

Instructions for the intelligent monitoring terminal for arrester working conditions

CE-AL12-5THT2-1.0

1 Overview

Lightning damage is one of the main factors affecting the safety of power grid operation. Due to the low insulation level of the distribution network system and generally no lightning protection wire, lightning strikes are particularly prominent. At present, as the main means of lightning protection in distribution networks, lightning arresters are widely used in distribution lines and distribution transformers. In areas where lightning activities are relatively frequent, the failure rate of arresters has remained high. Faced with the large quantity and wide distribution of arresters, it brings huge manpower and economic pressure for power outage maintenance and troubleshooting. For this reason, our company has specially developed a lightning arrester working condition Internet of Things monitoring system.

This monitoring unit has passive wireless (no external power supply, wireless transmission), low power consumption, GPS positioning, comprehensive lightning current parameter monitoring: peak value, effective value, wave head, duration, energy, frequency and other related parameters. Through the synchronous detection of time, environmental parameters, and electrical parameters of the arrester, the use of big data and neural network algorithms to effectively eliminate the impact of environmental factors such as pollution, temperature, humidity, and interphase capacitance, coupled with multiple international and industry standards such as Qrs, impact times, leakage current and other international and industry standards, it can effectively predict and judge the working conditions of the arrester, and realize the pre-judgment repair and accurate fault alarm in management.



2 Features

- Lightning monitoring: detection of all parameters of lightning current: real-time monitoring of parameters such as number, time, peak value, effective value, wave head, duration, energy, frequency and so on.
- Condition monitoring: According to the international and industry standard Qrs, the number of impacts, leakage current and other multi-parameter criteria, effective prediction and judgment of the operating conditions of the arrester.
- A variety of probes: it is convenient for the direct installation of various aperture arresters, and the lightning monitoring needs of different nodes (flexible, open).
- Accurate judgment: effectively eliminate the influence of temperature, humidity, and pollution on the leakage current, and monitor the status of the arrester in real time.
- Environmental monitoring: It has the synchronous monitoring function of time, temperature and humidity.
- Fault location: with GPS positioning function, accurately determine the location of the fault.

- Intelligent duplex: remote software update; can remotely set the threshold value, early warning value, alarm value, communication times and other parameters in each unit.
- Easy to install: self-monitoring of the environment before installation to ensure the use of the product, just screw the bottom of the arrester, light and handy.
- Passive wireless: no need for power supply, with power warning, charging monitoring, and multiple wireless communication methods such as NB, 4G, and LORA.
- Accurate counting: It has the functions of preventing repeated counting of multiple thunders and identifying the impact of power grid fluctuations.

3 Product function

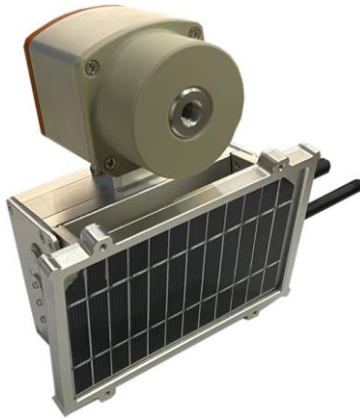
1	Full parameters	Real-time monitoring of leakage current, lightning times, time, peak value, effective value, wave head, duration, energy, frequency and other parameters.
2	Self-powered	Product integrates solar panel + lithium battery
3	Self-monitoring	Monitor the internal battery power, solar charging current, and self-power consumption of the product.
4	Remote setting	The lightning current alarm threshold and leakage current alarm threshold can be set remotely.
5	Remote upgrade	The firmware of the acquisition unit can be upgraded remotely
6	Synchronization detection	With synchronous monitoring function of time, temperature and humidity
7	Fault location	With GPS positioning function, accurately determine the location of the fault

4 Main Specifications

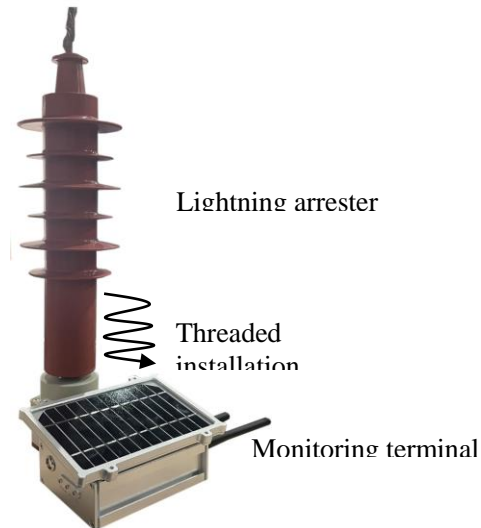
1	Measurement error	10%
2	Input signal	Lightning current: 300A~20kA Leakage current: 100mA
3	Power supply	6V 1.5W solar,battery 2000maH
4	Output signal	NB-IOT+GPS
5	Linear range	0~120%
6	Number of acquisition channels	One way lightning current, one way leakage current
7	Power consumption	Send 200mA, standby 4mA
8	Protocol	MODBUS protocol
9	Operating temperature	-20℃~+60℃
10	Working humidity	Not more than 95% (temperature 30℃, no dew)
11	Dimensions	See Figure 1 for details
12	Shell material	metallic material
13	Support frequency band	Band1/2/3/5/8/12/13/17/18/19/20/25/26/28/66/70 (currently only the Band5 frequency band is open for the product)
14	Bandwidth	100bps~100Kbps
15	Transmit power	<23dBm±2dB
16	Acceptance sensitivity	<-139dBm±1dB
17	Network protocol	COAP protocol
18	Platform	Telecom AEP platform

19	Synchronization detection	It has the function of synchronous monitoring of time, temperature and humidity.
20	Remote setting	The lightning current alarm threshold and leakage current alarm threshold can be remotely set through the SSET cloud platform
21	Remote upgrade	The firmware of the acquisition unit can be upgraded through the telecom AEP platform

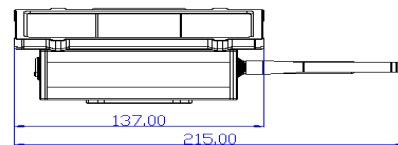
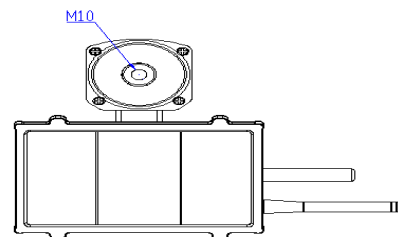
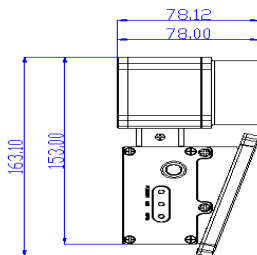
5 Appearance and Dimensions:



Size: 215*163*78mm



Installation method



Product Structure

6 Packet format

Item	Contents	Data Format	Description
Address	1 byte	1 byte	Address 01
Data length	1 byte	1 byte	Data length, the data length from "Number of Lightning Strikes" to "Software Version Number"
Number of lightning strikes	Unsigned integer	2 byte	High byte first, number of lightning strikes
Lightning time	YY-MM-DD-HH-M M-SS	6 byte	BCD code, 210226134258 means 13:42:58 on February-26, 21
Peak lightning current	Peak value (signed), unit: ampere	2 byte	High byte first, unit A, peak value = read value * lightning current range/1000

Effective value of lightning current	Effective value	2 byte	High byte first, unit A, effective value = read value * lightning current range/1000
Wave head time	Unsigned integer	2 byte	High byte first, the unit is uS, and the magnification is 0.1
Half peak time	Unsigned integer	2 byte	High byte first, the unit is uS, and the magnification is 0.1
Lightning strike time	Unsigned integer	2 byte	High byte first, the unit is uS, and the magnification is 0.1
Lightning energy	Unsigned integer	2 byte	High byte first, magnification is 0.001, unit coulomb (C)
Steepness	Unsigned integer	2 byte	High byte first, the unit is uS, and the magnification is 0.1
Lightning temperature	Unsigned integer	2 byte	High byte first, the unit is ℃, and the magnification is 0.1
Lightning Strike Humidity	Unsigned integer	2 byte	High byte first, the unit is ℃, and the magnification is 0.1
Current Temperature	Unsigned integer	2 byte	High byte first, the unit is ℃, and the magnification is 0.1
Current humidity	Unsigned integer	2 byte	High byte first, the unit is %, and the magnification is 1
50HZ leakage current	Uint32	4 byte	High byte first, unit mA, effective value = read value * leakage current range/1000
Leakage current at full frequency	Uint32	4 byte	High byte first, unit mA, effective value = read value * leakage current range/1000
Leakage current frequency	Unsigned integer	2 byte	High byte first, the unit is hZ, and the magnification is 0.1
GPS latitude	Uint32	4 byte	High byte first, the unit is °, and the magnification is 0.000001
GPS longitude	Uint32	4 byte	High byte first, the unit is °, and the magnification is 0.000001
GPS status	Unsigned integer	2 byte	0: Positioning is successful; 1: Positioning; 2: Positioning is invalid; 3: Failure;
Battery power	Unsigned integer	2 byte	High byte first, the unit is %, and the magnification is 1
Battery voltage	Unsigned integer	2 byte	High byte first, the unit is V, and the magnification is 0.001
Solar charging current	Unsigned integer	2 byte	High byte first, unit mA, magnification is 1
Working current	Unsigned integer	2 byte	High byte first, unit mA, magnification is 1
Signal strength	Unsigned integer	2 byte	High byte first
Heartbeat time	Unsigned integer	2 byte	High byte first, the unit is min, and the magnification is 1
Lightning current range	Uint32	4 byte	High byte first, unit A, magnification is 1
Leakage current range	Unsigned integer	2 byte	High byte first, unit mA, magnification is 1
Lightning current alarm threshold	Unsigned integer	2 byte	High byte first, the unit is %, and the magnification is 1
Leakage current alarm threshold	Unsigned integer	2 byte	High byte first, the unit is %, and the magnification is 1
Sampling rate	Unsigned integer	2 byte	0: 2Msps; 1: 2Msps; 2: 2Msps; 3: 2Msps; 4: 500Ksps; 5: 100Ksps; 6:50Ksps;
Calibration mode	Unsigned integer	2 byte	reserve
Heartbeat mode	Unsigned integer	2 byte	reserve
Upgrade completion rate	Unsigned integer	2 byte	reserve
Send mode	Unsigned integer	2 byte	reserve
Software version number	Unsigned integer	2 byte	High byte first
CRC check	Unsigned integer	2 byte	MODBUS CRC low order first

The heartbeat packet format of the multifunctional intelligent arrester acquisition unit:

Product address 01 (1 byte), function code 03H (1 byte) Data area length 06H (1 byte), XXXXXXXX (4 bytes, 50HZ leakage current amplitude), XXXX (2 bytes) , Leakage current frequency), XXXX (CRC check, 2 bytes).

7 User notice

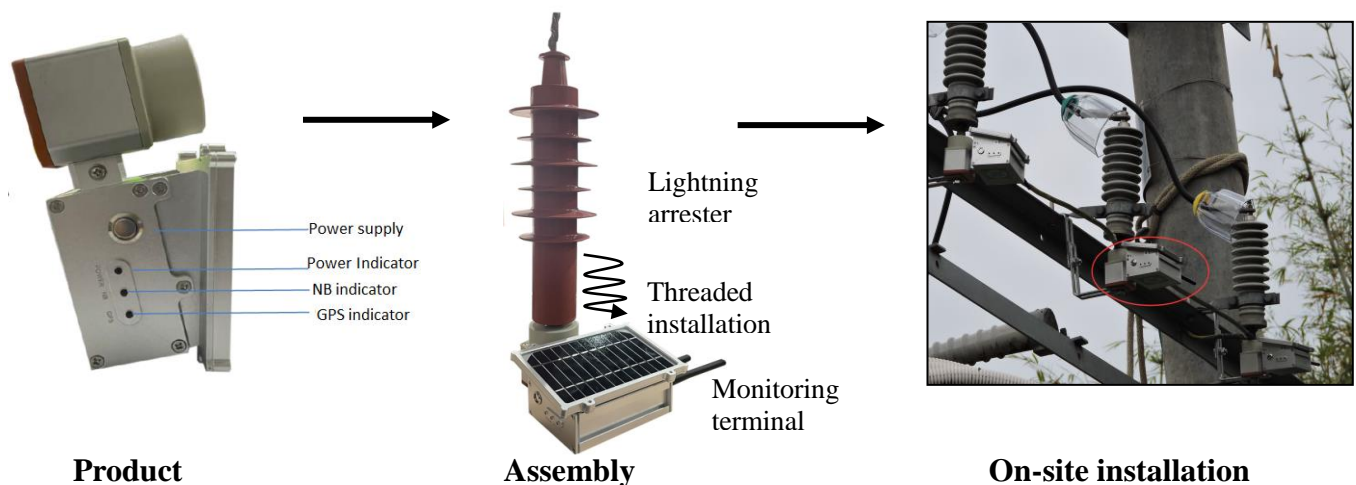
- 1 Please use it in strict accordance with the manual, otherwise it may damage the protective measures provided by the tester.
- 2 The solar panels of the collection unit are of glass structure, so collisions and drops should be avoided.
- 3 Do not use the collection unit near explosive gases or vapors.
- 4 When the acquisition unit is used in an environment with strong magnetic interference, please pay attention to the shielding of the input line, and the output signal line should be as short as possible. For centralized installation, the minimum installation interval should not be less than 10mm.

5 Please do not damage or modify the product label, logo, do not disassemble or modify the product, otherwise the company will no longer provide the "three guarantees" (replacement, return, repair) service for the product.

6 The company guarantees product quality. All products are inspected in full by the company's inspection department before they leave the factory. If product quality problems are found, we promise to replace and return within six months, and repair within two years (for products that are not used in accordance with product technical conditions, Damage caused by accidents such as disassembly, modification and debugging that are not caused by manufacturing or material defects, or modification and repair of this product without the written permission of Shenzhen Sensor Electronic Technology Co., Ltd. are not within the company's product quality commitment and warranty).

7 Please read the installation instructions carefully before use.

8 Installation instructions



Step 1: Press the power button of the product. When all three signal lights are on, the product is normal and can be installed

Step 2: Signal light display and status description.

1. Power indicator: "POWER" is always on (green), indicating that the working power supply is normal and the product is working normally. If the power indicator does not light up, it means that the battery is low. Please place the product under the sun or incandescent light for charging until the power indicator light turns on after the switch is pressed.
2. Communication indicator: "NB" keeps on (green), it means that communication is established with the IoT platform and the communication is working normally. If it flashes (once per second), it means that the product is establishing a communication link with the IoT platform, or the signal strength of the environment is not strong enough to be installed.
3. Positioning signal light: "GPS" keeps on (green), it means the positioning is successful, it is working normally, and it can be installed. If it flashes (once per second), it means the product positioning is unsuccessful and cannot be installed.

The third step: matters needing attention

1. After the product is turned on by the power button (press), when all three signal lights are on, the product works normally and can be installed.
2. After the product is working normally, when all three signal lights are off, the product is in a dormant state, which is a normal state.
3. When the various signal lights of the product flash, it means that they are not working properly. Please see the above description for the status.