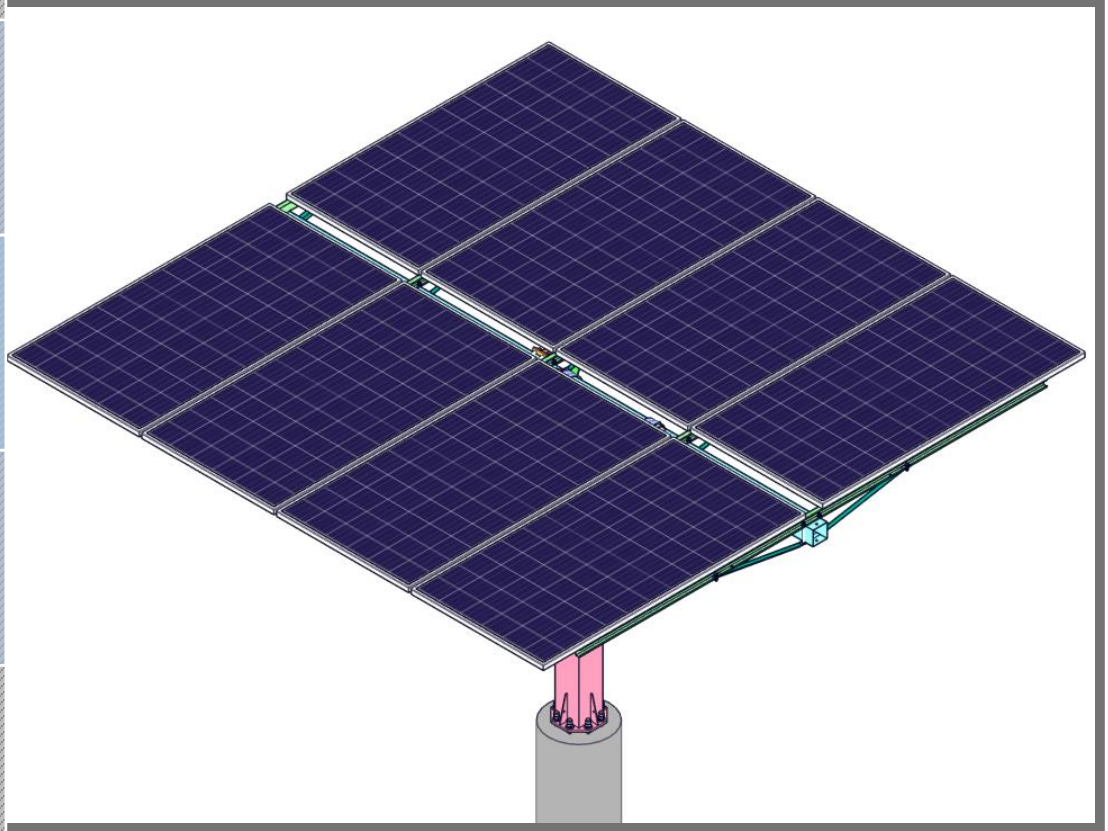
2022

ZRD-08 Tracking System Installation Manual (Northern Hemisphere)



SHANDONG ZHAORI NEW ENERGY TECH. CO., LTD.
www.zhaoripv.com
2022.11

INTRODUCTION

Thank you for purchasing this solar tracking system designed and manufactured by **Shandong Zhaori New Energy Tech. Co., Ltd.**, we will wholeheartedly to provide first-class product and service for you.

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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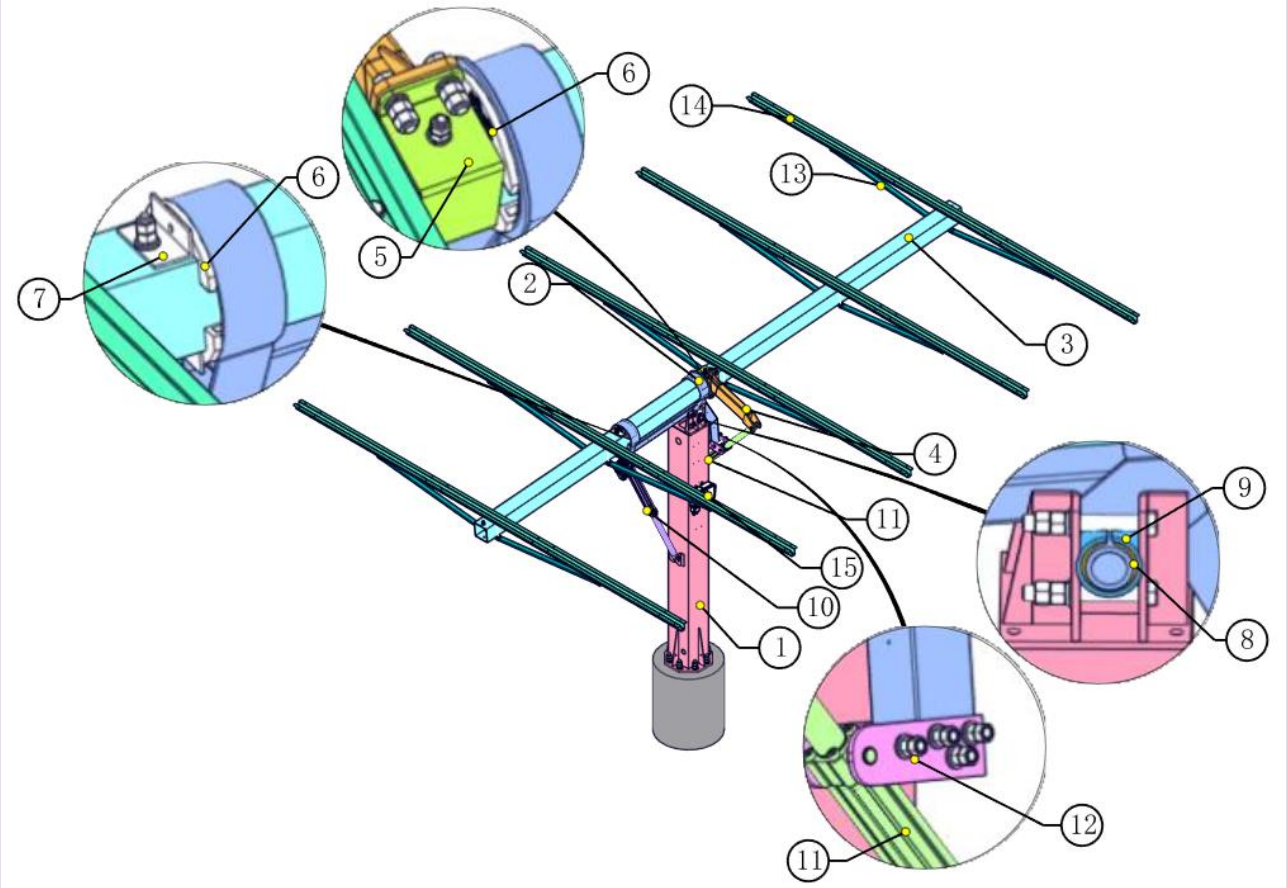
I. ZRD-08 Tracking System Structure Chart



System structure chart

Main parts of ZRD-08 solar tracking system

Item	Description	Weight (kg)	Total Weight	Dimension(mm)	Quantity
1	Vertical pole	43.22	43.22	2000*200*200*2.5	1
2	L-shaped bracket	15.7	15.7	770*194*5	1
3	Center beam	43.05	43.05	120*120*4700*2.5	1
4	Swing arm	5.53	5.53	380*100*50*3.5	1
5	Swing arm fixing plate	2.16	2.16	212*110*120	1
6	Plastic bearing	0.2	0.8	ϕ 120	4

7	Plastic bearing limit	0.25	0.5	36*50 angle steel	2
8	Plastic shaft sleeve	0.1	0.2	ϕ 60*45	2
9	Steel shaft sleeve	0.38	0.76	70*5	2
10	Elevation linear actuator	8	8.0	L=940mm	1
11	Elevation linear actuator seat	0.46	0.92		2
12	Azimuth linear actuator	8.5	8.5	L=985mm	1
13	Azimuth linear actuator seat	0.87	1.74		2
14	Supporting beam	7.97	39.85	50*30*80*1.8*3750	5
15	Inclined strut	1.5	7.5	34*16*1.8*1640	5
16	Control unit		1.0		1
Total		**137.89**	**179**		**33**

II. Connecting Screws and Clamps Details

Item	Specification	Used position	Quantity
S0	M22 double nuts, flat washer, spring washer	Vertical pole and foundation	8 sets
S1	M14*160 bolt, double nuts, 2 flat washers, spring washer	Plastic bearing and center beam	2 sets
S2	M16*120 bolt, double nuts, 2 flat washers, spring washer	Vertical pole and L-shaped bracket	4 sets
S3	M16×60 bolt, double nuts, 2 flat washers, spring washer	Swing arm and swing arm fixing plate	4 sets
S4	M14*120 bolt, double nuts, 1 flat washers, spring washer, 2 plastic washers	L-shaped bracket and actuator seat	4 sets
S5	Ø16×125 axis pin, flat washer, split pin, 2 small plastic pipe	L-shaped bracket and actuator	1 set
S6	Ø16×85 axis pin, flat washer, split pin	Swimming and actuator	2 sets
S7	M12*160 bolt, double nuts, 2 flat washers, spring washer,	Supporting beam and center beam	10 sets

S8	M12*30 bolt, nut, 2 flat washer, spring washer	Inclined strut and Supporting beam/Center beam limit	11 sets
S9	M8*25 bolt, double nuts, 2 flat washers, spring washer,double glass medium pressure block	Middle supporting beam and solar panels	32 sets
S10	M5*23 self-tapping screw	Control unit	3 sets

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

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

No.	Tools	Spec.	Quantity	Remarks
1	Open spanner	13/14	2	M8 bolt
2	Open spanner	17/19	2	M12 bolt
3	Open spanner	20/22	2	M14 bolt
4	Open spanner	22/24	2	M16 bolt
5	Open spanner	32/34	1	M22 bolt
6	Adjustable spanner	10 Inch	2	Crescent adjustable wrench
7	Screwdriver	3#	1	Electric debugging (flat head or cruciform)
8	Rubber Hammer		1	Facilitate the installation
9	Double ladder or Scaffolding		2	or use small crane

IV. Description of screw torque

Item	Specification	Moment of force	Remarks
1	M8	22-30N • m	
2	M12	45-59N • m	
3	M14	78-104N • m	
4	M16	124-165N • m	
5	M18	193-257N • m	
6	M22	264-354N • m	

Note：

1. According to the data obtained from testing and experience, the site shall be adjusted according to the actual situation.

2. For double nut bolts, the first nut shall be tightened before the second nut.

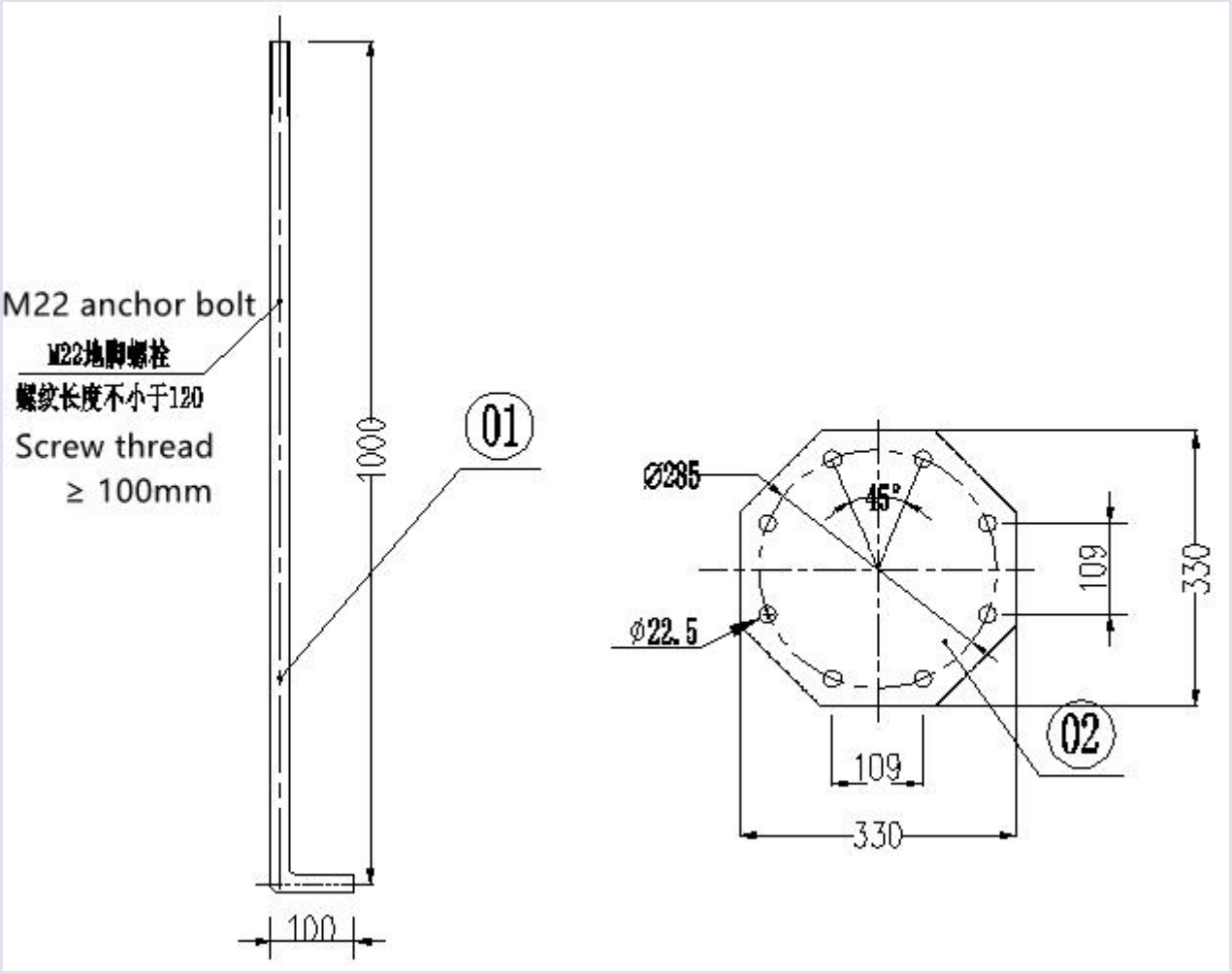
3. The bolt tightening torque of suspended or semi suspended structure is 60% of the reference torque.

V. Concrete Foundation

Materials Preparation

Marks	Description	Material	Quantity
⑴	Foundation bolt	M22、Q345B steel	8
⑵	Fixture template	---	1
⑶	Foundation (above ground)	C30 concrete	---
⑷	Foundation (below ground)	C30 concrete	---

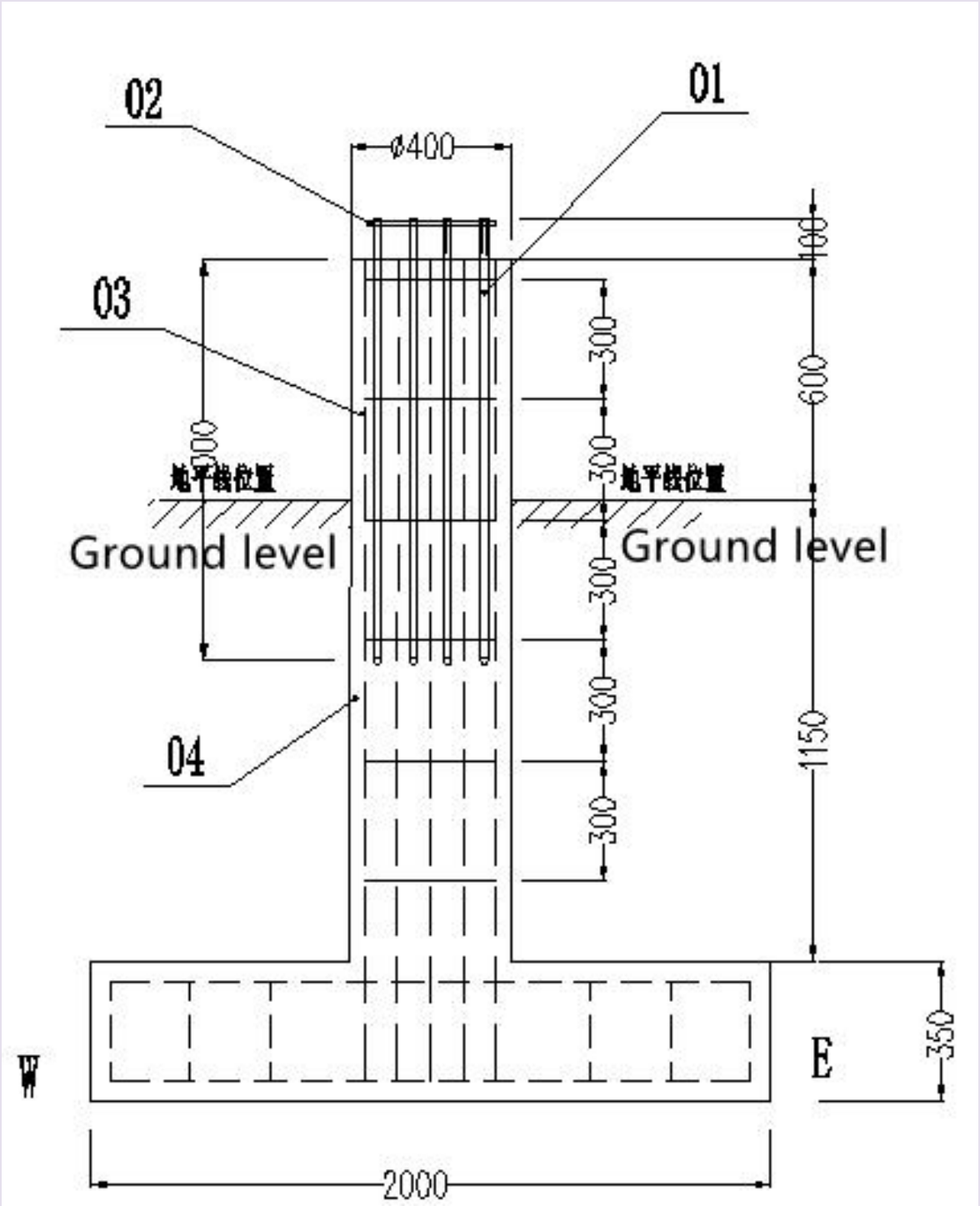
1.Make 8 foundation bolts ⑴, one foundation bolt fixture template ⑵ (using rigid material, only for positioning bolts, thickness is not important).



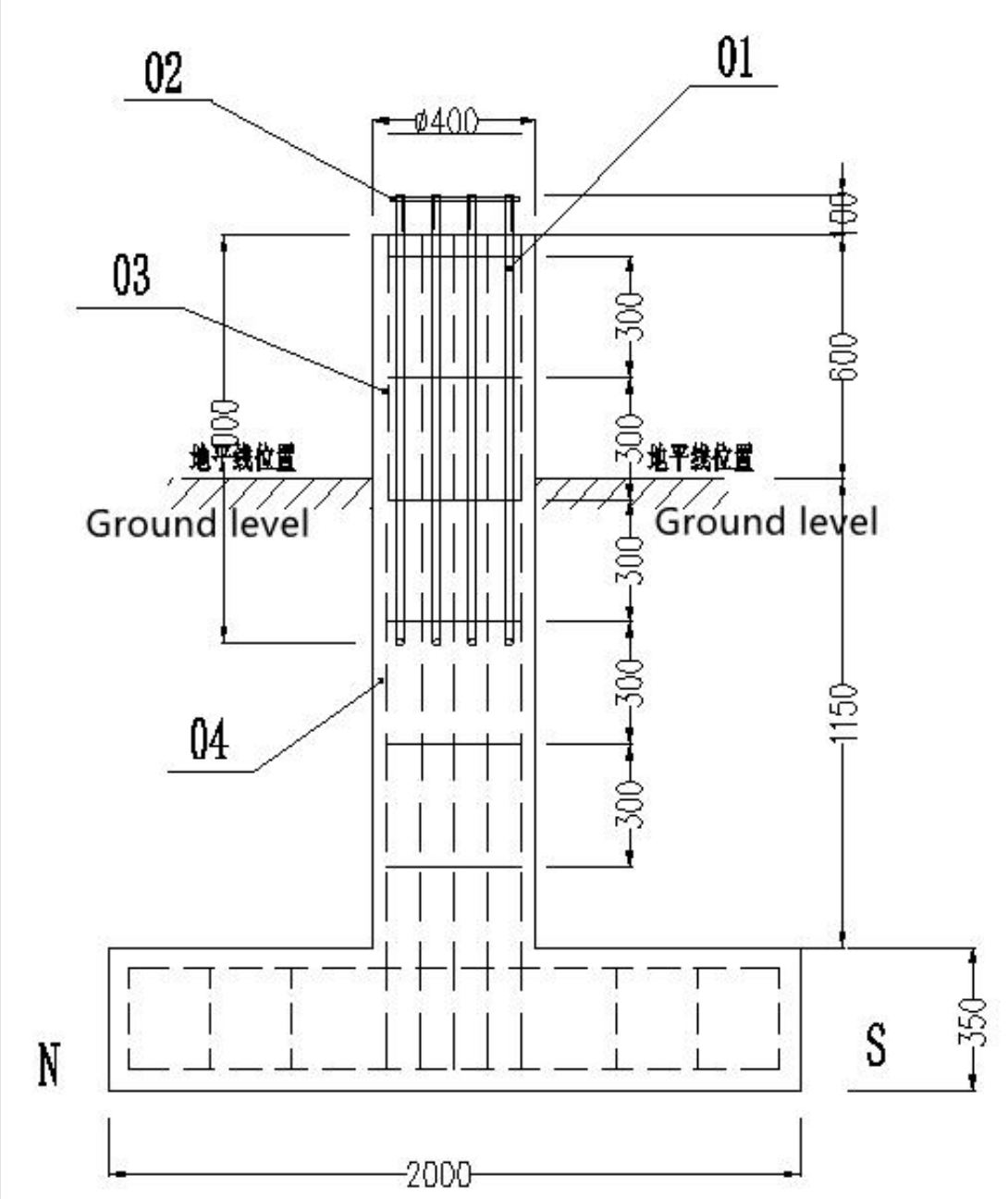
Unit: mm

2. Position 8 foundation bolts ⑴ with the fabricated fixture template ⑵, secure the bolts to foundation steel mesh grid (using Φ8 steel rebar). Confirm the east-west direction carefully, pour concrete foundation according to the dimensions shown in the following drawings, remove the fixture template ⑵ after the concrete is cured. The solar tracking system installation can be carried out only after the concrete is thoroughly cured.

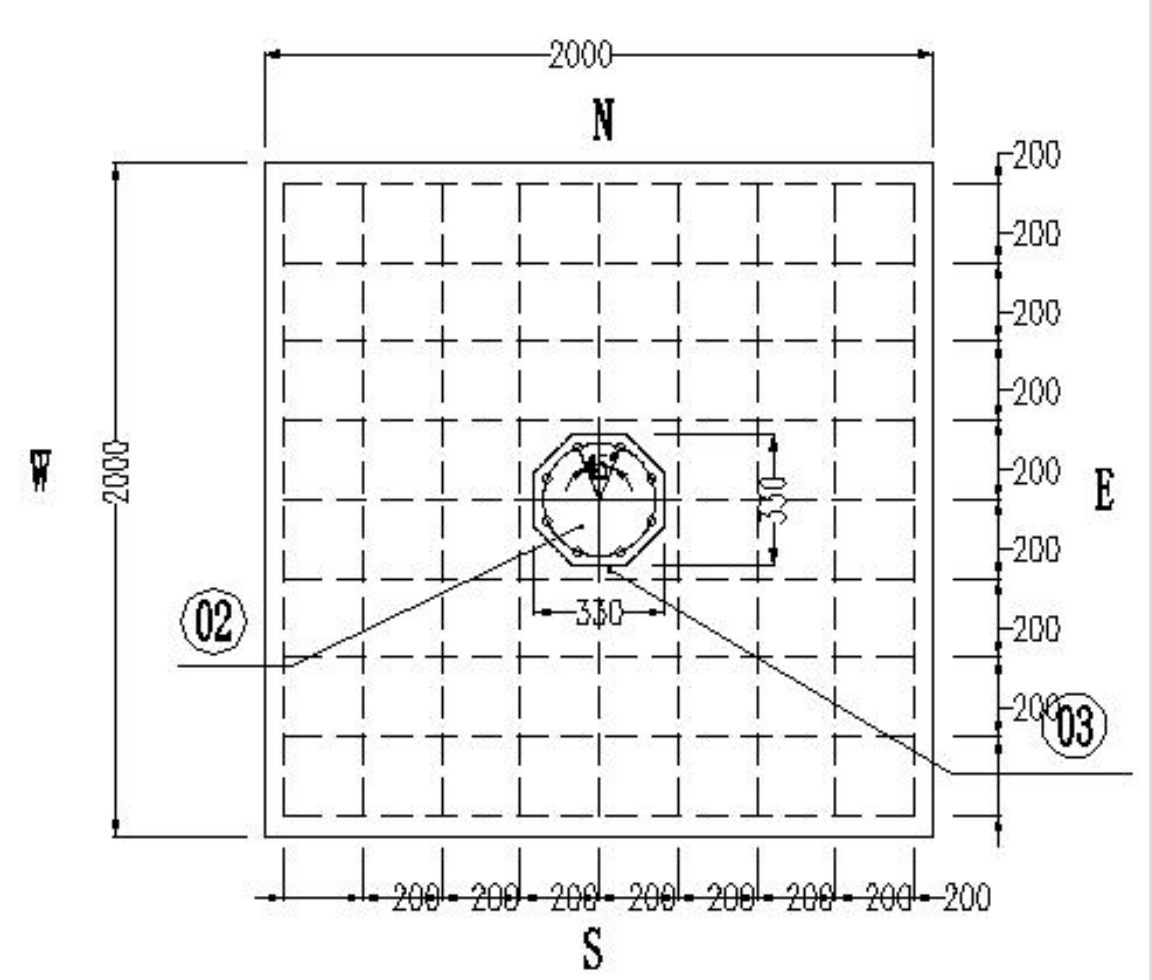
(Covering the poured concrete with a plastic sheet will make it stronger, because it will dry out slower from sun exposure. To convert the dimensions from mm to inches divide by 25.4)



Foundation as viewed from the South



Foundation as viewed from the West



Foundation as viewed from Above

Note: **Foundation above the ground should be more than 600 mm**, exposed foundation bolts ⑴ thread at least 100 mm. In order to ensure the verticality of tracking system pole, the top face of foundation shall be leveling with spirit level. The dimension and depth of the concrete foundation is just a guide, please design it for your local soil conditions and maximum wind speeds.

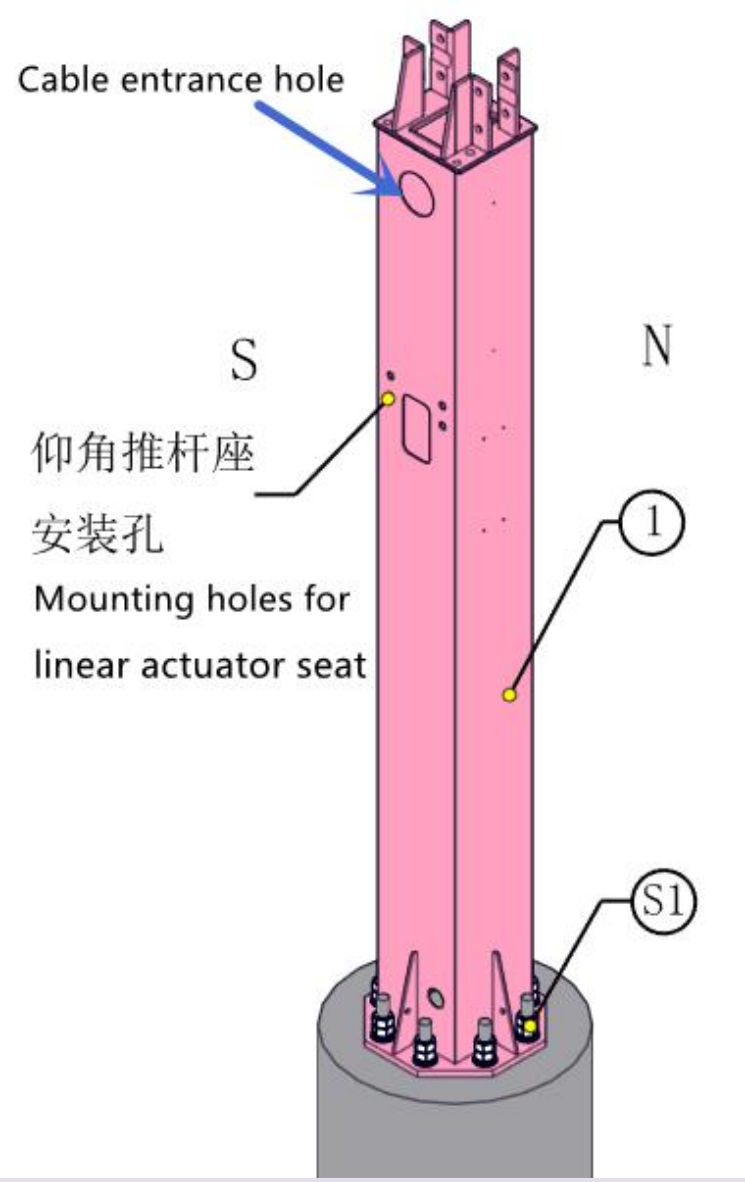
Concrete, foundation bolts ⑴ and fixture template ⑵ shall all be prepared by users. Φ40mm conduit for electrical wires can be planned into the concrete foundation, used for threading PV lines, controller power lines, etc.

VI . Installation of ZRD-08 Tracking System

6.1 Installation of Vertical Pole

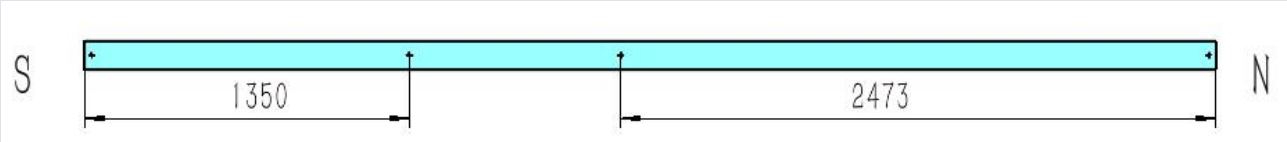
Put the vertical pole ① on the concrete foundation, **verify the orientation of the vertical pole** ① to ensure the side with linear actuator seat is facing **South**, then put on flat and spring washers, secure with hardware S0 (double nuts) to stabilize the vertical pole ①.

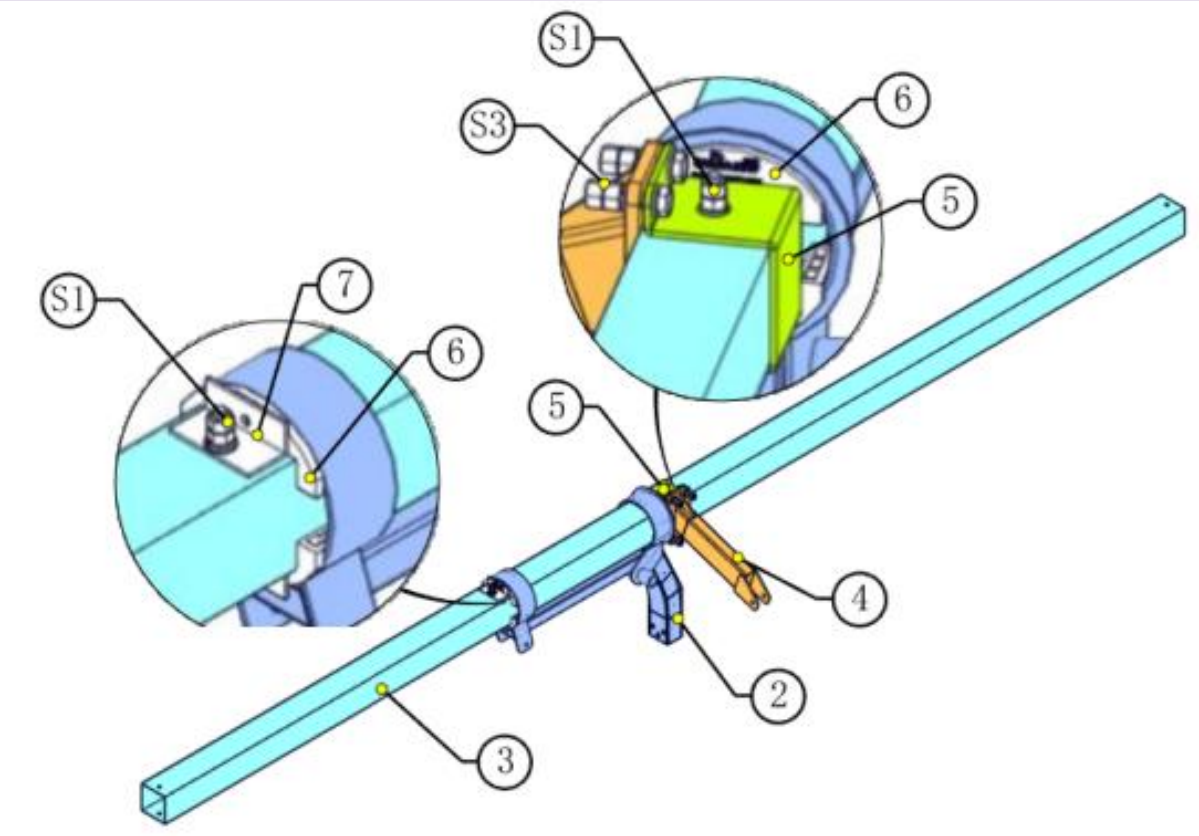
South means the direction of the geographical longitude lines, it can be confirmed with gyroscope or compass (need to amend the geomagnetic declination, different sites, difference geomagnetic declination).



6.2 Assembly of L-shaped bracket & Center beam

two fixing holes are set in the middle of the center beam, and the fixing hole in the south is 1350mm away from the south end, Put the **center beam** ③ into the **L-shaped bracket** ②, **please pay attention to the direction of the center beam and L-shaped bracket**. Then put two **plastic bearing** ⑥ into the **north** hoop of the **L-shaped bracket** (insert the **plastic bearing** from the north side), then fix the **swing arm fixing plate** ⑤ onto the **center beam** with **hardware** ⑤1, then fix the **swing arm** ④ onto s**wing arm fixing plate** ⑤ with hardware ⑤3, and put two **plastic bearing** ⑥ into the **south** hoop of the **L-shaped bracket** (insert the **plastic bearing** from the south side). Then use **hardware** ⑤1 to fix the **plastic bearing limit** ⑦ on the center beam. Installer may need to knock the plastic bearing ⑥ into the hoop with hammer, this is for reducing shaking space.

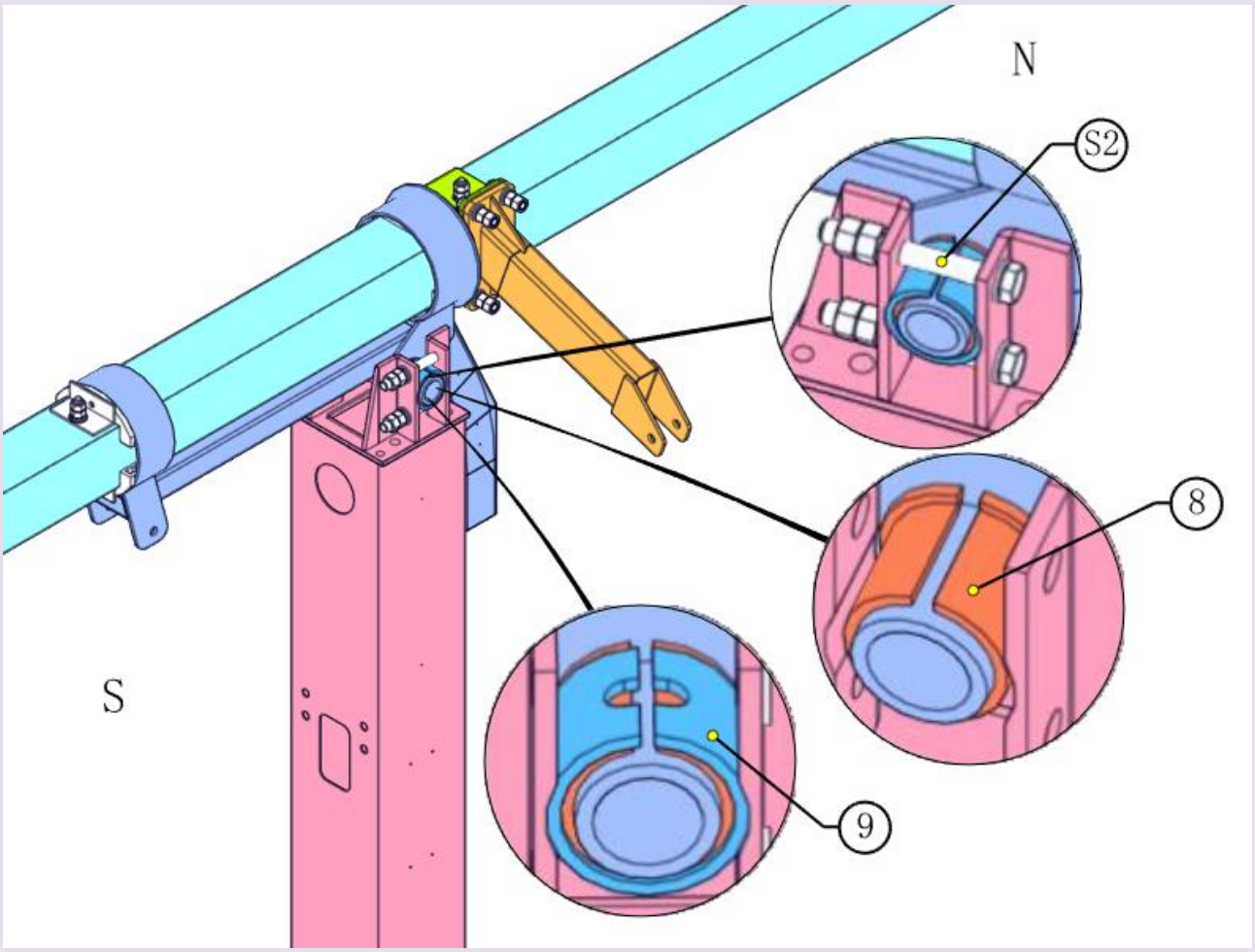




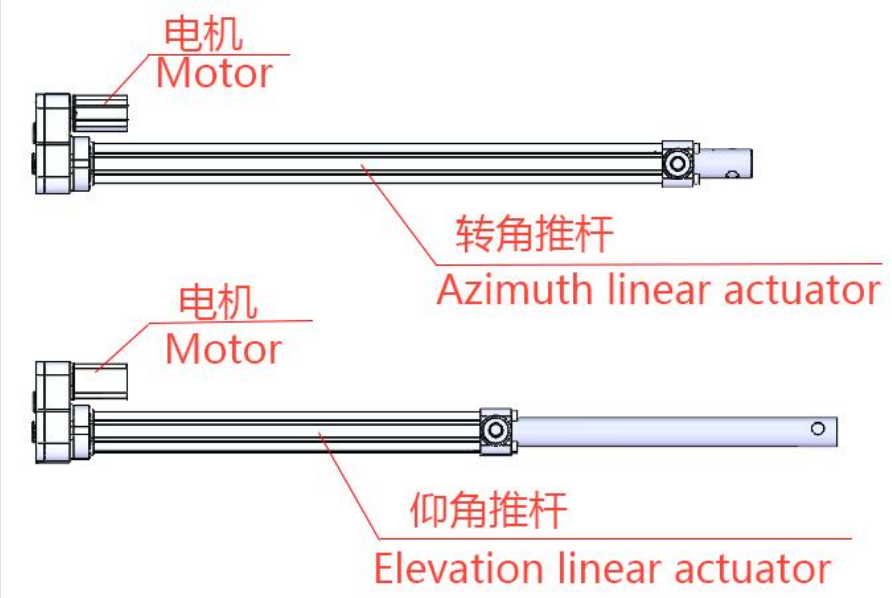
6.3 Installation of L-shaped bracket & Elevation linear actuator

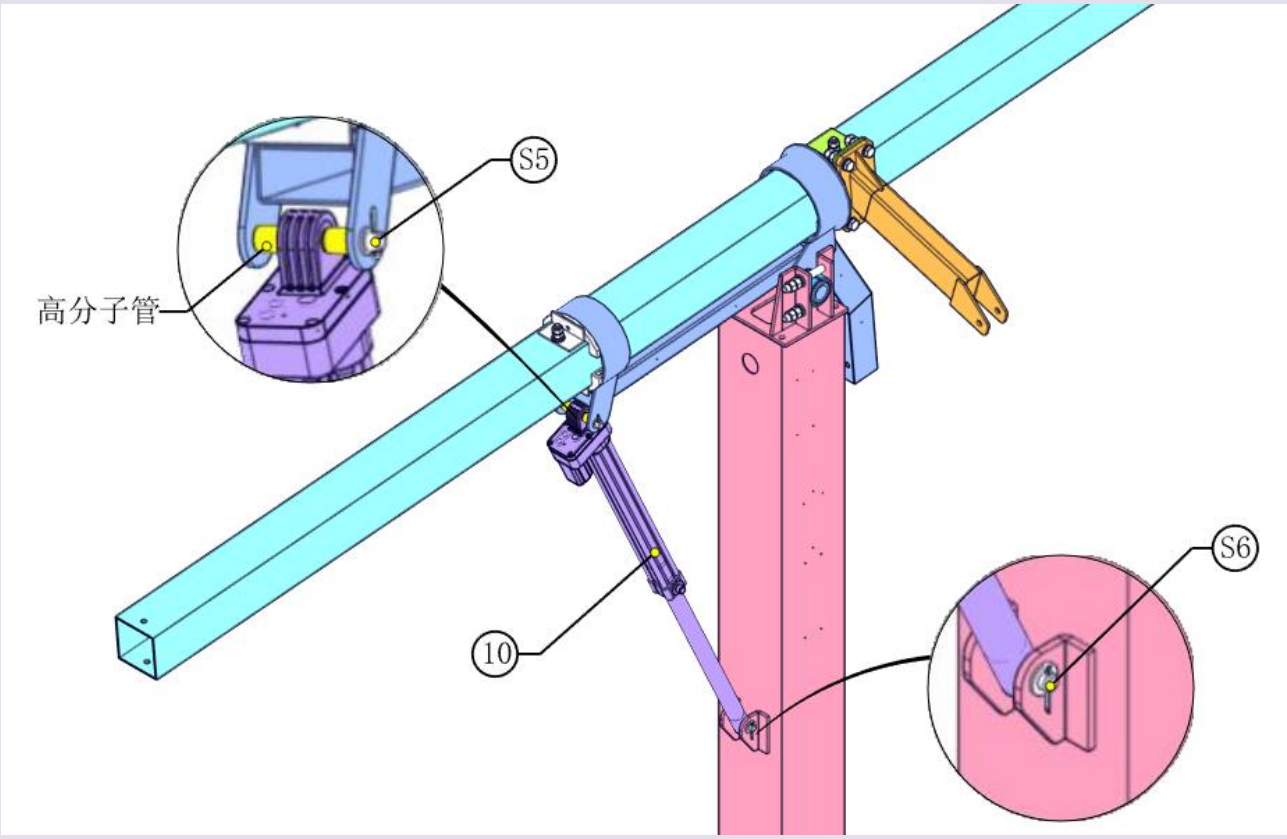
Install two lower screws of **hardware** ⑫ onto the top of **vertical pole** ①, do not fasten it for the time being. Put the **plastic shaft sleeve** ⑧ into the **steel shaft sleeve** ⑨, both openings are in same direction. Then affix the **L-shaped bracket** ② onto the **vertical pole** ①, put the plastic shaft sleeve and steel shaft sleeve onto the shaft of **L-shaped bracket**, the opening faces upwards, **please pay attention to the direction of plastic shaft sleeve**, then install the other two upper screws of **hardware** ⑫, tighten the four screws of **hardware** ⑫.

Note: Please pay attention to the direction of L-shaped bracket ②!



Fix **elevation linear actuator** ⑩ on the L-shaped bracket ② with **hardware** ⑤ . two polymer tubes on both sides of elevation linear actuator,motor is outside.Install the elevation linear actuator onto the vertical pole with the bolt kit ⑥ (the two pins of the cotter pin must be split). **There are two kinds of linear actuators for each unit, do not mixture them up when installing.**

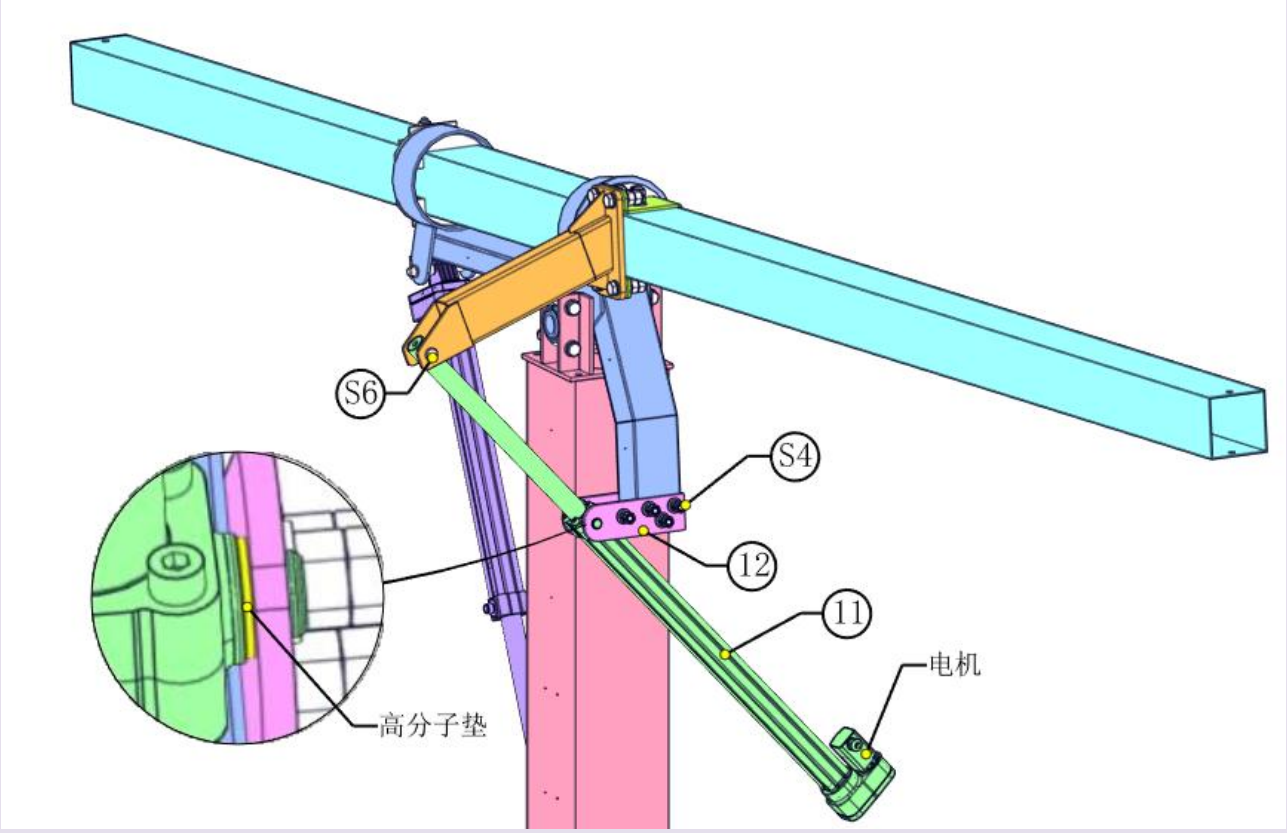




6.4 Installation of Azimuth Linear Actuator

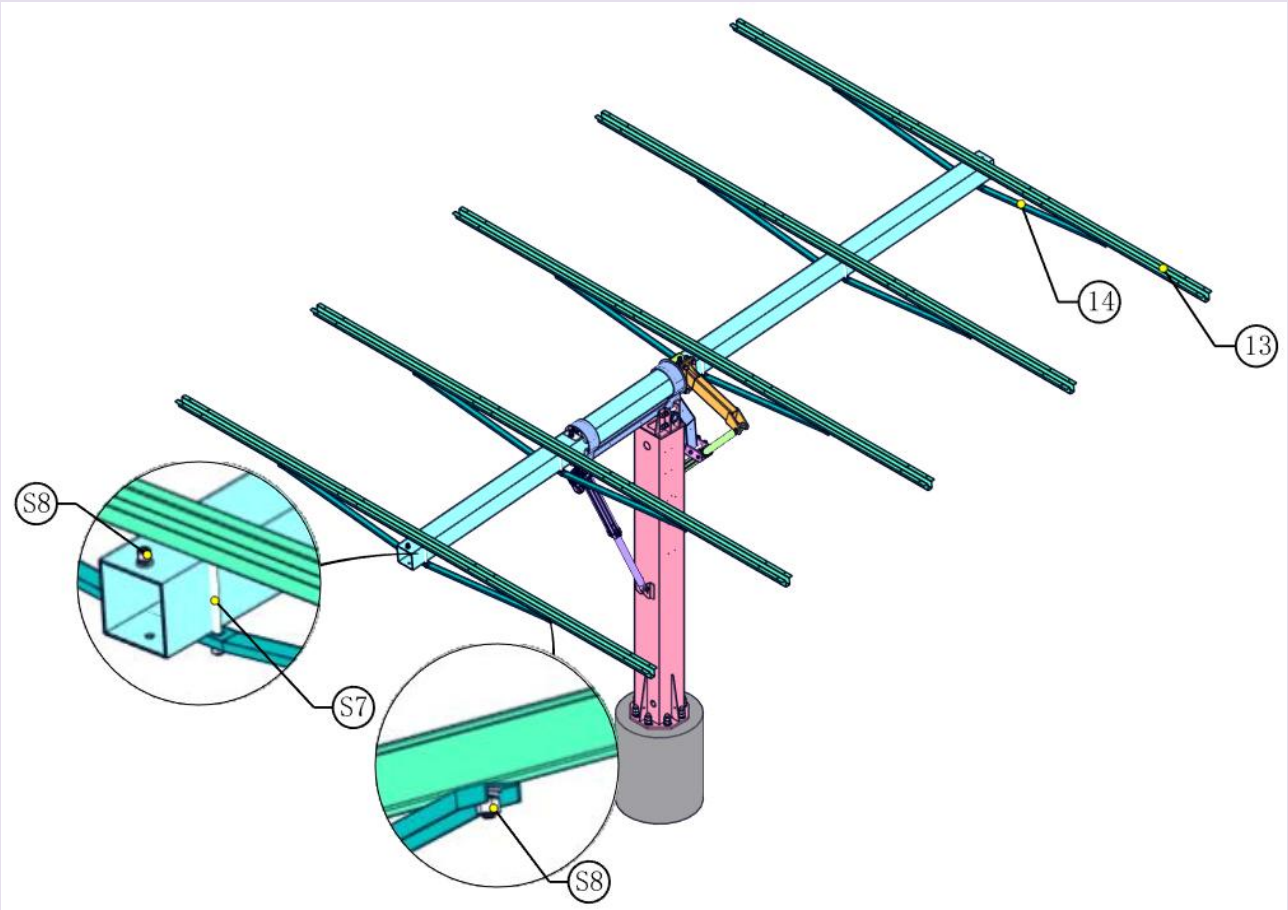
Fix the **azimuth linear actuator** ⑪ to **L-shaped bracket** ② with **azimuth linear actuator seat** ⑫ and **hardware** Ⓢ④. The motor is on top. The nuts of **hardware** Ⓢ④ should be on the north side. Put the plastic washers of **hardware** Ⓢ④ between the **azimuth linear actuator seat** ⑪ and **azimuth linear**

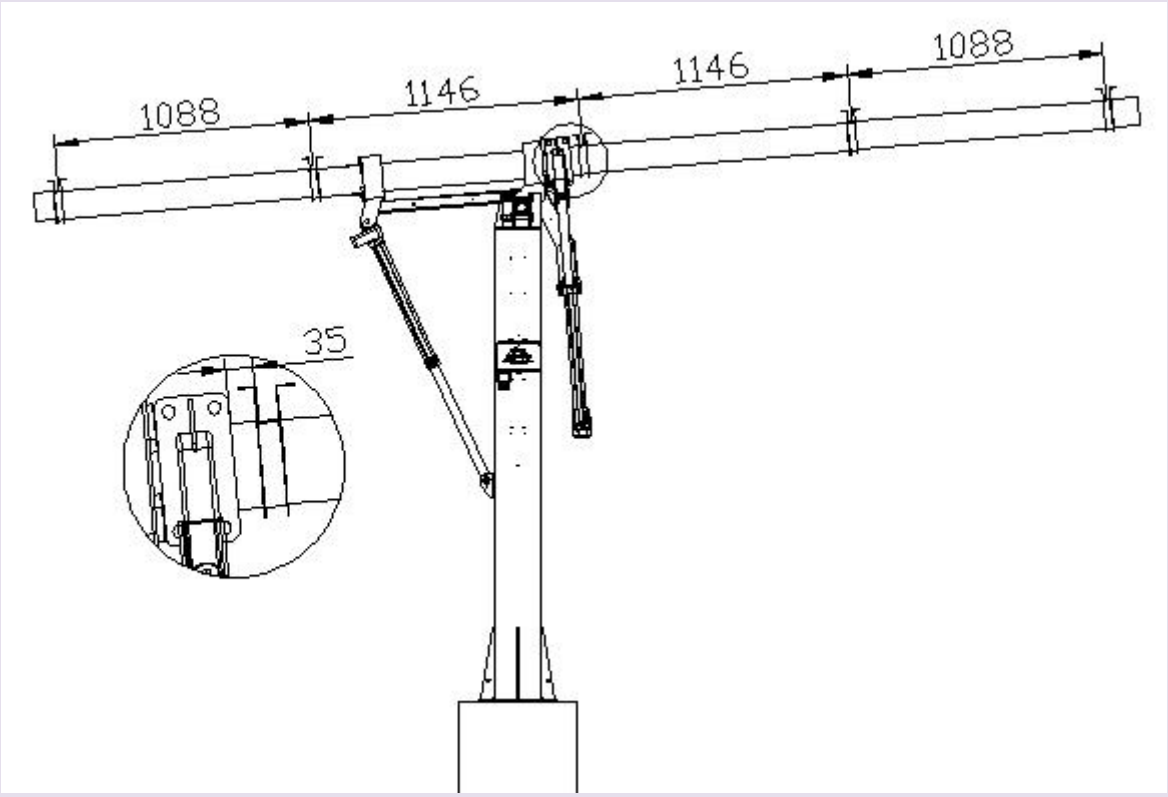
actuator ⑫ . Fix **azimuth linear actuator** ⑪ to **swing arm** ④ with **hardware** Ⓢ6 , the split pin of **hardware** Ⓢ6 should at the south side of **swing arm**, split the split pin. Adjust the position of **swing arm** ④ and **swing arm** ⑤ **fixing plate slightly**, **make the linear actuator at the center position of swing arm**.



6.5 Installation of U-shaped Beam & Inclined strut

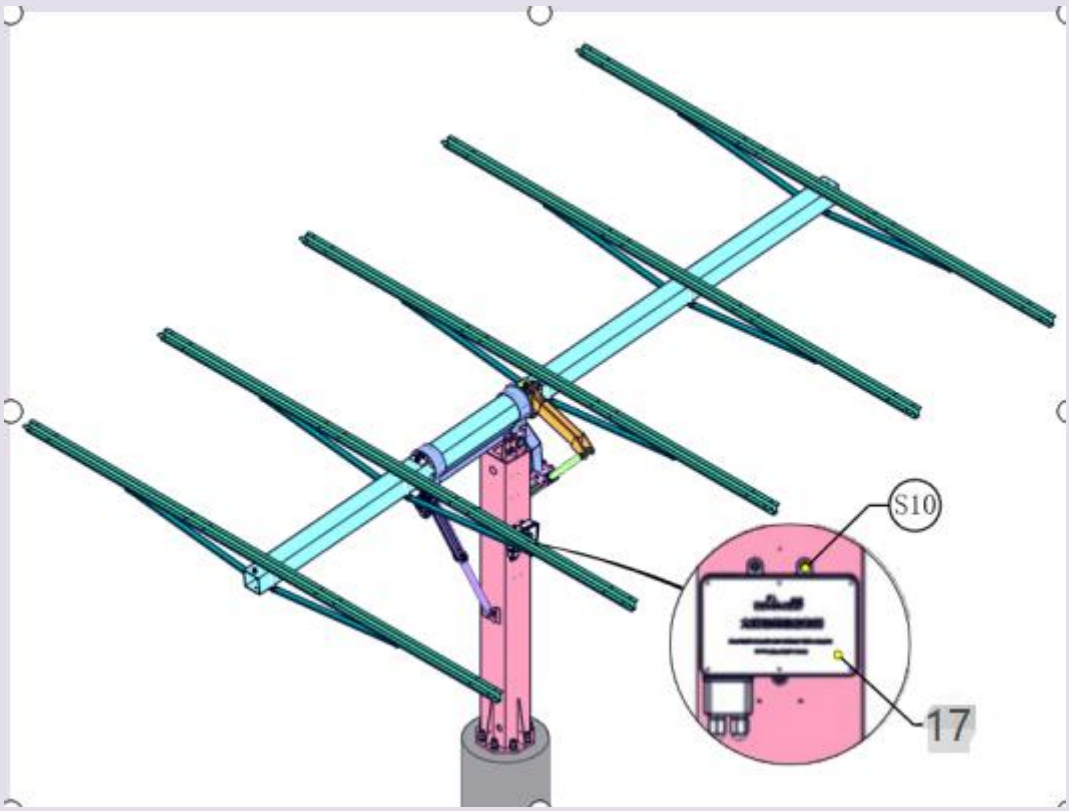
Fix the first **supporting beams** ⑬ and **Inclined strut** ⑭ at the **north** side of **L-shaped bracket** with **hardware** Ⓢ7 & Ⓢ8 , the rectangular plate of **hardware** Ⓢ8 shall be inside the **supporting beams**, leave 35**mm** space between the **supporting beam** and **plastic bearing limit** (as shown in the drawing). Then install other **supporting beams** and **Inclined strut** as distance in following drawing. Then install a M12*30 bolt of hardware Ⓢ8 at the south end of **center beam** for anti-slip purpose.





6.6 Installation of Control Unit

Fix the**control unit** ⑰ on the **vertical pole** with **hardware** ⑩ . The **vertical pole** is equipped with ϕ 3. Seal the control box after wiring.



6.7 Connect Control Unit Circuit

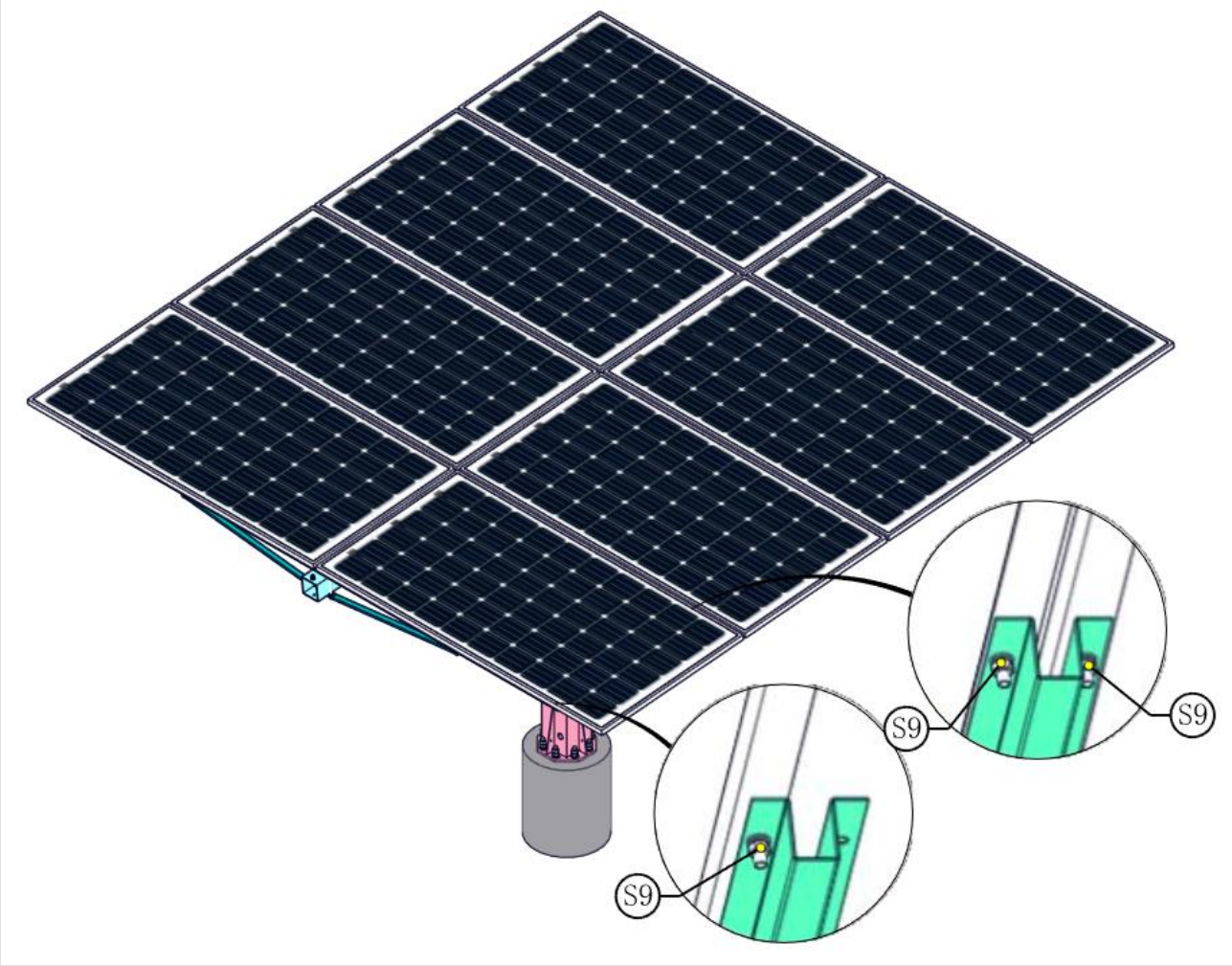
Using A/C power supply

Connect azimuth motor cable (the **long** one) with the motor on azimuth linear actuator, connect elevation motor cable (the **short** one) with the motor on elevation linear actuator. Run A/C power from the back of the driving system, and connect the two wires to the **power connector**. Use corrugated pipe and pipe clamp to fix the azimuth motor cable onto the vertical pole and L-shaped bracket, there are reserved small fixing holes on vertical pole and L-shaped bracket.

6.8 Installation of Solar Panels

To facilitate the installation of solar panels, installers can supply power to the control unit, insert the controller panels on the control box, press manual button, then press confirm button, then press west button to adjust the structure close to the flat position in east-west, it will stop rotating by pressing west button again, then press north button to adjust the structure close to flat position (It can lean slightly to the south), it will stop rotating by pressing north button again. Cut off the power after the adjustment.

Each solar panel is fixed with 6 sets of bolts, and connected with Inclined strut at both ends with bolt kits ⑲ (including double glass edge pressing blocks); The solar panel are connected with the three Inclined struts at the middle with bolt kits ⑲



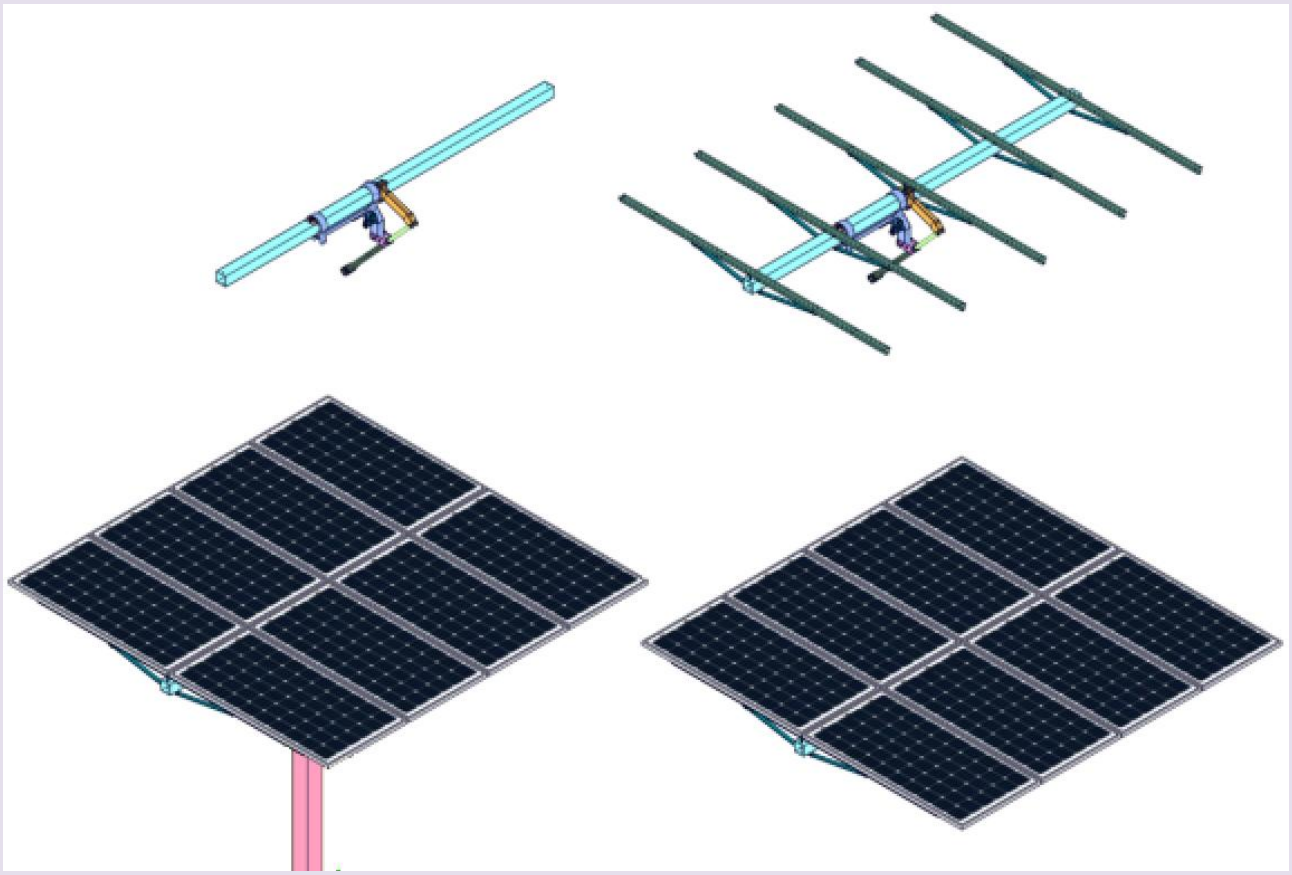
Note: after finished the installation of solar panels, please lock all of the connection screws.

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.

VII.Crane Hoisting

If there is small crane equipped at the installation site, including the L-shaped bracket, azimuth linear actuator, frames and solar panels can be assembled in

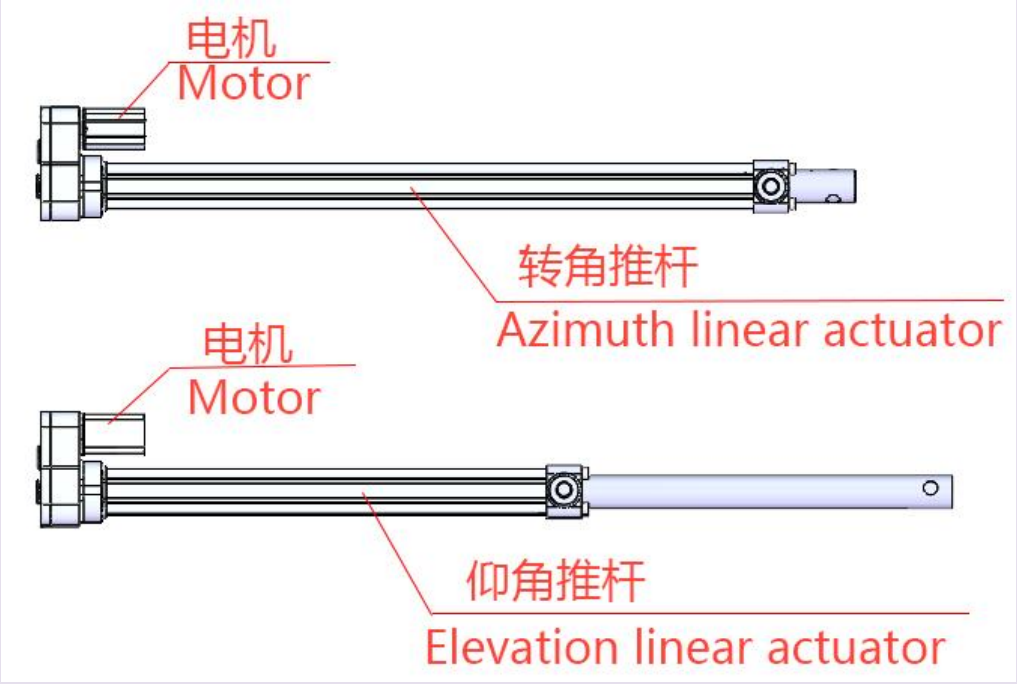
advance, then hoist it onto vertical pole ① directly, then following previous steps of 5.3 to fix the **L-shaped bracket** and **elevation linear actuator**.



VIII. Control unit debugging

8.1 Introduction to control unit components

8.1.1 control unit structure



8.1.2 Control box

8.2 Debugging

8.2.1

1.Confirm that there are no obstacles within the tracking range of all tracking systems, and the tracking system will work during commissioning;

2. The power supply plug of the control drive system has been correctly connected, and the plugs of the motor and the control system are correctly connected.

8.2.2

Control Unit Debugging

Supply the A/C power to all of the driving systems in one project, the controller will automatically start after 5 minutes, and the host control unit will download GPS data automatically (need about 1 - 10 minutes), then the system will rotate to east or west and hit the angle limit position, then it will rotate to north or south and hit the angle limit position, then it will wait for a while and go to the right position automatically. The slave driving systems will follow the movement of host driving system.

IX. Daily operation and maintenance - Important!

9.1 Regular inspection and maintenance

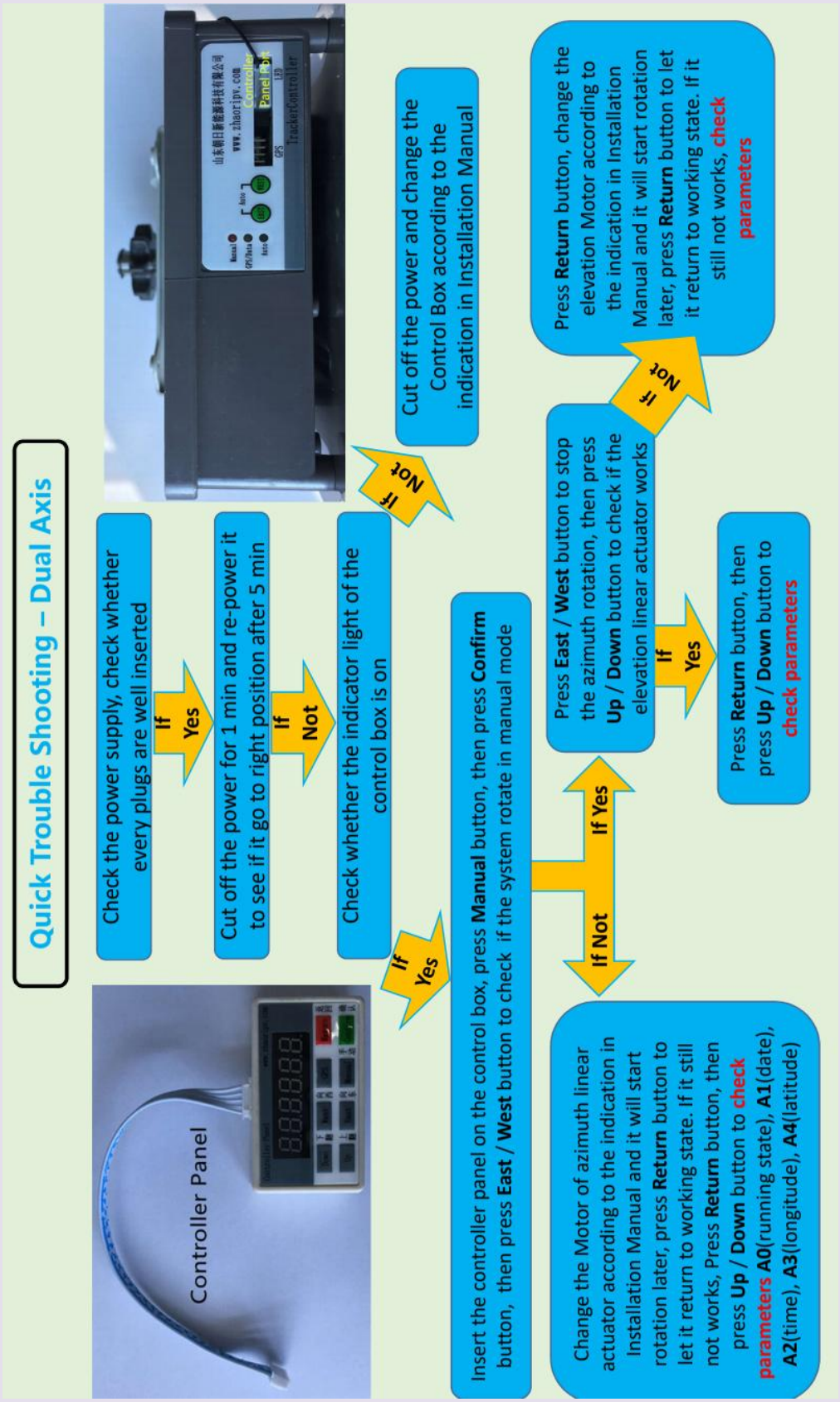
1. In order to discover potential fault timely, improve the system operation reliability, regular inspection shall be not less than once for every six months.

2. After bad weather like more than force 6 strong winds, 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.

9.2 Inspection items 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 crack or 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. If cracks appear, consult with factory for solutions.
Wire connection in driving box	Check whether have loosed wire connection	If there is loosed wire connection, need re-connect it or replace the plugs.

X. Quick trouble shooting



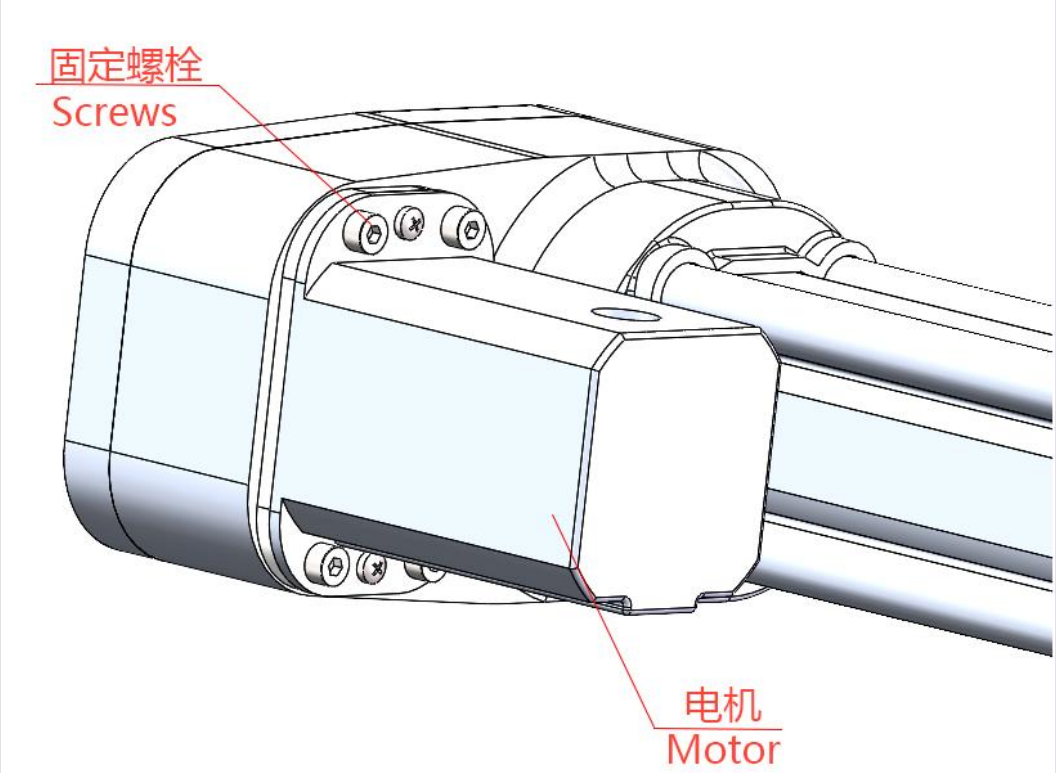
Please contact our customer service staff for situation not easy to judged and solved.

XI. 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.

11.1 Gear motor replacement

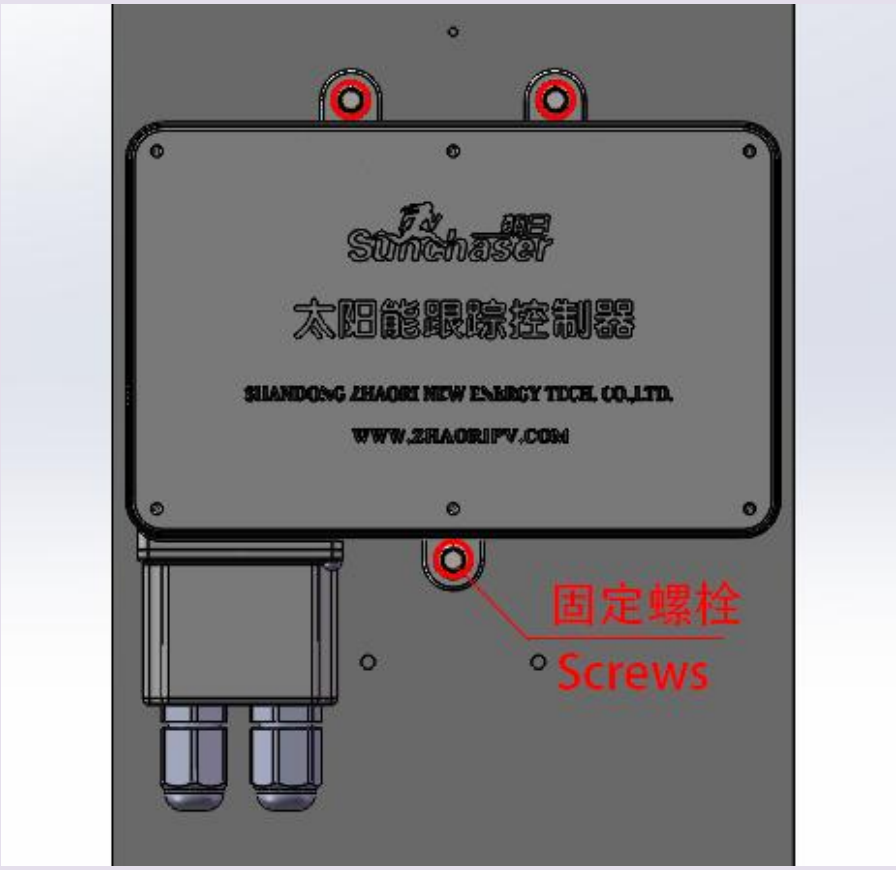
Unplug the gear motor plug, unscrew four fixing screws, take off the gear motor, then fix a new gear motor with fixing screws, plug in the motor plug.



11.2 Control box replacement

Step 1: Open the power cord cover and remove the power cord cover.

Step 2: After power off, remove the power supply of the control box and disconnect



Step 3: Loosen the fixing bolts between the control box and the column, and remove the control box from the column.

Step 4: Fix the new control box with bolts, plug in the corresponding connector, and install the power cable cover of the control box.