

POWERNICE

Album Frame

POWERNICE

Album Frame

OUR AIM

TO SERVE AS OUR CORE FOUNDATION

TO SURVIVE BY QUALITY

TO DEVELOP THRU INNOVATION

SMART WISDOM
&
TAILORED SOLUTIONS

Contact:

CHINA(Mainland)
Powernice Intelligent Technology Co., Ltd
Addr: No. 11, Industrial Road, Tutang Village, Changping Town, Dongguan, Guangdong, China
Tel: +86 769-81091048
Fax: +86 769-83820895
E-mail: Nedved@chn-powernice.com
Web: www.chn-powernice.com

USA
Addr: 3859 S. Valley View Blvd., Suite 2 - 316 Las Vegas, NV 89103
E-mail: Davis@chn-powernice.com

HK
Addr: Unit 5,27/F.,Richmond Comm.Bldg.,Mongkok,Kowloon,HONG KONG
E-mail: Daniel@chn-powernice.com

ADVANCED DEVELOPMENT

PRODUCTION

TESTING FACILITIES

AND

EQUIPMENT

Part 01 Company Profile

POWERNICE

Powernice originated in 2002 and began to develop electromechanical transmission products. Until now, various reliable products have been applied all over the world, with advanced and stable technology to improve industrial production efficiency and improve human living environment. In 2017, it has a development and production area of 6,500 square meters in Guangdong, China, and has a variety of advanced development, production, testing facilities and equipment.

Powernice has offices in Dongguan, China, Las Vegas, USA and Hong Kong, China to serve a global customer base.

Powernice has five core divisions, each of which is independently formed and cross-worked with each other to ensure efficiency and quality as the top priority. This also will ensure that customers in all areas will always be served by a team that possess extensive experience.

Powernice is praising smart wisdom and tailored solutions for every customer. From research and development design, sample trial production, material management and control, mass production, after-sales service, iterative upgrade, etc., consistently take off with the growth of customers. Our aim: to serve as our core foundation, to survive by quality, to develop thru innovation!

Part 02 The benefits of Using POWERNICE Electric Actuators

First, the advantages of POWERNICE electric actuators

Linear motion is mainly divided into: electric linear motion, hydraulic linear motion, and pneumatic linear motion.

- 1 POWERNICE electric actuators are integrated into one, the performance is far superior to the traditional hydraulic system and pneumatic system.
- 2 Compact design, convenient installation, eliminating the shortage of applications such as pumps and hoses.
- 3 Value for money, efficient use, almost zero maintenance required, will be your biggest cost savings.
- 4 Our positioning feedback is accurate, POWERNICE electric actuator and control system docking accurately in place.
- 5 POWERNICE electric actuators have low energy consumption and no risk of harmful hydraulic oil leakage, and truly achieve low carbon environmental protection.



Second, the benefits of using POWERNICE electric actuators

Cost reduction:

- 1 The cost of electric actuators is lower than that of hydraulic and pneumatic systems of the same function.
- 2 With the same function, installing an electric linear actuator is faster and more convenient than installing multiple hydraulic and pneumatic components.
- 3 The commissioning of the electric linear actuator is faster and more predictable than the power variation, temperature variation and nonlinear performance curve when configuring the hydraulic system and its components.
- 4 The hydraulic system requires fluid replacement, leak repair and other routine maintenance, while the electric linear actuator is maintenance-free.
- 5 Avoid environmental problems and costs associated with hydraulic fluid leakage and fluid handling.

Increase productivity and efficiency

- 1 Improve the control of the key operations of the machine by:
 - a. a variety of digital and analog feedback options
 - b. fixed and programmable limit switches for "teaching and repeating" positioning
 - c. low-voltage switch option can directly establish a connection with the programmable PC/PLC controller
 - d. pulse width modulation for shift control
- 2 Excellent precision and repeatability
connect and automatically synchronize the process
- 3 Keep workers away from dangerous sites with convenient remote control to increase safety and reduce costs

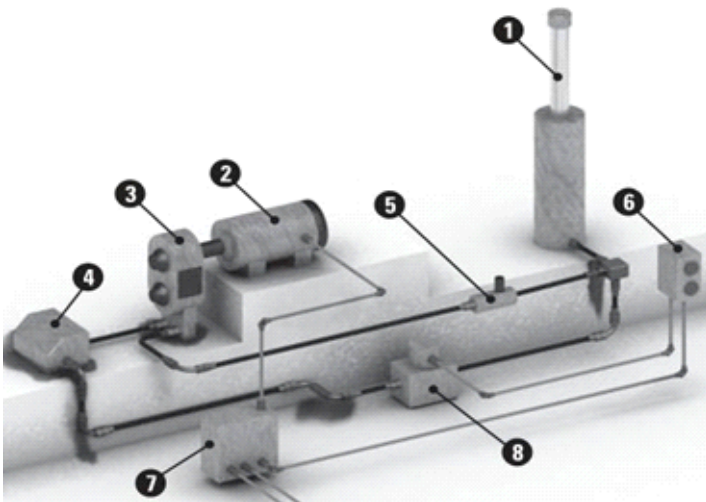


Example: Comparison of hydraulic linear motion

Using electric linear actuators instead of hydraulic or pneumatic cylinders simplifies installation and reduces equipment size, reduces control, reduces energy costs, improves accuracy, reduces maintenance and noise, and creates a cleaner and healthier environment.

Hydraulic system

- 1 hydraulic cylinder
- 2 hydraulic pump motor
- 3 hydraulic pump
- 4 storage tank
- 5 check valve
- 6 operating the button box
- 7 the relay box
- 8 pressure relief valve



This simple electric actuator system ensures continuous operation in both directions. It also provides additional features such as electronically calculated displacement, end-of-travel limit switches, clutch protection, overload protection and self-locking in the event of a power outage. Another advantage of this system is that it is easy to work with industrial systems or vehicles. Other control systems commonly used in the integration, such as PLCs, microcontrollers, computers or simple relay systems.



Hydraulic system

- 1 electric actuator
- 2 power supply
- 3 switch

Part 03 | Product Application

Wide application of POWERNICE electric actuators

01 Special vehicle and ship industry

Electric actuators can be used in agriculture, construction, sanitation, mining, afforestation, road engineering, railway equipment and the marine industry. They are used to control seats, guards, doors, covers, balers, conductive frames, sprayers, valves and Many other devices.

02 Meadow and garden

Electric actuators can be used in lawn mowers, golf carts, garden tractors, cleaners, lifters, and other functional vehicles.

They are used to control conveyor belts, adjustable work surfaces, and opening and closing of hatches, doors and locks. And cutting, packaging, labeling, scanning or printing machines.

03 Health and wellness

Electric actuators can be used for multi-purpose medical beds, disabled vehicles and wheelchairs to locate patients or equipment. Other applications include hospital equipment and gym exercise equipment.

04 Office, home and entertainment equipment

Electric actuators can be used in homes, offices and entertainment venues for automatic doors, lifts, garage doors, gates, satellite receivers, beds, lounge chairs, adjustable desks, arcade games, vending machines, theatre/TV/movie props, and Theme parks, etc.

05 Photovoltaic solar power tracking system

The electric actuator can be used in a photovoltaic solar panel tracking system with a controller to push the bracket mechanism to keep the panel always perpendicular to the sun.

APPLICATION

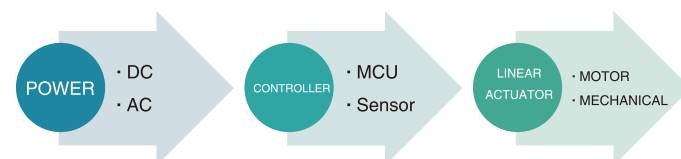
Part 04 | Flat single axis tracking controller

► Flat single axis tracking controller introduction

The flat single-axis tracking controller is a horizontal single-axis dedicated controller used in the solar PV industry. The controller uses the astronomical calendar method to calculate the solar motion trajectory algorithm and thus the motion posture of the bracket in real time; and by combining the angle sensor device to detect the real-time angle information of the bracket, and ultimately sends a rotation command to the motor for execution. The rotation of the motor realizes the adjustment of the bracket angle, and the system tracks the sun in real time, with a control precision within 2 degrees.



The input power of the controller is DC24V/AC AC220V, the output is connected to a 24V DC motor. The DC motor is built in with the linear electric push rod, the length of the electric push rod can be adjusted to realize the change of the bracket angle, thereby integrating the controller and the entire system together.



► Easy to install

The controller is integrated with the push rod. The controller requires 4 mounting holes in advance, which can be directly fixed to the rotating shaft of the bracket. The whole field operation team only needs to install the push rod and the fixed controller in two steps, without the need of connecting cables or other additional work.



► High reliability

The controller has a water protection rating of up to IP67 with the highest waterproof and dustproof standard in the industry. The product is also designed with minimal environmental impact as one of the primary considerations. It can also adapt to severe cold and heat temperature, as well as in other extreme environments such as desert and places with high humidity.



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► Intelligent monitoring

The controller provides real-time digital communication interface, it communicates with the power station monitoring system through RS485 and wireless 433MHZ, which provides real-time feedback to track the working status of the system, the information of the bracket movement angle, as well as the ambient temperature of the site.

The controller adopts the standard industrial communication protocol Modbus, which can be quickly integrated into the existing SCADA operation and maintenance monitoring system, enabling real-time monitoring of error information 24/7.

► Main technical parameters list

Tracker type	Single-axis photovoltaic / trough light heat
Tracking form	Astronomical + angle feedback
Tracking range (degrees)	45/52/60/70
Tracking accuracy (degrees)	0.2/0.5/2 Adjustable
Power supply	Solar module (DC)
Motor type	DC
Output Power	240W
Execution method	Linear actuator
Working wind speed (3S)	72kmph - Adjustable
Maximum wind speed (3S)	169kmph - Adjustable
Intelligent tracking mode	stand by
Reverse tracking	stand by
Night mode	stand by
Gale mode	stand by
Snow pattern	stand by
Self-cleaning mode	stand by
Remote mode	stand by
Communication method	Wired/wireless
Protocol Modbus	



▲ Main technical parameters list

► Example



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Part 04 | Product Introduction



Photovoltaics



TECHNICAL PARAMETERS

Voltage of motor	24V DC
Maximum load	15000N
Max Static Load	55000N
Speed Range	1.35~1.8mm/s
Current Range	0.6~6.5Amp
Standard Stroke	300~1000mm(customizable)
Retracted Length	≥ 100mm(customizable)
Protection Class	IP66-IP67
Other protection	Anti-corrosion, UV protection
Temperature Range	-45℃~+75℃
Limit switches	Included
Install connector	universal joint
Cable joint	IP67 Withstand voltage2500V
Mechanical Life/Guarantee(Y)	>25/5 (Y)
Certificate	CE UL ROHS FCC TUV

TECHNICAL PARAMETERS

Voltage of motor	24V DC
Maximum load	21000N
Max Static Load	65000N
Speed Range	1.35~1.8mm/s
Current Range	0.6~6.5Amp
Standard Stroke	300~1000mm(customizable)
Retracted Length	≥ 100mm(customizable)
Protection Class	IP66-IP67
Other protection	Anti-corrosion, UV protection
Temperature Range	-45℃~+75℃
Limit switches	Included
Install connector	universal joint
Cable joint	IP67 Withstand voltage2500V
Mechanical Life/Guarantee(Y)	>25/5 (Y)
Certificate	CE UL ROHS FCC TUV



Photovoltaics



Part 04 | Product Introduction



Photovoltaics



TECHNICAL PARAMETERS

Voltage of motor	24V DC
Maximum load	30000N
Max Static Load	110000N
Speed Range	1.22~1.6mm/s
Current Range	0.6~8.5Amp
Standard Stroke	300~1000mm(customizable)
Retracted Length	≥ 100mm(customizable)
Protection Class	IP66-IP67
Other protection	Anti-corrosion, UV protection
Temperature Range	-45℃~+75℃
Limit switches	Included
Install connector	universal joint
Cable joint	IP67 Withstand voltage2500V
Mechanical Life/Guarantee(Y)	>25/5 (Y)
Certificate	CE UL ROHS FCC TUV

TECHNICAL PARAMETERS

Voltage of motor	24V DC
Maximum load	35000N
Max Static Load	150000N
Speed Range	1.22~1.6mm/s
Current Range	0.6~8.5Amp
Standard Stroke	300~1000mm(customizable)
Retracted Length	≥ 100mm(customizable)
Protection Class	IP66-IP67
Other protection	Anti-corrosion, UV protection
Temperature Range	-45℃~+75℃
Limit switches	Included
Install connector	universal joint
Cable joint	IP67 Withstand voltage2500V
Mechanical Life/Guarantee(Y)	>25/5 (Y)
Certificate	CE UL ROHS FCC TUV



Photovoltaics



Part 04 | Product Introduction



Photovoltaics



TECHNICAL PARAMETERS

Voltage of motor	24V DC
Maximum load	40000N
Max Static Load	150000N
Speed Range	1.22~1.6mm/s
Current Range	0.6~10.5Amp
Standard Stroke	300~1000mm(customizable)
Retracted Length	≥ 100mm(customizable)
Protection Class	IP66-IP67
Other protection	Anti-corrosion, UV protection
Temperature Range	-45℃~+75℃
Limit switches	Included
Install connector	universal joint
Cable joint	IP67 Withstand voltage2500V
Mechanical Life/Guarantee(Y)	>25/5 (Y)
Certificate	CE UL ROHS FCC TUV

TECHNICAL PARAMETERS

Voltage of motor	24V DC
Maximum load	50000N
Max Static Load	170000N
Speed Range	1.22~1.6mm/s
Current Range	0.6~15Amp
Standard Stroke	300~1000mm(customizable)
Retracted Length	≥ 100mm(customizable)
Protection Class	IP66-IP67
Other protection	Anti-corrosion, UV protection
Temperature Range	-45℃~+75℃
Limit switches	Included
Install connector	universal joint
Cable joint	IP67 Withstand voltage2500V
Mechanical Life/Guarantee(Y)	>25/5 (Y)
Certificate	CE UL ROHS FCC TUV



Photovoltaics



Part 04 | Product Introduction



Photothermal
power
generation



▲ TECHNICAL PARAMETERS

Thrust	≥ 6000N
Speed	≤ 4mm/s
Stroke	200-1000mm
Temperature	-45℃~70℃
Precision	≤0.2mm
Self-locking	15000N
Protection	IP66
Anticorrosion	1000h

▲ TECHNICAL PARAMETERS

Thrust	≥35000N
Speed	≤1.5mm/s
Stroke	200-1000mm
Temperature	-45℃~70℃
Precision	≤0.5mm
Self-locking	120000N
Protection	IP66
Anticorrosion	1000h

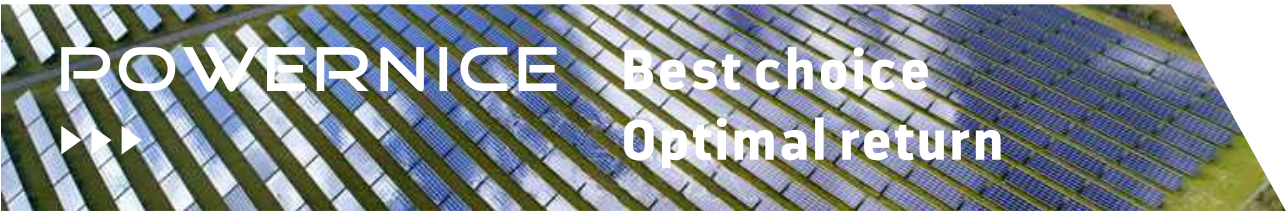


Photothermal
power
generation



Part 05

Financial Analysis of Three Tracking Systems
for Photovoltaic Power Generation



01

System introduction

- System 1 is the type of operation of each tracker table as a stand-alone drive unit (single-column system).
The battery is charged using a PV solar module that operates a linear actuator (POWERNICE) driven by a DC motor.
- System 2 is a type in which each tracker table operates as a stand-alone drive unit (single-column system).
The battery is charged using a PV solar module that operates a rotary drive driven by a DC motor.
- System 3 is a central drive (linkage system) design in which multiple tracker tables are driven by a single large drive that is coupled by a rotary power transmission.

02

Power generation data analysis

Through in-depth study of the technical characteristics of each system, as well as simulation analysis of the risks associated with component failure.

The end result is a relative financial analysis of the three system types through energy standardization costs.

Data sheet 1

System 1 has the highest power output of all systems. This is because System 1 has the highest module density resulting in the farthest line distance, so there is more time for the sun below the optimal angle.

Tracking method	System 1	System 2	System 3
Power generation / year / 1Mwh	124,227	123,520	121,155

03

Financial data analysis

Data sheet 2

Maintenance cost	System 1	System 2	System 3
Maintenance cost	\$3,732,775	\$8,754,975	\$5,344,556
System 1 saves money compared to System 2		\$5,022,220	
System 1 saves money compared to System 3			\$1,611,781

System 1 has the lowest overall operating and maintenance costs:

1. Due to the combination of the highest ground clearance, System 1 has the lowest mowing cost (reduced cutting frequency) and easy cutting of the grass (no rotary drive, making the machine work more efficiently in the bracket)
2. System 1 has lower equipment operating and maintenance costs, is an independent maintenance-free drive system and requires very low maintenance of batteries with long life.

Therefore, System 1 exhibits the best (highest) return on investment and the best (lowest) average cost among the three.

Data sheet 3

Pre-tax income	System 1	System 2	System 3
Unsubsidized income	\$17,971,995	\$12,446,695	\$13,336,806
System 1 saves money compared to System 2		\$5,525,300	
System 1 saves money compared to System 3			\$4,635,189

Data sheet 4

Average energy cost	System 1	System 2	System 3
Average 30 years of service life (\$/Mwh)	\$43.27	\$44.78	\$44.82
System 1 saves money compared to System 2		\$1.51	
System 1 saves money compared to System 3			\$1.55

Linear tracker and rotary tracker comparision

GENIUS TRACKER™

ROE: 19.42%

25ft Row Spacing
[7.62 m]
Energy Production: 4,525 MWh/yr
System Size = 2,545 MW DC

OPTIMAL POWER PRODUCTION ANGLES

BACKTRACKING TO AVOID SHADOWS ON MODULES: POWER PRODUCTION IS REDUCED

COMPETITOR CENTRAL DRIVE TRACKER

ROE: 14.43%

14ft Row Spacing
[4.27 m]
Energy Production: 4,320 MWh/yr
System Size = 2,545 MW DC

Summary:

It is recommended to use a high-quality DC linear drive photovoltaic tracking power generation method to achieve the highest return on investment.

Part 06

POWERNICE Electric Actuator Application Analysis Worksheet

Date		Company Name	
Address		Contact	
Telephone		Job	
Department		Fax	
Website		e-mail	

Application details and workplace _____

1 Motor arrangement of the push rod

☐ The motor is perpendicular to the push rod

☐ The motor is parallel with the push rod

☐ The motor is coaxial with the push rod

2 axial total load

	Dynamic load (kg)	Static load (kg)
Push		
Pull		

3 Stroke length_____mm

Lifting speed _____mm/s

4 Working load (% of time spent in 10 minutes)

☐ Work load ≤25% ☐ Work load>50%

☐ 25%<Work load ≤50% Number of cycles per 24 hours: _____

5 Screw classification

☐ Trapezoidal screw electric push rod

☐ Ball screw electric push rod

6 Is there a self-locking requirement? ☐ Yes ☐ No

7 Do you need to run without rotation? ☐ Yes ☐ No

8 Motor classification

☐ Single phase AC motor ☐ DC 24V

☐ DC motor 12V

9 Operating temperature _____℃ Working humidity_____ %

Special working environment _____

10 Other options

☐ Limit switch ☐ Encoder ☐ Potentiometer

☐ Rotation level ☐ Clutch

11 Detailed application (where and how to use the device) _____

12 Required quantity _____

Annual demand quantity _____

13 For special requirements, please provide detailed drawings