

# PR8111

# PR8112

# PEN RECORDER

# HIOKI

Instruction Manual

**EN**

Feb. 2020 Revised edition 3  
PR8111A981-03 20-02H





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## Basic Operation

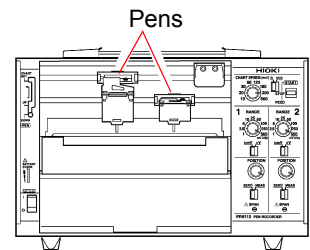
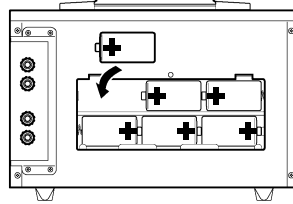
### Unpacking and Preparing for Use

Check the package contents (p. 2)  
Review operating precautions (p. 5)

Install batteries (p. 17)  
(When powering the instrument with batteries)

Install recording paper (p. 14)  
and pens (p. 16)

Before using the instrument, be sure to read "Operating Precautions" (p. 5) carefully.



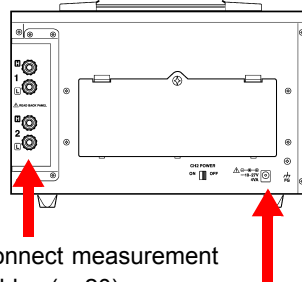
"Names and Functions of Parts" (p. 10)

### Installing, Connecting, and Turning On the Instrument

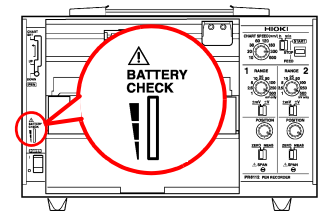
Install the instrument (p. 5)

Inspect and connect the instrument (p. 13)

Turn on the instrument (p. 19)



Connect measurement cables (p. 20)



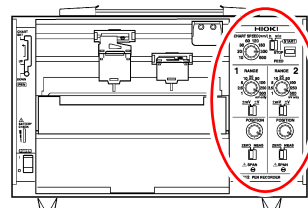
The green LED lights up when using the AC adapter and when there is sufficient battery life remaining when using batteries.

(When powering the instrument with mains power)  
Connect the included AC adapter (p. 18)

### Settings

Set measurement conditions (p. 23)

- Set the range and position.
- Set the chart speed.



### Starting and Stopping Measurement

Lowering the pens and starting recording ⇒ ⇒ ⇒ ⇒ ⇒ Stopping recording and raising the pens (p. 25)  
(PEN DOWN) ⇒ (START) (STOP) ⇒ (PEN UP)

### Finishing Using the Instrument

Turn off the instrument

# Introduction

Thank you for purchasing the HIOKI Model PR8111, PR8112 Pen Recorder. To obtain maximum performance from the instrument, please read this manual first, and keep it handy for future reference.

The PR8111 is a 1-pen model, while the PR8112 is a 2-pen model.

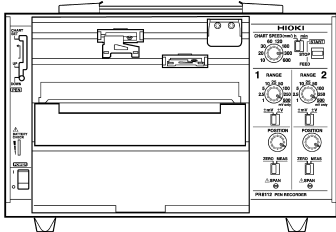
# Confirming Package Contents

## Inspecting the instrument

When you receive the instrument, 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.

## Package contents

Confirm that these contents are provided.

- |  |  |   |
|--|--|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> Model PR8111 or PR8112.....1</li> <li><input type="checkbox"/> Model 9418-15 AC Adapter .....1<br/>Included power cord (p. 18)</li> <li><input type="checkbox"/> Drip-proof vinyl cover.....1</li> <li><input type="checkbox"/> Front cover.....1</li> </ul> | <p>(Example: PR8112)</p>  | <ul style="list-style-type: none"> <li><input type="checkbox"/> Model P-1201A (Red), P-1202A (Green) Felt Pen.....1 each<br/>(PR8111: P-1201A [red] only)</li> <li><input type="checkbox"/> Model SE-10Z-2 Recording Paper (fanfold) 1</li> <li><input type="checkbox"/> Instruction Manual (this document)..... 1</li> </ul> |
|--|--|---|

**Use the original packing materials when transporting the instrument, if possible.**  
**For other precautions related to transporting the instrument, see "Transporting" (p. 33).**

## Options

The following options are available for the instrument. Contact your authorized Hioki distributor or reseller when ordering. The options are subject to change. Visit our website for updated information.

### Felt Pen

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> P-1201A (Red: standard)   | <input type="checkbox"/> P-1201B (Red: High-speed)    | <input type="checkbox"/> P-1201C (Red: Low-speed)   |
| <input type="checkbox"/> P-1202A (Green: Standard) | <input type="checkbox"/> P-1202B* (Green: High-speed) | <input type="checkbox"/> P-1202C (Green: Low-speed) |
| <input type="checkbox"/> P-1203A (Blue: Standard)  | <input type="checkbox"/> P-1203B *(Blue: High-speed)  | <input type="checkbox"/> P-1203C (Blue: Low-speed)  |

### Recording Paper

- |   |   |
|---|---|
| <input type="checkbox"/> SE-10Z-2 Recording Paper (fanfold) | <input type="checkbox"/> SE-10 Recording Paper (roll) |
|---|---|

\*: Discontinued product

## Safety Information




This instrument 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 instrument. Using the instrument 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 instrument defects.

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

### Safety Symbols



In the manual, the  symbol indicates particularly important information that the user should read before using the instrument.

The  symbol printed on the instrument indicates that the user should refer to a corresponding topic in the manual (marked with the  symbol) before using the relevant function.



Indicates the ON side of the power switch.



Indicates the OFF side of the power switch.



Indicates a ground terminal connected to the chassis of the system.



Indicates DC (Direct Current).

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



Indicates that incorrect operation presents an extreme hazard that could result in serious injury or death to the user.



Indicates that incorrect operation presents a significant hazard that could result in serious injury or death to the user.



Indicates that incorrect operation presents a possibility of injury to the user or damage to the instrument.



Indicates advisory items related to performance or correct operation of the instrument.

**Symbols for Various Standards**

Indicates that the product conforms to regulations set out by the EU Directive.



WEEE marking:

This symbol indicates that the electrical and electronic appliance is put on the EU market after August 13, 2005, and producers of the Member States are required to display it on the appliance under Article 11.2 of Directive 2002/96/EC (WEEE).

**Other Symbols**

Indicates the prohibited action.

(p. )

Indicates the location of reference information.

\*

Indicates that descriptive information is provided below.

**SET**

(boldface)

Text displayed on the instrument is shown in boldface in the manual.

**Measurement categories**

This instrument complies with CAT II safety requirements.

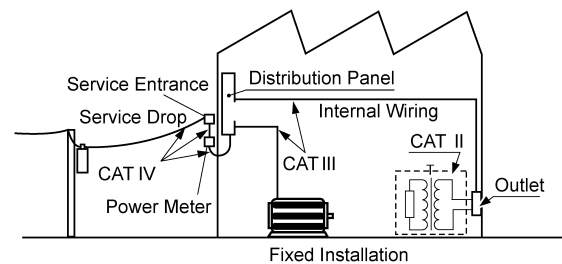
To ensure safe operation of measurement instruments, IEC 61010 establishes safety standards for various electrical environments, categorized as CAT II to CAT IV, and called measurement categories.

**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 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.

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.



## Operating Precautions



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

### Preliminary Checks



- Before using the instrument for the first time, verify that it operates normally to ensure that no damage occurred during storage or shipping. If you find any damage, contact your dealer or Hioki representative.
- Before using the instrument make sure that the insulation on the power cord is undamaged and that no bare conductors are improperly exposed. Using the instrument in such conditions could cause an electric shock, so contact your dealer or Hioki representative for repair.
- Before using the instrument, make sure that the insulation on cables is undamaged and that no bare conductors are improperly exposed. Avoid using any cables showing damage as they may cause electric shock.

### Instrument Installation

Be sure to observe the operating and storage temperature and humidity ranges specified for the instrument:

- Operating temperature and humidity: 0°C to 40°C, 40% to 80% RH (non-condensing)
- Storage temperature and humidity: -20°C to 55°C, 10% to 80% RH (non-condensing)

The instrument should be installed on a level surface. Use of the device on an inclined surface may prevent readings from being properly recorded or recording paper from folding properly.

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



Exposed to direct sunlight  
Exposed to high temperature



In the presence of corrosive or explosive gases



Exposed to water, oil, other chemicals, or solvents  
Exposed to high humidity or condensation



Exposed to strong electromagnetic fields  
Near electromagnetic radiators



Exposed to high levels of particulate dust



Near induction heating systems (e.g., high-frequency induction heating systems and IH cooking utensils)



Subject to vibration

**Handling the Instrument****! WARNING**

- Do not allow the instrument to get wet, and do not take measurements with wet hands. This may cause an electric shock.
- Do not attempt to modify, disassemble or repair the instrument; as fire, electric shock and injury could result.

**! CAUTION**

- To avoid damage to the instrument, protect it from physical shock when transporting and handling. Be especially careful to avoid physical shock from dropping.
- Do not slant the device or place it on top of an uneven surface. Dropping or knocking down the device can cause injury or damage to the device. Install the instrument on a level surface.
- Do not install the instrument with any side except the bottom facing down. This may cause a fire or other malfunction in the instrument.
- Exercise care to keep water droplets from accumulating on or getting into the instrument. Failure to do so may cause the instrument to malfunction.
- Do not apply any oil. Doing so could damage the instrument.
- Never apply any grease or lubricant to the sliding surfaces of the pen holders and the enclosure. Doing so could cause a malfunction of the pen operation or damage to the enclosure.

**Operating environment**

- This instrument is intended for use indoors.  
If you use the instrument in locations with an excessive amount of dust or sand, the pen operation could malfunction.  
Close the front cover, put the drip-proof cover on the instrument, and then load fanfold paper into the instrument.

**Handling pens and recording paper**

- Use only genuine Hioki pens and recording paper (p. 33).
- Do not touch pens while recording is in progress.
- Do not use damp recording paper. Doing so may cause the instrument to malfunction.
- Do not reuse recording paper. Doing so may cause the paper to misfeed.

**When using fanfold paper**

- Ink may run at fold lines. If this running is unacceptable, please use roll paper.
- Paper may not fold properly when used in a very hot, humid environment or when recording waveforms that cover a large percentage of the page. It is recommended to use roll paper for such applications.

**NOTE**

This product 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.

## Handling the Cords and Cables

### **CAUTION**

- Avoid stepping on or pinching cables, which could damage the cable insulation.
- To avoid instrument malfunction or damage due to broken connections, do not bend or pull on the power cord or cables at their base.

## Using the Batteries

How to install batteries: "Installing Alkaline Batteries" (p. 17)

### **WARNING**

- To avoid electric shock, turn off the **POWER** switch and disconnect the AC adapter and connection cables before replacing the batteries.
- After replacing the batteries, replace the cover and screws before using the instrument.
- 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

### **CAUTION**

- Do not mix old and new batteries, or different types of batteries. Also, be careful to observe battery polarity during installation. Otherwise, poor performance or damage from battery leakage could result.
- Use only the specified type of battery (six LR20 alkaline batteries).
- To avoid corrosion and damage to this instrument from battery leakage, remove the batteries from the instrument if it is to be stored for a long time (for a month).

### **NOTE**

- After use, always turn OFF the power.
- You can check the remaining battery life with the LED on the left side of the instrument. (p. 10)
- The instrument's Power LED can correctly indicate the remaining battery level only if the instrument was turned on with unused alkaline batteries inserted.
- The Power LED color depends on the setting conditions, surrounding temperature, and remaining battery level. Use of the instrument in a low temperature or that with weak batteries may cause the instrument to shut down regardless of the Power LED color. Replace batteries with unused batteries.

#### **Use with manganese batteries**

Use with manganese batteries, which cannot generate a large current because of their small capacity, will cause a shorter operating time.

## Using the AC Adapter

How to connect the adapter: "Connecting the AC adapter" (p. 18)

If you connect the AC adapter while batteries are installed in the instrument, the AC adapter takes precedence.

### **WARNING**

- Use only the supplied Model 9418-15 AC Adapter. AC adapter input voltage range is 100 to 240 VAC (with  $\pm 10\%$  stability) at 50/60 Hz. To avoid electrical hazards and damage to the instrument, do not apply voltage outside of this range.
- To avoid electrical accidents and to maintain the safety specifications of this instrument, connect the power cord provided only to a 3-contact (two-conductor + ground) outlet.
- Turn the instrument off before connecting the AC adapter to the instrument and to AC power.
- Before turning the instrument on, make sure the supply voltage matches that indicated on the AC adapter. Connection to an improper supply voltage may damage the instrument or AC adapter and present an electrical hazard.

### **CAUTION**

- For safety reasons, disconnect the power cord when the instrument is not used and before connecting it to a device to be tested.
- To avoid damaging the power cord, grasp the plug, not the cord, when unplugging it from the power outlet.

## Connecting Cables

### **DANGER**

- The maximum input voltage is 250 VDC. Attempting to measure voltage in excess of the maximum input could destroy the instrument and result in personal injury or death.
- The maximum rated voltage between input terminals and ground is 300 VAC, DC. Attempting to measure voltages exceeding 300 V with respect to ground could damage the instrument and result in personal injury.

### **WARNING**

- To avoid electrical accidents, confirm that all connections are secure. The increased resistance of loose connections can lead to overheating and fire.
  - To avoid experiencing an electric shock or causing a short-circuit at the input terminals, only insulated crimp contacts should be used on wires being connected to input pins. (The input terminal pin diameter is M6.)
-

# Overview

# Chapter 1

## 1.1 Product Overview and Features

The PR8111 and PR8112 are compact, lightweight, highly portable pen recorders. You can select from two power sources (AC adapter or dry-cell batteries) according to where the instrument is being used, assuring your ability to record data immediately and easily with unparalleled reliability, wherever you are.

### Record, verify, and notate measurement results in the field

Measurement results are recorded on paper, allowing them to be easily verified. You can also make notes on the paper in the field. Additionally, the instrument can measure voltage output from other equipment, allowing it to be used in maintenance applications such as corrosion prevention systems. It can also record analog output, for example from sensors and physics or chemistry instruments.

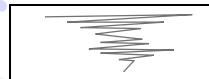
### Select the power source according to your location

The instrument can be operated using either the AC adapter or dry-cell batteries.



### Assess changes in easy-to-see color waveforms by watching pen movements

The instrument can use red, green, and blue pens (option). Waveforms are easy to see, even outdoors, and can be stored for extended periods of time. Additionally, you can assess waveform changes in real time simply by watching the instrument's pens as they move.



### Preserve important recordings

Record with the front cover open to protect recording paper from dirt on the ground. Record with the front cover closed to keep out dust and wind. You can also use the included drip-proof vinyl cover to protect the instrument from water droplets and dust.

### Easily compare and verify results on paper

You can easily discover changes and abnormalities by comparing recordings with previously recorded waveforms.



**CAUTION**

### Operating environment

This instrument is intended for use indoors. If you use the instrument in locations with an excessive amount of dust or sand, the pen operation could malfunction. Close the front cover, put the drip-proof cover on the instrument, and then load fanfold paper into the instrument.

# 1.2 Names and Functions of Parts

### Front Panel

(Example: PR8112)

#### Pen lever

- **CHART SET** (top)  
Use when changing recording paper. The pens will move up (away from the recording paper) and to the right.
- **UP** (middle)  
Use when changing pens or to disable recording. The pens will move up (away from the recording paper). Cap pens when not recording.
- **DOWN** (bottom)  
Use when recording. The pens will be in contact with the recording paper, allowing them to record data.

#### Power LED

Lights up when the instrument is being supplied with power.

Green	Lights up when power is being supplied by the AC adapter. When using batteries, indicates ample remaining battery life.
Orange	Indicates limited remaining battery life. It is recommended to have new batteries ready to use.
Red	Indicates low remaining battery life. It is recommended to replace the batteries in the instrument with new batteries.

#### POWER switch (p. 19)

Turns the power on and off.

- ⏻ :Power OFF
- ⏻ :Power ON

#### Pen holders (p. 16)

(Located toward the rear of the instrument)  
Holds the pens. For more information about compatible pens, see "Options" (p. 2).

#### Platen

Holds down the recording paper.

#### Chart holder

(Located underneath the platen)  
Stores new recording paper. (p. 14)

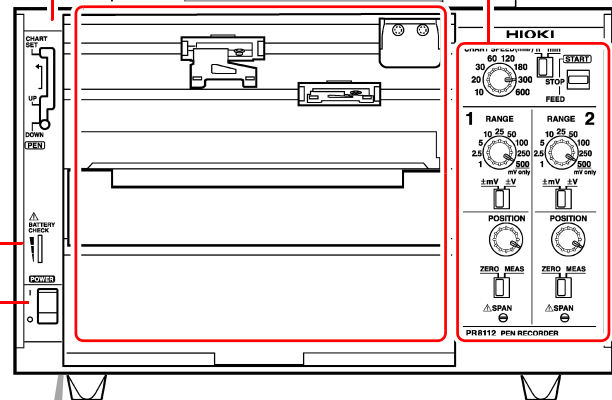
#### Chart cover (p. 12)

Holds down the recording paper.

#### Sprockets

Feed the recording paper using a series of holes along its edges.

#### Handle Operating panel (p. 11)

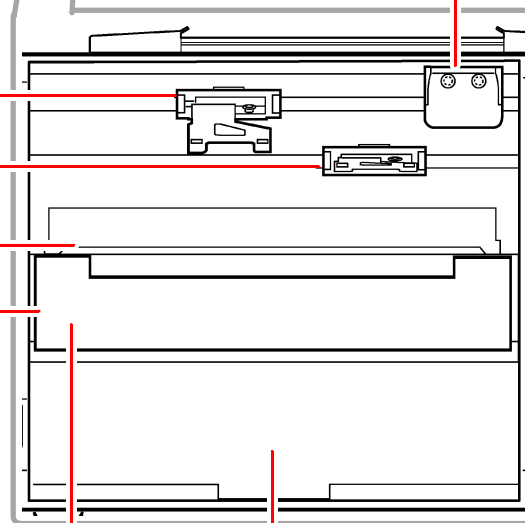


#### Front cover (p. 21)

Keeps wind and dust out of the instrument. The cover can be removed. It opens from above. Note: When using roll paper, either remove the front cover or use the instrument with the cover open. Recording data with the front cover closed may cause paper to jam in the chart tray.

#### Pen cap storage pins (p. 16)

Store caps on these pins while the pens are being used so they don't get lost.



When the chart cover is open

#### Chart tray

Stores paper after waveforms have been recorded. Fanfold paper will be folded here.

## Operating Panel

(Example: PR8112)

### CHART SPEED knob

Selects the chart speed, allowing you to change the speed at which the recording paper is fed through the instrument.

### RANGE knob

Selects the measurement range, allowing you to choose the range that best suits the voltage being measured. The 500 setting is used exclusively for mV ranges.

### mV/V switch

Selects the unit for the measurement range selected with the **RANGE** knob.

### POSITION knob

Adjusts the pen's zero point (0 V position) by moving its position. When the **ZERO/MEAS** switch is in the **ZERO** position, the pen can be moved throughout the entire effective recording width.

### ZERO/MEAS switch

- **MEAS**: Use when measuring data. (You can start recording by placing the **START/STOP/FEED** switch in the **START** position.)
- **ZERO**: Use when adjusting the pen's zero point. (You can move the position with the **POSITION** knob.)

### h/min switch

Selects the unit for the speed set with the **CHART SPEED** knob. You can select either minutes (min) or hours (h).

### START/STOP/FEED switch

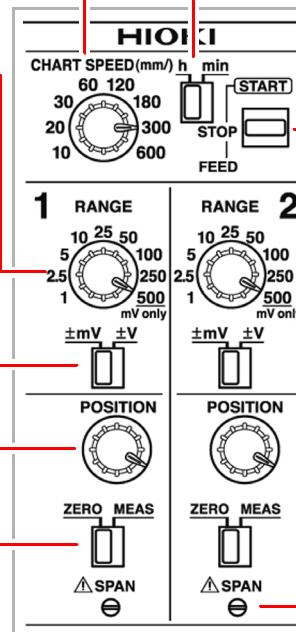
Starts and stops the paper feed.

- **START**: Starts feeding paper through the instrument.
- **STOP**: Stops feeding paper through the instrument.
- **FEED** (by pushing the switch past **STOP**): Feeds paper through the instrument. There are four feed speeds. You can increase the feed speed by pressing and holding the switch in the **FEED** position for at least 2 seconds.

### SPAN (p. 12)

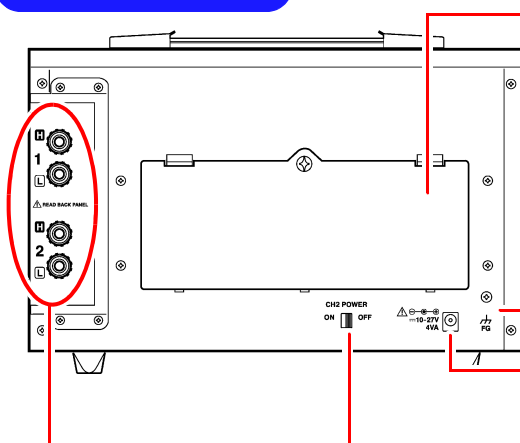
Allows the recording width to be adjusted using a screwdriver. This adjustment is not usually used during normal operation. Use as necessary when adjusting the instrument, for example during calibration.

- To increase the width: Turn clockwise. (The recording width can be increased by a maximum of about 20%.)
- To decrease the width: Turn counter-clockwise. (The recording width can be decreased by a maximum of about 20%.)



## Rear Panel

(Example: PR8112)



### Input terminals (p. 20)

Connect the measurement cables here.  
 Red: Connect the cable carrying the high signal.  
 Black: Connect the cable carrying the low signal.  
 On the PR8112, the upper two terminals are CH1, and the lower two terminals are CH2.  
 The PR8111 has only the upper two terminals.

### Battery bay and cover (p. 17)

When using batteries to power the instrument, load six LR20 alkaline batteries here. Since the battery cover is held in place with screws (M3), a Phillips head screwdriver is required in order to change the batteries.

### FG terminal

Use this terminal, which is connected to the instrument's metal chassis, to ground the chassis. For best grounding, use a cable of 3 m or less in length.

### AC adapter terminal (p. 18)

Connect the included AC adapter here.

### CH2 POWER switch (p. 26)

Use this switch (available only on the PR8112 [2-pen model]) to turn CH2 (pen 2) off. Turning off CH2 lowers the instrument's power consumption when using only one channel.



**SPAN (span adjustment)**

This feature is not usually used.

Perform span adjustment during calibration, when you wish to precisely realign the span (recording paper width) to compensate for the expansion and contraction of the recording paper, or when you wish to vary the span for other reasons.

The recording width can be adjusted with a precision slotted screwdriver.

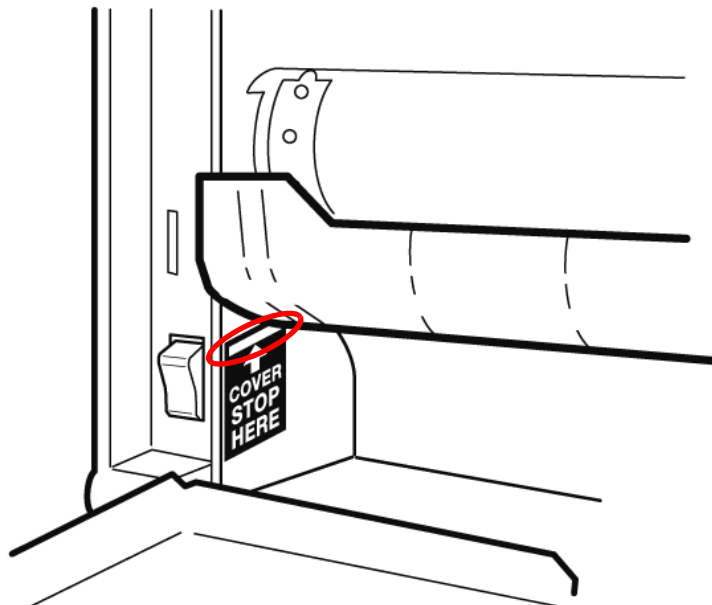
- To increase the width: Turn clockwise.  
(The recording width can be increased up to 20%.)
- To decrease the width: Turn counterclockwise.  
(The recording width can be decreased up to 20%.)

**CAUTION**

Adjusting the span causes values to diverge from the calibrated values guaranteed by HIOKI. After making measurements following span adjustment, have HIOKI or your nearest distributor recalibrate the instrument.

**Chart cover**

As shown below, the chart cover can be opened up to the line indicated by the label. Do not attempt to push the chart cover beyond the line as doing so may damage it.





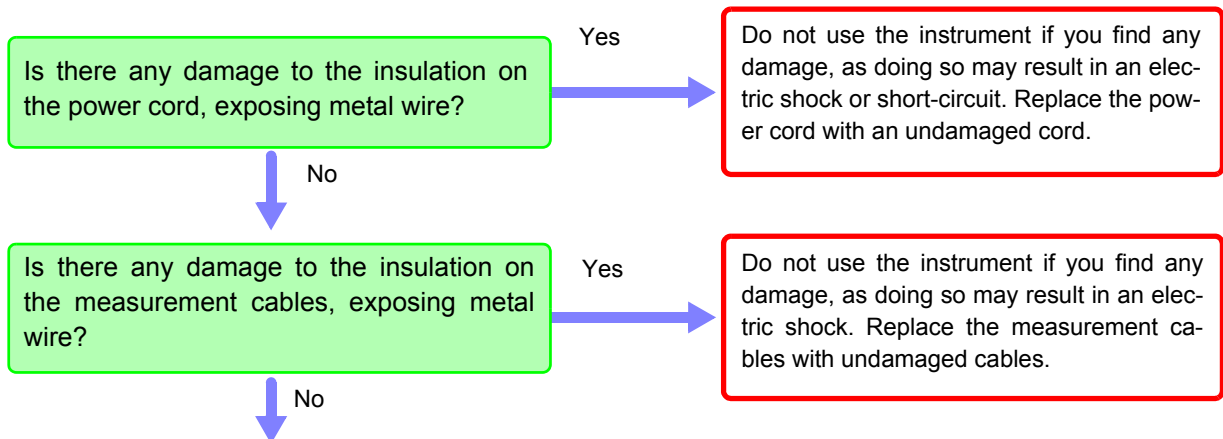
# Measurement Preparations

## Chapter 2

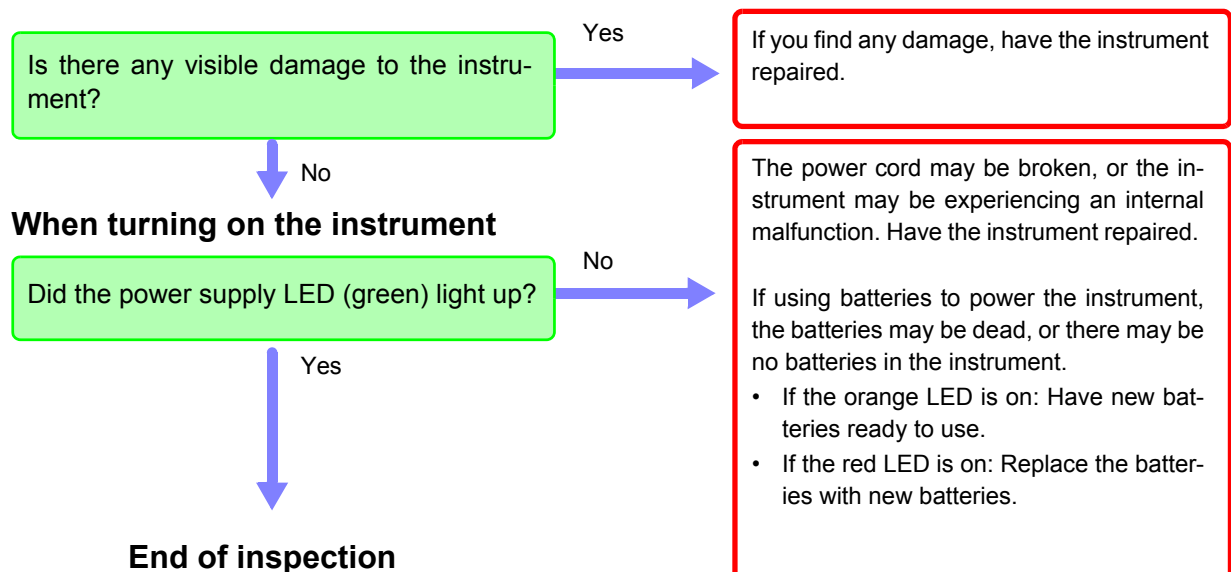
### 2.1 Pre-Operation Inspection

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

#### 1 Peripheral Device Inspection



#### 2 Instrument Inspection



Be sure to read "Operating Precautions" (p. 5) before using the instrument.

## 2.2 Loading Recording Paper

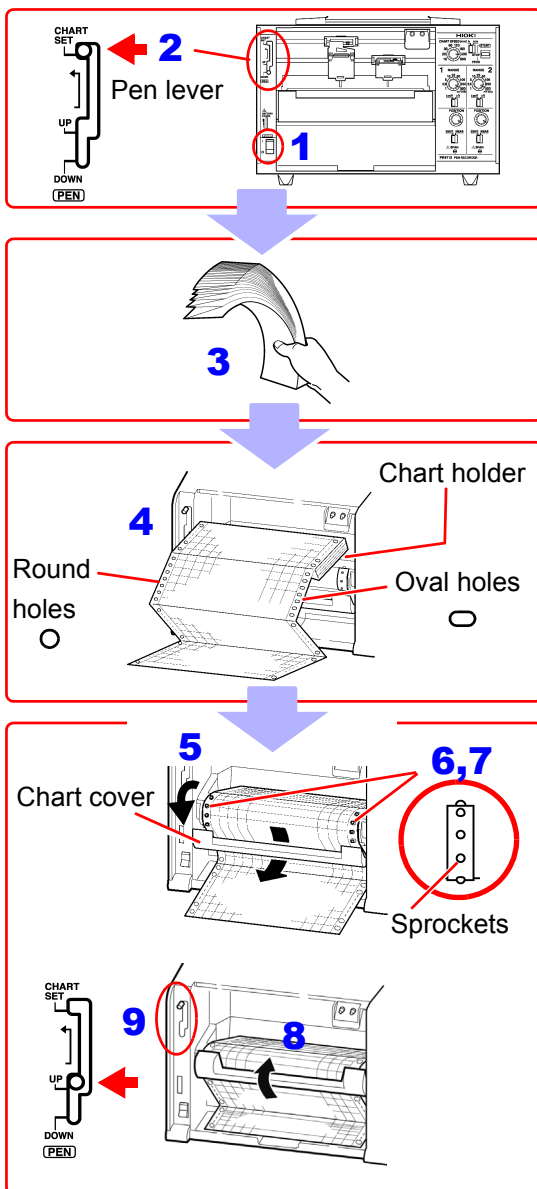
You can use either fanfold or roll type recording paper in the instrument.

See: "Options" (p. 2)

### CAUTION

- Please use only the specified recording paper. Using non-specified paper may not only result in faulty printing, but printing may become impossible.
- If not loaded properly, recording paper may jam.
- Do not use wet recording paper. Doing so may damage the instrument.
- Do not reuse recording paper. Doing so may prevent the paper from feeding properly.
- Store recording paper at room temperature, taking care to avoid high temperatures and humidity. Avoid moisture (rain or condensation).

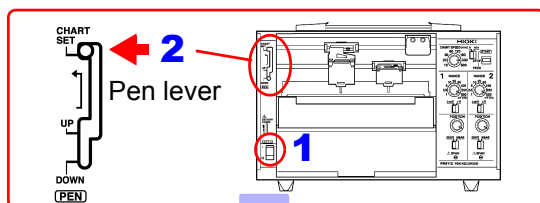
### Loading Fanfold Recording Paper



- 1 Turn on the **POWER** switch.
- 2 Set the pen lever to the **CHART SET** (top) position and lock the lever in place by moving it to the left.  
The platen will be raised, and the pens will automatically move to the far right.
- 3 Hold and shake the recording paper by the edge to separate the sheets.
- 4 Load the recording paper into the chart holder with the round holes on the left and the oval holes on the right.  
(Load so that the side of the paper with the red marks along the edge is on the bottom.)
- 5 Open the chart cover, pass the top of the recording paper through the opening, and pull the top edge through.
- 6 Align the paper so that the sprockets engage the round holes on its left edge.
- 7 In the same way, align the paper so that the sprockets engage the oval holes on its right edge.
- 8 Close the chart cover.
- 9 Set the pen lever to the **UP** (middle) position.  
The platen will be lowered.

Lower the **START/STOP/FEED** switch to the **FEED** position to feed the paper and verify that it has been properly loaded. You can press and hold the switch in the **FEED** position for at least 2 seconds to increase the feed speed.

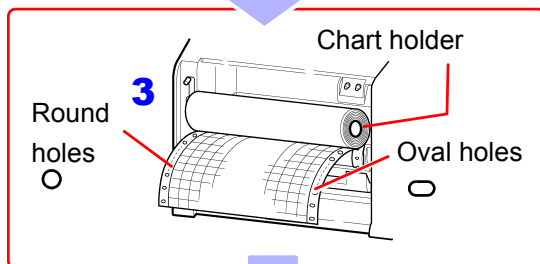
## Loading Roll Recording Paper



**1** Turn on the **POWER** switch.

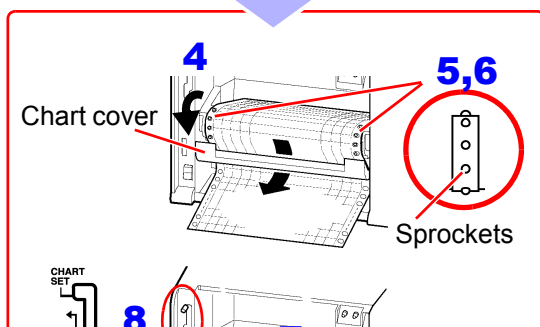
**2** Set the pen lever to the **CHART SET** (top) position and lock the lever in place by moving it to the left.

The platen will be raised, and the pens will automatically move to the far right.



**3** Load the recording paper into the chart holder with the round holes on the left and the oval holes on the right.

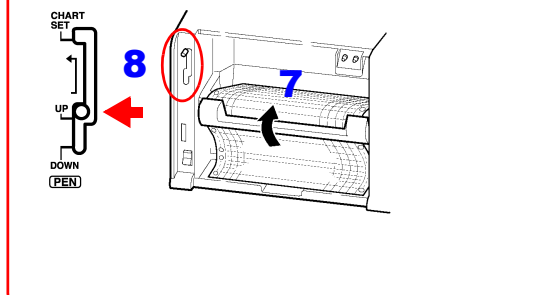
**4** Open the chart cover, pass the top of the recording paper through the opening, and pull the top edge through.



**5** Align the paper so that the sprockets engage the round holes on its left edge.

**6** In the same way, align the paper so that the sprockets engage the oval holes on its right edge.

**7** Close the chart cover.



**8** Set the pen lever to the **UP** (middle) position. The platen will be lowered.

Lower the **START/STOP/FEED** switch to the **FEED** position to feed the paper and verify that it has been properly loaded. You can press and hold the switch in the **FEED** position for at least 2 seconds to increase the feed speed.

### ■ Remaining recording paper

The amount of recording paper remaining (in cm) is indicated on the left edge of the paper. Red marks will appear on the right side of the paper when there is only about 100 cm of paper left.

## 2.3 Installing the Pens

Use only genuine HIOKI P-1200 series felt pens in the instrument.

Colors: P-1201 (red), P-1202 (green), P1203 (blue)

The letters A through C are appended to the above part numbers depending on the pen type (speed).  
(A: standard; B: high-speed; C: low-speed)

**See:** "Options" (p. 2)

The P-1201A and P-1202A (PR8112 only) pens that ship with the instrument are the standard "A" type.  
Use these pens for general recording work.

- If you need to record at a low paper feed speed of 120 mm/h or less...  
Use "C" low-speed type pens (P-1201C, etc.) for less running.
- If you need to record at a high speed or want the waveform to dry more quickly...  
Use "B" high-speed type pens (P-1201B).

### ! CAUTION

- Be sure to stop pen operation before attempting to install or replace pens. Do not apply excessive force to the pens during recording. Doing so may damage the instrument.
- After use, recap each pen. Leaving the pens uncovered may cause the pen tip to dry out, making it impossible to record waveforms.
- Never apply any grease or lubricant to the sliding surfaces of the pen holders and the enclosure. Doing so could cause a malfunction of the pen operation or damage to the enclosure.

### NOTE

- Once a pen has run out of ink, developed a thick tip, or grown too short, it cannot be used anymore. Replace it with a new pen.
- Store unused pens at room temperature, avoiding high temperature and humidity.
- Dispose of used pens in accordance with local regulations.
- Lines drawn with A-type and C-type pens are less prone to dry at a low temperature.
- If ink could bleed through a sheet of fanfold recording paper, use a B-type pen or roll-type recording paper instead.

## Installing Pens and Using the Pen Caps

For the PR881 (2-pen model), the forward (upper) pen holder is CH1, and the rearward (lower) pen holder is CH2.

Pen lever

1

CHART SET

UP

DOWN (PEN)

HIOKI

CHART SPEEDS: 100, 200, 400, 800, 1600, 3200, 6400

START

FEED

1 RANGE 2 RANGE

10 20 50 100 200 400 800 1600 3200 6400

10 20 50 100 200 400 800 1600 3200 6400

POSITION POSITION

TEST MEAS TEST MEAS

Δ-SHOW Δ-RANGE

PR8112 PEN RECORDER

Pen holder

2

Viewed from side

Pen cap storage pins

3

1 Set the pen lever to the **UP** (middle) position.  
The pens will be raised from the recording paper.

2 Firmly insert the pen as far as it will go into the pen holder.  
Verify that the pen has been inserted as far as it will go.

3 Remove the pen cap and place it on the pen cap storage pin.  
Pull the cap toward you away from the pen to remove it.

**Return the pen caps to the pen tips after use to keep the pens from drying out.**

## 2.4 Connecting the Power Source (Alkaline Batteries or AC Adapter)



You can power the instrument with either mains power or batteries, depending on where you're using it. If you use mains power while batteries are installed in the instrument, the AC adapter takes precedence.

### Installing Alkaline Batteries

When you are unable to operate the instrument using mains power, you can power it with six LR20 alkaline batteries instead. The batteries will also serve as a backup power source in the event of a power outage when using mains power.

#### ■ Checking the remaining battery life

You can check how much battery life remains with the Power LED.

- |        |   |
|--------|---|
| Green  | Indicates ample remaining battery life.<br>(Also lights up when powering the instrument with the AC adapter.)             |
| Orange | Indicates limited remaining battery life. It is recommend to have new batteries ready to use.                             |
| Red    | Indicates low remaining battery life.<br>It is recommended to replace the batteries in the instrument with new batteries. |

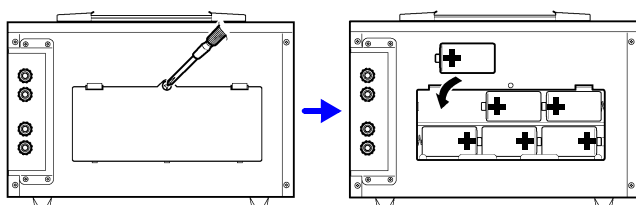
#### ■ Estimated operating times

- PR8111 (1-pen model): Approx. 50 hours
- PR8112 (2-pen model): Approx. 25 hours

When using the PR8112 (2-pen model) with just one pen, you can set the **CH2 POWER** switch on the rear of the instrument to **OFF** to realize similar operating times as for the PR8111 (1-pen model).(p. 26)

**Before installing batteries into the instrument, be sure to read "Using the Batteries" (p. 7).**

Required: One Phillips head screwdriver, six LR20 alkaline batteries



- 1** Turn off the **POWER** switch.  
If the instrument is connected to the AC adapter and cables, disconnect them.
- 2** Use the screwdriver to remove the screws holding the battery cover in place on the back of the instrument and remove the battery cover.
- 3** Install six new LR20 alkaline batteries.
- 4** Reattach the battery cover and tighten it securely in place with the screws removed in step (2) above.

#### **CAUTION**

The battery cover is held in place by M3-size screws. To ensure safe operation, affix the battery cover with screws. Avoid mixing new and old batteries or different types of batteries. Note the positive and negative poles and exercise care not to install the batteries backwards. Doing so may result in degraded performance or cause the batteries to leak.

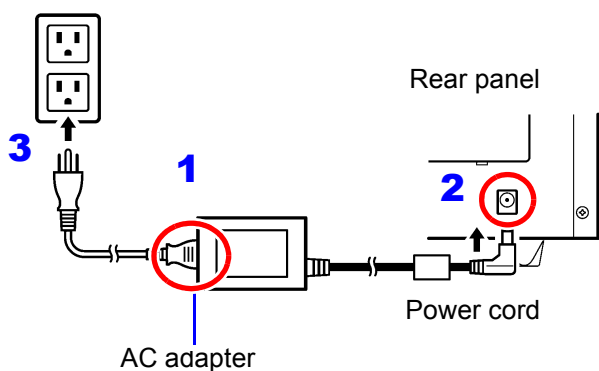
## 2.4 Connecting the Power Source (Alkaline Batteries or AC Adapter)

### Connecting the AC adapter

Connect the Model 9418-15 AC Adapter and power cord that came with the instrument and then connect the power cord to a wall outlet. When the adapter is used along with alkaline dry-cell batteries, the AC adapter takes precedence. If the supply of power from the AC adapter is interrupted, the instrument will switch over to battery power. When power returns, it will automatically revert to power from the AC adapter.

Before connecting the AC adapter, be sure to read "Using the AC Adapter" (p. 8) and "Handling the Cords and Cables" (p. 7).

Rated supply voltage is 100 to 240 VAC, and rated supply frequency is 50 or 60 Hz.



- 1 Connect the power cord to the inlet socket on the AC adapter.
- 2 Connect the output plug of the AC adapter to the instrument.
- 3 Plug the power cord into the mains outlet.

### Using a DC Power Source

You can also use the instrument with DC power source input, for example from an external battery. The instrument can be powered with a 10 to 27 VDC signal from the AC adapter jack. Hioki can provide cables for this purpose on a special-order basis. For more information, please contact your dealer or Hioki representative.

The cable connecting the battery and instrument should not exceed 3 m in length.

## 2.5 Turning the Instrument On and Off

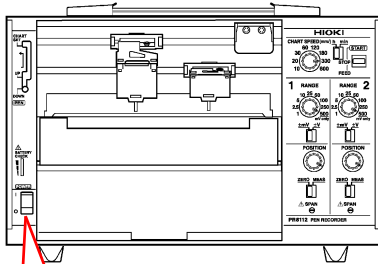


Once you have connected the instrument to its power supply or loaded batteries, you can turn the instrument on.

### Turning on the instrument

Turn the **POWER** switch to the **ON** position.

Once the instrument has been turned on, the power supply LED will light up.



Power ON



Power OFF



Green	Lights up when power is being supplied by the AC adapter. When using batteries, indicates ample remaining battery life.
Orange	Indicates limited remaining battery life. It is recommended to have new batteries ready to use.
Red	Indicates low remaining battery life. It is recommended to replace the batteries in the instrument with new batteries.

### **CAUTION**

If the orange or red LED lights up while using the AC adapter, the instrument may be damaged. Stop all use and have the unit repaired.

### Turning off the instrument

Turn the **POWER** switch to the **OFF** position.

## 2.6 Connecting Measurement Cables to the Input Terminals



Connect the measurement cables to the measurement terminals on the rear of the instrument. Wires with either crimp terminals or banana-plug cables can be connected.

Before connecting cables, be sure to read "Connecting Cables" (p. 8) and "Handling the Cords and Cables" (p. 7).



- The maximum input voltage is 250 VDC. Attempting to measure voltage in excess of the maximum input could destroy the instrument and result in personal injury or death.
- The maximum rated voltage between input terminals and ground is 300 VAC, DC. Attempting to measure voltages exceeding 300 V with respect to ground could damage the instrument and result in personal injury.

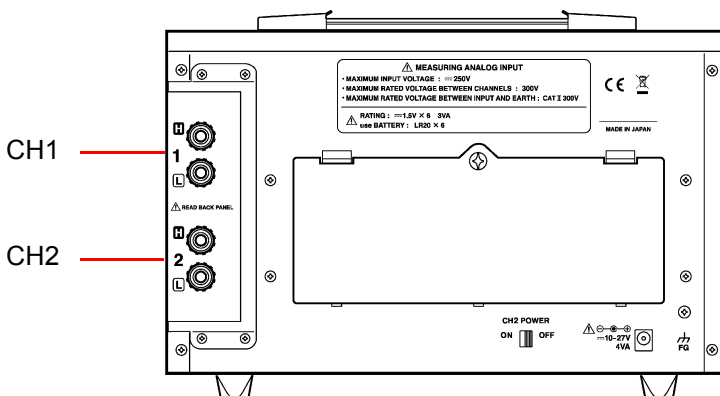


To avoid experiencing an electric shock or causing a short-circuit at the input terminals, only insulated crimp contacts should be used on wires being connected to input pins. (The input terminal pin diameter is M6.)

### How to connect cables

(PR8112)

The PR8111 does not have terminals for CH2.



- When you input a signal such that the red (H) terminal has a higher potential than the black (L) terminal, the pen moves rightward, starting from the user-specified zero point.
- When you input a signal such that the red (H) terminal has a lower potential than the black (L) terminal, the pen moves leftward, starting from the user-specified zero point.

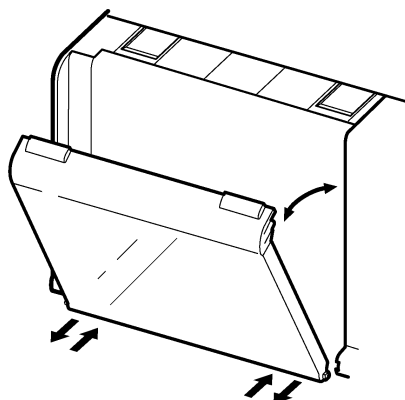
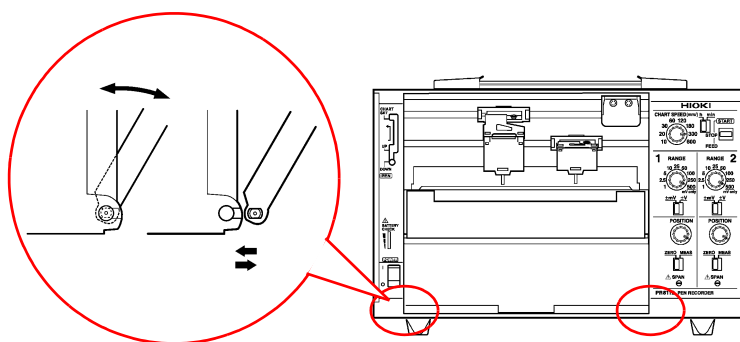


## 2.7 Attaching and Detaching the Front Cover

You can keep wind, dust, and other foreign matter out of the instrument by attaching the front cover, which also prevents recording paper from becoming entangled. The cover also protects the measurement hardware when the instrument is being shipped or transported.

### **NOTE**

When using roll paper, either detach the front cover or use the instrument with the cover open. Recording data with the front cover closed may cause paper to jam in the chart tray.



### **Attaching the front cover**

Insert the pegs on the cover into the grooves on the instrument while inclining the cover at an angle of about 60° from the horizontal.

### **Detaching the front cover**

Remove the pegs on the cover from the grooves on the instrument while inclining the cover at an angle of about 60° from the horizontal.

### **CAUTION**

#### **Operating environment**

This instrument is intended for use indoors.

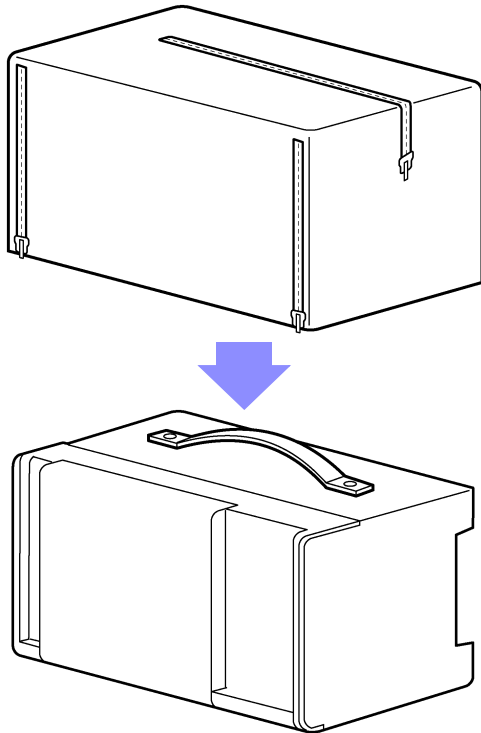
If you use the instrument in locations with an excessive amount of dust or sand, the pen operation could malfunction.

Close the front cover, put the drip-proof cover on the instrument, and then load fanfold paper into the instrument.

## 2.8 Attaching the Drip-proof Vinyl Cover

The drip-proof cover can keep the instrument and recording paper from getting wet when using the device in light rain or locations such as tunnels where dripping water is a concern. It can also help keep dust, sand, and other foreign matter out of the instrument.

The instrument can be carried with the drip-proof cover on it. Convenient zippers let you easily check and replace recording paper.



Place the cover over the instrument, positioning it so that the side that can be opened and closed covers the front of the device.

### **CAUTION**

#### **Operating environment**

This instrument is intended for use indoors.

If you use the instrument in locations with an excessive amount of dust or sand, the pen operation could malfunction.

Close the front cover, put the drip-proof cover on the instrument, and then load fanfold paper into the instrument.

# Configuring the Instrument and Taking Measurements

## Chapter 3

### 3.1 Configuration and Measurement Process

As much as possible, avoid printing in hot and humid environments. Otherwise, printer life may be severely shortened.

Select a measurement range (RANGE)  
(p. 24)

Move the pen position (POSITION)  
(p. 24)

Set the paper feed speed  
(CHART SPEED) (p. 24)

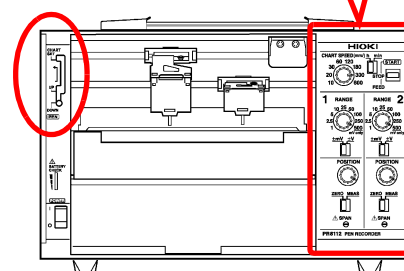
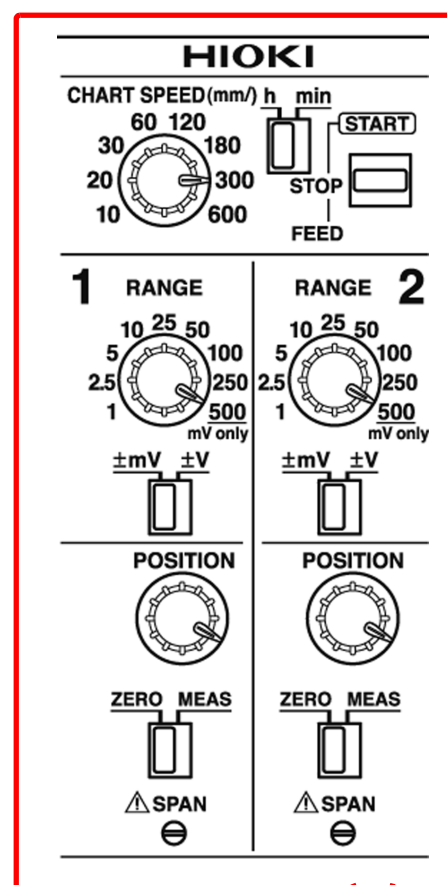
Place the pen lever in the **DOWN** position  
(bottom) to lower the pens (p. 24)

Start measurement (START) (p. 25)

Stop measurement (STOP) (p. 25)

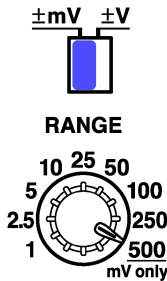
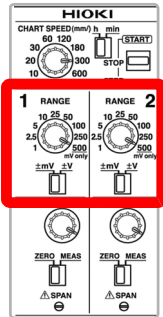
Remove the recording paper (p. 25)

Place the pen lever in the **UP** position  
(middle) and cap the pens (p. 25)



## 3.2 Basic Measurement

### Select a Measurement Range (RANGE)

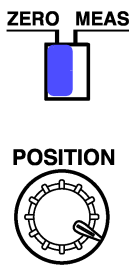
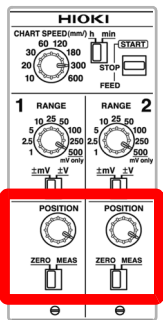


You can select the best range for the voltage you intend to measure. The range can be set from  $\pm 1$  mV to  $\pm 250$  V. The 500 setting is used exclusively for mV ranges.

- 1 Select the units with the **mV/V** switch.
- 2 Rotate the **RANGE** knob to select the desired range.

**NOTE** Do not set the **RANGE** knob to **500** while the **mV/V** switch is set to **V**.

### Move the Pen Position (POSITION)

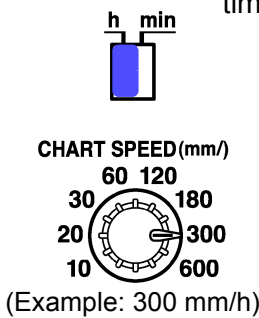
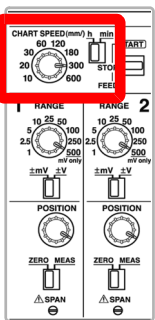


You can adjust the pen zero point and move the pen position. You can set the zero point (0 V position) by moving the **ZERO/MEAS** switch in the **ZERO** position.

Example: When using the  $\pm 1$  mV range, centering the zero point allows you to measure from -1 mV to +1 mV, while placing it at the leftmost edge allows you to measure from 0 V to +2 mV.

- 1 Move the **ZERO/MEAS** switch to the **ZERO** position.
- 2 Rotate the **POSITION** knob to set the pens' zero points.

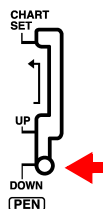
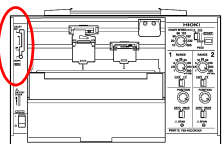
### Set the Paper Feed Speed (CHART SPEED)



You can set the paper feed speed according to the desired recording time. This setting can be changed while recording is in progress.

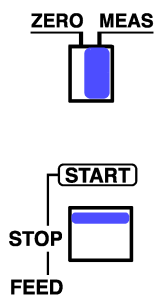
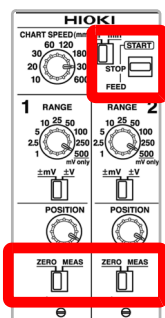
- 1 Select the speed unit with the **h/min** switch.
  - **mm/h**: Amount of paper feed per hour [mm]
  - **mm/min**: Amount of paper feed per minute [mm]
- 2 Rotate the **CHART SPEED** knob to select the desired speed.

### Lower the Pens (pen lever)



Place the pen lever in the **DOWN** (bottom) position to lower the pens.

## Start Measurement



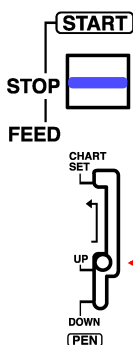
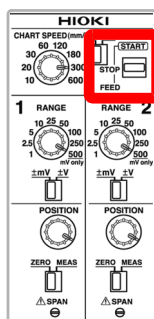
- 1 Move the **ZERO/MEAS** switch to the **MEAS** position.

The pens will move in response to input signals.

- 2 Move the **START/STOP/FEED** switch to the **START** position.

Paper will be fed through the instrument, and recording will start.

## Stop Measurement

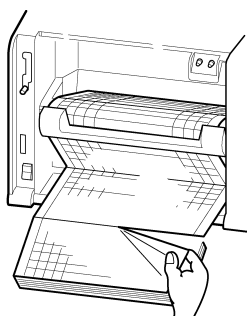


- 1 Move the **START/STOP/FEED** switch to the **STOP** position to stop feeding paper through the instrument.

Paper will stop moving through the instrument.

- 2 Place the pen lever in the **UP** (middle) position to raise the pens.

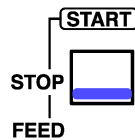
## Remove the Recording Paper



If you're using fanfold paper, tear off the paper along the perforated line.

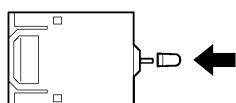
### To feed paper through the instrument

You can use the **START/STOP/FEED** switch to feed paper through the instrument.



Moving the switch to the **FEED** position causes paper to be fed through the instrument. There are four feed speeds. When you press and hold the switch in the **FEED** position for at least 2 seconds, the feed speed will increase.

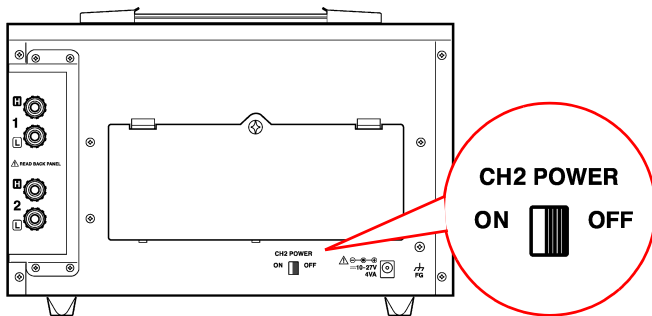
## Cap the Pens



Lift each pen toward you and cap it.

## 3.3 Using Only One channel (PR8112 Only)

When using only CH1, you can limit the instrument's power consumption to the power necessarily to drive one channel by setting the **CH2 POWER** switch on the rear of the instrument to **OFF**, thereby turning off the CH2 power supply. When powering the instrument with batteries, doing so will lengthen the batteries' service lifetime compared to when the **CH2 POWER** switch is **ON**.



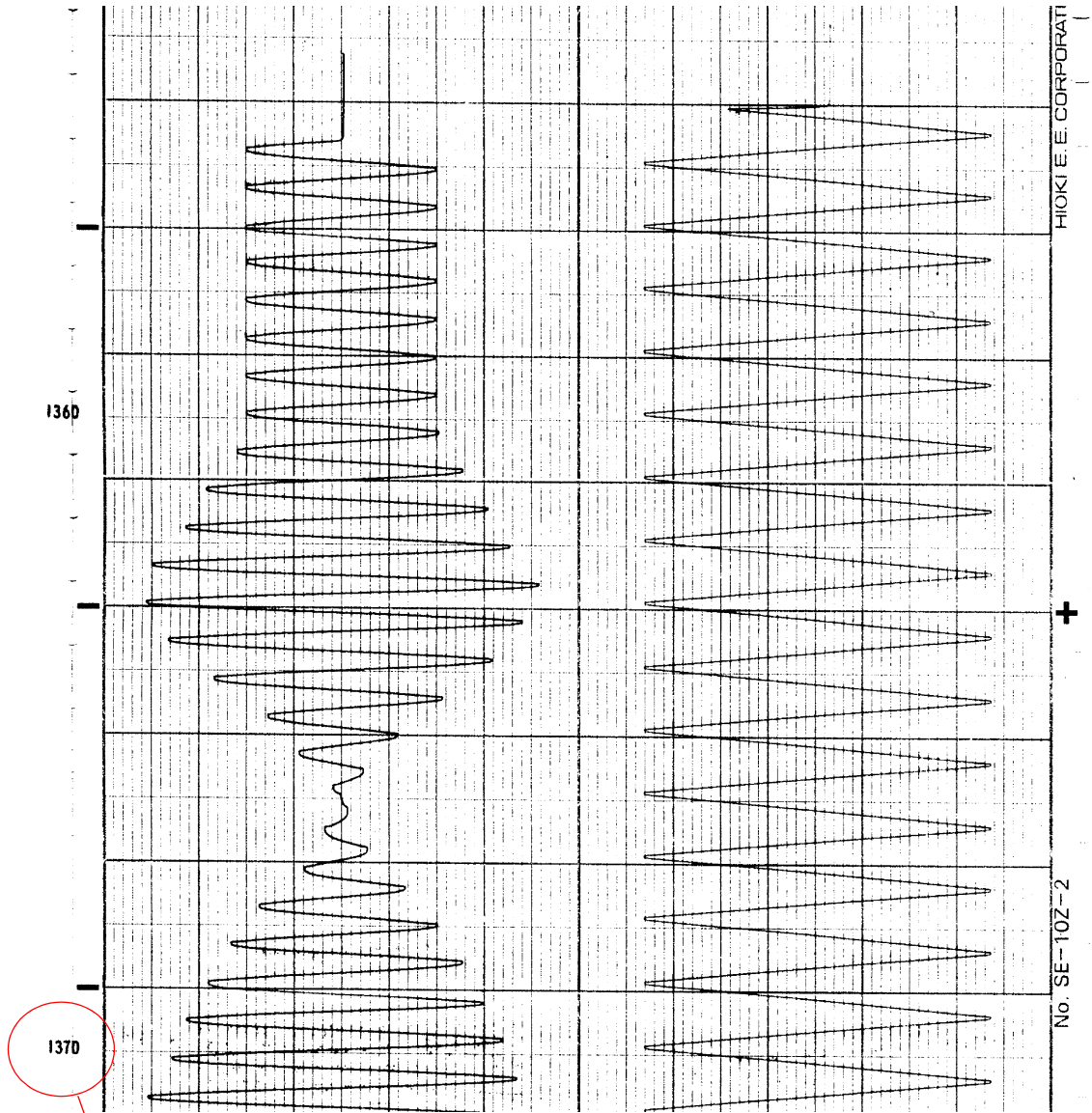
Move the **CH2 POWER** switch on the rear of the instrument to the **OFF** position.

Only the CH1 pen will operate.

Cap the CH2 pen before starting measurement. Taking measurements with the CH2 pen uncapped may cause the position of the CH2 pen tip to be recorded on the recording paper.

# 3.4 Example Printout

Example of data recorded with the PR8112



Indicates the amount of recording paper remaining (unit: cm).





# Specifications

# Chapter 4

## Product Configurations

1-pen model	Model PR8111
2-pen model	Model PR8112

## Basic Specifications

Operating method	Self-balancing
No. of pens	PR8111: 1 pen; PR8112: 2 pens
Input	DC voltage
Recording method	Disposable felt pens
Measurement ranges	$\pm 1$ mV, 2.5 mV, 5 mV, 10 mV, 25 mV, 50 mV, 100 mV, 250 mV, 500 mV, 1 V, 2.5 V, 5 V, 10 V, 25 V, 50 V, 100 V, 250 V 17 ranges
Effective recording width	150 mm
Recording accuracy	$\pm 0.5\%$ of effective recording width (including linearity in reference range; reference range of 250 mV) Excludes recording paper contraction and expansion.
Dead zone	$\pm 0.2\%$ of effective recording width
Inter-range error	$\pm 0.25\%$ of effective recording width
Temperature characteristics	$\pm 0.1\%$ of effective recording width per $1^\circ\text{C}$
Accuracy guarantee period	1 year
Input resistance	2 M $\Omega$ $\pm 1\%$
Pen interval	5 mm $\pm 1$ mm
Pen speed	500 mm/sec or faster (using AC adapter)
Chart speed	10 mm, 20 mm, 30 mm, 60 mm, 120 mm, 180 mm, 300 mm, 600 mm/min 10 mm, 20 mm, 30 mm, 60 mm, 120 mm, 180 mm, 300 mm, 600 mm/h 16 ranges
Chart speed accuracy	$\pm 0.25\%$
Zero point movement range	Can be adjusted throughout area for each range.
Chart feed	300 mm/min slow-up method
Pen-lifting mechanism	Gang lift
Orientation	Vertical

Recording paper	<ul style="list-style-type: none"> <li>Fanfold recording paper SE-10Z-2 (length: 15 m)</li> <li>Roll recording paper SE-10 (length: 20 m)</li> </ul>
Maximum rated voltage between terminals	250 VDC (V ranges) or 30 VDC (mV ranges)
Maximum rated voltage between terminals and ground	300 VAC, DC, measurement category II; anticipated transient overvoltage: 2,500 V (Between input channels and instrument or between input channels)
Dielectric strength and insulation resistance	3.0 kVAC for 1 min, 50 MΩ or more at 500 VDC (Between input channels and instrument or between input channels)
Battery check	3-stage LED display (green, orange, red) (when operating on battery power) Accuracy is guaranteed even when red indicator is lit. (green→orange: 6.9 V±0.15 V, orange→red: 6.4 V±0.15 V)
Operating temperature and humidity	Temperature: 0°C to 40°C (32°F to 104°F) Humidity: 40% to 80% RH (non-condensing)
Storage temperature and humidity	Temperature: -20°C to 55°C (-4°F to 131°F) Humidity: 10% to 80% RH (non-condensing)
Operating environment	Indoors, pollution degree 2, up to 2,000 m ASL
Dimensions	Approx. 292W × 177H × 182D mm (11.50"W × 6.97"H × 7.17"D) (excluding protruding parts)
Mass	PR8111: Approx. 3.9 kg (137.6 oz) (instrument only) PR8112: Approx. 4.4 kg (155.2 oz) (instrument only)
Power source	Model 9418-15 AC Adapter (12 VDC) Rated supply voltage: 100 to 240 VAC (with allowance for 10% voltage fluctuations) Rated supply frequency: 50/60 Hz Anticipated transient overvoltage: 2,500 V DC power supply input: 10 to 27 VDC (Input can be provided to the AC adapter jack via a special-order cable connected.) Wiring between battery and the instrument must be 3 m or less in length. Dry-cell batteries: Six LR20 alkaline batteries (When used with the AC adapter, the adapter takes precedence.)
Max. rated power	4 VA (AC adapter, DC power supply) or 3 VA (dry-cell batteries)
Continuous operating time	When using LR20 alkaline batteries (reference values for 23°C) PR8111: Approx. 50 hours PR8112: Approx. 25 hours Test conditions: 60 mm/h chart speed, ±250 mV measurement range, 400 mVp-p 0.01 Hz sine wave input waveform
Applicable standards	Safety: EN61010 EMC: EN61326 Class A
Effect of radiated radio-frequency electromagnetic field	±2% of effective recording with at 10 V/m
Effect of conducted radio-frequency electromagnetic field	±2% of effective recording width at 3 V

## Accessories

Felt pens	PR8111: P-1201A (red) PR8112: P-1201A (red), P-1202A (green)
Recording paper	SE-10Z-2 (fanfold paper) 1
AC adapter	9418-15
Instruction manual	1
Drip-proof vinyl cover	1
Front cover	1

## Accessories sold separately

Felt pens	Red : P-1201A (standard), P-1201B (high-speed), P-1201C (low-speed) Green: P-1202A (standard), P-1202B* (high-speed), P-1202C (low-speed) Blue : P-1203A (standard), P-1203B* (high-speed), P-1203C (low-speed) *: Discontinued product
Recording paper	SE-10Z-2 (fanfold paper), SE-10 (roll paper)
AC adapter	9418-15



# Maintenance and Service

## Chapter 5

### 5.1 Inspection, Repair, and Cleaning

**WARNING**

Do not attempt to modify, disassemble or repair the instrument; as fire, electric shock and injury could result.

#### Transporting

**CAUTION**

Observe the following precautions to avoid damaging the instrument:

- Use the original packing materials when transporting the instrument, if possible.
- When sending the instrument for repair, remove the batteries and pack carefully to prevent damage in transit. Include cushioning material so the instrument cannot move within the package. Be sure to include details of the problem. Hioki cannot be responsible for damage that occurs during shipment.
- Remove pens and recording paper when transporting the instrument. Failure to do so may damage the hardware in the instrument that accommodates the pens and recording paper due to vibrations. Be sure to cap the pens.

#### Storing the Instrument

**CAUTION**

- To avoid corrosion and damage to this instrument from battery leakage, remove the batteries from the instrument if it is to be stored for a long time (for a month). For more information about batteries, see "2.4 Connecting the Power Source (Alkaline Batteries or AC Adapter)" (p. 17).
- Cap pens after use. Leaving pens uncapped may cause their tips to dry out, making it impossible to record waveforms. When not being used, pens should be stored at room temperature, avoiding high heat and humidity. For more information about storing pens, see "2.3 Installing the Pens" (p. 16).
- Do not leave the front cover detached or open. Doing so could allow dust to enter the instrument, resulting in damage to the instrument. If the instrument will not be used for an extended period, put the drip-proof vinyl cover on the instrument to prevent dust from entering.

For more information about storing recording paper, see "2.2 Loading Recording Paper" (p. 14).

### Replaceable Parts and Operating Lifetimes

Useful life depends on the operating environment and frequency of use. Operation cannot be guaranteed beyond the following periods. For replacement parts, contact your dealer or Hioki representative.

Part	Life
Electrolytic Capacitors	Approx. 10 years

The fuse is housed in the power unit of the instrument. If the power does not turn on, the fuse may be blown. If this occurs, a replacement or repair cannot be performed by customers. Please contact your dealer or Hioki representative.

### Maintenance

To clean the instrument, 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.

#### CAUTION

- Do not apply any oil. Doing so could damage the instrument.
- Never apply any grease or lubricant to the sliding surfaces of the pen holders and the enclosure. Doing so could cause a malfunction of the pen operation or damage to the enclosure.

## 5.2 Troubleshooting

If damage is suspected, check the "Before Returning for Repair" section before contacting your dealer or Hioki representative.

### Before Returning for Repair

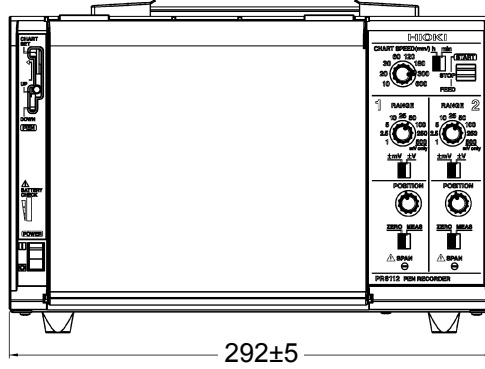
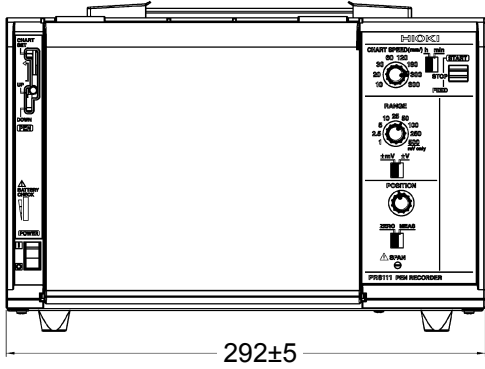
Symptom	Check Items	
The LED (on the left side of the instrument) doesn't turn on when the <b>POWER</b> switch is turned on.	Has the power cord been disconnected? Is it connected properly?	Verify that the power cord is properly connected to the outlet and the AC adapter (p. 18).
	Are the batteries installed properly?	Verify that the batteries have been installed properly (p. 17).
The pens don't move when the control panel is operated.	Is the <b>CH2 POWER</b> switch in the <b>OFF</b> position (PR8112)?	The CH2 pen will operate when the <b>CH2 POWER</b> switch is in the <b>ON</b> position.
Paper is not being fed through the instrument.	Has the recording paper come off the sprockets?	Verify that the recording paper has been loaded properly (p. 14). If the paper is not being fed through the instrument even though it has been loaded properly, the instrument may be damaged. Please contact your dealer or Hioki representative.
	Are you trying to reuse recording paper?	Do not attempt to reuse recording paper. Additionally, use only genuine Hioki recording paper.
The instrument won't turn on.	A power protection component may be damaged.	Customers should not attempt to replace or repair parts. Contact your dealer or Hioki representative for service.
The waveform is not changing.	Are the cables connected properly?	Verify that the measurement and other cables are connected properly.
	Is the measurement range set properly?	Verify that the <b>RANGE</b> knob and the mV/V switch have been set appropriately.
	Is the <b>ZERO/MEAS</b> switch set to the <b>MEAS</b> position?	Verify that the <b>ZERO/MEAS</b> switch is set to the <b>MEAS</b> position and that the <b>START/STOP/FEED</b> switch is set to the <b>START</b> position.
Nothing prints on the paper.	Are the recording paper and pens installed properly?	Verify that the recording paper (p. 14) and pens (p. 16) are installed properly.
	Is the paper lever in the <b>DOWN</b> (bottom) position?	The pens will be in contact with the recording paper when the paper lever is in the <b>DOWN</b> (bottom) position.
Printout is too light.	The pens may have dried out.	Replace the pens.
Ink is leaking from the pens.	Are the pens being stored properly?	Store pens at room temperature, avoiding high temperature and humidity.

# 5.3 Outline Drawings

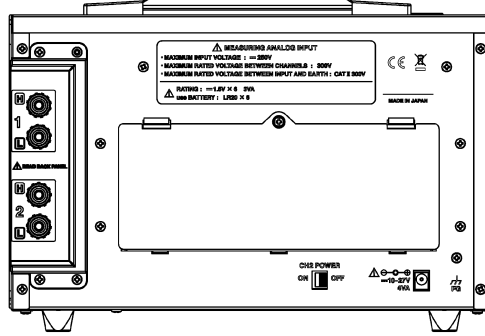
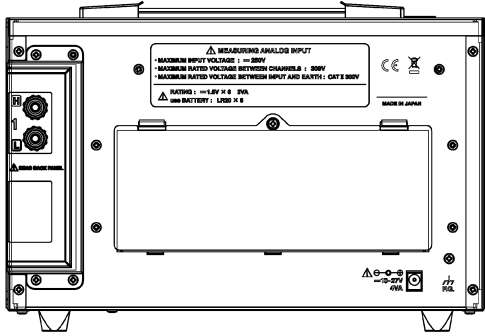
(mm)

PR8111

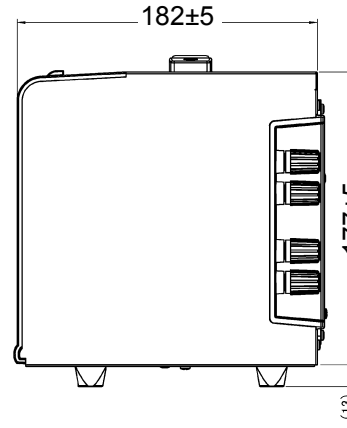
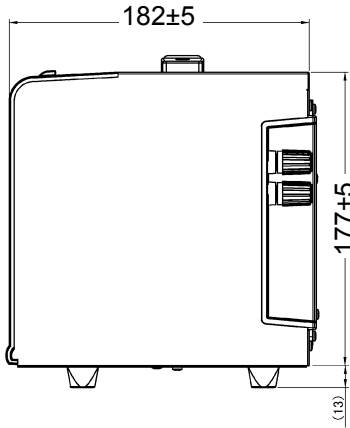
PR8112



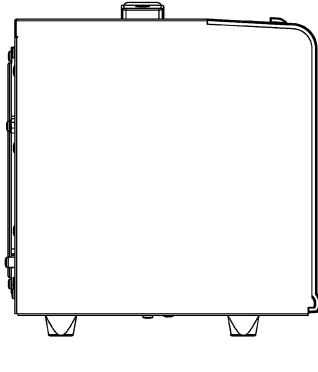
Front



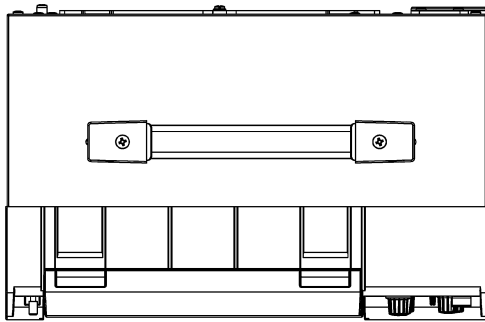
Rear



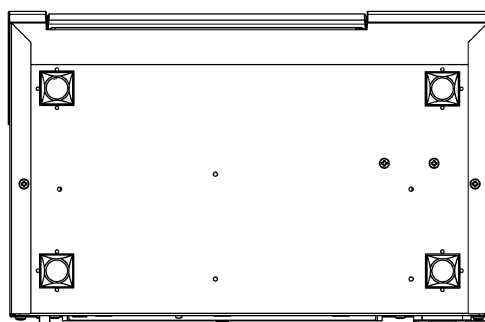
Right



Left



Top



Bottom



# Warranty Certificate

# HIOKI

Model	Serial number	Warranty period One (1) year from date of purchase ( ___ / ___ )
<p>Customer name: _____</p> <p>Customer address: _____</p>		
<p><b>Important</b></p>		
<ul style="list-style-type: none"><li>• Please retain this warranty certificate. Duplicates cannot be reissued.</li><li>• Complete the certificate with the model number, serial number, and date of purchase, along with your name and address. The personal information you provide on this form will only be used to provide repair service and information about Hioki products and services.</li></ul>		
<p>This document certifies that the product has been inspected and verified to conform to Hioki's standards. Please contact the place of purchase in the event of a malfunction and provide this document, in which case Hioki will repair or replace the product subject to the warranty terms described below.</p>		
<p><b>Warranty terms</b></p>		
<ol style="list-style-type: none"><li>1. The product is guaranteed to operate properly during the warranty period (one [1] year from the date of purchase). If the date of purchase is unknown, the warranty period is defined as one (1) year from the date (month and year) of manufacture (as indicated by the first four digits of the serial number in YYMM format).</li><li>2. If the product came with an AC adapter, the adapter is warranted for one (1) year from the date of purchase.</li><li>3. The accuracy of measured values and other data generated by the product is guaranteed as described in the product specifications.</li><li>4. In the event that the product or AC adapter malfunctions during its respective warranty period due to a defect of workmanship or materials, Hioki will repair or replace the product or AC adapter free of charge.</li><li>5. The following malfunctions and issues are not covered by the warranty and as such are not subject to free repair or replacement:<ol style="list-style-type: none"><li>-1. Malfunctions or damage of consumables, parts with a defined service life, etc.</li><li>-2. Malfunctions or damage of connectors, cables, etc.</li><li>-3. Malfunctions or damage caused by shipment, dropping, relocation, etc., after purchase of the product</li><li>-4. Malfunctions or damage caused by inappropriate handling that violates information found in the instruction manual or on precautionary labeling on the product itself</li><li>-5. Malfunctions or damage caused by a failure to perform maintenance or inspections as required by law or recommended in the instruction manual</li><li>-6. Malfunctions or damage caused by fire, storms or flooding, earthquakes, lightning, power anomalies (involving voltage, frequency, etc.), war or unrest, contamination with radiation, or other acts of God</li><li>-7. Damage that is limited to the product's appearance (cosmetic blemishes, deformation of enclosure shape, fading of color, etc.)</li><li>-8. Other malfunctions or damage for which Hioki is not responsible</li></ol></li><li>6. The warranty will be considered invalidated in the following circumstances, in which case Hioki will be unable to perform service such as repair or calibration:<ol style="list-style-type: none"><li>-1. If the product has been repaired or modified by a company, entity, or individual other than Hioki</li><li>-2. If the product has been embedded in another piece of equipment for use in a special application (aerospace, nuclear power, medical use, vehicle control, etc.) without Hioki's having received prior notice</li></ol></li><li>7. If you experience a loss caused by use of the product and Hioki determines that it is responsible for the underlying issue, Hioki will provide compensation in an amount not to exceed the purchase price, with the following exceptions:<ol style="list-style-type: none"><li>-1. Secondary damage arising from damage to a measured device or component that was caused by use of the product</li><li>-2. Damage arising from measurement results provided by the product</li><li>-3. Damage to a device other than the product that was sustained when connecting the device to the product (including via network connections)</li></ol></li><li>8. Hioki reserves the right to decline to perform repair, calibration, or other service for products for which a certain amount of time has passed since their manufacture, products whose parts have been discontinued, and products that cannot be repaired due to unforeseen circumstances.</li></ol>		
<p style="text-align: right;"><b>HIOKI E.E. CORPORATION</b> <a href="http://www.hioki.com">http://www.hioki.com</a> 18-07 EN-1</p>		





# HIOKI

<http://www.hioki.com>



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