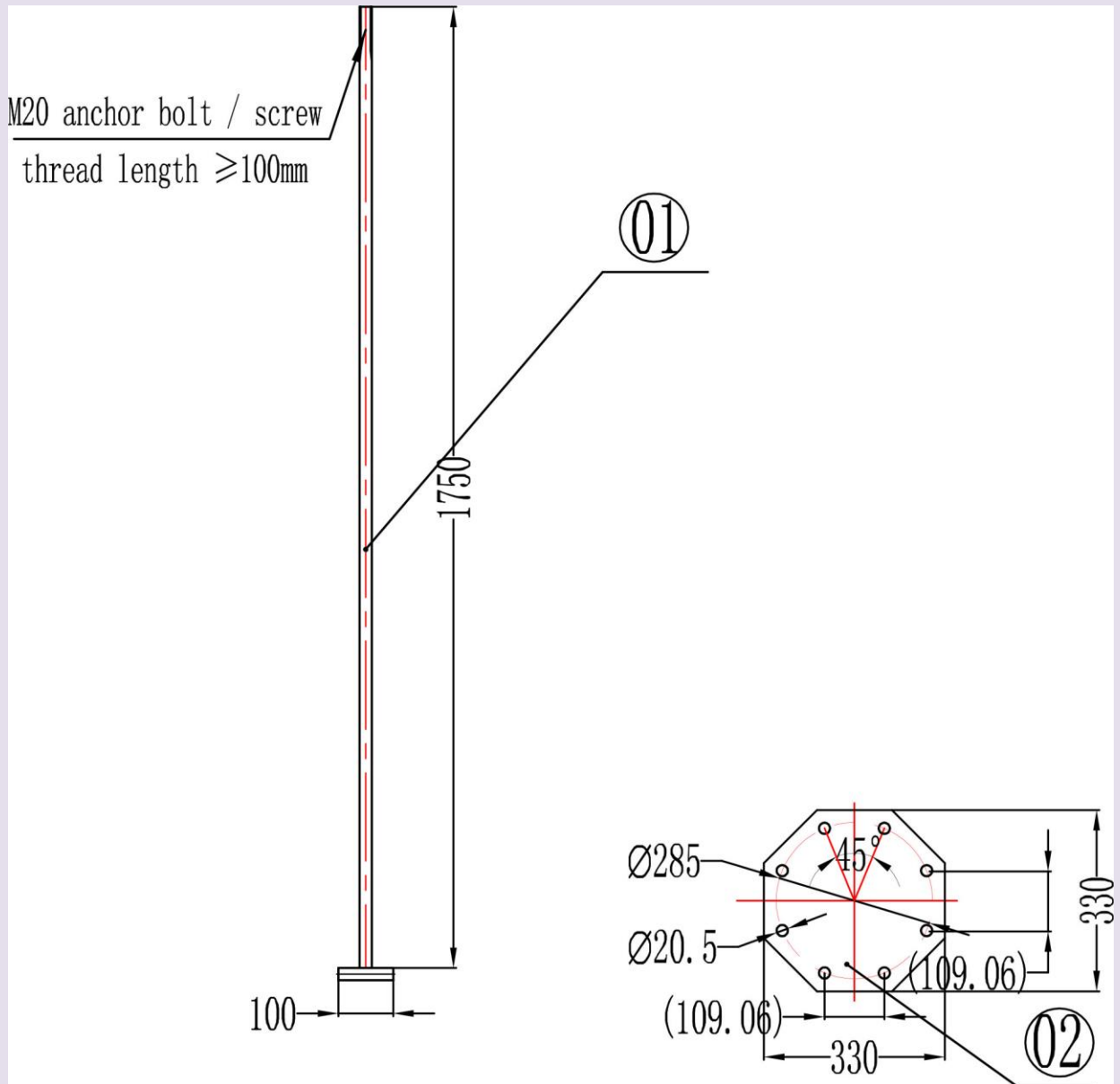
Materials Preparation

Marks	Description	Material	Quantity
○, 01	Foundation bolt	M20, 45# steel	8
○, 02	Fixture template	---	1
○, 03	Foundation (above ground)	C30 concrete	---
○, 04	Foundation (below ground)	C30 concrete	---

1. For use as shown in drawing (2), make 8 foundation anchor bolts

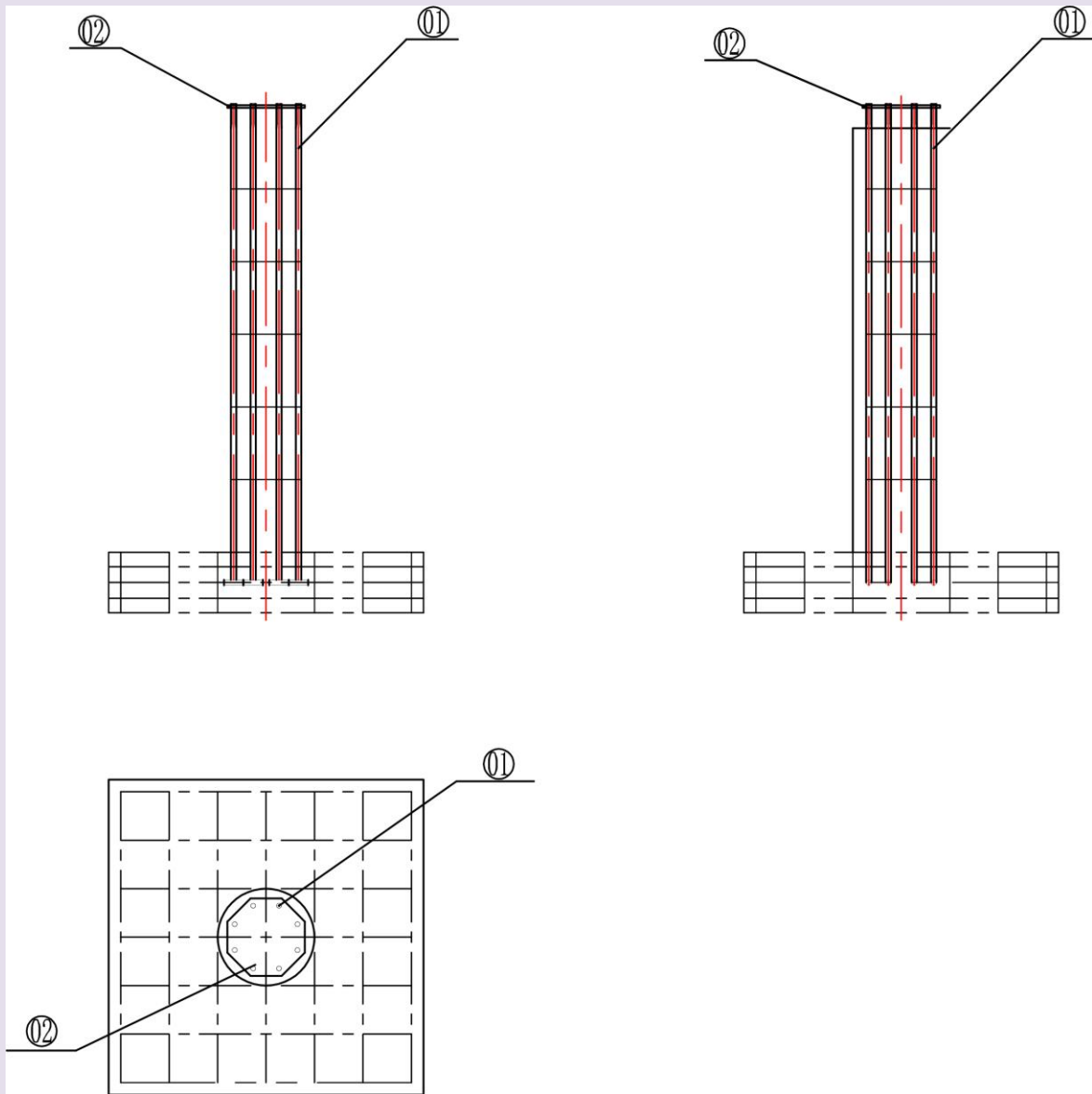
○, 01 with 45# steel, one foundation bolt fixture template ○, 02

(using rigid material, only for positioning bolts, thickness is not important).



Drawing (2) Unit: mm

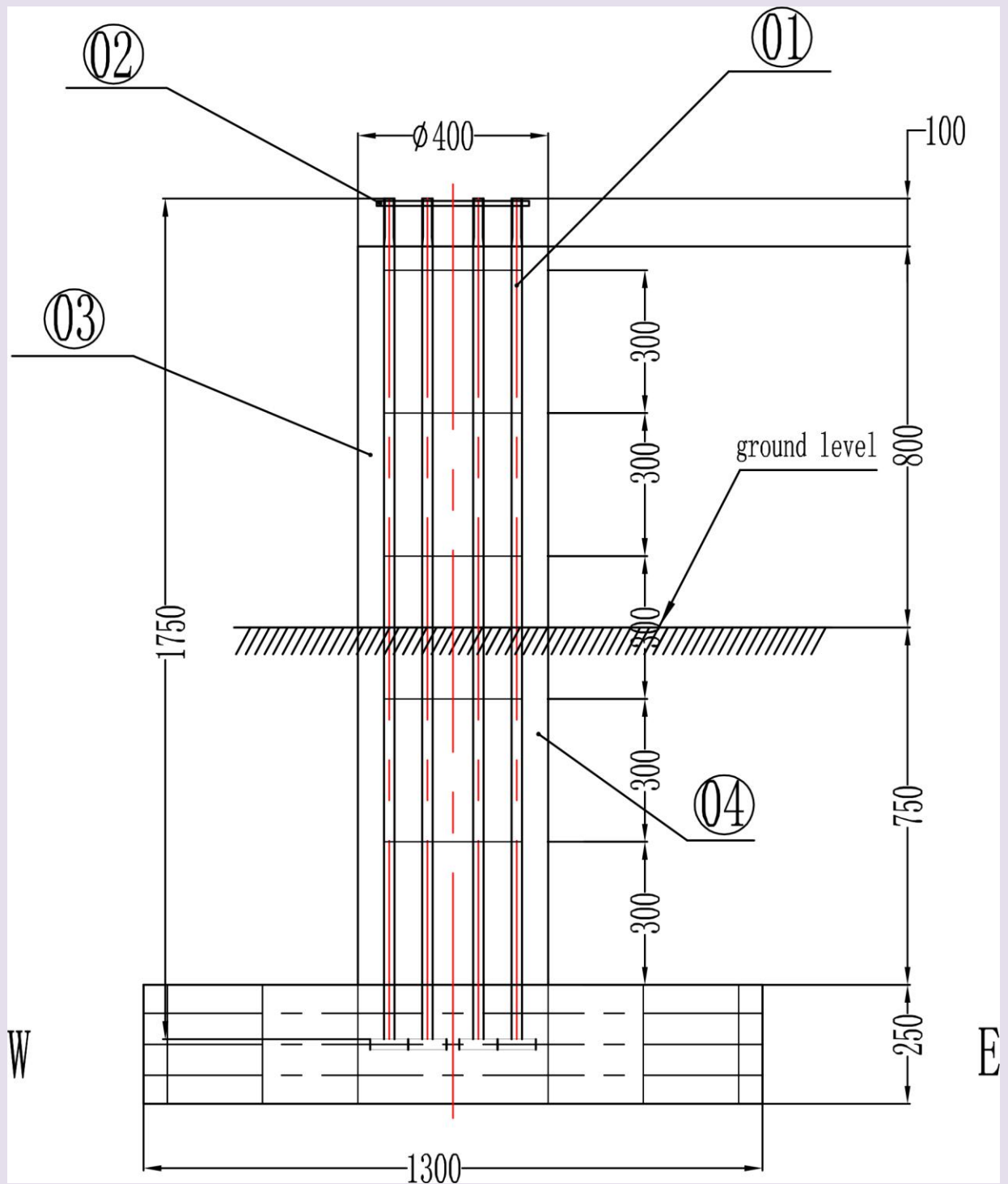
2. As shown in drawing (3), position 8 foundation bolts $\bigcirc$, 01 with your fabricated fixture template $\bigcirc$, 02, secure the bolts to foundation steel mesh grid (using $\Phi 8$ steel rebar).



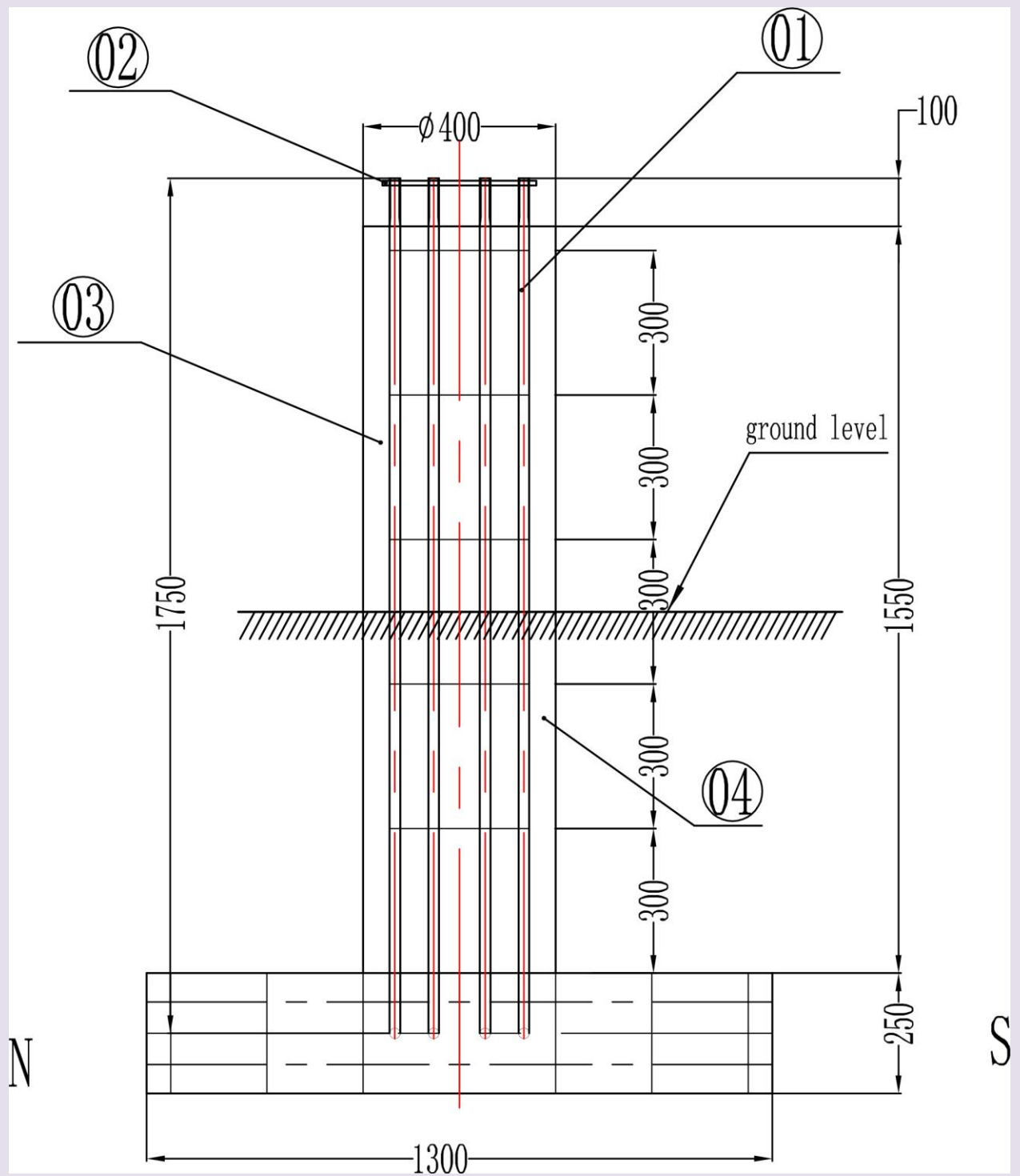
Drawing (3)

3. Confirm the east-west direction carefully, pour concrete foundation according to the dimensions shown in drawing (4) (5) (6), remove the fixture template $\bigcirc$, 02 after the concrete is cured. The solar tracking system installation can be carried out only AFTER the concrete is thoroughly cured.

(Covering the poured concrete with a plastic sheet will make it stronger, because it will dry out slower from sun exposure. To convert the dimensions from mm to inches divide by 25.4)



Drawing (4) Foundation as viewed from the South



Drawing (5) Foundation as viewed from the West

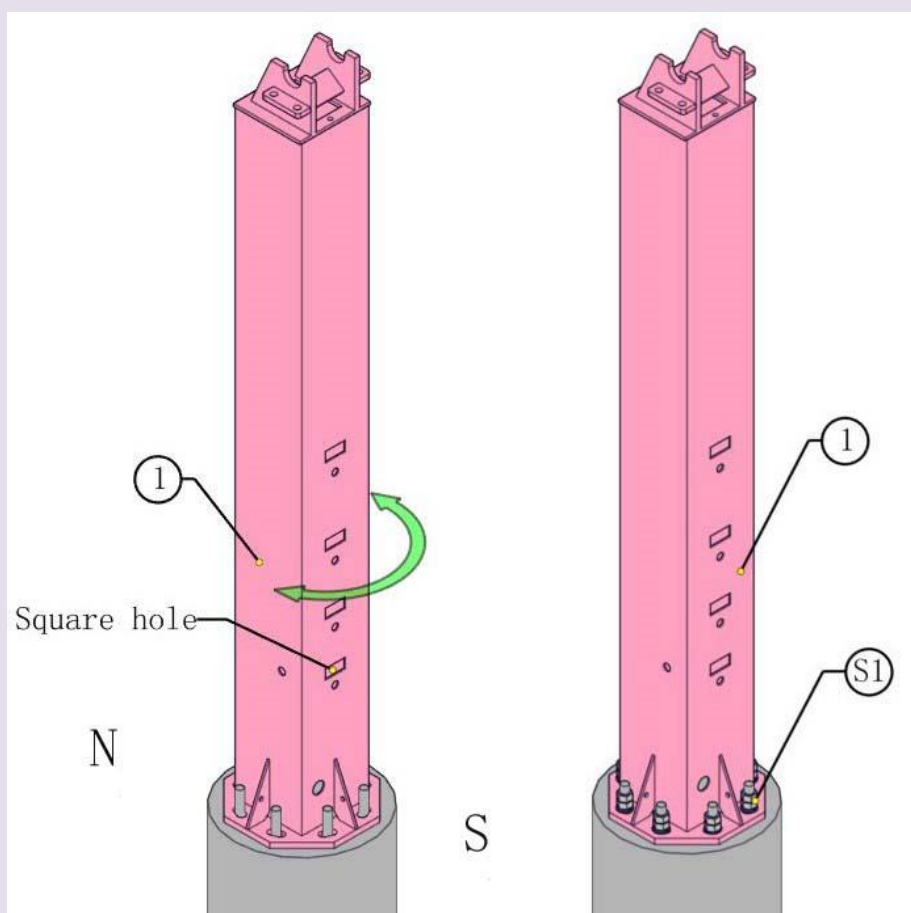
Part V. Installation of ZRS-08B Tracking System

5.1 Installation of Vertical Pole

As shown in drawing (7), put the vertical pole ①, 1 on the concrete foundation, **verify the orientation of the pole** ①, 1: position the vertical pole ①, 1 to ensure the side with square holes is facing **South**, then put on flat and spring washers, secure with hardware ①, S1 (double nuts) to stabilize the vertical pole ①, 1.

Note: Vertical pole ①, 1 with square holes must face South!

South means the direction of the geographical longitude lines, it can be confirmed with gyroscope or compass (need to amend the geomagnetic declination, different sites, difference geomagnetic declination).

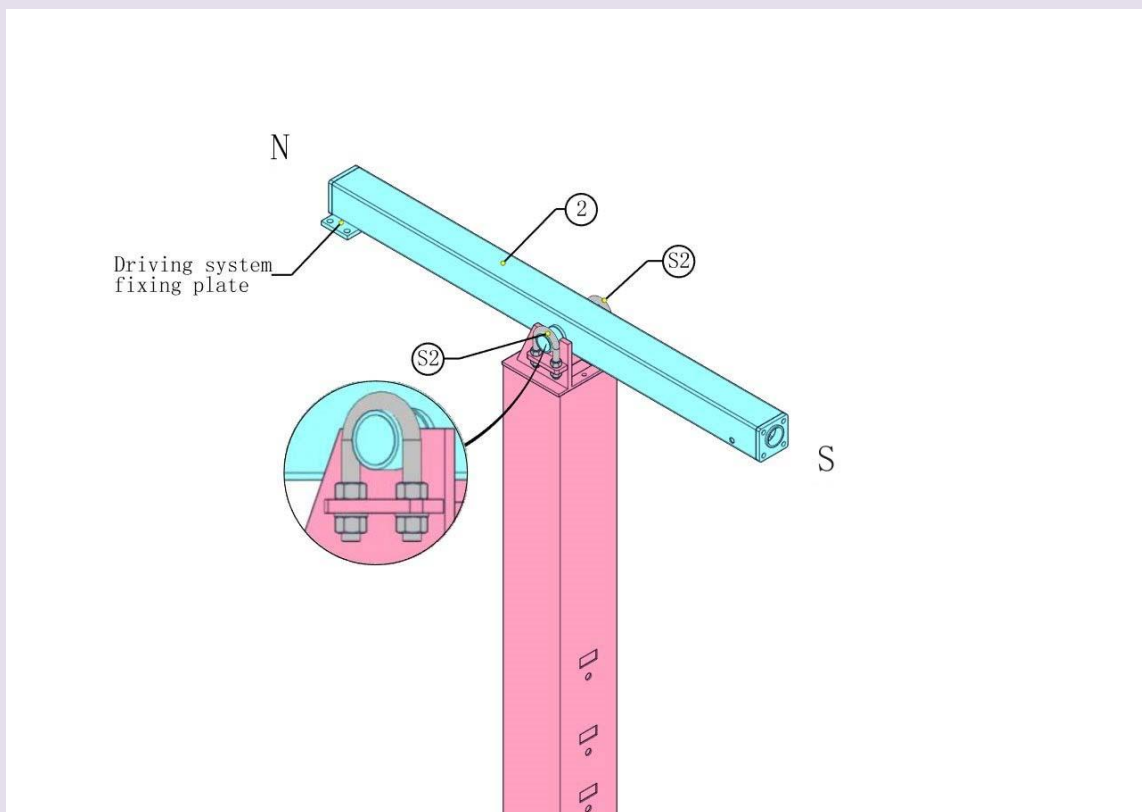


Drawing (7)

5. 2 Installation of Cross Shaft & Elevation adjusting pole

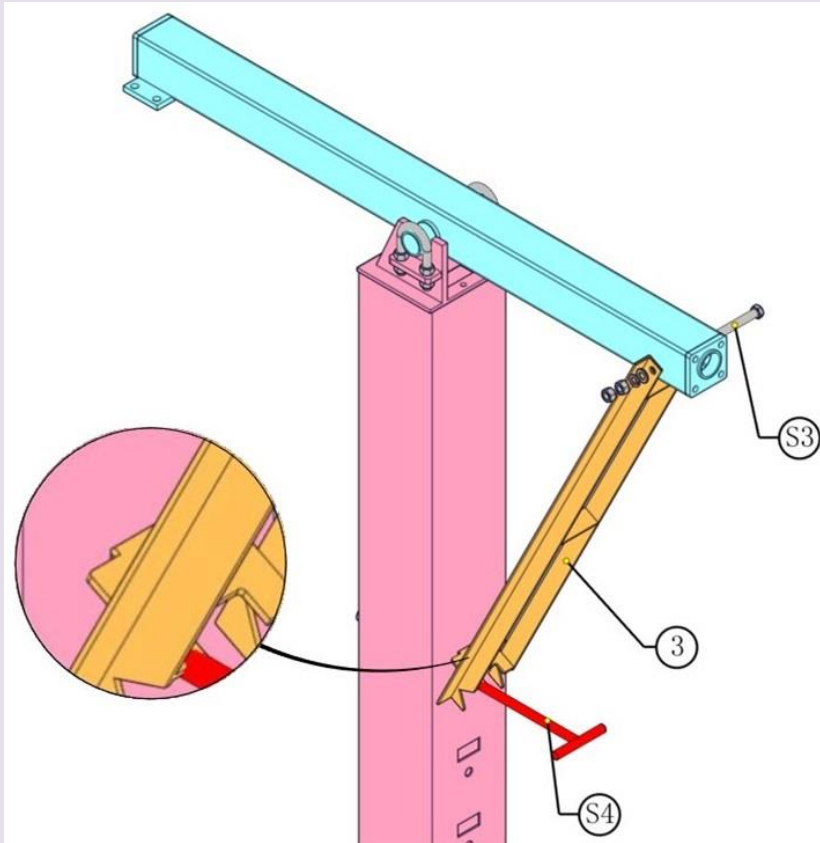
5.2.1 As shown in drawing (8), affix the cross shaft ② onto the vertical pole ① with hardware ③ (there are 4 nuts and 2 flat washers for one U-shaped bolt, only need put flat washers at the under nuts), tighten the ③ screws as far as possible while still allowing the rotation of cross shaft ②, so as to reduce the shaking clearance between vertical pole and cross shaft.

Note: The end of cross shaft ② with driving system fixing plate must towards North!



Drawing (8)

5.2.2 As shown in drawing (9), connect elevation adjusting pole ③, 3 with cross shaft ②, 2 and vertical pole ①, 1 with hardware ③, S3 and ④, S4.

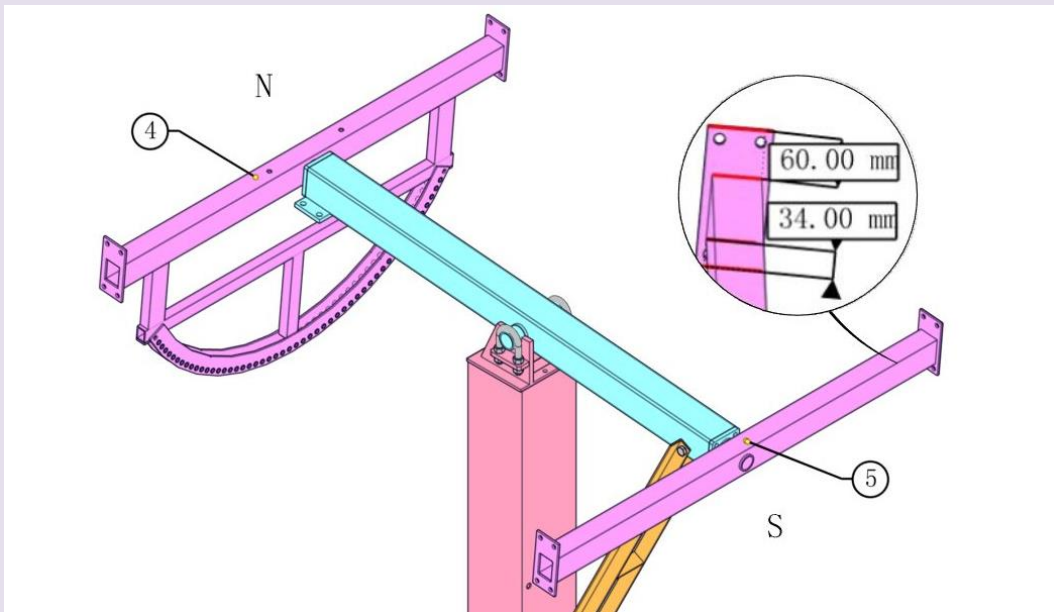


Drawing (9)

5.3 Installation of Frame

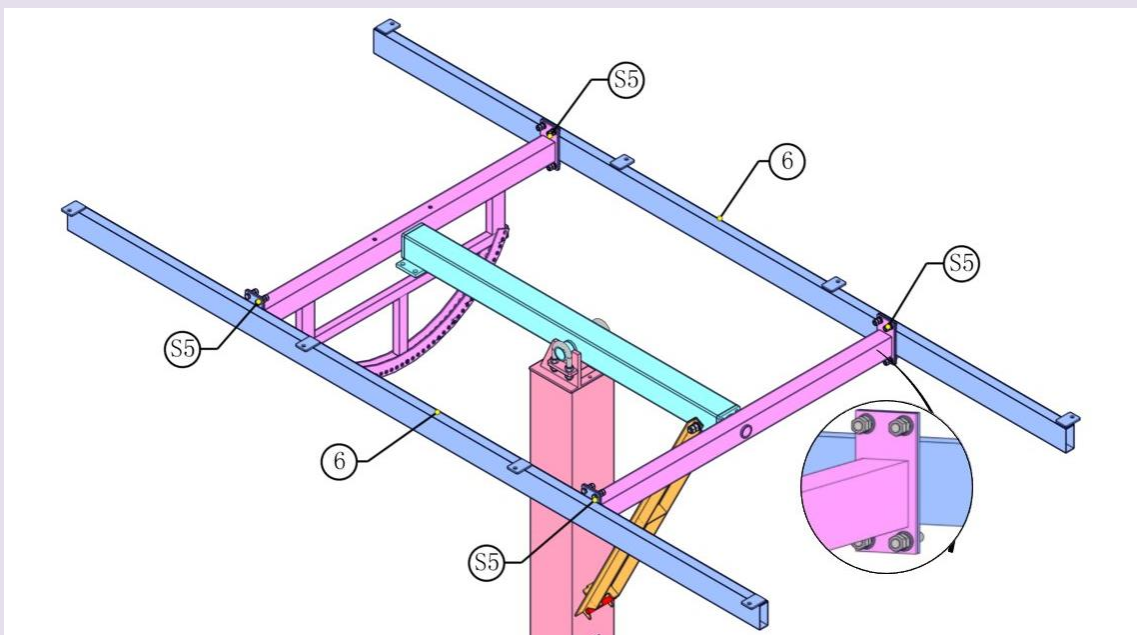
5.3.1 As shown in drawing (10), grease the inner wall of axle holes on both ends of cross shaft ②, 2, then put primary beam ④, 4 onto the north end of cross shaft ②, 2, and put secondary beam ⑤, 5 onto the other end.

Please note the direction of secondary beam in below drawing.



Drawing (10)

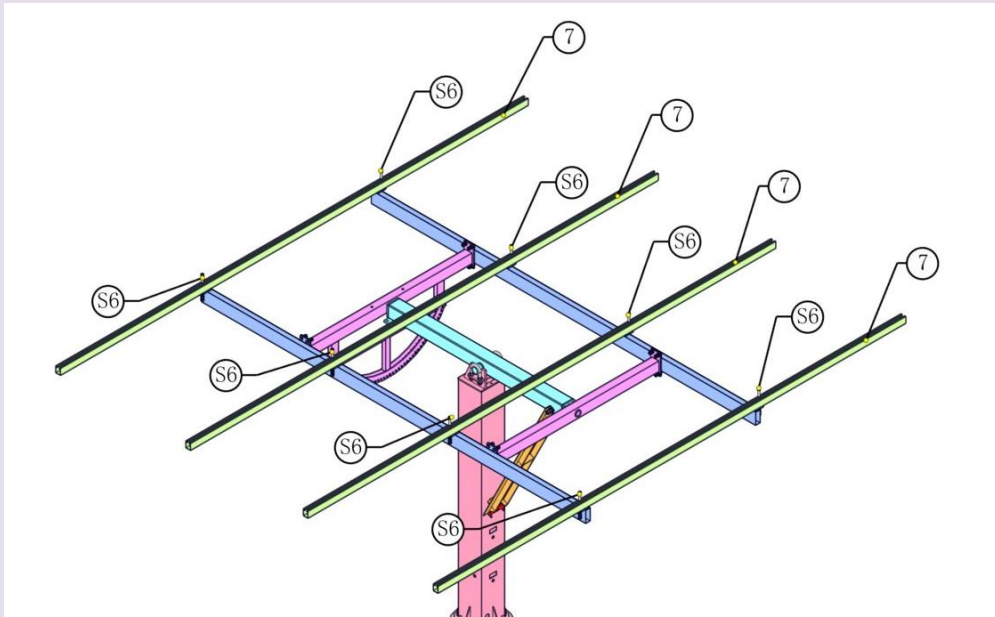
5.3.2 As shown in drawing (11), fix longitudinal beam ⑥, 6 to primary beam ④, 4 and secondary beam ⑤, 5 with hardware ⑤, S5 (double nuts), but do not fasten the hardware ⑤, S5 too tight.



Drawing (11)

5.3.3 As shown in drawing (12), fix the U-shaped beams ⑦, 7 to longitudinal beam ⑥, 6 with hardware ⑥, S6 (double nuts). Then

fasten the screws of hardware ○, S5 in diagonal order. Then fasten all the screws of hardware ○, S6.



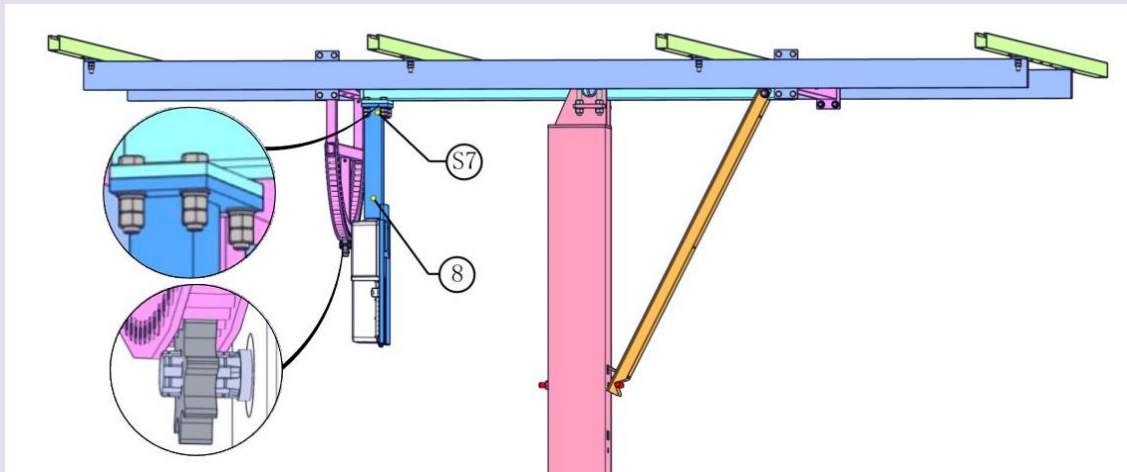
Drawing (12)

5.4 Installation of driving system

As shown in drawing (13), fix the driving system ○, 8 to the driving system fixing plate on cross shaft ○, 2 with hardware ○, S7 (double nuts) to make sure the wheel gear of driving system ○, 8 is well meshed with gear ring of primary beam ○, 4 (leave 1-2mm space between wheel gear and gear ring).

Remark: We put 2 boxes of flat washer in the spare parts pallet.

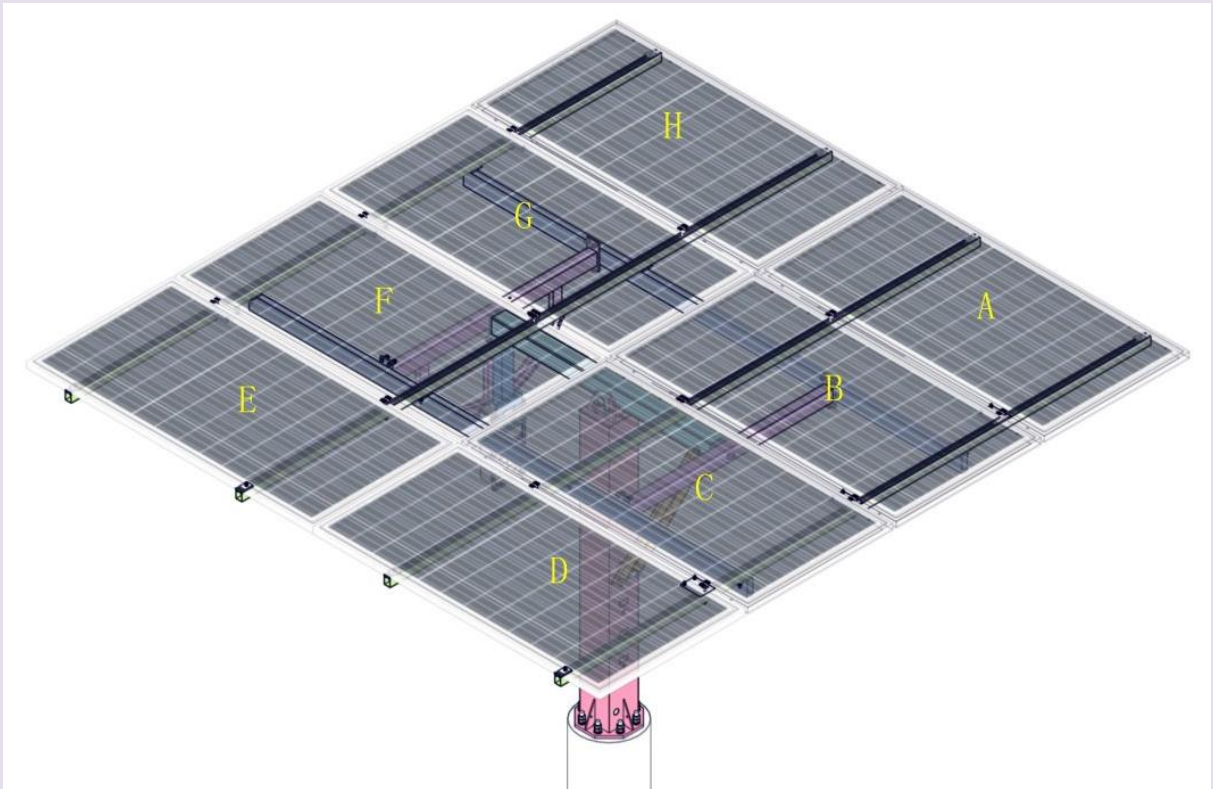
If the wheel gear and gear ring are not well meshed, these 2 boxes flat washer can be used in the following position to adjust the space for you.



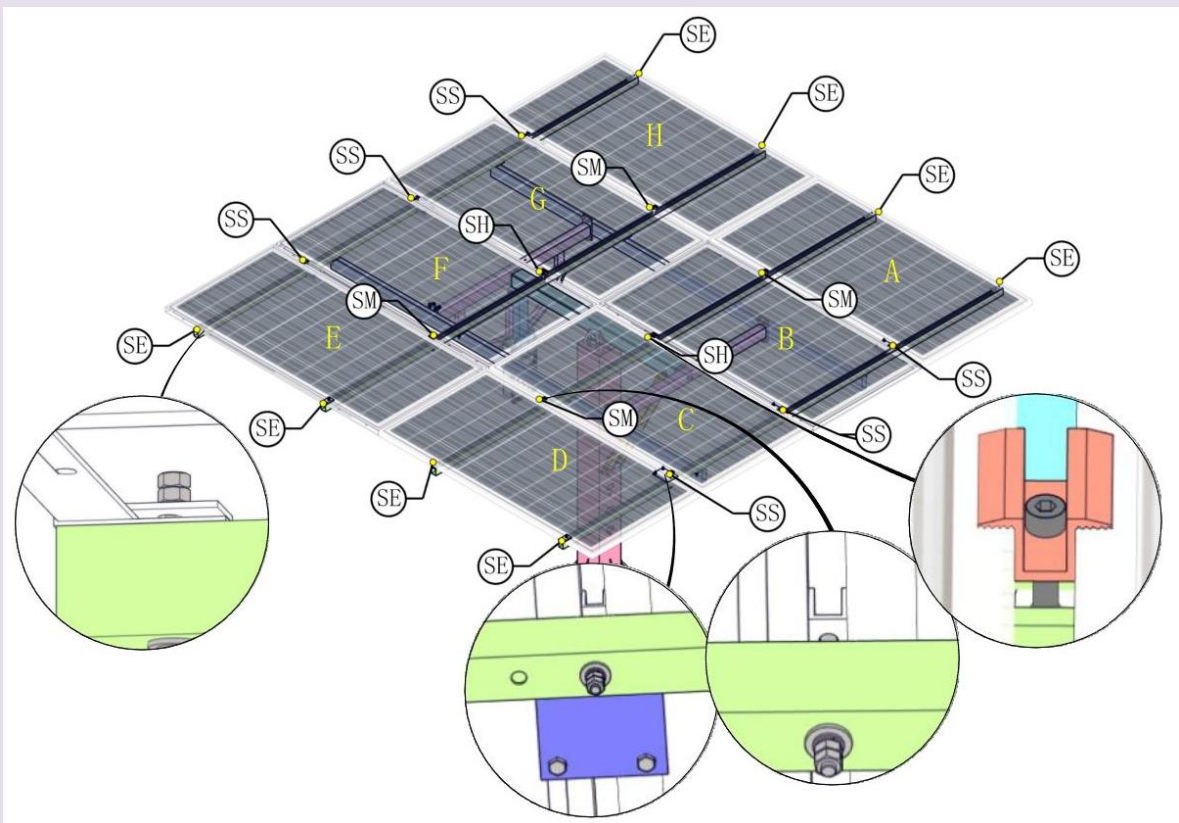
Drawing (13)

5.5 Installation of Solar Panels

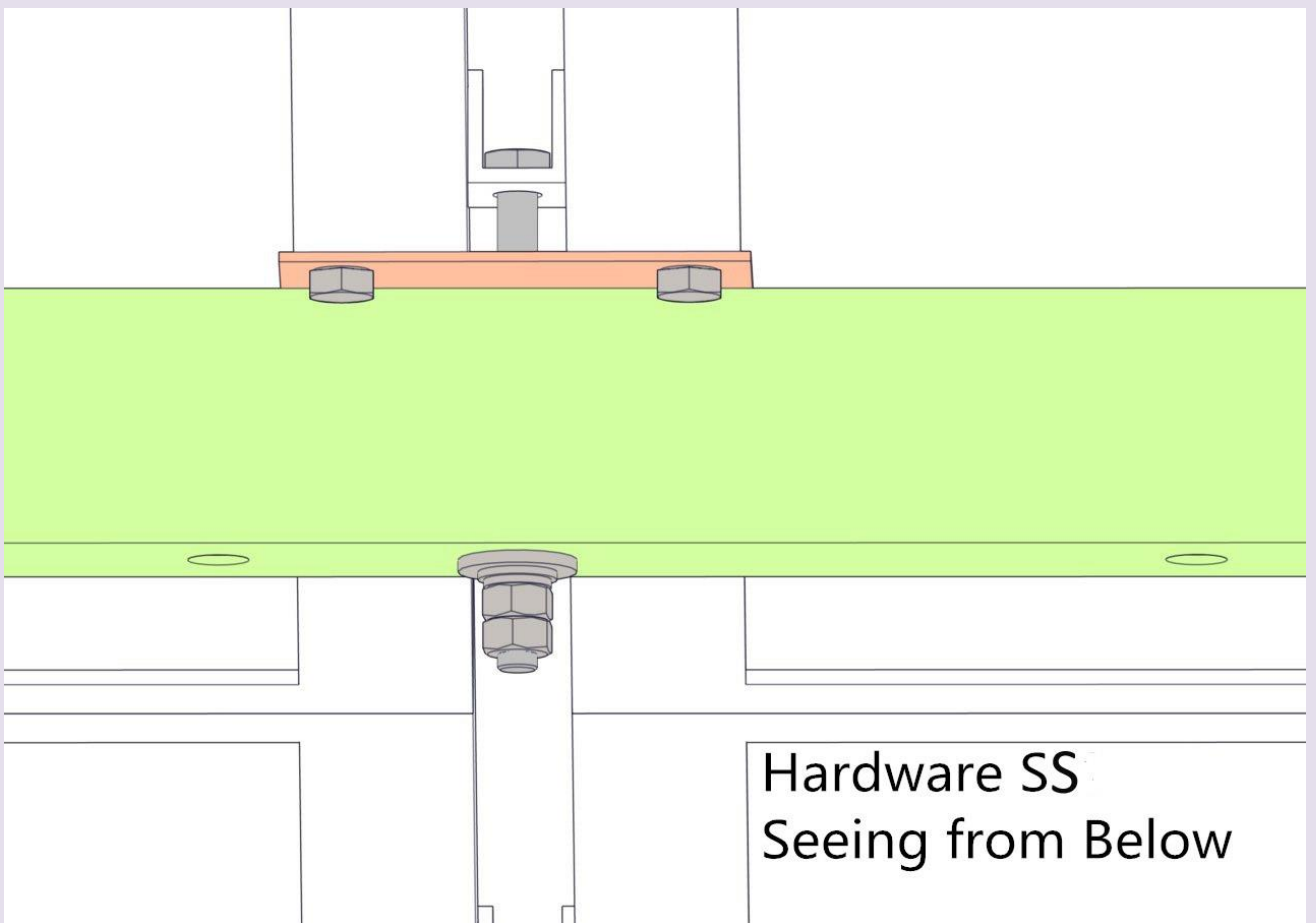
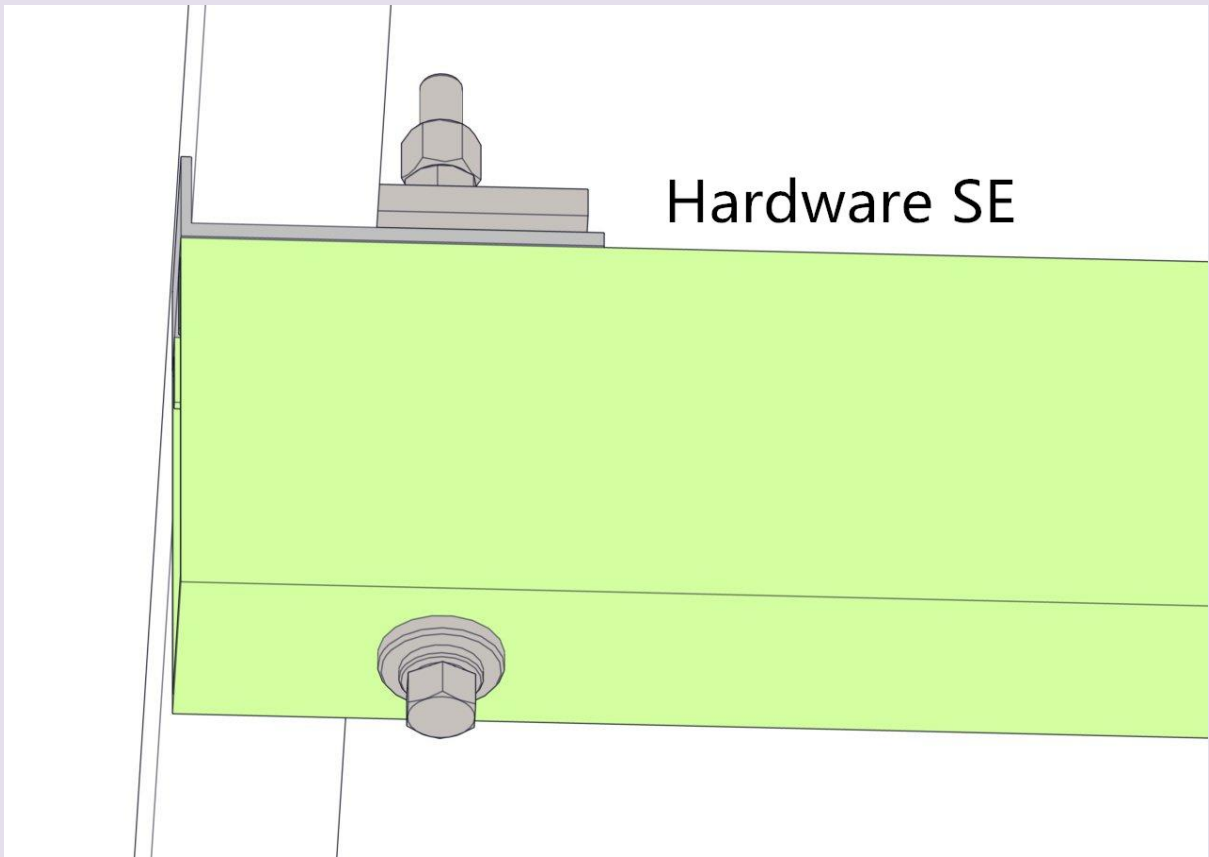
Adjust the elevation angle to 0° first, then fix all the solar panels as shown in drawing (14) (15). Put the solar panels D & E on the U-shaped beams $\bigcirc$, 7, and put on the hardware $\bigcirc$, SE & $\bigcirc$, SM & $\bigcirc$, SS, but do not fasten the screws too tight, then put solar panels C & F, B & G, A & H on the U-shaped beams, and put on the hardware $\bigcirc$, SE & $\bigcirc$, SM & $\bigcirc$, SS & $\bigcirc$, SH for all solar panels, adjust the solar panels to make it flat, then fasten all the hardware $\bigcirc$, SE & $\bigcirc$, SM & $\bigcirc$, SS & $\bigcirc$, SH.

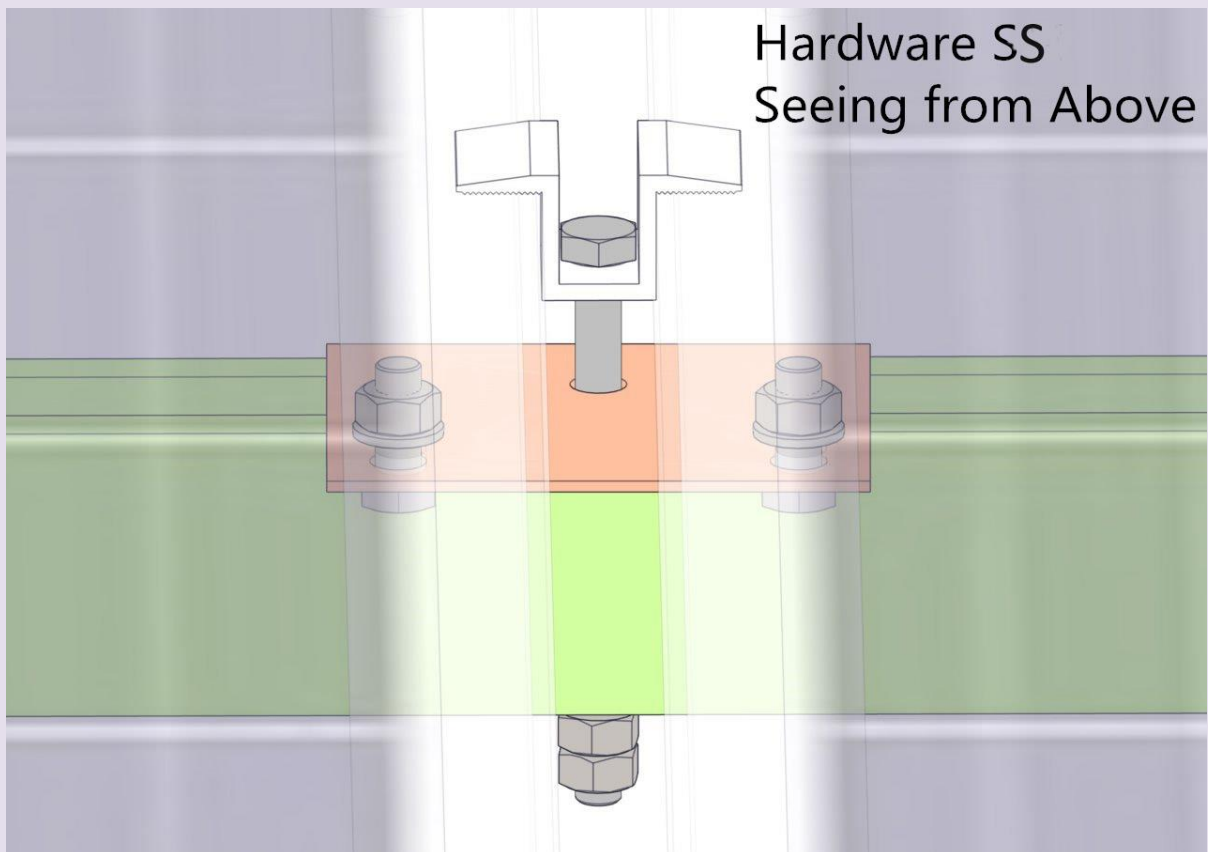


Drawing (14)



Drawing (15)



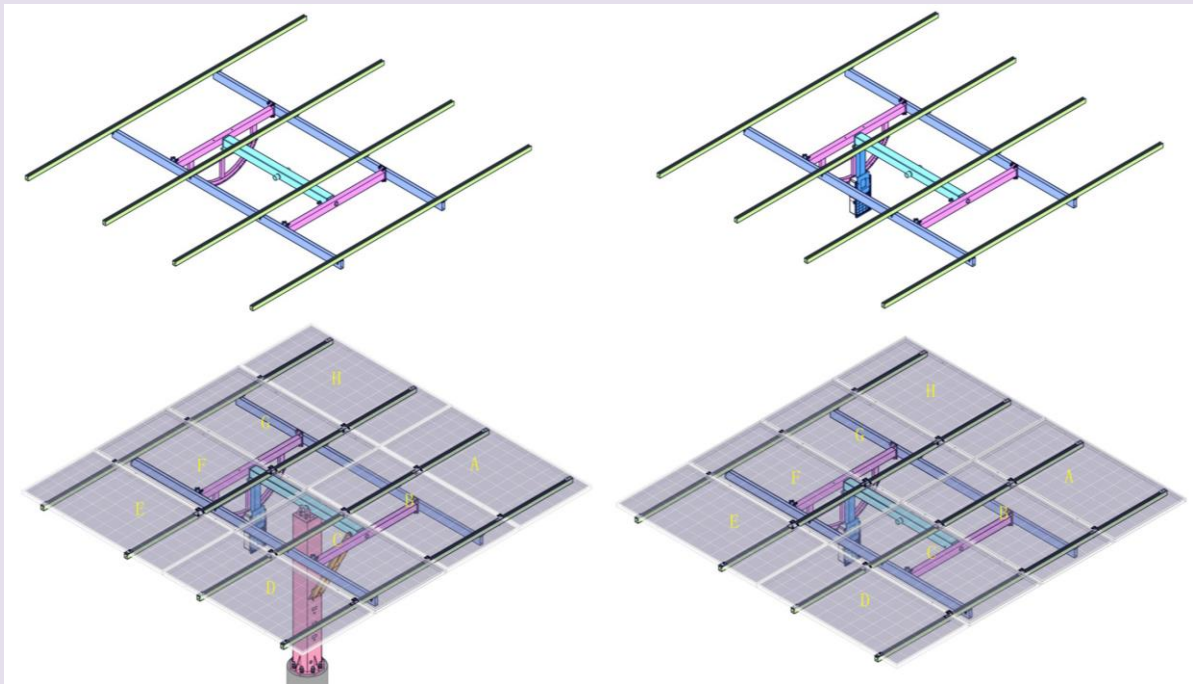


Note: after finished the installation of solar panels, please fasten all of the connection screws, and fasten hardware ○, S2 again according to actual conditions.

There are reserved connecting holes at the bottom of vertical pole for lightning protection grounding, please grounding the brackets properly according to PV power station grounding standard in your country.

Advice: as shown in drawing (16), if there is small crane equipped at the installation site, including cross shaft ○, 2, driving system ○, 9, frames and solar panels can be assembled in advance, then hoist it to vertical pole ○, 1 directly, then following previous steps of 5.2 to fix

cross shaft ○, 2 and elevation adjusting pole ○, 3.

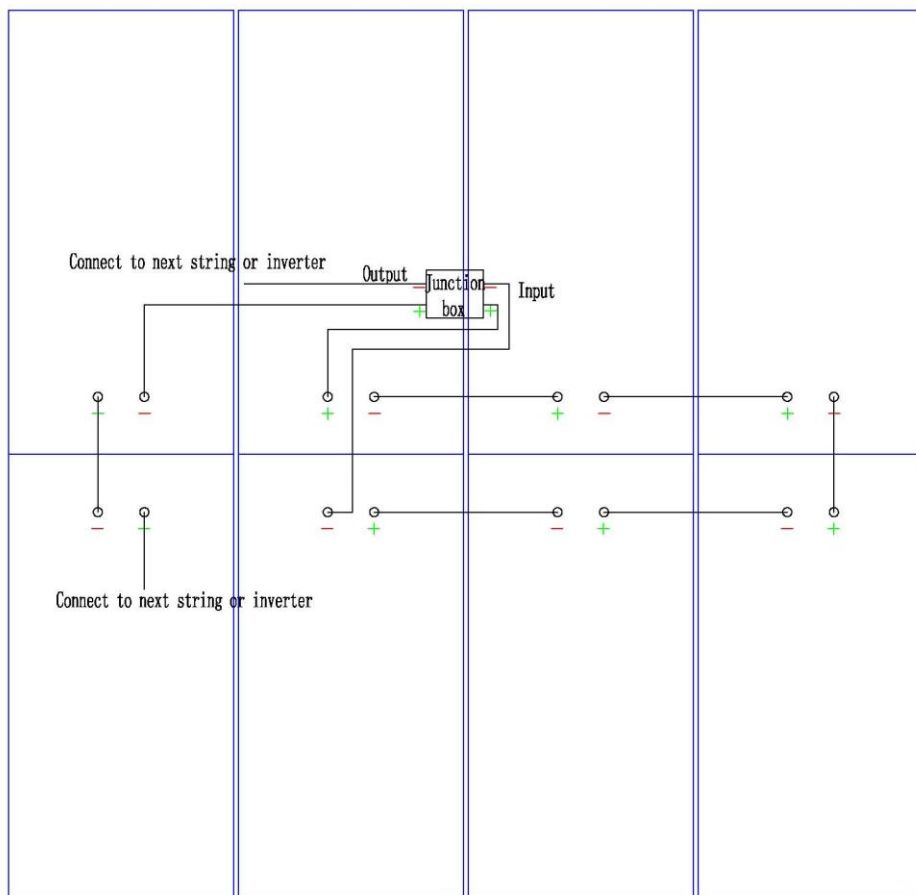


Drawing (16)

Part VI: Connect Control System Circuit

Using PV power supply

As shown in drawing (17), connect 6 solar panels in series, then connect the two lines to the two input terminals of **junction box** or **four-way connector** (red female head & black male head are for input, the other two are for output), the power line connected to driving system is already well connected before it leaves our factory. The output terminals of junction box are used for connect with other solar panels or inverter.

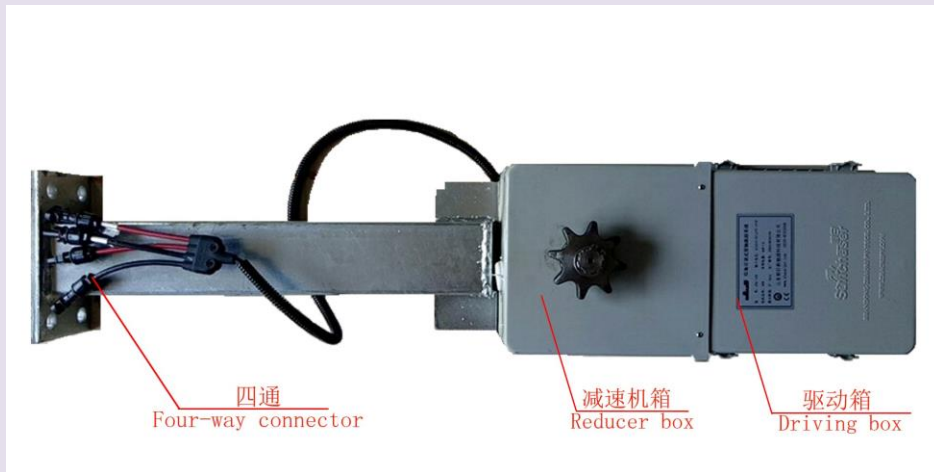


Drawing (17)

Note: the system can also use A/C power supply, please contact our salesman if you want use A/C power supply.

Part VII: Driving System

7.1.1 Driving System Overall



Drawing (18)

7.1.2 Controller box & Motor



Drawing (19)

7.2 Debugging

7.2.1 Inspection before debugging

1. Confirm that there are no obstacles within the tracking range. During the debugging process, the tracking system will act simultaneously;
2. The power plug of the control drive system has been correctly

connected.

7.2.2 Debugging steps:

1. After power on for 5 minutes, the controller will start automatically.
2. Wait for the host controller to complete the GPS download automatically; the download speed is related to the local latitude and longitude and the environment. Under normal circumstances, the GPS download is completed within 10 minutes.
3. After the GPS download is complete, the system will automatically calibrate the attitude.
4. After the attitude calibration is completed, it will automatically enter the normal tracking state.
5. If the bracket does not operate normally according to the above steps, please open the controller box for inspection:
 - a. Check whether the controller box Auto or Manual light is on. If it is not on, check the power supply line.
 - b. If the Auto light is on and the control drive system is not running, check whether the GPS / Data light is blinking or not. If it is blinking normally, it means that the GPS has been downloaded.
 - c. If the Manual light is on and the yellow light is flashing, check whether the motor carbon brushes have become loose due to transportation. If the problem is still not resolved, please check the list of faults and solutions.

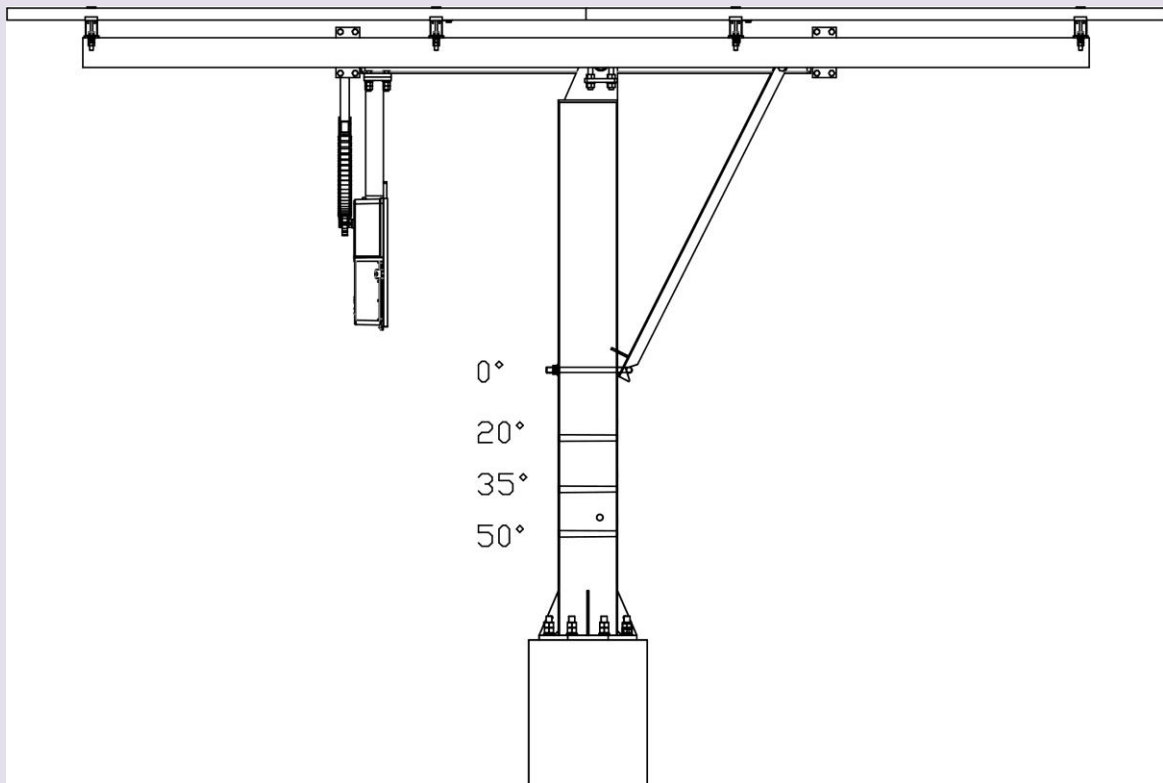


Drawing (20)

Note: the system will stay at horizontal state in east-west on cloudy days.

Part VIII: Daily Adjustment and Maintenance

8.1 As shown in drawing (21), there are 4 angle adjusting holes (0° 、 20° 、 35° 、 50°) on vertical pole, users can adjust it according to below time table or the actual solar elevation angle at project site.



Drawing (21)

Note: the system existing eccentric distance, so the elevation angle adjustment should be done at the noon time (or in the night before adjusting day, cut off the driving power to keep all of the trackers in horizontal state for elevation angle adjusting convenience).

8.2 Regular inspection and maintenance

1. In order to discover potential fault timely, improve the system operation reliability, regular inspection shall be not less than once for every six months.

2. After bad weather like more than force 6 strong wind, tropical storm, heavy snow, or earthquake occurred, maintenance personnel should make a general checking for the bracket, repair it in time if there is any damage.

8.3 Inspection content and problem treatment

Item	Inspection content	Solutions
Bolts and nuts	Check whether bolts and nuts were loosed	If bolts and nuts were not well fastened during installation, or loosed due to strong winds, maintenance personnel need to re-fasten it.
Clamps	Check if clamps were deformed or loosed	If it was loosed because of screws were not well fastened, need to re-fasten the screws. If clamps were deformed, need to replace it.
Solar panels	Check whether solar panels are flat	If it's not flat and caused by structural distortion, need to rectify the distortion, or replace some parts. If it caused by loosed screws, need to re-fasten or replace the screws.
Brackets	Check whether there is any bracket rust problem	If it appears rust, should use abrasive paper for rust removing, then spary epoxy zinc-rich primer or other antifouling paint for protection.
Wire connection	Check whether have	If there is loosed wire connection, need

in driving box	loosed wire connection	re-connect it or replace the plugs.
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Part IX: Malfunction List and Solutions

Malfunction	Possible Reasons	Solutions
System stop tracking	Low current protection	When the sunlight is not good, the system will stay at horizontal state, so as to reduce power consumption, mechanical wear, and realize wind protection.
	Abnormal power supply	Under normal lighting condition, check if the 'Auto' indicator lights up, if not, check the power supply circuit.
	Control box failure	If there is no problem with the power supply circuit, if the indicator still not lights up, need replace the control box.
	Gear motor failure	If the indicator light lights up, but gear motor can not running, try to take off the motor and fasten the two carbon brush screws at the bottom of motor, if still not works, replace the gear motor.
Tracking deviation	There are obstacles	Check if there is any obstacles in manual mode.

		Replace the gear motor.
	Gear motor failure	

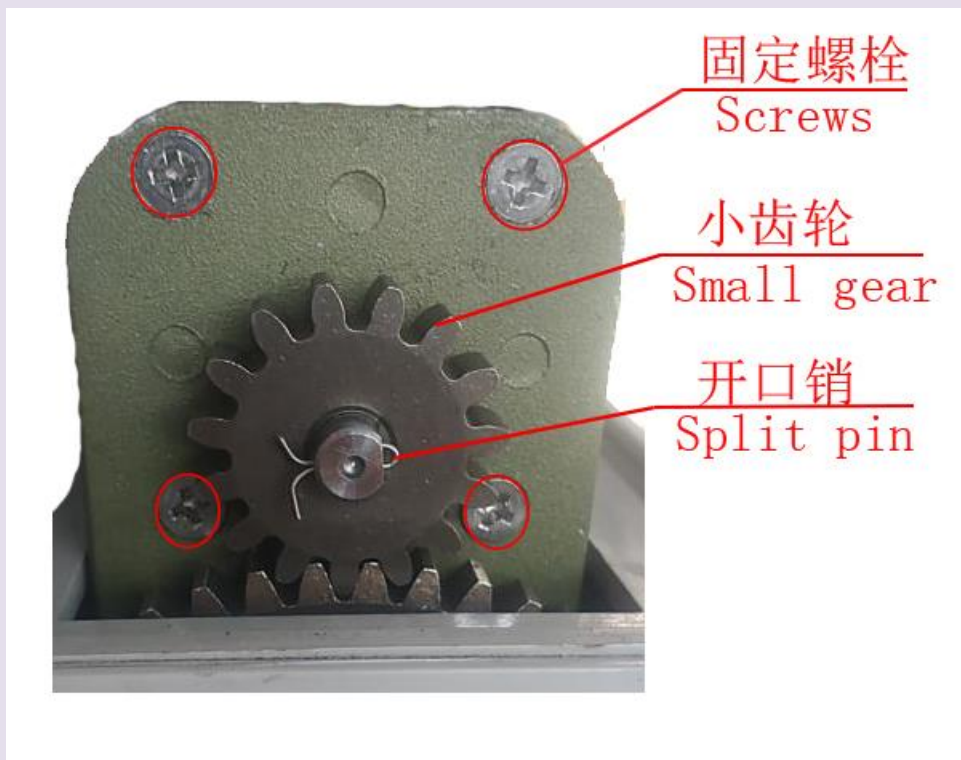
Note: The above malfunctions are common malfunctions, for situation not easy to judged and solved, please contact our customer service staff.

Part X: Spare Parts Replacement

Note: Cut off the power supply before replacement. If using PV power directly supply, disconnect all the connectors at input and output terminal of junction box or four-way connector. If using A/C power supply, cut off the A/C power switch.

10.1 Gear motor replacement

As shown in drawing (22), remove the split pin, take off the small gear, unscrew four fixing screws, take off the gear motor, then fix a new gear motor with fixing screws, lock it with split pin.



Drawing (22)

10.2 Control box replacement

As shown in drawing (23), disconnect all the plugs on control box, unscrew the four fixing screws of control box, replace it with a new control box, and insert the plugs.



Drawing (23)