PCM-3225 Non-contact Distributed Intelligent Fault Monitoring System

Domestic and international operational data indicates that lightning strikes cause 50% to 60% of the trippings of high-voltage transmission lines. Transient faults such as flashovers account for 90% to 95% of transmission line faults, and the local insulation damage they cause usually has no obvious burn marks. This not only hinders fault location but also poses hidden risks of secondary faults. Therefore, rapid and accurate fault positioning of high-voltage transmission lines is crucial for power supply restoration and the safe and economic operation of power systems.

Product Features

- Intelligently monitor, collect and store fault current waveform data of transmission lines under various fault types.
- Intelligently diagnose fault causes, including lightning faults (shielding failure, back flashover) and non-lightning faults (tree obstacles, mountain fires, wind deviation, floating objects, foreign object intrusion).
- Intelligently judge fault sections and accurately locate fault points.
- Intelligently identify, locate and early warn line abnormalities.
- Effectively solve the difficult positioning problem of T-type transmission lines.
- Real-time monitor the frequency and distribution of lightning-struck lines (without tripping).
- Enables live-line installation.

Technical Parameters

Project Scheme		Parameter
Basic Parameters	Fault Location Accuracy	≤300m (±1 tower)
	Accuracy of Fault Type Identification	≥95%
	Fault Resolution	10ms
	Bandwidth of Traveling Wave Current Sensor	1kHz～1MHz
	Sampling Frequency of Traveling Wave Current	2MHz～10MHz
	Fault Traveling Wave Recording Time	≥1000us
	Bandwidth of Power Frequency Current Sensor	0Hz～1kHz
	Sampling Frequency of Power Frequency Current	≥3.2kHz
	Fault Power Frequency Recording Time	500ms
	Time Synchronization of Multi-terminals	＜0.1μs
	Continuous Fault Response Times	＞20 times
	Fault Message Buffer Count	＞1000 entries
	Fault Diagnosis Time	＜5min
	Bandwidth of Voltage Sensor	15Hz～5MHz
	Sampling Frequency of Traveling Wave Voltage	2MHz～10MHz
	Pick-up Voltage	＜0.001 times the full scale
	Communication Mode	APN/4G
	Protection Grade	IP66
Solar Panel	Nominal Power	60W±5%
	Dimensions	670*500*25 mm
	Weight	3.5kg
Lithium Battery Pack	Battery Capacity	40AH, 12V
	Backup Battery Operation Time	＞30 天
Device Power	Normal Operation	＜0.6W
	Transmitting Power	＜2W
Normal Operating Atmospheric Conditions	Ambient Temperature	-40℃～+85℃
	Relative Humidity	1%～90%
	Altitude	≤5000m
Complete Set of Equipment	Weight	11.5kg

Application Scenarios

CYG SmartLink Technology (Zhuhai) Co.,Ltd.
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PCM-3225 Distributed Fault Diagnosis System

Product Introduction

The Transmission Line Distributed Fault Diagnosis System is applied to overhead lines with voltage levels from 35kV to 1000kV. It realizes high-frequency sampling and rapid wave recording of fault signals such as initial and reflected traveling waves, and achieves rapid positioning and accurate diagnosis of transmission line faults through rapid and accurate analysis algorithms by the master station background software system.

Functional Features

- **Reliability of fault section location**: ≥99%
- **24/7 online monitoring**: real-time acquisition of initial traveling wave current and power frequency fault current at the moment of fault occurrence, with precise sampling of fault waveforms to assist in fault analysis
- **Rapid location within 5 minutes**: Utilizes an AI deep learning algorithm-based fault identification program, achieving a fault identification accuracy of over 95%.
- **High-precision fault location (≤300m)**: Based on high-speed traveling wave sampling, Beidou (GPS) high-precision timing, and online traveling wave speed calibration technology for even more accurate fault location.
- **Distributed installation every 30km**: Good economic deployment and redundancy-based reliability.

Key Technical Parametersss

System Parameters	
Fault precise location accuracy	≤±300m
Accuracy rate of fault section determination	≥99%
Fault alarm delay	≤5min
Distance between monitoring terminals	30km
Fault analysis method	Deep Learning Algorithm
Communication	4G + Wireless Bridge
Power supply	CT + Solar Energy
Time synchronization	GPS+BDS
Current range of inductive power supply	20A—1500A
Temperature and humidity	-40 ° C~70 ° C; ≤100% RH

Application Scenarios

CYG SmartLink Technology (Zhuhai) Co.,Ltd.
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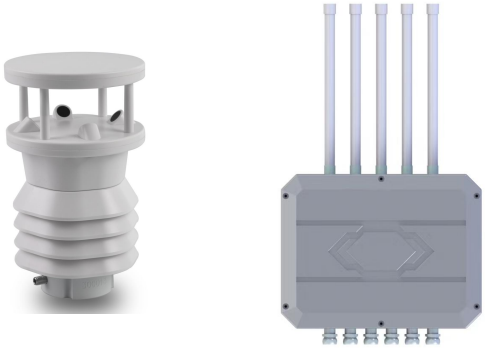
PCM-3231 Micro-Meteorology Online Monitoring Device



The Micro-Meteorology Online Monitoring Device is a multi-parameter, high-precision micro-meteorology monitoring system specially designed for meteorological monitoring needs in transmission line sections prone to icing, strong winds, frequent accidents and meteorological blind areas. It monitors the operating environment of high-voltage towers in real time and all-weather, including seven key parameters: wind speed, wind direction, temperature, humidity, atmospheric pressure, rainfall and light radiation. Once abnormal meteorological signals are detected, the system immediately sends early warning information to line operation managers to ensure the safe and stable operation of the lines.

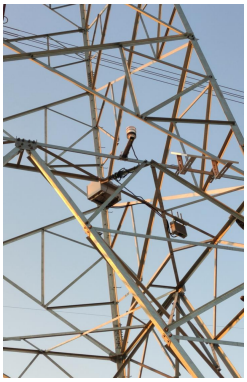
Functional Features

Integrated Design: All-in-one integration of seven meteorological elements for easy installation.
High Precision: Advanced digital sensors ensure accurate, high-resolution, and reliable data.
Rugged Performance: Excellent electromagnetic shielding, anti-icing, and lightning protection for stable operation in harsh environments.
Data Acquisition: Real-time monitoring of temperature, humidity, wind speed/direction, air pressure, etc., with customizable options.
Remote Communication: Supports CDMA, GPRS, 4G, and complies with State Grid and China Southern Power Grid protocols.

Technical Parameters

Monitoring Parameters	
Functions	Integrated with wind speed and direction, temperature and humidity, air pressure, rainfall, and light radiation; functions can be selected as required.
Temperature	Range: -40℃~+85℃
	Accuracy: ±0.2℃
Relative Humidity	Range: 0~100%RH
	Accuracy: ±2%RH°
Wind Direction	Range: 0~360°
	Accuracy: ±1°
Wind Speed	Range: 0~50m/s
	Accuracy: ±2%（>10m/s）
	Equipped with probe heating function
Air Pressure	Range: 200~1200hPa
	Accuracy: ±0.5hPa
Rainfall	Range: 0~24mm/min
	Accuracy: ±0.5mm/min
Light Radiation	Range: 0 W/m2～1400 W/m2
	Resolution: 1 W/m2
	Accuracy: ≤5%
Base station network and communication functions	
Communication method	RS485 communication
Power supply system	
Power supply mode	DC12V
System Parameters	
Protection Level	IP65
Environmental Parameters	Ambient Temperature: －55°C～＋85°C
	Ambient Humidity: ≦95%
	Altitude: ≦4500m

Application Scenarios



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PCM-3233-A Image Online Monitoring Device

Product Introduction

This product focuses on solving the needs of double-sided channel monitoring of transmission line towers, tower foundation anti-external damage monitoring, and wired/wireless sensor IoT access on towers. It is an all-dimensional intelligent image monitoring integrated machine integrating advanced functional characteristics such as intelligent four cameras, sensor IoT access, AI edge computing, and ultra-low power consumption.

Functional Features

Lightweight Design: Simple structure, quick single-person installation, 360° direction adjustment.
Ultra-low power consumption, standby time up to 40 days;
Multi-angle Coverage: Four-eye integrated design to realize monitoring of large and small side/tower body.
Highly reliable AI intelligent analysis.
Front view 1600W with 10x zoom in the daytime + 200W night vision, rear view 1600W, downward view 200W/120° wide angle;
Optional front camera visible light 10x zoom lens, heating, and wiper.
Supports timed automatic image capture and manual image capture, as well as short video shooting and transmission;
Supports starlight-level night vision full-color image capture with minimum illumination of 0.001Lux;
Based on industry in-depth customized intelligent analysis algorithm, it supports front-end AI image recognition, automatic early warning and linkage control for abnormalities such as mechanical target recognition (crane/excavator/concrete pump truck, etc.), conductor foreign objects, and fire. AI model can be remotely upgraded online;
Supports 4G full Netcom and intelligent traffic management;
Built-in 2.4G/433M low-power wireless module, which can access our full series of transmission low-power wireless sensors. Supports WIFI debugging, no need for tower climbing maintenance.

Application Scenarios

Technical Parameters

Camera Parameters			
1	Sensor Type	1/3.06" Progressive Scan CMOS	1/2.8" Progressive Scan CMOS
2	Pixel	16 million	2 million（Night Vision）
3	Minimum Illumination	Night Vision Color: 0.001Lux @(F1.0, AGC ON)	
4	Direction Adjustable	During installation, vertical adjustment is 45°, horizontal adjustment is 360°	
Performance Parameters			
1	CPU Architecture	ARM Cortex-A53 Octa-Core 2.3GHz	
2	Memory	4GB + 64GB, supporting a maximum expansion of 512G TF card	
Image/Video			
1	Image Resolution	16 million 4672×3504, 2 million 1920×1080	
2	Image Settings	Mirror/Anti-flicker/AE/3D Noise Reduction/Brightness/Chrominance/Contrast/Saturation, etc.	
3	Image Enhancement	Supports Backlight Compensation, Digital Wide Dynamic Range, Strong Light Suppression, and Digital Noise Reduction	
4	Encoding Format	Video Encoding H.264; Image JPEG	
Function			
1	Intelligent Analysis	Tower Base Intrusion Detection/Mechanical Recognition (Crane, Excavator)/Conductor Foreign Objects/Wildfire, etc.	
2	Power Management	Supports remaining power and intelligent switching of working modes	
3	Optional Functions	Front Camera Visible Light Lens with 10x Zoom, Heating, and Windshield Wiper.	
Communication			
1	Network Transmission	4G Full Netcom access to mobile networks, traffic management, and signal strength display;	
		Supports WiFi and low-power wireless modules	
2	Safety	Supports NARI/Smartchip Encryption Chip/TF Card Hardware Encryption, and Global Energy Interconnection Research Institute Software Encryption	
3	Supported Protocols	State Grid Standard Protocol, I1 Protocol, China Southern Power Grid Protocol, MQTT Protocol	
Power Supply System			
1	Solar Panel	30W Solar Panel	
2	Battery	20/40Ah Lithium Iron Phosphate Battery (optional), working time without sunlight ≥ 45 days	
Regular Parameters			
1	Power Consumption	Online Average Power Consumption ≤ 0.1W	
2	Protection Level	IP67	
3	Weight	Host < 4Kg	

PCM-3233-B Video Online Monitoring System

Device Introduction

The transmission line video online monitoring device is developed for overhead transmission line sections that cross high-speed railways, highways, and important transmission corridors. Its main function is to prevent accidents such as tower collapse, wire breakage, and insulator string falling that may occur in "three-crossing" areas, as well as to prevent major public safety and power grid safety incidents caused by "three-crossing".

Product Functions

Supports the requirements of the enterprise standard "Power Grid Video Surveillance System and Interface" Interface B, and supports access to the unified video surveillance platform of the State Grid Corporation of China's information intranet;
The device is equipped with power and load hierarchical management functions, which can adjust the working mode according to the current battery power, power consumption, etc., and supports the overlay display of voltage, current, power, etc., on the real-time video screen;
Supports dynamic adjustment of resolution and frame rate, which can be dynamically adjusted and transmitted back according to network conditions;
Supports night vision function to meet night monitoring needs;
Supports 24-hour continuous video recording at the front end;Supports PTZ control functions, including pan, tilt, step size, speed control, etc.; the lens supports zoom adjustment control;Equipped with AI recognition function.

Application Scenarios

Technical Parameters

Video Monitoring Unit		
1	Video Resolution	≥720P
2	Minimum Illuminance	≤0.01 Lux/f1.2
3	Zoom Ratio	≥Optical 20x
4	Light Control	Light adaptive, with automatic gain and backlight compensation.
5	Focusing Method	Auto Focus
PTZ		
1	Horizontal Range	360°
2	Vertical Range	-90° ~90° (Auto Flip)
3	Horizontal Speed	Horizontal keying speed: 0.1° ~120° /s, speed adjustable; horizontal preset speed: 120° /s.
4	Vertical Speed	Vertical keying speed: 0.1° ~80° /s, speed adjustable; vertical preset speed: 80° /s.
5	Power-off Memory	Supported
Communication		
1	Network Transmission	Supports 4G all- network access to mobile networks, traffic management, and signal strength display.
2	Storage	≥5days
3	Security	Supports NARI/Zhixin encryption chips and TF card hardware encryption.
4	Supported Protocols	Southern Network, State Grid Interface B
5	Traffic	10GB
Power Supply System		
1	Solar Panel	100W Solar Panel (Configurable on demand.)
2	Battery	100AH lithium battery (Configurable on demand.), operation time without sunlight ≥ 7 days.

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PCM-3233-C Dual Spectrum Video Monitoring Device for Transmission Line

Introduction

This product utilizes infrared dual-spectrum technology as its core, integrating high-definition cameras and intelligent algorithms to achieve 24/7 panoramic thermal source scanning with a monitoring radius of 2-3 kilometers. It can accurately identify fire points larger than 1 square meter. The device supports Beidou positioning and 3D point cloud technology, enabling real-time transmission of fire coordinates and video to the monitoring center. Equipped with solar power, 4G/5G communication, and automatic alarm functions, it effectively reduces the risk of power line failures caused by wildfires.

product function

- Channel lens: 16MP ultra-HD for daytime HD capture, and 2MP ultra-low-light mode for clear night scenes.
- Pan-tilt camera: Featuring a picture-in-picture mechanism, this 4-megapixel optical zoom camera offers thermal imaging capabilities with multiple resolution options, enabling 360° full-angle surveillance without blind spots.
- Low-power design: Ensures long battery life while supporting real-time video surveillance.
- AI Analysis: Customized intelligent algorithms for specific industries, supporting AI image recognition at the front end to detect anomalies like mechanical targets (cranes, excavators, pump trucks), wire foreign objects, and fire situations, with automatic alerts and coordinated control.
- Multiple temperature measurement modes: including area temperature measurement, point temperature measurement, and frame temperature measurement.
- Multi-mode early warning mechanism: supports surface temperature judgment, three-phase comparison judgment, relative temperature difference judgment, and other early warning modes;
- It supports 4G full-network connectivity and allows users to select their preferred carrier based on actual conditions.
- Supports windshield wipers and fog removal.

application scenarios

Camera settings			
1	Channel camera	16 million (daytime)	2 million (night vision)
2	Pan-tilt-tilt camera	Optical zoom: 20x,30x, and 40x available Pixels: 4 million, 2688 (H) × 1520 (V)	
3	Pan-Tilt Infrared Camera	Resolution: 256×192,384×288,640×512, or 600×800 Temperature range: -20℃ to 250℃ Temperature measurement accuracy: ±2 degrees (or ±2% of the range)	
4	Cloud Terrace	Horizontal: 0~360° Vertical direction: -90° to +90° 256 preset bits Support windshield wipers	
5	internal storage	Optional TF card (16G,32G,64G, or 128G)	
function			
1	Intelligent Analysis	Base intrusion detection, mechanical recognition (cranes, excavators, etc.), wire foreign objects, wildfires, etc.	
2	Power Management	Supports remaining battery and smart mode switching	
3	Optional features	Supports optional configurations including wired auxiliary units and audiovisual alarms	
4	locate function	Supports GPS and Beidou positioning	
5	Production cycle	The front-end analyzes photos at a default interval of 5 minutes, with scheduled uploads set to 1 hour and 1 photo. The sampling time can be freely configured. After the device takes photos, the front-end analyzes them, identifies potential hazards, and sends back immediately. If no hazards are detected, it uploads the photos at the scheduled time.	
6	Temperature measurement mode	The system can choose the temperature measurement mode of area, point or frame.	
7	early warning mechanism	Supports multiple early warning modes including surface temperature detection, three-phase comparison, and relative temperature difference analysis.	
8	Photo capture	Auto-set interval or manually capture photos	
communication			
1	network transmission	It supports 2G/3G/4G wireless transmission and adapts to the networks of China Telecom, China Unicom, and China Mobile.	
2	safe	Optional: Supports NARI/ZhiXin encryption chips	
3	Support protocol	State Grid Standard Protocol I1, Southern Power Grid Protocol, B Interface Protocol	
General parameters			
1	power dissipation	The average power consumption online is ≤0.8W	
2	Working temperature and humidity	Operating temperature: -40℃~75℃	
		Relative humidity: 0%RH–100%RH	
3	levels of protection	IP67