

New

HIOKI

2004

8420-51, 8421-51, 8422-51 MEMORY HILOGGER

Data Loggers 



Internal memory capacity is greatly increased – four times that of previous models!

New multi-channel loggers with enhanced noise immunity

As demand for multi-channel temperature recording for environmental protection, energy conservation and HACCP activities increase steadily, portability to enable measurement everywhere and at all times, and communications support for connecting to IT (information technology) networks are becoming indispensable capabilities for measurement instruments. Furthermore, at measurement sites, accurate measurements are required in severe conditions such as the presence of different electrical potentials, hum noise from commercial power lines, and switching noise from inverters. In response to these requirements, we have developed the new models with enhanced noise immunity from that of the former models.



ISO14001
JQA-E-90091



<http://www.hioki.co.jp/>

HIOKI company overview, new products, environmental considerations and other information are available on our website.

Enhanced functionality in response to user demands

- Main features and product outline -

Features

- **Numerical data logging/recording and trend graph display**
- **Completely isolated input channels**
No need to worry about potential difference between measurement objects
- **Real-time saving to large capacity memory card**
Use a large capacity memory card for long-term data recording
- **Data collection to a PC via LAN**
 - Real-time measurements on PCs running 9334 LOGGER COMMUNICATOR
 - Data acquisition by FTP client/server functions
 - Send e-mail notification of anomalies by SMTP
 - Monitor and control over the Web using HTTP server functions

Applications

- **Power and Gas**
 - Trend measurement of machinery output/temperature
 - Watt-hour meter pulse count/output recording of machinery
- **Electronic Device and Component Manufacturing**
 - Product testing, quality control recording
- **Automobiles, Trains and Distribution Transportation**
 - Collect the necessary data during their development
- **Building Maintenance, Factory Facilities**
 - Long-term data acquisition for maintenance
 - Food-related temperature recording



Functions upgraded from former models

- **Four Times More Internal Memory**
Internal memory has been increased from 8 to 32 megabytes in the new models, which can now store up to about 16.77 million data points.
- **Enhanced Noise Immunity**
The circuitry was reviewed from the ground up, and a delta-sigma type A/D converter was incorporated. The effects of inverter switching noise and 50/60 Hz hum noise that previously presented problems have been greatly reduced by the digital filtering function using the oversampling principle inherent in this type of device.
Note: Optimum noise suppression obtained with recording intervals of two seconds or longer
- **Battery Charging Available During Operation**
Previously, the battery could be charged only when the instrument was turned off, but it can now be charged while measuring. Because of this, if an unexpected power outage occurs during long-term measurement and recording, situations such as measurement discontinuation resulting from battery self discharge can be avoided, significantly improving the reliability of long-term measurement.
- **Improved Accuracy of Internal Clock**
Clock accuracy has been greatly improved (0.2 seconds/day is the same as the previous Model 8422-01).
- **Chatter Filter Installed for External Trigger**
The filter function installed for external triggering prevents malfunctioning when starting and ending measurement using a mechanical relay.

External Docking Printer



Get measurement result printouts on site by docking with the 8992 PRINTER UNIT. Record long-period trend graphs and print hard copies of screens.

External Docking Input-Output unit



Send control signals to an external device by docking with the 8993 DIGITAL I/O UNIT (available with up to 16 channels). Sixteen logic input channels are also provided. In addition to analog and pulse inputs such as for temperature, 16 points of simultaneous logic signal input are supported.

Pulse totalization /rotation count inputs

- Up to four input channels
 - All channels isolated
 - For totalization of power and flow values
- Note: uses special input cable (Model 9641 CONNECTION CABLE)*



RS-232C Connector

LAN Connector (10 Base-T)

PC Card slot

9329 TERMINAL UNIT (optional)

Attached Cover



M3 Screw Terminals
The recommended wire diameter for the instrument's terminal block is 0.32mm. Use the Model 9329 TERMINAL UNIT to secure smaller-diameter wire.

ch 32
ch 31

ch 2
ch 1

AC Adapter

External Trigger Terminals

Trigger Output Terminals

Temperature / voltage inputs

- Up to 32 input channels (8420-51: 8 channels) (8421-51: 16 channels)
- All channels isolated

Temperature/Analog, all inputs isolated

- Measurement Functions -

Universal isolated temperature, voltage and pulse inputs

Universal isolated temperature, voltage and pulse inputs, Universal measurement inputs, voltage, temperature (thermocouple and Pt inputs*¹) and humidity*^{1,2} can be selected for each channel. In addition, four input channels are provided for measuring pulse inputs (totalization/rotation count) simultaneously with voltage, temperature and humidity. In addition to channel-to-channel input isolation, the PC connection interface is completely isolated from the measurement terminals. Shock hazard is minimized even when thermocouples and voltage inputs are measured at the same time.

(Maximum rated voltage above ground is 60 V DC.)

*¹ Pt and humidity measurement inputs are supported only by the 8420-51 and 8421-51.

*² Requires the 9653 humidity sensor (both optional).

Measurement parameters	Ranges	Range of Measurements	Finest Resolution
Voltage	100mV f.s.	-100mV to +100mV	5µV
	1V f.s.	-1V to +1V	50µV
	10V f.s.	-10V to +10V	500µV
	100V f.s.	-60V to +60V	5mV
	1 – 5V f.s.	1V to 5V	500µV
Temperature Thermocouples: K, E, J, T, N, W (WRe5-26), R, S, B	100°C f.s.	-100°C to 100°C	0.01°C
	500°C f.s.	-200°C to 500°C	0.1°C
	2000°C f.s.	-200°C to 2000°C	0.5°C
Pulse Accumulation	50,000c f.s.	0 to 50,000 counts	1 count
	500,000c f.s.	0 to 500,000 counts	10 counts
	5Mc f.s.	0 to 5M counts	100 counts
	100Mc f.s.	0 to 100M counts	2,000 counts
	2,500Mc f.s.	0 to 2,500M counts	50,000 counts
Rotation	5,000/n (r/s) f.s.* ¹	0 to 5,000/n (r/s)* ¹	1/n (r/s)* ¹
Humidity	100%rh f.s.	5.0 to 95.0%rh	0.1%rh

*¹ n = pulses per rotation (1 to 1,000)

Sample multiple channels at high speeds

All input channels are quickly scanned, measured and stored within 100 ms (200 ms or more with channels 17 to 32 in Model 8422-51, and within about 5 seconds for mixed humidity measurements). As stand-alone instruments, Model 8420-51 provides 4 pulse input channels, plus 8 temperature/voltage channels, Model 8421-51 provides 4 pulse input channels, plus 16 temperature/voltage channels, and Model 8422-51 provides 4 pulse input channels, plus 32 temperature/voltage channels. The 32MB of internal memory records about 16.77 million data points.

Real-Time Save to High-Capacity Memory Card

Measurement data can be automatically saved to a PC Card. Binary (real-time) and text (post-measurement) formats can be selected. High-capacity Flash ATA cards up to 512 MB can be used for continuous long-term recording. Choose binary in normal use. This recording method is linked to writing measurements in real time. The supplied Wv Wave Viewer software can convert the data into text format on a PC.

Recording intervals	64MB (using 1 channel)	64MB (using 4 channels)	64MB (using 8 channels)	64MB (using 16 channels)	64MB (using 32 channels)
100ms	36 days	9 days	4 days, 12 hours	2 days, 6 hours	- NA -
200ms	72 days	18 days	9 days	4 days, 12 hours	2 days, 6 hours
500ms	180 days	45 days	22 days, 12 hours	11 days, 6 hours	5 days, 15 hours
1s	360 days	90 days	45 days	22 days, 12 hours	11 days, 6 hours
2s	1 year, 355 days	180 days	90 days	45 days	22 days, 12 hours
5s	4 years, 340 days	1 year, 85 days	225 days	112 days, 12 hours	56 days, 6 hours
10s	9 years, 315 days	2 years, 170 days	1 year, 85 days	225 days	112 days, 12 hours
20s	- omitted -	4 years, 340 days	2 years, 170 days	1 year, 85 days	225 days
30s	- omitted -	7 years, 145 days	3 years, 255 days	1 year, 310 days	1 year, 85 days
1min	- omitted -	- omitted -	7 years, 145 days	3 years, 255 days	1 year, 310 days
2min	- omitted -	- omitted -	- omitted -	7 years, 145 days	3 years, 255 days
5min to 1hour	- omitted -	- omitted -	- omitted -	- omitted -	- omitted -

Real-Time Storage Recording Times with 64 MB Card (approximate times)

Note: Recording times are calculated values, and cannot be guaranteed. For calculations, one year = 365 days. Calculated values resulting in extremely long periods are omitted.

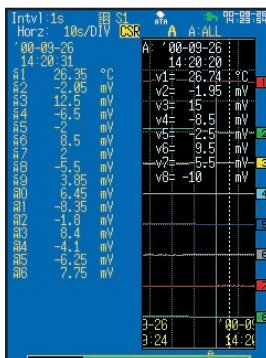
What happens if a power failure occurs while measuring ?

We recommend using the real-time saving function of the 8420-51, 8421-51 and 8422-51 MEMORY HiLOGGERS with a PC Card. This exclusive technology has been developed to preserve data as reliably as possible even in the event of a power failure by incorporating PC card technology with the know-how built into the MEMORY HiRECORDER series recording instruments. When recording only to internal memory without using a card, stored data is retained for about ten minutes in the event of a power failure.

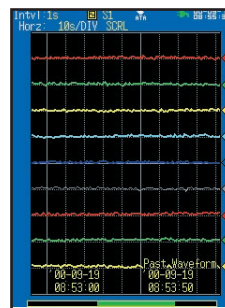


Color LCD displays waveforms and numerical values simultaneously, and allows viewing earlier data while measuring

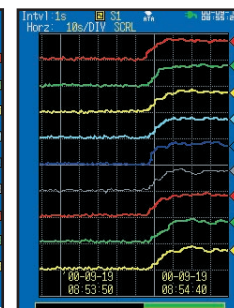
Scroll through the displayed graph while saving measurements in real time to PC Card to verify earlier measurements. You can also read the values at the movable cursors.



Standard Measurement Screen
(Measured values appear numerically at the left, and plotted as a graph at the right together with the measured values at the cursors.)



Display of Earlier Waveforms
(The green bar at the bottom indicates the relative location of the current display in internal memory.)



Display of Current Measurements
(The green bar at the bottom indicates the relative location of the current display in internal memory.)

LAN Connectivity Supported by PPP Connection to a Telephone Circuit

- Communication Functions -

The following PC measurements and various web server functions can be employed with a LAN or PPP connection (by connecting the RS-232C connector through a modem to a telephone circuit or cellular phone).

■ Operation from a PC

- Real-time PC measurement with the optional 9334 Logger Communicator
- Download acquired data from a PC Card or internal memory using the FTP server function
- Remote control from a web browser using the HTTP server function

■ Automatic sending from the instrument

- E-mail sending function
- Send data automatically using the FTP client function, or connect directly to a PC via the RS-232C interface.



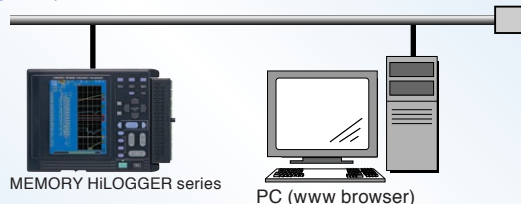
- When communicating with a PC using FTP, acquired data is transferred only in file units.
- The 9334 software with a LAN connection supports quick response times as short as 100 ms.
- User-created PC commands necessary to use a direct RS-232C connection. A direct RS-232C connection allows near real-time measurement data to be obtained with response times of as little as about a second.

Even on a PC equipped only with a USB port, PC calculations can be performed using a commercially available USB-LAN adapter.

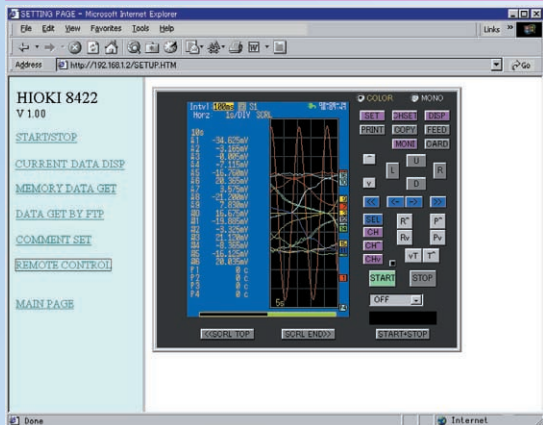
Remote measurements by HTTP server operation

The HTTP server function can be used to make instrument settings, control data acquisition and monitor the instrument screen using a common web browser such as Internet Explorer, without requiring any special software application to be installed on the PC.

[Example of HTTP communications via 10Base-T LAN connection]

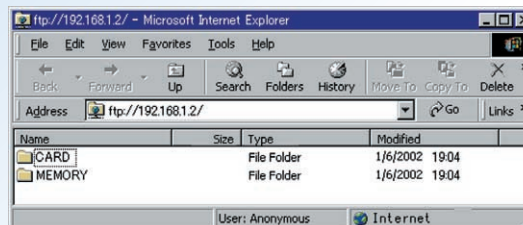


Function Details



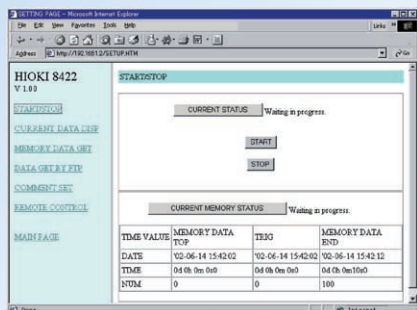
[Remote Control Screen]

- The instrument screen is duplicated in the web browser.
- Key inputs can be made using the same panel configuration as on the actual instrument.
- Monochrome/color display and screen refresh rate are selectable.
- The lit/unlit state of the Start LED is refreshed whenever the screen is refreshed.
- By clicking inside the window, the lighting cursor can be moved without having to use the up, down, left and right arrow keys.



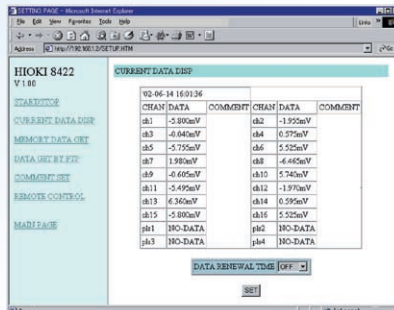
[Data Acquisition by FTP]

- Acquired data in files on a PC Card in the instrument, and measurement data in internal memory can be transferred by the web browser using FTP.
- Data being acquired into internal memory cannot be transferred while measuring. Transfer data after measurement has finished.
- While measuring, data previously transferred from internal memory can be viewed on the Data Acquisition Screen.



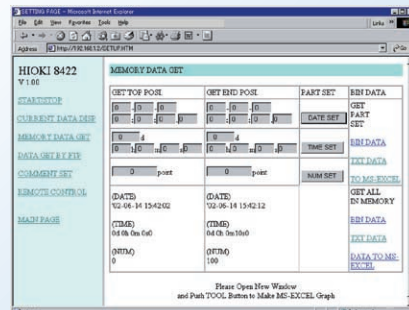
[Starting and Stopping Measurement]

- Start and stop measurement using the web browser.
- Current measurement status can be displayed.



[Current Value Display]

- Measurement data can be displayed as numerical values.
- During measurement, data acquired on each channel at every recording interval can be monitored.
- Instantaneous data input to each channel can be monitored even when measurement is stopped.
- Selectable screen refresh rate.



[Data Acquisition in Internal Memory]

- Data acquired in internal memory can be transferred to the browser during measurement, or the data over an optionally specified range can be transferred after measurement stops. All data in internal memory can be transferred.
- Either binary or text data can be selected.
- Data can be freely transferred to MS Excel for graphing.

Communication functions for added convenience

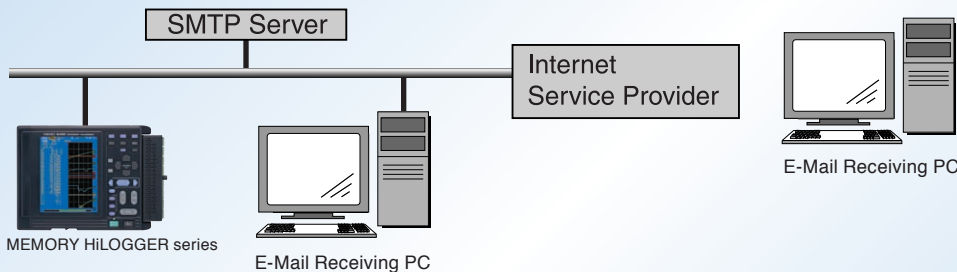
- Communication Functions -

E-Mail Sending

E-mail can be automatically sent through an SMTP mail server to a local network, remote PC or e-mail compatible cellular phone upon any of the following events: start/stop trigger, alarm, recovery from power failure, memory full or card full. Up to three e-mail destination addresses can be specified.

(The 8993 DIGITAL I/O UNIT is required for alarms)

[Example of sending e-mail via 10Base-T LAN connection]



```
mail from: logger@xxxx.xx.xx
mail to: tab@yy.zzz.zzz
subject: logger_mail

message = mail from logger
comment = title comment
time = '02-04-25 15:11:34
start trigger happen

trigger course = CH1
data = -163.795mV
channel comment = channel1

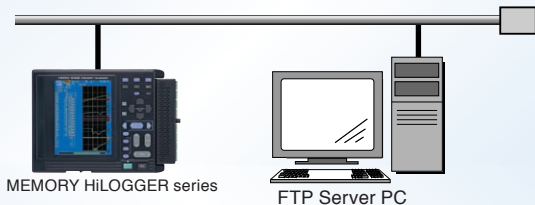
instant data
CH1 = -163.795mV
CH2 = 121.435mV
CH3 = 102.435mV
CH4 = -21.805mV
CH5 = 183.795mV
CH6 = 102.435mV
CH7 = 21.850mV
CH8 = 102.435mV
```

[Example of Sent E-mail]

Automatic Data Sending by FTP Client

Binary data files that are saved automatically to the PC Card during periodic measurement or when finished measuring, are sent automatically by the instrument to the FTP server on a local network or remote PC.

[Example of FTP data transfer via 10Base-T LAN connection]



PPP Communication (RS-232C + modem)

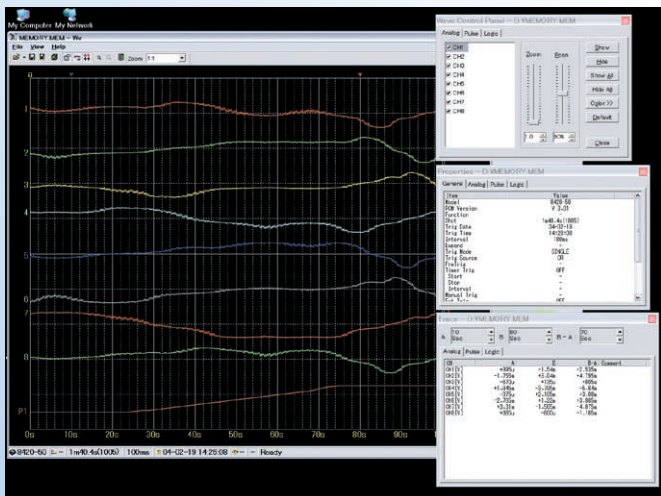
By connecting the instrument to a modem using an RS-232C cable, measurement can be controlled from a remote modem-equipped PC. Connect the instrument to a modem using the 9721 RS-232C Cable (straight-through cable for modems).

Application for PC - Wave Viewer (Wv) Software (bundled accessory)

Measurement data (in binary format) from the MEMORY HILOGGER series can be displayed as waveforms on the PC screen. It can also be converted (file-by-file or all files) to CSV-format text data, so the data can be loaded into other PC applications like Excel.

■ Specifications

Wave Viewer (Wv) Software (bundled accessory)	
Functions	<ul style="list-style-type: none"> • Simple display of waveform file • Text conversion: convert binary data file to text format, with selectable space or tab separators in addition to CSV, and specifiable section, thinning available • Display format settings: scroll functions, enlarge/reduce display, display channel settings • Others: voltage value trace function, jump to cursor/trigger position function
PC operating systems	Windows 95/98/Me, Windows NT 4.0 (SP3 or later), 2000, XP



Control up to 16 Instruments Over LAN Connections

- PC Application -

9334 LOGGER COMMUNICATOR (optional software)

Collect Data on a PC via Ethernet

Data from a HiLOGGER connected to a LAN can be stored on the hard disk of a PC in real time. Other functions include waveform display, CSV conversion, printing, numerical value calculations and searching.

Acquired data (either all data, or only that between marker cursors) can be converted to CSV format text data. Data in this format can be loaded into a spreadsheet program such as Excel.

A table shows time difference and potential difference between A and B cursors, and the time and potential at each cursor on the waveform screen.

Acquired data can be displayed as numerical values for time series'. Waveform image and numerical values can be displayed simultaneously.

Acquired data can be printed out as a waveform image on a connected printer.

Acquired data can be subjected to parameter calculations such as maximum value, time and average value.

Acquired data can be searched for specific event marks, as well as for conditions such as date, maximum and minimum values.

The waveform image of acquired data is displayed. It can be drawn in real time during data acquisition. Up to 512 analog channels, 256 logic channels and 64 pulse channels are supported.

■ Specification Overview

9334 LOGGER COMMUNICATOR (PC application, sold separately)

■ Interface: Ethernet ■ Controllable instruments: 16 ■ Data transfer: data transferred from instrument's internal memory, data acquired in real time ■ Display: displays image of acquired waveform data on-screen, real-time data image during acquisition, numerical values, and simultaneous display of image and numerical values ■ Maximum channels: 512 analog, 256 logic and 64 pulse channels ■ Data conversion: converts all data or data between AB cursors to CSV-format text data ■ Printing: available ■ Parameter calculation: available ■ Other functions: marking function, search function

PC operating systems Windows 95/98/Me, Windows NT 4.0 (SP3 or later), 2000, XP

Functions

■ Product Specifications

General Specifications		
	8420 -51/8421 -51	8422-51
Measurement parameters	Temperature (thermocouple, Pt), voltage, humidity, totalized pulses, rotation count	Temperature (thermocouple only), voltage, totalized pulses, rotation count
Input System/ Channels	Analog: 8 channels isolated by Photo-MOS relays/16 channels scanning isolated inputs (voltage, temperature and humidity independently selectable for each channel) Pulse Inputs: 4 channels Logic Inputs: 16 channels (using Model 8993 DIGITAL I/O UNIT)	Analog: 32 channels isolated by Photo-MOS relays (voltage and temperature can be independently selected for each channel) Pulse Inputs: 4 channels Logic Inputs: 16 channels (using Model 8993 DIGITAL I/O UNIT)
Recording intervals	100 ms to 1 hour (5 s to 1 hour when combined with humidity measurement) <i>Note: All input channels are scanned at high speed during each recording interval.</i>	100 ms to 1 hour (200 ms to 1 hour when using channels 17 to 32)
Data recording capacity	Internal: 32 MB (about 16.77 million data points: each data point = 2 bytes/16 bits) External: up to 528 MB (Flash ATA Card)	
Real time save	Waveforms are saved as binary data to the PC Card in real time, and can be saved to separate files at preset times, selectable as full files or an endless loop with automatic deletion of oldest data. Stored data can be recalled by the instrument in 32-MB blocks by specifying a time point (for one channel. For n channels, 32 MB / 2n data points are recalled.)	
File operations	PC Card type II slot: accepts Flash ATA (up to 528 MB) Stores binary data (custom format), text data (Excel format), BMP data (screen images), numerical calculation results and measurement values. A-B cursors can be used select data to be saved (manual operation only).	
PC Interface	RS-232C (Round 9-pin mini-DIN connector) LAN (supports 10Base-T, DHCP, DNS)	

A/D Converter	One internal delta-sigma type A/D converter with digital filtering
External control connectors	Trigger input, trigger output (push-button type terminal block)
Memory backup function (@23°C)	Time and settings: 10 years or more, Measurement data: 10 minutes or more after turning instrument power off (Retained from at least 2 minutes after power on)
Environmental conditions (non-condensating)	Operating temperature and humidity: 0 (32°F) to 40°C (104°F), 30 to 80% rh (charging temperature range: 10 (32°F) to 30°C (86°F)) Storage temperature and humidity: -10 (14°F) to 50°C (122°F), 30 to 80% rh
Conforming standards	Safety: EN61010, EMC: EN61326, EN61000
Power supply	(1) Using Model 9418-15 AC ADAPTER, 100 to 240 VAC, 50/60 Hz (2) Model 9447 BATTERY PACK (when used with the AC ADAPTER, the AC ADAPTER has priority) (3) 12 V Battery (voltage may range from +30 to -20%, although chargeable range is 12 VDC ±5%)
Power consumption	16 VA (maximum load under battery power), 20 VA (maximum load using AC Adapter)
Continuous usage time with one Model 9447 BATTERY PACK, when measuring voltage	Approx. 5 hours (with 5-min backlight saver setting, after about 10 hours charging) Approx. 2.5 hours (with bright backlight, after about 2.5 hours charging)
Charging Battery pack	Available with the battery pack and AC Adapter connected: quick charging time is approx. 2.5 hours (@23°C), after which trickle charging prevents battery self-discharge. Printing interrupts quick charging.
Dimensions & Mass (without battery)	Approx. 234 mm (9.21 in) W x 170 mm (6.69 in) H x 52 mm (2.05 in) D mm, 1.4 kg (49.4 oz) (instrument only) Approx. 310.5 (12.22 in) W x 170 (6.69 in) H x 52 (2.05 in) D mm, 1.7 kg (60.0 oz) (with printer attached) Approx. 302.5 (11.91 in) W x 170 (6.69 in) H x 52 (2.05 in) D mm, 1.7 kg (60.0 oz) (with Digital I/O Unit)
Accessories	9418-15 AC ADAPTER xl, Wave Viewer (Wv) floppy diskette xl, Flat-blade Screwdriver (xl, for terminal block), Detailed Operating Manual xl, Communication Function/Wave Viewer Operating Manual xl, Quick Start Manual xl, Communication Commands Operating Manual diskette xl.

Product Specifications

Functional Specifications	
Display	5.7-inch STN Color LCD (240 × 320 dots). Displays either waveforms only, waveforms and numerical values simultaneously, numerical values only or calculation results and waveforms simultaneously. Japanese/English language selectable. The most recent 16 MB of data (with one-channel recording) can be displayed by back scrolling.
Waveform compression and magnification	Time-axis: 1/2/5/10/20/30 seconds, 1/2/5/10/20/30 minutes, 1/2/5/10/12 hours, 1 day/division Voltage-axis zoom: ×100, ×50, ×20, ×10, ×5, ×2, ×1, ×1/2
Search function	Event marks can be searched
Calculation functions	Waveform parameter calculations: Up to four simultaneous calculations are supported: average, peak, maximum, minimum and effective values, timing of maximum and minimum values, and waveform processing calculation: displays sums and differences between channel waveforms
Communication functions (Controlled by PC)	<ul style="list-style-type: none"> ■ Data can be collected in real time using the optional Model 9334 LOGGER COMMUNICATOR (data collection software application). ■ Data in internal memory*⁸¹ and in the PC Card can be transferred by the FTP server function. *⁸¹ Data in internal memory can be transferred only when not measuring. ■ Remote control by communications commands (separate programming required) ■ Remote control by HTTP server function (with no special software other than a common Web browser, HILOGGER settings, data acquisition and screen monitoring can be performed)
Communication functions (Sending to PC)	<ul style="list-style-type: none"> ■ Automatic data sending by FTP client function (periodically during measurement or after measuring, a file automatically saved to PC Card is automatically sent to an FTP server on the internal network or on a remote PC) ■ Automatic e-mail sending (upon trigger start/stop, trigger warning, power outage recovery, memory or card full status, an e-mail notification is sent to a PC on the local network or to a remote PC through an SMTP mail server)
Communication functions (PPP)	To communicate with a modem-equipped PC through the public telephone circuit, connect a standard modem to the RS-232C terminal using the Model 9721 RS-232C CABLE.
Miscellaneous	Waveform scroll, cursor measurement, scaling, automatic saving (binary/text selectable), start condition retention, settings saving, comment entry, event marking (for search), automatic setup, saves the most recent 16 MB of data (with one-channel recording) in internal memory
Trigger Functions	
Trigger source (conditions can be set for each channel)	Analog input: all channels, Pulse totalizer inputs: P1 to P4, Logic inputs LI-1 to LI-16 (using Model 8993 DIGITAL I/O UNIT), External trigger, Time trigger, Logical Product of each trigger source (AND), Logical Sum (OR)
External trigger	Active low, valid pulse width H period 2.5 ms or more, L period 2.5 ms or more (with external trigger filter ON)
Trigger timing	Start, Stop and Start/Stop (separate trigger conditions can be set to start and stop)
Trigger type (analog, pulse)	Level: Triggers when rising or falling through preset level Window: Triggers when entering or exiting range defined by preset upper and lower limit values
Trigger level resolution	0.5% f.s. (f.s. = 10 divisions)
Trigger type (logic)	Pattern trigger by 1, 0 and × (don't care) (with Model 8993 DIGITAL I/O UNIT)
Miscellaneous	Pre-trigger (records period before trigger, can be set for real-time saving), Trigger output (open collector, 5V output, active low, at least 100 ms pulse width), Trigger mode (single, continuous)
Thermocouple Inputs (accuracy specified @23 ±5°C, from 30 minutes after power on and after zero point adjustment, guaranteed for one year)	
Input Terminals/ Impedance	Screw-type terminal block (recommended minimum wire diameter 0.32 mm ⁸²), removable, supplied terminal block cover (all channel terminals are isolated from each other and chassis), Input impedance: 1MΩ (850kΩ when open-circuit polling is enabled) ⁸² Recommended wire: 0.14 to 1.5 mm ² single strand, or 0.14 to 1.0 mm ² twisted multi strand. To connect smaller thermocouple wire, use the Model 9329 TERMINAL UNIT.
Setting range ⁸³ Upper and lower limits depend on the measurement input range of each sensor	100°C f.s. : -100 to 100°C ⁸³ (0.01°C resolution) 500°C f.s. : -200 to 500°C ⁸³ (0.1°C resolution) 2000°C f.s. : -200 to 2000°C ⁸³ (0.5°C resolution)
Thermocouples are JIS C 1602-1995 compliant (except type W)	K: -200 to 1350°C, E: -200 to 1000°C, J: -200 to 1200°C, T: -200 to 400°C, N: -200 to 1300°C, R: 400 to 1700°C, S: 400 to 1700°C, B: 400 to 1800°C, W (WR5-26): 400 to 2000°C <i>Note:</i> Types W, R and S can measure from 0°C, but measurements in this range are not guaranteed. Standard. Reference contact: internally and externally switchable
Accuracy	Types K, E, J, T, N: ±0.05% f.s. ±1°C Types R, S, B, W: ±0.05% f.s. ±2°C (applicable at 400°C and above) Standard reference contact accuracy: ±1°C (with internal compensation, add to measurement accuracy)
Max. allowable input	60 V DC (maximum voltage between input terminals that does not cause damage)
Max. rated voltage to earth	60 V DC (Upper limit voltage that does not cause damage when applied between input channel and chassis, and between each input channels)
Platinum resistance temperature sensor inputs (only in 8420-51/8421-51, accuracy specified @23 ±5°C, from 30 minutes after power on and after zero point adjustment, guaranteed for one year)	
Input terminal, detection current	Common thermocouple application, detection current: 1 mA, Input Resistance: 2 MΩ
Setting range ⁸⁴ Upper and lower limits depend on the measurement input range of each sensor	100°C f.s. : -100 to 100°C ⁸⁴ (0.01°C resolution) 500°C f.s. : -200 to 500°C ⁸⁴ (0.1°C resolution) 2000°C f.s. : -200 to 2000°C ⁸⁴ (0.5°C resolution)
Resistance temperature sensor	Pt100: -200 to 800°C, JPt100: -200 to 500°C, Connection: 3-wire/4-wire (Pt100: JIS C 1604-1997, JPt100: JIS C 1604-1989)
Accuracy	Pt100, JPt100: ±0.05% f.s. ±0.5°C
Max. allowable input	60 V DC (maximum voltage between input terminals that does not cause damage)
Max. rated voltage to earth	60 V DC (Upper limit voltage that does not cause damage when applied between input channel and chassis, and between each input channels)

Voltage Inputs (accuracy is specified at 23 ±5°C, from 30 minutes after power on and after zero point adjustment, guaranteed for one year)	
Input Terminals/Impedance	Same as for thermocouples, Input resistance: 1 MΩ
Measurement ranges	100 mV f.s. : -100 to +100 mV (5 μV resolution) 1V f.s. : -1 to +1 V (50 μV resolution) 10V f.s. : -10 to +10 V (500 μV resolution) 100V f.s. : -60 to +60 V (5 mV resolution) 1 to 5 V f.s. : 1 to 5 V (500 μV resolution)
Accuracy	±0.1 % f.s. (in the 1-5 V f.s. range only, f.s. = 10 V)
Max. allowable input	60 V DC (maximum voltage between input terminals that does not cause damage)
Max. rated voltage to earth	60 V DC (Upper limit voltage that does not cause damage when applied between input channel and chassis, and between each input channels)
Humidity measurement (only in 8420-51/8421-51, accuracy specified @23 ±5°C, from 30 minutes after power on and after zero point adjustment, guaranteed for one year)	
Input terminals	Commonly used with thermocouples
Measurement ranges	100% rh f.s. : 5.0 to 95.0% rh (0.1% rh resolution)
Accuracy	±5% rh (with Model 9653 HUMIDITY SENSOR, when measuring 20 to 30°C, 30 to 80% rh)
Filter function (common to thermocouple/platinum resistance temperature sensor/voltage/humidity inputs)	
Digital Filter	OFF, 50 Hz, 60 Hz (With 50 and 60 Hz settings, the digital filter is automatically set according to recording interval)
Pulse inputs (@23 ±5°C, accuracy guaranteed for one year)	
Input terminals	Custom connector (up to 4 channel inputs using 9641 CONNECTION CABLE)
Input signal condition	<ul style="list-style-type: none"> ■ No-voltage 'a' contact (normally open contact), open collector or voltage input ■ Insulated between all pulse input channels and instrument chassis, and between each pulse input channel ■ Maximum input voltage: 15 V DC ■ Detection level: HIGH = at least 1.0 V, LOW = 0 to 0.5 V ■ Pulse input cycle: with filter OFF, 200 μs or more (both H and L periods must be at least 100 μs), with filter ON, 100 ms or more (both H and L periods must be at least 50 ms) ■ Slope: Rising or falling edge can be set for each channel ■ Chatter-prevention filter: can be set on/off
Pulse totalization ranges	50,000 c f.s. : 0 to 50,000 counts (1-count resolution) 500,000 c f.s. : 0 to 500,000 counts (10-count resolution) 5M c f.s. : 0 to 5M counts (100-count resolution) 100M c f.s. : 0 to 100M counts (2,000-count resolution) 2,500M c f.s. : 0 to 2,500M counts (50,000-count resolution)
Rotation range	5,000/n (r/s) f.s. : 0 to 5,000/n (r/s); Resolution: 1/n (r/s) <i>Note: n = pulses per rotation (1 to 1,000)</i>
Max. rated voltage to earth	60 V DC (Upper limit voltage that does not cause damage when applied between input channel and chassis, and between each input channels)

Optional Accessories (sold separately)

8992 PRINTER UNIT Specifications (installs on HILOGGERS)	
Recording paper	Recording width: 100mm (10 divisions full scale), Model 9234 RECORDING PAPER (112 mm (4.41 in) × 18 m (59.06 ft) roll, thermal paper)
Recording speed	Maximum 2 mm/s (using AC Adapter or battery pack) <ul style="list-style-type: none"> ■ Logging (prints numerical measurement values) ■ Hybrid (prints waveforms simultaneously with numerical values for each numerical quantity at selectable printing intervals) ■ Real-time printing (automatic printing during measurement, available when waveform time axis is 5 s to 1 d, and numeric printing interval is at least 5 s) ■ Manual printing (while measuring, on/off selectable) ■ Other functions include selectable printing between A/B cursors, screen hard copy, list print, report print, list/gauge, comment print
8993 DIGITAL I/O UNIT Specifications (installs on HILOGGERS)	
Logic Inputs	<ul style="list-style-type: none"> ■ Screw-type terminal block, 16 channels (common GND between all input channels to instrument chassis, and between each input) ■ Input signal condition: No-voltage 'a' contact (normally open contact), open collector or voltage input, ■ Detection level: HIGH = at least 2.5 V, LOW = 0 to 1.5 V, ■ Maximum input voltage: 50 V DC, ■ Input resistance: 1.1 MΩ
Alarm outputs	<ul style="list-style-type: none"> ■ 16 isolated channels: from any of 32 analog input channels and 4 pulse input channels, 16 digital input bits (= 1 channel) can be output for any of 16 channels (all output channels isolated from the chassis and from each other), ■ Output latch settings: latch/no latch, ■ alarm sound: enabled/disabled, ■ Max. rated voltage to earth: 60 V DC, ■ Output type: open collector (active low), ■ Maximum switching capability: 5 to 60 V DC @ 10 mA⁸⁵ ⁸⁵ Mechanical contact outputs are available by modification for users who want to control sequencers using relays or photocouplers that require drive current exceeding 10 mA. Please contact your distributor or HIOKI for details. ■ Output refresh: at each recording interval

■ Appearance/Dimension Illustration

Main unit

170 mm (6.69 in)
234 mm (9.21 in)
52 mm (2.05 in)

With printer attached

170 mm (6.69 in)
310.5 mm (12.22 in)
52 mm (2.05 in)

With Digital I/O Unit attached

170 mm (6.69 in)
302.5 mm (11.91 in)
52 mm (2.05 in)

9329 TERMINAL UNIT (option)
This photo shows the optional 9329 TERMINAL UNIT installed. Remove the supplied terminal block to install the optional unit. M3 screw terminal input connections are available.

Options in Detail

Note: Product names in this publication are trademarks or registered trademarks of their respective companies.

Cases and Stand

9648 CARRYING CASE
Includes space for options

9649 PROTECTIVE CASE
Includes storage for options, simple water-resistant type with rubber grommets for cables to permit measuring while the case is closed

9652-01 FIXED STAND
Enables installation in standard DIN rails, other features include belt attachment, wall hanging and slanted bench mounting

Peripherals and PC-Related Options

9612 RS-232C CABLE
9-pin mini DIN to 9-pin Dsub, crossover cable for PC, 1.5m (4.92 ft) length

9642 LAN CABLE
Straight-through cable with crossover adapter, cable length 5m (16.41 ft)

9641 CONNECTION CABLE
(for pulse inputs) cable length 1.5m (4.92 ft)

9721 RS-232C CABLE
9-pin mini DIN to 9-pin Dsub, straight-through cable for modem, 1.5m (4.92 ft) length

9626 PC CARD 32M

9627 PC CARD 64M

9726 PC CARD 128M

9727 PC CARD 256M

9728 PC CARD 512M

PC Card Precaution
HIOKI-supplied PC Cards are recommended. Operation with other PC Cards cannot be guaranteed.

9653 HUMIDITY SENSOR
Custom designed for 8420-51 and 8421-51, 3m (9.84 ft) length

9334 LOGGER COMMUNICATOR
Data collection application software required for LAN connection on Windows 95/98/Me, Windows NT 4.0/2000/XP

With the PC card adapter.

Alarm Output and Logic Input

Note: The 8993 is required for dual-battery HiLOGGER operation.

8993 DIGITAL I/O UNIT
Input type: No-voltage 'a' contact (normally open contact), open collector, or voltage common with 16 channels/GND, Output type: 16 channels, open collector isolated, used in combination with the HiLOGGER instrument

Power Supplies

Supplied Accessories: 9418-15 AC ADAPTER
(100 to 240 V AC, 2.5 A/12 V)

9447 BATTERY PACK
7.2 V, 2400 mAh

9643 CHARGE STAND
Charges one 9447, works in combination with the 9418-15 AC ADAPTER attached to the HiLOGGER

By using the AC adapter provided with the HiLOGGER, the 9447 BATTERY PACK can be charged without the 9643 CHARGE STAND. If the charging stand, AC adapter, and battery pack are purchased separately, standalone battery charging is possible.

Printing

8992 PRINTER UNIT
(Prints 100 mm, 3.94" wide, attaches to the HiLOGGER)

9234 RECORDING PAPER
(Set of ten 18m, 59.06 ft rolls)

220H PAPER WINDER
(70 to 220 mm, 2.76" to 8.66" paper width, 100 V AC)

8420 -51 MEMORY HiLOGGER (8ch)
8421 -51 MEMORY HiLOGGER (16ch)
8422 -51 MEMORY HiLOGGER (32ch)

Supplied Accessories: 9418-15 AC ADAPTER x1, Wave Viewer (Wv) floppy diskette x1, Flat-blade Screwdriver (x1, for terminal block), Detailed Operating Manual x1, Communication Function/Waveform Viewer Operating Manual x1, Quick Start Manual x1, Communication Commands Operating Manual diskette x1

Note: Thermocouples are not provided by HIOKI, and must be purchased from a separate vendor.



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