

# 3293-50

## CLAMP ON LEAK HiTESTER

### Instruction Manual

EN

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# HIOKI

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### 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 three (3) years 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 3293-50 CLAMP ON LEAK HiTESTER. To obtain maximum performance from the product, please read this manual first, and keep it handy for future reference.

### Overview

The 3293-50 Clamp On Leak HiTester is a small sized, thin-type sensor that can measure current between a wide 1 mA to 1000 A range. In addition, the angle of the display panel can be adjusted to suit the measuring location, and the back light makes the product easy to use even in dark places.

### Inspection

#### Initial Inspection

When you receive the product, inspect it carefully to ensure that no damage occurred during shipping. If damage is evident, or if it fails to operate according to the specifications, contact your dealer or Hioki representative.

### Maintenance and Service

- To clean the product, 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.
- If the protective functions of the product are damaged, either remove it from service or mark it clearly so that others do not use it inadvertently.
- If the product seems to be malfunctioning, contact your dealer or Hioki representative.

### Safety

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

### ! DANGER

This product 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 product. However, using the product in a way not described in this manual may negate the provided safety features. 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 product defects.

### Safety Symbol

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

### Other Symbols

	Indicates a prohibited action.
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### Symbols for Various Standards

	Indicates that the product conforms to regulations set out by the EU Directive.
	Indicates the Waste Electrical and Electronic Equipment Directive (WEEE Directive) in EU member states.

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

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

### Measurement categories

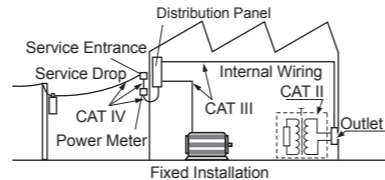
To ensure safe operation of measuring instruments, IEC 61010 establishes safety standards for various electrical environments, categorized as CAT II to CAT IV, and called measurement categories.

### ! DANGER

- **Using a measuring instrument in an environment designated with a higher-numbered category than that for which the instrument is rated could result in a severe accident, and must be carefully avoided.**
- **Using a measuring instrument without categories in an environment designated with the CAT II to CAT IV category could result in a severe accident, and must be carefully avoided.**

This product complies with CAT III 300 V safety requirements.

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



**CAT III:**  
When measuring the primary electrical circuits of heavy equipment (fixed installations) connected directly to the distribution panel, and feeders from the distribution panel to outlets

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

### Usage Notes

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

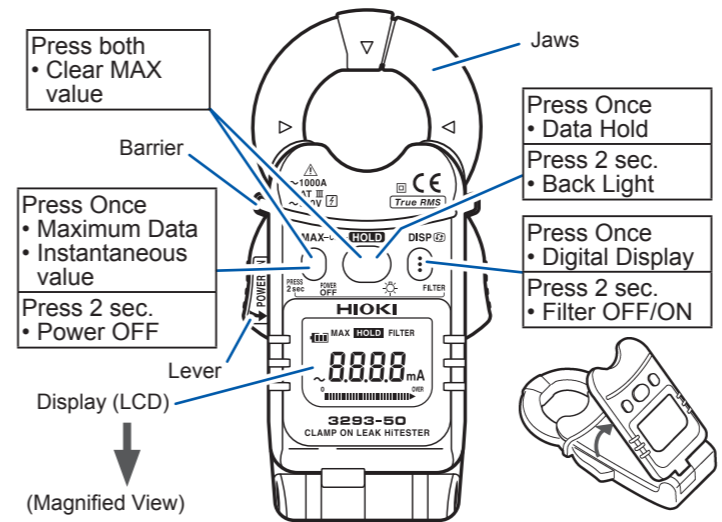
### ! WARNING

**Do not allow the product to get wet, and do not take measurements with wet hands. This may cause an electric shock.**

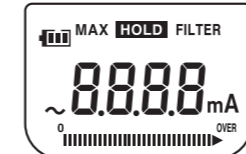
### ! CAUTION

- Do not store or use the product where it could be exposed to direct sunlight, high temperature or humidity, or condensation. Under such conditions, the product may be damaged and insulation may deteriorate so that it no longer meets specifications.
- This instrument contains a magnetic core. The device should not be used by anyone with a pacemaker or any other electronic medical devices installed in his body.

### Names and Functions of Parts



(Magnified View)



\* The device considers the maximum displayed value to be the MAX value.

	Alternating current (AC)
	MAX value
	Data hold function
	Filter ON
	Bar graph
	Over range
	Battery low warning (4 levels)

### Specifications

#### Measurement specification

- Temperature and humidity for guaranteed accuracy: 23±5°C (73±9°F), 80% RH or less.
- Guaranteed accuracy period: 1 year, or opening and closing of the jaws 10,000 times, whichever comes first.)
- Guaranteed accuracy period from adjustment made by Hioki: 3 year
- Guaranteed accuracy range: 1.00 mA or above

AC current A rms (true rms indication, Auto range)

Zero-discontinuity range: 0.50 mA or less

Range	Guaranteed accuracy	Resolution	Accuracy	
			FILTER ON	FILTER OFF
30 mA	1.00 mA to 30.00 mA	0.01 mA	±1.5% rdg.±5 dgt. (45 Hz to 66 Hz) (50 Hz to 60 Hz)	±1.5% rdg.±5 dgt. (45 Hz to 66 Hz) ±3.0% rdg.±5 dgt. (66 Hz to 400 Hz)
300 mA	27.0 mA to 300.0 mA	0.1 mA		
6 A	0.270 A to 6.000 A	0.001 A		
60 A	5.40 A to 60.00 A	0.01 A		
600 A	54.0 A to 600.0 A	0.1 A		
1000 A	540 A to 1000 A	1 A		

Effect of conductor position:	Within ±0.1% (up to 6 A range), Within±5.0% (greater than 60 A range) (in any position based on the center of the jaws)
Maximum rated voltage to earth:	300 V rms, Measurement category III (anticipated transient overvoltage 4000 V)
Crest factor:	2.8 or less (up to 600 A), 1.68 or less (1000 A range)
Diameter of measurable conductor:	24 mm dia. or less
Temperature characteristics:	Add measurement accuracy × 0.05 / °C (except 23°C±5°C (73°F±9°F))
Magnetic field interference:	Maximum 7.5 mA in an external magnetic field of AC 60 Hz 400 A/m (up to 6 A range)
Response time:	1.1 sec. or less
Maximum input current:	1000 A continuous (Refer to Fig. 1)

We define measurement tolerances in terms of rdg. (reading) and dgt. (digit) values, with the following meanings:  
rdg. (reading or displayed value)  
The value currently being measured and indicated on the measuring product.  
dgt. (resolution)  
The smallest displayable unit on a digital measuring product, i.e., the input value that causes the digital display to show a "1" as the least-significant digit.

Example	Calculation
Accuracy spec: ±1.5% rdg. ±5 dgt.	(A) Reading error (±% rdg.): ±1.5% of 30.00 A = ±0.45 A
Measurement range: 60.00 A	(B) Digit error (±dgt.): ±5 dgt. = ±0.05 A (Due to minimum resolution of 0.01 A)
Measurement values: 30.00 A	(C) Total error: (A) + (B) = ±0.50 A The limit error value for the measured value of 30.00 A is 29.50 A to 30.50 A based on the total error (C).

### General Specifications

Display update rate	1.1 sec. or less
Display	LCD: monochrome, 91 segments
Operating temperature and humidity	0 to 40°C (32 to 104°F), 80% RH or less (with no condensation)
Storage temperature and humidity	-10 to 50°C (14.0 to 122.0°F), 80% RH or less (with no condensation)
Location for use	Indoors, Pollution degree 2, Altitude up to 2000 m (6562 feet)
Rated supply voltage	3 V DC × 1
Maximum rated power	25 mVA
Power supply	CR2032 × 1 Lithium battery
Battery lifetime	Approx. 18 hours (continuous, no load, at 23°C)
Dimensions	Approx. 50W × 130H × 26D mm (1.97"W×5.12"H×1.02"D) (Without protrusions)
Mass	Approx. 135 g (4.8 oz.)
Dielectric strength	4290 V rms / 1 minute 1 mA sensitivity current between the jaws and case
Applicable standards	Safety EN61010 EMC EN61326
Accessories	9757 Carrying Case, Strap, Instruction Manual, CR2032 Lithium battery
Product warranty period	3 years

### Functions

Power supply control	ON: Grasping the lever and opening wide the jaws (sideways). OFF: Press POWER OFF key for 2 seconds or longer.
Filter	Details of operation: Low pass filter OFF/ON Cutoff frequency: 180 Hz±30 Hz (-3 dB) Initial setting: ON (Always ON when the power supply is turned on; non-filtered data is not saved) Activate/De-activate: Press FILTER key for 2 seconds or longer. * When set to ON, the filter removes noise and other unwanted frequency components.
Data hold	Details of operation: Holds measured values (data update is halted) Activate: Pressing the <b>HOLD</b> key once. De-activate: Pressing the <b>HOLD</b> key once. FILTER OFF/ON
MAX value display	Details of operation: Displays the maximum measured values reached since the power has been turned on. Activate/De-activate: Pressing the MAX key once. Clear displayed maximum value: Press the MAX key and HOLD key at the same time. Filter OFF/ON
Auto power-off	Details of operation: The power cuts off when "0" is displayed continuously for 1 minute. Any key operation is not performed for approx. 10 minutes. To de-activate: Power ON while pressing the <b>HOLD</b> key.
Battery Level Indicator	Details of operation: Displays 4 levels of remaining battery charge. * Refer to "Replacing Battery".
Back light	Setting method: Press  key for 2 seconds or longer. (About 15 seconds lighting.) * Frequent use of backlight reduces battery life.
Liquid crystal display (LCD) reversal	Details of operation: Automatically reverses when the display panel is opened and closed. Manual reversal: Pressing the key <b>DISP</b> once. * Refer to "Opening and Closing the Display Panel".
Bar graph	Shows the proportion of the measured value to the range.
Over range display	Over-Range Display: Displays "OVER" when a high crest factor current is inputted, which means an out of the accuracy guarantee. * Refer to "Crest factor".

### Measurement Procedure

#### Pre-Operation Inspection (Check the following before using the product.)

- Before using the product 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.
- The jaws or the case shall be free of damage. (If damage has occurred, (avoid using the product. Use of the product under these conditions may result in electric shock.)
- The mating portions of the jaws should be free of any scratches or cracks.
- Battery power should be near full capacity when power is turned on. (Refer to "Replacing Battery".)
- The reading should be around 0 A using the current function when no measurements are being made.



## ⚠ DANGER

- This product 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, do not touch the portion beyond the protective barrier during use.

## ⚠ CAUTION

- Do not input a current exceeding the maximum allowable current. Doing so will make the jaws generate heat, which may damage the product and cause burn.

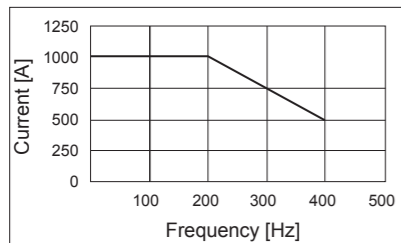


Fig 1. Maximum allowable current for frequency

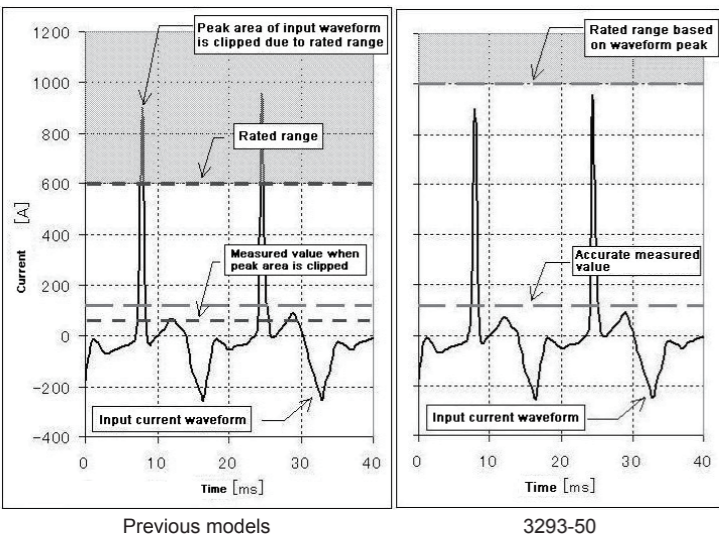
- To avoid damage and malfunctions to the instrument and adverse effect on measurement, observe the following:
  - Do not drop the clamps or subject them to mechanical shock.
  - Do not deform the jaw by subjecting it to excessive force.
  - Do not engage the jaw tips with them misaligned.
  - Do not clamp foreign objects between the jaw tips.

### NOTE

- Please note that waveforms that include elements outside the frequency characteristic range may not be measured correctly.
- Accurate 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.

### Crest factor

“Crest factor = Waveform peak value/ Internal rated range” is defined for this instrument. There are cases when the accurate measurement cannot be performed with our previous models, because a top portion of the waveform is clipped off due to the rated range if a high crest factor current (= RMS is low and a waveform peak is high) is flowed. This instrument defines the range based on a waveform peak value and measured value so that the accurate measurement can be performed. As for a high crest factor current, its measured value becomes small to the range. If a current exceeding a crest factor of 2.8 is inputted, “OVER” is displayed. This measurement is the out of accuracy guarantee range and the measured value is for reference purpose only.



### Regarding the MAX value display

- (1) Press the MAX key once to confirm the MAX value. If the MAX value is renewed, the new value will be displayed as the MAX value. After approximately 15 seconds the device will return to normal measurement display and the MAX value will be saved.
- (2) To clear the MAX value, simultaneously press both of the MAX and HOLD keys regardless of whether the display shows the MAX value mode or a measured value.
- (3) When opening and closing the jaws frequently, a large display count may remain on the MAX value display. When measuring for the maximum value, clamp onto the conductor and clear any residual maximum values before conducting your test.

### NOTE

- As far as the Data Hold mode is on, MAX value can not be updated.
- The MAX value is cleared with FILTER OFF/ON.

## AC Current Measurement

## ⚠ DANGER

To avoid short circuits and potentially life-threatening hazards, never attach the product in current measurement mode to a circuit that operates at more than the maximum rated voltage CAT III 300 V, or over bare conductors.

### NOTE

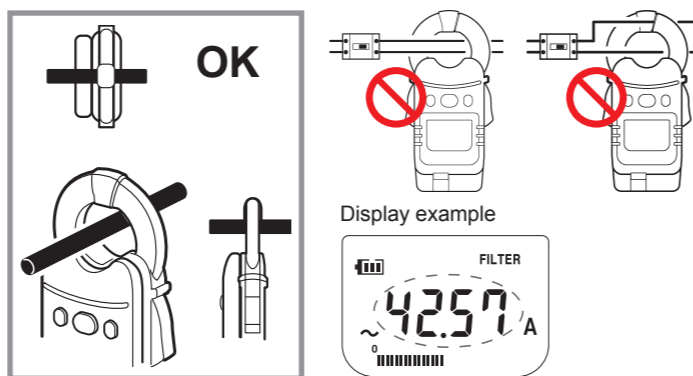
- Correct measurement may be impossible for the case of rush current or significantly fluctuating current.
- As for the measurement on 6 A or more, the error margin might be larger depending on the positioning of the conductor and sensor.
- When the measuring value exceeds 1000 A the digital display will blink.
- Waveforms around 20 Hz or below may be displayed as “----”.
- At a low temperature, there are cases when the reading may not be around 0 A without any input signal. But it does not affect measurement.

Open Jaws to Power On.

- 1 Clamp the tester on the conductor so that the conductor passes through the center of the clamp core.

- Put the conductor perpendicular to the sensor, as shown in the sketch.
- Clamp the tester on one wire only.

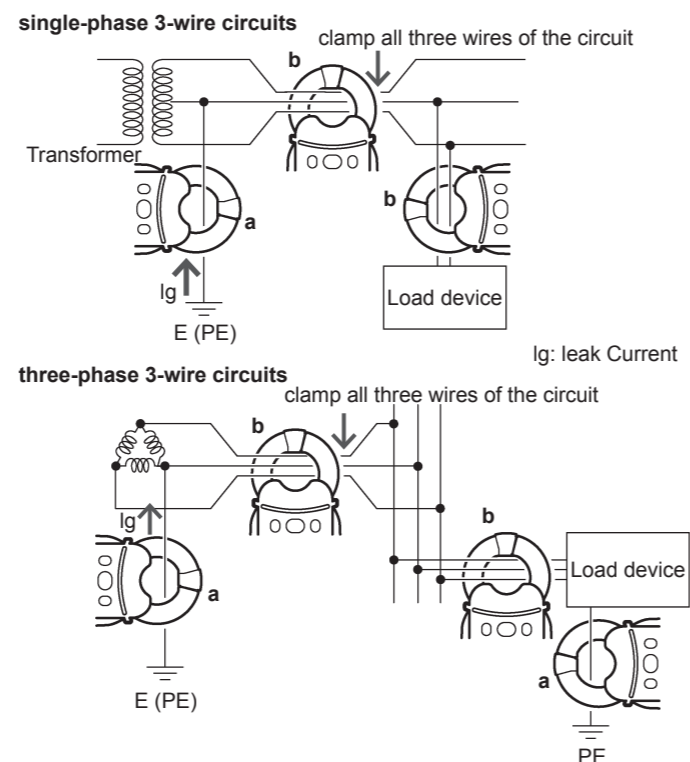
- 2 The effective value is shown on the digital display.



### Filter function

- (1) The default setting of Filter is ON. Please change the setting according to the use.
- (2) Normally, load current is measured with Filter OFF and leak current is measured with Filter ON.

## Leak Current Measurement



- 1 Clamp the tester on the conductor, so that the conductor passes through the center of the jaws. For measurement of grounded wires, clamp the tester on one wire only (see a). For overall measurements, clamp the tester on the entire circuit path (see b).
- 2 The effective value (RMS) of the leak current is shown on the digital display. The selected current range is shown at the bottom of the display.

### Regarding the Auto Power Off Function

If the measured current remains at 0 ampere for 1 minute or no key is pressed for 10 minutes, power turns off automatically. When measuring leakage current, if you wish to disable the Auto Power Off function, turn the device's power on while pressing the HOLD key. Press the POWER OFF key for 2 seconds or longer to turn the device off.

### NOTE

- For measurement of single-phase 2-wire circuits, clamp both wires of the circuit.
- For measurement of three-phase 4-wire circuits, clamp all four wires of the circuit. If this is not possible, the measurement can also be carried out on the ground wire of the equipment.
- Do not input current that exceeds the maximum continuous input of the electric current range.
- Measurement may not be accurate in the cases below.
  - (1) When there is large current (of about 100 A) flowing through a nearby electric line.
  - (2) When using the 3293-50 to measure special waveforms, such as those on the secondary side of an inverter
- Note that a large display count may appear momentarily when opening or closing the jaws. This is not an error. It may take some time for the display to return to zero. However, starting measurement before the display returns to zero will not affect measurement.

## Replacing Battery

## ⚠ WARNING

- To avoid electric shock when replacing the battery first disconnect the clamp from the object to be measured. After replacing the batteries, replace the cover and screws before using the product.
- Use only CR2032 lithium battery. Use of any other battery may result in explosion.
- Be sure to insert them with the correct polarity. Otherwise, poor performance or damage from battery leakage could result.
- Battery may explode if mistreated. Do not short-circuit, recharge, disassemble or dispose of in fire.
- Handle and dispose of batteries in accordance with local regulations.
- Keep batteries away from children to prevent accidental swallowing.
- To avoid corrosion from battery leakage, remove the batteries from the product if it is to be stored for a long time.

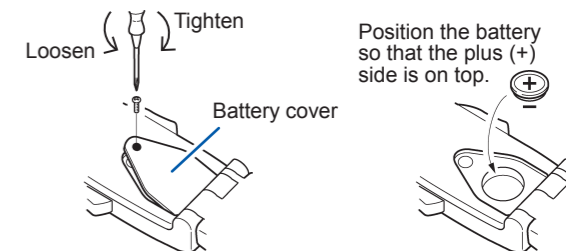
### NOTE

- at the upper left on the display screen indicates the remaining power level. When the battery approaches the exhausting value, is displayed and a few minutes later, power turns off automatically. When is displayed, the accuracy of measurement value is not guaranteed. Replace the new batteries soon.
- At a low or high temperature, the battery life is reduced faster.
- The batteries included with the device were installed for factory testing purposes. CR2032 lithium batteries can be purchased at electronics and appliance stores where specialized batteries are sold.
- Although the remaining power level indicator may become lower for a moment due to the internal processing, it is not an anomaly.

### CALIFORNIA, USA ONLY

This product contains a CR Coin Lithium Battery which contains Perchlorate Material - special handling may apply. See [www.dtsc.ca.gov/hazardouswaste/perchlorate](http://www.dtsc.ca.gov/hazardouswaste/perchlorate)

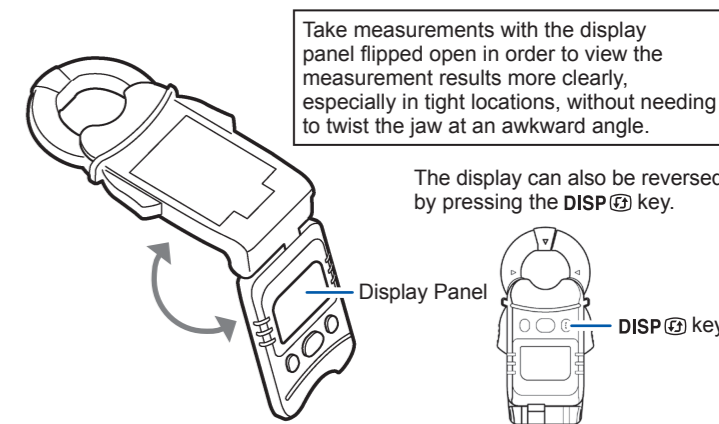
## Replacing the Batteries



- 1 Press and hold the POWER OFF key for 2 seconds or longer to turn off the device's power.
- 2 Remove the battery cover screws on the back of the device with a Phillips screwdriver, then remove the battery cover.
- 3 Replace with a new battery. When inserting a new battery (CR2032 lithium battery), be sure to position the polarities in their proper orientations.
- 4 Replace the battery cover and fasten the screws.

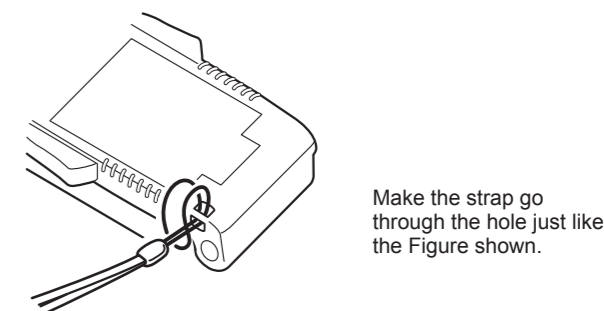
## Opening and Closing the Display Panel

Adjust the angle of the display panel for better viewing.



## Attaching the strap

Fix the strap for fall prevention.



## Error Display

When an error is displayed on the LCD, the HiTester requires repair. Contact your supplier or Hioki representative.

Error Display	Meaning	Remedial Action
Err0	Internal ROM Error	Repair is necessary. Contact your supplier or Hioki representative.
Err1		
Err2	Calibration Data Faulty	
Err3		