



InHand Wireless Overhead Line System Overhead Line Sensor

Key Features:

- Innovative low current (10A) auto power-harvesting technology, maintains network connection and reliable operation
- Advanced electronic current transformer, measurement precision of line current reaching $\pm 1\%$.
- Electric-field sensor of optimized design, unaffected by multi-circuit line on one pole, recognizes voltage fall and outage accurately.
- Intelligent triggering high-speed wave-recording (4kHz) of line current and line-to-ground electric field, captures momentary transient waveform of low current ground faults
- High precision ($\pm 100\mu\text{s}$) wireless time synchronization, supports synchronized waveform collection of 3-phase current and line-to-ground electric field
- Low power consumption bi-directional wireless communication, supports remote upgrade and maintenance
- Install and remove live, IP67 protection rating

Product Description

As an important sector of smart grid building, smart distribution network faces the serious challenge of how to quickly and accurately locate the faulty section in

inter-phase short circuit or ground fault incidents. While current distribution automation, feeder automation, and conventional fault indicators have the problems of high investment, requiring power off for construction, low accuracy and etc., InHand Networks launched an innovative smart monitoring product for distribution network overhead lines. The InHand Wireless Overhead Line System can accurately identify the type of fault and quickly locate the faulty section of overhead lines through precision measurement and high-speed wave-recording of line current, thus will significantly shorten response and treatment time of overhead line faults and improve the reliability of power supply.

The Overhead Line Sensor, core sensing unit of InHand Wireless Overhead Line System, is applicable for overhead lines of 6~35kV distribution networks. With innovative low current auto power-harvesting technology and wireless communication technologies, the Overhead Line Sensor can report real-time monitoring data, allowing operators to stay updated of the status of overhead lines. Also, with big-data based comprehensive analysis of the status of distribution network overhead lines, including line faults, line losses, energy quality and etc., the InHand Wireless Overhead Line System can provide comprehensive and solid data support for the structural optimization of distribution networks.

Features

■ **Accurate Recognition of Line Status, Support Wave-recording of Line Current**

Accurately recognize the status of overhead lines with innovative precision measurement of line current and line-to-ground electric-field, measurement precision reaching $\pm 1\%$ for line current between 0~630A, sensitivity to detect $\pm 0.5\%$ change of line-to-ground electric field. Support wave-recording of line current during faults and batch summon of operation data processes, accumulating operation experience for continuous improvement.

■ **Smart Identification of Faults, No More Mal-operation of Failing to Operate**

Smart identification of interphase short circuit and single phase ground faults based on accurate recognition of line status. Auto decide operating value of faulty current alarm based on powerful signal processing and micro-computing capability, effectively avoid mal-operation or failing to operate caused by load fluctuation and reclosing magnetizing inrush current. Inverse time-delay operation that can cooperate with substation protection operation to maximum degree, avoid momentary disturbance and ensure correct actions.

- **Abundant Operation Information**

Provides abundant operation information to the main station system, including line current, line-to-ground electric field, fault status, live or dead, and auxiliary information like cable temperature, power of harvesting, battery voltage, etc., to help operators get overall control of the operation status of overhead lines.

- **360° Visible Indication of Line Status**

Super bright LED provides 360° visible status indication, indicating current line status by various combinations of flashing rates. Auto reset when line fault is removed and power supply recovers; also support timed reset, and wireless remote control set and reset.

- **Keep Track of Real-time Status of Overhead Lines**

Hybrid networking of short and long range wireless connection supporting various complicated topologies; active and regular (configurable, default at every 5 minutes) line status reporting, and bi-directional signaling and resending communication functions, safeguard the communication reliability. Customers can keep track of real-time status of overhead lines, putting an end to the "wake up once a day or never wake up" mode of conventional fault indicators, while on less wireless communication cost.

- **Innovative Low Current Auto Power-harvesting Technology, Saving the Use of Battery**

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 power from the line with a line current between 0~630A. A line current of 10A can meet the minimum requirement for the operation of auto power-harvesting, saving the use of battery and largely prolonging product service life.

■ **Free of Maintenance, Remote Upgrade Wirelessly**

Operate autonomously once hanged on line. Customer may configure, update fault criteria or upgrade the software of the Sensor remote wirelessly whenever necessary. The completely maintenance free design offers convenience, flexibility, and improved efficiency.

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

Use the insulated control lever to install or remove the device live, which is safe and convenient.

■ **High Protection Level, Prepared for Harsh Conditions**

The Sensor is highly ruggedized to safeguard long hours of reliable operation under harsh conditions, featuring robust industrial-grade build, high EMC level, super wide range of input voltages and operating temperatures, housing of IP67 protection rating - resistant to hurricanes and typhoons of force 8 as well as lightning storms, etc., and structural parts coated as corrosion and rust proof to resist salt spray corrosion.

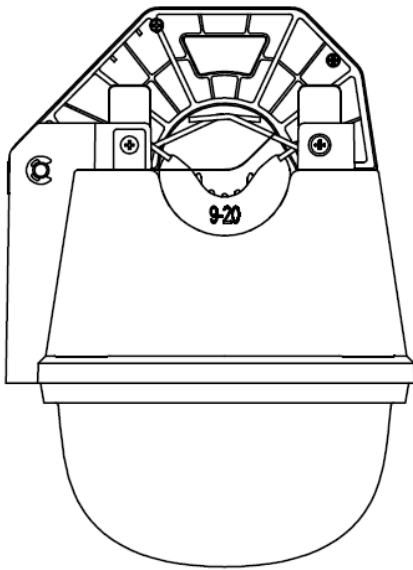
Product Specifications

Applicable Power System	Rated Frequency	50Hz
	Rated Voltage	6~35kV
	Working Current	0~630A
	Applicable Wire Diameter	8 ~ 42mm (35 ~ 800mm ²)
	Neutral Earthing Types	All types
Measurement Range and	Line Current	Measurement range: 0~630A, Measurement precision: 0~300A, ±3A;

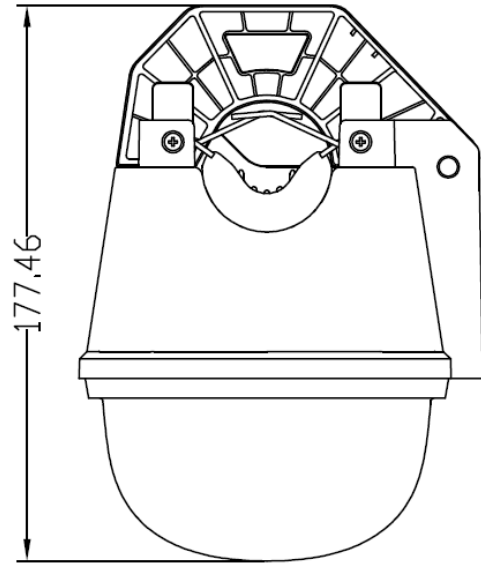
Precision		300~630A, $\pm 1\%$
	Line-to-ground Electric Field	0~4095
	Cable Temperature	$-40^{\circ}\text{C}\sim+85^{\circ}\text{C}$, $\pm 1^{\circ}\text{C}$
	Energy of Auto Power-harvesting	0~100%, $\pm 0.5\%$
	Battery Voltage	0~3.6V, $\pm 2\%$
Fault Detection	Types of Identifiable Faults	Inter-phase short circuit, single-phase ground fault; momentary fault and permanent fault
	Minimum Identification Time of Reclosing	0.2S
Line Status Indications	Types of Indications	Super bright LED (Luminous intensity of single LED>13000mcd)
	Visible Angles	360° Omni-directional
	Visible Distance	Day: 200m Night: 500m
	Continuous Flashing Duration since Outage	$\geq 2000\text{h}$
	Reset Modes	Auto-reset when power supply recovers, Timed reset, Remote control reset
	Time of Timed Reset	Configurable between 0~48h, defaulted as 24h
Short-range Wireless Communication Indicators	Operating Frequency	470~510MHz
	Transmit Power	$\leq 10\text{mW}$ (10dBm)
	RX Sensitivity	$\geq -90\text{dBm}$
	Transmission Rate	250kbps
	Communication Distance	$\leq 100\text{m}$
	Network Topology	Star
	Directionality	Omni-directional
Power Supply	Battery Capacity	3.6V, 8.5Ah
	Auto Power-harvesting	Line current 10A
Physical Characteristics	Dimensions (W x H x D)	120mm x 129mm x 177mm
	Weight	<1kg
	Protection Rating	IP67 (IP68-TBC upon result of type-test)
	Tensile Strength of Line-clamping Mechanism	Un-shift for vertical 50N, horizontal (along the direction of line) 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	31.5kA/2S
	Adjacent Interference Test	100mm
	Fire Danger Rating	Level 5
	Immunity against ESD	Level 4
	Immunity against RF Radiated Fields	Level 3
	Immunity against Surge	Level 4
	Immunity against Power Frequency Magnetic Field	Level 5
Service Life and Warranty	Service Life	>8 years
	Electrical Endurance	>2000 times
	Warranty Period	1 year

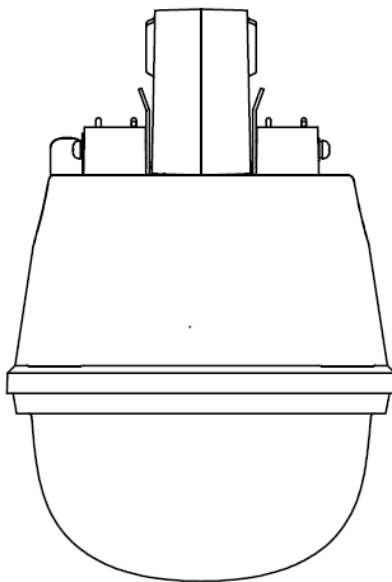
Dimensions (mm)



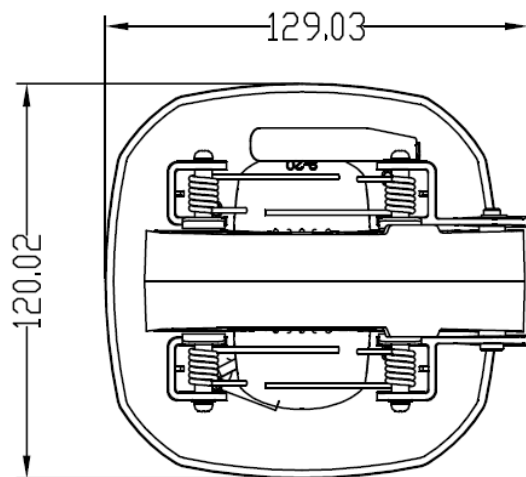
Front View



Back View



Side View



Top View

InHand Networks is an established global leader in industrial M2M products and solutions, with a record of tremendous success following groundbreaking innovation since inception in 2001.

InHand serves world-class partners and customers, including General Electric, China State Grid, SKF, Schneider Electric, Siemens, Rockwell Allen-Bradley and many others with an extensive product portfolio including industrial cellular devices, industrial Ethernet switches, rugged computers, IoT management platforms, remote PLC access tools, wireless sensor network devices, and distribution automation solutions.

Proudly bearing the marks of both Schneider Electric CAPP Technology Partner and Rockwell Automation Encompass Product Partner, InHand Networks defines industrial innovation and reliability.



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