

Emission Thermometer
User's Manual

Model: **53005/53006**

YOKOGAWA ◆

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Compliance with the Radio Waves Act (Republic of Korea)

This product complies with the Radio Waves Act (Republic of Korea).

Note the following when using the product in Republic of Korea.

The product is for business use (Class A) and meets the electromagnetic compatibility requirements. The seller and the user must note the above point and use the product in a place except for home.

Registration No: KCC-REM-IMY-EEN326
Equipment Name: Emission Thermometer
Trade Name: Yokogawa Meter & Instruments Corporation
Manufacturer: Yokogawa Meter & Instruments Corporation
Country of Origin: Japan

Γ

Thank you very much for purchasing Thermometers products. This device is a non-contact thermometer to convert the infrared energy emitted from the surface of an object into temperature. This thermometer measures the surface temperature of solid and liquid without contacting them. The temperature of gas cannot be measured by this thermometer.

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Introduction

- Please make sure the model you purchased is the one you specified.
- Please read the manual thoroughly before using the Products for correct usage.
- After reading this manual, please retain it for future reference.
- YOKOGAWA is not liable for any incidental or consequential damages or losses including losses of data or changes of measurement, arising from accident, misuse or abnormal conditions of operation or handling.

Safe Usage

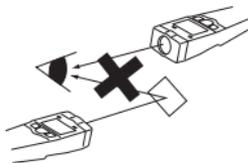
When operating the instrument, be sure to observe the cautionary notes given below to ensure correct and safe use of the instrument. If you use the instrument in any way other than as instructed in this manual, the instrument's protective measures may be impaired.

Yokogawa is by no means liable for any damage resulting from use of the instrument in contradiction to these cautionary notes.

 **Caution :** This symbol signifies that improper usage may result in injuries or damage.



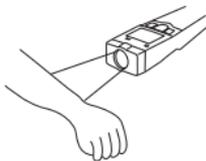
CAUTION



Do not look into the laser beam, nor point it directly at eyes. Even the reflection is harmful. This laser may cause eye injury or damage to your health.



CAUTION



This product is not a clinical thermometer and therefore, can not be used for medical purposes.



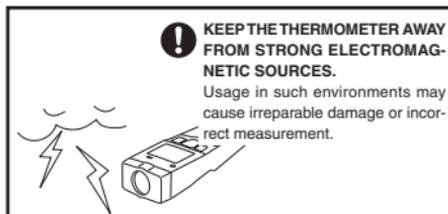
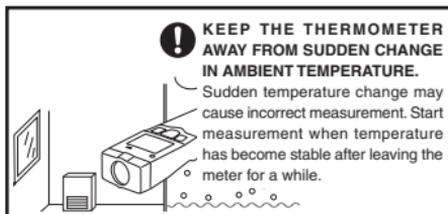
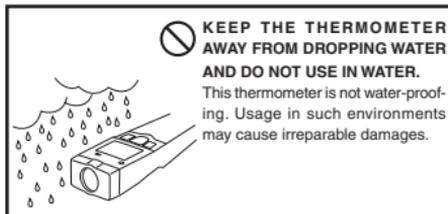
CAUTION



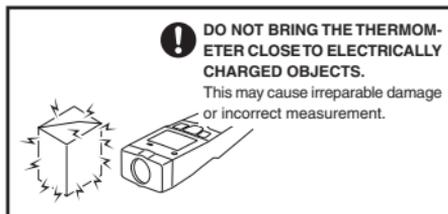
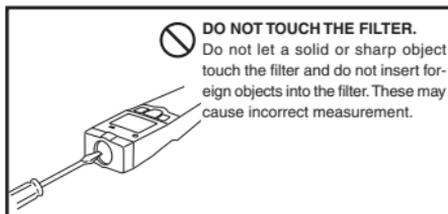
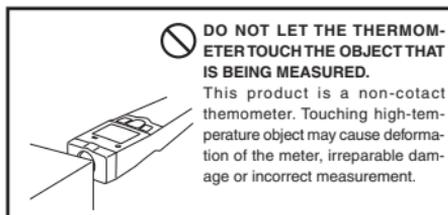
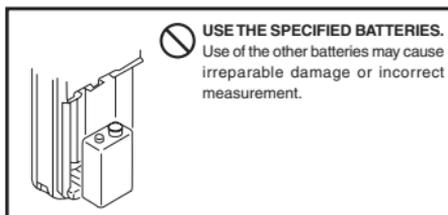
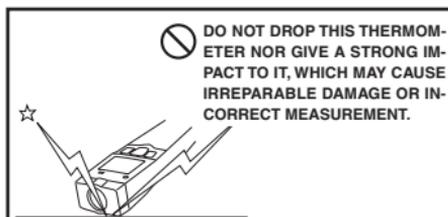
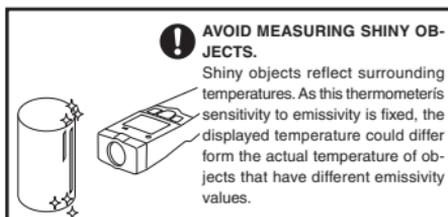
Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Safe Usage — Environmental warnings/Cautions

Environmental Warnings ⚠ — Warning ! — Caution



Usage Warnings ⚠ — Warning ! — Caution



Specifications

Model	53005-E	53006-E
Measuring range	- 30 to 600°C	
Field of view	□ 30/1000mm (D:S=33:1)	
Optics	Si lens	
Sensing element	Thermopile	
Wavelength	8 to 14 μ m	
Response time	0.5sec. / 90%	
Accuracy ($\epsilon \doteq 0.95$)	- 30.0 to 0°C : $\pm 3^\circ\text{C}$ 、0.1 to 200°C : $\pm 2^\circ\text{C}$ 、 201 to 600°C : $\pm 1\%$	
Repeatability	$\pm 1^\circ\text{C}$ of reading value	
Display resolution	- 30.0 to 199.9°C : 0.1°C、200 to 600°C : 1°C	
Sighting method	Coaxial laser marker (Class 2)	
HOLD time	15 seconds	
Continuous measurement mode	—	ON / OFF Selectable
USB output	—	○
Memory	1-point memory	35-point memory
High/Low Alarm LED/Buzzer	Alarm LED/Buzzer ON/OFF Selectable	
Emissivity (ϵ) Adjustment	0.95/0.85/0.70 Selectable	ϵ Adjustable (0.30 to 1.20/0.01step)
Display function	NOR / MAX / MIN	
Power supply	AA Battery × 2pcs	
Battery life	Approx. 15 Hours (With max load)	
Ambient temperature	0 to 50 °C	
Ambient humidity	35% to 85%Rh (Without due condensation)	
Storage temperature/humidity	- 10 to 60°C/35% to 85% Rh	
Material	ABS/TEEE	
Dimension	H × W × D = Approx. 182 × 56 × 38mm	
Weight	Approx. 250g (Including batteries)	

Accessories : AA battery × 2pcs., user's manual, exclusive protective case
USB cable (Only for 53006)

Optional : Blackbody tape (Maximum available temperature 250°C)

Compliant standards.

IEC 60825-1

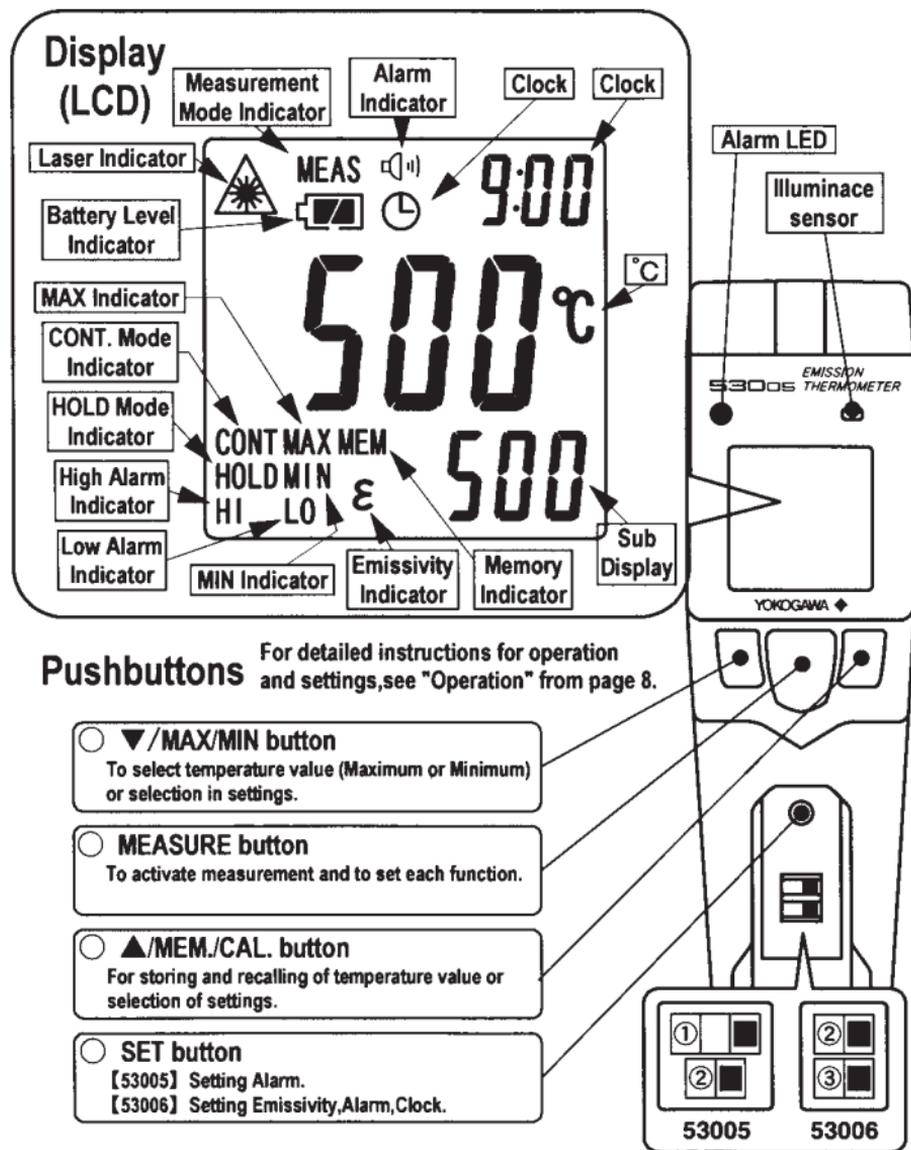
EN 60825-1

US 21 CFR 1040.10 and 1040.11

EN 61326-1

※ Specifications may change without prior notice.

Name of Components

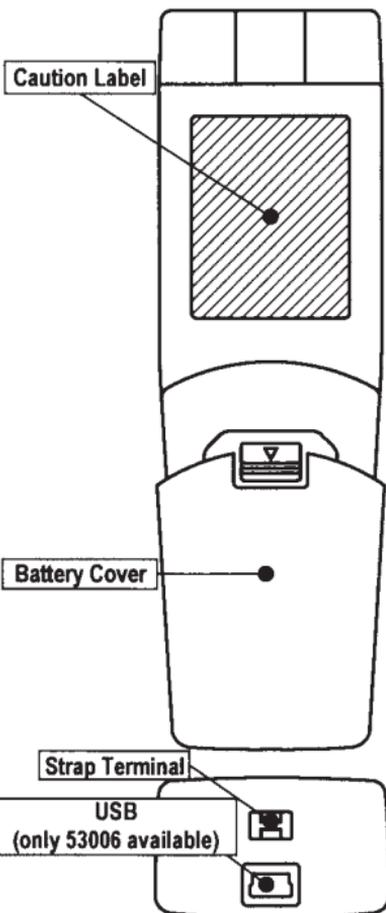
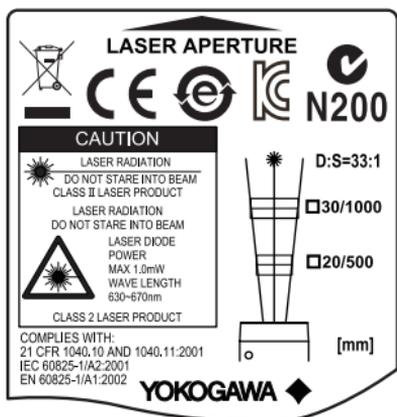
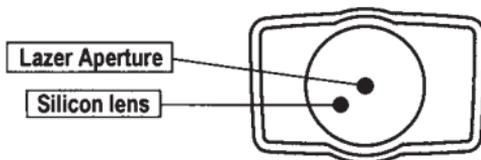


* There is no button to turn ON/OFF the supper supply.

Safety Precautions for Laser Products

This Instrument uses a laser light source. This instrument is a Class 2 laser product as defined by IEC60825-1 Safety of Laser Products-Part1: Equipment classification and requirements. In addition, this instrument complies with 21 CFR 1040.10 except for deviations pursuant to Laser Notice No.50, dated June 24, 2007.

**DO NOT STARE INTO BEAM.
CLASS 2 LASER PRODUCT.**



DIP switches

【53005】

① . 0.95 / 0.85 / 0.7

Setting Emissivity to fit objects surface.

【53005-E/53006-E】

② . —

【53006】

③ . NOR. / CONT.

Selecting NOR.(Normal Mode) or
CONT. (Continuous Mode).

Operation

Temperature can be measured while the **MEASURE** button is being pressed.

Set the battery supplied as an accessory and operate the unit according to the following procedure.

1



Pressing the **MEASURE** button turns ON the power supply. A laser beam is emitted and the measurement starts.

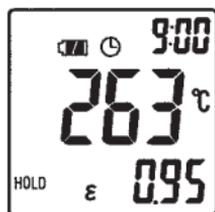
In the Normal Measurement mode, the unit takes measurement while the **MEASURE** button is pressed.

2



Point the laser beam at a measurement object and aim it at the center of the area to be measured. For the distance from this thermometer to the measuring object, refer to page 10.

3



When the **MEASURE** button is released, the "MEAS" and laser beam symbols go out and "HOLD" and "C (F)" symbols light up. After the last temperature value is displayed for 15 seconds (HOLD mode), the power is automatically turned OFF.

Selection of display function

Each time the  button is pressed, the display function is switched in order of NOR., MAX, and MIN.

NOR.: “ ϵ ” is displayed at the bottom of LCD and the currently set emissivity is displayed on the sub-display.

MAX: “**MAX**” is displayed at the bottom of LCD and the maximum value during measurement is displayed on the sub-display.

MIN: “**MIN**” is displayed at the bottom of LCD and the minimum value during measurement is displayed on the sub-display.

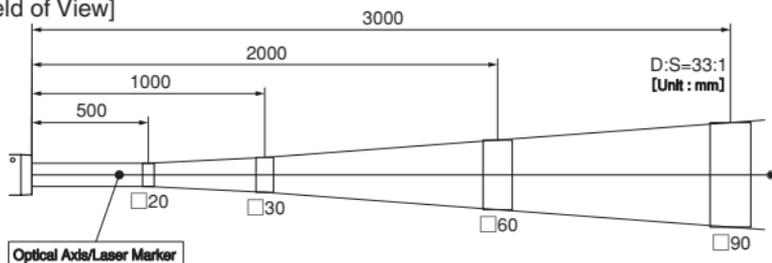
Default value for each setting (at the time of shipment)

	53005-E	53006-E
Display function	NOR.	
Maximum temperature alarm	Temperature setting : 600°C Function : OFF	
Minimum temperature alarm	Temperature setting : -30°C Function : OFF	
Emissivity (ϵ)	0.95	
Memory	Nothing	
Continuous measurement mode	—	OFF

Field of View

For the non-contact thermometer (infrared thermometer), the field of view (spot size) is specified depending on the distance from the thermometer to the measuring object as shown below. The temperature value displayed is the average temperature within the spot size. To take an accurate measurement, check the correlation between the size of object and the distance to it.

[Field of View]

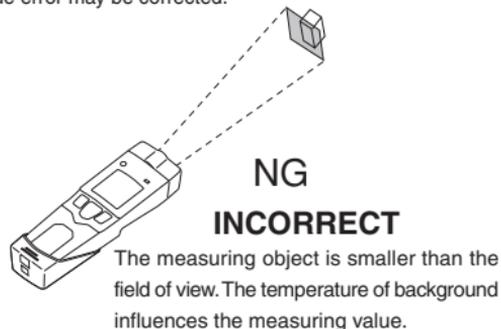
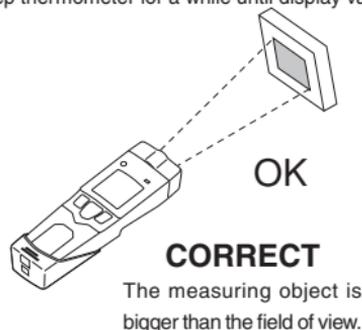


* Remarks

- ex.) The average temperature of surface of the square 90mm in diameter is measured at a distance of 3000mm away from the measuring object.
- * The laser beam points center of the field of view. The laser marker functions as a sighting method and not a sensing element.
- * It is possible to take temperatures with this thermometer at a distance of 3,000mm or more away from the measuring object, unless there is any obstacle. However, please note that the measuring field of view enlarges in proportion to the measuring distance. This thermometer has an optical resolution of 33:1 [D(Distance to the measuring object):S(Spot size)].

[For Correct Measurement]

The optical resolution values stated in "Field of View" are at minimum 90% energy. The size of measuring object should be sufficiently larger than the field of view (spot size) shown in the above illustration. Please keep away from target as far as you can within spot ratio when you measure high temperature. Sudden ambient temperature change may cause thermometer display value error. In this case, please keep thermometer for a while until display value error may be corrected.



Setting/Resetting the High/Low Temperature Alarm

When the measured temperature exceeds the High alarm value, the alarm LED blinks in red and a buzzer (high tone) sounds. When it is below the Low alarm value, the alarm LED blinks in green and a buzzer (low tone) sounds. The "High alarm" is set up first, and then the "Low alarm".

Set up the alarms according to the following steps.

1



Press the **SET** button while the power is ON.



Pressing the **SET** button displays "ALM" on the top of LCD.

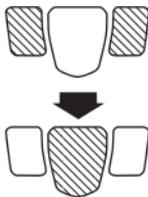
(Regarding 53006, the display is switched in order of "ALM", "EMS" and "TIME" each time the **SET** button is pressed.)

2



Pressing the **MEASURE** button blinks "ALM". Then, "ON" or "OFF" (currently set status) is displayed on the top of LCD and "AL-H" is displayed on the sub-display. (The High alarm is set up.)

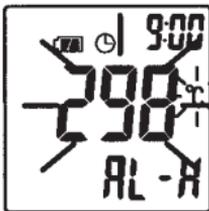
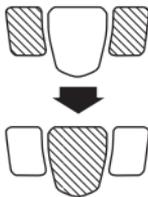
3



Press the **▼/MAX/MIN** or **▲/MAX/MIN** button to select ON or OFF, and then press the **MEASURE** button to confirm the setting.

When OFF is selected, the display shifts to the setting for the Low temperature alarm.

4



The alarm temperature is displayed on the top of LCD by selecting ON.

Press the **▼/MAX/MIN** or **▲/MAX/MIN** button to select ON or OFF, and then press the **MEASURE** button to confirm the setting.

When the setting has been completed, the display shifts to the setting for the Low temperature alarm.

For the setting/resetting of the Low temperature alarm, the above steps can be applied excluding that "AL-H" on the sub-display is changed to "AL-L" in step 2 and later. When the lower limit setting has been completed, the mode is changed to HOLD.

When the upper and lower limit alarms are set, "HI" and "LO" lamps are lit on the display.

Note) The High alarm value cannot be set to the value less than the setting for the Low temperature alarm, and the Low alarm value cannot be set to the value more than the setting for the High temperature alarm.

53005

■ P.13 Recording Measured Temperature

- Record Measured Temperature (MEM.Mode)
- Call Temperature Record (CALL Mode)

■ P.13 Emissivity Setting

Recording Measured Temperature

53005 can store one (1) temperature measurement data.

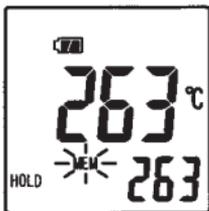
Perform the following steps.

[Record measured temperature/ MEM. mode]

1



1 Press this button for 2 seconds or more while the power is ON.



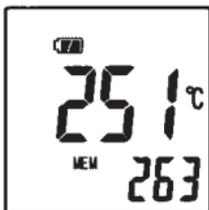
After "CALL" is displayed on the sub-display, "MEM" blinks on the display and the temperature value that had been displayed on the sub-display when the \triangle /MEM./CAL button was pressed starts to light up. Then the value is stored in memory. After the data is stored, the mode is changed to HOLD.

[Call temperature record/CALL mode]

1



1 Press this button for less than 2 seconds while the power is ON.



"CALL" is displayed on the sub-display, and then the stored temperature data displayed.

2



Press the \square (MEASURE) button to terminate the CALL mode. Then, the normal measurement mode is restored.

Emissivity Setting

Emissivity (ϵ) refers to the ratio of infrared energy emitted from all the object surfaces. All objects has their own emissivity, which changes depending on the surface conditions and object temperature. This thermometer has 3 fixed emissivities. Refer to the following examples.

0.95...Food, rubber, plastic, paintwork, etc.

0.85...Temperature of Frozen food can be measured almost accurately.

0.70...Temperature of oxidized metal surfaces can be measured almost accurately.

The displayed temperature could differ from the actual temperature of objects that have different emissivity. In such cases, regard the displayed temperature as a rough standard. When you wish to measure shiny metal surfaces, put a piece of optional blackbody tape ($\epsilon = 0.95$) on the surface of the measured object.

When the emissivity (0.95/0.85/0.7) is selected according to "DIP switch setting" in page 7, the temperature value converted into the selected emissivity is displayed.

53006

- *P.15 Date and Time Setting*
- *P.17 Emissivity Setting*
- *P.18 Recording Measured Temperature*
 - Record Measured Temperature (MEM.Mode)*
 - Call Temperature Record (CALL Mode)*
 - Delete All the Temperature Records*
- *P.19 Continuous Measurement*
- *P.20 USB Connection*

Date and Time Setting

Date and time can be set in 53006.

Perform the following steps.

*The setting returns to the default if batteries are removed.

1



SET

1 Press this button while the power is ON.



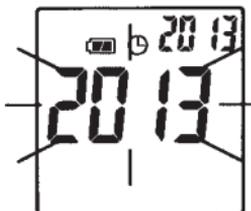
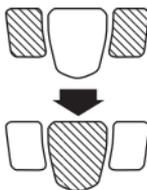
The LCD display is switched in order of "ALM", "EMS" and "TIME" each time the (SET) button is pressed. Display "TIME" on the LCD.

2



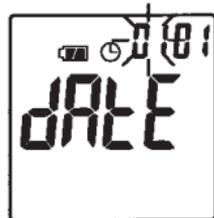
After "TIME" blinks, "YEAR" blinks. Then, the display is automatically shifted to the state that "YEAR" lights up and the dominical year blinks.

3



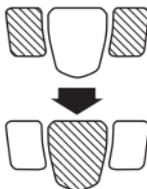
Press the (▼/MAX/MIN) or (▲/MEM./CAL) button to adjust the year. Then press the (MEASURE) button to fix the setting. After the setting, the set year blinks on the LCD.

4



After the set year blinks, "date" blinks, then the display is automatically shifted to the state that "date" lights up, the left 2 digits of the clock (month) blinks and the right 2 digits (day) lights up. The left 2 digits of the clock indicate a "month" and the right 2 digits indicate a "day".

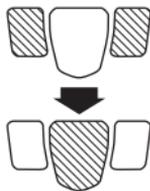
5



Press the (▼/MAX/MIN) or (▲/MEM./CAL) button to adjust the month. Then press the (MEASURE) button to fix the setting. After the setting, the right 2 digits of the clock blink. Then go to the "date" setting.

To the page that follows

6



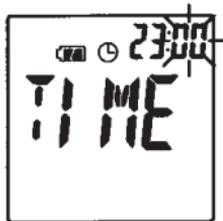
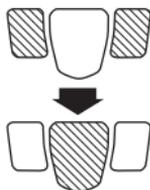
Press the **(▼/MAX/MIN)** or **(▲/MEM./CAL)** button to adjust the month. Then press the **(MEASURE)** button to fix the setting. After the setting, the set month and date blink on LCD.

7



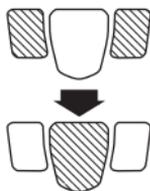
After the set date blinks, "TIME" blinks, and then the display is changed to the state that the time lights up, the left 2 digits of the clock (hour) blinks and the right 2 digits (minute) light up.

8



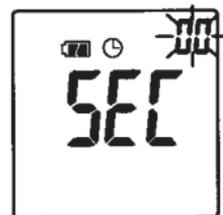
Press the **(▼/MAX/MIN)** or **(▲/MEM./CAL)** button to adjust the hour. Then press the **(MEASURE)** button to fix the setting. After the setting, the right 2 digits of the clock start to blink for the "minute" setting.

9



Press the **(▼/MAX/MIN)** or **(▲/MEM./CAL)** button to adjust the hour. Then press the **(MEASURE)** button to fix the setting. Then, the set time blinks on LCD.

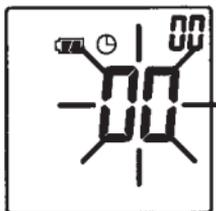
10



After the set time blinks, "SEC" start to blinks and then the display is automatically changed to the state that "SEC" lights up and the "00" blinks on the clock.

To the page that follows

11



When the **(MEASURE)** button is pressed, the second is set to 0. Press the button so that the second is accurately set. The date and time setting is now complete. After "00" blinks on LCD, the mode is switched to HOLD.

Emissivity Setting

Emissivity setting

Emissivity (ϵ) refers to the ratio of infrared energy emitted from all the object surfaces. All objects has their own emissivity, which changes depending on the surface conditions and object temperature. The emissivity setting for this thermometer can be changed, so that emissivity can correspond to a measured object and more accurate values can be measured.

Objects with low emissivity (ex: shiny metal surfaces) reflect the surrounding temperatures due to the high reflectivity. If an object other than the measured object such as a high-temperature object exists on the periphery, temperature for the other object is reflected, which will cause incorrect measurement. Thus, it is necessary to block off the obstacle.

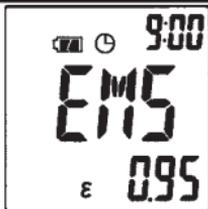
Although the maximum emissivity is primarily 1.00, the value up to 1.20 can be set for this thermometer in consideration of convenience.

1



SET

1 Press this button while the power is ON.



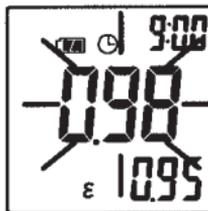
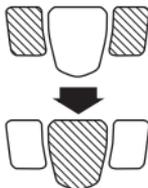
The LCD display is switched in order of "ALM", "EMS" and "TIME" each time the **(SET)** button is pressed. Display "EMS" on the LCD. (The currently set emissivity is displayed on the sub-display.)

2



After "EMS" blinks, the currently set emissivity appears on LCD. (The currently set emissivity is displayed on the sub-display.)

3



Press the **(▼/MAX/MIN)** or **(▲/MEM./CAL)** button to display the emissivity to be set up. The setting is completed by pressing the **(MEASURE)** button. After the setting, the mode is changed to HOLD.

Recording Measurement Temperature

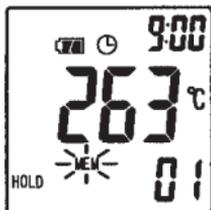
53006 can store 35 temperature measurement data.
Perform the following steps.

[Record measured temperature/ MEM. mode]

1



1 Press this button for 2 seconds or more while the power is ON.



After "CALL" is displayed on the sub-display, "MEM" blinks on the display and a memory No. lights up on the sub-display. Then the temperature value that had been displayed when the **(▲/MEM./CAL)** button was pressed is stored in memory. After the data is stored, the mode is changed to HOLD.

*If the number of stored data has exceeded the capacity, "FULL" lights up on LCD.

[Call temperature record/CALL mode]

1



1 Press this button for less than 2 seconds while the power is ON.



"CALL" is displayed on the sub-display, and then the latest stored temperature data and the corresponding memory No. are displayed.

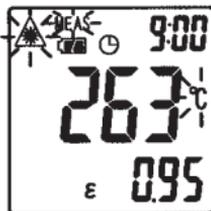
*Data cannot be called during the continuous measurement mode.

2



When the memory No. is changed, the corresponding temperature data is displayed in order.

3



Press the **(MEASURE)** button to terminate the CALL mode. Then, the normal measurement mode is restored.

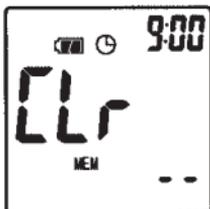
[Delete all the temperature records]

1



SET

Press the **SET** button during the CALL mode.



“CLR” is displayed on LCD, and all the temperature records are deleted. After the deletion, the HOLD mode is restored.

Continuous Measurement

For 53006, continuous measurement can be performed without pressing the **MEASURE** button. Perform the following steps.

1



NOR. CONT.

Press once



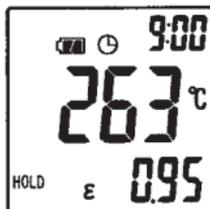
When the **MEASURE** button is pressed while the DIP switch is adjusted to the CONT. side (Refer to “DIP switch setting” in page 7.), “CONT” is lit on LCD and continuous measurement is started. Measurement continues even if releasing the **MEASURE** button.

2



NOR. CONT.

Press once



When the **MEASURE** button is pressed again or the DIP switch is changed over to the NOR. side, the mode is changed to HOLD.

*Laser beam is not radiated during the continuous measurement mode.

USB Connection

53006 is connectable to PC with the exclusive software and included USB cable. The exclusive software is downloadable at following Web address.

URL <http://tmi.yokogawa.com/products/portable-and-bench-instruments/thermometers/53005-53006-emission-thermometer/>

《Adaptable hardware》

The exclusive software activates on DOS/V PC with USB connector and installed Windows 2000 or XP. USB Rev1.1.

Note:Macintosh is not acceptable.

Connection

1: Download and install the exclusive software into PC.

Please make sure the PT-U80 turns off when connecting PC.Otherwise stored data is deleted.

2: Connect USB cable to PC.

3: Set up the exclusive software.

4: Push MEASURE switch on thermometer.

USB cable provides power to thermometer in connecting.

The outlook of exclusive software

1: Software is capable of reading, revising and writing of data inside thermometer.

2: PC can read all date instantly on thermometers continuous mode.

3: Output all data by CSV format.

4: Set up each parameters.

Clock

Emissivity

Change memory capability

For the details, please see the exclusive software.

Shut down

1: Finish the exclusive software.

2: Disconnect USB cable from PC with PO indication.

3: Disconnect USB cable from thermometer.

Troubleshooting

Symptom	Cause	Things to Check
Display does not appear.	The batteries have been exhausted. Battery installation is incorrect.	Replace the batteries. Re-install the batteries correctly.
Laser beam is not radiated.	The laser ejection exit is stained.	Clean the laser ejection exit referring “Body” of “Maintenance” described in page 22.
	Voltage necessary for lighting up laser beam is not satisfied.	Replace the batteries, (The -b- sign blinks.) or re-install the batteries correctly.
Measured value is incorrect.	The lens unit is stained.	Clean the lens referring “Lens” of “Maintenance” described in page 22.
	Field of view is deviated from the measuring object.	Center the laser beam on the measuring object by referring “Field of View” described in page 10.
	The measured object is smaller than the field of view.	Adjust the measuring distance referring to the “Field of view” described in page 10.
	The thermometer is affected by a nearby heating source.	Cut off the heat sources with a shield or such.
Measured value are unstable.	A shiny metal surface is being measured.	This thermometer causes an error when measuring a shiny metal surface. Perform measurement after putting optional blackbody tape onto the object.
	The thermometer is affected by considerable temperature fluctuation.	Wait until the temperature of thermometer stabilizes.

When the above symptoms are not removed even after the corresponding countermeasure has been taken, the thermometer may have a fault. In such cases, contact the vendor from purchased the product.

Maintenance

[Lens]

Dust, stain or scratch on the lens causes incorrect measurement. If the lens is stained, clean the lens with a lens-cleaning blower.

If the lens is still stained, gently wipe the stain off with a cotton swab or lens cleaning cloth, which may be moistened with ethyl alcohol.

[Body]

Wipe it with a soft cloth.

When the body is extremely dirty, wipe it with a cloth moistened with diluted detergent after wrung sufficiently.

Note) Do not use hot water exceeding 50°C and chemicals such as thinner and benzene, which may cause fading of characters, deformation, or damage.

[Periodical inspection]

It is recommended that the thermometer be calibrated annually.

For further information, please contact the vendor from which you purchased the product.

Battery

[Battery replacement]

When the BATT. symbol as a battery indicator and "-b-" on the display have started to blink, it is time to replace the batteries.

Note)When replacing the batteries, be sure to install new batteries without mixing an old one.

- (1) Slide and remove the slide cover at the bottom of the thermometer.
- (2) Install new batteries in the correct direction.



*The attached batteries are to be used for checking operations. The battery life mentioned in Specifications is not assured for these batteries.

Precaution when handling batteries

- Do not dispose exhausted batteries in a fire, nor recharge them.
- Please dispose of depleted batteries in accordance with environmental protection regulations of region.
- Remove batteries when the thermometer is not used for along term.

Disposing the Product

Waste Electrical and Electronic Equipment (WEEE). DIRECTIVE 2002/96/EC (This directive is valid only in the EU.)

This product complies with the WEEE Directive (2002/96/EC) marking requirement. The following marking indicates that you must not discard this electrical/electronic product in domestic household waste.

Product Category

With reference to the equipment types in the WEEE directive Annex 1, this product is classified as a "Monitoring and Control instrumentation" product. When disposing product in the EU, contact your local Yokogawa Europe B. V. office. Do not dispose in domestic household waste.



How to Replace and Dispose the Batteries

New EU Battery Directive DIRECTIVE 2006/66/EC

(This directive is valid only in the EU.) Batteries are included in this product.

When you remove batteries from this product and dispose them, discard them in accordance with domestic law concerning disposal.

Take a right action on waste batteries, because the collection system in the EU on waste batteries are regulated.

Battery type: Alkaline dry cell



Notice:

The marking (see above), which is marked on the batteries, means they shall be sorted out and collected as ordained in ANNEX II in DIRECTIVE 2006/66/EC.

How to remove batteries safely:

For further details, see "Battery" of Maintenance / Battery.

"Measures for Administration of the Pollution Control of Electronic Information Products" of the People's Republic of China

This User's Manual explains the Prevention of Pollution Control of Electronic Equipment Method in China.

This manual is valid only in China.

产品中有毒有害物质或元素的名称及含量

部件名称	有毒有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
<形式名> 53006						
框架 (塑料)	○	○	○	○	○	○
线路板 ASSY	○	○	○	○	○	○
USB CABLE	○	○	○	○	○	○
电池	○	○	○	○	○	○
<形式名> 53005						
框架 (塑料)	○	○	○	○	○	○
线路板 ASSY	○	○	○	○	○	○
电池	○	○	○	○	○	○
○：表示该部件的所有均质材料中的有毒有害物质的含量均在 SJ/T 11363-2006 标准中所规定的限量以下。 ×：表示该部件中至少有一种均质材料中的有毒有害物质或元素的含量超过 SJ/T 11363-2006 标准所规定的限量要求。						

环保使用期限：



表示该有毒有害物质在该产品中的含量均在 SJ/T 11363-2006 标准规定的限量要求以下。