Instruction Manual

Waterproof Digital Thermometers

Model SK-250WPⅡ-T
Model SK-250WPⅡ-R

SATO KEIRYOKI MFG. CO., LTD.

Thank you for purchasing the SK-250WP Ⅱ series Waterproof Digital Thermometer.

- This product is designed to measure temperature. Do not use it for other purposes.
- Read this manual carefully before using the thermometer. Keep the manual in a safe place for future reference whenever necessary.

1. Notes on Use

Be sure to observe the following precautions in order to use this unit correctly.

- Do not use this unit as a clinical thermometer.
- Do not drop this unit or apply impact to it. This unit is a precision instrument.
- Never disassemble or modify this unit. Doing so may result in failure.
- Do not use this unit in water.
- Do not use this unit in a place exposed to direct sunlight or near heating equipment. Doing so may result in deformation of the casing or failure.
- Do not use this unit in an environment where electrical noise is generated. Doing so may result in unstable display or larger errors.
- Do not forcibly pull, bend, or bundle the sensor cord. Placing a heavy object on the sensor cord, heating or scratching the cord may also damage it.
- If this unit is not to be used for a long time, always remove the batteries from the unit. Otherwise, the batteries may leak fluid, resulting in failure.
- Do not wash or wipe this unit with alcohol, thinner, or other solvents. Also, do not wash it in water. If the unit becomes dirty, wipe it with a tightly wrung cloth that has been dipped in warm water with neutral detergent.
- Be sure to use this unit within the specified measurement range. Using the unit outside the specified measurement range will result in failure or damage.
- The pointed type probe has a sharp pointed edge so that it can penetrate into the measuring object; as this edge could cause accidental injuries, handle the probe with due care.

** For repair or calibration, contact the dealer from which the unit was purchased, or our service network.

2. Overview

The SK-250WP Ⅱ series are waterproof digital thermometers to which a dedicated thermistor sensor probe can be connected. SWP Ⅱ series probes can be interchageablely connected with main unit.

3. Features

- Both the main unit and the probes have a waterproof structure that conforms to “Protection level 6 in JIS C 0920” that is equivalent to IP X6　They will not be affected in function at the touch of wet hands or with splashes of water.
- Measured value can be held. (HOLD)
- Maximum (MAX) and minimum (MIN) temperature can be measured.
- The power is automatically turned off if the continuous measurement was not done for 60 minutes.
- The clock and timer allow time-based temperature management.
- Upper/Lower Temperature Alarm helps to monitor temperature. If the temperature exceeds the preset threshold, the message "Alarm" appears and a buzzer sounds.
- Measurement results can be recorded on the unit for later reference. No pen and paper recording on site is necessary. (SK-250WPⅡ-R)
- Temperature can be measured between -40 and 250°C (the measuring range is different depending on the probe connected)

.

Warning

The SK-250WPⅡseries thermometers are not explosion-proof. Never use them in an atmosphere containing flammable gases.

Beware of explosion!
There is a risk of explosion. Take extreme care.

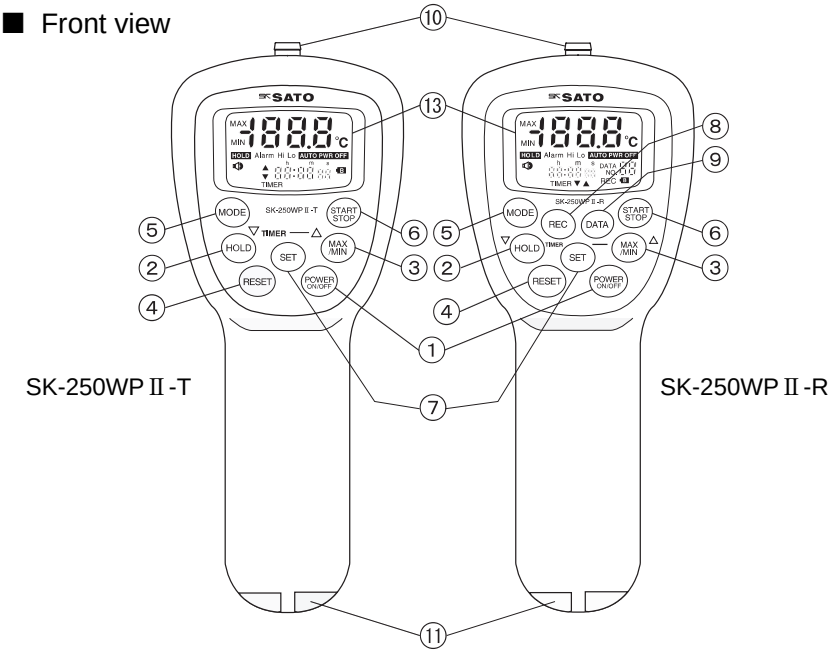
Caution

- Waterproofness of this instrument conforms to “Protection level 6 in JIS C 0920 Protection level 6 (equivalent to IP X6) is called water resistant type. It means a construction of an instrument which protects against splashes from any direction.
- This instrument cannot be used in water.
- The screws to fix the instrument are fastened at the designated torque to guarantee waterproofness. Do not loosen or tighten the screws. Otherwise, waterproofness corresponding to IP X6 will not be guaranteed.

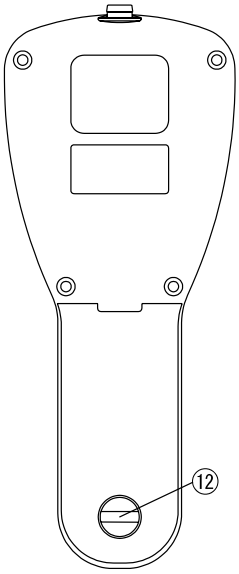
4. Names of Section

4-1 Main housing

■ Front view



■ Rear view



(1) POWER ON/OFF key
- Press this key to turn the main unit on. Press the key again to turn it off.

(2) HOLD key (▼)
- Press the HOLD key to hold (freeze) temperature readings. Press the HOLD key again to return to real-time measurement.

(3) MAX/MIN key (▲)
- It display the maximum value or minimum value after the power is on or alter displayed valued is cleared by RESET key.

(4) RESET key
- Press the RESET key to clear the maximum and minimum temperature values stored.

(5) MODE key
- Press this key to enter the setting mode.

(6) START/STOP key
- Used to enter the timer mode. In the timer mode, it is used to start or stop counting.

(7) SET key
- Press the SET key to confirm the setting in the setting mode.

(8) REC key (SK-250WP Ⅱ-R)
- Used to record measured data on the unit.
- Pressing and holding this key records measured data at two-second intervals.

(9) DATA key (SK-250WPⅡ-R)

- Press the DATA key to recall data recorded on the unit to the display.

Key Operations in Setting and Timer modes

Key	Operation
HOLD (▼)	Decreases the value.
MAX/MIN (▲)	Increases the value.
RESET	Resets the set value to the default value.
MODE (only in setting mode)	Moves to the next setting item. Returns to the measurement mode when pressed for two seconds or more.
SET (only in setting mode)	Confirms the set value.

(10) Sensor connector

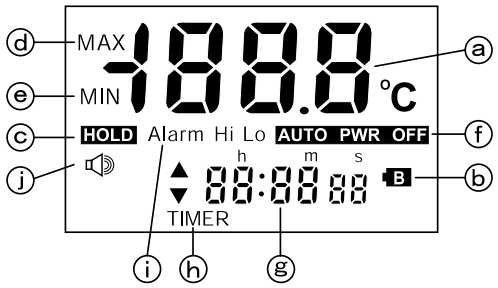
- Connect the connector of SWPⅡ series probes.

(11) Hook for hand strap

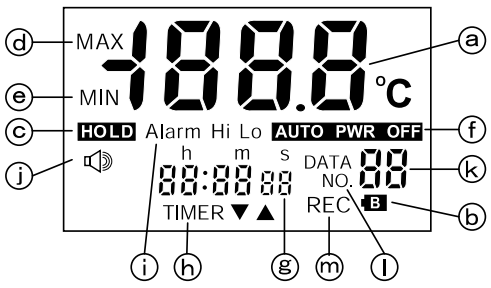
(12) Fixing screw for battery component cover.

(13) Display section

SK-250WPⅡ-T



SK-250WPⅡ-R



(a) 7-segment LCD: Displays the measured value or error message

(b) Low battery mark B blinks when battery power is insufficient. Replace the batteries with new ones

(c) HOLD: Shows while measured value is being held

(d) MAX: Shows while the maximum measured value is being displayed

(e) MIN: Shows while the minimum measured value is being displayed

(f) AUTO PWR OFF: Shows when the auto-power function is being set.

(g) Time display: Displays the time or counting of the timer.

(h) TIMER h m s ▲▼ key: Remains lit while the timer is counting.

(i) Alarm Hi Lo: Remains lit when the upper/lower temperature alarm function is set.

(j) Alarm: Lights up if the temperature exceeds the upper or lower temperature threshold.

(k) Data item number display
Displays the measurement result number to be recorded on the unit.

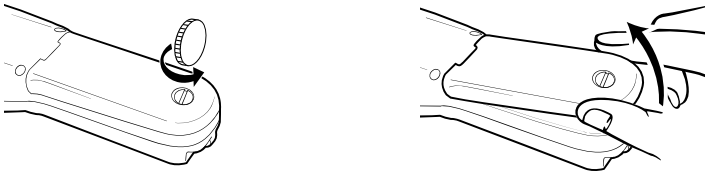
(l) DATA No: Lights up when the measurement result number to be recorded on the unit is displayed.

(m) REC: Lights up while data is being recorded.

5. How to Use

5-1. Loading Batteries

(1) Rotate the screw on the battery lid on the back of the main unit counterclockwise using a blade screwdriver or a coin until it comes free and then remove the lid.



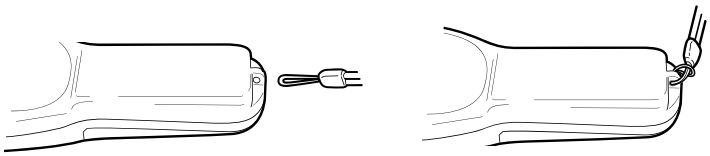
(2) Load two AAA batteries so that each positive or negative terminal faces the correct direction as shown in the battery compartment.
Note: Replace all two batteries with new batteries of the same type.

(3) Reinstall the battery lid and secure with the screw in the reverse order of the removal procedure.
NB. Secure the battery lid putting the packing in the groove. Otherwise, waterproofness will not be guaranteed.

5-2. Installing the hand strap

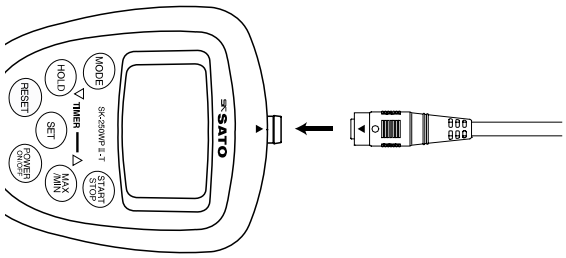
Install the attached hand strap as shown in the following figures.

(1) Run the string through the hook
(2) Pass the strap through the ring string.



5-3. Connecting the Sensor Probe

Put grooves of the plug of the probe and the connector socket together and insert the plug into the socket until a “click” is heard



Note: Never forcefully rotate or pull the connector to avoid the causes of trouble.
- To remove the probe, pull it straight toward you in the reverse direction of installation.
- Never pull the sensor cord.

5-4. Installing a vinyl cover over the unit

The SK-250WPⅡ-R/ SK-250WPⅡ-R comes with a vinyl cover to keep it clean and protect the unit from damage if dropped.

(1) Open the mouth of the cover and place the unit inside.
(2) Connect the sensor connector.

6. How to measure temperature

(1) Connect the probe to the main unit

NB. If the probe is disconnected when power is turned on, error message “Er” will be displayed. By connecting the probe, display changes to measurement mode.

(2) Press the POWER ON/OFF key to turn the power on. The current temperature will display and it will be in measurement mode. The time will display in bottom section.

* To measure temperature precisely

Insert the sensor stem into the object to be measured whether it is air, liquid or solid, to the depth of about 15 times as deep as the diameter of stem (ex. deeper than 45 mm in the 3mm dia. probe) by reason that the sensor will be less affected by the open air around the sensor stem.

(3) Press the POWER ON/OFF key again and the display will disappear and power will be off.

7. Warnings for low battery

When the batteries are exhausted, B mark will blink. Place the batteries with new ones. Otherwise, measured value may display incorrectly.

Cautions!

When measuring high temperature, be careful not to get hurt.

8. HOLD Function

Note: The function cannot be used while the MAX/MIN or timer function is being used.

When the temperature changes too frequently during measurement, press the HOLD key to hold (freeze) the measured value for easier reading. While the measure value is being hold, HOLD will show in display section. Press the HOLD key again to return to real-time display.

9. MAX/MIN Function

Note: This function cannot be used while the MAX/MIN or hold function is being used.

The maximum and minimum measured values are kept in the change of measured values. Press the MAX/MIN key once to display the highest temperature value and press the MAX/MIN key again to display lowest temperature value. Press the MAX/MIN key to switch back to the real-time display. The display will be switched cyclically. While the maximum or minimum measured values is displayed, MAX or MIN will show in display section. The maximum and minimum values are cleared by pressing the RESET key or turning the power off.

If the multiple highest/lowest temperature are collected, the oldest time at which the highest/lowest value was measured will be displayed.

10. RESET Function

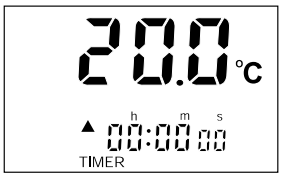
Press the RESET key to clear the maximum and minimum values stored. While these values are being cleared, **°C** will be blinking in display section. Then measured values are newly kept.

11. Timer

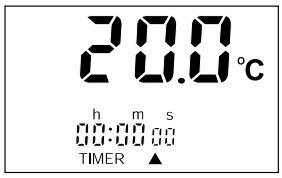
Note: The timer function cannot be used while the hold, MAX/MIN or record function is being used. No other functions except the upper/lower temperature alarm function can be used while the timer is being used.

(1) Press the START/STOP key while in the measurement mode. The display of "TIMER" lights up to indicate that the timer function is turned on (default timer state).

SK-250WP Ⅱ-T



SK-250WP Ⅱ-R



While in this default state, the unit returns to the measurement mode if the RESET key is pressed or no key is pressed for one minute.

11-1. Count Up (▲)

(1) Press the START/STOP key while the timer is in the default state. The unit starts counting up.
* The displays of [▲] and [:] blink while counting up is in progress.

(2) The counting stops/resumes every time the START/STOP key is pressed. The unit resets the timer to the default state if the RESET key is pressed during counting.

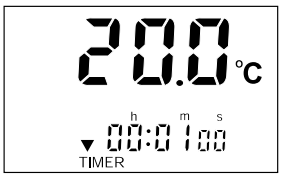
* The display of [▲] is lit and [:] blinks while counting is suspended.
* To count down, return to the timer default state first.
* The unit counts up to "99 : 59 59" and then resets the count to "00 : 00 00" to suspend counting.

11-2. Count Down (▼)

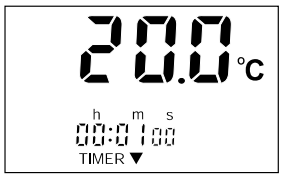
(1) To set the count down, press either the MAX/MIN key (▲) or HOLD key (▼) while the timer is in the default state. Pressing and holding the key increases (decreases) the time value quickly.

* Once the minute value is set, the hour value increases (decreases) with the minute. The second value cannot be set by the user. This unit is designed to count down from "00" seconds.

SK-250WP Ⅱ-T



SK-250WP Ⅱ-R



(2) Press the START/STOP key to start counting down. The counting stops/resumes every time the START/STOP key is pressed. The unit resets the timer to the default state if the RESET key is pressed during counting.

* The displays of [:] and [▼] blink while counting down is in progress. The display of [:] blinks and [▼] is lit while the counting is suspended.
* To edit the timer setting, return to the timer default state first.

(3) When the counting down ends, the clock display starts blinking and the buzzer starts sounding (30 seconds). To stop the blinking and sounding, press any key. The unit returns to the setting mode for count down when the buzzer sounding ends or is stopped.

* If the upper/lower temperature alarm is triggered, the timer's tweeting sound stops and switches to the alarm sound (the blinking clock display remains).

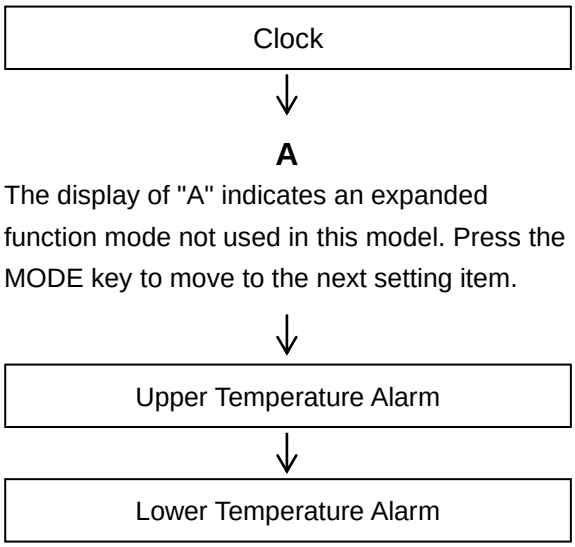
12. Setting Mode

Set each function while in the applicable setting mode by referring to the steps described in each function section below.

Note: While in a setting mode, the MAX/MIN function and the upper/lower temperature alarm function are disabled.

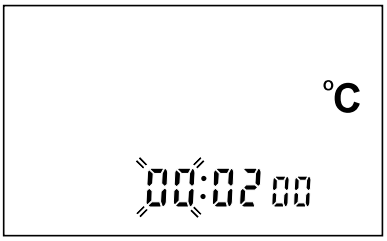
(1) Press the MODE key while in the measurement mode. The unit enters the setting mode.
To move to the next setting item, press the MODE key.
(2) The unit returns to the measurement mode if the MODE key is pressed for two seconds or no key is pressed for one minute.

Sequence of Settings



13. Clock

(1) Press the MODE key while in the measurement mode. The hour digits start blinking to indicate that the unit has entered the clock setting mode.



(2) Press either the MAX/MIN key (▲) or HOLD key (▼) to set the hour digits.
To cancel the hour setting, press the RESET key. To move to the next setting item without setting the hour digits, press the MODE key.

(3) Press the SET key to confirm the hour setting. The minute digits start blinking to indicate that the unit has entered the minute setting mode.

(4) Press either the MAX/MIN key (▲) or HOLD key (▼) to set the minute digits.
To cancel the minute setting, press the RESET key. To move to the next setting item without setting the minute digits, press the MODE key.

(5) Press the SET key to confirm the minute setting. The second digits start blinking to indicate that the unit has entered the second setting mode.

(6) Press either the MAX/MIN key (▲) or HOLD key (▼) to set the minute digits to 00 seconds.

(7) Press the SET key to confirm the second setting. The hour digits start blinking to indicate that the unit has entered the hour setting mode.
If the clock setting needs to be edited, repeat steps (2) to (7). If not, move to step (8) below.

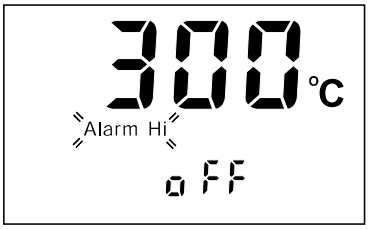
(8) Press the MODE key three times to return to the measurement mode.

14. Upper/Lower Temperature Alarm

If the temperature exceeds the preset upper/lower threshold, the buzzer (beep) sounds and "Alarm" blinks.
* The alarm function can be activated while the unit is in any state except setting mode.

14-1. Upper Temperature Alarm

(1) Press the MODE key twice while in the measurement mode. The display of "Alarm Hi" starts blinking.



(2) Press the START/STOP key to turn the function on ("on") or to cancel ("oFF"). Setting is not possible while "oFF" is displayed.

(3) Press either the MAX/MIN key (▲) or HOLD key (▼) to set the upper threshold. Pressing and holding the key increases (decreases) the temperature value quickly. To cancel the temperature setting and return to the default setting, press the RESET key.

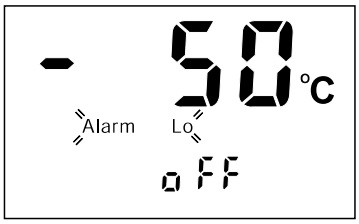
(4) Press the SET key to confirm the temperature setting. The display of "Alarm Hi" stops blinking and lights up to indicate that the setting is confirmed. To edit the setting, press one of the following keys: START/STOP, MAX/MIN, HOLD, and RESET.

(5) Press the MODE key twice to return to the measurement mode.
The setting is not complete until the SET key is pressed for confirmation (see (4) above).

* When the upper temperature alarm function has been set, the display of "Alarm Hi" lights up in the measurement mode.

14-2. Lower Temperature Alarm

(1) Press the MODE key three times while in the measurement mode. The display of "Alarm Lo" starts blinking.



(2) Press the START/STOP key to turn the function on ("on") or to cancel ("oFF"). Setting is not possible while "oFF" is displayed.

(3) Press either the MAX/MIN key (▲) or HOLD key (▼) to set the lower threshold. Pressing and holding the key increases (decreases) the temperature value quickly. To cancel the temperature setting and return to the default setting, press the RESET key.

(4) Press the SET key to confirm the temperature setting. The display of "Alarm Lo" stops blinking and lights up to indicate that the setting is confirmed.
To edit the setting, press one of the following keys: START/STOP, MAX/MIN, HOLD, and RESET.

(5) Press the MODE key once to return to the measurement mode.
The setting is not complete until the SET key is pressed for confirmation (see (4) above).
* When the Lower Temperature Alarm function has been set, the display of "Alarm Lo" lights up in the measurement mode.

14-3. Alarm Setting Conditions

The conditions and examples of the setting alarm function are as follows.

Alarm Setting Conditions

- The upper temperature alarm setting takes priority over the lower temperature alarm setting.
- If either of the upper or lower thresholds is set to exceed the other, the other threshold returns to the default state.
- When either of the upper or lower alarms is set to "oFF", the other can be set to "on" or "oFF".

Alarm Activation Conditions

- The alarm is activated if the value of the temperature measured is equal to or greater than the preset threshold value.

Setting Options

(1) When the upper alarm is "on":
The value for the lower alarm must be set smaller than the value for the upper alarm.

(2) When the upper alarm is "oFF":
The value for the lower alarm can be set to any value within the measuring range.

(3) If the value for the upper alarm becomes smaller than that for the lower alarm when the upper alarm is changed from "oFF" to "on":
The value for the lower alarm returns to the default value.

Example: The lower alarm is set to "on" with 200°C, and the upper alarm is set to "oFF" with

100.0°C. If the upper alarm is changed to "on" with 100°C, the lower alarm becomes "oFF" with -50°C (the default).

(4) If the value for the upper alarm becomes smaller than that for the lower alarm when the lower alarm is changed from "oFF" to "on":
The value for the lower alarm returns to the default value (-50°C)

(5) When the upper alarm is set to "on" with 50°C (lowest value in the setting range):
The lower alarm can be set to ”on”.

15. Auto Power-off Function

The power will be turned off automatically if the unit is not operated for approx. 60 minutes. This function conserves battery power if you forget to turn the power off.

The auto power-off function is activated by pressing the POWER ON/OFF key while pressing HOLD key. Then “AUTO PWR OFF” will show in the display section.

Note: To release the Auto Power-off Function, press the POWER ON/OFF key while pressing HOLD key again or remove the batteries once.

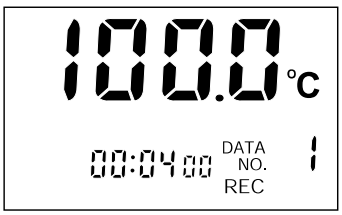
16. Recording Function (SK-250WPⅡ-R)

16-1. Recording Data

The temperature measured and the time of measurement can be recorded on the unit. Data of up to 100 measurement results can be recorded and called up onto the display. Data cannot be exported to an external device such as a computer.

Note: Data recording is possible only while the unit is in the measurement mode without the functions (HOLD, MAX/MIN, TIMER) being used.

(1) Press the REC key while in the measurement mode to start recording measurement data on the unit. At every recording operation, a short beep sounds and the display of "REC" and the serial number for the recorded data of temperature appear on the display. Pressing and holding the REC key records the measured temperature at two-second intervals.



* When data of 100 measurement results have been recorded:
The number appears as "DATA No 00" in the display. In this state, further recording is not possible even if the REC key is pressed. To record new data, first delete data recorded on the unit.

16-2. Calling Up Data

(1) Press the DATA key while in the measurement mode to call up data onto the display. The recorded data item appears in order from No. 1 each time the DATA key is pressed. Pressing and holding the DATA key displays recorded data continuously.
The display of "no" appears if no data items have been recorded.

(2) Press the RESET key to return to the measurement mode.

16-3. Deleting Data

Turn off the unit by pressing the POWER ON/OFF key. Press the RESET key first and then the POWER ON/OFF key to turn on the unit. All the data items recorded on the unit are deleted.

17. Maintaining/Deleting the Settings or Data

When replacing the battery or turning off the power, some of the settings or data may be reset and overwritten by default values. If this happens, reset the settings (as needed) by referring to the tables below.

Function	Maintaining the Setting (Yes: maintained, No: reset)	
	Power off	Battery Replacement
MAX/MIN	No	No
Clock	Yes	No
Upper/Lower Temperature Alarm	Yes	No
Auto Power Off	Yes	No
Data Recording	Yes	Yes

18. Default Setting

Function	Default setting
MAX/MIN	No data
Clock	00 : 00 00
Upper Temperature Alarm	oFF 300°C
Lower Temperature Alarm	oFF -50°C
Auto Power Off	oFF
Data Recording	No data in factory setting.

19. Error Message

If an error occurs, one of the error codes below will be shown on the temperature display section.

Error code	Causes	Remedy
Hi	Measured value is higher than 305°C	Bring the value within the measuring range.
Lo	Measured value is lower than -55°C	
Er	Probe is not connected	Connect the probe. If the error message is still displayed although the probe has been connected, stop using it and contact us or the dealer.
Er1, Er2, Er3	An unusual signal or a noise may be input from sensor or power section.	Remove batteries and then load batteries again after 5 sec.

20-1. Specifications

Model	: No. 8064-00 Waterproof Digital Thermometer SK-250WP Ⅱ-T
Display range	: -55 to 305°C (Measuring range is different depending on the probes connected)
Display Accuracy	: ± (0.1°C + 1 digit) at 9.9 to 199.9°C
	: ± (1°C + 1 digit) at other than above.
Resolution	: 0.1°C at -9.9 to 199.9°C
	: 1°C at other than above
Grade of protection from water	
	: Conforming to JIS C0920 Protection Class 6 ---- Equivalent to **IP X6** rated ---
Operation ambient	: 0 to 50°C
Sampling time	: 1 sec.
Probes connected	: SWP Ⅱ series probes (thermistor)
Operational Functions	: HOLD, MIN. MAX, TIMER ▲▼ (h, m, s), Buzzer, Alarm Hi Lo, Low battery mark, Auto-Power-Off
Power requirements	: 3VDC (“AAA” size alkali battery x 2 pcs.)
Battery life	: About 1000 hours continuous (without buzzer function) About 350 hours continuous (with buzzer function) (Using alkali batteries in normal temperature)
Materials	: ABS resin
Dimensions	: 71(W) × 170(H)× 36(D) mm
Weight	: Approx. 145g (including batteries)
Standard Accessories	: SWP Ⅱ-01M probe, Vinyl case, hand strap, 2 alkali AAA batteries

20-2. Specifications

Model	: No. 8066-00 Waterproof Digital Thermometer SK-250WP Ⅱ-R
Display range	: -55 to 305°C (Measuring range is different depending on the probes connected)
Display Accuracy	: ± (0.1°C + 1 digit) at 9.9 to 199.9°C
	: ± (1°C + 1 digit) at other than above.
Resolution	: 0.1°C at -9.9 to 199.9°C
	: 1°C at other than above
Grade of protection from water	
	: Conforming to JIS C0920 Protection Class 6 ---- Equivalent to **IP X6** rated ---
Operation ambient	: 0 to 50°C
Sampling time	: 1 sec.
Probes connected	: SWP Ⅱ series probes (thermistor)
Operational Functions	: HOLD, MIN. MAX, TIMER ▲▼ (h, m, s), Buzzer, Alarm Hi Lo, DATA No. REC Low battery mark, Auto-Power-Off
Power requirements	: 3VDC (“AAA” size alkali battery x 2 pcs.)
Battery life	: About 1000 hours continuous (without buzzer function) About 350 hours continuous (with buzzer function) (Using alkali batteries in normal temperature)
Materials	: ABS resin
Dimensions	: 71(W) × 170(H)× 36(D) mm
Weight	: Approx. 145g (including batteries)
Standard Accessories	: SWP Ⅱ-01M probe, Vinyl case, hand strap, 2 alkali AAA batteries

SATO KEIRYOKI MFG. CO., LTD.

3-4, Kanda-kajicho, Chiyoda-ku, Tokyo
101-0045 Japan
TEL: +81 (0)3-3254-8117　FAX: +81 (0)3-3254-8123
URL: http://www.sksato.co.jp/english/