HIOKI

MEASUREMENT GUIDE

3145-20

NOISE HiLOGGER

Read first.
Offers an introduction to the 3145-20 NOISE HiLOGGER's basic measuring method for first time users.

HIOKI E. E. CORPORATION

Contents

Introduction

Thank you for purchasing the HIOKI "Model 3145-20 NOISE HiLOGGER." To obtain maximum performance from the instrument, please read this manual first, and keep it handy for future reference.

The following instruction manuals are included with the 3145-20 NOISE HiLOGGER. Refer to them as they pertain to your usage of the instrument.

Manual		Content
1	Measurement Guide (this manual)	**Read first.** Offers an introduction to the 3145-20's basic measuring method for first time users.
2	Instruction Manual	Contains explanation and instructions regarding the instrument's operating method and functions.

CD		Content
3	"DATA VIEWER for 3145" Instruction Manual	Contains information about PC software which can analyze the measurement data recorded by the instrument.
4	"Communications" Instruction Manual	Explains the communication functions which can be used via the LAN and RS-232C interfaces.
5	"Communication Commands" Instruction Manual	Explains the commands for remote control of the instrument via the LAN and RS-232C interfaces.

NOTE Before reading this manual, fully read and understand "Safety Information" and "Chapter 2 Measurement Preparations" in the instruction manual, and then start taking measurements.

Notation

Safety Symbols

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.

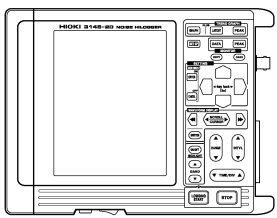
Others

(⇒ p.)	Indicates the location of reference information.
	Indicates quick references for operation and remedies for troubleshooting.
*	Indicates that descriptive information is provided below.

Verifying Package Contents

Please check to make sure that no items are missing from your package.

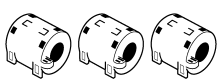
☐ Model 3145-20 NOISE HiLOGGER..... 1



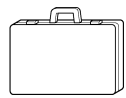
Accessories

☐ Model 9418-15 AC ADAPTER.....1

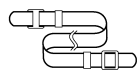
☐ Ferrite cores 3



☐ Carrying case 1



☐ Strap.....1



☐ CD (Software, Instruction Manuals)
.....1

- "DATA VIEWER for 3145" Software and Instruction Manual
- "Communications" Instruction Manual
- "Communication Commands" Instruction Manual

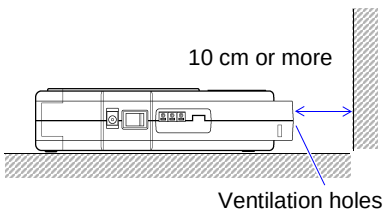
☐ Instruction Manual / Measurement Guide (this manual) ..... each one

Options

- ☐ Model 9754 CLAMP ON NOISE SENSOR
- ☐ Model 9418-15 AC ADAPTER
- ☐ Model 9447 BATTERY PACK (7.2 V, 2400 mAh)
- ☐ Model 9643 CHARGE STAND (For the 9447 BATTERY PACK)
- ☐ Model 9612 RS-232C CABLE
  (9-pin mini DIN to 9-pin Dsub, cross cable, for PC)
- ☐ Model 9721 RS-232C CABLE
  (9-pin mini DIN to 9-pin Dsub, straight cable, for modem)
- ☐ Model 9726 PC CARD 128M
- ☐ Model 9727 PC CARD 256M
- ☐ Model 9728 PC CARD 512M
- ☐ Model 9729 PC CARD 1G
- ☐ Model 9642 LAN CABLE

Preparing the Measuring Instrument

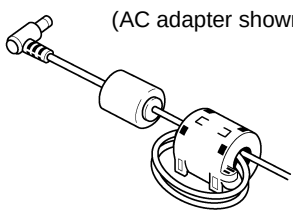
1. **Install the instrument.**



- Vents must not be obstructed.
- The instrument should be operated only with the bottom side downwards.
- Do not place on an unstable stand or on an incline.

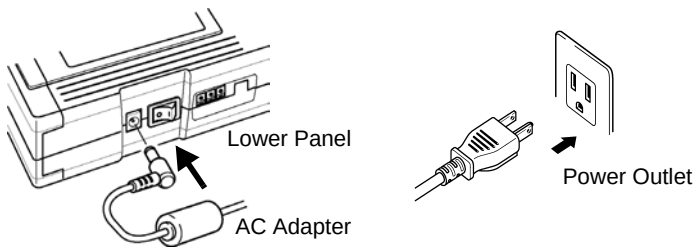
2. **Install the included ferrite cores on the AC adapter and the Clamp on Noise Sensor**
Loop the output side of the cable through the ferrite core twice and then close it until you hear a snap.

(AC adapter shown here)



Install as close as possible to the pre-installed ferrite core.

3. **Connect the 9418-15 AC ADAPTER to the instrument.**
Plug the AC adapter into the power outlet.

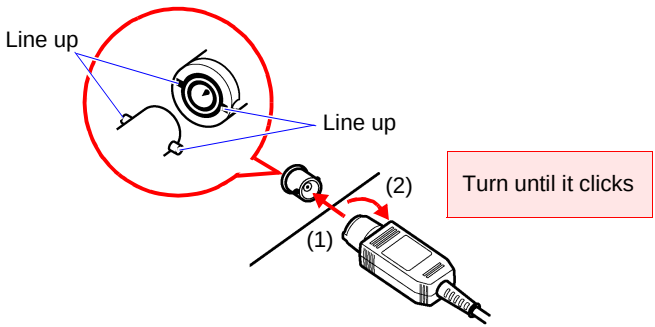


⚠WARNING

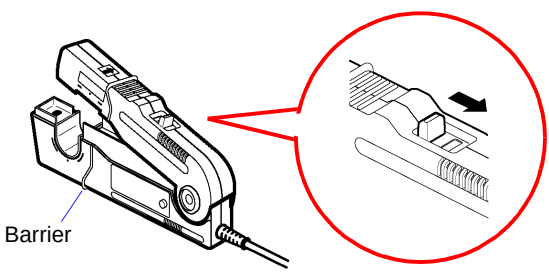
- **Turn the instrument off before connecting the AC adapter to the instrument and to AC power.**
- **Use only the supplied Model 9418-15 AC ADAPTER. AC adapter input voltage range is 100 to 240 VAC (with ± 10% stability) at 50/60 Hz. To avoid electrical hazards and damage to the instrument, do not apply voltage outside of this range.**

NOTE The instrument has dual power systems and you can supply it power with both the AC adapter and the optional 9447 BATTERY PACK. You can take measurements using only the AC adapter, but we recommend installing and using the battery back as a preventative measure for power supply interruptions.
For installing the battery pack and how to recharge it, refer to "2.4 Supplying Power with the Battery Pack" in the instruction manual included with the instrument.

4. Connect the BNC connector of the 9754 CLAMP ON NOISE SENSOR (optional) to the input terminal of the instrument being connected to.



5. Pull the slider on the sensor to open the clamp.



⚠DANGER

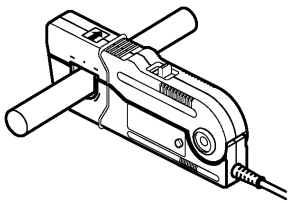
- **To avoid electric shock, do not touch the portion beyond the protective barrier during use.**
- **To avoid short circuits and potentially life-threatening hazards, never attach the clamp to a circuit that operates at more than 600 V (CAT II) / 300 V (CAT II), or over bare conductors.**

⚠CAUTION

To avoid damaging the instrument, do not apply current that exceeds the maximum continuous input range.

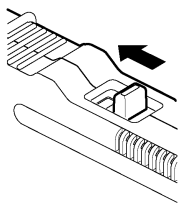
* Maximum continuous input range:
This range is based on heat that is internally generated during sine wave input at a prescribed frequency at room temperature. It varies according to the frequency of the measured current. (Use the 9754 CLAMP ON NOISE SENSOR at the highest effective value within the maximum continuous input range.) In addition to the maximum continuous input range, there is also the "maximum peak current value 15 Apeak" product specification. This indicates an upper waveform response limit of 15 Apeak.

6. **Clamp the conductor to be measured and close the clamp.**



Make sure also that the conductor is clamped in the center of the clamp opening.

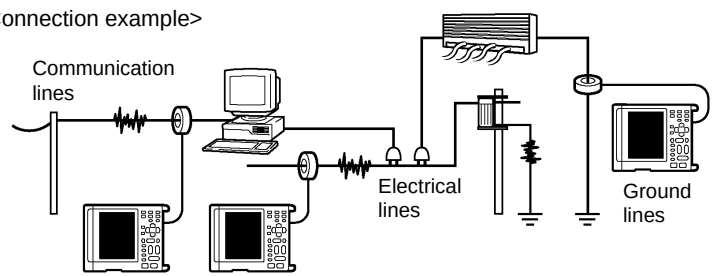
7. **Press on the slider until it clicks to lock shut.**



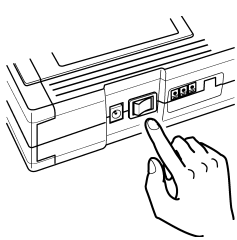
Press the sensor slider until the "UN-LOCK" message disappears and "LOCK" is displayed, and confirm that the slider is firmly locked and the clamp securely closed.

By checking the noise level and frequency range of an electrical product's communication lines, power supply lines, and grounding lines, you can identify the existence of noise and obtain clues for suppressing it.

<Connection example>



8. **Turns on (|) the POWER switch.**



Preparations for the measuring instrument are complete with the above.

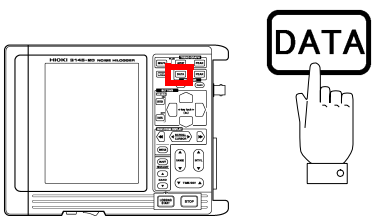
Checking Noise on the Monitor Display

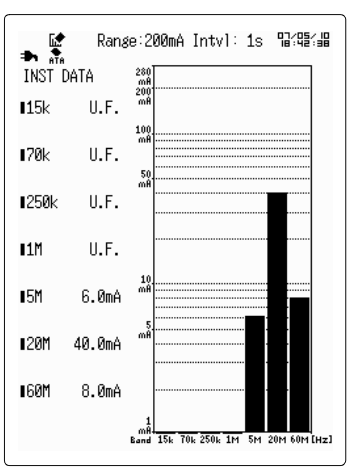
An example of taking measurements of a PC's communications line (LAN line) is explained here.

In order to investigate the cause of a malfunctioning PC, measure the noise current flowing through the LAN cable with the instrument.

1. Press DATA and display the Monitor screen.

The noise current detected by the 9754 CLAMP ON NOISE SENSOR is read into the instrument and displayed on the monitor. Check the noise's frequency band and level.

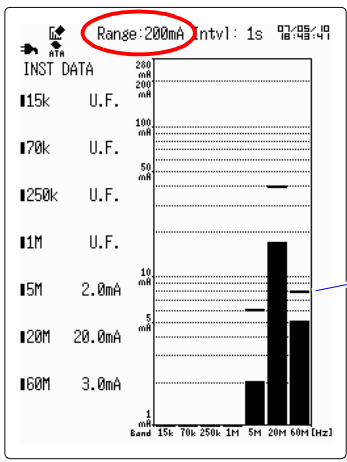




You can see that large noise is intruding in 20 MHz.

2. **Press** RANGE **to select the range.**

Set to **[200mA]**.



NOTE

"U.F." indicates underflow.
If "U.F." is displayed, lower the range.

"O.F." indicates overflow.
If "O.F." is displayed, raise the range.

Peak Bar: Displays the noise level's peak value generated during the monitor display.

3. **When you want to check the peak value, press** PEAK**.**

If you wish an alarm to sound when the measurement value exceeds a specified value, set the alarm function on the Set up screen. See "Sound Alarm When Exceeding Specified Value"(⇒ p. 19).

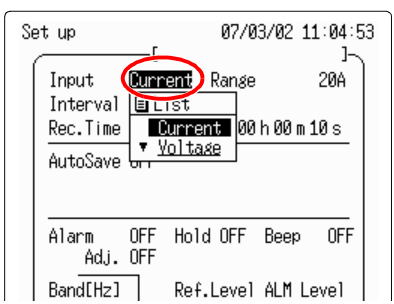
View/Save Noise Progression

Measure the noise level's temporal change using the logging function and save it to the PC card.
After measuring, check the noise generation time and noise level so that you can gain clues for noise suppression.

Setting the measurement conditions

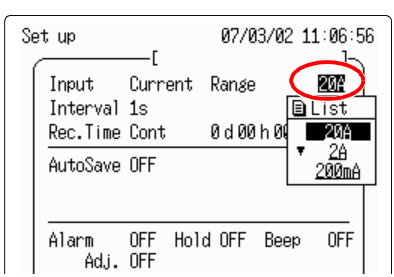
1. **Press SET UP to open the Set up screen.**

2. **Check if the input type is [Current].**



Selectable items	Explanations
Current	Select when using the 9754 CLAMP ON NOISE SENSOR for measurement.
Voltage	Select when using products other than the 9754 CLAMP ON NOISE SENSOR for measurement.

3. **Press ◁▷ to move the blinking cursor to [Current Range], and press ENTER to open the selection window.**



Input type	Selectable ranges
Current	200 mA, 2 A, 20 A
Voltage	1 V, 100 mV, 10 mV

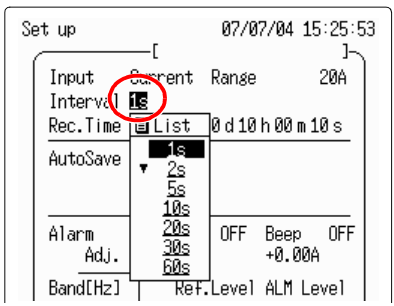
As a general reference, select 200mA for communications, 2A for power supply and 20A for lightning surge.

4. **Press △/▽ to select the range, and ENTER to set.**

Set to **[200mA]**.

To cancel, press CANCEL.

5. **Press ◇ to move the blinking cursor to [Interval], and press ENTER to open the selection window.**



Recording interval
1s, 2s, 5s, 10s, 20s, 30s, 60s

6. **Press △/▽ to select the recording interval, and ENTER to set.**

Set to **[1s]**. Data will be loaded every second.

How to decide the recording interval

When you set the recording time to 1 second, with using the 9726 PC CARD 128M, you can save approximately 60 days worth of data.

<Reference>

1s : 60 days
2s : 120 days
5s : 300 days
10s : 1.7 years
20s : 3.3 years
30s : 5 years
60s : 10 years

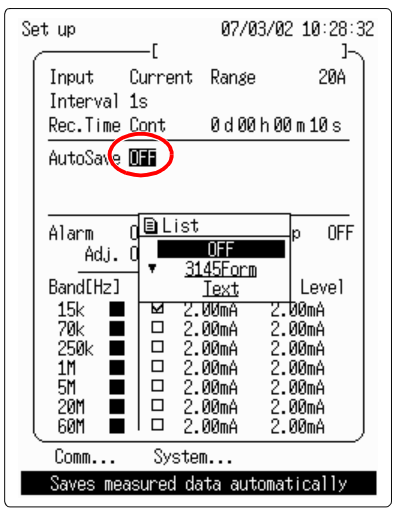
However, the maximum save time for 1 measurement is 999 days 23 hours 59 minutes 59 seconds.

If you wish an alarm to sound when the measurement value exceeds a specified value, set the alarm function on the Set up screen. See "Sound Alarm When Exceeding Specified Value"(⇒ p. 19).

Setting automatic save

Set for saving measurement data to the PC card.

1. Press ◇ to move the blinking cursor to [AutoSave], and press ENTER to open the selection window.



Selectable items	Explanations
OFF	Does not save data.
3145 Form	Auto saves in binary format readable by the instrument and the "DATA VIEWER for 3145" software on the included CD.
Text	Auto saves in text format readable by personal computer spreadsheet programs. (Cannot be read by the 3145-20.)

2. Press ◇/◇ and select [3145 Form], and set with ENTER.

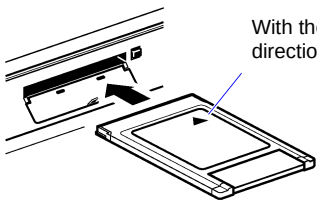
3. Check if the save mode is [Normal], [Full].

As a filename is not set here, a filename of **[NONAME]** and a consecutive number will be attached as a filename.
When you enter a filename, the data will be saved with the entered filename during automatic saving. When you save the data continuously, a number is attached.

NOTE When the instrument's clock is not accurate, set the time on the System Init screen. For details refer to "7.3.1 Setting the Clock" in the included instruction manual.

PC card insertion

1. Open the cover and insert the PC card, as far as it will go.



With the arrow facing up and in the direction of the PC card slot

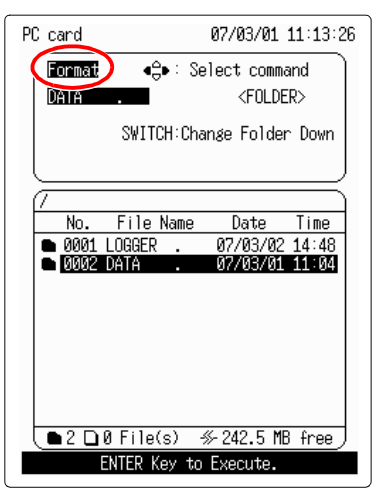
Inserting a PC card upside down, backwards or in the wrong direction may damage the instrument

Important
Use only PC Cards sold by Hioki.
Compatibility and performance are not guaranteed for PC cards made by other manufacturers. You may be unable to read from or save data to such cards.
Hioki options PC cards (includes adapter)
Model 9726 PC CARD 128M, Model 9727 PC CARD 256M,
Model 9728 PC CARD 512M, Model 9729 PC CARD 1G

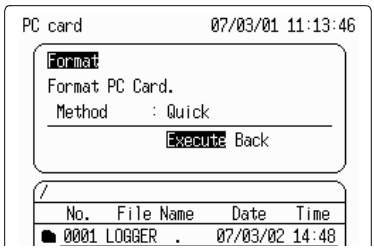
2. When using a brand new PC card for the first time, initialize the PC card.

Press CARD to open the PC card screen.

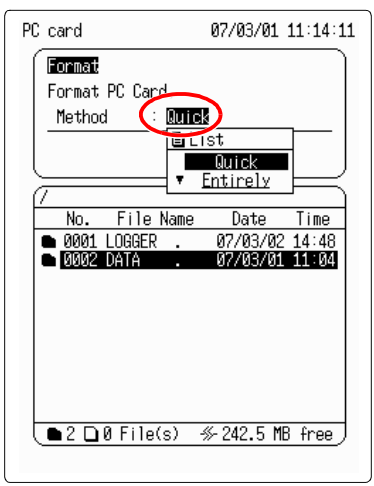
3. Press ◁/▷ to choose [Format].



4. **Press [ENTER] to open the initialize screen.**



5. **Press ⌂ to move the blinking cursor to [Method], and press [ENTER] to open the contents.**



Selectable items	Explanations
Quick	The PC Card is not tested for bad sectors.
Entirely	The PC Card is tested for bad sectors, which are removed from use if possible. When using a brand new PC card for the first time, select **[Entirely]**.

6. **Use the up and down ⌂/⌄ keys to select [Entirely], and press [ENTER] to set.**

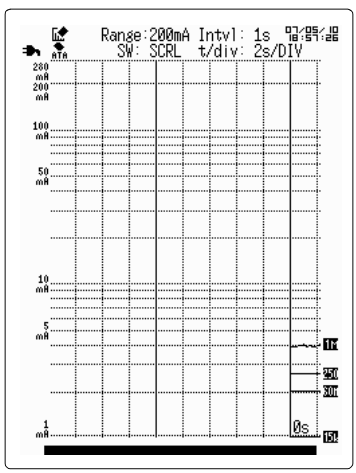
7. **Press ⌄ to move the blinking cursor to [Execute], and press [ENTER] to execute initialization.**

Starting and stopping measurements

Start measurements. Measurement data is saved automatically to the PC card.

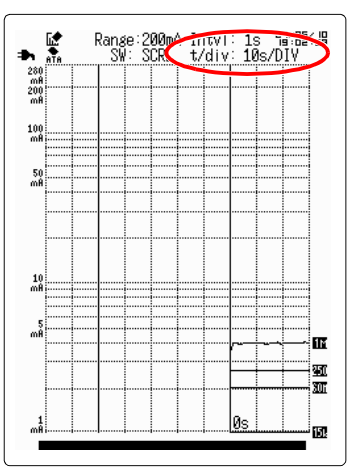
1. **Press GRAPH and display the Logging screen.**

2. **Press LOGGING START and start measurements.**



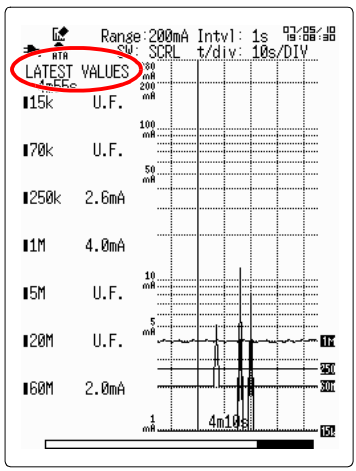
3. **Press ▼TIME/DIV▲ and set the temporal axis.**

Set to **[10s/DIV]**. On the horizontal axis 1 square will become 10 seconds.



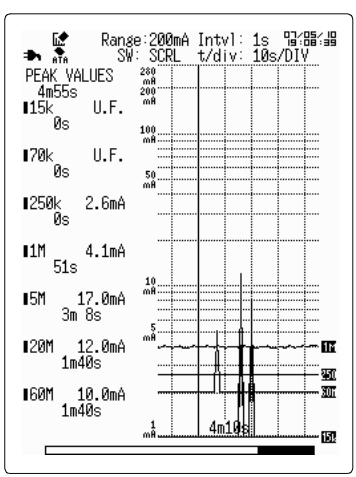
4. Press the LATEST when you wish to view the latest value on the Logging screen.

On the updated value display, the updated recorded data for each band's noise level is displayed on the left side of the screen.



5. Press the PEAK when you wish to view the maximum value.

On the peak value display, the maximum value for the noise level for each band and the time it occurred are displayed on the left side of the screen. Check the time the noise interference occurs and if there is corresponding unexpected noise.

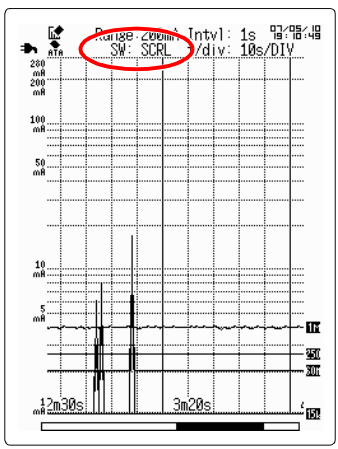


6. Press STOP twice and the measurement will end.

Analyzing data after measurements

During logging measurements or after logging ends, check the past logging data by scrolling the waveform. You can also check the value for the time the noise occurred.

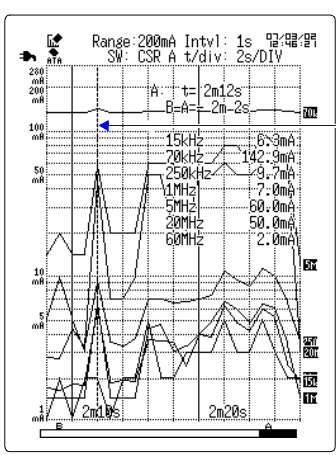
1. When you wish to view the past waveform, press SWITCH and set the switching to [SCRL].



2. Press SCROLL CURSOR and scroll the measurement waveform.

3. When you wish to know the waveform's measurement value, press SWITCH and set the switching to [CSR A] or [CSR B].

You will see the measurement value at the cursor's position.



Cursor A

15 kHz	: U.F.
70 kHz	: U.F.
250 kHz	: 2.6 mA
1 MHz	: 4.0 mA
5 MHz	: 17.0 mA
20 MHz	: 8.0 mA
60 MHz	: 6.0 mA

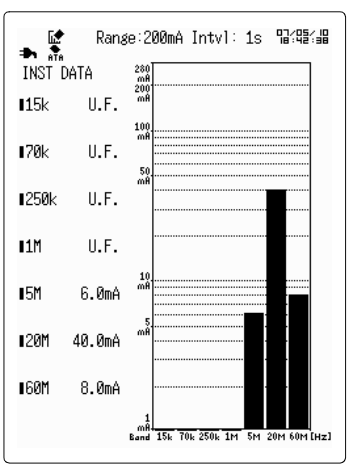
Noise Suppression

Select noise suppression parts based on the noise current data obtained by the measurements and perform noise suppression.

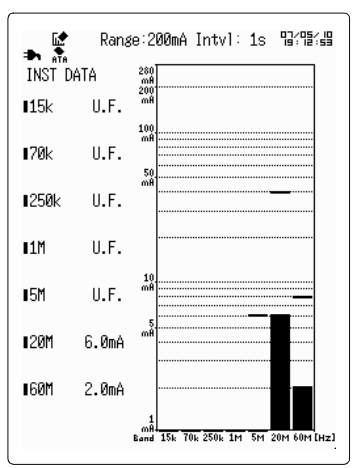
Noise suppression parts example

After performing noise suppression, recheck the LAN cable's noise current level on the instrument's monitor display.

(Before Suppression)



(After Suppression)



By checking with the logging measurement, you can check the effect of reducing isolated noise that occasionally occurs.

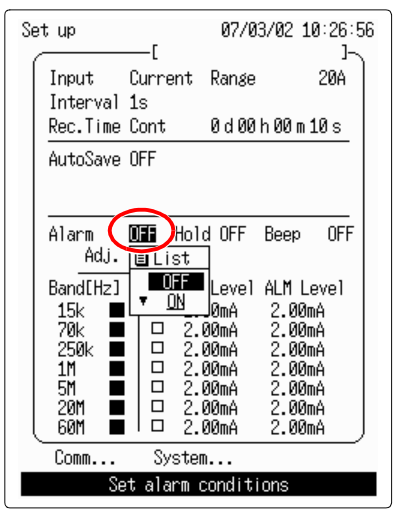
Measurement Hints

Sound Alarm When Exceeding Specified Value

Set the alarm function and alarm to ON on the Set up screen.

1. **Press SET UP to open the Set up screen.**

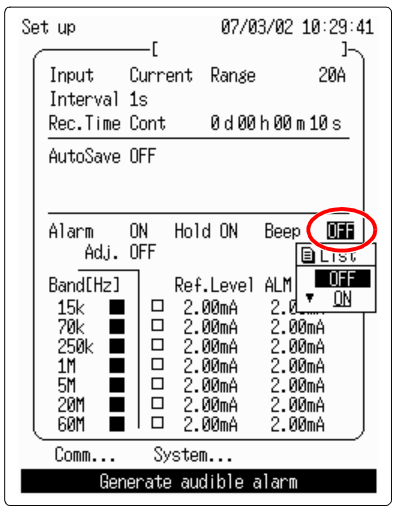
2. **Press ◇ to move the blinking cursor to [Alarm], and press ENTER to open the selection window.**



Selectable items	Explanations
ON	Turns the alarm function ON.
OFF	Turns the alarm function OFF.

3. **Press △/▽ to select [ON], and press ENTER to set.**

4. **Press ◇ to move the blinking cursor to [Beep], and press ENTER to open the selection window.**

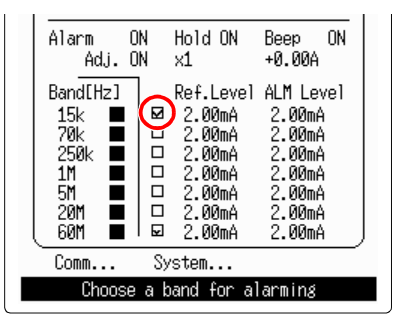


Selectable items	Explanations
ON	When the measurement value exceeds the alarm judgment value, the alarm sound sounds.
OFF	The alarm sound does not sound.

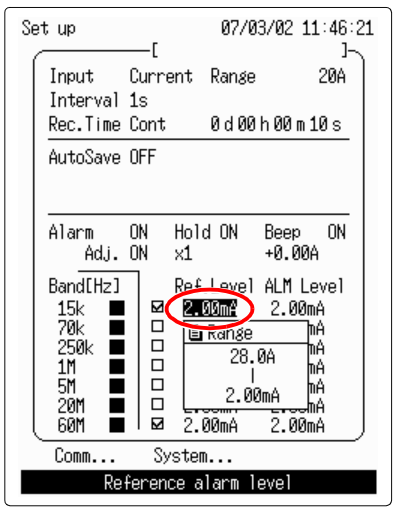
5. **Press △/▽ to select [ON], and press ENTER to set.**

6. **Press ◇ to move the blinking cursor to the position of the band for which to set the alarm.**

7. **Press ENTER to check.**



8. **Press ◇ to move the blinking cursor to [Ref. Level] and press ENTER to open the selection window.**



Input type	Setting range
Current	28.0 A to 2.00 mA
Voltage	1.40 V to 100 µV

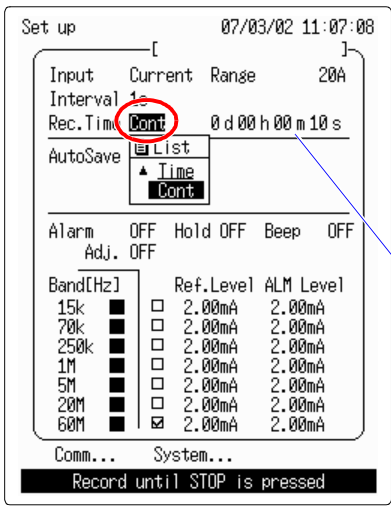
9. **Press ◇/◇ to select the reference value, and ENTER to set.**

10. **When the alarm reference value is exceeded the alarm sound will be output.**

You can retain and correct the warning state. For details refer to "4.5 Using the Alarm Function" in the included instruction manual.

Specifying Recording Time

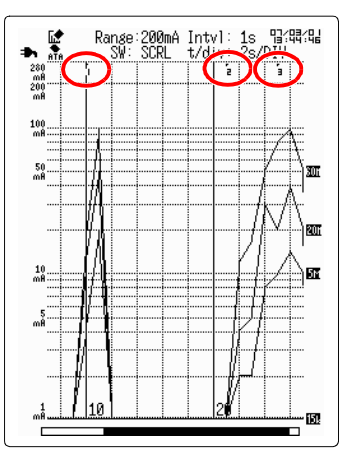
When you wish to specify the recording time, set the recording time to **[Time]** on the Set up screen, and set an optional time.



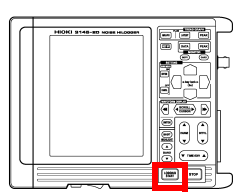
Selectable items	Explanations
Time	The recording time can be set to any value.
Cont	Continuous measurement between the start of measurement and pressing STOP twice can be performed.

Attaching an Event Marker to a Waveform

Using the event marker function, you can attach an event marker (100 maximum) to the desired data during measurements. You can also search for event markers.
For details refer to "4.6 Adding Event Marks to Waveforms" in the instruction manual.



Press this key to add an event mark.



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Measurement Guide

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