

# **Handheld Thermometer Instruction Manual HR-1400**

AE-100289

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## Safety information

### Caution

To safely operate and service the thermometer and to prevent any product damage and/or maintain the precise temperature measurement results, please carefully follow the instructions below:

- Do not use this product for any purpose other than taking temperature measurements.
- If any abnormalities are found, immediately stop using the product.
- Do not disassemble or modify the product.
- Do not use any power supply other than commercially available dry batteries and/or a dedicated adaptor.
- Insert the batteries in the correct manner (pole+ to pole+).
- Remove the batteries when depleted or when the product is not expected to be used for an extended period of time.
- Do not mix old and new batteries or batteries of different makes or types.

### Warning

- Do not throw into an open fire. Do not short circuit, disassemble, or heat .
- Do not recharge the batteries at any time.
- Use specified type batteries.
- To prevent electric shock, do not touch the metal parts or terminals of the sensor cable or analog output cable during measurement.
- To prevent electric shock, if the sensor is still in contact with the voltage application part even when the power is turned off, disconnect the sensor before setting the analog output cable or device.
- ※ When measuring under the influence of high voltage and high frequency, there is a risk of electric shock and measurement failure, so please contact us.

## **Introduction**

Thank you very much for purchasing this Anritsu Meter product.

This instruction manual has been carefully prepared to ensure that the product can be used safely and securely.

Please carefully and thoroughly read this instruction manual, fully understand all the individual functions, and use the product properly.

Should you have any unclear issues or questions while operating the product, please refer to this instruction manual.

## **Notes**

- The contents of this document and/or product specifications are subject to change without prior notice.
- Unauthorized reproduction of any part of this document is strictly prohibited.
- This instruction manual has been prepared with absolute care. Please free feel to contact our company or your retailer should you discover any omissions or mistakes.
- In no event is Anritsu Meter liable to anyone for any indirect, special, or consequential damages as a result of using this product.

## **Warranty and After-sales Service**

### **● Warranty**

This product has been submitted to strict tests and inspections prior to delivery. Anritsu Meter warrants this product to be free from defects in material and workmanship for a period of one (1) year from date of delivery. Should any failures arise due to defects during manufacture or accidents during transportation, please contact our company or your retailer. For any failures during the warranty period which are deemed our responsibility, we will exchange the necessary parts or carry out repairs at no cost.

However, the warranty will be considered to be voided (i.e., the customer pays for repairs) in the following cases:

- Failure due to a fire, earthquake, or any other force majeure.

- Failure due to misuse, abuse, and/or modification. (Please note that if the case of the product is opened or the screws are loosened, such an act will be regarded as a modification.)

Note: Our thermocouple sensors are consumables and are not covered by the warranty.

- **After-sales Service**

- If you think the product is not correctly working, please refer to this instruction manual. Should any issue persist, please contact our company or your retailer.

- Repairs during the warranty period are subject to the content of the warranty sheet. Repairs after the warranty period has elapsed will be carried out only if such repairs recover and maintain the product functions.

- If there is a need to return the product for repair or calibration, please pack it in the original packaging that was used for delivery. If such packaging is not available, please enclose the product with sufficient cushioning material and return the product in a condition where no damage can be caused.

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## 1. General

This product is a handheld thermometer for high precision, reliability, and usability. It has a high-precision analog technology and a microcomputer to digitally correct measured data, making highly stable and high-precision temperature measuring possible.

## 2. Unpacking

### 2.1. Unpacking

Please check if the following items are present when unpacking. We make sure all items are carefully packed, but should you find any missing or failed items, please contact our company or your retailer.

Item	Q'ty	Applicable model
Main unit	1	All models
Soft case	1	All models
Hand strap	1	All models
Alkaline AA battery	4	All models
Instruction manual	1	All models
Test report	1	All models
Warranty sheet	1	All models
User registration sheet	1	All models

### 2.2. Repacking

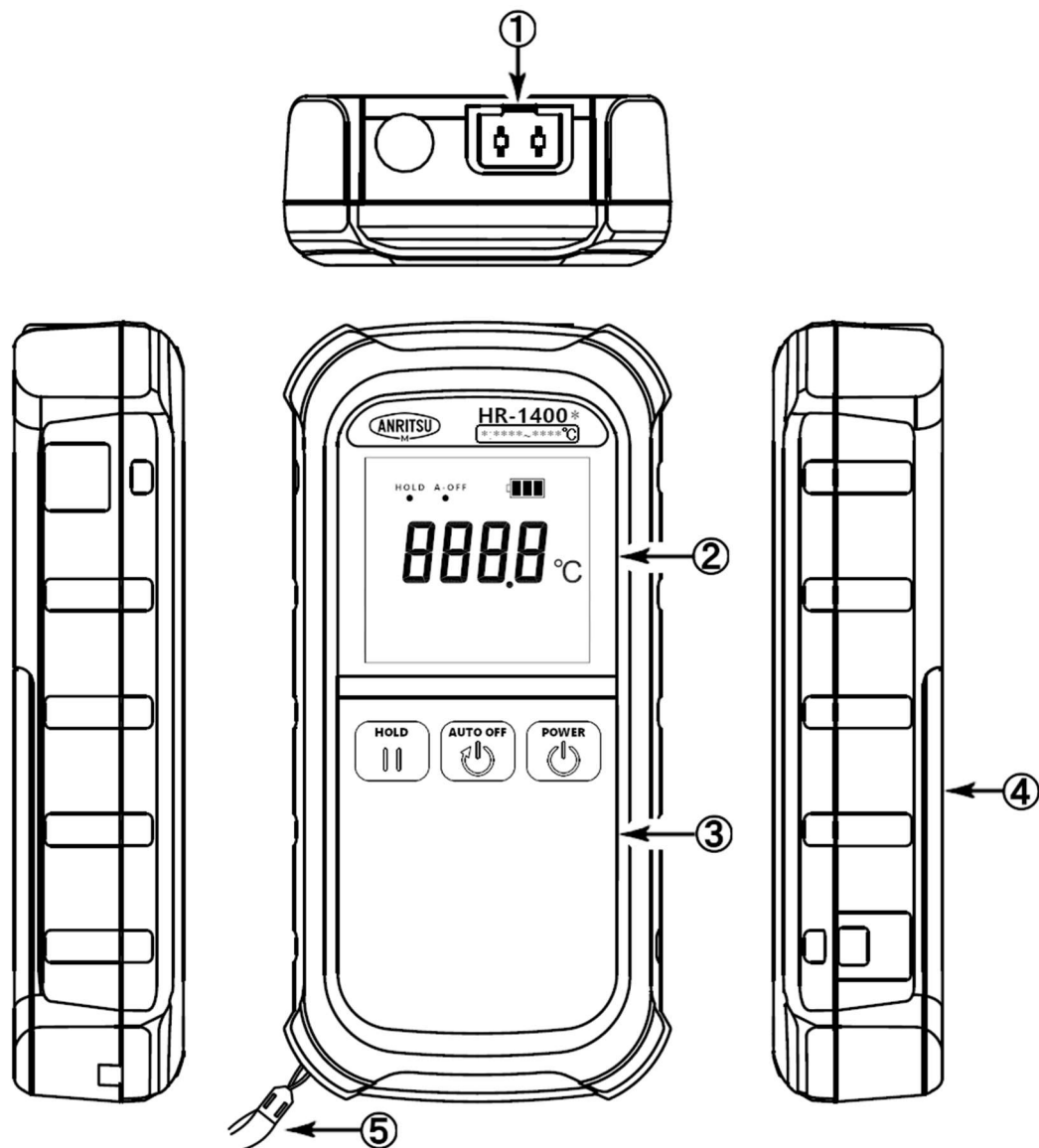
To move this instrument (such as transportation by car), pack it in its original packaging. If such packaging is not available, fully protect the instrument with shock-absorbing material (Styrofoam, etc.). Please note that if packing materials generate dust or moisture, the instrument may become damaged. Please use dry packing materials that do not generate dust.



### 3. Name and Explanation of Each Part

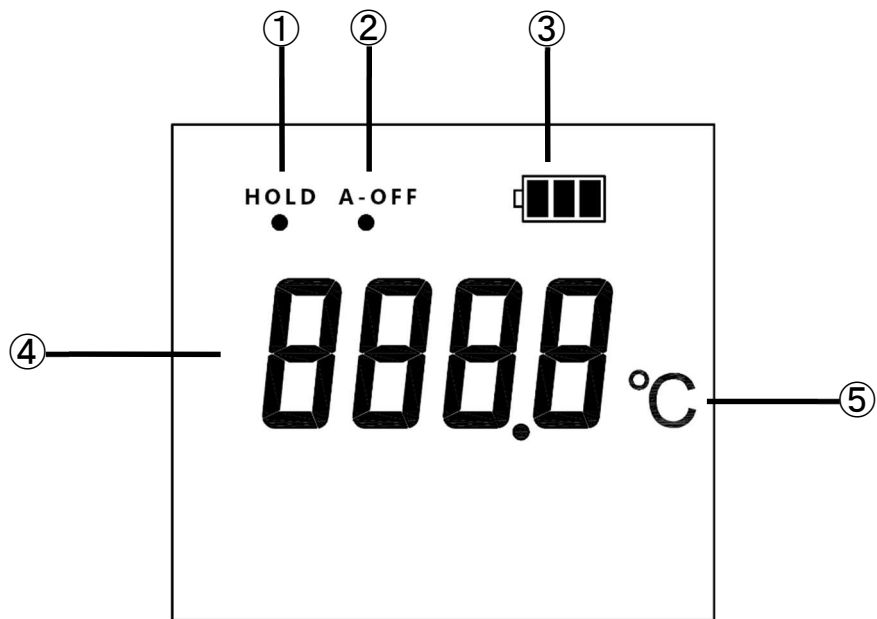
#### 3.1. External View

(HR-1400)



- ① Sensor input connector
- ② display
- ③ Key switch panel
- ④ Battery housing
- ⑤ Hand strap

### 3.2. Display

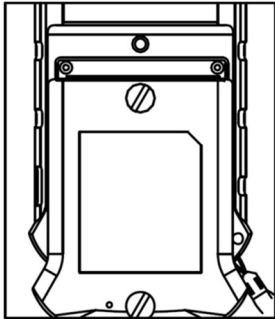


Description		
①	HOLD Indicator	Lights when using the hold function
②	A-OFF Indicator	Lights when using the auto-off function
③	Battery level Indicator	Battery level
④	Main display	Main display
⑤	°C	Temperature symbol

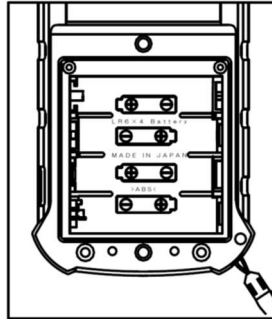
## 4. Preparations Before Taking Measurements

### 4.1. How to Install the Batteries

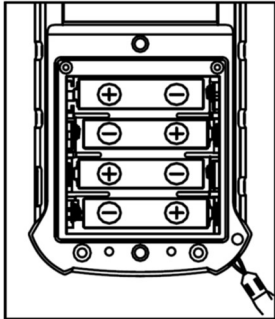
Make sure to turn the power off when replacing batteries.



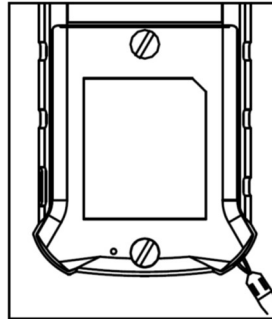
- (1) Remove both screws and open the cover of the battery housing.



- (2) Pay attention to the orientation of the batteries.



- (3) Install the batteries.



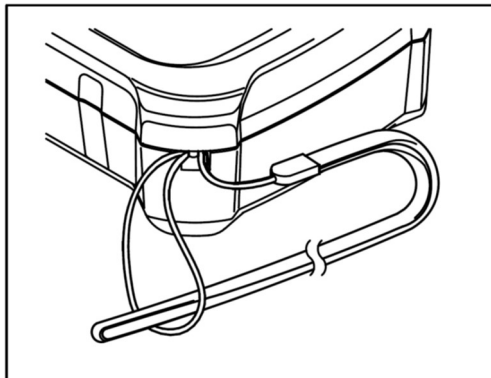
- (4) Reattach the battery housing cover, tighten both screws, and then press the edge of the cover to secure it.

Note: To maintain the waterproofing performance, firmly tighten the screws on the battery cover.

### 4.2. How to Use the Hand Strap

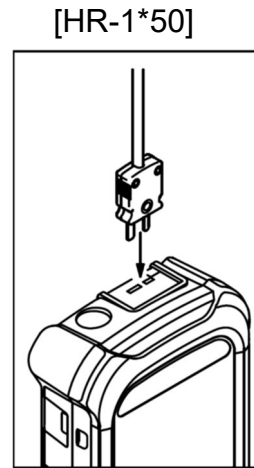
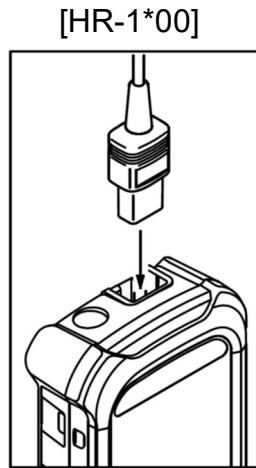
Place the enclosed hand strap on your wrist to prevent the instrument from dropping.

Loop the thin cord of the strap through the hole and then pull the other end of the hand strap through that loop.



### 4.3. How to Set the Sensor

Set the sensor to the main unit as shown in the illustration below. It is designed so that if the sensor orientation is incorrect, it cannot be fully inserted. If the sensor is forcefully inserted, failure may result. Please check the sensor's orientation before inserting it.



### 4.4. How to Use the Soft Case

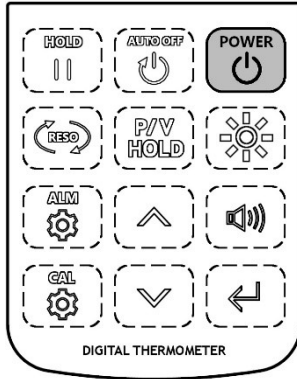
To protect the instrument from dirt or scratches, etc., use the attached soft case.

## 5. Operations and Functions

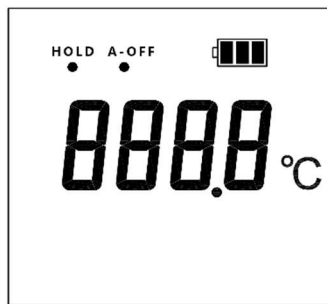
### 5.1. Power ON/OFF

Pressing the **POWER** key will illuminate all the indicators for about three seconds and start the measurements.

Press the **POWER** key again to turn the instrument off.



All illuminated

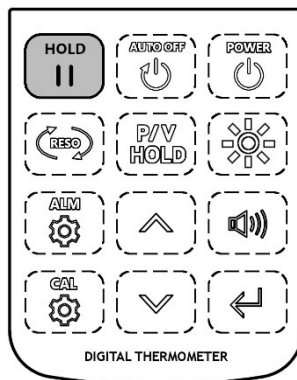


Normal measurement

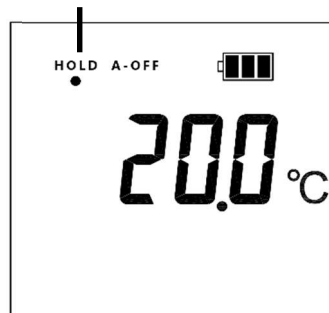


### 5.2. HOLD Function

Press the **HOLD** key to maintain the indicated values during measurements. HOLD will illuminate on the screen while HOLD is on. To release the HOLD function, press the **HOLD** key again.

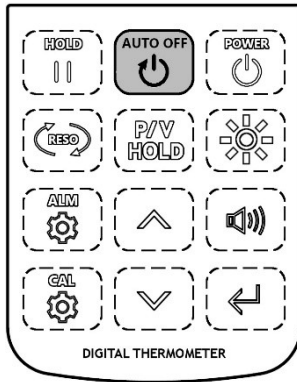


HOLD illuminated

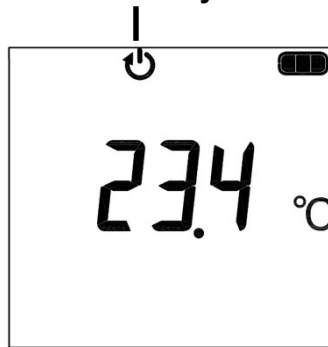


### 5.3. Automatic Power OFF Function

When the **AUTO OFF** key is pressed, “AUTO OFF” symbol will illuminate on the screen. If no key operation is performed for a certain period of time (about five minutes), the power will automatically be turned off, preventing the unit from remaining turned on. To release the Automatic Power OFF function, press the **AUTO OFF** key again.



“AUTO OFF” symbol illuminates



## 6. Retention of Setup Data

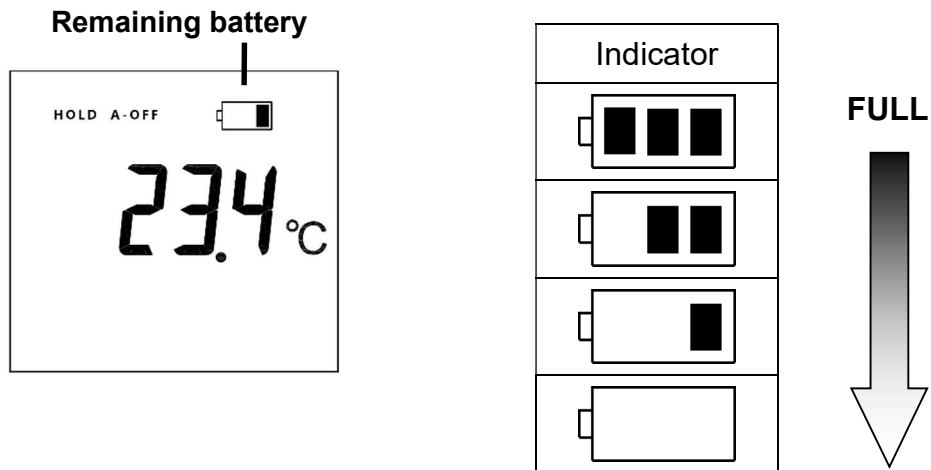
Some settings will be released when the batteries are exchanged or when the instrument is turned off. Please check the details in the following table:


Function	
HOLD	Released
Automatic power OFF	Retained

## 7. Checking the Remaining Battery

Remaining battery is displayed in the top right corner of the indication.

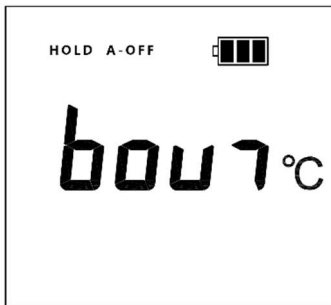
As properties vary, depending on batteries, use this value only as a reference.



When the indication of the indicator becomes  replace the batteries with new ones.

## 8. Error Messages

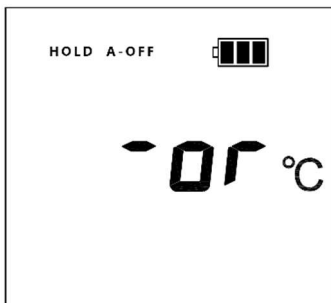
### 8.1. Indication of a Broken Wire of the Sensor



If the sensor has a broken wire or is disconnected, the burnout (broken wire) indication is displayed.

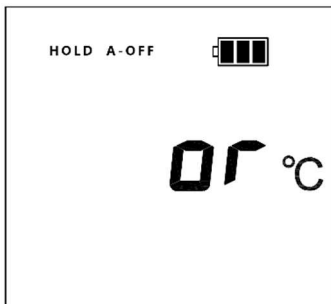
If this indication is displayed, replace the sensor with a new one or connect the sensor.

### 8.2. Overrange Indication



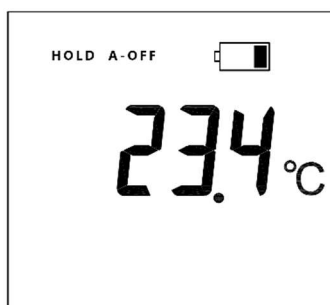
When the temperature in measurement exceeds the measurable range, the overrange indication is displayed.


If the wire of the sensor is about to become broken, this overrange indication may be shown. If it is clear that the temperature in measurement is within the measurable range, check the sensor.



Even if the overrange indication is shown, it will not damage the instrument. However, the sensor may be consumed, so relocate it to a place where the temperature is at a heat-resistant temperature or a lower temperature.

### 8.3. Battery Voltage Drop Indication



When batteries are depleted and the battery indication on the screen becomes  , replace the batteries with new ones.



## **9. Maintenance**

### **9.1. Storage**

When storing the instrument, avoid the following places:

- In direct sunlight
- Subject to heavy vibrations
- High humidity (85%RH or more)
- High temperature atmosphere (50°C or higher)
- Filled with dust, waste, corrosive gas, and/or salt
- High electromagnetic field

To store the instrument for a long time, it is recommended to remove the batteries and store the unit in the original packaging at time of delivery.

### **9.2. When the Case of the Instrument Gets Dirty**

When the case of the instrument gets dirty, please wipe it with a slightly damp cloth. Do not use alcohol, thinner, benzine, or other chemicals. Otherwise, the case or keyboard may become discolored or deformed.

## 10. Troubleshooting: Before Contacting Support

If you find any abnormalities or become unable to operate the instrument, first check for the following items. If you still cannot solve the issue, please contact your retailer or our company.

(1) The instrument does not operate when power is turned on:

- Is the orientation of the batteries in the correct manner?

Reset the batteries.

- Have the batteries been depleted?

Install new batteries.

(2) The indicated values of temperature are unstable:

- Is the wire of the sensor almost broken or is the sensor deformed?

Do an appearance check of the sensor.

- Is the sensor connector inserted fully?

Re-insert the connector.

- Is the sensor sufficiently making contact with the object of measurements?

Change how to set the sensor.

- Is the measurement environment in a high electromagnetic field (such as a large motor)?

- Relocate the instrument or use the shield.

(3) If measurement errors are too large:

- Are the thermocouple types of the sensor and the instrument the same?

Replace the sensor.

- Is the head of the sensor deformed?

Replace it with a new one.

(4) Keys are not responding:

- Is there any burn out (broken wire) indication shown?

Set the sensor.

- Are any functions running?

Terminate various functions and retry to operate the keys.

## 11. HR Series Specifications

### ASP specifications (common)

Model (HR-)		1100, 1200, 1300, 1301, 1400, 1500	
Operation switches		Membrane keyboard (with clicking function)	
Input connector		ASP connector (thermocouple homogeneous metals)	
Input		Thermocouple Type E or K	
No. of input		One	
Signal source resistance		1 k $\Omega$ or less	
Measurement range	1 $^{\circ}$ C resolution	E	-200 to 800 $^{\circ}$ C
		K	-200 to 1370 $^{\circ}$ C
	0.1 $^{\circ}$ C resolution	E	-104.9 to 504.9 $^{\circ}$ C
		K	-104.9 to 504.9 $^{\circ}$ C
Measurement accuracy	1 $^{\circ}$ C resolution	Less than 0 $^{\circ}$ C	$\pm (0.5\% \times \text{indicated value} + 1^{\circ}\text{C})$
		0 $^{\circ}$ C or more	$\pm (0.1\% \times \text{indicated value} + 1^{\circ}\text{C})$
	0.1 $^{\circ}$ C resolution	Less than 0.0 $^{\circ}$ C	$\pm (0.15\% \times \text{indicated value} + 0.2^{\circ}\text{C})$
		0.0 $^{\circ}$ C or more	$\pm (0.05\% \times \text{indicated value} + 0.2^{\circ}\text{C})$
Accuracy of reference junction compensation		$\pm 0.2^{\circ}\text{C}$ (at 25 $^{\circ}\text{C} \pm 10^{\circ}\text{C}$ )	
Temperature coefficient (Only when exceeding 25 $^{\circ}\text{C} \pm 10^{\circ}\text{C}$ )		$\pm 0.02 \times \Delta t^{\circ}\text{C}$ (Exceeded temperature $\Delta t$ is multiplied by the coefficient and then added to the indication tolerance (measurement accuracy + accuracy of the reference junction compensation)) Ex. @50 $^{\circ}\text{C}$ or 0 $^{\circ}\text{C}$ environment: $\pm 0.3^{\circ}\text{C}$ added	
Operational conditions		0 to 50 $^{\circ}\text{C}$ , within 0 to 80% RH (no condensation)	
Storage conditions		-20 to 50 $^{\circ}\text{C}$ , within 0 to 85% RH (no condensation)	
Sampling frequency		About 200 ms	
Linearizer method		Digital linearizer method (compliant with JIS C 1602-2015)	
Dimensions		82.1 $\times$ 166 $\times$ 36 (W $\times$ H $\times$ D) (Excluding connector extrusion)	
Weight		About 350 g (including batteries)	
Analog output		See specifications (analog output)	
Alarm output		See specifications (alarm output)	

Power supply	See specifications (power supply)
Accessories	See specifications (accessories)
Conformity standards (CE)	EMC: EN61326-1: 2013 EN 61326-2-1: 2013 class A Table2 (Industrial) RoHS: IEC EN 63000:2018

### ANP specifications (common)

Model (HR-)		1150, 1250, 1350, 1351, 1450, 1550	
Operation switches		Membrane keyboard (with clicking function)	
Input connector		ANP connector (thermocouple homogeneous metals)	
Input		Thermocouple Type E or K	
No. of input		One	
Signal source resistance		1 k $\Omega$ or less	
Measurement range	1 $^{\circ}$ C resolution	E	-200 to 800 $^{\circ}$ C
		K	-200 to 1370 $^{\circ}$ C
	0.1 $^{\circ}$ C resolution	E	-104.9 to 504.9 $^{\circ}$ C
		K	-104.9 to 504.9 $^{\circ}$ C
Measurement accuracy	1 $^{\circ}$ C resolution	Less than 0 $^{\circ}$ C	$\pm (0.5\% \times \text{indicated value} + 1^{\circ}\text{C})$
		0 $^{\circ}$ C or more	$\pm (0.1\% \times \text{indicated value} + 1^{\circ}\text{C})$
	0.1 $^{\circ}$ C resolution	Less than 0.0 $^{\circ}$ C	$\pm (0.15\% \times \text{indicated value} + 0.2^{\circ}\text{C})$
		0.0 $^{\circ}$ C or more	$\pm (0.05\% \times \text{indicated value} + 0.2^{\circ}\text{C})$
Accuracy of reference junction compensation		$\pm 0.2^{\circ}\text{C}$ (at 25 $^{\circ}\text{C} \pm 10^{\circ}\text{C}$ )	
Temperature coefficient (Only when exceeding 25 $^{\circ}\text{C} \pm 10^{\circ}\text{C}$ )		$\pm 0.03 \times \Delta t^{\circ}\text{C}$ (Exceeded temperature $\Delta t$ is multiplied by the coefficient and then added to the indication tolerance (measurement accuracy + accuracy of the reference junction compensation) Ex. @50 $^{\circ}\text{C}$ or 0 $^{\circ}\text{C}$ environment: $\pm 0.5^{\circ}\text{C}$ added	
Operational conditions		0 to 50 $^{\circ}\text{C}$ , within 0 to 80% RH (no condensation)	
Storage conditions		-20 to 50 $^{\circ}\text{C}$ , within 0 to 85% RH (no condensation)	
Sampling frequency		About 200 ms	
Linearizer method		Digital linearizer method (compliant with JIS C 1602-2015)	
Dimensions		82.1 $\times$ 166 $\times$ 36 (W $\times$ H $\times$ D) (Excluding connector extrusion)	
Weight		About 350 g (including batteries)	
Analog output		See specifications (analog output)	
Alarm output		See specifications (alarm output)	
Power supply		See specifications (power supply)	

Accessories	See specifications (accessories)
Conformity standards (CE)	EMC: EN61326-1: 2013 EN 61326-2-1: 2013 class A Table2 (Industrial) RoHS: IEC EN 63000: 2018

\* About the tolerance

The indication tolerance on the main unit of the thermometer is calculated as “measurement accuracy + accuracy of reference junction compensation”. However, this product is manufactured by customizing the reference junction compensation section for individual products. For this reason, the acceptance-rejection criterion at the time of shipment does not take the accuracy of the reference junction compensation into account and makes judgment for the measurement accuracy only. (This will narrow tolerance.)

For actual use, please calculate the indication tolerance with the formula: measurement accuracy + accuracy of reference junction compensation.

If the value exceeds  $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ , the formula will be: measurement accuracy + accuracy of reference junction compensation + temperature coefficient.

### Specifications (analog output) HR-13\*1

Output rate (to be switched by indication resolution)	1 mV/°C (1°C resolution)	10 mV/°C (0.1°C resolution)
Output range	Full range @1°C resolution measurements	Full range @0.1°C resolution measurements
Analog output conversion accuracy (under the 25°C±10°C environment)	Add equivalent to ±1°C (1 mV) to measurement accuracy	Add equivalent to ±0.1°C (1 mV) to measurement accuracy
Temperature coefficient (When exceeding 25°C±10°C, exceeded temperature Δt°C is multiplied by the coefficient and then added to the analog output conversion accuracy)	± (0.1 mV/°C × Δt°C) Ex. @50°C or 0°C environment: ± 1.5 mV (equivalent to 2°C)	± (0.1 mV/°C × Δt°C) Ex. @50°C or 0°C environment: ± 1.5 mV (equivalent to 0.2°C)
When the sensor disconnected	About -2.3 V	
Out of measurement range (+)	About 5.1 V	
Out of measurement range (-)	About -2.2 V	
Insulation	Insulation resistance	100 MΩ/500 VDC (Between sensor input and analog output)
	Rated working voltage	300Vp-p (Between sensor input and analog output)
Cable		ANGHA-1.5

### Warning

- To prevent electric shock, if the sensor is still in contact with the voltage application part even when the power is off, disconnect the sensor before setting the analog output cable and equipment.
- Do not touch the metal part or terminal part of the sensor cable or analog output cable during measurement.

\* When measuring under the influence of high voltage and high frequency, there is a risk of electric shock and measurement failure, so please contact us.

\* The sensor input and analog output are isolated, but they are connected by a capacitor to reduce output noise.

(Leakage current 0.5mA or less in AC500V withstand voltage test)

\* About analog output

The indicated value is D/A-converted and outputted. The timing of an update is about 200 mS, and the output resolution is in the order of 1 mV.

\* When not used, turn the analog output off (see instruction manual.)

**Specifications (alarm output) HR-13\*0 and HR-13\*1**

	Below lower limit	Within upper/lower limits	Above upper limit
ALM1 Upper limit	Open	Open	Close
ALM2 Lower limit	Close	Open	Open
Cable	ALMHA-1.5		

\* The alarm output uses a photo MOS relay.

ON resistance (internal protection resistance 400Ω, photo MOS relay ON resistance 50Ω) Drive voltage MAX.25V

**Specifications (power supply)**

Model (HR-)	11*0	12*0	13*0	13*1	14*0	15*0
Batteries	4 x Alkaline AA battery (LR6)					
Battery life (continuous operation time)	About 900h	About 900h	About 600h	About 400h	About 300h	About 550h
Analog output (continuous output)	900h	900h	600h	About 20h	300h	550h
AC adaptor (optional) support			•	•		•

\* When the AC adaptor is connected, the AC adaptor has priority as the power supply.

\* When the AC adaptor is connected, the power can be turned on without pressing the POWER key. Therefore, the AC adaptor can be used as an external switch.

\* The HR-1500 has a built-in capacitor to maintain the clock settings. To recharge, please keep the batteries in the housing even when the product is being run by the AC adaptor.



\* Lithium batteries are not used.

\* AC adaptor (optional)

Type name: AD-100-500-HR-R (100 VAC input); AD-220-500-HR-R (220 VAC input)

### Specifications (accessories)

Common	Instruction manual
	Test report
	Warranty sheet
	Soft case
	Hand strap
	4 x Alkaline AA battery (LR6)
HR-13*1	Analog output cable (ANGHA-1.5)
HR-13*0, 13*1	Alarm output cable (ALMHA-1.5)
HR-15*0	Communication cable (AM-USB2)
	Dedicated software (AMS-300)