

User's Manual

CT2000A
AC/DC Current Sensor

Thank you for purchasing the AC/DC Current Sensor. To ensure correct use, please read this manual thoroughly before beginning operation.
Please familiarize yourself with the functions and characteristics of the AC/DC current sensor prior to operation. After reading this manual, keep it in a safe place.



The following symbols are used in this manual.

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This symbol is used in conjunction with the word “WARNING” or “CAUTION.”
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Ce symbole est accompagné des termes “AVERTISSEMENT” et “ATTENTION.”
- WARNING

Calls attention to actions or conditions that could cause serious or fatal injury to the user, and precautions that can be taken to prevent such occurrences.
- AVERTISSEMENT

Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures graves (voire mortelles), et sur les précautions de sécurité pouvant prévenir de tels accidents.
- CAUTION

Calls attention to actions or conditions that could cause light injury to the user or damage to the instrument or the user's data, and precautions that can be taken to prevent such occurrences.
- ATTENTION

Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures légères ou d'endommager l'instrument ou les données de l'utilisateur, et sur les précautions de sécurité susceptibles de prévenir de tels accidents.
- Note

Calls attention to information that is important for proper operation of the instrument.

Safety Precautions

This product is designed to be used by a person with specialized knowledge.
Make sure to observe the following safety precautions when handling the current sensor. YOKOGAWA assumes no liability for the customer's failure to comply with these safety precautions. Before you use the current sensor, read the measuring instrument's manual to fully acquaint yourself with its specifications and handling.
This manual is an essential part of the product; keep it in a safe place for future reference.

- The following symbols are used on this instrument.
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Handle with care. Refer to the user's manual or service manual. This symbol appears on dangerous locations on the instrument which require special instructions for proper handling or use. The same symbol appears in the corresponding place in the manual to identify those instructions.
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Risk of electric shock
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Hot surface

Make sure to observe the following safety precautions to prevent electric shock, personal injury, or damage to the instrument.

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WARNING
- Use the Instrument Only for Its Intended Purpose**
This instrument is a current output type current sensor. Use the instrument only for measuring current.
 - Beware of electric shock.**
 - Do not perform measurement if the case is damaged.
 - Do not operate the instrument with wet hands, in a rainy or humid environment, or if any water droplets are visible on it.
 - Condensation may appear if sudden changes in temperature occur. If this happens, let the instrument acclimatize to the new temperatures for at least one hour, then refrain from using the instrument until confirming that there is no condensation.
 - Do not disassemble the instrument.**
The instrument should be disassembled by qualified personnel only.
 - Use the correct power supply.**
Ensure that the source voltage matches the voltage of the power supply before turning the power ON.
 - Do not use uninsulated measurement conductors or cables.**
Use conductors or cables with reinforced insulation.
 - Make sure that the surface temperature of measurement conductors is within the instrument's operating temperature range.
 - Although it is well-insulated, do not touch the instrument or secondary output cable while voltage is being applied to the primary conductor.
 - Connect the secondary signal output before supplying power to the instrument.
 - Do not disconnect the secondary output while power is being supplied to the instrument to prevent electric shock or damage to the instrument.
 - Do not apply primary current before supplying power to the instrument to prevent electric shock or damage to the instrument.
 - Do not input excessive current as malfunction or damage may result.
 - Do not allow vibrations to disturb the instrument after it has been set in place as damage may result.

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AVERTISSEMENT
- Utiliser l'instrument aux seules fins pour lesquelles il est prévu**
Cet instrument est un capteur de courant du type de débit de courant. Utiliser l'instrument uniquement pour mesurer le courant.
 - Faire attention aux chocs électriques.**
 - Ne pas effectuer une mesure si le boîtier est endommagé.
 - Ne pas faire fonctionner le dispositif avec les mains humides, dans un environnement pluvieux ou humide, ou si des gouttelettes d'eau sont visibles dessus
 - La condensation peut s'effectuer et les changements brusques de température se produisent. Si cela se produit, laisser le dispositif s'acclimater aux nouvelles températures pendant au moins une heure, puis éviter de l'utiliser jusqu'à confirmer qu'il n'y a pas de condensation.
 - Ne pas démonter le dispositif.**
Le dispositif doit être démonté uniquement par un personnel qualifié.
 - Vérifier l'alimentation.**
S'assurer que la source de tension correspond à la tension de l'alimentation avant la mise sous tension.
 - Ne pas utiliser de conducteurs ou de câbles de mesure non isolés.**
Utiliser des conducteurs ou des câbles avec isolation renforcée.
 - S'assurer que la température de surface des conducteurs de mesure se situe dans la plage de température de fonctionnement du dispositif.

- Bien qu'il soit bien isolé, ne pas toucher le dispositif ou le câble de sortie secondaire pendant que la tension s'applique au conducteur primaire.
- Connecter la sortie du signal secondaire avant d'alimenter le dispositif.
- Ne pas débrancher la sortie secondaire lorsque l'alimentation électrique est fournie au dispositif afin d'éviter tout risque de choc électrique ou d'endommagement de l'instrument.
- Ne pas appliquer de courant primaire avant d'alimenter le dispositif afin d'éviter tout risque d'électrocution ou d'endommager l'instrument.
- Ne pas entrer de courant excessif, car un dysfonctionnement ou des dommages peuvent en résulter.
- Ne pas laisser les vibrations perturber le dispositif après qu'il a été mis en place, car des dommages peuvent en résulter.

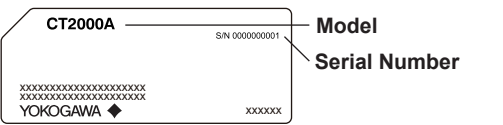
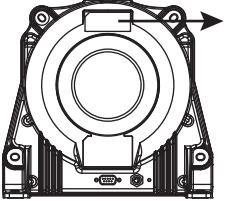
1. Description

This instrument is a current output type current sensor with a 2000: 1 current transformation ratio that performs transformation on the primary current. After familiarizing yourself with the performance and functions of this instrument, you will be able to use it in conjunction with measuring instruments from YOKOGAWA.

2. Checking the Contents of the Package

The current sensor consists of the following parts.

CT2000A



MODEL	Specifications
CT2000A	Current transformation ratio is 2000: 1

Standard Accessories

The instrument is shipped with the following accessories. Make sure that all accessories are present and undamaged.

User's manual		
IM CT2000A-01EN	CT2000A AC/DC Current Sensor User's Manual	This manual. This manual explains the handling precautions, basic usage, and specifications of the probe.
IM CT2000A-01JA	CT2000A AC/DC Current Sensor	The Japanese version of the above manual
IM CT2000A-92Z1	CT2000A AC/DC Current Sensor	Document for China
IM 00C01C01-01Z1	Safety Instruction Manual	Safety manual (European languages)

The “EN” and “JA” in the manual numbers are the language code.

Contact information of Yokogawa offices worldwide is provided on the following sheet.

PIM 113-01Z2	Inquiries	List of worldwide contacts
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Accessory (Sold Separately)

The optional accessory below is available for purchase separately. Use the accessory specified in this manual. Moreover, use the accessory of this product only with Yokogawa products that specify it as accessory.

Output connector	B8200JQ	B8200JQ consists of a connector and attachment screws for connecting to the CT2000A. A separate cable is required for making the connection.
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Accessory (sold separately) is not covered by warranty of this instrument.

3. Part Names

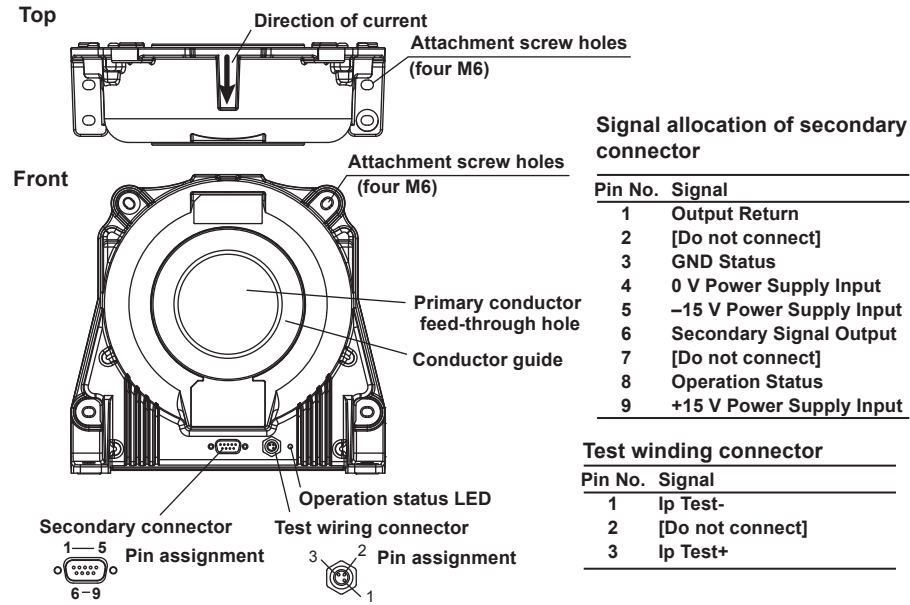


Figure 1. Names of Parts and Pin Assignments

4. Operating Procedure

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CAUTION
- Ensure that the current flowing to the conductor of the object to be measured is within the measuring range. If the current exceeds the measuring range, the instrument may overheat and get damaged.

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ATTENTION
- S'assurer que le courant qui s'achemine vers le conducteur de l'objet à mesurer se situe dans la plage de mesure. Si le courant dépasse la plage de mesure, le dispositif peut surchauffer et subir des dommages.

- Connect the secondary connector on the instrument to the current input terminal on the measuring instrument, and connect to 0 V (common) and ± 15 V on the power supply.
- Set up the measuring instrument and power supply to match the specifications of the current transducer. Carefully read the user's manuals for your measuring instrument and power supply to perform the correct procedure for making the connections.

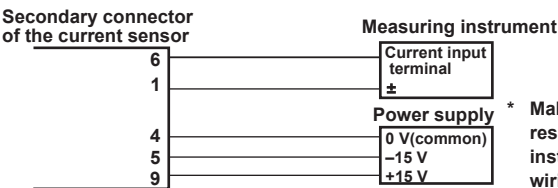


Figure 2. Connection Example

- Insert the primary conductor into the primary conductor feed-through hole on the instrument. Make sure that the direction of current flow matches the arrow on the instrument.

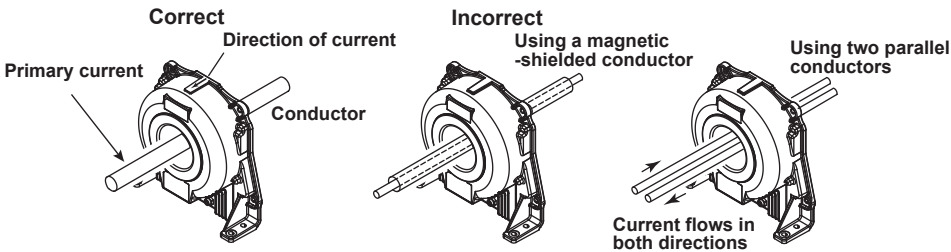


Figure 3. Insertion of a Conductor

4. Check that power is being supplied to the instrument, and then apply the primary current.
5. Read the measured values. The following calculation is used to determine the current flowing through the primary conductor.
- Example: When the output current from the instrument's secondary connector (pin 6) is 100 mA.
CT2000A: 100 mA x 2000 = 200 A

Note

- If the operation status LED is off even when power is being supplied to the instrument, the protection function may be activated. Immediately stop the primary current.
- Only pass conductors through the primary conductor feed-through hole if the current that you want to measure is flowing through the conductors and their current directions are the same. Correct measurements cannot be taken if you pass conductors with magnetic shielding or conductors whose current directions are opposite of each other through the feed-through hole.
- Make sure the primary wiring and secondary wiring do not interfere with each other. The secondary wiring may be affected by the primary wiring because it uses a very small current. Make the secondary wiring as short as possible and maintain its distance from the primary wiring, without allowing them to be parallel to each other. We recommend AWG24 or higher for the secondary wiring material. Twisted-pair may be better than shielded cable for measurement applications such as inverters.
- The instrument outputs current. Connect the instrument to a measuring instrument with current input. To connect the instrument to a measuring instrument with voltage input, use an appropriate shunt resistor to connect the instrument to the voltage input terminals.
- Configure your setup so that the load resistance of the measuring instrument connected to the secondary signal output is within the specification range.
- Correct measurements may not be possible in places where there is an extremely strong external magnetic field besides the magnetic fields produced by the primary current of the object to be measured or where there is a strong electric field.

Power Off If Abnormal Behavior Occurs

If you notice smoke or unusual odors coming from the instrument, immediately turn off the measuring instrument supplying the power. Then, contact your nearest YOKOGAWA dealer.

Status circuit diagram

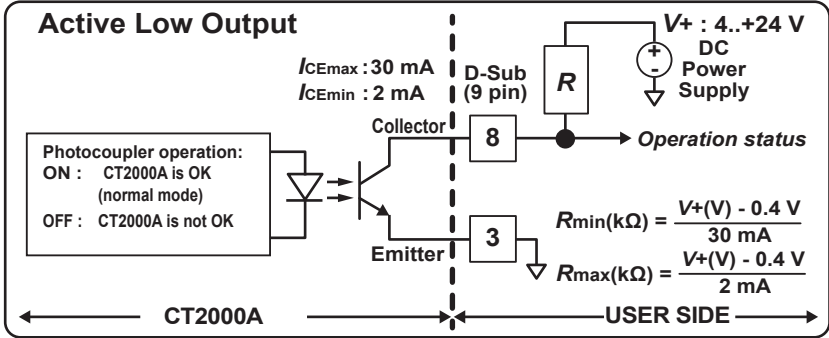
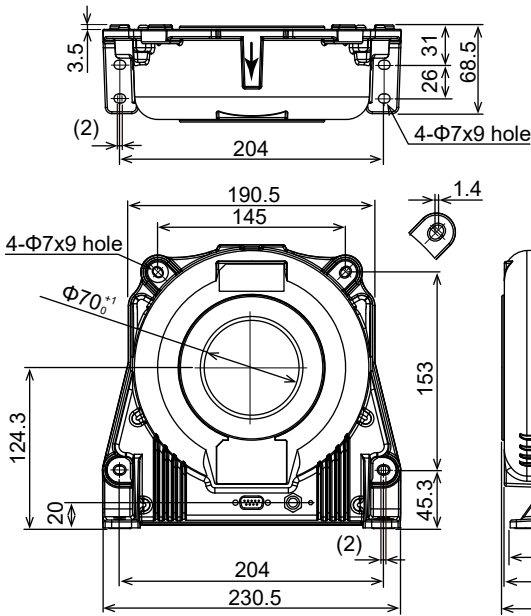


Figure 4. Derating of Primary Current by Frequency



Unless otherwise specified, tolerances are ±3% (however, tolerances are ±0.3 mm when below 10 mm).

Figure 5. External Dimensions

6. Servicing

If you encounter any problems during use, or if the instrument does not appear to be operating normally, contact your nearest YOKOGAWA dealer.

7. Warranty

If you experience a breakdown in the instrument due to faulty manufacturing or accidents during shipping, contact your nearest YOKOGAWA dealer.

8. Appendix

Waste Electrical and Electronic Equipment (WEEE)



(EU WEEE Directive valid only in the EEA* and UK WEEE Regulation in the UK)
This product complies with the WEEE marking requirement. This marking indicates that you must not discard this electrical/electronic product in domestic household waste. When disposing of products in the EEA or UK, contact your local Yokogawa office in the EEA or UK respectively.

* EEA: European Economic Area

Authorized Representative in the EEA

Yokogawa Europe B. V. is Authorized Representative of Yokogawa Test & Measurement Corporation in the EEA for this Product. To contact Yokogawa Europe B. V., see the separate list of worldwide contacts, PIM 113-01Z2.

Disposing of the Instrument

When disposing of the instrument, follow the laws and ordinances of your country or region.

Storage environment	Temperature	-40 to 85 °C
	Humidity	20 to 80 % RH (No condensation)
	Altitude	2000 m or less
External Dimensions	Approx. 230.5(W) x 219.5(H) x 75.5(D) mm (excluding the connector, conductor guide, and protrusions)	
Diameter of Primary Current Hole	φ70 mm	
Secondary Connector	D-Sub 9 pin	
Test Wiring Connector	M8 circular 3 pin Test current: 1 A max. Number of test windings: 200	
Weight	Approx. 4.2 kg.	
Power Supply Voltage	±(15 V ± 5 %)	
Maximum Rated Power Consumption	Approx. 35 VA	
Current Consumption (at Power Supply Voltage)	Approx. (225 mA + output current)	
Recommended fastening torque	•Flat mounting •Straight mounting	
Safety standard	Compliant standards EN61010-1 1000 Vrms Measurement Category: CAT III ¹ Pollution degree 2 ²	
Emissions	Compliant standards EN61326-1 ClassB, EN55011 ClassB, Group1	
Immunity	Compliant standards EN61326-1 Table 2 (for industrial locations)	
Environmental standards ³	EU RoHS Directive compliant	

If you obtained this manual separately from the product, the specifications in this manual may differ from those of the product.

- This instrument is measurement category III product. Do not use it for Measurement Category IV. Measurement category O applies to measurement of other circuits that are not directly connected to a main power supply. Measurement category II applies to electrical equipment that is powered through a fixed installation, such as a wall outlet wired to a distribution board, and to measurement performed on such wiring. Measurement category III applies to measurement of facility circuits, such as distribution boards and circuit breakers. Measurement category IV applies to measurement of power source circuits, such as entrance cables to buildings and cable systems, for lowvoltage installations.
- Pollution Degree applies to the degree of adhesion of a solid, liquid, or gas which deteriorates withstand voltage or surface resistivity. Pollution degree 2 applies to normal indoor atmospheres (with only non-conductive pollution).
- For conformity to environmental regulations and/or standards other than EU, contact your nearest YOKOGAWA office (PIM 113-01Z2).

Operation status output

Status	Operation Status (8-pin) Output	Note
Normal	Less than 0.7 V	The LED turns on.
Overloaded	V+	The LED turns off. A low frequency signal is output as a secondary signal output.

Overload Protection

The overload occurs when the primary current I_p exceeds a trip level such that the fluxgate detector becomes completely saturated and, consequently, the current sensor will switch from normal operation to overload mode.

This trip level is guaranteed to be greater than I_{pm} (3000 Apeak) and its actual value depends on operating conditions such as temperatures and measuring resistance.

During the overload mode, the current sensor generates and outputs a low frequency signal. The measuring operation resumes when the primary current returns in the measuring range between $-I_{pn}$ and $+I_{pn}$ (2000 Arms).

Test Winding Connector

The test winding connector is used to test the operation of the current sensor. When a current is applied between the positive and negative I_p test pins, a current that corresponds to the test current winding number of 200 and current transformation ratio of 2000: 1 is output from the secondary signal output pin.

Example: When 1 A is applied between the positive and negative I_p pins, 100 mA is output from the secondary signal output pin.

Note

To measure the current of the primary conductor that has been passed through the through hole, do not connect anything to the test winding I_{p+} or I_{p-} pin. If connected, errors may be induced in the sensor output.

5. Specifications

Item		Specification
Current Rating		DC: 0 to 2000 A
		AC: 3000 Apeak
Output Current		Primary rated current at 2000 A is 1A.
Current Transformation Ratio		2000: 1
Direction of Current		Per the arrow printed on the main unit.
Accuracy		DC: ±(0.05 % of reading+30 μA)
		50/60 Hz: ±(0.05 % of reading+30 μA) sine wave
		Standard Conditions
		Voltage to earth: 0 V Conductor position: center Conductor: φ25 mm; length,300 mm or more; straight
Accuracy warranty period		12 months
Effect of Position of Conductor		Add ±(0.01% of reading)
Measurement Band (-3dB)		DC to 40 kHz
Temperature Coefficient		In the -40 to 18 °C, 28 to 85 °C ranges: 0.01 %/°C
Max. Allowable Continuous Input		3000 Apeak
Derating of Max. Allowable Input		For the maximum allowable continuous current with respect to frequency, see figure 4.
Instantaneous Max. Allowable Input (0.1 sec. or less, reference value)		10000 Apeak
Maximum Rated Voltage		1000 Vrms, CAT III ¹
Load Resistance		0 to 1 Ω(power supply voltage: ±14.25 V, 25 °C)
Operating environment	Temperature	-40 to 85 °C
	Humidity	20 to 80 %RH (no condensation)
	Altitude	2000 m or less
	Location for use	Indoor use