

Overhead Line Sensor

- Acquisition Unit



Key Features

- Innovative low current (5A) energy harvesting, maintaining reliable network connection and operation
- Advanced electronic current transformer, precision of line current measurement reaching $\pm 1\%$
- Electric-field sensor of optimized design, unaffected by multi-circuit lines on one pole, accurately identifying voltage fall and outage
- Intelligently triggered high-frequency (4kHz) wave-recording of line current and line-to-ground electric field, capturing momentary transient waveform of low current ground faults
- High precision ($\pm 100\mu\text{s}$) wireless time synchronization based sync collection of 3 phase current and line-to-ground electric field waveforms
- Low-consumption two-way wireless communication, supporting remote upgrade and maintenance
- Live installation and removal, IP67 protection rating

Product Description

As an important sector in the building of smart grids, the operation of smart distribution networks faces the great challenge of quick and accurate locating of power lines faults, especially low-current ground faults. Existing distribution automation, feeder automation, and fault indicating technologies have the problems of requiring high investment, power off for construction, low accuracy of detection, etc. With high-precision measurement and high-frequency wave-recording of line current, the InHand Wireless Overhead-line Monitoring System, an innovative smart distribution lines monitoring product launched by InHand Networks, can accurately identify fault types and quickly locate the faulty section on power lines, thus largely shorten response and processing periods of power line faults and improving power supply reliability.

The Overhead Line Sensor, acquisition unit and core sensing unit of the system, is applicable to 10kV overhead distribution lines. With innovative low current energy harvesting and wireless communication technologies, the Overhead Line Sensor can submit real-time monitoring data, keeping operational staff updated of the operation status of power lines. With big-data based comprehensive distribution line status analysis, the InHand Wireless Overhead-line Monitoring System can provide line status analysis including line faults, line loads, energy quality, etc., giving comprehensive and solid data support for structural optimization of distribution networks.

Features & Advantages

■ **Accurately Recognize Line Status, Support Current Wave-recording**

With innovative precision current measurement and line-to-ground electric field detection technologies, measurement precision of line current between 0~600A reaches $\pm 1\%$, detection sensitivity of change of line-to-ground electric field reaches $\pm 0.5\%$, thus the sensor can accurately recognize power line status. It supports wave-recording of line current during faults or batch summon of operation data, which will lead to operation experience accumulation and continuous improvement.

■ **Smart Detection of Line Faults, No More Mal-operation or Refusing to Operate**

With accurate recognition of line status, the product can detect interphase short circuit,

single phase ground faults, etc. accurately. It can auto decide action value of fault current alarming with its powerful signal processing and micro-computing capabilities, effectively preventing mal-operation or refusing to operate that are caused by load fluctuation, reclosing magnetizing inrush current, etc.. Supports inverse time-delay action for maximum coordination with substation protection action, avoiding momentary disturbances and ensuring correct actions.

- **Provide Abundant Operation Information**

Provides operational information, including line current, line-to-ground electric field, fault status, live or dead, etc. to main station system. Can also provide information like cellular signal strength, battery voltage, etc., to help operational staff learn overall status of the overhead lines.

- **Diversified Line Status Indications**

Super bright LED provides 360° visible status indication, and indicates different line status by different flashing frequencies. Auto resets when fault is removed and power supply recovers; also supports timed reset, and wireless remote set and reset.

- **Always Online, Keep Track of Line Status**

Hybrid networking of short and long range wireless connection, support various complicated line topologies; proactive regular (configurable, default every 5 minutes) line status reporting, and bi-directional confirming and resending communication functions, safeguarding data transmission reliability. Keep track of real-time status of lines, putting an end to the “wake up once a day or never wake up” mode of traditional fault indicators, while on less wireless communication costs.

- **Innovative Low Current Energy Harvesting Technology, Rid of Batteries**

Though embedded with a large capacity, long-service argon lithium battery, by applying new material and innovative power supply technology, the Sensor can continuously harvest energy from the line when line current is between 0~600A. A line current of 5A can meet the minimum requirement for energy harvesting, saving the use of batteries and

prolonging product service life.

■ **Maintenance Free, Wireless Remote Upgrade**

Operate autonomously once hanged on line, completely maintenance free. Customers may remote configure parameters, update fault criteria or upgrade the software wirelessly when necessary. The complete maintenance free design offers convenience, flexibility, and improved efficiency.

■ **Safe and Convenient Live Installation and Removal**

Use insulated hot stick to live install or remove the device safely and conveniently.

■ **High Protection Rating, Rugged for Harsh Conditions**

The Sensor is highly ruggedized to ensure long hours of reliable operation even under harsh conditions, featuring high EMC level, extremely wide range of input voltages and operating temperatures, IP67 protection rating, resistance to storms and typhoons of force 8, coated structural parts that are corrosion and rust proof and resistant to salt spray corrosion.

Product Specifications

Applicable Power System	Rated Frequency	50Hz
	Rated Voltage	10kV
	Working Current	0~600A
	Applicable Wire Diameter	8 ~ 42mm (35 ~ 400mm ²)
	Neutral Earthing Types	All earthing types
Measurement Range and Precision	Line Current	Current measurement range: 0~600A, Measurement precision: 0~300A, ±3A; 300~600A, ±1%
	Line-to-ground Electric Field	0~4095
	Quantity of Electricity of Energy Harvesting	0~100%, ±0.5%

	Battery Voltage	0~3.6V, $\pm 2\%$
Fault Detection	Identifiable Fault Types	Interphase short circuit, single-phase grounding; momentary faults and persistent faults
	Minimum Identification Time of Reclosing	0.2S
Line Status Indications	Types of Indications	Super bright LED (Luminous intensity of single LED >13000mcd)
	Visibility	360° all directions
	Visible Distance	Day: 200m Night: 500m
	Continuous Flashing Duration after Outage	≥ 2000 h
	Fault Reset Modes	Auto-reset when supply recovers, Timed auto reset, Remote manual reset
	Timed Reset Period	Between 0~48h, default is 24h
Short-range Wireless Communication Indicators	Operating Frequency	470~510MHz
	Transmission Power	≤ 10 mW (10dBm)
	RX Sensitivity	≥ -90 dBm
	Transmission Rate	250kbps
	Communication Distance	≤ 100 m
	Network Topology	Star
	Directionality	All directions
Power Supply	Battery Capacity	3.6V, 8.5Ah
	Energy-harvesting Operation	Line current 5A
Mechanical	Dimensions (W x H x D)	120mm x 129mm x173mm
	Weight	<1kg
	Protection Rating	IP67 (IP68- depending on type-test result)
	Tensile Strength of Line-	Un-shift vertical 50N, horizontal (along the line)

	clamping Mechanism	50N
	Endurance to Installation & Removal	No damage for >50 time
	Mechanical Strength (Anti Shock, Falling, Vibration)	Vibration level 1 Slanted falling from 1m
Operating Environment	Working Temperatures	-40 ~ +70 °C
	Storage Temperatures	-40 ~ +70 °C
	Ambient Relative Humidity	5%~95% (non-condensing)
Safety and EMC	Short Circuit Current Withstand Capability	20kA/2S
	Adjacent Interference Test	100mm
	Damped Oscillatory Electric Field Immunity	Level 5
	Rapid Transient Pulse Train Immunity	Level 4
	Fire Danger Rating	Level 5
	ESD Immunity	Level 4
	RF Radiated Fields Immunity	Level 4
	Surge Immunity	Level 4
	Power Frequency Magnetic Field Immunity	Level 5
Service Life and Warranty	Service Life	>8 years
	Electrical Endurance	>2000 times
	Warranty	1 year

Dimensions (mm)

