HIOKI

INSTRUCTION MANUAL

3447-01

TEMPERATURE HiTESTER

HIOKI E. E. CORPORATION

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Introduction

Thank you for purchasing the HIOKI "3447-01 TEMPERATURE HiTESTER". To obtain maximum performance from the product, please read this manual first, and keep it handy for future reference.

Inspection

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

Accessories

Alkaline (LR03) batteries 4
Strap band 1
Instruction Manual 1

Safety Notes

⚠DANGER This product is designed to conform to IEC 61010 Safety Standards, and has been thoroughly tested for safety prior to shipment. However, mishandling during use could result in injury or death, as well as damage to the product. Be certain that you understand the instructions and precautions in the manual before use. We disclaim any responsibility for accidents or injuries not resulting directly from product defects.

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

Safety Symbols

	In the manual, the ⚠ symbol indicates particularly important information that the user should read before using the product.
⚠	The ⚠ symbol printed on the product indicates that the user should refer to a corresponding topic in the manual (marked with the ⚠ symbol) before using the relevant function.
⎓	Indicates DC (Direct Current).

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

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

Other Symbols

	Indicates the prohibited action
❖	Indicates the reference

Accuracy

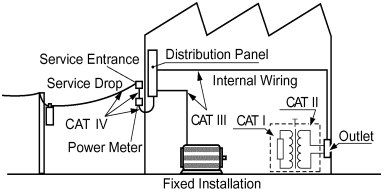
We define measurement tolerances in terms of rdg. (reading) and dgt. (digit) values, with the following meanings:

rdg.	(reading or displayed value) The value currently being measured and indicated on the measuring product.
dgt.	(resolution) The smallest displayable unit on a digital measuring product, i.e., the input value that causes the digital display to show a "1".

Measurement categories (Overvoltage categories)

This product conforms to the safety requirements for CAT I measurement products.
To ensure safe operation of measurement products, IEC 61010 establishes safety standards for various electrical environments, categorized as CAT I to CAT IV, and called measurement categories. These are defined as follows.

CAT I	Secondary electrical circuits connected to an AC electrical outlet through a transformer or similar device.
CAT II	Primary electrical circuits in equipment connected to an AC electrical outlet by a power cord (portable tools, household appliances, etc.)
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).



Higher-numbered categories correspond to electrical environments with greater momentary energy, so a measurement product designed for CAT III environments can endure greater momentary energy than one designed for CAT II. Using a measurement product in an environment designated with a higher-numbered category than that for which the product is rated could result in a severe accident, and must be carefully avoided.
Never use a CAT I measuring product in CAT II, III, or IV environments.
The measurement categories comply with the Overvoltage Categories of the IEC60664 Standards.

Usage Notes

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

⚠WARNING

Do not attempt to measure the temperature of objects carrying a voltage. Doing so will result in a short-circuit accident or an electrocution accident.

⚠CAUTION

- This product should be installed and operated indoors only, between 0 and 40°C and 80% RH.
- To avoid damaging the product, never connect any sensor other than the 9478 or 9479 SHEATH TYPE TEMPERATURE PROBE to the sensor connector. Never attempt to input a signal through the sensor connector. For information on the temperature range of use for temperature probes, see 4.2 "9478 SHEATH TYPE TEMPERATURE PROBE" (53 page) and 4.3 "9479 SHEATH TYPE TEMPERATURE PROBE" (54 page).
- Do not store or use the product where it could be exposed to direct sunlight, high temperature or humidity, or condensation. Under such conditions, the product may be damaged and insulation may deteriorate so that it no longer meets specifications.
- Do not use the product where it may be exposed to corrosive or combustible gases. The product may be damaged.
- Avoid using the product for long periods if the unit is soiled with oil or dirt. Doing so may cause the unit's case to become warped or damage the product.

⚠CAUTION

- The sheath of the temperature probe is filled with magnesium oxide powder. If the probe is broken, the magnesium oxide powder may spill out. Be careful not to subject the sheath to excess stress. Inhaling large quantities of magnesium oxide may be hazardous to your health.
- This product has a dust and water-resistant construction. However, it cannot be used in water.
- The protection rating for the enclosure of this device (based on EN60529) is *IP67.

***IP67:**

This indicates the degree of protection provided by the enclosure of the device against use in hazardous locations, entry of solid foreign objects, and the ingress of water.

6: Protected against access to hazardous parts with wire measuring 1.0 mm in diameter. Dust-proof type (Dust shall not penetrate the enclosure.)

7: Watertight (Quantities of water that may harm the enclosure when it is temporarily immersed in water shall not penetrate the enclosure.)

Overview Chapter 1

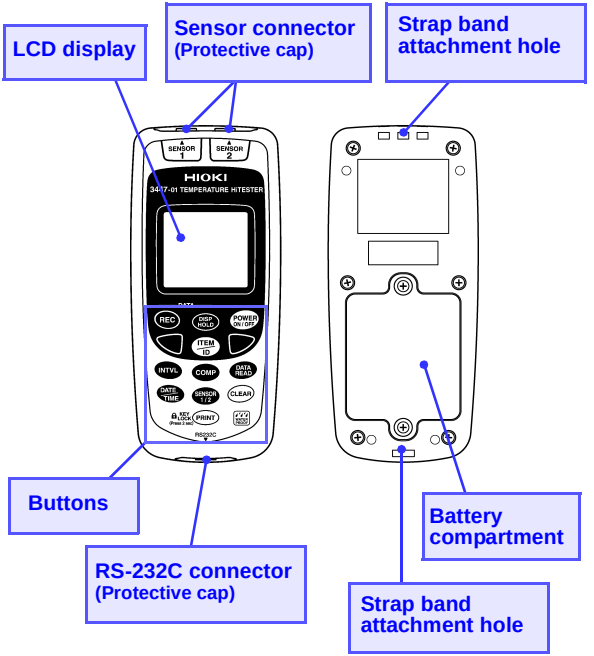
1.1 Product Overview

The 3447-01 TEMPERATURE HiTESTER is a water-resistant thermometer designed for use with the platinum resistance thermometer sonsor (Pt100).
By using the product in combination with the special 9478 SHEATH TYPE TEMPERATURE PROBE or 9479 SHEATH TYPE TEMPERATURE PROBE, the product is capable of temperature measurement within the range -100°C to 300.0 °C.
Equipped with a clock function, the product allows you to check the time.
This product is ideal for controlling temperatures since it allows you to record both measurement temperatures and measurement times at the touch of a REC button. (Manual Recording Mode)
Further, the product can be used as a logger for continuous data recording at a specified recording interval. (Interval Recording Mode)
This product can store up to 7,200 data items (in manual recording mode), or 28,800 data items (in interval recording mode) in its internal memory.
Because data is stored in the unit's non-volatile memory, data is not lost when battery power runs low or during battery replacement.
When the product is connected to a PC via the optional 9674 RS-232C PACKAGE, you can set items (product names) and IDs (worker names) from your computer, and record this information together with temperature data.
You can also transfer recorded data to your computer and display it.

1.2 Parts Names and Functions

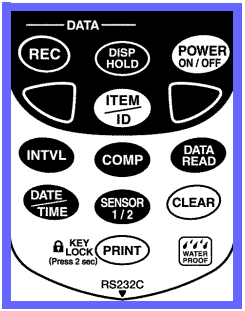
1.2.1 3447-01 TEMPERATURE HiTESTER

3447-01 TEMPERATURE HiTESTER



LCD display	Displays temperature readings and settings.
Sensor connector	Connect either the 9478 or 9479 SHEATH TYPE TEMPERATURE PROBE.
Protective cap	Place on unused connectors.
Strap band attachment hole	For attaching the provided strap band.
Battery compartment	The product uses 4 LR03 (AAA) alkaline dry cell batteries.
RS-232C connector	Use the special cable provided with the 9674 RS-232C PACKAGE to connect the unit to your computer or printer.

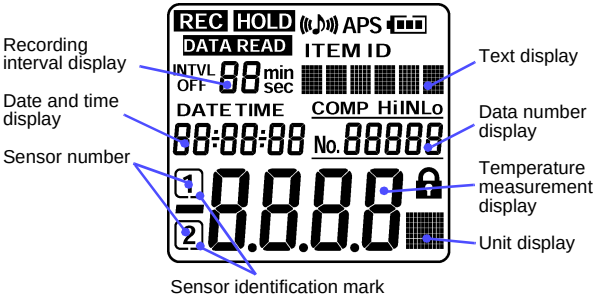
Buttons



REC	**●Manual Recording Mode** Records temperature and time readings. **●Interval Recording Mode** Starts and stops interval recording.
DISP HOLD	Activates the display hold function.
POWER ON / OFF	Turns the 3447-01's power on/off. (Press for 2 seconds)
	• Selects Item or ID type. • Selects a data number for reading. • Changes date/time settings. • Selects the recording interval.
ITEM ID	Toggles between Item display and ID display.

	Sets the recording interval for interval recording. When this is off, manual recording is selected.
	Displays comparator value settings.
	Displays recorded data.
	Toggles the display between date and time. Sets date and time. (Press for 2 seconds)
	Toggles temperature display between Sensor 1 and sensor 2.
	**● Delete most recent data** Deletes the most recent data item. **● Delete all data** Deletes all recorded data. Cancels all settings in all settings screens, and returns the monitor screen.
 Key lock (Press for 2 seconds)	**● Print** Sends recorded data to a printer. **● Key lock (Manual recording)** Inhibits operation of all keys except PRINT and REC. **● Key lock (Interval recording)** Inhibits operation of all keys except PRINT.

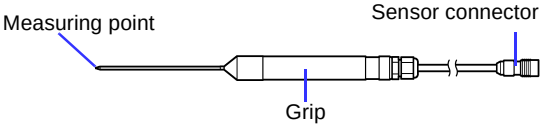
LCD display



REC	Indicates that recording is taking place.
HOLD	Indicates that the display hold function is activated.
	Indicates that the buzzer is on.
APS	Indicates that the auto power save function is on.
	Displays the remaining battery charge in 4 steps.
DATA READ	Indicates data read mode.
ITEM	Indicates that the item (product name) is being displayed.
ID	Indicates that the ID (worker name) is being displayed.
INTVL	Indicates that the 3447-01 is in interval recording mode or in recording interval setting mode.
Recording interval display	Displays the recording interval.
Text display	Displays text (alphanumeric) set as Items or IDs.
DATE	Indicates date display.

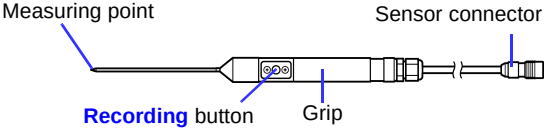
TIME	Indicates time display.
Date and time display	Displays the date or time.
COMP Hi IN Lo	Indicates comparator settings mode, or comparator test results.
Data number display	Displays a number for a data item.
Sensor number	Indicates the number for the connected sensor.
Sensor identification mark	Indicates the sensor displayed in the temperature display.
Temperature measurement display	Displays temperature measurement. Displays comparator value settings. (comparator confirm mode)
🔒	Indicates that the key lock function is activated.
Unit display	Indicates the units (°C) for the temperature display.

1.2.2 9478 SHEATH TYPE TEMPERATURE PROBE



1.2.3 9479 SHEATH TYPE TEMPERATURE PROBE

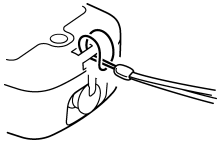
With the 3447-01 you can record temperatures in the same manner using the button on the temperature probe's grip, or the button on the 3447-01 itself.



Installation Chapter 2

2.1 Attaching the strap band

You can attach the strap band provided with the product. There are holes on the top and bottom of the product. Attach the strap handle to these holes as necessary.



2.2 Mounting or Replacing the Batteries

⚠WARNING

- 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.
- After replacing the batteries, replace the cover and screws before using the product.
- Failure to properly close the unit's battery compartment cover will cause loss of water resistance.
- To avoid the possibility of explosion, do not short circuit, disassemble or incinerate batteries.
- Handle and dispose of batteries in accordance with local regulations.

NOTE

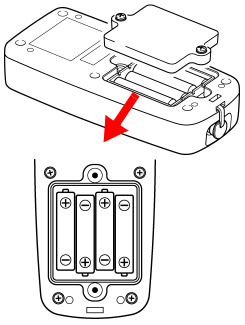
- The "▮□" indicator appears when battery voltage becomes low. Replace the batteries as soon as possible.
- To avoid corrosion from battery leakage, remove the batteries from the product if it is to be stored for a long time (several months or more).
- To prevent recorded or settings data from being destroyed, always switch off the power before replacing the batteries.
- The unit's battery compartment and battery cover are fitted with rubber rings. After replacing the battery, check that the rubber rings are properly seated before reinstalling the battery cover. Improper seating of the rubber rings will compromise the unit's water-resistant structure, and possibly result in damage to the equipment.

New batteries should last for about 15 days of continuous use, with the auto power save function switched off. Batteries should last for about 1 month or more of continuous recording using the product in interval recording mode (with the recording interval set to 1 minute or longer), and with the auto power save function switched on. (When using the product at 20°C)
During interval recording, recording stops when batteries wear out.

Remaining battery charge display

	The display disappears from the right side as the remaining battery charge decreases.
	Time to replace batteries. There is no charge remaining in the batteries.

Mounting or replacing the batteries



1. Remove back cover screw to remove cover. Verify polarity and install four new LR03 alkaline batteries.
2. Fit cover properly and tighten screw.

2.3 Connecting the Temperature Probe

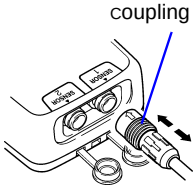
⚠CAUTION

- To avoid damage to the product, protect it from vibration or shock during transport and handling, and be especially careful to avoid dropping.
- To avoid damaging the product, never connect any sensor other than the 9478 or 9479 SHEATH TYPE TEMPERATURE PROBE (with recording switch) to the sensor connector. Never attempt to input a signal through the sensor connector.
- The ends of the probes are sharp. Be careful to avoid injury.
- When disconnecting the temperature probe, be sure to release the lock before pulling off the connector. Forcibly pulling the connector without releasing the lock, or pulling on the cable, can damage the connector.
- To avoid damaging the probes, do not bend or pull the probes.
- Keep the cable well away from heat sources, as bare conductors could be exposed if the insulation melts.
- Improper connecting of a connector will permit passage of moisture into the device and damage it.
- Do not bend the temperature probe's measuring element (the metallic portion). Doing so is likely to cause damage.

⚠CAUTION

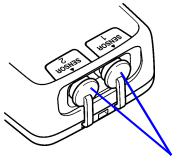
- The sensor used in the temperature probe is a precision platinum element. Please note that excessive voltage pulses or static discharges can destroy the element.To avoid damage or malfunction, avoid hitting the tip of the temperature probe and overly bending the leads.
  When measuring high temperatures, do not let the handle of the temperature probe or the cable exceed the temperature range.
- Make sure that temperatures do not exceed those rated for the temperature probe handle and cable.
- The temperature probe has a protective nylon cap fitted on the end of the probes. Remove the cap before using the probe.
- Put the protective cap back on the connector when not in use. If the protective cap is not properly inserted, dust or other foreign matter may enter the connector and cause damage.
- The sheath of the temperature probe is filled with magnesium oxide powder. If the probe is broken, the magnesium oxide powder may spill out. Be careful not to subject the sheath to excess stress. Inhaling large quantities of magnesium oxide may be hazardous to your health.

Connecting the temperature probe



To remove the temperature probe, grip the connector coupling and pull it straight out to remove it.

1. To lock the connector, grip the connector and turn the arrow upwards until you hear a click.
2. Hold the connector (not by the coupling) and lightly pull it to confirm that it is properly connected.



Insert the protective cap into the sensor connectors when not connecting a temperature probe.

Protective cap

2.4 Connecting the RS-232C Cable

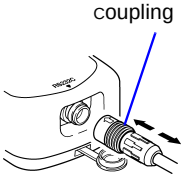
Using the optional 9674 RS-232C PACKAGE, you can connect the product to a computer or a printer for exchange of data.

⚠CAUTION

- To avoid damaging the product, never connect any cable other than the supplied cable to the RS-232C connector.
- When disconnecting the RS-232C cable, be sure to release the lock before pulling off the connector. Forcibly pulling the connector without releasing the lock, or pulling on the cable, can damage the connector.
- To avoid damaging the cable, do not bend or pull the cable.
- Avoid stepping on or pinching the cable, which could damage the cable insulation.
- Keep the cable well away from heat sources, as bare conductors could be exposed if the insulation melts.
- The RS-232C cable is not dust or water resistant. Do not use RS-232C communication in environments that are very dusty or exposed to water. Doing so is likely to result in damage.
- Leaving the product connected to a computer that is running will cause the batteries to wear out faster than usual. Do not connect the product to a computer if there is no data transfer.

Make sure connectors and protective caps are always properly inserted. If the connector or protective cap is not properly inserted, dust or other foreign matter may enter the connector and cause damage.
Replace the protective cap when not using the connector.

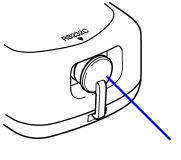
Connecting the RS-232C cable



1. To lock the connector, grip the connector and turn the arrow upwards until you hear a click.

2. Hold the connector (not by the coupling) and lightly pull it to confirm that it is properly connected.

To remove the RS-232C cable, grip the connector coupling and pull it straight out to remove it.



Insert the protective cap into the RS-232C connectors when not connecting a RS-232C cable.

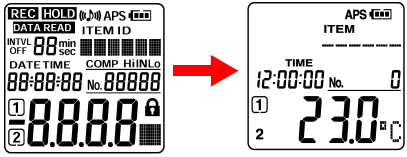
Measurement Procedures Chapter 3

⚠WARNING Do not attempt to measure the temperature of objects carrying a voltage. Doing so will result in a short-circuit accident or an electrocution accident.

3.1 Before Measurement

3.1.1 Switching the 3447-01 ON or OFF

Press (POWER ON / OFF) for about 2 seconds.
The whole LCD goes on for 2 seconds, the monitor screen appears and the temperature is displayed.



Whole LCD goes on　　Monitor screen

Press (POWER ON / OFF) again for 2 about seconds to switch the 3447-01 off.

NOTE If the message "**ERROR!**" appears when the power is turned on, the unit's settings may not have been saved properly. Cycling the power off once, and then on again can ordinarily restore normal operation. If this does not restore normal operation, equipment failure is possible. Contact the store from which you purchased the unit for assistance.

3.1.2 Auto Power Save Function

With the auto power save function switched on, the power is automatically switched off if no button is pressed for approximately 10 minutes.
As the default setting, the auto power save function is switched on. ("**APS**" lights)

Switching the auto power save function from OFF to ON

1. While pressing DISP HOLD, press POWER ON / OFF for about 2 seconds to turn the power on.
2. "**APS**" lights on the LCD. The auto power save function is now switched on.

Switching the auto power save function from ON to OFF

1. While pressing DISP HOLD, press POWER ON / OFF for about 2 seconds to turn the power on.
2. "**APS**" disappears on the LCD. The auto power save function is now switched off.

Even with the auto power save function activated and the power off, setting of auto power save function is saved.
With the auto power save function on during interval recording, the LCD (temperature display and so on) goes off, and only "REC" and "▪▪▪" are displayed. Temperature measurement and recording still continues. To release the auto power save mode, press any switch to turn on the display and return to the monitor screen.

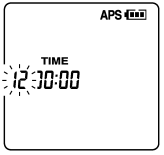
Interval recording
(With auto power save ON)

3.1.3 Date and time settings (on the 3447-01)

Check the date and time displayed on the product. Since the clock function is backed up in the product, time is not reset when changing batteries. However, the accuracy of the internal clock may deviate after long periods of use. If the time deviates, follow the procedure below to reset the time. You can set the date and time easily on the product.

Seting the date and time

Date settings mode (year setting)



Time setting mode (hour setting)

1. Press POWER ON/OFF for about 2 seconds to turn the power on.
2. In the monitor screen, press DATE TIME for about 2 second. "DATE" lights, and the product is ready for date setting.
3. "**Year**" flashes. Press ◀/▶ to set the year.
4. Complete the date and time setting in the same way, by pressing DATE TIME, and setting each item as it flashes, in the order "**year**"→"**month**"→"**day**"→"**hour**"→"**minute**"→"**second**." When setting the time (hour, minute, second) "**TIME**" lights.
5. Set the seconds, and press DATE TIME. The settings are complete, and the monitor screen returns.

Until the date and time settings are complete, the monitor screen returns if you press any key other than DATE TIME or ◀/▶.

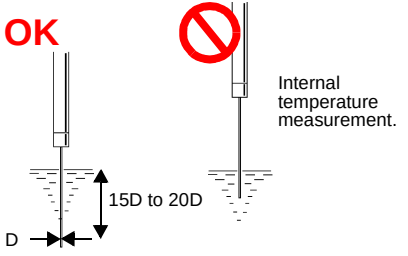
3.1.4 Date and Time Settings (Using a Computer)

You can set the date and time from a computer with the product connected via the optional 9674 RS-232C PACKAGE. The 9674 COMMUNICATION UTILITY must be installed into the computer. For details about installing and operating the software, refer to the 9674 Instruction Manual.

3.2 Basic Temperature Measurement

This section describes basic temperature measurement procedures and data recording (in manual recording mode).

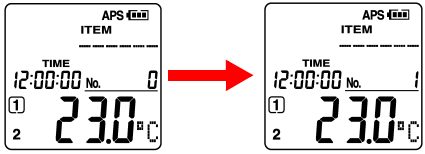
NOTE The temperature sensor is located at the end of the metal sheath of the 9478, 9479 SHEATH TYPE TEMPERATURE PROBE. To accurately test internal temperature, insert the probe into the item you want to measure to a distance at least 15 to 20 times the diameter of the sheath.



3.2.1 Recording Temperature Data (Manual Recording Mode)

You can record temperature as well as time.
Turn off the recording interval.
❖3.3.1 "Selecting a Recording Interval" (37 page)

When using the product in only manual recording mode, it possible to record up to 7200 data items (single channel) or 4800 entries (dual channel).
To record a temperature in the product's internal memory, Press REC. "REC" appears on the display, and the temperature displayed on the LCD is recorded.
To record a temperature with the 3447-01 in manual recording mode, you can press REC on the product, or press the button on the handle of the 9479 SHEATH TYPE TEMPERATURE PROBE. Upon pressing REC, the temperatures for both sensor 1 and sensor 2 are simultaneously recorded.
If there is no data recorded, 0 appears for the data number. The data number counts up each time you press REC , indicating the number of data items.



No data recorded (data number 0)

Data recorded (data number 1)

9479 SHEATH TYPE TEMPERATURE PROBE

3.2.2 Display Hold

Upon pressing DISP HOLD, "HOLD" lights, and the displayed temperature and time are held.

To release the display hold function, press DISP HOLD. "HOLD" goes off.

Pressing REC while product is display hold mode records the temperature and time displayed, and then releases the display hold function.

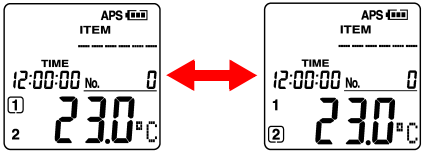
Pressing DISP HOLD during interval recording only holds the display. Interval recording continues. Press DISP HOLD to release the display hold function.

You can use the ITEM ID, DATE TIME and SENSOR 1/2 keys while the product is in the display hold state.

3.2.3 Switching Sensor

You can connect either the 9478 or 9479 SHEATH TYPE TEMPERATURE PROBEs to the 3447-01. The number for the connected sensor is displayed on the LCD screen. However, only the measurement for either sensor 1 or sensor 2 is displayed at one time.

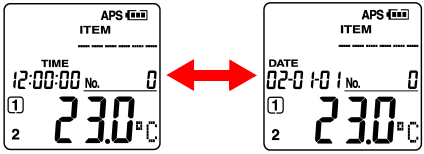
Press SENSOR 1/2 to toggle the temperature measurement display between the sensors. Anidentification mark appears for the sensor number, indicating which sensor's temperature is displayed.



Sensor 1 displayed Sensor 2 displayed

3.2.4 Switching Date and Time

Upon turning on the power, "**TIME**" lights, and the time is displayed.
Press DATE/TIME to toggle between date and time display.



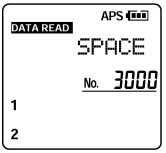
Time display Date display

3.2.5 Reading Data

You can read data stored in the product's memory.

Reading data

Data reading
(data number 7000)



Remaining memory display
(3000 available data items)

1. In the monitor screen, press DATA READ, "DATA READ" lights, and the most recently recorded data appears.
2. Press ▶, "SPACE" lights, and the available memory (the number of empty data items) appears.
3. Each time you press ▶, the data number counts up from data number 1 and the corresponding data appears.
   Each time you press ◀, the data number counts down from the most recent data item, and the corresponding data appears.
   If there is a large number of data items, hold down ◀/▶ to automatically scroll through the data. Auto-scroll stops when you release the button.
4. To finish data reading, press any button other than ◀/▶ to return to the monitor screen.

3.2.6 Deleting Recorded Data

Deleting the most recent data item

To delete unwanted data or data resulting from accidental depression of the REC button, follow the procedure below to delete the most recent data item.
With sensors 1 and 2 connected, the data item for both sensors is deleted.

Deleting recorded data (most recent data)

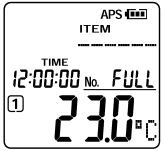
Clear data screen (Deleting the most recent data item)

1. In the monitor screen, press (CLEAR). The clear data screen appears and "**CLEAR?**" is displayed.
2. Press (CLEAR) to delete the most recent data item.
3. After deleting the data, the monitor screen returns.

Deleting All Data

When there is no more internal memory available, "**FULL**" is displayed for the data number. Further recording is not possible.
After storing the data in a computer or sending it to a printer, follow the procedure below to delete all data.

Deleting recorded data (all data)



Internal memory full

Clear data screen (Deleting all data)

1. While holding down (CLEAR), press the (POWER ON/OFF) button for about 2 seconds to turn the power on.

2. The clear data screen appears, and "**CLEAR? ALL**" is displayed.

3. Press (CLEAR) to delete all data.
Press any button other than (CLEAR) or (POWER ON/OFF) to return to the monitor screen.

3.3 Interval Recording Mode

Select a recording interval to record temperature at a specified interval.
Both manual recording data and interval recording data can be saved in the product together.
If you only use interval recording, the following limitations apply to the recording interval and the maximum recording time:
With single channel recording, the maximum number of data items is 28800 per product.

INTVL.	REC. time	INTVL.	REC. time
1 sec	8 h	1 min	20 d
2 sec	16 h	2 min	40 d
5 sec	1 d 16 h	5 min	100 d
10 sec	3 d 8 h	10 min	200 d
15 sec	5 d	15 min	300 d
20 sec	6 d 16 h	20 min	400 d
30 sec	10 d	30 min	600 d
		60 min	1200 d

d: day(s), h: hours

With dual channel recording, the maximum of data items is 14400 per product.

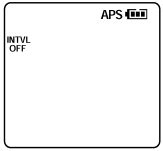
INTVL.	REC. time	INTVL.	REC. time
1 sec	4 h	1 min	10 d
2 sec	8 h	2 min	20 d
5 sec	20 h	5 min	50 d
10 sec	1 d 16 h	10 min	100 d
15 sec	5 d	15 min	150 d
20 sec	2 d 12 h	20 min	200 d
30 sec	5 d	30 min	300 d
		60 min	600 d

d: day(s), h: hours

NOTE The amount of continuous recording time available is limited by remaining battery charge.

3.3.1 Selecting a Recording Interval

Selecting a recording interval



Interval recording screen
(No recording interval)

Interval recording screen
(30 second recording interval set)

1. In the monitor screen, press INTVL to display the interval recording screen. "**INTVL**" appears.

2. Press ◀/▶ to select a recording interval. The default setting is "OFF" (manual recording). The recording interval display switches as follows: "**OFF**" (manual recording)→"**1sec**" (1 second)→"**2sec**"→"**5sec**"→"**10sec**"→"**15sec**"→"**20sec**"→"**30sec**" (30seconds)→"**1min**" (1 minute)→"**2min**"→"**5min**"→"**10min**"→"**15min**"→"**20min**"→"**30min**"→"**60min**"→"**OFF**" (manual recording).

3. Press INTVL to return to the monitor screen.
With any setting other than "**OFF**", "**INTVL**" is displayed on the screen, and the product is set for interval recording.

3.3.2 Starting recording

NOTE With interval recording, you can start up to 16 new recordings. Confirm that the product is ready for interval recording.
❖ 3.3.4 "Reading Data" (39 page)

In the monitor screen, press REC. "REC" lights and recording commences.
Only the REC button on the product is available with interval recording. You cannot use the button on the handle of the 9479 SHEATH TYPE TEMPERATURE PROBE.
When there is no recorded data, 0 appears for the data number. The data number counts up with each successive interval during interval recording, hence displaying the number of data items.
It is not possible to turn the power off during interval recording, even by pressing POWER ON/OFF. Stop interval recording before turning the power off.

Interval recording (data number 7000)

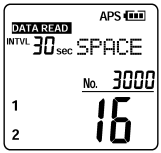
3.3.3 Stopping Interval Recording

To stop the interval recording, press REC a second time (while the " REC " indicator is on).
Recording stops automatically if the product's internal memory becomes full (when "**FULL**" is displayed for the data number).
Recording stops automatically if the batteries run out during interval recording.

3.3.4 Reading Data

❖ 3.2.5 "Reading Data" (32 page)

With interval recording (when "**INTVL**" is displayed), the number available interval recording sequences, and the amount of available memory (the remaining number of empty data items) is displayed upon reading data.
If 0 is displayed for the number of available recording sequences, interval recording is not possible. Delete data and then commence recording.

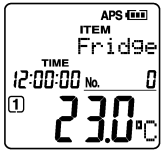


Remaining memory display
(maximum 16 interval recording sequences).

3.4 Item/ID display

On the 3447-01's display, you can display text for Items (product names) and IDs (worker names) first registered on a computer, and record items and IDs with temperature recordings.
The display is capable of displaying up to 6 characters (alphanumeric) at one time. However, by scrolling the text, you can display registrations up to 12 characters long.
You can set separate items for sensors 1 and 2. However, both sensors share the ID that you set.
You can register a maximum of 300 items, and a maximum of 100 IDs.
❖9674 RS-232C PACKAGE Instruction manual

Displaying Item/ID



ITEM display
(Item: Fridge)

ID display
(ID: Hioki)

1. Upon turning on the power, "**ITEM**" lights, and an Item appears on the monitor screen.

2. Upon pressing (ITEM/ID), "**ID**" lights and an ID appears.
If there is no item or ID data registered, "**------**" is displayed.

3. With ITEM displayed ("**ITEM**" lights), press ◀/▶ to scroll through registered items and select the item you want.
With ID displayed ("ID" lights), press ◀/▶ to scroll through registered IDs and select the ID you want. Press ▶ to scroll in the forward direction, and ◀ to scroll in the reverse direction.
If there is a large number of Item or ID registrations, hold down ◀/▶ to automatically scroll through the data. Auto-scroll stops when you release the button.

3.5 Comparator Function

You can configure the comparator function using the 9674 RS-232C PACKAGE.
The comparator function tests whether the temperature is within a predetermined temperature range, and displays a test result on the LCD. If the temperature is outside the range, the buzzer sounds.
The following conditions apply to comparator value settings (upper and lower temperature limits) and test results: In manual recording mode, the comparator function checks the temperature at the time of recording. During interval recording, the comparator function checks the temperature currently on the display.

Comparator criteria	Test result	Buzzer
Temperature<lower limit	Lo	Yes
Lower limit ≦ temperature ≦ upper limit	IN	No
Upper limit<temperature	Hi	Yes

You can set comparator values for individual Items (product names).

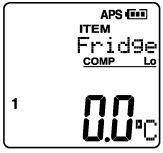
3.5.1 Setting Comparator Values

For details about setting comparator values, refer to the Instruction Manual provided with the 9674 RS-232C PACKAGE.

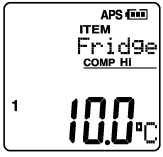
3.5.2 Confirming Comparator Value Settings

You can check the comparator value settings on the product.

Confirming comparator value setting



Comparator confirmation screen
(Lower limit display)



Comparator confirmation screen
(Upper limit display)

1. In the monitor screen, press COMP to display the comparator confirmation screen. "**COMP Lo**" (the lower temperature limit) appears.
2. Press COMP to display "**COMP Hi**" (the upper temperature limit).
3. To close the comparator confirmation screen and return to the monitor screen, press any button.

3.6 Key Lock Function

You can use the key lock function to prevent the product's settings from being accidentally altered.

Switching the key lock function ON

Press PRINT (key lock) for at least 2 seconds. "🔒" lights, indicating that the key lock function is activated.

Switching the key lock function OFF

Press PRINT (key lock) for at least 2 seconds. "🔒" lights, indicating that the key lock function is released.

If interval recording is OFF and the key lock function is activated, only operation of REC and PRINT (press for 2 seconds) is possible.
With interval recording set to anything other than OFF and the key lock function activated, only operation of PRINT (press for 2 seconds) is possible. To perform other operations, first release the key lock function.

3.7 Buzzer Function

The product comes equipped with a miniature buzzer, which sounds upon pressing buttons or when the comparator function detects a temperature outside the set range.
As the default setting, the buzzer is switched on. ("🔊" lights)

Switching the buzzer from OFF to ON

1. While pressing COMP, press the POWER ON/OFF for about 2 seconds to turn the power on.
2. "🔊" appears on the LCD and the buzzer is switched on.

Switching the buzzer from ON to OFF

1. While pressing COMP, press the POWER ON/OFF for about 2 seconds to turn the power on.
2. "🔊" disappears on the LCD and the buzzer is switched off.

The buzzer setting is saved even if when the power is switched off.

3.8 Print Function

You can connect the product to an RS-232 compatible printer via the cable provided with the optional 9674 RS-232C PACKAGE, and print out the data stored in the product's memory. For details about operating the printer, refer to the Instruction Manual for the printer.

Printing data

Print confirmation

Printing

1. Using the RS-232C cable provided with the 9674, connect the product to a printer.
2. In the monitor screen press (PRINT). "**PRINT?**" appears on the display.
3. Press (PRINT) again, "**PRINT**" appears, and the data is sent to the printer.
4. The monitor screen returns when printing finishes.
   You can cancel printing by pressing (CLEAR) during printing.

Specifications for printers compatible with the 3447-01 are as follows:
Check the specifications and settings before connecting the product to the printer.

Interface	RS-232C
Characters per line	Greater than 40 characters
Transmission speed	19200 bps
Data bit	8 bit
Parity	No
Stop bit	1 bit
Flow control	Xon/Xoff
Optional printer	9670 PRINTER

The connector of the RS-232C cable provided with the 9674 has the following pin configuration:
Connector type: Dsub-9 pin (female)

Pin No.	Signal name	Function
1	NC	Not connected
2	TxD	Send data
3	RxD	Receive data
4	NC	Not connected
5	GND	Ground
6	NC	Not connected
7	NC	Not connected
8	NC	Not connected
9	NC	Not connected

NOTE With some types of printer, an adapter is required between the cable and the printer.
With the optional 9670 printer, please connect the following adapter between the cable and the printer.
Dsub-9 pin (male)↔Dsub-25pin (male)

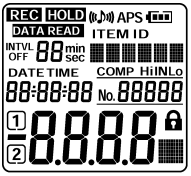
3.9 Data Communication with a Computer

The optional 9674 RS-232C PACKAGE enables data transfer between the product and a computer. The 9674 communication utility must be installed into the computer. For details about installing and operating the software, refer to the 9674 Instruction Manual.

Specifications Chapter 4

4.1 3447-01 TEMPERATURE HiTESTER

Sensor types	Platinum resistance thermometer sensor Pt 100 (3 wires)
Measuring current	0.5 mA
Number of inputs	2 ch
Measurement range	-100.0 to 300.0°C
Resolution	0.1°C
Accuracy	±0.1%rdg.±0.4°C
Sampling rate	1 time/s
Recording function	Temperature recording by key operation (Recording also possible via the button on the handle of the 9479 SHEATH TYPE TEMPERATURE PROBE.)
Recording content	Time, temperature, Item, ID, comparator test result.
Recording modes	Manual recording (Recording by manual key operation) Interval recording (Automatic recording at a set interval.)
Number of possible data items	Manual recording (Max. 7200:1ch, 4800:2ch) Interval recording (Max 28800:1ch, 14400:2ch)
Interval recording	1/ 2/ 5/ 10/ 15/ 20/ 30 sec 1/ 2/ 5/ 10/ 15/ 20/ 30/ 60 min, OFF
Item display	6 character (alphanumeric) item display (Max. 300 registrations) Max 12 character display when scrolled. Item registration via a computer with special software installed.

ID display	6 character (alphanumeric) ID display (Max. 100 registrations) Max.12 character display when scrolled. ID registration via a computer with special software installed.
Clock function	Built-in real time clock (year, month, day, hour, minute, second) Configurable on the product, or from a computer with special software installed.
Display  	LCD display REC : recording HOLD : hold : buzzer **APS**: auto power save function ON : remaining battery charge (4 stages) DATA READ : data reading **ITEM**: ITEM(6 characters) **ID**: ID (character)(key operation to toggle between ITEM and ID display) **INTVL**: interval recording **DATE**: date **TIME**: time (Key operation to toggle between Date and Time display) **COMP**: comparator setting **Hi IN Lo**: comparator test result **No.**: recorded data item number **1 2**: channel number (key operation to toggle between the temperature reading for each channel) Temperature reading (4 digits) : key lock **°C**: unit
Auto power save function	Automatically switches the power of if no key is pressed for 10 minutes. Interval recording continues, although the LCD goes off. Auto power save is released upon pressing any key.
Display hold function	Key operation to hold the temperature display

Data read	Key operation to display recorded data, recorded time and data number.
Comparator	Displays Hi/IN/Lo for upper and lower limits of temperature range set for individual items. Comparator values configurable form a computer with special software installed. Value display LCD display for test results, and buzzer output Hi: Upper limit < measured temperature IN: Lower limit ≦ measured temperature ≦ upper limit Lo: measured temperature < lower limit
Data delete	Key operation to delete most recent data item or all data items. Data deletion also possible from a computer with special software installed.
Back-up	Temperature data, ITEM, ID comparator value settings are saved in non-volatile memory even when batteries wear out. Clock data (uses a lithium battery)
Communications interface	Communications with a computer via RS-232C (using a special cable) Output to printer (supports commercially available RS-232 printers, using a special cable)
Computer software	Data display, graph display, Item registration, ID registration, Comparator settings, printing Data output (CSV format), data deletion, clock settings, communication settings
Power supply	Four alkaline (LR03) batteries
Rated supply voltage	DC1.5 V x 4
Maximum rated power	60 mVA

Continuous operating time	Approx. 15 days (at 20°C, auto power save function: OFF) Approx. 1 month (at 20°C, auto power save function: ON, recording interval: 1 min)
Size	Approx. 66W x 150H x 31.5D mm (2.60"W x 5.91"H x 1.24"D) (without protrusions)
Weight	Approx. 240 g (8.5 oz.) (within batteries)
Accessories	Four alkaline (LR03) batteries Strap band Instruction Manual
Options	9478 SHEATH TYPE TEMPERATURE PROBE 9479 SHEATH TYPE TEMPERATURE PROBE 9674 RS-232C PACKAGE 9386-01 CARRYING CASE 9670 PRINTER 9671 AC ADAPTER (for the 9670) 9237 RECORDING PAPER (for the 9670)
Operating temperature & humidity	0 to 40°C, 80%RH or less (non-condensating)
Storage temperature & humidity	-10 to 50°C, 80%RH or less (non-condensating)
Operating temperature & humidity for guaranteed accuracy	0 to 40°C, 80%RH or less (non-condensating)
Guraranteed accuracy period	1 year
Operating environment	Indoors, <2000 m (6562-ft.) ASL
Standards applying	Safety EN61010-1:2001 Pollution Degree 2 Measurement Category I (330 V) EMC EN61326:1997+A1:1998+A2:2001 +A3:2003 Water resistant: EN60529:1991, IP67

4.2 9478 SHEATH TYPE TEMPERATURE PROBE

Sensor type	Platinum resistance thermometer sensor Pt 100 (3 wires)
Accuracy	IEC751, class A ±0.15°C±0.002t (t: measurement temperature)
Measuring current	0.5 mA
Measurement range	-100 to 300°C
Temperature sensor dimensions	Approx. ϕ2.3 mm (ϕ0.09")
Temperature sensor length	Approx. 100 mm (3.94")
Temperature sensor material	SUS316
Grip heat resistance	80°C
Cable heat resistance	120°C
Cable length	Approx. 1000 mm (39.37")
Insulation resistance	More than 10 MΩ (DC250 V)
Water-resistant	EN60529:1991 IP67

4.3 9479 SHEATH TYPE TEMPERATURE PROBE

Sensor type	Platinum resistance thermometer sensor Pt 100 (3 wires)
Accuracy	IEC751, class A ±0.15°C±0.002t (t: measurement temperature)
Measuring current	0.5 mA
Measurement range	-100 to 300°C
Temperature sensor dimensions	Approx. ϕ2.3 mm (ϕ0.09")
Temperature sensor length	Approx. 100 mm (3.94")
Temperature sensor material	SUS316
Grip heat resistance	80°C
Cable heat resistance	120°C
Cable length	Approx. 1000 mm (39.37")
Insulation resistance	More than 10 MΩ (DC250 V)
Water-resistant	EN60529:1991 IP67
Others	Equipped with recording button

Maintenace and Service Chapter 5

5.1 Replacing the Batteries

❖2.2 "Mounting or Replacing the Batteries" (16 page)

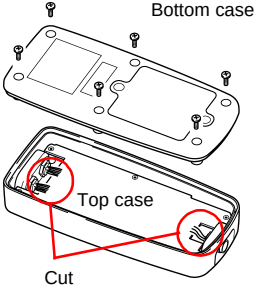
5.2 Disposing the Lithium Battery

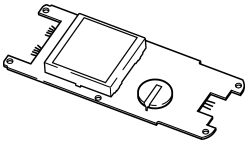
⚠WARNING

- To avoid the possibility of explosion, do not short circuit, disassemble or incinerate batteries.
- The product uses a lithium battery for clock data backup.
- When disposing of this product, remove the lithium battery and dispose of battery and product in accordance with local regulations.

The following tools are required to remove the lithium battery:
Phillips screwdriver, wire cutters

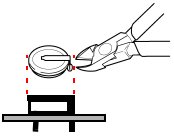
Disposing the lithium battery





Back of the circuit board

1. Turn the 3447-01 off.
2. Using the Phillips screwdriver, unscrew the 6 screws from the back of the product and remove the bottom case.
3. Using the wire cutters, cut the cables, and remove the circuit board from the case.
4. Use the wire cutters to cut the battery terminal mounted on the back of the circuit board.



5.3 Cleaning

To clean the product, wipe it gently with a soft cloth moistened with water or mild detergent. Never use solvents such as benzene, alcohol, acetone, ether, ketones, thinners or gasoline, as they can deform and discolor the case.

5.4 Service

- If the product seems to be malfunctioning, confirm that the batteries are not discharged, and that the temperature probes and RS-232C cable are not open circuited before contacting your dealer or Hioki representative.
- When sending the product 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.

HIOKI

DECLARATION OF CONFORMITY

Manufacturer's Name: HIOKI E.E. CORPORATION

Manufacturer's Address: 81 Koizumi, Ueda, Nagano 386-1192, Japan

Product Name: TEMPERATURE HiTESTER

Model Number: 3446-01, 3447-01

Options:
9472-50 SHEATH TYPE TEMPERATURE PROBE
9473-50 SHEATH TYPE TEMPERATURE PROBE
9476-50 SURFACE TYPE TEMPERATURE PROBE
9478 SHEATH TYPE TEMPERATURE PROBE
9479 SHEATH TYPE TEMPERATURE PROBE
9674 RS-232C PACKAGE

The above mentioned product conforms to the following product

Safety: EN61010-1:2001

EMC: EN61326:1997+A1:1998+A2:2001+A3:2003
ClassB equipment
Portable test and measurement equipment

Supplementary Information:

The product herewith complies with the requirements of the EMC Directive 89/336/EEC, but is not applicable to the Low Voltage Directive 73/23/EEC.

HIOKI E.E. CORPORATION

15 September 2006

T. Yoshiike

Tatsuyoshi Yoshiike

President

3446A999-02

HIOKI 3447-01 TEMPERATURE HiTESTER
Instruction Manual

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