

Comparison Table of Advantages - Electric Telescopic Poles (Robo Pole)

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Item	Newly developed electric screw type (RoboPole)	Hydraulic and pneumatic	Wire type (crane truck type)	Multi-stage pantograph type
Power source	Induction motor, DC motor, servo motor	Hydraulic/pneumatic pumps and tanks	Electric motor winch	Electric motor or hydraulic cylinder
Feed method	Multi-stage screw feed (reciprocating drive)	Single-acting cylinder	Wire winding system (single-acting)	Multi-stage pantograph system (reciprocating drive)
Simplicity of the device	This machine's motor is powered by a simple, reliable, and easy-to-use screw rotation transmission mechanism.	A separate hydraulic/pneumatic pump and tank system is required, making it complex.	The winch winds up each section of wire using pulleys, which is not a simple method.	Simple drive system using only the opening and closing of the pantograph base.
Control performance	Precise positioning and speed control possible using servo motor with screw feed.	Precise positioning and speed control is impossible.	Precise positioning and speed control is impossible due to wire stretching.	Due to the continuous links in the multi-stage pantograph mechanism, the deflection changes significantly depending on the opening and closing angle, making precise speed and position control difficult.
Operation	Reciprocating screw drive enables movement in all directions (single-axis robot actuator), with a maximum speed of 2 m/s (using a ball screw).	It is driven only in the upward direction and does not move downwards, instead falling due to its own weight.	Driven only in the upward direction; falls downward due to its own weight.	The pantograph base opens and closes to raise and lower (extend), but it sways and flexes considerably.
Installation direction	Can be installed vertically (up and down), suspended from the ceiling, diagonally, and horizontally in all directions.	Can only be installed in the vertical ascent and descent directions.	Can only be installed in the vertical ascent and descent directions.	Lifting and ceiling suspension devices are the main applications; lateral movement is unsuitable due to significant deflection.
Installation area	The pole itself requires only a small installation area.	Large area required for pole and pump/tank installation.	Installation area for the pole body and winch motor: Medium area	Large in both installation area and structure.
Handling and Maintenance	Motorized screw operation makes handling and maintenance easy.	Hydraulic and pneumatic pump tank Maintenance is complex due to oil management Requires replacement of packings/seals, etc.	The winch wire has reached the end of its lifespan and needs to be replaced.	Maintenance is easy.
Environmental performance	Environmentally friendly, powered solely by electricity, and suitable for cleanroom applications.	It uses oil, which is bad for the environment, and it cannot be used in a cleanroom.	Electrical power only.	Electrically operated pantographs have good environmental performance; hydraulic cylinders are not good for the environment.
Communication cables for cameras, measuring instruments, antennas, etc.	Communication cables can be installed inside the pole.	It is impossible to install communication cables inside the pipe.	Cables can be installed inside the pole.	Internal cable installation is possible.
Applicability	Robot arm lifting/lowering, X-Z-6 robots, measuring instrument cameras, lighting, antenna lifting and lowering, transport, cranes, parallel links, and other multi-purpose applications,combined with AGV.	Up and down movement only. It's a cylinder, not a robot actuator.	It only moves up and down, and its control performance is low in terms of accuracy as an actuator.	Used for vertical lifting and lowering; ceiling suspension is also possible. Horizontal installation is not possible due to excessive deflection.