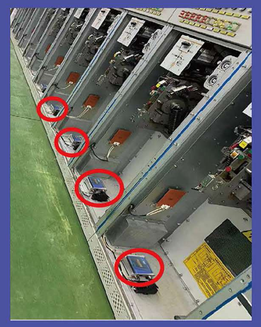
应用案例
Application cases

风电场、光伏场、储能站等部分应用案例。

青铜峡市第四风电场(80MW)
银川灵武市风电场(100MW)
吴忠市第三风电场(98.7MW)
吴忠市第一风电场(99MW)
吴忠市第四风电场(99MW)
吴忠市第五风电场(99MW)
青铜峡市第一风电场(200MW)
吴忠市盐池县风电场（200MW)
中卫市第一光伏电站（1000MW)
中卫市第二光伏电站2000MW（在运1000)
中卫市第四十五光伏电站（200MW)
中卫市海原县分布式户用光伏项目
宁津县36KW光伏发电扶贫项目（0.11MW)
青铜峡市第一风电场配套储能(60MWh)
中卫市第一光伏配套储能电站(100MW/200MWh)
中衡第一光伏电站
中衡第二光伏电站
宁夏分布式户用光伏项目
邱渠第一风电场





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Retail trader

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输变电系统运行安全智能检测装置

INTELLIGENT DETECTION DEVICE FOR OPERATIONALSAFETY OF POWER TRANSMISSION AND TRANSFORMATION SYSTEM.

ODL-HF-PD-03

micno 深圳市迈凯诺电气股份有限公司
SHENZHEN MICNO ELECTRIC CO., LTD.

检测方法

1. TEV (Transient Earth Voltages): transient voltages between a device and ground

When partial discharge occurs in high-voltage electrical equipment, the discharge energy typically first accumulates on metal grounding components adjacent to the ground point, generating a ground current that propagates along the equipment's metal surfaces. For internal discharges, the energy concentrates on the inner surface of the grounded shielding layer; when the shielding is continuous, no partial discharge signals can be detected externally. However, discontinuities in the shielding layer at certain insulation points allow partial discharge signals to propagate into the equipment's shielding enclosure. The resulting electromagnetic waves are emitted through metal joint gaps or gas-insulated switch spacers, then propagate along the exterior surface of the equipment while generating transient voltage pulse signals to ground.

The TEV method theoretically offers advantages such as high sensitivity and strong interference resistance; however, due to the numerous interference sources present at substation sites,TEV lightning detection can still be affected by external disturbances. Generally, during testing, local discharge in switchgear is considered present when the test signal exceeds 20 dB, surpasses the background level by 10 dB, or when the number of discharge pulses ranges from 50 to 1000.

2. Ultrasonic Testing Method (AE)

The acoustic signals of partial discharge primarily concentrate within the frequency range of 0 to 100 kHz, whereas interference signal spectra generally fall between 0 and 40 kHz. Voice interference signals are concentrated below 10 kHz, and vibrations as well as background noise also predominantly occur in this frequency band. Therefore, when partial discharge occurs inside a switchgear, it generates impact vibrations and sound waves that propagate significantly throughout the surrounding environment. We can detect partial discharge by capturing ultrasonic signals with a frequency range of 20 to 100 kHz. Based on this principle, specialized systems are used to monitor partial discharge in electrical equipment such as switchgears, overhead lines, transformers, and GIS switches, enabling precise determination of the magnitude and location of partial discharge through ultrasonic signal spectra and characteristic acoustic patterns. When ultrasonic testing identifies suspected partial discharge signals, the likelihood of their presence within the switchgear is highly probable. It is generally accepted that discharge occurs when ultrasonic test readings exceed 6 dB.

3.HF Detection Technology

The insulation strength and breakdown field strength of electrical equipment insulators are both extremely high. When partial discharge occurs within a very small area, the breakdown process occurs rapidly, generating a steep pulse current with an rise time of less than 30 ns, which also induces high-frequency electromagnetic waves.The fundamental principle of the high-frequency partial discharge detection method involves using a HF sensor to detect ultra-high frequency electromagnetic wave signals generated during partial discharge in electrical equipment, thereby obtaining relevant information and enabling effective monitoring. Since field electromagnetic interference primarily occurs below the 100 MHz frequency band, the HF method effectively mitigates interference from corona effects, demonstrating high sensitivity and strong anti-interference capabilities. This approach offers advantages such as live partial discharge detection, precise localization, and defect type identification.

监测系统简介

- This monitoring system consists of two components: sensors and an intelligent monitoring terminal. The sensors include three types: current transformers, spatial electromagnetic field sensors, and ultrasonic sensors.
- The sensor collects the corresponding signals and transmits them via a coaxial cable to the intelligent monitoring terminal.
- The intelligent monitoring terminal consists of three components: a digital signal processing module, a data analysis module, and a signal transmission module.
- The signal processing module comprises three channels, each corresponding to a distinct type of sensor input, and performs filtering and sampling based on the specific signal characteristics of each sensor.
- The data analysis module includes device alarm algorithms that perform comprehensive analysis of collected data to determine whether an alarm should be triggered.
- The signal transmission module comprises a W base module, an Ethernet module, and a 485 module, allowing users to select the most suitable access method based on the field network environment. After connection, monitoring data is transmitted to the system backend via a aggregation switch.

传感器简介

1 High-frequency current transformer

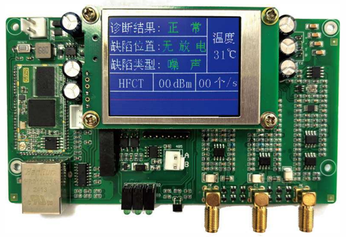
The monitoring range is 3–30 MHz, with a maximum sensitivity of 8.SmV/mA, effectively detecting internal insulation defects such as partial discharges and single-core cable circulating currents.

2. TEV(Transient Earth Voltage)

Monitoring range:0–60 dBmV, effectively detecting internal discharge in the insulation equipment of switchgear. 3 Ultrasonic sensor

The monitoring frequency range is 20 kHz to 200 kHz, which effectively identifies external discharges in the insulation equipment of the monitoring switchgear.

产品主板



智能监控终端简介

The monitoring host supports 1 hundred-megabit or gigabit Ethernet ports (45) (compatible with IPV4 and PV6 communications), features a W module, and supports 802.1X authentication. Data is freely accessible. The specific hardware specifications of the monitoring host are as follows:

Xiang Ⅱ	Slaqk	Metric
TEV "Ground Electromagnetic Wave	Measure the daytime frequency band	3～100MHz
	Daytime duration	0–60 μV
	Splitting Army	1 dBmV
	Error	≤20 Abdomen V
	Large, intermittent pulses in each cycle	1400
	Dynamic Range of Transmission Container	0～60dBm
AE Ultrasonic	Remaining Day Band	20～200KHz
	Measurement Range	0–60 mV
	Split Rate	1 dBmV
	Error	≤20 Abdomen V
	Reported peak sensitivity of the measuring device	≧60dB(V/(m/s))
In compliance with High-frequency current	Detection Band	2～100MHz
	Leftover Day Range	3–3 mg/m³
	Error	≦3 dB
	Accuracy	Level: 1 dB
	Center Frequency of the Sensor	40kX::: 2 Qin K
	Maximum lockability of the sensor	8.5mV/mA
Environmental Silver Limit I	Temperature range	One 10–so•c
	Humidity Range	a.; 90, no knots
	Above sea level	<3000m
	Storage Temperature	One 25 to 70
Basic function	The original waveform is captured and displayed; the graph includes at least three categories. Data storage duration shall be no less than 1 month; the typical stability failure prediction model shall include no fewer than 5 types of warnings.	
Since the collection of drinking water samples begin...	It features self-check data acquisition capabilities for monitoring the operating status of sensors and collectors.	
Human-computer interface	Chinese Cuber Second Display Screen	
Data Communication Interface	At least one 100 Mbps or 1 Gbps RJ45 network port supporting IPv4 and IPv6 communication	
Working power supply	AC 155–255 V; current rating: a1ow; XS12-type plug-in three-wire aviation interface	
Temple of Electricity Compatibility	Implementation standard GB/T 14598.9/10/13/1 4/16/11/18/19	
Occupation standard	GB/1735 4-2003; IEC 60270 • 2000; JB/TI 2422-2015	
Communication mode	RJ45 interface, wireless communication, and Ethernet communication; supports 802.1X authentication	
Other Communications	RS485 interface, supporting the MODBUS-RTU protocol; XS12 plug-and-play two-wire aviation interface	
fIFI antenna	1PEX1	
State Indication	6 LED indicators	
Sampling Channel	:::: 3	
Cai Xiang Resolution	Qin 2 positions	
Overall dimensions	Length: 191 mm; Width: 118 mm; Thickness: 43.5 mm	
Complete Machine Storage Facility	≦2kg	
Levels of protection	1 Qiao 4	

产品展示

产品配置与功能

Main engine

The monitoring host is installed in the power distribution room or substation, housed within the main control cabinet. It consists of multiple modules including a CPU module, high-speed data acquisition module, communication module, clock module, and electrical monitoring module, featuring compact size and high integration.

High-frequency current transformer

The cable ground wire passes through the magnetic ring and connects it to the main unit chassis.

High-frequency current transformers are used to measure the high-frequency signals generated by partial discharge flowing to the ground.

Current signal.

Ultrasonic sensor

The ultrasonic sensor is installed on the inner side of the cabinet (using magnetic attraction) to measure the ultrasonic signals generated by discharge.

High-frequency electromagnetic wave sensor

Installed on the inner side of the cabinet (magnetically), it measures the electromagnetic wave signals generated during discharge.

Standard Features

1 Local discharge detection and warning: Detects local discharge conditions in high-voltage cabinet components and identifies cable insulation damage locations. 2 Measures ambient temperature and calibrates sensor data accordingly.

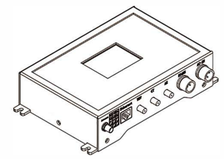
3. Supports modbus RTU communication.4 Supports network communication.

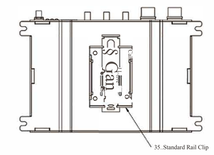
5. Local LCD display results and waveform data from each sensor.

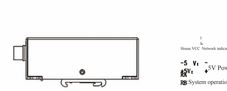
Optional Features

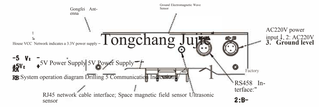
1 Short-range wireless communication. 2. Handheld data collection devices.

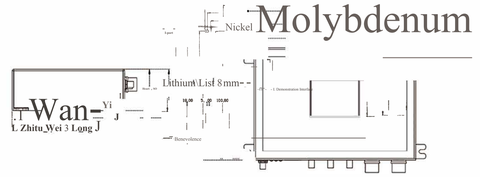
产品外形











Model: ODL-HF-PD-03

Product superiority

- Targeted, with precise locking range for discharge characteristics and accurate judgment. Compared to specialized testing equipment, it offers lower costs.
- This device is installed near switchgear, ring main units, overhead lines, cables, and similar infrastructure. It enables real-time online monitoring without requiring manual inspections, operates independently of natural conditions, and eliminates significant labor costs associated with manual patrols. With high real-time fault detection capabilities, it significantly extends the warning window and ensures stable operation of on-site equipment. The non-invasive installation method allows operation without power interruption or equipment shutdown at the installation site.

Functional characteristics

- AC220V power supply with direct feeding, multi-sided isolation, and built-in dedicated grounding wire
- Color LCD display supporting Chinese and English languages, capable of displaying multiple data items
- Built-in RS485-RTU standard communication protocol with broad compatibility
- Various types of indicator lights, including those for system status, gateway status, network port status, W-old status, and screen status.
- Built-in ambient temperature detection for automatic data calibration
- Active detection function: performs — scans per second for more accurate data
- Supports network ports or WIFI connectivity
- HFCT Ground Wave Detection,TEV Electromagnetic Wave Detection,AE Ultrasonic Detection

Test Results Display