

LogStick

Temperature Data-Logger For K type thermocouple

LS450-T(K)

Users Manual

Attention on safety Please guard.

Please read this "Attention on safety" well and use it ahead of the use correctly.

It divides by displaying  warning and  attention and it explains danger and the extent caused when wrong handling is done.

	Warning The one with possibility of relating to important results such as deaths and serious injuries when wrong handling is done
---	--

 Use prohibition	<p>Do not pull out and do not use the battery when abnormality occurs by any chance. It causes a fire and the electric shock when abnormally using it. Please pull out the battery from the main body, and request the repair at once.</p> <p>Smoke has risen, and it doesn't use it when it is abnormal of smelling to strangeness etc. It causes a fire and the electric shock when abnormally using it. It moves to the place that doesn't spread to surroundings, and please pull out the battery from the main body after confirming safety, and request the repair at once.</p> <p>Do not use it when damaging it. It causes a fire and the electric shock.</p>
 Remodeling prohibition	<p>Do not resolve, and remodel it. It causes a fire and the electric shock by the short and generation of heat.</p>
 Prohibition	<p>Do not use it outside the purpose. Do not use it in the usages other than the measurement of the temperature.</p> <p>Do not put the foreign body. When metals and the combustible one, etc. enter the inside, it causes a fire and the electric shock.</p> <p>Do not put it on the place where child's hand reaches. Please do not set it up in the place where child's hand reaches in the measurement place etc. It swallows, and it causes the injury.</p>
 Water wet prohibition	<p>Do not wet it with water. It causes a fire and the electric shock. Please note use in outdoor and near the window in rain, the snow inside, and the coast and the waterside, etc. especially.</p>
 Correct battery	<p>Use a specified battery. When a correct battery is not used, it causes a fire, the electric shock, and the breakdown.</p>

	Attention The one related to damage of injury or house and household goods, etc. when wrong handling is done
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 Installation prohibition	<p>Do not put it on the following places when you set it up. Place where lamp soot and steam are hit directly Place where sunlight strikes directly As for the temperature and humidity outside the specification The transformation of the short, generation of heat, and the case etc. might be caused when putting it on such a place, and it cause a fire, the electric shock, and the breakdown. The range that this machine can use is a temperature: +5-40 and humidity: It becomes 5-90%RH.</p>
 Prohibition	<p>Not putting the heavy one on main body, and up field The balance collapses, and might it fall, and it cause the injury and the breakdown.</p> <p>Put neither finger nor the foreign body in the connector and the space. It causes the injury and the breakdown.</p>
 Wet person prohibition	<p>Do not touch by a wet hand. It might cause the electric shock and the breakdown.</p>
 Attention	<p>Aged deterioration The battery terminal and the USB connector might become the loose connections by the vibration and the aged deterioration.</p> <p>Note static electricity. There is a possibility of causing destruction by static electricity. Please let the touch static electricity go into the metal etc. to prevent it before touching this machine.</p>
 Observing strictly	<p>Pull out the battery when not using it for a long term. It might cause the breakdown because of the liquid leakage of the battery.</p>

As for this product, building in the equipment related to the life, equipment that needs the container machine and high reliability and safety, and the container machine (medical, aerospace relation, transportation relation, and nuclear power relation, etc.) etc. are not considered. Even if the accident resulting in injury or death and the property damage occur by having used this product with these equipment and container machine, our company doesn't assume the responsibility at all.

Thank you indeed for purchasing temperature and humidity data logger 'LS450-T(K)'. It explains the handling method and the directions point of this product in this manual. Please read this manual to use it ahead of the use correctly and safely. Please read when it is necessary after it reads.

Attention

It is prohibited to reprint all of the content of this book partially without permission.

This product might change the specification without a previous notice for the function addition and the quality improvement.

Please acknowledge being not able to assume any responsibility such as the losses and passive damages in which the operation of this product is assumed to be a reason beforehand.

I am afraid that I cannot guarantee to the acquisition data of the disappearance and the failure, etc. of the recorded data of this product.

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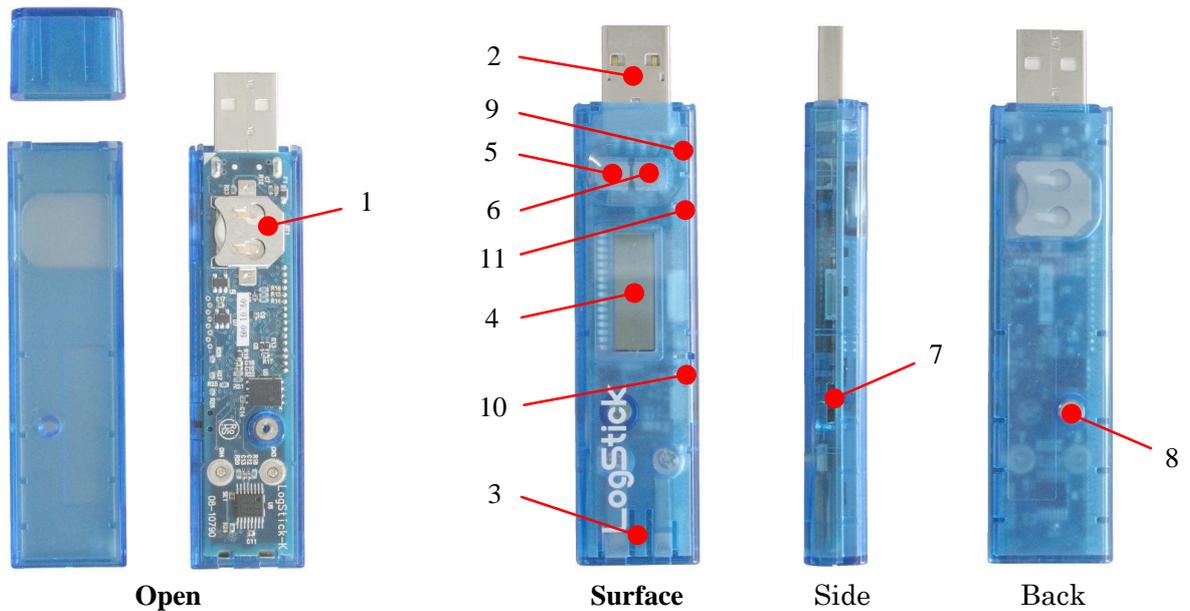
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1 Outline

- Wide-ranging temperature (-200~+999.99°C) can be measured by using the thermocouple.
- The temperature is measured at constant intervals and it is possible to record.
- The use of button battery (CR1220/CR1225) can be enabled by achieving low power consumption, and it record for the small size and a longtime.
- The clock function is built into the main body, and measured value and date are recorded at the same time
- The state can be confirmed by installing small LCD, and ON/OFF of the record be set.
- Moreover, the data recorded with the application software can be easily transmitted by using the USB interface for the connection with the personal computer.

2 Explanation of each part

Main body externals



Part names and functions

- | | |
|------------------------------|---|
| 1. Battery | : Please use CR1220 or CR1225 |
| 2. USB connector | : It connects it with the personal computer. |
| 3. Thermocouple Connector | : It connects it with the thermocouple. (Miniature size connector) |
| 4. LCD | : A state of operation and present temperature,etc. can be confirmed. |
| 5. Mode SW | : This switch is used for the setting and the state confirmation. |
| 6. Setting SW | : This switch is used for the setting. |
| 7. Display Mode SW | : The temperature (Non-record) or recording points (Record) become by moving this switch to the USB connector side and the display becomes possible by LCD. |
| 8. Screw for battery | : M2×6 Countersunk screw |
| 9. Communication LED (Green) | : When communicating with the personal computer, it lights. |
| 10. Log LED (Green) | : When the log is recorded, it lights. |
| 11. BatteryStatusLED (Red) | : When the voltage of the battery decreases, it blinks in three seconds. |

Attention

- If the voltage decrease is detected, a present log record is ended.
- All the settings before it exchanges it are initialized when changing a battery. Therefore, please connect with the personal computer, and set it when you restart the log record.
- When LCD is always lit, the consumption of the battery becomes intense. Please use it by turning off when you use it usually.
- The connection might become defective if it inserts it from the diagonal when the thermocouple is installed. Please install it so that the main body and the connector may become the horizontal.

3 Preparation to use LS450-T(K)

The following preparations are necessary to use LS450-T(K).

- 1) Battery exchange
- 2) Driver installation
- 3) The acquisition of the COM port number
- 4) The installation of the application software

3.1 Battery exchange

3.1.1 Please take off a cover for USB connectors

Please remove a cover for USB connectors



3.1.2 Please take off a screw

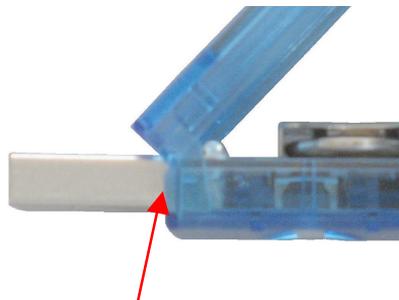
I loosen a screw for battery exchange with a driver, and please take off a screw. Please be careful then not to lose a screw.



Please take off a screw

3.1.3 Please take off a cover

The cover removes it from the back (a battery side). Because there is "a hook" in the USB connector side, I lift it centering on "a hook" to the top, and please remove it.



Please remove it centering on a hook to the top

3.1.4 Please pull an old battery

Please push a battery in the insulation thing such as the wooden/plastic toothpick



Please push you from this side

* Use the insulation thing by all means

3.1.5 Please insert a new battery

Please insert the new battery with + as the top.

* Please be careful to the polarity of the battery enough. It becomes the cause to be damaged when I make a mistake!

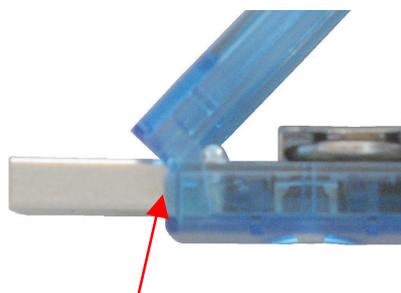


Please insert a battery from this side

* Use a designated battery by all means

3.1.6 Please cover it with a cover

Please fit a cover in "a hook", and please cover it with a cover.



Please lock a cover, and please cover a hook with a cover with a cover

3.1.7 Please close a screw

Please warn the screw not to close too much it.

Attention

- This machine is a precision instrument. Please note the operational error and damage by static electricity. Touch metal before touching this machine, and please perform measures to miss static electricity by all means.
- The battery entering at the time of the purchase is for tests. Please really change it for a new battery by all means before beginning use.
- There is not disappearance of data by exchange of a battery, but recommends a download of data beforehand.

3.2 Driver installation

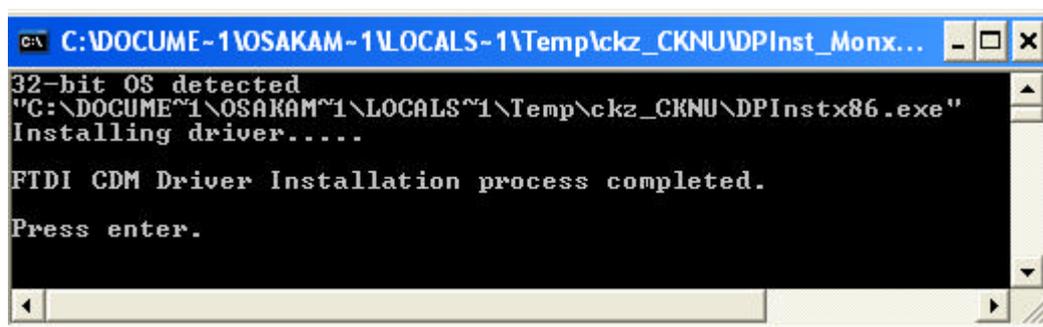
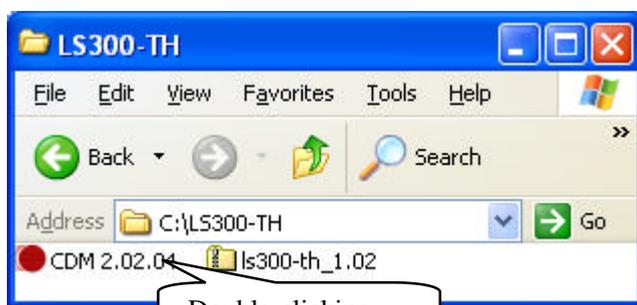
Recommended environment	
· OS	Windows 2000, Windows XP(SP2 or more), Windows VISTA(32bit), Windows 7(32bit),
· CPU	1GHz or more
· Memory specification	512MB or more
· Hard disk capacity	10MB or more free disk space
· Size of display	1024×768 or more

This machinery has a RS232C USB conversion tip built-in, and it is recognized as connection to the COM port for a personal computer.

At first I install a driver for RS232C USB conversion tips.

Please carry out a driver installation program

Please carry out "CDM *.*.*.exe" of driver software. (* is version number)



3.3 The acquisition of the COM port number

Please acquire COM port number

3.3.1 Please connect LogStick to a personal computer

Please connect LogStick to a personal computer.

The property of Device Manager USB(Universal Serial Bus) controllers

USB Serial Converter is opened after it connects it, and the check is put in "Load VCP" of Advanced.

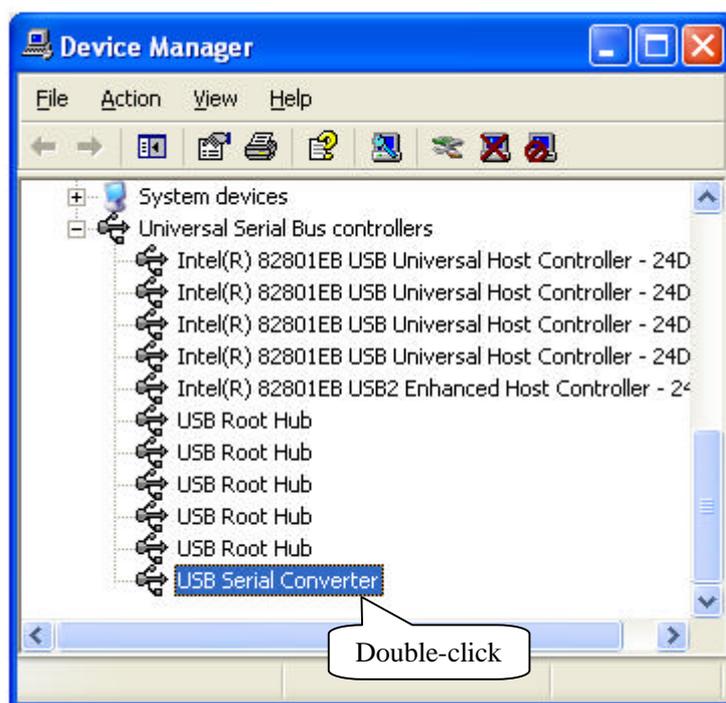
The method of displaying the device manager is as follows.

For WindowsXP

Start button control panel system Hardware device manager

For WindowsVista / Windows7

Start button control panel device manager



3.3.2 Please remove LogStick from a personal computer

Please pull LogStick out of a personal computer once.

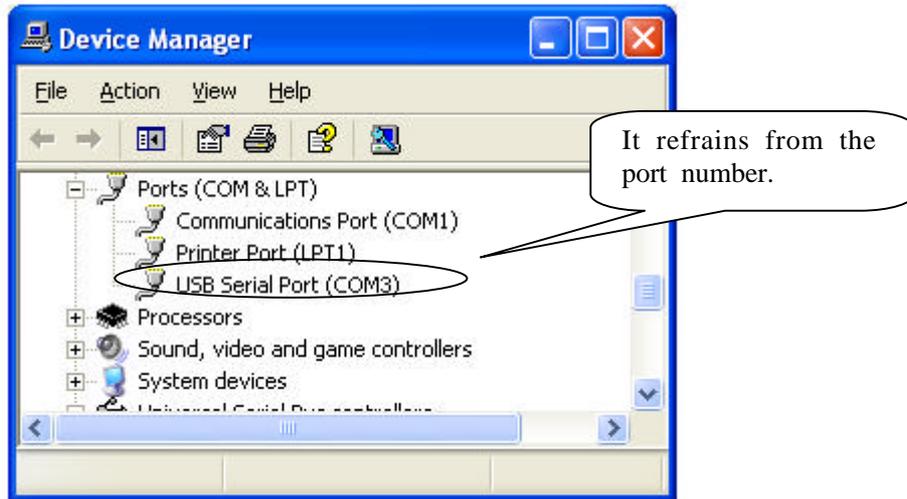


3.3.3 Please connect LogStick to a personal computer

Please connect LogStick to a personal computer again

Please confirm that there is indication of USB Serial Port (COM**) to a Device Manager Ports (COM & LPT).

At this chance please record a port number.



3.4 The installation of the application software

All the operations of LogStick are done with special application software.
Please install the exclusive application software.

Please carry out a setup program

Please carry out "LogStickControl_v***.msi". (* is version number) Please install it according to the instructions of the setup program afterward.

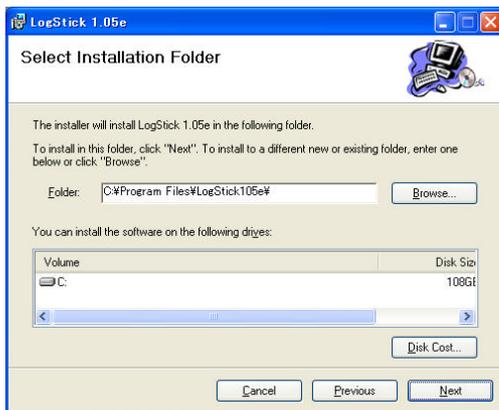
1



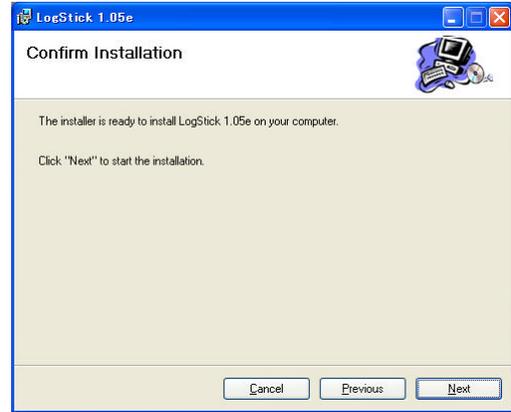
2



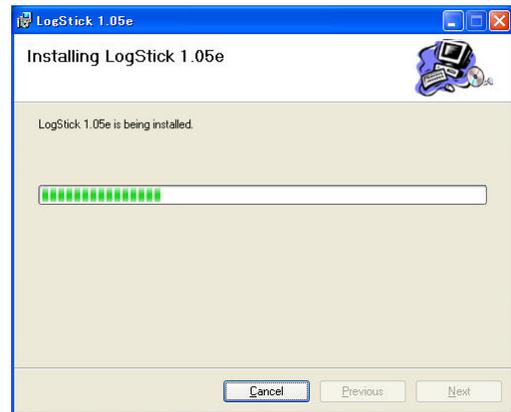
3



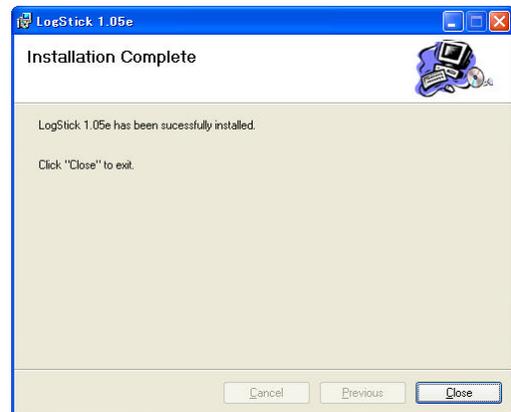
4



5



6



4 An operation method by the application software

Please execute the application software for LogStick installed in clause 3.

In the application software, the display of centigrade/Fahrenheit can be switched as a temperature display. Please select the unit for which it hopes by "Tool" "Setting" of the menu-bar.

4.1 Communication

LogStick is recognized automatically by being connected to the Universal Serial Bus port of the personal computer. A present setting is displayed to the [LogStick operation panel] dialog when recognizing it.



4.2 Various settings

" more settings " of button can set an internal clock, the recognition name, and the record mode by clicking.

4.2.1 Clock setting

The time of the personal computer when clicking is set at the time set to the main body.

Attention

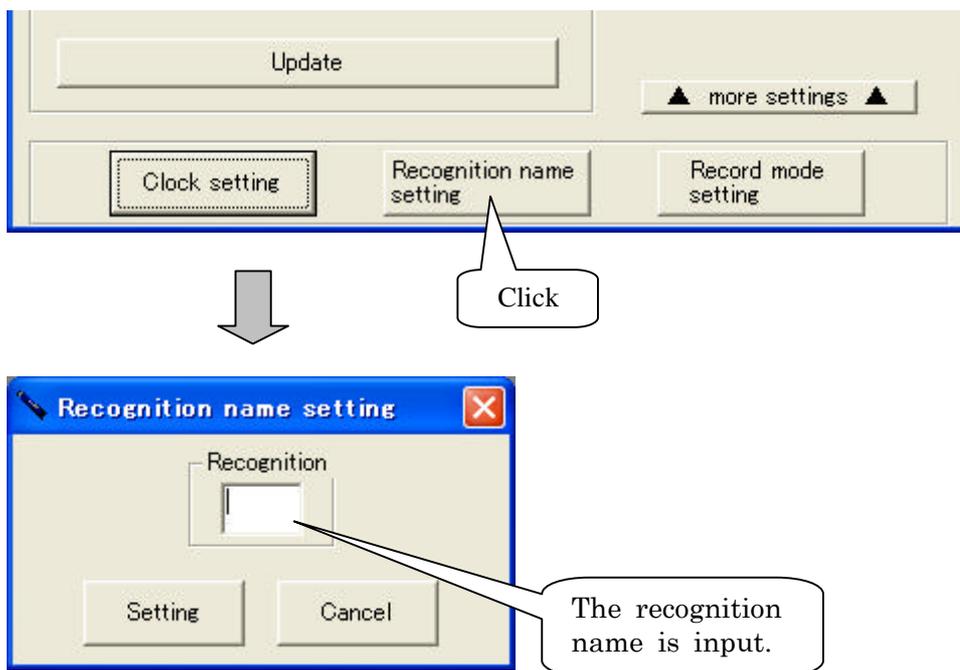
When the log record begins by using the personal computer, this setting need not be done because time is automatically set again even if this setting is not done.



Time is set by clicking.

4.2.2 Recognition name setting

[Recognition name setting] dialog opens by clicking and the recognition name can be set. The recognition name can be registrable up to four characters, and be used for the recognition of the measurement place etc.

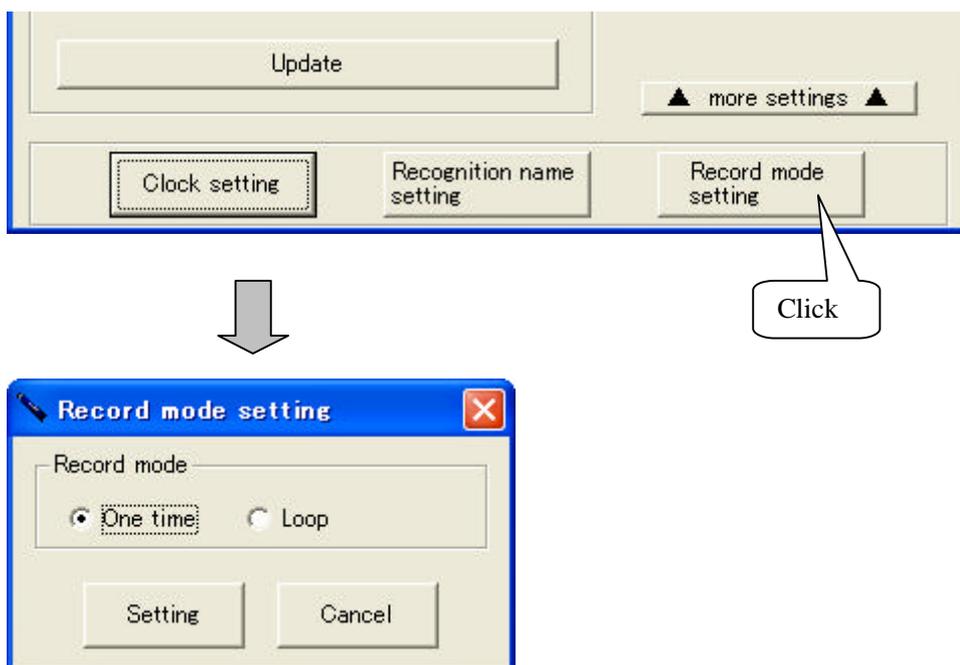


4.2.3 Record mode setting

[Record mode setting] dialog is displayed by clicking and the mode of the record can be set. Record mode setting shows operation when becoming the number of maximum records while recording.

One time: When the number of records becomes 15000, the record is automatically ended.

Loop : It overwrites from the oldest data when the number of records exceeds 15000 and it keeps recording.(Four loops the maximum.)



4.3 Log record

The feature of the log record is as follows.

- The temperature data measured by the set recording interval are recorded in an internal memory.
- The recording interval can be set in 5-59 seconds and in 1-240 minutes.
- The date when the record is started can be reserved one month ahead.
- The record in the memory can be selected in the one time mode or the loop mode.

One time: When the number of records becomes 15000, the record is automatically ended.

Loop : It overwrites from the oldest data when the number of records exceeds 15000 and it keeps recording.(Four loops the maximum.)

4.3.1 Operation panel

A present setting can be confirmed by clicking "Update".



The item that can be confirmed is as follows.

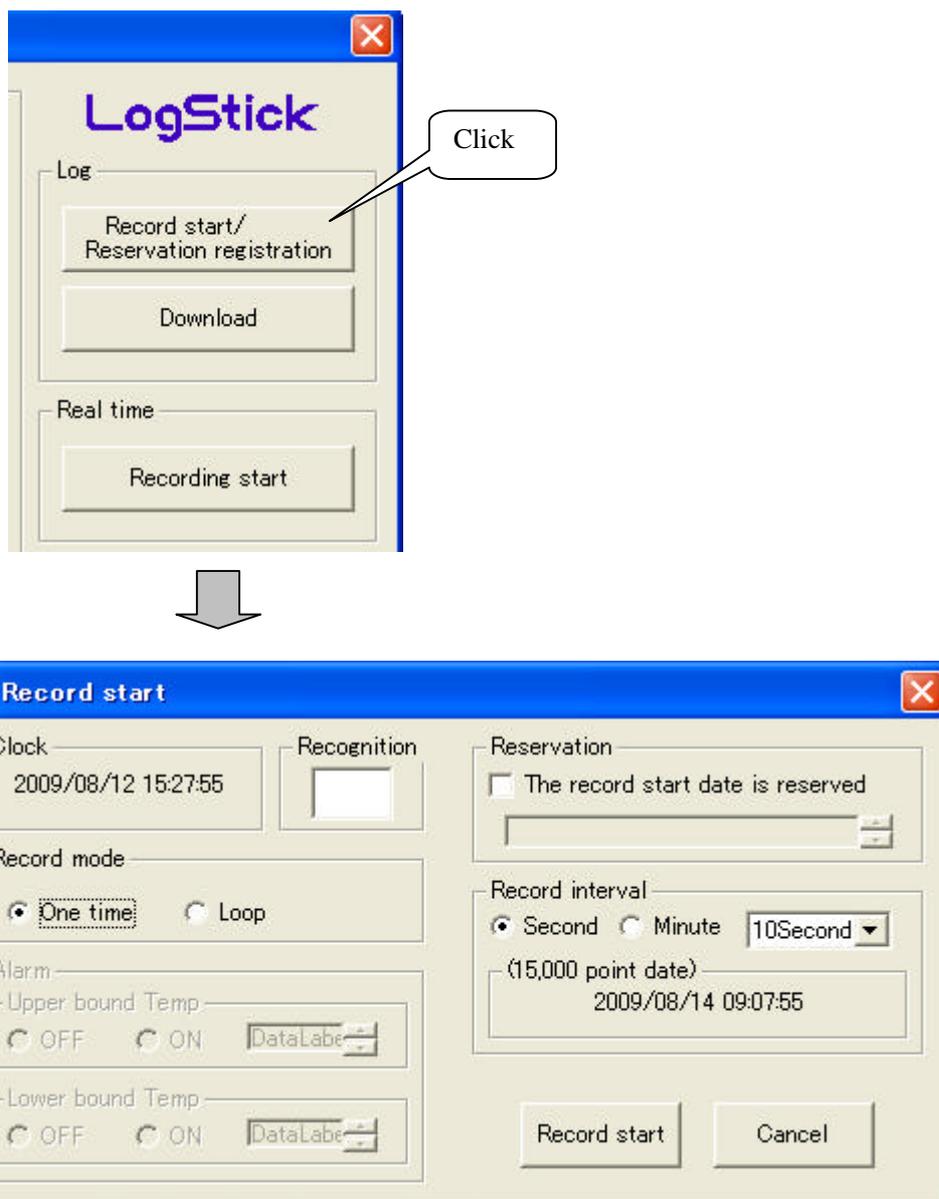
Model name	: Model name of connected equipment
Firmware version	: Software version of LogStick
Voltage of battery	: Installed battery voltage
State of operation	: State of operation of LogStick (record stops, recording, reserving)
Recognition name	: Recognition name to which LogStick is set
Record mode	: Record mode to which LogStick is set (One time, Loop)
Record start date	: Date when LogStick began record
First record date	: Date of the first data that LogStick records
Final record date	: Date when LogStick ended record

Attention

- The indication of the battery voltage is an aim. Please exchange the batteries beforehand before the record of a long-term log.
- It becomes impossible to operate the log record when the voltage of the battery becomes 2.7V or less.

4.3.2 Record start

When "Record start" is clicked, [Record start] dialog is displayed.



The recognition name, the record mode, and the recording interval are set. Please put the check in "The record start date is reserved", and set the date when you reserve the beginning time. Please click "Record start" after all the settings end.

Attention

- When "Record start" is done, the previous data is deleted.
- Please exchange the batteries beforehand before the record of a long-term log.
- The first recorded data becomes after the time set by the recording interval passes for "Record start".
- The first recorded data becomes a reserved record beginning date for "Reservation registration".

Explanation of each item

- Clock
The time of the personal computer now is displayed.
The clock in LogStick sets the displayed time again, and set the time of the personal computer again, please when actually differing.
- Recognition
The character string up to four characters is filled in.
It is possible to use it as management of two or more LogStick and recognition of the measurement place.
- Record mode
One time: When the number of records becomes 15000, the record is automatically ended.
Loop : It overwrites from the oldest data when the number of records exceeds 15000 and it keeps recording.(Four loops the maximum.)
- Recording interval
The recording interval is set.
(15000 point date): Time when 15000 points can be recorded when the record of a present setting begins is displayed.
- Reservation
The date when the record begins is set.

4.3.3 Record end/Reservation cancellation

"The record is stopped and download it" of [LogStick operation panel] dialog ("Reservation cancellation" when the reservation is operating) is clicked.



Attention

- When the record end is done, the temperature data are automatically downloaded.

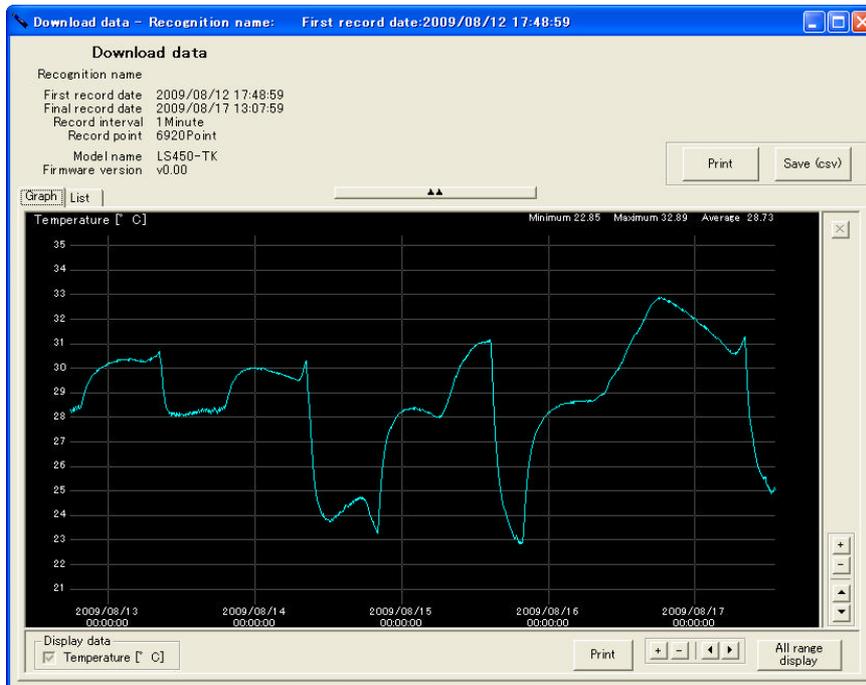
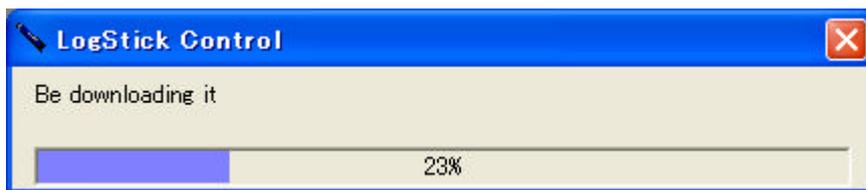
4.3.4 Download

The temperature data recorded by clicking "Download" of [LogStick operation panel] dialog are transmitted to the personal computer.

When download to the personal computer ends, the graph is displayed.

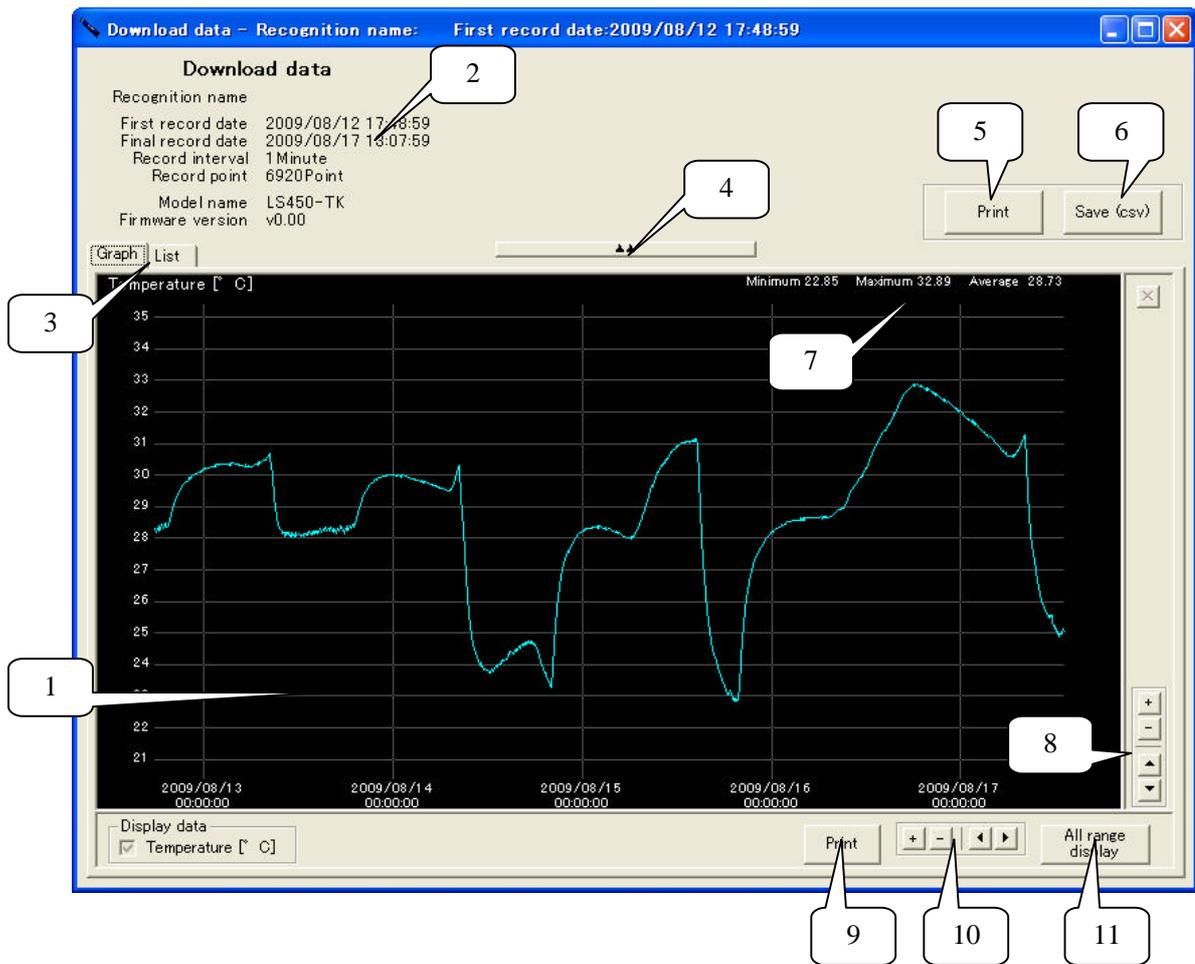
Attention

- Please do not do other operations while downloading it.



4.3.5 Display of download data (Graph)

The following functions exist in the graphical representation of the download data.



1. Display of data (Graph)

The graph of the measuring data is displayed.

The expansion becomes possible by enclosing the part to be displayed with the cursor.

Attention

The range of the selection reddens when a possible range is exceeded when expanding with the cursor and it is not possible to expand.

2. Screen of information

Measurement information in the displayed graph is displayed.

3. Graph/List Switch of display

The display method of the data display screen is switched.(Graph/List)

4. Screen of information is displayed

Display/non-display of the information screen is switched.

As for the comparison of graphs etc. , it becomes easy to compare by non-displaying it.

5. Print
Data is printed.

Attention

The print might not be able to be normalized according to the model of the printer.

6. Save
Recorded data is saved as CSV file.(Refer to 4.5 Save of data for details)
7. Simple information on the displayed data
"Maximum", "Minimum", and "Average" within the range where the graph is displayed are displayed.
Detailed information at the cursor position is displayed by matching the cursor to the graph.
8. Expansion reduction/Movement (Data range)
The expansion reduction and the movement of the displayed graph can be done.
9. Print
Equal to "5. print"
10. Expansion reduction/Movement (Time axis)
The expansion reduction and the movement of the displayed graph can be done.
11. Full screen
The display range in the graph is made full screen.

4.3.6 Display of download data (List)

The download data can be displayed by the list as a numerical value.

Numb.	Date	Temperat..
1	2009/08/12 17:48:59	28.31
2	2009/08/12 17:49:59	28.30
3	2009/08/12 17:50:59	28.22
4	2009/08/12 17:51:59	28.25
5	2009/08/12 17:52:59	28.20
6	2009/08/12 17:53:59	28.24
7	2009/08/12 17:54:59	28.19
8	2009/08/12 17:55:59	28.22
9	2009/08/12 17:56:59	28.25
10	2009/08/12 17:57:59	28.25
11	2009/08/12 17:58:59	28.28
12	2009/08/12 17:59:59	28.30
13	2009/08/12 18:00:59	28.28
14	2009/08/12 18:01:59	28.26
15	2009/08/12 18:02:59	28.21
16	2009/08/12 18:03:59	28.24
17	2009/08/12 18:04:59	28.27
18	2009/08/12 18:05:59	28.25
19	2009/08/12 18:06:59	28.28
20	2009/08/12 18:07:59	28.31
21	2009/08/12 18:08:59	28.30
22	2009/08/12 18:09:59	28.25
23	2009/08/12 18:10:59	28.26
24	2009/08/12 18:11:59	28.28
25	2009/08/12 18:12:59	28.25
26	2009/08/12 18:13:59	28.28
27	2009/08/12 18:14:59	28.25
28	2009/08/12 18:15:59	28.27
29	2009/08/12 18:16:59	28.30
30	2009/08/12 18:17:59	28.32
31	2009/08/12 18:18:59	28.34
32	2009/08/12 18:19:59	28.36
33	2009/08/12 18:20:59	28.38

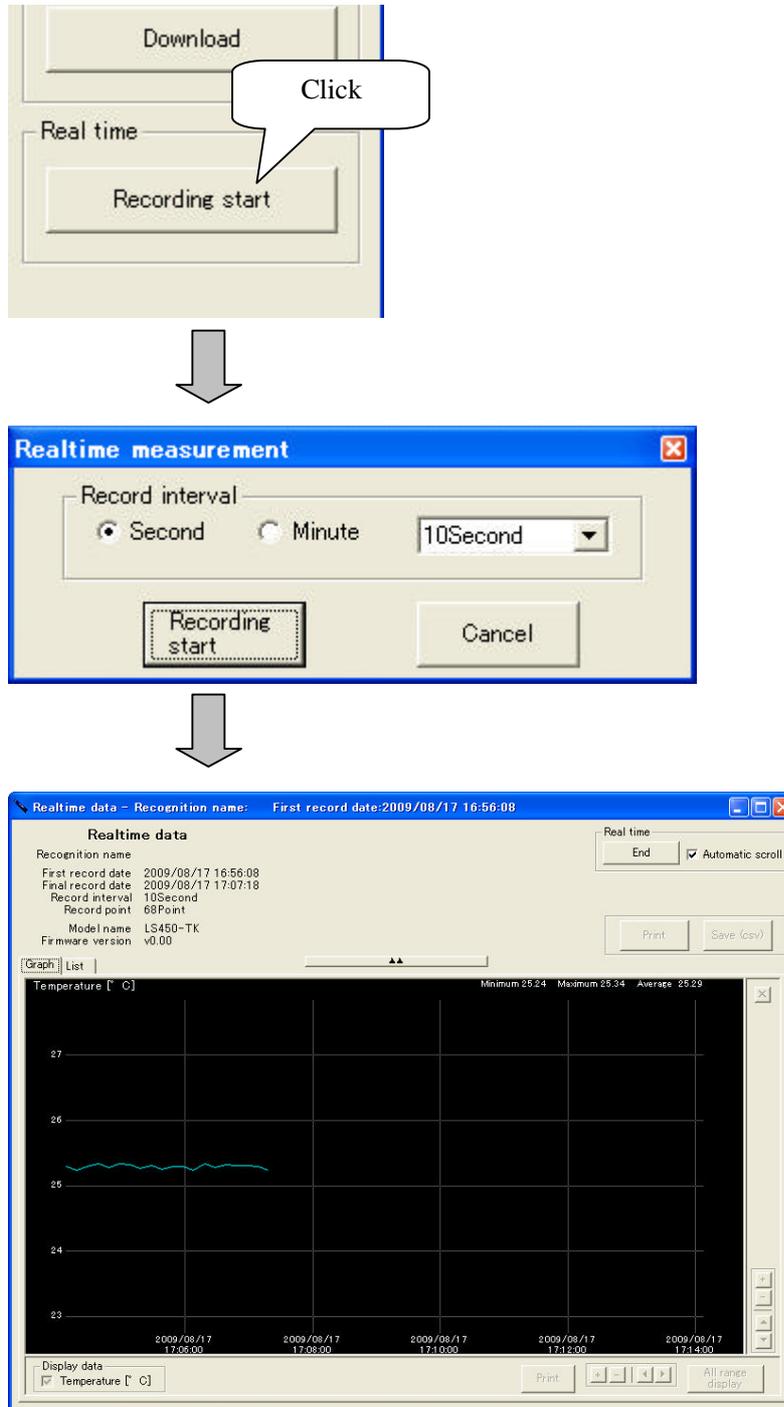
4.4 Real-time measurement

The feature of a real-time measurement is as follows.

- A present temperature are always measured while connected with the personal computer.
- The measured interval can be set in 5-59 seconds and it set it in 1-240 minutes.

4.4.1 Measurement method

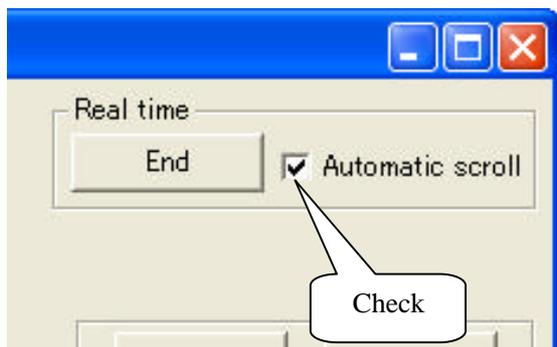
Please connect LogStick with the personal computer, and click real-time "Measurement start". Because [Realtime measurement] dialog is displayed, the measurement is begun by setting the time between measurements and clicking "Measurement start".



4.4.2 Automatic scroll

When the check box of "Automatic scroll" is checked, it scrolls so that the latest data is always displayed.

In that case, because the expansion reduction of the graph etc. cannot be edited while scrolling automatically, it is necessary to turn off "Automatic scroll".



4.5 Save of data

The recorded data can be preserved in the file of Comma Separated Value.

The file save dialog is displayed by clicking "Save" and it becomes possible to save to an arbitrary folder.

The saved file name is as follows in an initial value.

(Example) LOG1_090701_150000.csv

1 2 3

1. Recognition name (Example) LOG1
2. Record start date (Example) July 1, 2009
3. Record start time (Example) 15:00:00

4.5.1 Inspection of save data

The saved file can be inspection by the spreadsheet like the note pad and Excel, etc.

	A	B	C	D	E	F	G
1	Download data						
2	Recognition name						
3	First record date	2009/8/12 17:46					
4	Final record date	2009/8/17 14:58					
5	Record interval	1 Minute					
6	Record point	7033Point					
7	Model name	LS350-TH					
8	Firmware version	v0.05					
9							
10	Number	Date	Temperature [°C]	Humidity [%RH]	Dew point [°C]		
11	1	2009/8/12 17:46	30.04	48.82	18.1		
12	2	2009/8/12 17:47	29.89	48.6	17.89		
13	3	2009/8/12 17:48	29.74	49.34	17.99		
14	4	2009/8/12 17:49	29.63	50.08	18.13		
15	5	2009/8/12 17:50	29.39	47.68	17.13		
16	6	2009/8/12 17:51	29.28	49.21	17.53		
17	7	2009/8/12 17:52	29.2	49.82	17.65		
18	8	2009/8/12 17:53	29.22	49.86	17.68		
19	9	2009/8/12 17:54	29.28	49.7	17.69		
20	10	2009/8/12 17:55	29.33	49.65	17.71		
21	11	2009/8/12 17:56	29.36	49.49	17.69		
22	12	2009/8/12 17:57	29.42	49.39	17.72		
23	13	2009/8/12 17:58	29.43	49.04	17.61		
24	14	2009/8/12 17:59	29.34	47.84	17.14		
25	15	2009/8/12 18:00	29.16	47.65	16.91		
26	16	2009/8/12 18:01	29.1	49.22	17.37		
27	17	2009/8/12 18:02	29.12	49.46	17.46		
28	18	2009/8/12 18:03	29.19	49.62	17.57		

Attention

- Time and data might be omitted according to the spreadsheet used.
In that case, please change, and display the setting of the spreadsheet.

4.6 Reading of save data

The saved data file is read.

The reading method includes the following two methods.

Method 1

"File" > "Opens the data file" is executed from the menubar, and it reads.

Method 2

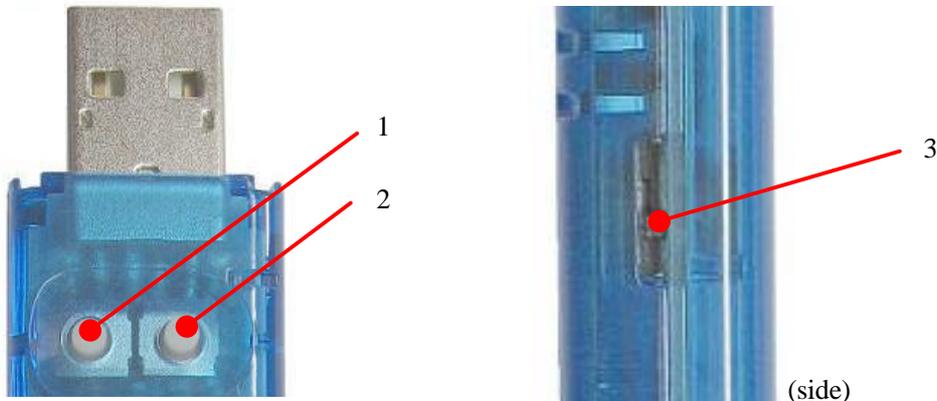
It files and drag and drop is done on LogStickControl.

5 Manner of operation with main body

The confirmation of temperature, and the record beginning setting can be done with the switch of the main body.

5.1 Name of switch

The switch used for the operation is as follows.



- | | | |
|--------------------|---|--|
| 1. Mode SW | : | It uses it for the setting and the state confirmation. |
| 2. Setting SW | : | It uses it for the setting. |
| 3. Display Mode SW | : | The confirmation of the temperature (Non-record) or recording points (Record) becomes possible by LCD by moving to the USB connector side. |

Attention

- When LCD is always lit, the consumption of the battery becomes intense. Please use it by turning off when you use it usually.

5.2 Confirmation of temperature

The confirmation of the temperature becomes possible by pushing the mode switch (Exclude it while connecting the personal computer).

Displayed temperature become as follows by the state of the main body.

- | | | |
|-------------|-------|--|
| · No record | · · · | A present temperature are displayed. |
| · Record | · · · | The temperature recorded at the end are displayed. The mark is displayed in LCD while recording. |



- | | | |
|------------|---|-----------|
| Lights out | : | No record |
| Lighting | : | Record |

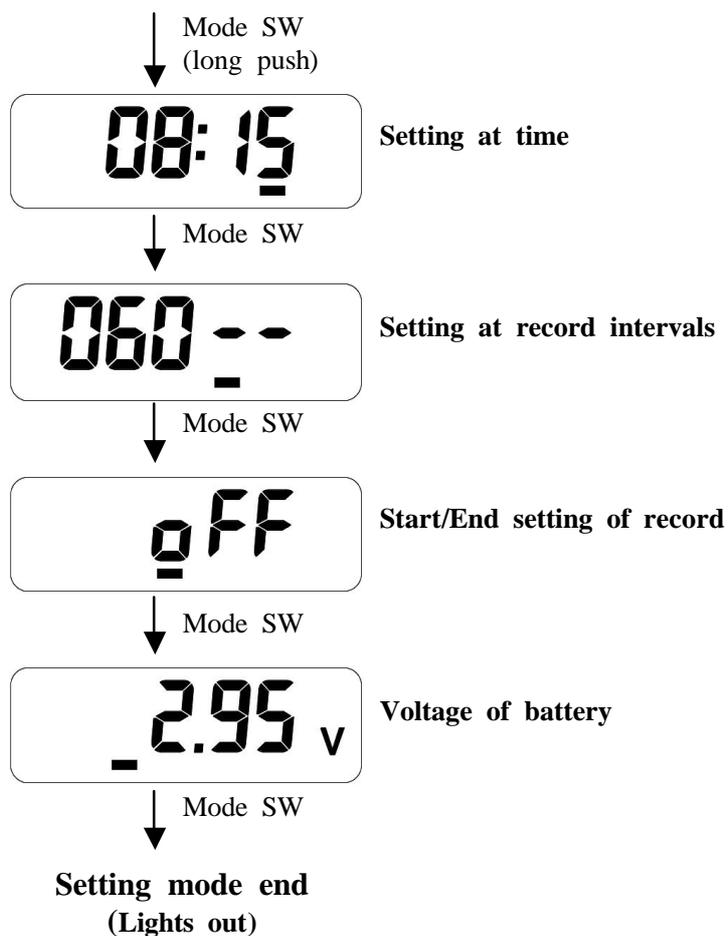
Attention

- The temperature and the numerical value where the temperature displayed in LCD is recorded might be different. This is an error margin because it requests the LCD display by a simple operation, and the recorded temperature reaches an accurate value.
- The displayed temperature is a centigrade alone, and it doesn't correspond to the display by Fahrenheit.

5.3 Setting mode

It becomes a setting mode by doing a long push the mode switch.

It changes in a set mode , saying that "Setting at time" "Setting at record intervals"
"Start/ End setting of record" "Voltage of battery" whenever the mode switch
is pushed.



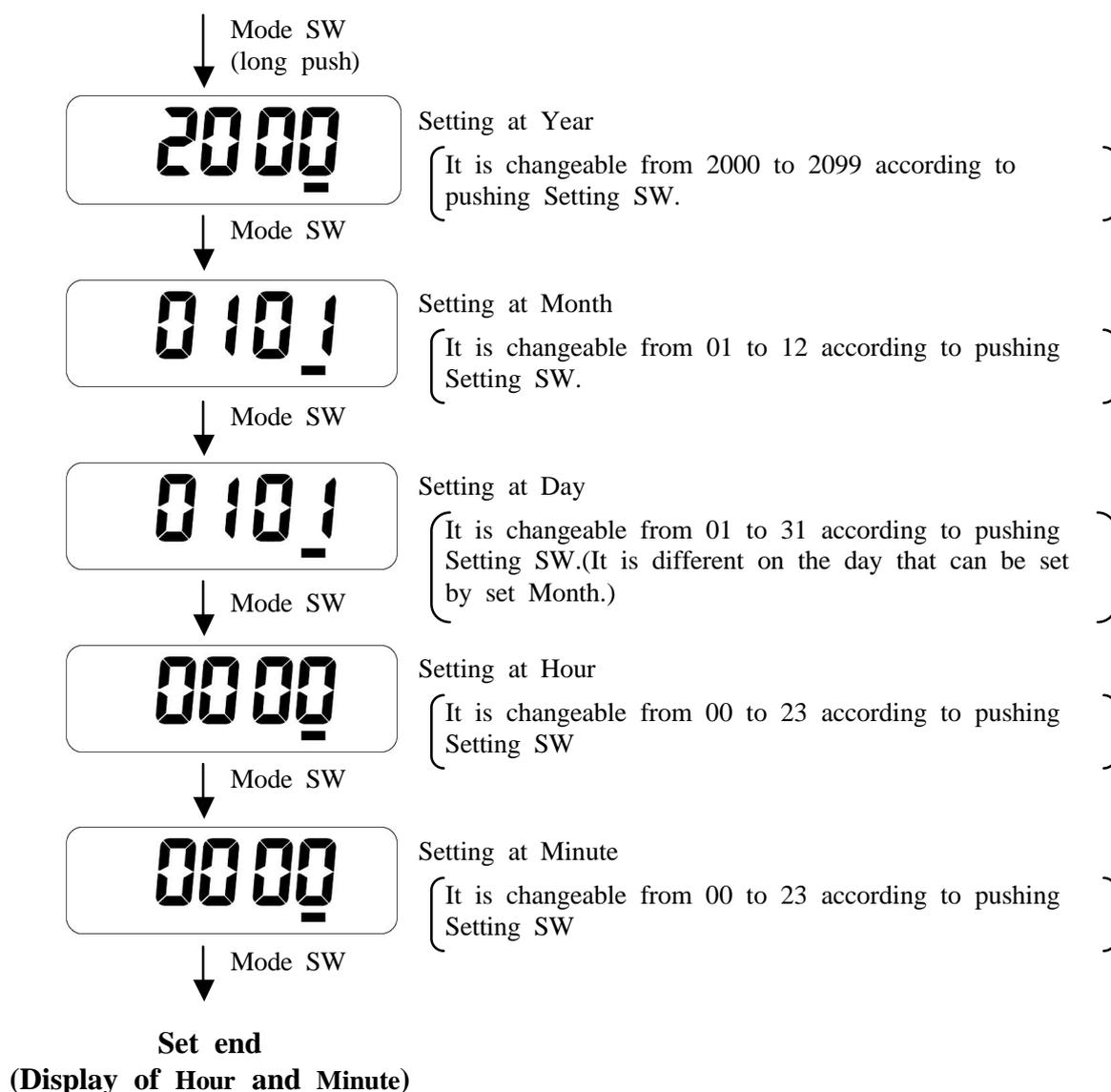
Attention

- It ends automatically when the operation is not in a setting mode for 10 seconds.
- It is not possible to operate it with the switch while connecting it with the personal computer.

5.4 Setting at time

It becomes possible to set present time by doing a long push of the mode switch by the item of the time setting.

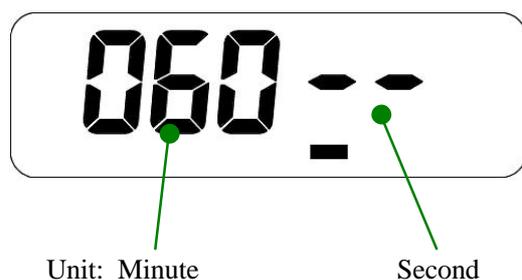
In set operation, a set value changes if the configuration switch is pushed, and the item changes like "Year" "Month" "Day" "Hour" "Minute" if the mode switch is pushed.



5.5 Setting at record intervals

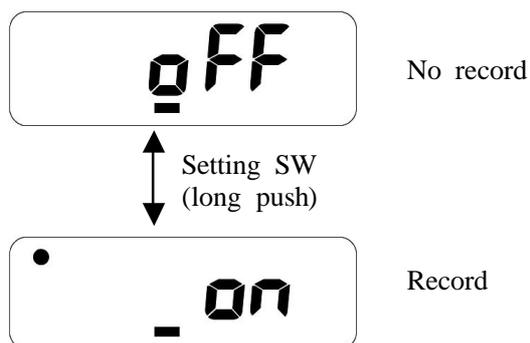
It becomes possible to set the interval of the record by doing a long push Mode SW in the item of the setting at record intervals.

In set operation, a set value changes if Setting SW is pushed, the left side shows, and "Minute" and the right side show "Second".



5.6 Start/ End setting of record

It becomes possible to do Start/ End of the record by doing a long push with the configuration switch in the item of Start/ End setting of record.



Attention

The recorded change is operated by a long push of Setting SW for the prevention of the operational error.

5.7 Voltage of battery

The battery voltage is displayed.



Attention

- The indication of the battery voltage is an aim. Please exchange the batteries beforehand before the record of a long-term log.
- It becomes impossible to operate the log record when the voltage of the battery becomes 2.7V or less.

5.8 Display of LCD always (TEST Mode)

The confirmation of the temperature or recording points becomes possible by LCD by moving display confirmation SW to the USB connector side.

The item displayed by the state is as follows.

There is no record or nor a reservation.



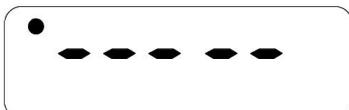
A present temperature are alternately displayed.
(Update for ten seconds)

Record



The mark of the record is displayed, and the recorded point is displayed.

Reservation



The mark of the record is displayed, and all "-" is displayed.

Attention

- When LCD is always lit, the consumption of the battery becomes intense.
Please use it by turning off when you use it usually.

6 Specification

Thermocouple specification	
Input signals	Thermocouples of type K
Interface	Thermocouple Connector Miniature Size
Number of channels	1ch
Range of measurement	-200 ~ +999.99°C (-328 ~ +1831.982°F)
Resolution	0.2°C 16Bit
Accuracy	±0.8°C (25°C) *1 (It do not include an error of a thermocouple)
Storage capacity	
Storage capacity	MAX 15000 points
Measurement interval	5 ~ 59 seconds or 1 ~ 240 minutes
Operating temperature	+5 ~ +40°C
Interface	USB
Clock function	Build in
Battery	CR1220 or CR1225 (It is possible to exchange it.)
Battery longevity (When CR1220 is used) *2	1 Year (1 hour interval , LCD OFF)
	45Days (1 minute interval , LCD OFF)
	7Days (10 seconds interval , LCD OFF)
	7Days (Not measurement , LCD ON)
LCD Spec	Reflective TN
Size	
95.0 (w) × 10.4 (H) × 21.0 (D) (mm)	
Weight	
21g (Without battery and thermocouple)	
OS	
Windows 2000, Windows XP(SP2 or more) , Windows VISTA(32bit) , Windows 7(32bit) The personal computer control software free is distributed.	
Accessory	
CR1220 Button battery for test (Install it in the main body.) K type thermocouple Keeping bag for main body Guarantee certificate	

*1 The measurement precision of the thermocouple is controlled in not only the error of the thermocouple but also the operating temperature of the main body.

*2 The indication of the battery voltage is an aim. The performance of the lithium battery decreases remarkably because of the high temperature and making to the low temperature. Therefore, the battery life might change greatly in the battery actually used performance and environment.
The battery life exceeds storage capacity by the recording interval. Therefore, please use it at intervals when it was considered to end.

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