

Non-contact AC Current and Voltage 2-in-1 Sensor

1. Engineering Background

The 3rd Generation Non-Contact AC Voltage Series was engineered to overcome the critical limitations of traditional capacitive-based sensors:

- **Positional Sensitivity:** Traditional sensors suffer from accuracy degradation due to wire positioning, insulation thickness, and core-to-conductor displacement. Our new design ensures high stability regardless of wire gauge or minor physical shifts.
- **Environmental Drift:** We have mitigated measurement errors caused by thermal expansion, contraction, and environmental fouling (contamination) that typically plague field-deployed sensors.
- **Grounding Complexity:** In complex environments with floating grounds, signal commons, and varying earth potentials, standard sensors often lose precision. Our solution provides reliable detection by isolating the reference points from ground line interference.

2. Product Overview

This smart sensor integrates high-impedance capacitive coupling with advanced digital signal processing—including time-frequency domain analysis, phase-locking, and AI-driven data modeling. It provides a comprehensive, non-intrusive (split-core) monitoring solution for:

- **Non-Destructive Safety Monitoring:** Rapid installation without conductor stripping, significantly enhancing personnel and equipment safety.
- **Comprehensive Power Metrics:** Real-time acquisition of current, voltage, active power, and grounding resistance.
- **Asset Health Assessment:** Predictive monitoring of insulation health, environmental humidity, and contamination levels.

3. Key Features

- **Superior Precision:** AC Current $\leq 0.5\%$; AC Voltage $\leq 1.5\%$; Power $\leq 1\%$
- **High-Reliability Architecture:** Dual non-contact measurement for both current and voltage ensure an isolated, failure-resistant monitoring mode.
- **Robust Anti-Interference:** Employs **Bootstrap High-Impedance Technology** to neutralize co-frequency interference and spatial electric field noise.

- **Intelligent Self-Management:** Features automated zero-point calibration and real-time probe health diagnostics.
- **Insulation and Environmental Diagnostics:** Provides real-time online monitoring for the measured conductor's insulation (anomaly trends and early warnings) as well as the probe's spatial environment (fouling and humidity).

4. Technical Specifications

	Parameter	Range	Notes
1	Input Voltage	30-400V	Other ranges customizable
2	Voltage Accuracy	≤1.5%	3%–5% when wire diameter ≤ 2/3 of aperture
3	Input Current	0-800A	Customizable Split-Core High-Current Type
4	Current Accuracy	≤0.5%	
5	Power Accuracy	≤1.0%	
6	Frequency Range	45-65Hz	customizable
7	Output Interface	RS485	MODBUS RTU
8	Power Supply	15VDC	customizable
9	EFT/Burst Immunity	±3KV	Input / Power Ports
10	Isolation Voltage	≤2500VDC	
11	Operating Temperature	-40~80°C	
12	Storage Temperature	-40~80°C	

5. Product Introduction

5.1. Accuracy

- AC Current Accuracy: 0.5% (at ambient temperature).
- AC Voltage Accuracy: 1.5% absolute accuracy when the conductor diameter is $\geq 2/3$ of the aperture diameter.
- Accuracy ranges from 3%–5% for conductor diameters outside this range. As a general principle, the conductor diameter must not be less than $1/3$ of the aperture diameter.
- Power Accuracy: $\leq 1.5\%$

5.2. Communication

- Supports various wired/wireless protocols.

5.3. Self-Calibration

- **Factory Calibrated:** Pre-configured for "Plug-and-Play" operation. No field calibration is required if the conductor is centered.

- **Dynamic Re-Calibration:** For standard-sized conductors, the system automatically returns to a calibrated steady state following physical vibrations or disturbances.

5.4. Grounding & Reference Configurations

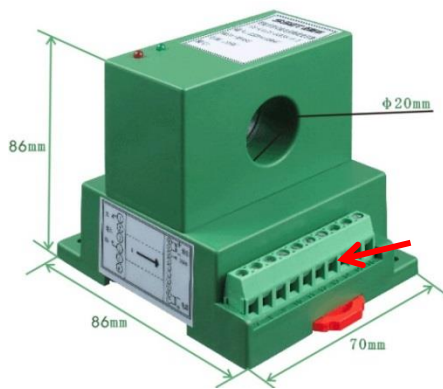
The voltage reference is determined by the Ground Terminal connection:

- **Earth Ground (PE):** Measures **Phase-to-Ground** voltage.
- **Signal Common (G0):** Measures **Phase-to-Common** voltage.
- **Neutral (N):** Measures **Phase-to-Neutral** voltage.

5.5. Advanced Diagnostics

- **Grounding Health:** The system detects "Poor Grounding" by monitoring slow output drift and settling time.
- **AC/DC Hybrid Environments:** Filters DC components to output pure AC amplitude and phase. Specialized algorithms can be enabled to monitor slow-varying DC (> 0.5Hz) if required.

6. Product Dimensions and Wiring Diagram



PIN	定义	说明
4	VIN-	voltage reference
7	+15V	+15V Power Supply
8	GND	Power Ground
10	RS485+ (A)	
11	RS485- (B)	

7. Operating Precautions

- **Terminal Compliance:** Verify all terminal markings before commissioning. Unauthorized modification of signal assignments or power polarity will void the warranty and may cause catastrophic equipment failure.
- **Grounding Distinction:** Clearly distinguish between the **Power Ground (GND)**, **System Protective Earth (PE)**, and **Digital Signal Ground (G0)**. Ensure independent wiring strictly according to specifications to maintain the independence and



SEHNZHEN SENSOR ELECTRONIC TECHNOLOGY CO., LTD.

effectiveness of each grounding loop. This is essential to meet electrical safety and Electromagnetic Compatibility (EMC) requirements.

- **Beat Frequency Mitigation:** If "Beat Frequency" interference (observed as cosine wave drift) occurs during lab testing, use a stable utility power source as the reference signal instead of a standard signal generator.