



2026
Product Catalog







SHANDONG HIGH END
INTELLIGENT TECHNOLOGY CO.,LTD.

山东海恩德智能科技有限公司

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Company Profile >>>

-  Position: A leading domestic power robot company
-  Corporate philosophy: Integrity、 Pragmatism、 Innovation
-  Target: Professionalization、 Intelligitization
-  Mission: Promote the intelligent upgrading of equipment in the power industry



Shandong HIGH END Intelligent Technology Co., Ltd. located in Jinan, Shandong Province. It is a national high-tech enterprise in the field of power robots The company focuses on the research, development, manufacturing, and application of Insulator Inspect robot 、 Transmission Line Prevent-icing Robot 、 Transmission Line De-icing Robot 、 Broken Strand Repair Robot、 Overhead Transmission Line Net Sealing Robot、 UAV Carrying Tower Climbing Fall-Protection Device 、 UAV-Mounted Transmission Line Warning Device Installation Carrier.

While adhering to independent research and innovation and improving product quality, the company combines customers' pain points and market demands to provide complete intelligent solutions for the power industry.

Qualifications & Honors >>>



Product Introduction >>>

- Insulator Inspect Robot
- Airborne Insulator Inspect device
- Transmission Line Prevent-icing Robot
- Transmission Line De-icing Robot
- Transmission Line Broken Strand Repair Robot
- Overhead Transmission Line Net Sealing Robot
- UAV Carrying Tower Climbing Fall-Protection Device
- UAV Carrying Warning Device Installation Carrier



 海恩德智能
HED HIGH-END INTELLIGENCE

Insulator Inspect Robot

UAV-mounted

The drone-mounted insulator inspect robot consists of the robot body, drone mounting components, and a robot control terminal. During operation, the robot is precisely mounted onto the insulator string via the drone, performing high-voltage impact testing, insulation resistance inspecting, and visual defect inspection on the insulators. The entire process eliminates the need for manual tower climbing, ensuring both efficiency and safety. The robot control terminal boasts comprehensive functionality, supporting real-time display of insulator impact voltage and insulation resistance. It can store inspection data and insulator appearance videos, features real-time alarming for deteriorated insulators, and automatically generates and exports insulator status reports. This synchronizes real-time recording and full traceability of inspection data, providing a precise, convenient, and traceable intelligent solution for power inspection.



UAV-mounted Insulator Inspect Robot

Robot Control Terminal

Manually--mounted

The manually--mounted insulator inspect robot primarily consists of the robot body and the robot control terminal. The robot is capable of conducting high-voltage impact testing, insulation resistance testing, and appearance defect testing on insulators. The robot control terminal boasts comprehensive functions, supporting real-time display of insulator impact voltage and insulation resistance, storage of inspection data and insulator appearance videos, real-time alarming for deteriorated insulators, and the ability to automatically generate and export insulator status reports, achieving real-time recording and full traceability of inspection data simultaneously.

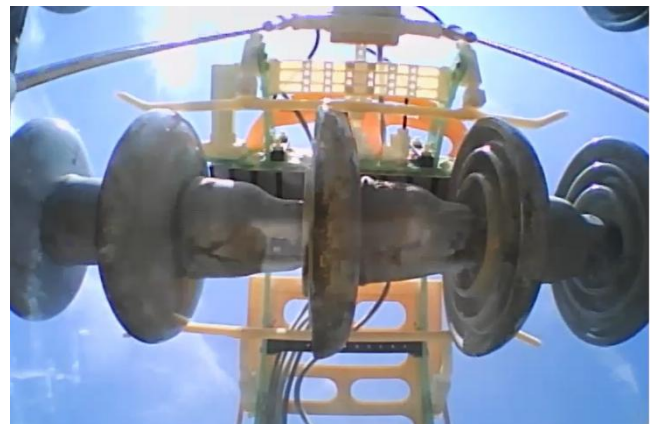
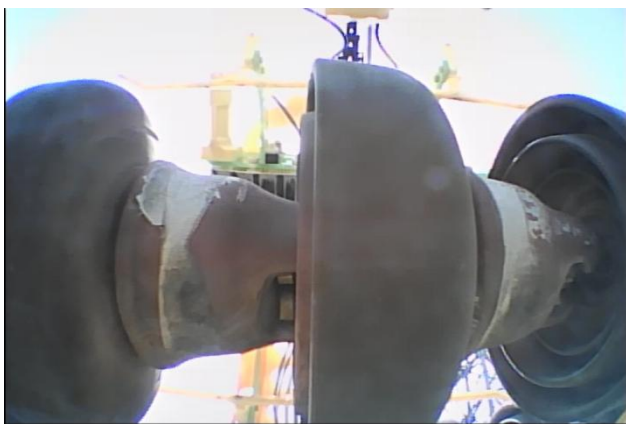
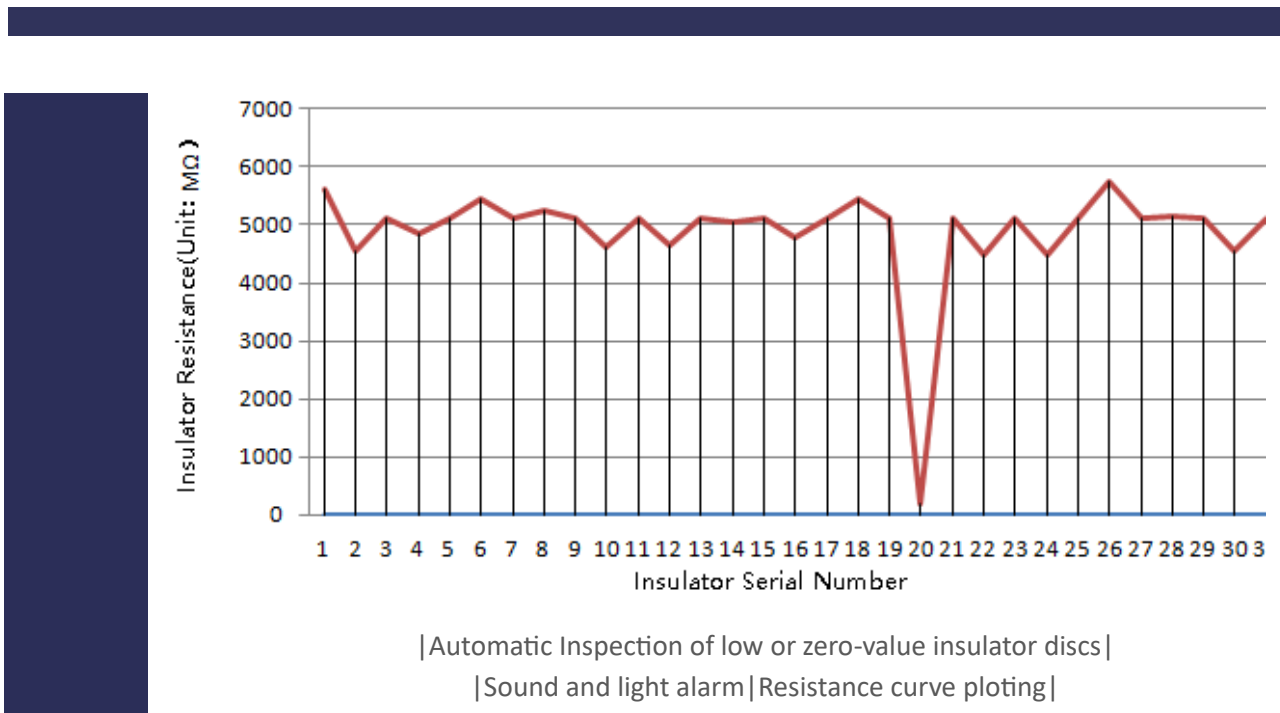


Manually-mounted Insulator Inspect Robot



Robot Control Terminal

Insulator Inspect Robot Inspection Items



Appearance Inspection

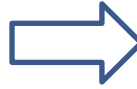
- [Insulator damage|Insulator crack]
- [Steel foot and steel cap connection status]
- [Contamination Flashover]

Insulator Inspect Robot VS Traditional Inspections

Traditional Inspection



Robot Inspection



- Complex operations, high labor intensity
- Insulated rods cannot reach insulator strings exceeding 5 meters

- The UAV-mounted version can complete the inspection without manual tower climbing
- Only one person is needed to climb the tower to install manually-mounted robot, which will automatically detect

- Can detect live lines up to a voltage level of 500kV

- Capable of live inspection of insulator strings on lines with voltage levels up to 1000kV (AC) and 1100kV (DC)

- Single testing item
- Live inspection can only detect distributed voltage and cannot perform resistance measurements

- Diverse inspection items
- High-voltage impact inspection, resistance inspection, appearance inspection

- Poor inspection accuracy
- Under live conditions, judging the state of insulator discs indirectly through distributed voltage is a qualitative assessment, often leading to misjudgments and missed inspections

- High inspection accuracy
- The system provides real-time display of insulator impulse voltage and insulation resistance, with a detection error within 1%. It features a real-time alarm function for deteriorated insulators, accurately determines the state of insulator pieces, and can promptly identify critically damaged insulator pieces

▪ Technical Indicators

Insulator Inspect Robot Parameters	
Technical Indicators	Robot Parameters
Dimension	470*370*(580-800)mm (drone-mounted) / 500*480*680mm (Manually-mounted)
Weight	4kg (drone-mounted) / 7.5kg (Manually-mounted)
Operating Duration	Continuous operating duration of the Robot \geq 8h
Remote Control Distance	Under unobstructed conditions 6 km
Walking Mechanism	Track-Type walking mechanism
Operational Capacity	High-voltage impact inspection; Resistance inspection; Appearance inspection
Operating Environment	AC 110kV-1000kV; DC \pm 400kV- \pm 1100kV
Applicable Insulators	Insulator Diameter: 260mm-420mm; Nominal Structure Height: 146-265mm Type: Glass insulators, Porcelain insulators; Insulator Shape: Bell jar insulators, Anti-pollution insulators, Straw hat insulators; Connection Form: Single link, Double link, Triple link, Quadruple link, Sextuple link, Octuple link
Moving Speed	\geq 130mm/s
Inspection Cycle	5s/piece
Inspect Impulse Voltage	45kV-80kV
Inspect Rated Charging Energy	\geq 5J
Inspection Resistance Range	0-9999M Ω
Inspection Error	\leq \pm 1%
Mode of Operation	Live Working Power Outage Working
Working Conditions	Relative Humidity: \leq 85%; Temperature: -20 $^{\circ}$ C-50 $^{\circ}$ C Atmospheric Pressure: 86KPa-106KPa
Storage Conditions	Relative Humidity: \leq 90%; Temperature: -40 $^{\circ}$ C-65 $^{\circ}$ C Atmospheric Pressure: 86KPa-106KPa
Inspection Report	China Electric Power Research Institute 1000kV Live Inspection Report
Robot Control Terminal Parameters	
Dimensions	250*160*90mm
Weight	1.6kg
Power Consumption	5W
Battery	12V, 5Ah
Functions	Insulator impulse voltage display, insulation resistance display, storage of insulator appearance video display, real-time alarm for deteriorated insulators, generation and export of insulator status reports
Video	Real-time insulator video display, recording, and playback
Remote Control Distance	Under unobstructed conditions 6 km

Inspection Report (Excerpt)



No: BA0500208



检验检测 TEST REPORT

样品名称: 绝缘子检测机器人
 生产单位: 山东海恩德智能科技有限公司
 委托单位: 山东海恩德智能科技有限公司
 检验检测类别: 委托

山东省产品质量检验研究院
 Shandong Institute for Product Quality Inspection

No: BA0500208-2025

山东省产品质量检验研究院 Shandong Institute for Product Quality Inspection 检验检测报告

样品名称	绝缘子检测机器人
委托单位	山东海恩德智能科技有限公司
生产单位	山东海恩德智能科技有限公司
委托单位地址	山东省济南市高新区凤凰路海信创智楼15层
抽样地点	/
抽样基数	/
样品数量	1台
样品描述和状态	外观完好, 无破损
检验检测环境	温度: 20.5℃; 湿度: 38%RH; 大气: 98.50kPa
检验检测依据	GB/T 17626.2-2018, GB/T 17626.1
判定依据	山东海恩德智能科技有限公司《绝缘子检测机器人》
检验检测要求	静电放电抗扰度试验、工频磁场抗
检验检测结论	该样品符合山东海恩德智能科技有限公司的要求。
备注	1、本报告含封面及封二, 符号“/” 2、检验检测地址: 山东省济南市

批准: 潘勇 审核: 陶
 日期: 2025-04-21 日期: 202

山东省产品质量检验研究院 Shandong Institute for Product Quality Inspection 检验检测报告 (续页)

No: BA0500208-2025

山东省产品质量检验研究院 Shandong Institute for Product Quality Inspection 检验检测报告 (续页)

共8页 第7页



China Electric Power Research Institute Test Report (Excerpt)

国家电网 STATE GRID
 中国电力科学研究院有限公司

绝缘子串检测机



(2) 绝缘子串及金具配置
 如图4所示, 试验选取型号为U420BP-I 双联绝缘子串用于试验。



U420BP-205D-1 型绝缘子参数见表2。
 表2 U420BP-205D-1 型污闪

型号	会称结构高度 H (mm)	会称直径 D (mm)	重量
U420BP-205D-1	205	380	

双联双串绝缘子串每串由 56 片 U420BP-I 型机器人的带电检测性能, 选取高压侧的模拟低阻值绝缘子。绝缘子与金具连接中型

试验变压器型号参数: YDTCW-6000kV
 4800kVA/10.5kV。
 高压绝缘电阻表: 额定电压: 25
 0.0-499.0MΩ, 500V 档 0.0-999MΩ, 1
 0.0-99.9GΩ, 5000V 档 0.0-1000GΩ。

2.3 试验试品与试品布置

(1) 绝缘子串检测机器人系统

该绝缘子串检测机器人系统型号规格为 ZH-ACHV, 由检测机器人、遥控数据接收器、视频图像接收终端 3 部分组成, 试品如图 3 所示。

山东省产品质量检验研究院 检验报告

No: BA0500446-2021

共6页 第4页

10 为 635kV 电压下视频截图。



图9 577kV 电压下机器人实时检测的视频截图



图10 635kV 电压下机器人实时检测

(7) 在试验过程中, 机器人操作系统正常, 1 片上下两塔倒塔, 完成检测后, 快速分离; 机器检测数据实时回传至地面显示终端; 视频图像可 (8) 绝缘子串检测机器人模拟绝缘子串表面 爬电等情况。

4 结论

本次试验针对绝缘子串检测机器人试品, 在

试验结果如下:
 (1) 绝缘子串检测机器人在 2.3 部 2 1000kV 交流高压输电线路中 (480kV)、检测绝缘、定位系统、检测数据回传功能正常。
 (2) 绝缘子串检测机器人在 2.3 部 2 1000kV 交流高压输电线路中 (480kV)、检测绝缘数据回传功能正常, 检测数据回传为 480kV、电压 25、0.0-99.9GΩ。
 (3) 绝缘子串检测机器人在 2.3 部 2 1000kV 交流高压输电线路中 (480kV)、检测绝缘数据回传功能正常, 检测数据回传为 480kV、电压 25、0.0-99.9GΩ。
 (4) 绝缘子串检测机器人在 2.3 部 2 1000kV 交流高压输电线路中, 检测数据回传至地面显示终端, 检测数据回传为 480kV、电压 25、0.0-99.9GΩ。
 (5) 绝缘子串检测机器人在 2.3 部 2 1000kV 交流高压输电线路中, 检测数据回传至地面显示终端, 检测数据回传为 480kV、电压 25、0.0-99.9GΩ。
 (6) 绝缘子串检测机器人在 2.3 部 2 1000kV 交流高压输电线路中, 检测数据回传至地面显示终端, 检测数据回传为 480kV、电压 25、0.0-99.9GΩ。

▪ Insulator Inspect Robot Operating Methods

UAV-mounted

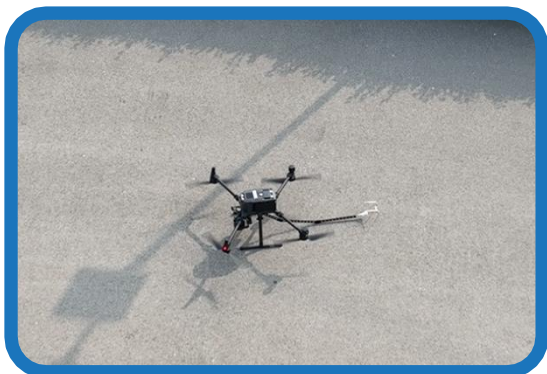
After the hanging hook is installed under the drone, the robot is lifted from the ground and installed onto the insulator string from the top down. The drone descends to a lower altitude to automatically release the hook and then returns to the ground. The robot activates its automatic inspection process. Once the inspection is completed, the drone retrieves the robot.



Take-off and ascend



Mounting the robot



Unhooking and landing

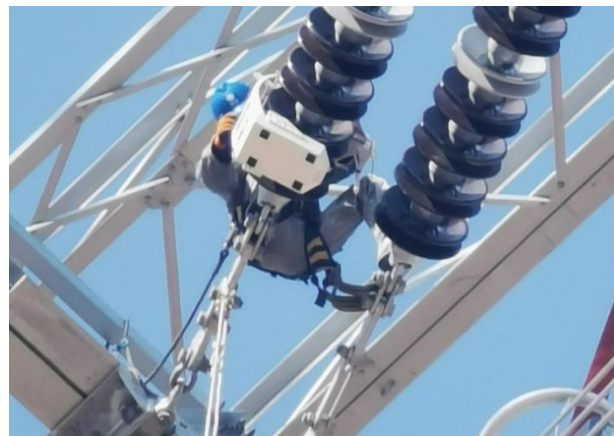
Manually-mounted

The worker carries insulating ropes and pulleys to climb the tower. Fix the pulley to the cross arm of the tower or the low-voltage side fittings of the insulator string and pass it through the transfer rope.

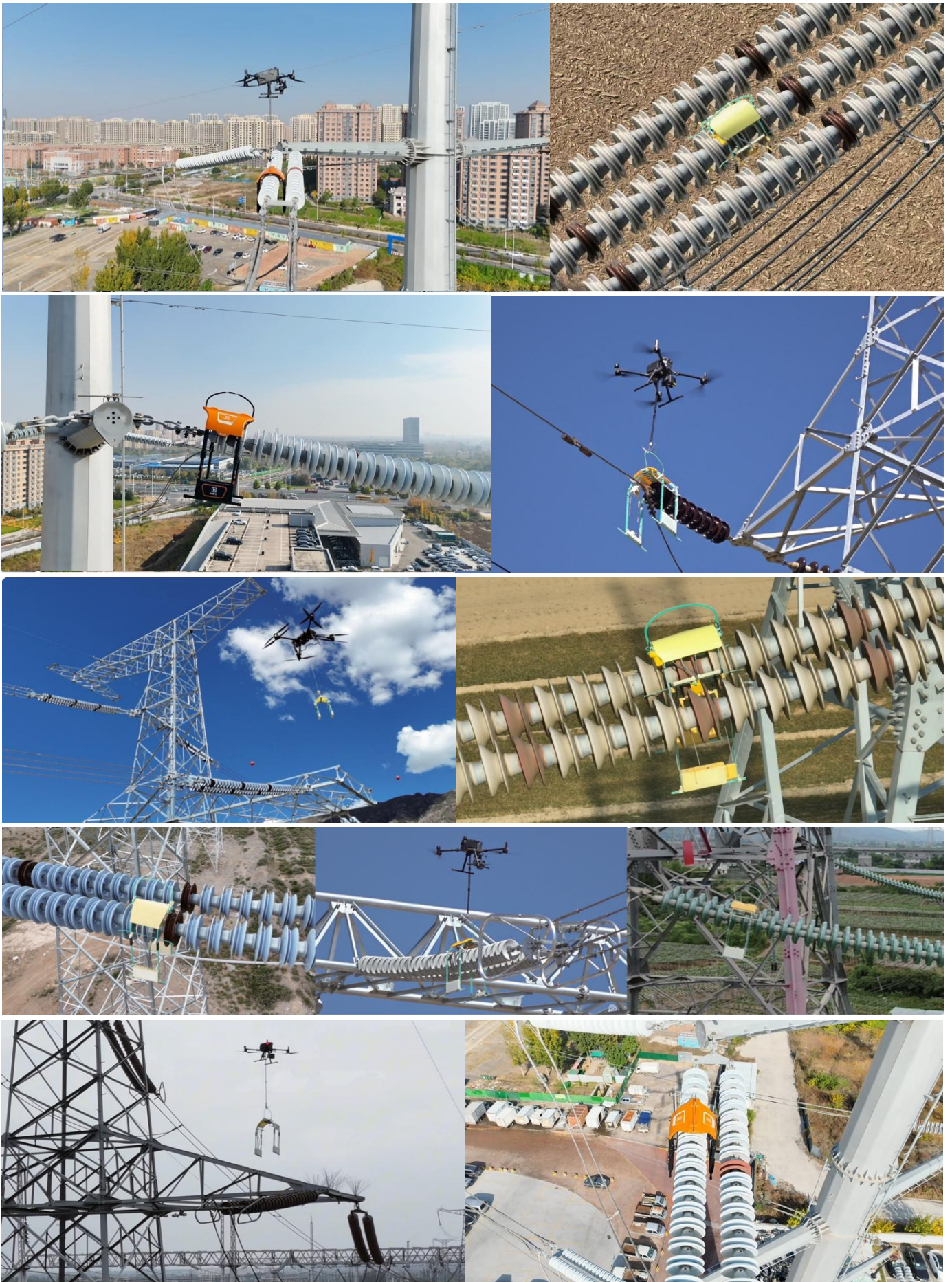


Attach the lock of the transmission rope to the lifting ring on the robot to mount or dismount the robot. During the operation, ensure that the robot maintains a certain safe insulating distance from the high-voltage power transmission lines to avoid contact with the tower, preventing damage to the robot and potential harm to personnel.

After the tower worker receives the robot, they hang it on an insulator near the tower. The robot has an overall hook shape, and the worker simply needs to insert the opening of the robot into the insulator string from the upper right side of the insulator string.



▪ Insulator Inspect Robot Application Cases





Airborne Insulator Inspect Device

- Work Environment** 35kV-220kV
- Work Methods** Live working | Power outage operation
- Work Capacity** High-voltage impact inspection; Resistance inspection
- Remote control distance** Under unobstructed conditions 6km
- Size/Weight** 1600*200*200mm/1.2kg



The airborne insulator inspect device mainly consists of an inspection device and a drone. When in use, the inspection device is installed under the drone, and the drone carries the inspection device into the air. The insulator resistance can be detected under power outage and live working conditions. The appearance of the inspection device is fork shaped, which can detect both suspension insulator strings and tension insulator strings. The drone camera can monitor and detect the device in real time, and can view real-time videos and record inspection data.



Inspection screen

▪ Technical Indicators

Airborne Insulator Inspect Device Parameters	
Technical Indicators	Inspecting Device Parameters
Dimension	1600*200*200mm
Weight	1.2kg
Operating Duration	≥8h
Remote Control Distance	Under unobstructed conditions 6km
Work Capacity	High-voltage impact inspection; Resistance inspection
Work Environment	35kV-220kV
Applicable Insulators	Insulator Diameter: 260mm-420mm; Nominal Structure Height: 146-265mm Type: Glass insulators, Porcelain insulators; Insulator Shape: Bell jar insulators, Anti-pollution insulators, Straw hat insulators; Connection Form: Single link, Double link, Triple link, Quadruple link, Sextuple link, Octuple link
Inspection Cycle	3s/piece
Inspect Impulse Voltage	45kV-80kV
Inspect Rated Charging Energy	≥5J
Inspection Resistance Range	0-9999MΩ
Inspection Error	≤±1%
Mode of Operation	Live Working Power Outage Working
Working Conditions	Relative Humidity: ≤85%; Temperature: -20°C-50°C Atmospheric Pressure: 86KPa-106KPa
Storage Conditions	Relative Humidity: ≤85%; Temperature: -20°C-50°C Atmospheric Pressure: 86KPa-106KPa

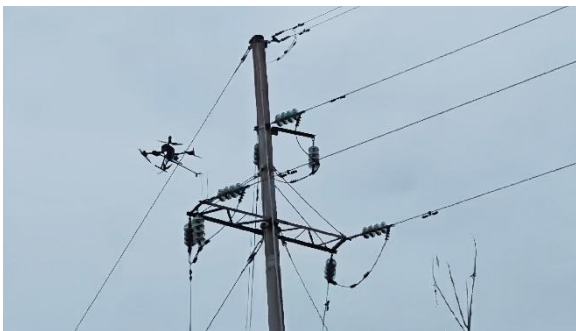
Airborne Insulator Inspect Device Application Cases



Airborne insulator inspect device



Airborne insulator inspect device take off



Inspecting tension insulator strings



Inspecting suspension insulator strings



Drone captured footage (tension string)



Drone captured footage (hanging string)

Transmission Line Prevent-icing Robot

UAV-mounted

Work Environment	≤220 kV line conductor and ground wire ; ≥500kV line grounding wire
Work Methods	Live working Power outage operation
Work Speed	500m/h
Spraying Thickness	0.1-0.5mm
Size	600*520*630mm (excluding handle)
Weight	19kg



The Prevent-icing Robot for drone mounting consists of a mounting device, a robot body, and a control terminal. The mounting device is compatible with various types of drones, which are used to install the robot on transmission lines. The robot carries anti-icing paint and travels along the lines, evenly spraying the paint on the surface of the lines. After the paint solidifies, it forms a protection to prevent the transmission lines from being severely damaged by ice disasters. The robot has a certain climbing ability and its running speed is adjustable; the paint supply device delivers the paint to the spraying mechanism and can precisely control the amount of paint supplied; the spraying mechanism is placed at the rear end of the robot and can adapt to different types of lines by replacing the inner core.

Manually-mounted

Work Environment	≤110 kV line conductor and ground wire ; ≥220kV line grounding wire
Work Methods	Live working Power outage operation
Work Speed	500m/h
Spraying Thickness	0.1-0.5mm
Size	550*300*450mm
Weight	16kg



The manually-mounted Transmission Line Prevent-icing Robot is mainly composed of a walking mechanism, an anti-icing material supply device, an anti-icing material spraying mechanism and a hoisting mechanism. The robot can be installed online via a high-altitude boom truck, or it can be manually hoisted online using a pulley block through a hoisting mechanism.。

▪ Features of the Transmission Line Prevent-icing Robot

-**Anti-Icing material spraying function:** Capable of completing the spraying of anti-icing materials for wires and ground wires, with uniform coating thickness controlled at around 0.2mm, without affecting the heat dissipation of the circuit.

-**Communication control function:** It can achieve remote control of anti-icing material spraying robot, control of travel speed, and on/off feeding.

-**Wireless Image transmission function :** Realize real-time image monitoring of the anti-icing material spraying operation and inspect the spraying effect of the anti-icing material.

-**Practical and compact structure:** Practical design easy for robots to go online and offline.



▪ Advantage comparison of the prevent-icing robot



- ✓ **Simple operation:** Low power consumption, available for construction at any time, preventing problems before they occur.
- ✓ **Long effective time:** Spraying once does not require repeated spraying within three years.
- ✓ **Wide range:** Rapid construction in heavy icing areas, covering large areas.
- ✓ **Safety:** Effectively prevent people from climbing the tower to remove ice in ice disaster weather.

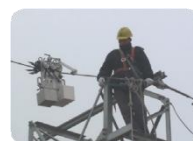
Vs



Laser Cannon De-Icing :
High power consumption,
small range



Flame Ice Removal :
Small range, poor effect



Robotic Mechanical De-Icing :
It is difficult and highly
dangerous to install robots on
iron towers after they have iced



Direct Current De-Icing :
Operation is complex and
energy consumption is high.

▪ Technical Indicators

Transmission Line Prevent-icing Robot Parameters	
Technical Indicators	Technical Parameters (UAV-mounted/Manually-mounted)
Dimensions	600*520*630mm(excluding handle)/550*300*450mm
Robot Weight	19kg/16kg
Robot Weight (with full material load)	29kg/21kg
Work Speed	500m/h
Climbing Angle	45°
Spraying Thickness	0.1-0.5mm
Continuous Operation Duration	3h(Can replace the battery)/2h(Can replace the battery)
Robot's Voltage Withstand	1000kV
Remote Control Distance	3km
Spraying Distance/ Material Consumption	About 50m/kg
Operating Environment	Live working Power outage operation

Anti-icing Material

Anti-icing Material have characteristics such as superhydrophobicity, self-cleaning, and anti condensation. Can be used for anti-icing of power equipment such as transmission lines, insulators, towers, and wind turbines. It does not affect the heat dissipation of power equipment, has no corrosion to lines and power equipment, isolates air and pollution, reduces power transmission energy consumption, and extends the service life of lines.





☑ Unique and durable anti-icing coating.

Excellent resistance to UV rays, moisture, wear, and corrosion.

Single-layer spraying, no primer needed (except for metal and polyethylene, where primer is recommended).

☑ 100% volume solid content, VOC-free.

Operates without the need for heating or external force factors.

Can be applied by brushing or rolling.

Drying and curing time of 24 hours or less.

☑ Performance data :

• Product Color	Yellow transparent and colorless transparent
• Finished Surface	Luster
• Components	3 part (A/B/C)
• Curing Mechanism	Chemical Reaction RT (Room Temperature)
• Volume solid content	100%
• Dry film thickness	125-250 μm (0.125-0.25mm)
• Theoretical coverage rate	4.4-6.6 m^2 /L

☑ Curing time (at 21°C or room temperature)

• Touch dry	2 hours
• Fully dry	10 hours
• Fully cured	1 day

☑ Storage temperature (Between 0°C and 20°C)

• Part A and Part B	Within 1 year after leaving the factory
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☑ Wear (ASTM D4060)

• 1 kg load/1000 cycles	Weight loss
• CS-17 wheel (a type of wheel used for measuring abrasion)	72mg
• Adhesion Reduction Factor (ARF)	25 or above

☑ Ultraviolet (UV) accelerated weathering

• ISO 16474-3	1 month
• QUV-A (Ultraviolet lamp) 60°C	336 hours
• 50°C water condensation	336 hours



▪ Anti-icing Material Parameter Indicators

Project	Basis	Indicators
Appearance	GB/T 19250-2013	The product is a uniform viscous body, free of gel and caking.
Nonvolatile Content	GB/T 1725-2007	≥45%
Drying Time (Surface Drying)	GB/T 1728-2020	≤2h
Drying Time (Practical)	GB/T 1728-2020	≤24h
Pencil Hardness (Abrasion)	GB/T 6739-2022	≤F
Impact Resistance	GB/T 1732-2020	50cm
Adhesion (Pull off Method)	GB/T 5210-2006	≥5MPa
Resistance to liquid media	GB/T 9274-1988	168h without any abnormalities
Alkali	GB/T 9265-2009	168h without any abnormalities
Adhesion	GB/T 9286-2021	≥130mm/s
Water Resistance	GB/T 1733-1993	≤level 1
Abrasion Performance	GB/T 1768-2006	0-9999MΩ
Contact Angle	GB/T 30447-2013	≥1000r
Self-cleaning Property	GB/T 30191-2013	≥level 1
Temperature Resistance	GB/T 17748	-60°C—120°C

▪ Anti-icing Material Inspection Report





中科检测技术服务有限公司
CAS Testing Technical Service Co., Ltd.

报告编号: KK24062503 日期: 20240615



检测报告



中科检测技术服务有限公司
CAS Testing Technical Services (GuangZhou) Co., Ltd.

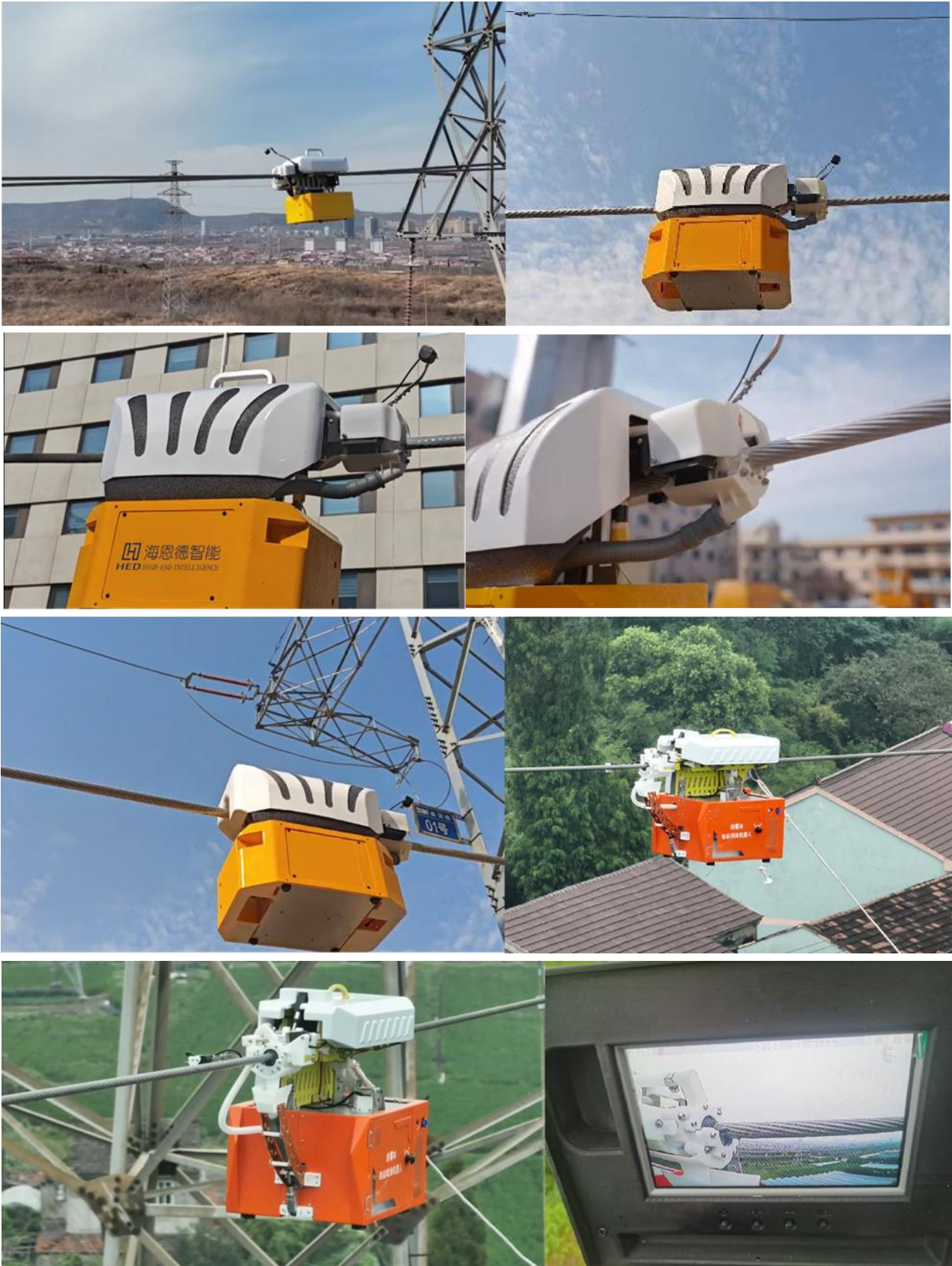
报告编号: KK24062503 日期: 20240615 页码: 2/4

检测项目	检测方法	单位	技术要求	检测结果	单项判定
外观*	GB/T 19250-2013	/	产品为均匀粘稠体,无凝胶、结块	符合	符合
不挥发物含量	GB/T 1725-2007	%	≥45	54.1	符合
干燥时间	表面	h	≤2	<2	符合
	实干	h	≤24	<24	符合
耐冲击	GB/T 1732-2020	J	50cm	通过	符合
附着力(拉拔法)	GB/T 5210-2006	J	≥5MPa	6MPa (5.98MPa~6.1MPa) 100%附	符合
耐液体介质性 (90g/L, 酸醇溶液)	GB/T 9274-1988	J	168h,无异常	168h,无异常	符合
附着力(划格法)	GB/T 9286-2021	级	≤1	0	符合
耐水性(168h)	GB/T 1733-1993	J	未出现起泡、开裂、剥落、掉粉、掉粒、脱落、掉色、明显失光等现象	未出现起泡、开裂、剥落、掉粉、掉粒、脱落、掉色、明显失光等现象	符合
耐磨性	GB/T 1768-2006	r	≥1000	2300	符合
接触角**	GB/T 30447-2013	°	≥150	158.9 158.9 152.9	符合
自洁性**	GB/T 30191-2013	级	≥1	0	符合
		级	≥1	0	符合

备注: 技术要求由委托方提供。 ***** 接下页 *****

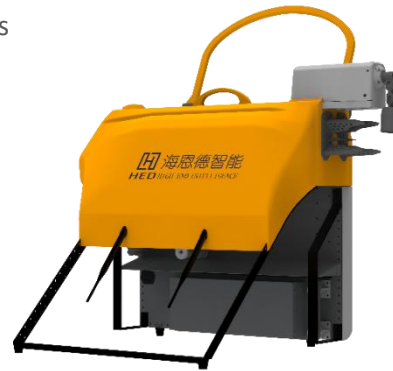
Transmission Line Prevent-icing Robot Application Case





Transmission Line De-icing Robot

Work Environment	10kV-1000kV live transmission line conductors and ground wires
De-icing Capacity	≤single side 120mm
Moving Speed	0-2m/s
Remote Control Distance	6km
Operating Temperature	≥-40°C
Climbing Angle	≤75°
Work Methods	Live working Power outage operation



The Transmission Line De-icing Robot is mainly composed of a robot body and a control terminal. Adopting a wheeled mobile mechanism, the robot is equipped with de-icing cutters and ice hammers, enabling mechanical impact de-icing, ice chipping and rolling de-icing operations to remove ice columns attached to transmission lines under live conditions.

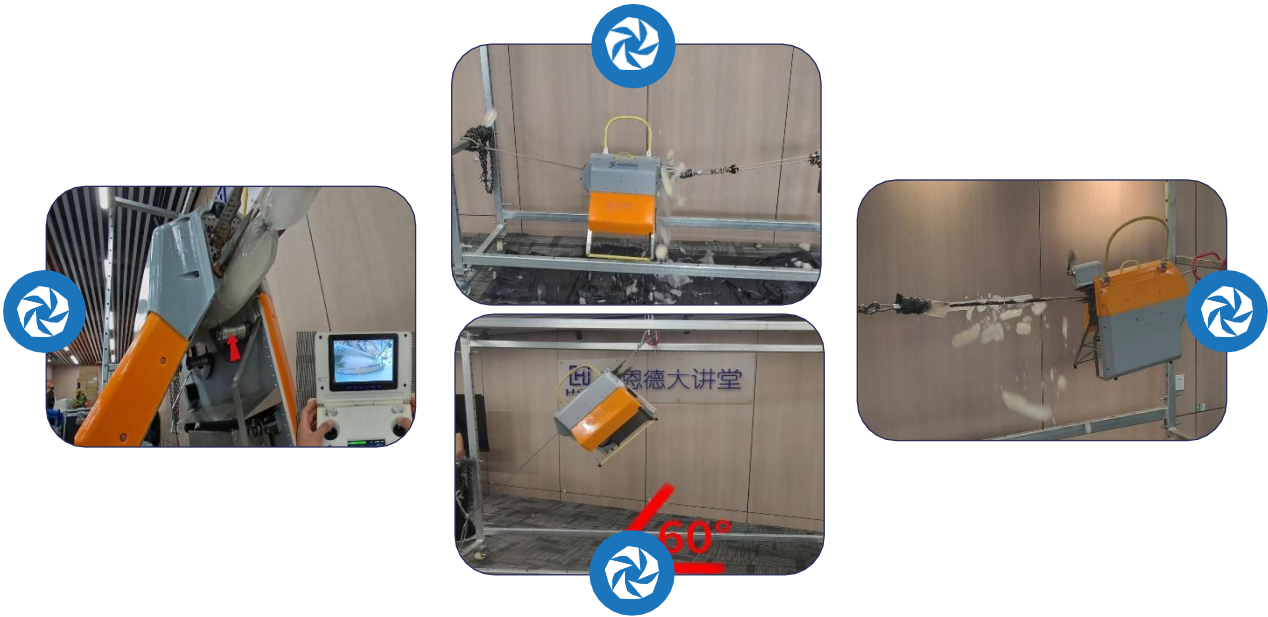
▪ The current situation of ice formation on transmission lines



▪ Technical Indicators

Transmission Line De-icing Robot Parameters			
Type	DEICE-ROB-01	DEICE-ROB-02	DEICE-ROB-03
Device dimensions	500*420*500mm (Excluding ice blade length and lifting ring)	500*420*530mm (Excluding ice blade length and lifting ring)	580*490*530mm (Excluding ice blade length and lifting ring)
Weight	22kg	25kg	29kg
De-icing method	Squeezing de-icing Impact ice blade de-icing	Squeezing de-icing Impact ice blade de-icing Strike ice hammer	Squeezing de-icing Impact ice blade de-icing Strike ice hammer
De-icing thickness	Single side 25mm	Single side 60mm	Single side 120mm
De-icing speed	1.5m/s (5.4km/h)	1.5m/s (5.4km/h)	2m/s (7.2km/h)
Applicable wire diameter	8mm-30mm (Intelligent adaptation of wire diameter)	8mm-30mm (Intelligent adaptation of wire diameter)	8mm-40mm (Intelligent adaptation of wire diameter)
Number of cameras	2 ↑ (Forward view, ice pressing)	2 ↑ (Forward view, ice pressing)	2 ↑ (Forward view, ice pressing and drop line assistance)
Climbing angle	≤75°		
Launch method	Unmanned aerial vehicle lifting method		
Applicable voltage level	10kV-1000kV live transmission line conductors and ground wires		
Single homework duration	3h (Replaceable battery, supports quick disassembly)		
Communication method	Wireless		
communication range	6km		
Working environment temperature	≥ -40°C		
Walking mechanism	Wheeled walking mechanism		
Video function	Real time video display, recording, and playback of de icing operations		
Remarks	The battery supports quick disassembly and replacement, and can be equipped with multiple lithium batteries		

▪ De-icing robot experiment process and application case

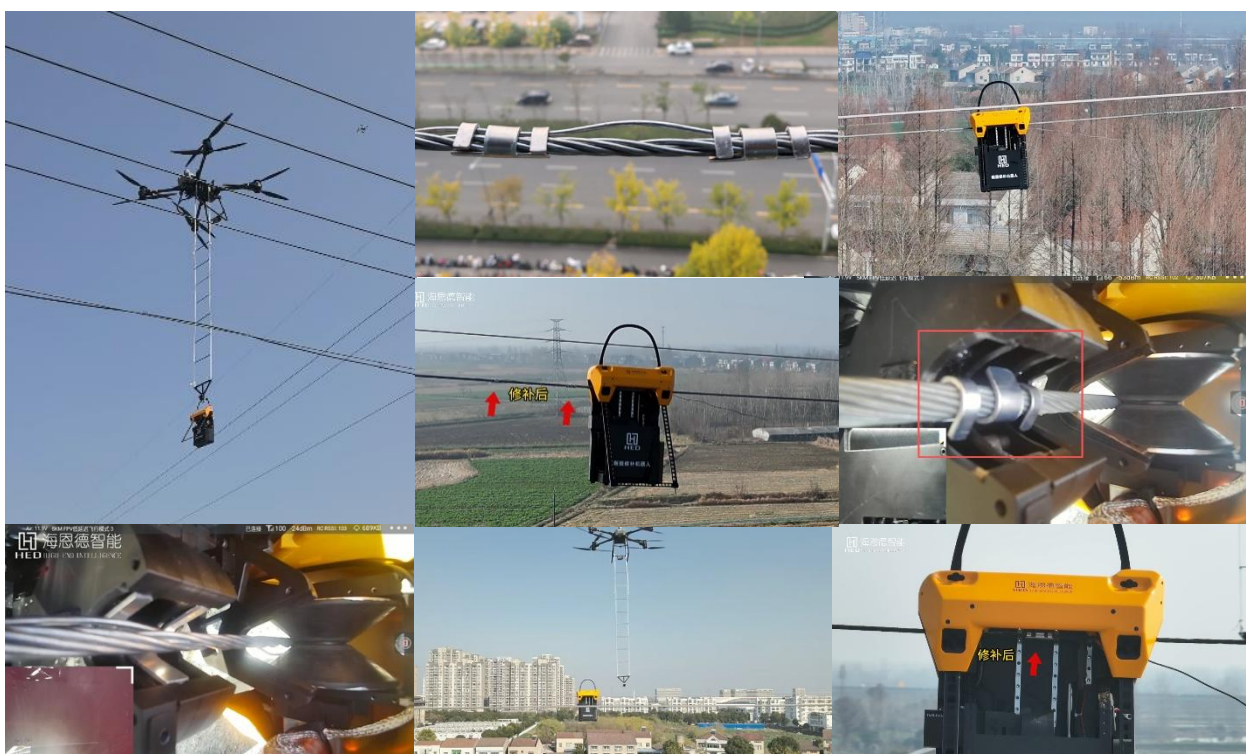


Transmission Line Broken Strand Repair Robot

- Installation method** Drone lifting
- Applicable Wire Diameter** 7-30mm
- Voltage Level** 10kV-1000kV
- Remote Control Distance** 6km
- Climbing Angle** $\leq 45^\circ$
- Weight** 10kg



The Transmission Line Broken Strand Repair Robot can be lifted up and down by drones, and the robot completes the task of repairing broken wires in conductors and ground wires by carrying specialized tools for repairing broken wires. Robots have advantages such as large climbing angles, high repair efficiency, and visual operations, which solve the difficulties of equipment up and down, poor environmental adaptability, and low safety faced by the current high-altitude electrified environment for repairing broken transmission lines.



Overhead Transmission Line Net Sealing Robot

Maximum Traction Force	900N
Applicable Wire Diameter	7-30mm
Voltage Level	10kV-1000kV
Remote Control Distance	6km
Climbing Angle	$\leq 45^\circ$
Weight	10kg



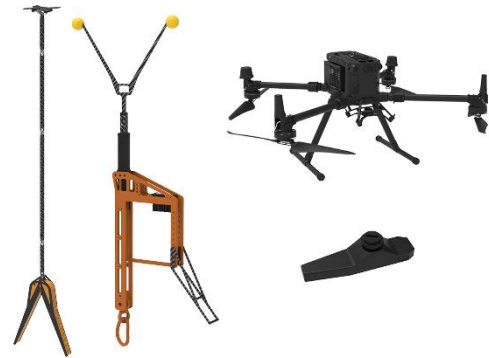
The Overhead Transmission Line Net Sealing Robot is mainly composed of a robot body and the robot remote control. The robot adopts a wheeled mobile mechanism and can work collaboratively with multiple machines. A group of 4 robots travel along 2 lines to pull and erect a power construction protection net. After the robot reaches the designated location, the safety net will be deployed. The robot is fixed and locked at a precise position. Complete the erection of protective net.





UAV Carrying Tower Climbing Fall-Protection Device

DJI Intelligent Control Edition

The DJI Intelligent Control Edition Tower Climbing Fall-Protection Device consists of a gimbal camera, a mounting device, and an anti fall hook. The gimbal camera can be connected to the DJI drone transmission link for real-time monitoring of the attachment and detachment of the fall protection device. The hanger can recognize the fall protection hook, and the internal lock pin automatically closes to achieve automatic attachment and detachment, making the operation convenient and efficient.



Type	DJI AI automatic hanging and dismantling edition	DJI intelligent control edition
Pattern		
Matching Equipment	<ol style="list-style-type: none"> 1. Flexible hanger (eight-shaped fork) 2. Hanging point device (V) 3. Protective box 4. Gimbal Camera 3.0 5. Safety protection rope 6. Speed differential self-locker, D-type lock 	<ol style="list-style-type: none"> 1. Flexible hanger (eight-shaped fork) 2. Hanging point device (V) 3. Protective box 4. Gimbal Camera 2.0 5. Safety protection rope 6. Speed differential self-locker, D-type lock
Parameters	<ol style="list-style-type: none"> 1. Hanging and detaching method: The eight-shaped hanger and the "V"-shaped guide fork are used for hanging, allowing a drone drift error of 18cm; 2. Bearing capacity of anti-falling hook: 30KN; 3. Camera resolution: 1080P; 4. Transmission distance: 7km line-of-sight to the ground; 5. Status feedback, real-time feedback of lock pin status 6. Semi-automatic hanging and detaching: It can detect automatically, and the lock pin automatically locks 7. Fully automatic hanging and dismantling: The drone's AI autonomously identifies the angle iron, plans the flight route, and adjusts the flight attitude, without requiring manual intervention 8. The anti-fall device can be automatically attached and detached with a pre-set mechanism. 8. It can support drones to automatically retrieve flexible fall protection devices 	<ol style="list-style-type: none"> 1. Hanging and detaching method: The eight-shaped hanger and the "V"-shaped guide fork are used for hanging, allowing a drone drift error of 18cm; 2. Bearing capacity of anti-falling hook: 30KN; 3. Camera resolution: 1080P; 4. Transmission distance: 7km line-of-sight to the ground; 5. Status feedback, real-time feedback of lock pin status 6. Semi-automatic hanging and detaching: It can detect automatically, and the lock pin automatically locks
Applicable size	Suitable for cross arm dimensions of 40-150mm angle iron (dimensions can be customized free of charge)	

Intelligent Edition

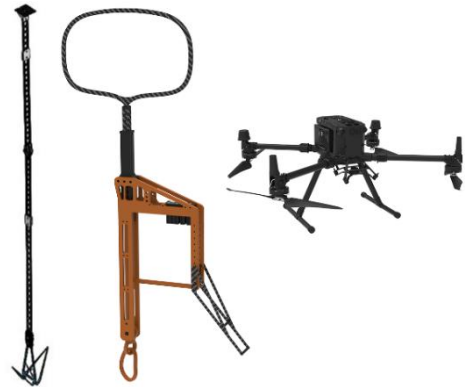
The intelligent edition of the Power Tower Climbing Fall-Protection Device consists of anti fall hooks, safety ropes, anti fall self-locking devices, mounting devices, and ground monitoring systems. When in use, install the mount under the drone, carrying an anti fall hook, and mount it on the tower crossbar. The installation process is fully visualized, effectively reducing the difficulty of operation. During the process of climbing the tower, the self-locking device always slid along the safety rope, achieving the purpose of anti fall protection.



Type	Intelligent edition
Pattern	
Matching Equipment	<ol style="list-style-type: none"> 1. Flexible hanger (eight-shaped fork) 2. Hanging point device (V) 3. Protective box 4. Remote control of ground terminals 5. Safety protection rope 6. Speed differential self-locker, D-type lock
Parameters	<ol style="list-style-type: none"> 1. Hanging and dismantling method: The eight-shaped hanger and the "V"-shaped guide fork are used for hanging, allowing a drone drift error of 18cm 2. The mount is equipped with two cameras 3. Bearing capacity of anti-falling hook: 30KN 4. Camera resolution: 720P 5. Transmission distance: 1.3km line-of-sight range to the ground 6. Endurance time: 3 hours;
Applicable size	Suitable for cross arm dimensions of 40-150mm angle iron (dimensions can be customized free of charge)

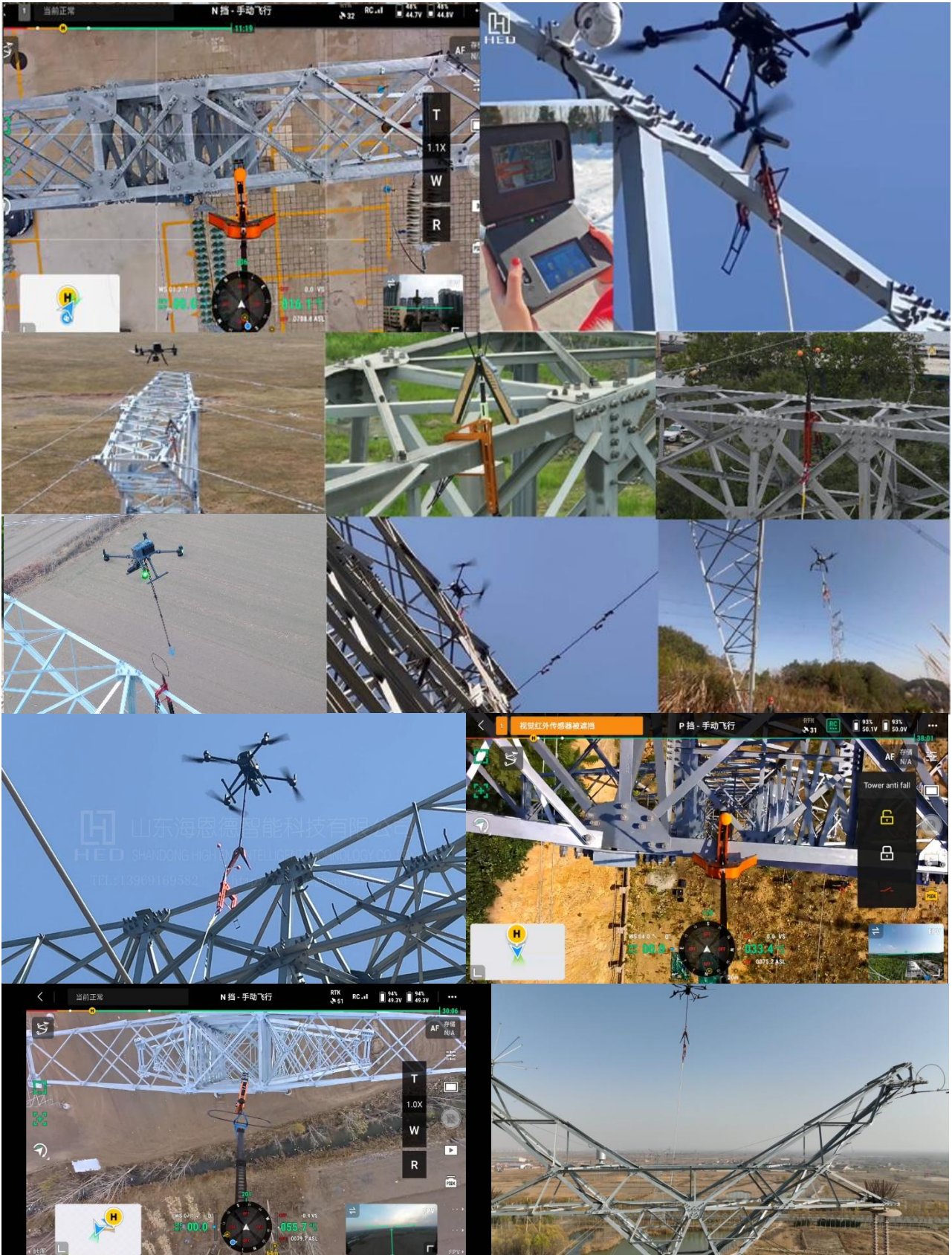
Simple Edition

The simple edition of the Power Tower Climbing Fall-Protection Device consists of an elliptical ring fall-arrest hook and a quick attachment and detachment device. The entire set of equipment can be operated with just one drone and a drone operator. The drone operator can achieve docking with the elliptical ring fall-arrest hook by simply controlling the attitude of the quick attachment and detachment device, thus completing the hanging and removal work of the fall protection device.



Type	Gimbal edition	Upgraded simple edition	Mechanical edition
Pattern			
Matching Equipment	<ol style="list-style-type: none"> 1. Flexible mount 2. Hanging point device (ring) 3. Safety protection rope 4. Protective box 5. Speed differential self-locker, D-type lock 6. Gimbal Camera 1.0 	<ol style="list-style-type: none"> 1. Flexible Mount 2. Hanging point device (ring) 3. Safety protection rope 4. Protective box 5. Speed differential self-locker, D-type lock 6. Visual camera 7. Little Pilot 	<ol style="list-style-type: none"> 1. Flexible hanger 2. Hanging point device (ring) 3. Safety protection rope 4. Protective box 5. Speed differential self-locker, D-type lock
Parameters	<ol style="list-style-type: none"> 1. Hanging and removing method: hooking method 2. Bearing capacity of anti-falling hook: 30KN 3. Camera resolution: 720P 4. Transmission distance: 1.3km line-of-sight range to the ground 5. The gimbal camera can be connected to DJI drones, allowing video transmission to the DJI remote controller 	<ol style="list-style-type: none"> 1. Hanging and removing method: hooking method 2. Bearing capacity of anti-falling hook: 30KN; 3. Camera resolution: 720P; 4. Transmission distance: line-of-sight range to the ground is 1.3km; 5. Endurance time: 1.5 hours; 6. Equip with a separately configured auxiliary camera for hanging and dismantling, and a small screen for visual drone control 	<ol style="list-style-type: none"> 1. Hanging and removing method: hooking method 2. Bearing capacity of anti-falling hook: 30KN
Applicable size	Suitable for cross arm dimensions of 50-135mm angle iron (dimensions can be customized free of charge)		

UAV Carrying Tower Climbing Fall-Protection Device Application Cases



Transmission Line Warning Device Installation Carrier

When using it, connect the dedicated installation tool and warning light to the bottom of the drone, control the drone to fly to the line to find a suitable installation position, lift it up, and the dedicated fixture on the warning light touches the line and closes. The warning light is then firmly hung on the line, and the drone returns to the ground with the installation tool. The installation of the warning light is completed.

It has a wide range of applications and can replace the warning lights below with other line warning devices. When used, it is not limited by terrain and environment, making it safer and more efficient compared to traditional installation methods. It reduces the labor intensity and installation risks of operators, greatly improves work efficiency, and has received widespread praise.



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