Fungal Growth Rate at a Glance

Predict the start of fungal growth

Prevent Fungal Occurrence in Business Critical Locations

Food & Grain Storage

Document Storage

Art Galleries and Museums

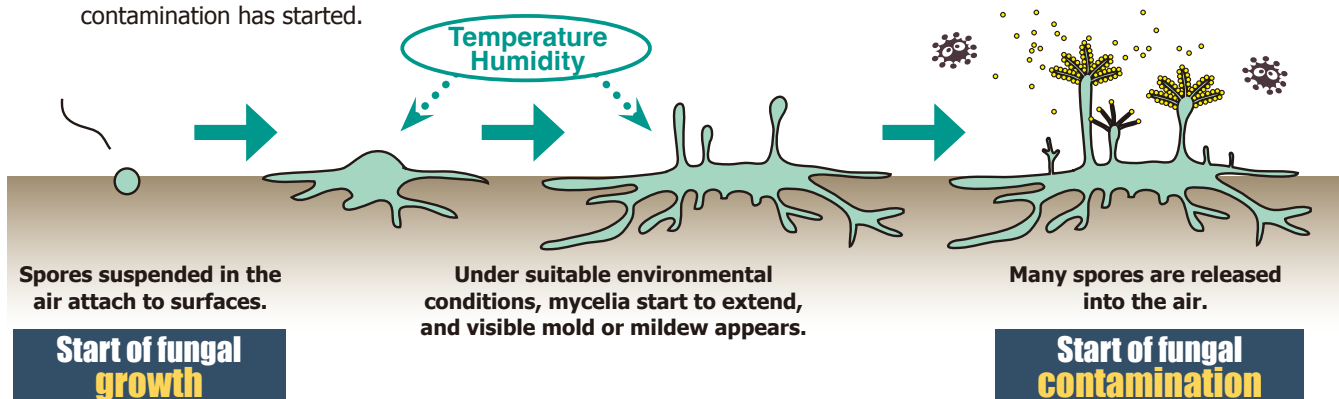CE

3 year Warranty
Main unit only

Bluetooth®

2

Fungal Growth Prevention: Shifting from Temperature and Humidity Management to "Fungal Index" Management

Fungal Growth and Contamination

▶ Fungal spores are floating in the air.
These spores easily attach to any surface. Fungal growth then starts based on environmental conditions, such as source of nutrients, temperature, and moisture.

▶ There is a correlation between fungal growth and temperature/ humidity. If the environmental conditions are right, spores that have attached to surfaces will germinate, extend mycelia, and begin to grow.
After a certain amount of fungal growth, visible fungi in the form of mold and mildew appear, and spores are released and dispersed through the air.

▶ It is not possible to see each fungus with the naked eye at the start of its growth, as it fungus is visible only after spores are formed.
Once we are able to detect visible fungi, mold or mildew, the spores have already been released and fungal contamination has started.

Temperature Humidity

Spores suspended in the air attach to surfaces.

Under suitable environmental conditions, mycelia start to extend, and visible mold or mildew appears.

Many spores are released into the air.

Start of fungal growth

Start of fungal contamination

Key Point

It is important to stop fungal growth as early as possible.
The "Fungal Logger" is effective for predicting the period of time until the start of fungal growth.

Easily Predict Fungal Growth Based on 2 Indices

Growth Prediction

Fungal index

Fungal index - Calculated based on temperature and relative humidity -

▶ This index, which predicts how easy it is for fungi to grow, was proposed by Keiko Abe, Doctor of Agriculture and Director of the Institute of Environmental Biology. Because fungal growth has a direct correlation with temperature and relative humidity, expected occurrence can be predicted. Mainly, this index can be used to express the indoor environment for fungal growth quantitatively. (Japanese Patent Number 2710903)

▶ The Hioki LR8520 Wireless Fungal Logger calculates the fungal index based on temperature and humidity measured using high-precision sensors.
The fungal index is indicated by a value from 0 to 200, and can be used to predict the period of time until the start of fungal growth and contamination.

Fungal Index	Period of time until the start of fungal growth (estimate)	Period of time until the start of fungal contamination (estimate)	Locations in a home (example)
1	2 months	10 years or more	Dry areas, Living spaces, Closets, Shoe storage
2	1 month	8 years	
5	2 weeks	3 years	
10	5 days	2 years	
20	3 days	1 year	Basements and crawl spaces, Bathrooms, Inside air conditioners running in cool mode
50	1 day	4 months	
100	12 hours	2 months	
200	6 hours	1 month	
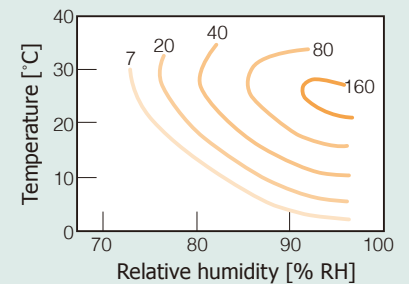
*Fungal contamination may be confirmed quicker in environments that are already contaminated or rich in nutrients necessary for fungal growth.

Growth Prediction - Calculated based on the fungal index -

▶ If the fungal index value increases momentarily, that does not necessarily mean that fungal contamination will start immediately. Since fungal growth occurs when the necessary environmental conditions are maintained over a certain period of time, the cumulative value estimated from the fungal index can be used to predict fungal contamination.

▶ The Hioki LR8520 uses illustrations to indicate fungal growth in 5 stages based on the accumulative value.

No spore germination (no illustration) → Hyphae starting to elongate → New spores generated → Dispersal of spores starting → Large number of spores dispersed (spore illustration flashes)

"Fungal Index" proponent

The late **Keiko Abe**, Director of the Institute of Environmental Biology, Doctor of Agriculture.

Graduate of Chiba University, Faculty of Horticulture, Department of Agricultural Chemistry. Completed Tokyo University Graduate School Doctorate. Majored in Microorganism Cellular Physiology.
Received the Japan Society for Bioscience, Biotechnology, and Agrochemistry's scholarship in 1985, for research in morphology changes in yeast.
Proposed the "fungal index" (Japanese Patent Number 2710903), which predicts the occurrence of indoor fungal growth. After establishing the Institute of Environmental Biology, she has been engaged in controlling fungal growth through environmental control.

Prevent Fungal Occurrence in Business Critical Locations

Thoroughly manage the environment of a room by including corners and areas near entrances and exits as inspection locations. The compact Hioki LR8520 can be easily installed in a variety of locations for detailed monitoring of environmental conditions.

Food and Grain Storage

▶ Grain is traded in terms of weight, but its quality is maintained by keeping the grain as dry, and therefore as light, as possible.
On the other hand, increased humidity brings about the risk of fungal contamination.
▶ If fungal contamination is discovered, the entire volume of product must be destroyed.

Using the fungal logger

You can easily check if environmental conditions promote fungal growth in order estimate how high the humidity can be safely raised.

Document Storage

▶ Fungal growth can occur on the surface of boxes that are stored at room temperature in environments where temperature and humidity are not controlled.
▶ Customers might seek verification that fungal growth will not occur.

Using the fungal logger

Confirm that environmental conditions of storage areas at room temperature discourage fungal growth.
Reassure customers by explaining the principles and applications of "fungal index".

Art Galleries and Museums

▶ Although temperature and humidity are controlled to preserve cultural properties, stagnant air in display cases and storage vaults promotes fungal growth.
▶ Because of the large number of people entering and exiting, you may not notice a rise in the temperature and humidity.

Using the fungal logger

Install the LR8520 in display cases and monitor the data remotely using a tablet PC.
Set alarms to warn of changing environmental conditions that run the risk of promoting fungal growth.

Buildings

▶ Since buildings have a high degree of air tightness, fungal growth occurs easily in any season.
▶ In the summer, fungal growth occurs easily in areas subject to cool air from air conditioning units.
▶ Air conditioning is set to excessively control temperature and humidity in an attempt to prevent fungal growth.

Using the fungal logger

Easily identify the range in which fungal growth occurs in order to moderate air conditioner settings and conserve energy.

Useful Features for Managing the Fungal Index

Recorded Items

In addition to the fungal index and growth prediction, the LR8520 also records temperature and humidity so that changes can be identified according to time period and season. The screen can be toggled to display temperature and humidity, and the logger also records the maximum, minimum, and average values for each parameter at the set recording interval.
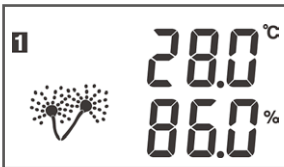
Temperature and humidity display

Fungal index display
(Max. and Min. values)

Alarm

Using the built-in alarm function, if measured signals fall outside defined ranges,"ALARM" can be displayed.
You can also connect the logger to an external buzzer or warning indicator lamp. (The buzzer and warning indicator lamp must be prepared separately.)
Set individual alarm ranges for fungal index, growth prediction, temperature, and humidity, according to your needs.

CONNECTION CABLE
L1010 for Alarm Output

Sensor

Select from 2 types of high-precision ±3% RH humidity sensors: a 50 mm sensor for measuring temperature and humidity in the immediate area, and a 1.5 m sensor useful for taking measurements in locations away from the unit.

50 mm

1.5 m

Calibration

Calibration of measurement accuracy is conducted at Hioki and is required only for temperature and humidity sensors, but not for the Hioki LR8520 logger. Hioki provides both calibration results and a certificate of calibration. Please inquire with your Hioki distributor to request a calibration.
By keeping spare, calibrated temperature/ humidity sensors on hand, you can avoid any interruptions in measurement work when calibration is necessary.

Calibration required　　**Calibration not required**

Power source

The unit supports a variety of power sources such as an AC adapter (sold separately), AA alkaline batteries x 2, or an external power source (such as from 5 V to 13.5 V DC/ USB*).
* A conversion cable is required. Please inquire with us.

AA alkaline batteries

AC Adapter

✔ **Power-saving function for longer battery life**

Set to turn on the Bluetooth® only during a pre-set time period. The shorter the power is on, the longer the battery will last.

Continuous operating time (Battery)	WIRELESS FUNGAL LOGGER LR8520
Recording interval of 1 min, Bluetooth® OFF	**3.5 months**
Recording interval of 1 sec, Bluetooth® OFF	**3 months**
Recording interval of 1 sec, Bluetooth® ON	**20 days**

*When Bluetooth® is constantly on or constantly off.

If recording for a long period of time, we recommend using the AC ADAPTER.

Use with Logger Series

You can use the fungal logger together with other loggers in the wireless mini logger series of products to take a variety of measurements.
For example, you can use it in combination with the Hioki WIRELESS CLAMP LOGGER LR8513 to simultaneously control both air conditioning load current and fungal index as part of your energy saving measures.

WIRELESS PULSE LOGGER LR8512

WIRELESS CLAMP LOGGER LR8513

WIRELESS HUMIDITY LOGGER LR8514


WIRELESS VOLTAGE/ TEMP LOGGER LR8515

Using Wireless Technology for Data Collection

> Difficult and Hazardous Data Collection is Made **Simple and Safe through Wireless Technology!**

Reduce workload

😞 Physically capturing logged data from location to location takes time and effort

Walk from one measurement device to another to record data ... It's not so bad for 1 or 2 locations, but it can be quite a chore to collect data from several locations spread out across a large site.
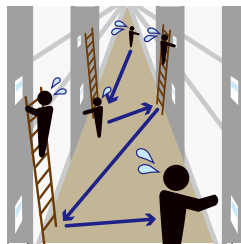
😊 Data is transmitted to your remote unit

Collect data from any measurement device that is within 30 m and direct line of sight*. Since you do not need to be near the measurement devices, time and effort are dramatically reduced.

* Depends on the performance of the supported communication device.
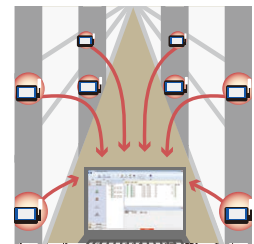
😞 Collecting data from hard-to-reach locations can be challenging

To control temperature and humidity, measurements must be taken at locations near both the floor and ceiling. However, to check measurement values near the ceiling you must use a tall ladder, which invites work hazards.
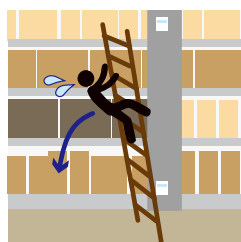
😊 No ladder required

Collect data from heights up to 30 m and within direct line of sight*. There is no need to use a ladder, so you can avoid the risk of falling as well as the tedious effort of climbing up and down.

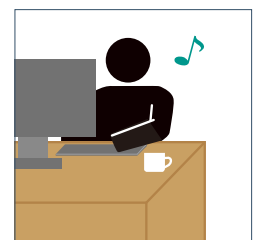* Depends on the performance of the supported communication device.
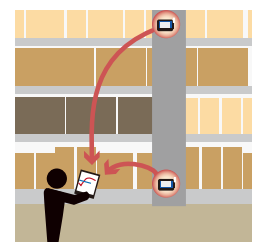
😞 Entering handwritten data into a computer is not efficient

Traditionally, measured values are entered by hand onto data logs. Then, this data must be entered into a computer for data analysis and to create reports ... In addition to the time and effort required, there is also a large possibility of data entry errors.
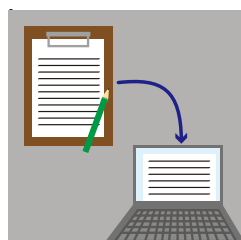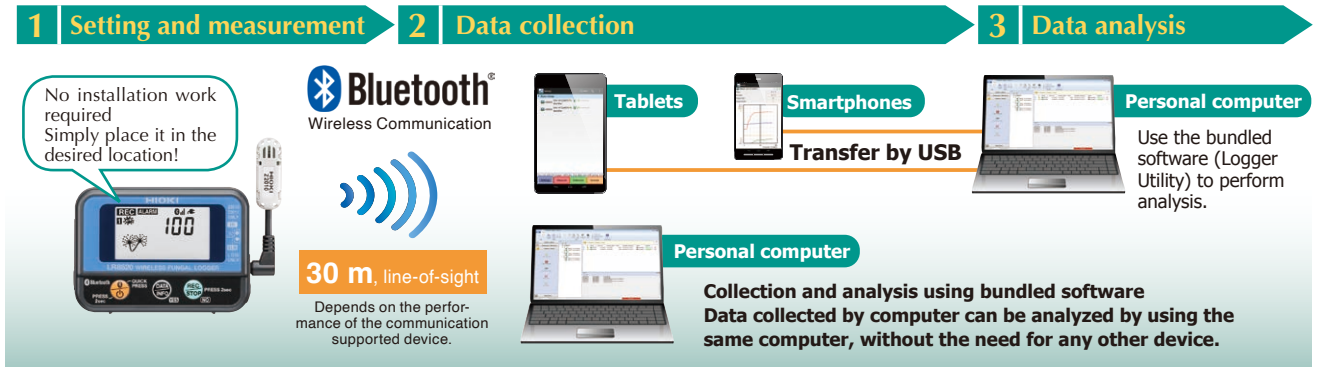
😊 Effortless data collection and analysis

Immediately after the data is collected, it can be analyzed by using the bundled software (Logger Utility). (If an Android device is used to collect data, connect the device to a computer via USB. If a computer is used to collect data, the data can be analyzed by the computer without the need for any other device.)

Select a Collection Device Based on Your Needs

1 Setting and measurement   **2** Data collection   **3** Data analysis

No installation work required
Simply place it in the desired location!

Bluetooth®
Wireless Communication

30 m, line-of-sight
Depends on the performance of the communication supported device.

Tablets

Smartphones
Transfer by USB

Personal computer
Use the bundled software (Logger Utility) to perform analysis.

Personal computer
Collection and analysis using bundled software
Data collected by computer can be analyzed by using the same computer, without the need for any other device.

Simple on-site collection and confirmation of data
Tablet, Smartphone -Android Terminal-

Waveform monitoring

Check recent data trends as a waveform or values even during measurement
This is also convenient for checking the levels before actual recording.

Portable and convenient

The user interface is perfect for the small screens of tablets or smartphones.

Check waveforms on-site

Check the collected data on your tablet or smartphone.

■ Collection software specifications

| Name	Wireless Logger Collector
Communications	Bluetooth® 2.1+EDR or later Profile: SPP
Supported devices	Android tablet / Android smartphone
Android OS	4.0.3 or later
Number of available registrations	Max. 100 units
Recommended display size	7 inches or larger

Get the App
● Scan to download
● Download from Google Play Store
 - Search for "Hioki".
   Select "Wireless Logger Collector".

Detailed data analysis is available on a PC. Transfer data using the USB interface.

Centralized monitoring, bulk data management
Personal computer -Windows PC-
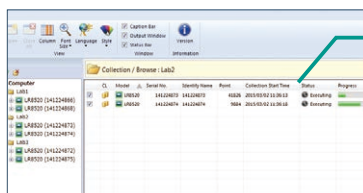
Periodic collection

Automatically collect data at intervals from 10 minutes to 1 day. Avoid the trouble of going around to collect data.

Multi-device management

Centrally manage up to 100 loggers. Since you can group devices in a tree structure, management is very easy.

Status monitoring

Periodically monitor information such as the latest measured values, remaining battery power, and signal strength.

■ Collection software specifications

Name	Wireless Logger Collector
Communications	Bluetooth® 2.1+EDR or later Profile: SPP
Supported devices	Windows PC / Windows tablet
OS	Windows 10/8 (32/64bit)
Number of available registrations	Max. 100 units

Acquisition
● Supplied CD-R
● Download from HIOKI's website

Data is analyzed on the same computer.

✔ Real-time monitoring

WIRELESS LOGGING STATION LR8410-20

Bluetooth®
Wireless Communication

LR8410-20

By using the Hioki LR8410-20 to acquire data, you can view the waveforms in real time. Furthermore, previous waveforms can be viewed while the device is taking measurements.

■ Specifications

Supported devices	WIRELESS LOGGING STATION LR8410-20
Communication range	30 m (line of sight)
Number of available registrations	Max. 7 units

Specifications

*Only the temperature and humidity sensors affect the measurement accuracy and are subject to calibration. The LR8520 logger does not require calibration.

Supported devices	● Android™ smartphone or Android™ tablet (Download app from Google Play) ● Windows PC or Windows tablet (Use bundled software) ● WIRELESS LOGGING STATION LR8410-20 *The settings can only be configured from supported devices.
Control and communications	Bluetooth® 2.1+EDR or later Profile: SPP Communications Range: 30 m, line-of-sight (Depends on the performance of the communication supported device)
Display contents	Temperature, humidity, fungal index (0 to 200), growth prediction (5 levels), date, time, number of recorded data, maximum value, minimum value, and average value
Input	1 temperature channel + 1 humidity channel (HUMIDITY SENSOR Z2010 or HUMIDITY SENSOR Z2011 is required (sold separately))
Measurable range	[Temperature] -40°C to 80°C, Range 100°C f.s., Max. resolution 0.1°C [Humidity] 0% RH to 100% RH, Range 100% RH f.s., Max. resolution 0.1% RH
Temperature measurement accuracy (using Z2010/Z2011)	±0.5° C (10 °C to 60 °C), using Z2010/Z2011 If outside above temperature range: Add 0.015 °C/ °C (-40 °C to 10 °C) or 0.02 °C/ °C (60 °C to 80 °C)
Humidity measurement accuracy (using Z2010/Z2011)	±3% RH (20 °C to 30 °C, 20% to 90% RH) If outside above range, see Figure 1 Hysteresis: ±1% rh (Added to the humidity measurement accuracy) Environmental effects and ageing changes: add the below to the accuracy of the humidity measurement ±12% RH (10% RH ≤ humidity <30% RH) ±6% RH (30% RH ≤ humidity <40% RH) ±3% RH (40% RH ≤ humidity <90% RH)
Output	Outputs alarm signals
Recording intervals	0.5 sec to 30 sec, 1 min to 60 min, 14 selections
Storage capacity	500,000 data items
Recording modes	Instantaneous value
Continuous recording	Set to ON or OFF ON: When the storage limit is reached, the oldest data is deleted and the unit continues to record (endless recording) OFF: Recording stops when the storage limit is reached (one-time recording)
Operating temperature and humidity	-20°C to 60°C, 80%RH or less (non-condensing) (When operating on battery power, these values will vary according to the battery specifications.)
Storage temperature and humidity	-20°C to 60°C, 80%RH or less (non-condensing) (With batteries removed)
Applicable standards — Safety	EN61010
Applicable standards — EMC	EN61326 classA

Wireless logger emit radio waves. Use of radio waves is subject to licensing requirements in certain countries. Using it in a country or region other than those indicated may violate the law and may result in legal penalties for the operator. For the latest information about countries and regions where wireless operation is currently supported, please visit the Hioki website.

Vibration endurance	JIS D 1601:1995 5.3(1), Category 1: Vehicle, Condition: Category A equiv.
Power source — AC adapter	AC ADAPTER Z2003 (sold separately, DC 12 V)
Power source — Battery	AA alkaline batteries (LR6)×2
Power source — External power	DC 5 V to 13.5 V * can also be supplied from USB bus power via a conversion cable
Continuous operating time (Battery)	3.5 months (Recording interval of 1 min, Bluetooth® OFF) 20 days (Recording interval of 1 sec, Bluetooth® ON)
Dimensions and mass	85 mm (3.35 in) W × 61 mm (2.40 in) H × 31 mm (1.22 in) D (Excluding protrusions), 95 g (3.3 oz) (Not including the battery)

■ Functions

Alarm	: ALARM is displayed when values fall outside defined ranges Open drain output (Max. rating: 30 V DC, 200 mA)
Scaling	: Measured values are scaled when displayed
Recording operation hold function	: If the power source is interrupted while recording, recording will start again automatically when the power is restored.
Erroneous operation prevention	: Confirmation messages are displayed when recording is started/ stopped and when turning the power off
Comment recording function	: Titles and comments for each channel can be recorded
Power saving function	: Power can be saved by turning Bluetooth® on and off as necessary
Authentication function	: A password can be set for user authentication
Free Run	: ON/ OFF selection ON: The measurement value is indicated every 1 second while measurement is stopped. (the data is not saved in the memory) The measurement value is saved in the memory every recording interval and indicated every 1 second regardless of recording interval setting while measuring. (when the setting of recording interval is less than 1 second, the measurement value is indicated every recording interval) OFF: The measurement value which is at the time of a measurement stop is indicated while measurement is stopped. The measurement value is saved in the memory and indicated every recording interval while measuring.

■ Humidity measurement accuracy (fig. 1)

The accuracy of values shown in [ ] is not guaranteed.
(These values are provided only for reference.)
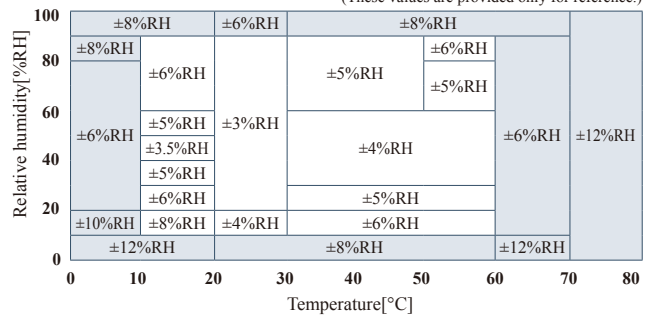
Order Code/ Options

WIRELESS FUNGAL LOGGER LR8520
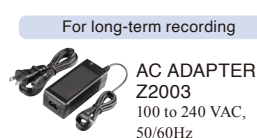**Order Code: LR8520**

Accessories :
CD-R (Instruction Manual, Logger Utility, Wireless Logger Collector) × 1, Measurement Guide × 1, Caution for Using Radio Waves × 1, AA alkaline batteries (LR6) × 2 , CONNECTION CABLE L1010 × 1

Temperature and humidity sensor, and AC Adapter are not included.

CONNECTION CABLE L1010
1.5 m (4.92 ft)
Bundled and also available for additional purchase
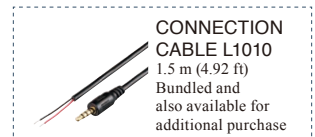
HUMIDITY SENSOR Z2010 or HUMIDITY SENSOR Z2011 is required to measure humidity.

HUMIDITY SENSOR Z2010
50 mm (0.16 ft)

HUMIDITY SENSOR Z2011
1.5 m (4.92 ft)

For long-term recording

AC ADAPTER Z2003
100 to 240 VAC, 50/60Hz

MAGNETIC STRAP Z5004

MAGNETIC STRAP Z5020
Extra strength

Precaution: Although the fungal index is a highly reliable index based on academic research, it does not assure that absolutely no fungus will grow in environments with a low fungal index.

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