CLAMP ON PROBE 3270 series
AC/DC CURRENT SENSOR CT6860 series

Wide-band Models from DC to 100 MHz

CLAMP ON PROBE 3276
Because current measurement requires the insertion of a shunt or a CT, the task often becomes difficult due to breaks in the electrical path. The 3273-50 - 3276 CLAMP ON PROBES only need to be connected directly into the BNC input on waveform observation equipment such as an oscilloscope or a recorder. Then simply clamp onto the conductor to be measured to easily observe current waveforms under a wide bandwidth and high sensitivity conditions.
Features

- High S/N ratio: ideal for measuring milliampere waveforms (Model 3273-50)
- Capable of waveform monitoring from wide band and minute currents to large currents (Model 3274)
- Permits waveform observation of large current of up to 500 Arms (Model 3275)
- Wide-band waveform observations, from DC to 100 MHz (Model 3276)
- Direct connection to BNC input of oscilloscope
- Highly accurate current detection
- Newly developed indium-antimony (InSb) thin-film Hall element
- Simple overload protector prevents damage due to overheating
- Easy measurement
- The 3273-50 includes a soft case, the 3274 / 3275 / 3276 includes a hard carrying case

### 3274: DC to 10 MHz

#### Square wave response

- Input: 100 Hz square wave 20 Ap-p
- Input: 100 kHz square wave 400 mA-p

#### Transient response

- Input: 1 Ap-p

#### Low-current measurement

- Input: 1 kHz sine wave 50 mAp-p

### 3275: DC to 2 MHz

#### Square wave response

- Input: 100 Hz square wave 300 Ap-p
- Input: 10 kHz square wave 400 mA-p

#### Transient response

- Input: 1 kHz sine wave 50 mAp-p

#### Low-current measurement

- Input: 1 kHz sine wave 50 mAp-p

### Table: Input Impedance

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3274</td>
<td>100</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>3275</td>
<td>1000</td>
<td>-20</td>
<td>200</td>
</tr>
</tbody>
</table>

Waveform Example

- Lighting Inverter
  - 200 mA/div
  - 20 μs/div
- Press Machine
  - Load Current
  - 50 A/div
  - 10 ms/div
- Automobile
  - Starter Current
  - 100 A/div
  - 1 s/div
### Specifications

**3273-50 / 3276 Specifications** *(Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 6 months)*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>3273-50</th>
<th>3276</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency bandwidth</td>
<td>DC to 50 MHz (-3 dB) * See Fig. 1 on page 1.</td>
<td>DC to 100 MHz (-3 dB) * See Fig. 1 on page 1.</td>
</tr>
<tr>
<td>Rise time</td>
<td>7 ns or less</td>
<td>3.5 ns or less</td>
</tr>
<tr>
<td>Continuous maximum input range</td>
<td>30 Arms</td>
<td>30 Arms</td>
</tr>
<tr>
<td>* Frequency derating see Fig. 2 on page 1.*</td>
<td></td>
<td>* Frequency derating see Fig. 2 on page 1.*</td>
</tr>
<tr>
<td>Maximum peak current value</td>
<td>Non-continuous 50 Apeak</td>
<td>Non-continuous 50 Apeak</td>
</tr>
<tr>
<td>Output voltage rate</td>
<td>0.1 V/A</td>
<td>0.1 V/A</td>
</tr>
<tr>
<td>Amplitude accuracy</td>
<td>±1.0% rdg. ±1 mV (0 to 30 Arms / DC, 45 to 66 Hz)</td>
<td>±1.0% rdg. ±1 mV (0 to 30 Arms / DC, 45 to 66 Hz)</td>
</tr>
<tr>
<td>* See Fig. 1 on page 1.*</td>
<td>±2.0% rdg. (30 Arms to 50 Apeak / DC, 45 to 66 Hz)</td>
<td>±2.0% rdg. (30 Arms to 50 Apeak / DC, 45 to 66 Hz)</td>
</tr>
<tr>
<td>Noise</td>
<td>2.5 mArms or less (measured with 20 MHz bandwidth equipment)</td>
<td>2.5 mArms or less (measured with 20 MHz bandwidth equipment)</td>
</tr>
<tr>
<td>Input impedance</td>
<td>* See Fig. 3 on page 1.</td>
<td>* See Fig. 3 on page 1.</td>
</tr>
<tr>
<td>Sensitivity temperature characteristics</td>
<td>Within ±2%</td>
<td>Within ±2% (from 0 to 40 °C [32 to 104 °F])</td>
</tr>
<tr>
<td>Maximum rated power</td>
<td>5.6 VA (Input within the maximum input range.)</td>
<td>5.3 VA (Input within the maximum input range.)</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>±12 V ±0.5 V</td>
<td>±12 V ±0.5 V</td>
</tr>
<tr>
<td>Operating temperature and humidity</td>
<td>0 to 40 °C [32 to 104 °F], 80% rh or less (no condensation)</td>
<td>0 to 40 °C [32 to 104 °F], 80% rh or less (no condensation)</td>
</tr>
<tr>
<td>Storage temperature and humidity</td>
<td>-10 to 50 °C [14 to 122 °F], 80% rh or less (no condensation)</td>
<td>-10 to 50 °C [14 to 122 °F], 80% rh or less (no condensation)</td>
</tr>
<tr>
<td>Effect of external magnetic fields</td>
<td>Max. 20 mA (equivalent) (DC and 60 Hz, Magnetic field of 400 A/m)</td>
<td>Max. 5 mA (equivalent) (DC and 60 Hz, Magnetic field of 400 A/m)</td>
</tr>
<tr>
<td>Max. rated voltage to earth</td>
<td>300 V, CAT-I (insulated conductor)</td>
<td>300 V, CAT-I (insulated conductor)</td>
</tr>
<tr>
<td>Measurement conductor</td>
<td>Diameter max. 5 mm [0.20”]</td>
<td>Diameter max. 5 mm [0.20”]</td>
</tr>
<tr>
<td>Dimensions and mass</td>
<td>Sensor: approx. 175(W) × 18(H) × 40(D) mm; 230 g</td>
<td>Sensor: approx. 175(W) × 18(H) × 40(D) mm; 240 g</td>
</tr>
<tr>
<td></td>
<td>[6.89”(W) × 0.71”(H) × 1.57”(D), 8.1 oz.]</td>
<td>[6.89”(W) × 0.71”(H) × 1.57”(D), 8.1 oz.]</td>
</tr>
<tr>
<td></td>
<td>Termination unit: approx. 27(W) × 55(H) × 18(D) mm</td>
<td>Termination unit: approx. 27(W) × 55(H) × 18(D) mm</td>
</tr>
<tr>
<td></td>
<td>[1.06”(W) × 2.17”(H) × 0.71”(D)]</td>
<td>[1.06”(W) × 2.17”(H) × 0.71”(D)]</td>
</tr>
<tr>
<td>Cable length</td>
<td>Sensor cable: approx. 1.5 m [59.06”] (BNC connector)</td>
<td>Sensor cable: approx. 1.5 m [59.06”] (BNC connector)</td>
</tr>
<tr>
<td></td>
<td>Power cable: approx. 1 m [39.37”]</td>
<td>Power cable: approx. 1 m [39.37”]</td>
</tr>
<tr>
<td>Supplied accessories</td>
<td>Soft case × 1</td>
<td>Hard case × 1</td>
</tr>
<tr>
<td>Safety standards</td>
<td>EN 61010 (Measurement category I (anticipated transient overvoltage 1500 V), Pollution Degree 2)</td>
<td>EN 61010 (Measurement category I (anticipated transient overvoltage 1500 V), Pollution Degree 2)</td>
</tr>
<tr>
<td>EMC</td>
<td>EN 61326, EN 61000-3-2, EN 61000-3-3</td>
<td>EN 61326, EN 61000-3-2, EN 61000-3-3</td>
</tr>
</tbody>
</table>

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**Sensor head**

Composed of molded parts, ferrite and Hall elements. The thin-film of the Hall element especially improves detection sensitivity to realize wider bands and high sensitivity monitoring.

**Power supply plug**

Connects to the FET probe power supply outlet of an oscilloscope or to the optional 3269 / 3272 power supply unit. (Provided that connector type, pin assignment, voltage, and capacity rating match, the 3273-50 to 3276 can be powered also from another source. For operation safety, be sure to refer to the specifications to ensure an exact match.)

**Power supply plug pin assignment** *(Plug as seen from the front)*

- 1: Not connected
- 2: GND
- 3: V- (-12V)
- 4: V+ (+12V)

* Connector type: LEMO inc. / FFA.05.304.CLAAC42Z

**BNC output connector**

Can be connected directly to the BNC input of an oscilloscope or level recorder or similar device.

Output voltage rate: 0.1 V/A (3273-50 / 3276) 0.01 V/A (3274 / 3275)

(Use only equipment with an input impedance of 1 MΩ or more.)
**Power Supply for Clamp-on Probes**

**POWER SUPPLY 3269, 3272**

- **Power supply for the Clamp on probe 3273-50 - 3276, CT6700 series**
- **Supplies power when connected to a general-purpose instrument such as a recorder.**

### Specifications

<table>
<thead>
<tr>
<th>3274</th>
<th>3275</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency bandwidth</strong></td>
<td>DC to 10 MHz (<em>-3 dB</em>)</td>
</tr>
<tr>
<td><strong>Rise time</strong></td>
<td>35 ns or less</td>
</tr>
<tr>
<td><strong>Continuous maximum input range</strong></td>
<td>150 Arms</td>
</tr>
<tr>
<td><strong>Maximum peak current value</strong></td>
<td>Non-continuous 300 Apeak 500 A peak at pulse width of ( \leq 30 \mu s )</td>
</tr>
<tr>
<td><strong>Output voltage rate</strong></td>
<td>0.01 V/A</td>
</tr>
<tr>
<td><strong>Current consumption</strong></td>
<td></td>
</tr>
<tr>
<td>[3273-50]</td>
<td>500</td>
</tr>
<tr>
<td>[3274]</td>
<td>100</td>
</tr>
<tr>
<td>[3275]</td>
<td>0</td>
</tr>
<tr>
<td>[3276]</td>
<td>0</td>
</tr>
</tbody>
</table>

### Basic specifications

<table>
<thead>
<tr>
<th>3269</th>
<th>3272</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compatible sensors</strong></td>
<td>Model CT6700, CT6701, 3273-50, 3274, 3275 or 3276 up to 4 units Note: Also up to 4 units of Model 3273-50, 3274, 3275 or 3276 on condition that the measurement current is sufficiently low.</td>
</tr>
<tr>
<td><strong>Number of power supply connections</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td>( \pm 12 \text{ V} \pm 0.3 \text{ V}, \pm 2.5 \text{ A} ) (sum total of all channels)</td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td>500 V to 240 V AC (free) 50/60 Hz 170 VA max.</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>80 mm (3.15 in)W × 119 mm (4.69 in)</td>
</tr>
<tr>
<td><strong>Accessories</strong></td>
<td>Instruction manual ×1, Power cord ×1</td>
</tr>
</tbody>
</table>

### Applicable standards

- **Safety standards**: EN 61010
- **EMC**: EN 61326, EN 61000-3-2, EN 61000-3-3
- **Overvoltage category**: II, III (anticipated transient overvoltage 4000 V), Pollution Degree 2

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**Power Supply for Clamp-on Probes**

- **Power supply for the Clamp on probe 3273-50 - 3276, CT6700 series**
- **Supplies power when connected to a general-purpose instrument such as a recorder.**
Wide-Bandwidth, High-Precision and Large Current Measurements

AC/DC CURRENT SENSOR CT6865, 9709

- 100 A current measuring applications in the fields of electric and hybrid electric vehicles (CT6865)
- Operating temperature range of -30°C to 85°C (CT6865)
- Super high precision, ±0.05% amplitude accuracy, ±2° phase accuracy
- Wide-bandwidth DC to 20 kHz (CT6865), 100 kHz (9709) excellent frequency characteristics
- Ideal for evaluation of solar power generation and fuel cells to measure battery charge and discharge and the secondary side of inverters
- For observing waveforms to be used with the oscilloscopes or Memory HiCorders (use with SENSOR UNIT)

Model: AC/DC CURRENT SENSOR CT6865

Model No. (Order Code) (Note)
CT6865 (1000 A AC/DC)
CT6865-05 (1000 A AC/DC, 12 pin terminal)

Delivering Wide-bandwidth and High-precision Current Measurement

AC/DC CURRENT SENSOR CT6862, CT6863

- Super high precision, ±0.05% amplitude accuracy, ±2° phase accuracy
- Wide-bandwidth DC to 1 MHz (CT6862) excellent frequency characteristics
- Applications in the fields of electric and hybrid electric vehicles
- Wide operating temperature range fit for automobile applications
- Ideal for evaluation of solar power generation and fuel cells to measure battery charge and discharge and the secondary side of inverters
- For observing waveforms to be used with the oscilloscopes or Memory HiCorders (use with SENSOR UNIT)

Model: AC/DC CURRENT SENSOR CT6862

Model No. (Order Code) (Note)
CT6862 (50 A AC/DC)
CT6862-05 (50 A AC/DC, 12 pin terminal)

Model: AC/DC CURRENT SENSOR CT6863

Model No. (Order Code) (Note)
CT6863 (200 A AC/DC)
CT6863-05 (200 A AC/DC, 12 pin terminal)

Compatible models... CT6865 (-05), 9709 (-05)

Model: AC/DC CURRENT SENSOR PW60001

Model No. (Order Code) (Note)
Model: PW60001 (Requires CT9900)

Model: AC/DC CURRENT SENSOR CT6866

Model No. (Order Code) (Note)
Model: CT6866 (Requires 9318, 9705, and CT9901)

Model: AC/DC CURRENT SENSOR CT6867

Model No. (Order Code) (Note)
Model: CT6867 (Requires 9318, 9705, and CT9901)
Power supplies for high-precision current sensors

**SENSOR UNIT CT9555, CT9556, CT9557**

- **Model CT9555**
  - Power supplies for high-precision current sensors with waveform output functionality

- **Model CT9556**
  - Power supply for high-precision current sensors with waveform output functionality
  - Output a single waveform from an aggregate of input waveforms

- **Model CT9557**
  - Output a single waveform from an aggregate of input waveforms

**Basic specifications**

- **Model CT9555**
  - Current sensors with a HIOKI ME15W (male) output connector (CT6886-05, CT6884-05, etc.)
  - Output Terminal: BNC terminal
  - Power supply: AC Adapter Z2008 (100 to 240 V AC, 50/60 Hz, 45 VA)
  - Dimensions and mass: 33 mm (1.30 in)W × 67 mm (2.64 in)H × 132 mm (5.20 in)D, 200 g (7.1 oz)

- **Model CT9556**
  - Current sensors with a HIOKI ME15W (male) output connector (CT6886-05, CT6884-05, etc.)
  - Output Terminal: BNC terminal
  - Power supply: AC Adapter Z2008 (100 to 240 V AC, 50/60 Hz, 45 VA)
  - Dimensions and mass: 33 mm (1.30 in)W × 67 mm (2.64 in)H × 132 mm (5.20 in)D, 200 g (7.1 oz)

- **Model CT9557**
  - Current sensors with a HIOKI ME15W (male) output connector (CT6886-05, CT6884-05, etc.)
  - Output Terminal: BNC terminal
  - Power supply: AC Adapter Z2002 (100 to 240 V AC, 50/60 Hz, 155 VA)
  - Dimensions and mass: 33 mm (1.30 in)W × 67 mm (2.64 in)H × 132 mm (5.20 in)D, 420 g (14.8 oz)

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Ideal for Measuring Current with Low Frequencies such as Inverter Control Devices

**CLAMP ON SENSOR 9272-10**

- **Basic specifications** (Accuracy guaranteed for 6 months, Post-adjustment accuracy guaranteed for 6 months)
  - Rated current: 20 A AC, or 200 A AC (selectable)
  - Max. allowable input: 50 A rms (at 20 A range), 300 A rms (at 200 A range)
  - Frequency characteristics: 1 Hz (±2 % rdg. ±0.1 % f.s.) to 100 kHz (±30 % rdg. ±0.1 % f.s.)
  - Amplitude and phase accuracy: Amplitude: ±0.3 % rdg. ±0.01 % f.s. Phase: ±0.2° (45 to 66 Hz)
  - Output voltage: 2 V/20 A rated current range, or 2 V/200 A rated current range
  - Core diameter: ø 46 mm (1.81 in)
  - Power supply: ±11 V to ±15 V DC (Power supplied via the Sensor Unit, which supports 100 to 240 V AC)
  - Accessories: Carrying case 9355-1, Instruction manual ×1, Mark bands ×6

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**Power supplies for high-precision current sensors**

**SENSOR UNIT CT9555, CT9556, CT9557**

- **Model CT9555**
  - Power supplies for high-precision current sensors with waveform output functionality
  - Model No. (Order Code) (Note)
  - CT9555: AC Adapter Z1002, Power cord ×1, Instruction manual ×1

- **Model CT9556**
  - Power supplies for high-precision current sensors with waveform output functionality
  - Model No. (Order Code) (Note)
  - CT9556: AC Adapter Z1003, Power cord ×1, Instruction manual ×1

- **Model CT9557**
  - Power supplies for high-precision current sensors with waveform output functionality
  - Model No. (Order Code) (Note)
  - CT9557: AC Adapter Z1004, Power cord ×1, Instruction manual ×1

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**Model CLAMP ON SENSOR 9272-10**

- **Model: CLAMP ON SENSOR 9272-10**
  - Mounted on Cable (Note)
  - 9272-10
  - 2(200 A AC)

**Compatible models**

<table>
<thead>
<tr>
<th>Model</th>
<th>Status</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>3190-10, 3193, 3194 (use with the 9920)</td>
<td>Directly connectable. Add 0.1% rdg. to accuracy</td>
<td></td>
</tr>
<tr>
<td>MR9827, MR9847s (use with the 9971)</td>
<td>To connect via the Conversion Cable 9938</td>
<td></td>
</tr>
<tr>
<td>Model 9940 for Memory HiCorders</td>
<td>Need the Conversion Cable 9940, and use with the Conversion Cable 9810 to connect Model 9272-10 to the F/V Unit 9940. (No necessary when using Model 9272 due to different output wiring specifications.)</td>
<td></td>
</tr>
</tbody>
</table>

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**Power supplies for current sensors**

**SENSOR UNIT CT9656, CT9306, CT9863**

- **Model CT9656**
  - Power supplies for current sensors (1ch, with Waveform/RMS output)

- **Model CT9306**
  - Power supplies for current sensors (1ch, with Waveform output)

- **Model CT9863**
  - Power supplies for current sensors (1ch, with Waveform output)

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**Model: ENSOR UNIT**

- **Model No.** (Order Code) (Note)
  - CT9655: HIOKI ME15W (12-pin terminal)
  - CT9306: HIOKI ME15W (12-pin terminal)
  - CT9863: HIOKI ME15W (12-pin terminal)

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**Shared options for CT9656, CT9709, CT9862, and CT9863**

- **Options A**
  - CT9900: CARRYING CASE

- **Options B**
  - CT9901: EXTENSION CABLE CT9901

- **Options C**
  - CT9902: EXTENSION CABLE CT9902

- **Options D**
  - CT9903: EXTENSION CABLE CT9903
### Rated current & Frequency characteristics

<table>
<thead>
<tr>
<th>AC/DC</th>
<th>AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 500A</td>
<td>3275 : DC to 2 MHz</td>
</tr>
<tr>
<td>up to 150A</td>
<td>3274 : DC to 10 MHz</td>
</tr>
<tr>
<td>10mA class to 30A</td>
<td>3273-50 : DC to 50 MHz</td>
</tr>
<tr>
<td>up to 100A</td>
<td>3276 : DC to 100 MHz</td>
</tr>
<tr>
<td>up to 1000A</td>
<td>CT6865 : DC to 20 kHz</td>
</tr>
<tr>
<td>up to 500A</td>
<td>9709 : DC to 100 kHz</td>
</tr>
<tr>
<td>up to 200A</td>
<td>CT6863 : DC to 500 kHz</td>
</tr>
<tr>
<td>up to 50A</td>
<td>CT6862 : DC to 1 MHz</td>
</tr>
<tr>
<td>up to 200A</td>
<td>9272-10 (200A) : 1Hz to 100kHz</td>
</tr>
<tr>
<td>up to 20A</td>
<td>9272-10 (20A) : 1Hz to 100kHz</td>
</tr>
</tbody>
</table>

#### Frequency (Hz)

<table>
<thead>
<tr>
<th></th>
<th>DC</th>
<th>1</th>
<th>10</th>
<th>100</th>
<th>1k</th>
<th>10k</th>
<th>100k</th>
<th>1M</th>
<th>10M</th>
<th>100M</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC/DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Wide-Band Current Probe Allows Direct Input to Oscilloscope

#### CLAMP ON PROBE 3273-50, 3274, 3275, 3276

<table>
<thead>
<tr>
<th>Model : CLAMP ON PROBE 3273</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model No. (Order Code) (Note)</td>
</tr>
<tr>
<td>3273-50 (DC to 50 MHz, 30 Arms)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model : CLAMP ON PROBE 3274</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model No. (Order Code) (Note)</td>
</tr>
<tr>
<td>3274 (DC to 10 MHz, 150 Arms)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model : CLAMP ON PROBE 3275</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model No. (Order Code) (Note)</td>
</tr>
<tr>
<td>3275 (DC to 2 MHz, 500 Arms)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model : CLAMP ON PROBE 3276</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model No. (Order Code) (Note)</td>
</tr>
<tr>
<td>3276 (DC to 100 MHz, 30 Arms)</td>
</tr>
</tbody>
</table>

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**WARNING**

1. To avoid short circuits and electric shock accidents when using a clamp-on sensor, use only with power lines carrying voltages within the rating limit of the sensor.
2. To avoid short circuits and electric shock accidents when the clamp-on sensor is open, do not use on bare conductors.

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