HIOKI

9272-05
9272-10
CLAMP ON SENSOR
Instruction Manual

EN

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HIOKI

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- Regional contact information
- The latest revisions of instruction manuals and manuals in other languages.
- Declarations of Conformity for instruments that comply with CE mark requirements.

Warranty

Warranty malfunctions occurring under conditions of normal use in conformity with the Instruction Manual and Product Precautionary Markings will be repaired free of charge. This warranty is valid for a period of one (1) year from the date of purchase. Please contact the distributor from which you purchased the product for further information on warranty provisions.

Introduction

Thank you for purchasing the HIOKI Model 9272-05 and 9272-10 CLAMP ON SENSOR. To obtain maximum performance from the device, please read this manual first, and keep it handy for future reference.

Inspection and Maintenance

Initial Inspection

When you receive the device, inspect it carefully to ensure that no damage occurred during shipping. In particular, check the accessories, panel switches, and connectors. If damage is evident, or if it fails to operate according to the specifications, contact your dealer or Hioki representative.

NOTE

Pack the device so that it will not sustain damage during shipping, and include a description of existing damage. We cannot accept responsibility for damage incurred during shipping.

Safety

This manual contains information and warnings essential for safe operation of the device and for maintaining it in safe operating condition. Before using it, be sure to carefully read the following safety precautions.

DANGER

- This device is designed to comply with IEC 61010 Safety Standards, and has been thoroughly tested for safety prior to shipment. However, mishandling during use could result in injury or death, as well as damage to the device. Be certain that you understand the instructions and precautions in the manual before use. We disclaim any responsibility for accidents or injuries not resulting directly from device defects.
- To avoid short circuits and potentially life-threatening hazards, never attach the device to a circuit that operates at more than 600V.

Safety Symbols

⚠	Indicates cautions and hazards. When the symbol is printed on the product refer to a corresponding topic in the Instruction Manual.
⚡	Indicates that the device may be connected to or disconnected from a live circuit.
⧈	Indicates a double-insulated device.
~	Indicates AC (Alternating Current).

The following symbols in this manual indicate the relative importance of cautions and warnings.

DANGER	Indicates that incorrect operation presents an extreme hazard that could result in serious injury or death to the user.
WARNING	Indicates that incorrect operation presents a significant hazard that could result in serious injury or death to the user.
CAUTION	Indicates that incorrect operation presents a possibility of injury to the user or damage to the device.
NOTE	Indicates advisory items related to performance or correct operation of the device.

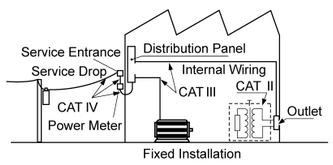
Other Symbol

⊘	Indicates a prohibited action.

Measurement categories

This device complies with CAT III safety requirements.
To ensure safe operation of measurement devices, IEC 61010 establishes safety standards for various electrical environments, categorized as CAT II to CAT IV, and called measurement categories.

CAT II: Primary electrical circuits in equipment connected to an AC electrical outlet by a power cord (portable tools, household appliances, etc.)
CAT II covers directly measuring electrical outlet receptacles.



CAT III: Primary electrical circuits of heavy equipment (fixed installations) connected directly to the distribution panel, and feeders from the distribution panel to outlets.

CAT IV: The circuit from the service drop to the service entrance, and to the power meter and primary overcurrent protection device (distribution panel).

Using a measurement device in an environment designated with a higher-numbered category than that for which the device is rated could result in a severe accident, and must be carefully avoided.Use of a measurement instrument that is not CAT-rated in CAT II to CAT IV measurement applications could result in a severe accident, and must be carefully avoided.

Instrument Installation

Operating temperature and humidity: 0 to 50°C, 80%RH or less (non-condensation)

Avoid the following locations that could cause an accident or damage to the device.

Exposed to direct sunlight Exposed to high temperature	In the presence of corrosive or explosive gases
Exposed to liquids Exposed to high humidity or condensation	Exposed to strong electromagnetic fields Near electromagnetic radiators
Exposed to high levels of particulate dust	Subject to vibration

Usage Notes

Follow these precautions to ensure safe operation and to obtain the full benefits of the various functions.

DANGER

- Clamp sensor should only be connected to the secondary side of a breaker, so the breaker can prevent an accident if a short circuit occurs. Connections should never be made to the primary side of a breaker, because unrestricted current flow could cause a serious accident if a short circuit occurs.
- To avoid electric shock, short circuits and damage to the device, observe the following precautions:
  Check the position of the range switch before taking measurements.
  Disconnect the conductor from the measurement object before switching ranges.
- To avoid electric shock, do not touch the portion beyond the protective barrier during use.

WARNING

- Do not allow the device to get wet, and do not take measurements with wet hands. This may cause an electric shock.
- To avoid electric shock when measuring live lines, wear appropriate protective gear, such as insulated rubber gloves, boots and a safety helmet.
- Before using the device, make sure that the insulation on the probes is undamaged and that no bare conductors are improperly exposed. Using the device in such conditions could cause an electric shock, so contact your dealer or Hioki representative for repair.

CAUTION

- Note that the device may be damaged if current exceeding the selected measurement range is applied for a long time.
- When the digital power meter or the clamp unit's power is turned off, do not apply current to the clamp sensor. Doing so may damage the device.
- When disconnecting the connector, be sure to release the lock before pulling off the connector. Forcibly pulling the connector without releasing the lock, or pulling on the cable, can damage the connector.
- To prevent damage to the connected instruments and the sensor, never connect or disconnect a sensor while the power is on, or while the sensor is clamped around a conductor.
- To avoid damage to the device, protect it from physical shock when transporting and handling. Be especially careful to avoid physical shock from dropping.
- Do not store or use the device where it could be exposed to direct sunlight, high temperature or humidity, or condensation. Under such conditions, the device may be damaged and insulation may deteriorate so that it no longer meets specifications.

CAUTION

- Measurements are degraded by dirt on the mating surfaces of the jaws so keep the surfaces clean by gently wiping with a soft cloth.
- To avoid breaking the cables, do not bend or pull them.
- Avoid stepping on or pinching cables, which could damage the cable insulation.
- Keep the cables well away from heat sources, as bare conductors could be exposed if the insulation melts.

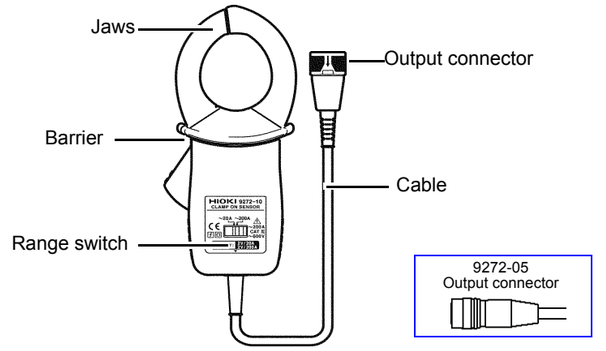
NOTE

- Correct measurement may be impossible in the presence of strong magnetic fields, such as near transformers and high-current conductors, or in the presence of strong electromagnetic fields such as near radio transmitters.
- This device may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.

Overview

The 9272-05 and 9272-10 was developed for to provide a 20 A, 200 A clamp sensor. Together with the power meter, the 9272-10 makes it possible to measure alternating current in live power lines without cutting into the lines.
The sensor features excellent amplitude-frequency response and phase-frequency response, and is easy to connect and use. Its versatility will find application in a wide variety of fields dealing with current and power measurement.

Names of Parts



Options

9705 Conversion Cable*1, 9318 Conversion Cable*1, CT9900 Conversion Cable*1, CT9901 Conversion Cable*2

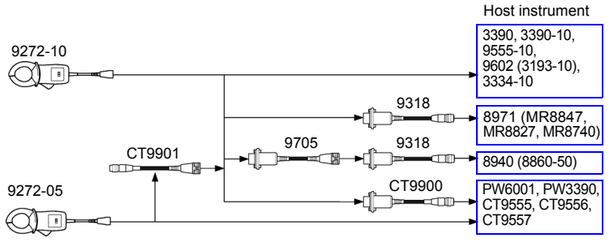
The Conversion Cable makes it possible to connect to and use with products that cannot be directly connected to the 9272-05 or 9272-10. (Refer to "Connection example") (No figures are added to the accuracy.)

CT9902 Extension Cable*2(5 m), CT9903 Extension Cable*1(5 m)

- Single sensor cable, 5 m extension (max. 10 m extension)
- Up to two extension cable is connectable. (If three or more extension cables are connected to the device, its performance is not guaranteed)
- Add the following values to each of the accuracy per cable:
  Amplitude accuracy: ±0.1% rdg. (DC ≤ f^{*3} ≤ 1 kHz)
  ±0.5% rdg. (1 kHz < f^{*3})
  Phase accuracy: ±(0.1 × f^{*3} kHz)° (1 kHz < f^{*3})

*1: For 9272-10, *2: For 9272-05, *3: frequency

Connection Example



Cannot be directly connected to any parenthesized models. A module is required.
Refer to “Combined accuracy and conditions” specified in the specifications.

Preliminary Checks

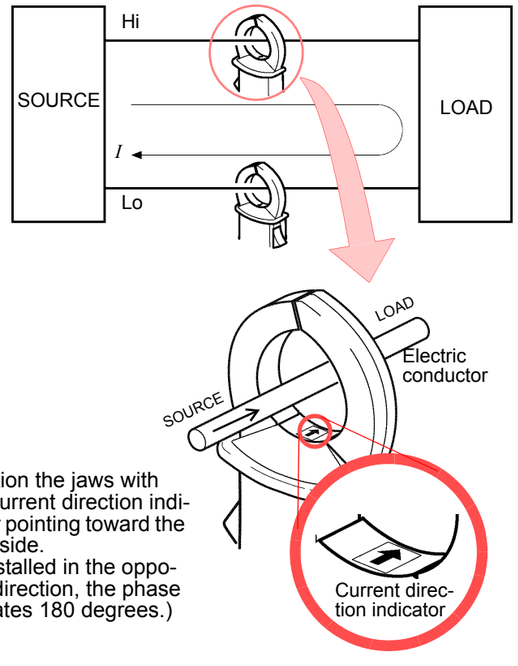
Before using the device the first time, verify that it operates normally to ensure that the no damage occurred during storage or shipping. If you find any damage, contact your dealer or Hioki representative.

Measurement procedure

At the start of measurement

1. Attach the device to the host instrument that is powered off.
2. Turn on the host instrument.
3. Set the panel range switch to the appropriate current range.
4. Clamp the jaws of the sensor onto the conductor so that the current direction on the clamp points in the direction of the load, and so that the conductor is approximately centered between the jaws. Make sure that the jaws of the clamp are fully closed.

Wiring example



Position the jaws with the current direction indicator pointing toward the load side.
(If installed in the opposite direction, the phase deviates 180 degrees.)

When measurement is complete

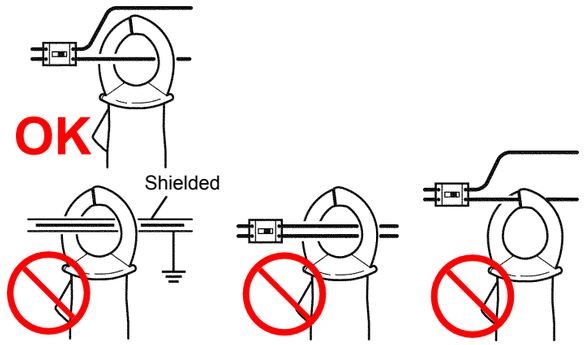
1. Remove the jaws from the conductor.
2. Turn off the host instrument.
3. Detach the device from the host instrument.

⚠CAUTION

In case of applying exceeded 430 A input such as rush current (it may reach more than ten times of rated current) while the power of the measured unit is on, release the jaws to be stationary condition (300 A max.) and then clamp it or use with the Model 9290-10 Clamp on Adapter.

NOTE

- Note that a DC component will result in an erroneous reading.
- Also note that operation will not be correct if the power frequency is very low (less than about 1 Hz).
- Ground-shielded conductors cannot be accurately measured.
- The circuit is such that a DC voltage is output briefly after the power is turned on. Stabilization of the output takes about 30 seconds.
- Also read the instruction manual for whichever device you connect to.
- Attach the clamp around only one conductor. Single-phase (2-wire) or three-phase (3-wire) cables clamped together will not produce any reading.



Maintenance and Service

- To clean the device, wipe it gently with a soft cloth moistened with water or mild detergent. Never use solvents such as benzene, alcohol, acetone, ether, ketones, thinners or gasoline, as they can deform and discolor the case.
- Measurements are degraded by dirt on the mating surfaces of the clamp-on sensor, so keep the surfaces clean by gently wiping with a soft cloth.
- If the device seems to be malfunctioning, confirm that the batteries are not discharged, and that the test leads, probes and fuse are not open circuited before contacting your dealer or Hioki representative.

Specifications

f.s. :maximum display value or scale length (Rated current)
rdg. :reading value (The value currently being measured and indicated on the measuring device.)
The specs except the output connector and options are the same as respectively those of the 9272-05 and 9272-10.

1. General Specifications

Operating environment	Indoors, Pollution degree 2, Up to 2000 m (6562ft) ASL
Operating temperature and humidity	0°C to 50°C (32 °Fto 122°F), 80%RH max. (no condensation)
Storage temperature and humidity	-10°C to 60°C (14°F to 140°F), 80%RH max. (no condensation)
Maximum rated current	200 A rms AC
Maximum rated voltage to earth	600 V rms AC (50 Hz/60 Hz) Measurement category III (anticipated transient overvoltage 6000 V)
Applicable Standards	Safety EN61010 EMC EN61326 Class A
Product warranty period	1 year

2. Specifications

-1. 20 A range Specificons

Rated current	20 A rms AC
Output voltage	2 V/20 A
Maximum input current	50 A rms (71 Apeak, continuous, 50 Hz/60 Hz, within a derating)

-2. 200 A range Specifications

Rated current	200 A rms AC
Output voltage	2 V/200 A
Maximum input current	300 A rms (430 A peak, continuous, 50 Hz/60 Hz, within a derating)

-3. 20 A/200 A range Specifications

Output impedance	50 Ω (±5%)
Accuracy guarantee for temperature and humidity	23°C±5°C (73°F±9°F), 80%RH or less
Period of guaranteed accuracy	1 year (Opening and Closing of the jaws: Maximum 10000 times)
Guaranteed accuracy period from adjustment made by Hioki	1 year (Opening and Closing of the jaws: Maximum 10000 times)
Warm-up time	1 minute

Accuracy: Within rated current for each range and inside of derating range (The following accuracy values are merely design values: amplitude at under 5 Hz and phase at under 10 Hz)
Sine wave input, conductor at jaws center position, not including each effect, a measurement instrument with an input resistance of 1 MΩ or more

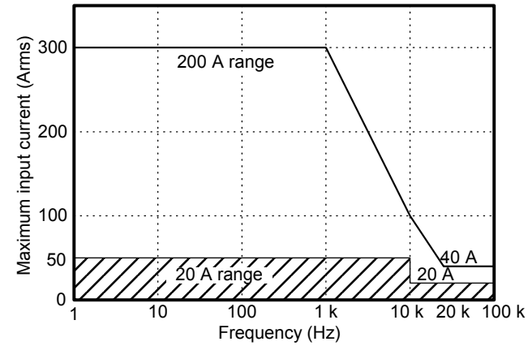
Frequency	Amplitude accuracy	Phase accuracy
1 Hz ≤ f < 5 Hz	±2.0% rdg.±0.10% f.s.	Accuracy not provided
5 Hz ≤ f < 10 Hz	±1.0% rdg.±0.05% f.s.	±1.0°
10 Hz ≤ f < 45 Hz	±0.5% rdg.±0.02% f.s.	±0.5°
45 Hz ≤ f ≤ 66 Hz	±0.3% rdg.±0.01% f.s.	±0.2°
66 Hz< f ≤ 500 Hz	±0.5% rdg.±0.02% f.s.	±0.5°
500 Hz< f ≤ 1 kHz		±1.0°
1 kHz< f ≤ 5 kHz	±1.0% rdg.±0.05% f.s.	±2.0°
5 kHz< f ≤ 10 kHz	±2.5% rdg.±0.10% f.s.	±3.0°
10 kHz< f ≤ 20 kHz	±5% rdg.±0.1% f.s.	±5.0°
20 kHz< f ≤ 50 kHz		±15.0°
50 kHz< f ≤ 100 kHz	±30% rdg.±0.1% f.s.	Accuracy not provided

Temperature coefficient	Amplitude sensitivity: Within ±0.03% rdg./°C
Effect of conductor position	Within ±0.2% rdg. (at 100 A/55 Hz input, using with the conductor 10 mm diameter)
Effect of external magnetic fields	100 mA equivalent or less (in an AC electromagnetic field of 400 A/m, 60 Hz)
Effect of radiated radio-frequency electromagnetic field	1% f.s. at 10 V/m
Measurable conductor diameter	ϕ46 mm (1.81”) or less
Rated supply voltage	±11 V to ±15 V (Tracking)
Power supply capacity	Within ±200 mA(200 A/55 Hz measurement, with ±12 V power supply)
Rated power	5 VA or less (200 A/55 Hz measurement, with ±12 V power supply)
Output connector	9272-10: Hioki PL23 (Male) 9272-05: Hioki ME15W (Male)
Dimensions	Approx. 78 W×188 H×35 D mm Approx. 3.07” W×7.40 ”H×1.38 ”D (Without protrusions, cord)
Mass	Approx. 450 g (15.9 oz.)
Cable length	Approx. 3 m
Accessories	Model 9355 CARRYING CASE Instruction manual Mark bands (6)

Option

9272-10	CT9900	Conversion Cable
	CT9903	Extension Cable
	9318	Conversion Cable
	9705	Conversion Cable
9272-05	CT9901	Conversion Cable
	CT9902	Extension Cable

3. Derating



Measurement Procedure

Combined accuracy and conditions

Combined accuracy = Accuracy of 9272-05 (-10) + Accuracy of combined product (Power factor: 1)

Combined product	Required option	
	9272-05	9272-10
CT9555,CT9556,CT9557 Sensor Unit*1	—	CT9900
PW3390 Power Analyzer	—	CT9900
PW6001 Power Analyzer	—	CT9900
9602 AC/DC Clamp Input Unit*2	CT9901	—
3334-10 AC/DC Power HiTester	CT9901	—
8940 F/V Unit*3	CT9901+9705+9318	9705+9318
8971 Current Unit*3	CT9901+9318	9318
9555-10 Sensor Unit	CT9901	—
3390,3390-10 Power Analyzer	CT9901	—

∗ 1: Add the sensor unit output accuracy to the combined accuracy when one of the addition functions, that is, RMS output or TOTAL OUTPUT, is used.
∗ 2: Add ±0.1% rdg. to the combined accuracy
∗ 3: The sensor recognition methods vary according to the Memory HiCorder settings (refer to the manuals of Memory HiCorder to be connected).