INSTRUCTION MANUAL

HANDHELD THERMOMETER

HA-100 HA-200 HA-300 Series

2ed edition March, 2004

Please observe the following matters to ensure safe and reliable operation of products.

⚠ Caution

This product should not be used for any purpose except temperature measurement.
Stop using as soon as any problems are discovered.
Do not take the unit apart or remodeling.
Use the specified battery cells or specified AC-Adaptor.
This products is not rechargeable model.

Concerning the battery cells

Please observe the following matters to guard the battery leakage, exothermic reaction and ignition.

⚠ Warning

Do not throw away the battery cells in the fire, and avoid short between electrodes.
Do not charge or heat.
Use the specified battery cells.

⚠ Caution

Set the battery cells correctly   and   .
Remove the battery cells when the battery life is finished, or long time no using.
Do not mix old and new, or variety battery cells.
The battery life will be affected by the environmental temperature.

Preface

Thank you for purchasing this product from ANRITSU METER CO., LTD.

We prepared this manual so that you can use this product with ease and confidence.

Please read this manual carefully and understand each functions of this product for your safety and correct using.

Caution

This contents and the specification of this product are subject to change without notice.

Reproduction in part or whole of any material from this booklet is prohibited by low.

We surely make this manual, however if there are any error or not clear, please contact the place of purchase or us.

We are not responsible for the consequences of using this product.

After-sales Service

ANRITSU METER CO., LTD. ships products after severe company's inspection. Should you find any failure resulting from poor material and workmanship or accident during transportation, please contact the place of purchase or us.

We recommend that you may use the original packaging for this product when you send it to us for repairing or periodical checkup. If you no longer have the original carton, be sure to use plenty of wrapping to guard against damage during shipping.

e2

CONTENTS

1. General

This is a handheld thermometer by the latest microcomputer technology.
A microprocessor is used for constant compensation of zero-point and full scale, thus ensuring extremely stable, high precision measurement.

2. Unpacking

2.1. Unpacking

Open the carton and the check that the following are provided. If any of them is missing or out of order, please contact the place of purchase or us.

1.   Main unit
2.   Soft case
3.   Analog Output cable (HA-**1, HA-**2 only)
4.   Alarm Output cable (HA-3** only)
5.   AA-size alkaline battery cells
6.   Instruction manual
7.   Warranty

2.2 Repacking

Use the original carton of the instrument for its transportation by mail or car. If the original case is not available, carefully wrap the instrument in shock-absorbing material (polystyrene form and the like). Wrapping material should be dry and free of dust generation otherwise the instrument may be damaged.

3. Name of Components

3.1. Name of Components
(MODEL: HA-3　1)
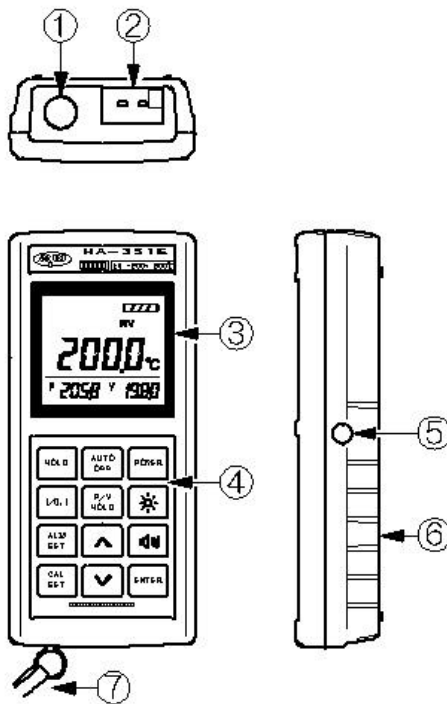
Alarm Output / Analog Output connector
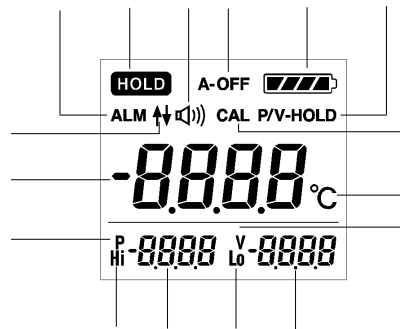Sensor Input connector
LCD Display
Key switch panel
AC adaptor jack
Battery housing
Hand strap

3.2. Display of all segments

	Segments	HA 1**	HA 2**	HA 3**
	Alarm			
	Hold			
	Alarm Buzzer			
	Auto-power-off			
	Battery			
	P/V Hold			
	alarm			
	Main display			
	Peak			
	Calibration			
	Valley			
	Hi			
	Sub-display 1			
	Lo			
	Sub-display 2			

4. Preparation for Operation

4.1. Battery Installation

Be sure to keep the power OFF during the battery cells change.
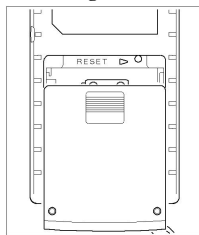
(1) Open the battery housing cover.

(2) Set battery cells correctly.
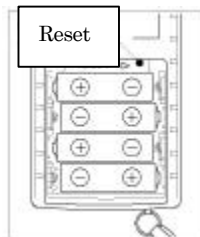
Reset

(3) After setting battery cells, press the Reset switch.
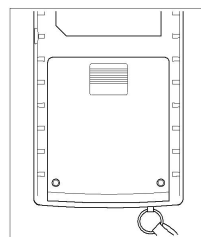
(4) Close the battery housing cover completely.
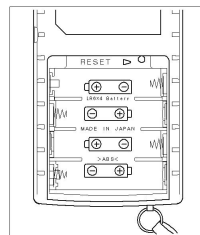
The Reset switch is a small push button in the upper section of the battery housing. Use a thin stick to lightly press it.

 When the Rest button is pressed, operation begins in the same way as power is turned ON, and the instrument will be ready for measurement. When measurement is not intends after battery change, turn power OFF.

4.2. AC-power Supply

(1) After turning power OFF, connect the AC-adaptor connection plug to the main unit as shown.

(2) Connect the power plug of the AC-adaptor to commercial power (100V AC).

When the AC-adaptor is connected during operating the battery, the internal battery circuit will be cut OFF as same as Reset.
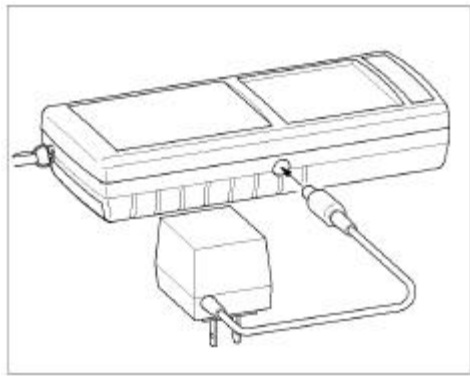
Be sure to use the specified AC-adaptor. The AC-adaptor for the HA series is available as an option.

4.3. How to Use Hand Strap

Hang the hand strap around the hand to prevent in advertent drop of the instrument.

4.4. Sensor Setting

Set the sensor as shown.

The plug is so designed that it will not be set when the polarity is reversed.

Forcible insertion will damage the instrument.

Be sure to check the polarity.

[   ]   [   ]
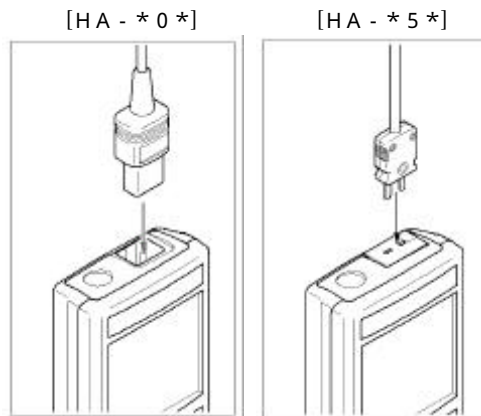
4.5. Soft case

Use the attached soft case for protection instrument against dirt or flaw.

In case of the combined use attached Soft case and the AC-adaptor, please bore the hale at the AC-adaptor jack part of Soft case by scissors, etc.

5. Operation

HA-100 / 200 / 300 series come in a variety of models shown below.

Table of the Function and HA series

Function	HA-1**	HA-2**	HA-3**
Power ON/OFF			
Hold			
Automatic Power OFF			
Resolution change			
P/V hold			
Backlight			
Calibration			
Alarm			

Analog Output model

	HA **1	HA **2
1mV/		
10mV/		

5.1. Power ON OFF
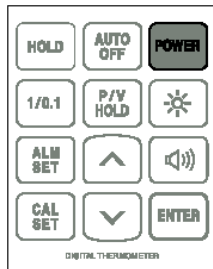
Press the Power key to turn power ON and all segments appear on the display for 1 second, and start measurement as be shown below.

Press the key again to turn power OFF.

5.2. Hold

Press the HOLD key to stop measurement and show the measured Temperature on the display.

Then HOLD appears on the display.

Press the key again to return to the normal mode.

HOLD

5.3. Automatic Power OFF

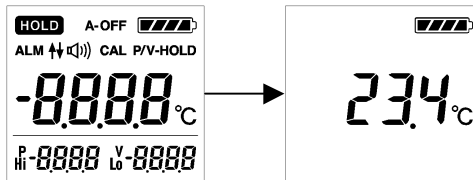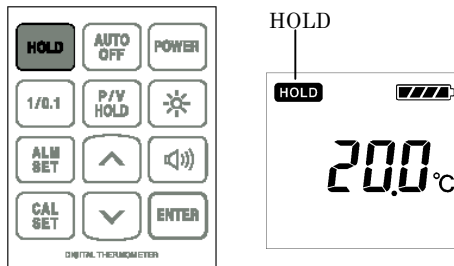Press the AUTO OFF key to enter the Automatic Power OFF mode that is provided to automatically turn Power OFF after a certain period time (about 5 minutes) no key operation. Press the key again to return to normal mode.

AUTO OFF

A-OFF

23.4℃
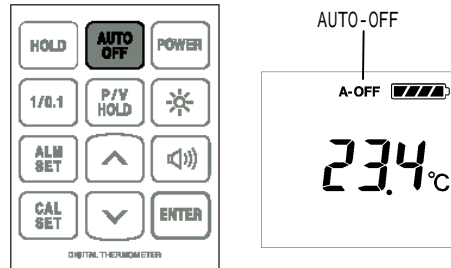
5.4. Resolution change   HA 2** HA 3**

Press the 1/0.1 key to change the resolution of the displayed temperature.

0.1   resolution
Range is from −104.9
504.9   at every 0.1   .
When   the   measured
value exceed this range,
the resolution changes
to 1   automatically.
1   resolution
All   measurable   range
at every 1   .

0 1

23.4℃

1

23℃
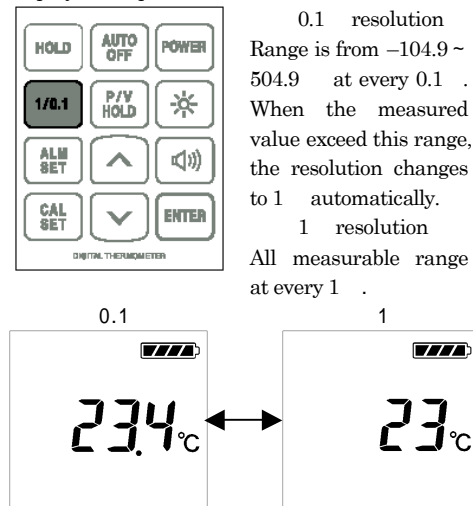
5.5. P/V Hold   **HA-2****   **HA-3****
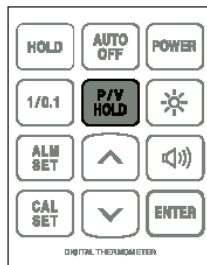
Press the P/V HOLD key to enter P/V Hold mode that the maximum value, the minimum value and the present value are displayed simultaneously. Press the key again to return normal mode.

Normal mode   P/V Hold mode

Present value   **MAX**   **MIN**
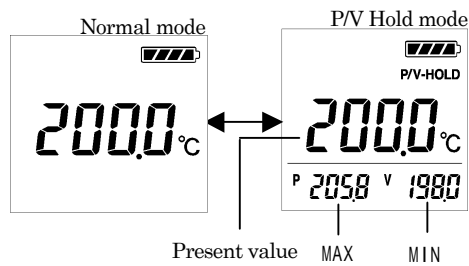
5.6. Backlight   **HA-2****   **HA-3****

Press the   key to turn the backlight ON, and the display on the screen will be visible even in the dark. Press the key again to turn the backlight OFF.

The battery consumption is double when the backlight is ON.
Be sure to turn OFF the backlight.

5.7. Calibration set　　HA-3**

This function permits calibration of a measured

value.

(1) Calibration set

Touch the sensor probe to the target and press the CAL SET key.

The calibration value is added the adjusted value of last calibration set. In case of above the display, the adjusted value is +0.4 .
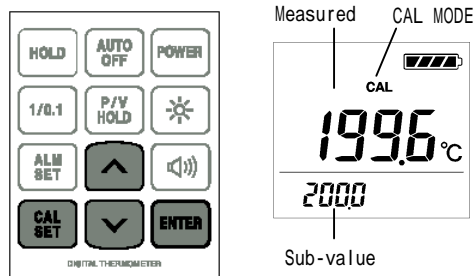
Set the calibration value (Sub-value) to the desired temperature by pressing the 　 key and the 　 key.

The sub-value for calibration is limited to ± 10

Press the ENTER key to complete calibration setting, and enter the calibration mode.

If the CAL SET key is pressed before the completion of calibration setting, this mode will be canceled and return to normal mode.

(2) Calibration mode

CAL MODE

CAL

200.0℃
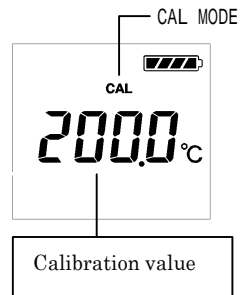
Calibration value

CAL appears on the display. The Main display indicates the calibration value that is added the adjusted value. In case of the shown display, the present value is 199.6 , the adjusted value is +0.4 .

(3) Canceling calibration

HOLD	AUTO OFF	POWER
1/0.1	P/V HOLD	☀
ALM SET	∧	◁))
CAL SET	∨	ENTER

DIGITAL THERMOMETER
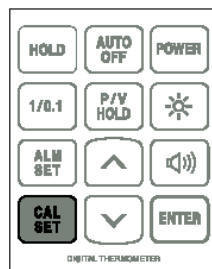
Press the CAL SET key twice to cancel calibration mode.

5.8. Alarm HA 3**

This function presets high low limits and gives the alarm when the measured value goes beyond the limits.
The alarm function is set in the ON poison at all measurement.
When the measured value goes beyond limits, ALM appears on the display.

ALM

or

ALM↑

286.1℃
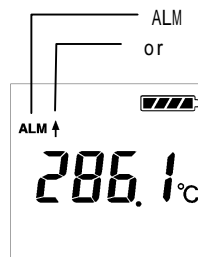
Measurement condition	Display
High limit Measured value	
Low limit Measured value	
Within limits	NON

(1) High/Low limit setting

HOLD	AUTO OFF	POWER
1/0.1	P/V HOLD	☀
ALM SET	∧	◁))
CAL SET	∨	ENTER

DIGITAL THERMOMETER
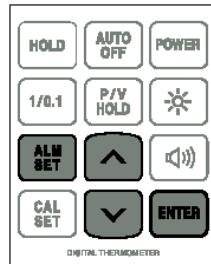
Press the ALM SET key to change the setting display as shown.

Normal

High limit

200.0 ℃

Hi ℃
Hi **210.0** Lo **170.0**

Lo ℃
Hi **210.0** Lo **170.0**
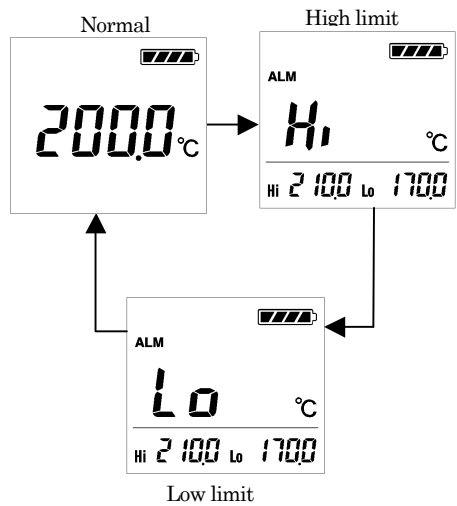
Low limit

Set the high limit or low limit setting with the ▲ key and the ▼ key.

When the keys are kept pressing, value will be changed by 10 steps.

Hi ℃
Hi **210.0** Lo **170.0**

High   Low
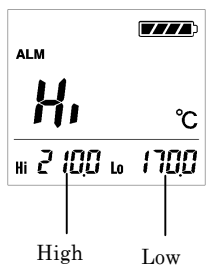
Press the ENT key to end setting.

If the ALM SET key is pressed before the completion of Alarm setting, this mode will be canceled and return to normal mode.

(**2**) Alarm Buzzer ON / OFF

Press the 🔊 key to turn the alarm buzzer ON and ALM and 🔊 are appeared on the display.

When the measured value goes beyond limits, the alarm buzzer sounds.

Press the key again to return to normal mode.
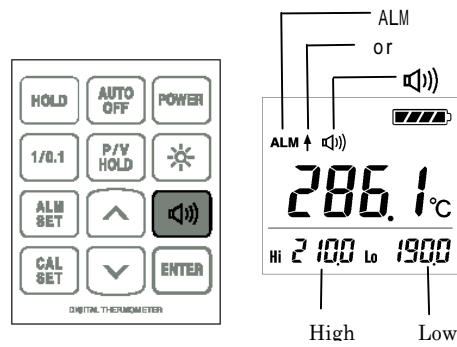
(**3**) Alarm Output

Signal names and Connector pin arrangement

Pin No.	Signal name
	ALM (MAX)
	ALM 2 (MIN)
	V 1 (Power 1)
	V 2 (Power 2)
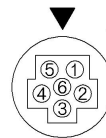
ALM1 and ALM2 are directly coupled with C-MOSIC.

Output Signal

Output signal is digital (" L" 0V " " 5V) as below table from comparison of the present value and the high / low limits.

Measured value		
Over High	" "	" "
Within Limits	" "	" "
Below Low	" "	" "

Signal takeout and example of use

Shown circuit is an example of simple temperature measurement (ON / OFF control) with the high limit alarm.
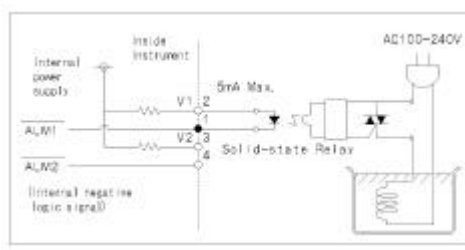
Signal current of up to 5 mA can be taken out. Examine the junction circuit (driver, etc.) in accordance with the driving load.

Be sure to turn the power OFF before connecting to or separating from other equipment.

6. Default Configuration

When the instrument turns the power OFF, Reset
or Battery exchange, some setting will be canceled.
Default Configuration is below tables.

Function	
HOLD	Cancel
Auto Power OFF	Default
P / V Hold	Cancel
Resolution	Default
Backlight	Cancel
Alarm	Default
Alarm buzzer ON / OFF	Cancel
Calibration set	Default
Calibration ON / OFF	Default

7. Indicator of Battery remain

The battery level is indicated in the upper section of the display. In accordance with operation hours, the indicator lights go out as shown below.

Battery level

23.4℃

This table is tentative value because of the battery remains according to variety battery specification.

Indicator	Battery remain
▮▮▮▮	Over
▮▮▮	
▮▮	
▮	Under
	Exhausted Battery

This instrument can work for a while after the Exhausted Battery sign appears. However, Change battery as soon as possible, otherwise satisfactory function will not be available.

8. Analog Output   **HA****1 **HA****2

There are two analog output rates. The rate of output is shown in follow table.

Model	Rate	Output range
HA **1	mV	All measurable range at 1 resolution
HA **2	10mV	100.0 500.0 at 0.1 resolution

When the display is the Over range or the Burned out etc., the Analog Output is shown in follow table.

Plus Over	About
Minus Over	About
Burn out	About

Signal names and Connector pin arrangement

Pin No.	Signal name
	side
	side

8.1. Connection of Recording

(1) Turn off the power of recorder and instrument.

(2) Connect the red terminal of the attached the Analog Output cable to the positive: + side of the recorder terminal and the black terminal to the negative: side of the recorder terminal.

(3) Adjust the recorder input range to the measuring range of the instrument.

(4) Turn on the power of recorder and instrument.

(5) Check the Automatic Power OFF mode is

canceled.
Caution: Never short-circuit the cable or cable itself
otherwise failure will result.

9. Error Messages

9.1. Indication of Sensor Burnout

If the sensor burns out or is
not coupled, the Burnout
display appears shown as
right.
Check whether the sensor
burns out or does not
connect to instrument.

```
bou⅂℃
```
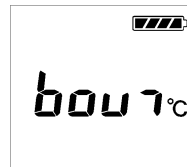
9.2. Indication of Over range

If the temperature exceeds the measurable range
during measuring, the
Over range display
appears shown as right.

```
Or ℃
```

  If the sensor is almost
cut, the Over range
display sometimes
appears.
Please check the sensor
cut if measuring
temperature is in the
range.

```
⁻Or ℃
```

 The over range display
does not damage the
instrument, however
the sensor will be
exhausted. Avoid the
sensor to the place in measurable temperature.
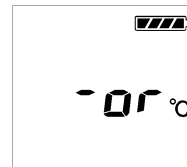
9.3. Indication of Error

The instrument is broken,

```
Err ℃
```

please contact the place of purchasing.

9.4. Indication of Exhausted Battery

When the battry is
exhausted, Battery
indicator blinks.
Then replace the old
battery cells with new
ones.

Blink

23.4 ℃
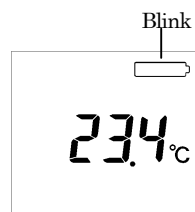
10. Maintenance

10.1. Storage

Avoid places subject to the following when storing
the instruments.

 Direct Sunlight
 Strong vibration
 High humidity (85% RH or more)
 Hot atmosphere (50 or more)
 Dust, corrosive gas, or salt
 Strong electromagnetic field

It is recommended to put the instrument in the
original case when storing it for a long time.

10.2. Case cleaning

When the case is dirty, lightly wipe it with a cloth
slightly impregnated with water or petroleum.
Do not use thinner or benzene, otherwise the case or
keyboard may discolor or deform.

11. In case of Trouble

Issues of instruments operation trouble, please check follows. If your trouble is not solved, please contact the place of purchase or us.

(1) Display does not show any segments.

      Push the Reset switch

      Check the pole of battery cells

      Replace the old battery with new ones

      If you use the AC-Adaptor, please pull it out.

(2) Measurement value does not stable.

      If sensor is deformation or broken junction, please contact us for repairing.

      Pull out and put in the plug of the sensor with the instrument again.

      If the senor does not hold in the correct position, measurement value does not stable.

      If you measure in the environment of strong electromagnetic field (a big motor, etc.), please shield the instruments and the sensor against electrical noise.

(3)   Measurement value error is too big (Not acceptable).

      If the thermocouple type of the sensor is not corresponded to the instruments, measurement value is not correct.

      Please replace the correct sensor.

      If sensor is deformation, please contact us

(4)   The key switch is not operated

      When the Burn out display appears, no operation. Please put the sensor in, or check the sensor broken junction.

12. Specification

Display	7 segments LCD display
Operation key	Membrane switch
Linearizer	Digital (based on JIS C 1602-1995)
Sampling rate	Approximately 300 ms
Signal source resistance	500
Power supply	Battery cells (AA) 4 pieces or AC adaptor
Battery life	Approximately 300 h
Environmental limit	Operation :0　40　, 0　80% Storage : -20　50　, 0　80%
Dimensions	71(W)× 160(H)× 35(D)mm
Weight	Approximately 250 g
Accessories	Soft case Instruction manual Battery cells (AA) 4 pieces HA-3**: Alarm Output cable HA-**1, HA-**2: 　　Analog Output cable

Analog Output (HA-**1, HA-**2)

Model	HA-**1	HA-**2
Rate	1 mV/	10 mV/
Range	All range at 1 resolution	All range at 0.1 resolution
Resistance	100	
Accuracy	± (0.15% of F/S + 1 mV) at 25　± 5 ± (0.15% of F/S + 1 mV) ± (0.01% of　F/S) except 25　± 5	

Alarm   (HA-3**)

Measured value		
Over high	" "	" "
Within Limits	" "	" "
Below low	" "	" "

Accuracy

	Measurement range *1	1	-200 800
E		0.1	-100.0 500.0
	Accuracy 1 resolution	0 800 ± (0.1% of reading + 1) -200 -1 ± (0.5% of reading + 1)	
	Accuracy 0.1 resolution	0.0 500.0 ± (0.05% of reading + 0.2) -100.0 0.1 ± 0.5	
K	Measurement range *2	1	-200 1200
		0.1	-100.0 500.0
	Accuracy 1 resolution	0 1370 ± (0.1% of reading + 1) -200 -1 ± (0.5% of reading + 1)	
	Accuracy 0.1 resolution	0.0 500.0 ± (0.05% of reading + 0.2) -100.0 0.1 ± 0.5	
Accuracy Cold-junction compensation	0.2 at 25 ± 10		
Temperature coefficient	± 0.01 of F/S		

*1, *2: Indicator range is wider than measurement
       range.   (approximately 2   5)

e27