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Rev.A2

**[ AT720 Temperature Calibrator ]**  
User's Guide

## Safety Summary



Warning



Dangerous :

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS elsewhere in this manual may impair the protection provided by the equipment. In addition it violates safety standards of design, manufacture, and intended use of the instrument.

Disclaimer

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The Applent Instruments assumes no liability for the customer's failure to comply with these requirements.

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Ground  
The Instrument

To avoid electric shock hazard, the instrument chassis and cabinet must be connected to a safety earth ground by the supplied power cable with earth blade.

DO NOT  
Operate In An Explosive  
Atmosphere

Do not operate the instrument in the presence of inflammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

Keep away  
from live circuit

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

Operations not included in  
the manual are forbidden

The protection measurements will be failure while beyond the scope.



Warning: TO AVOIDE INSTRUMENT DAMAGED, PLEASE DO NOT PUT DC VOLT OR CURRENT IN THE TESR TERMINAL  
MAKE SURE THE CAPACITOR IS DISCHARGED BEFORE TESTING

Safety Sign:



Provide double insulation or reinforced insulation protection

Waste Electrical and Electronic Equipment (WEEE) order 2002/96/EC



Do not leave in the trash can

## CERTIFICATION, LIMITED & LIMITATION OF LIABILITY

**Applent Instruments, Inc.** ( shortened form **Applent** ) certifies that this product met its published specifications at the time of shipment from the factory. Applent further certifies that its calibration measurements are traceable to the People's Republic of China National Institute of Standards and Technology, to the extent allowed by the Institution's calibration facility or by the calibration facilities of other International Standards Organization members.

This Applent instrument product is warranted against defects in material and workmanship for a period corresponding to the individual warranty periods of its component products. **The warranty period is 1 year and begins on the date of shipment.** During the warranty period, Applent will, at its option, either repair or replace products that prove to be defective. This warranty extends only to the original buyer or end-user customer of a Applent authorized reseller, and does not apply to fuses, disposable batteries or to any product which, in Applent's opinion, has been misused, altered, neglected or damaged by accident or abnormal conditions of operation or handling.

For warranty service or repair, this product must be returned to a service facility designated by Applent. The buyer shall prepay shipping charges to Applent and the Buyer shall pay all shipping charges, duties, and taxes for products returned to Applent from another country.

Applent warrants that its software and firmware designated by Applent for use with an instrument will execute its programming instruction when properly installed on that instrument. Applent does not warrant that the operation of the instrument, or software, or firmware, will be uninterrupted or error free.

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside the environmental specifications for the product, or improper site preparation or maintenance.

THIS WARRANTY IS BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. APPLENT SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, WHETHER ARISING FROM BREACH OF WARRANTY OR BASED ON CONTRACT, TORT, RELIANCE OR ANY OTHER THEORY.

People's Republic of China  
Jiangsu Province  
Changzhou Applent Instruments Inc.  
Oct. 2009  
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# 1. Unpacking and Inspection

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This chapter provides the following information:



- Packing List
  - Power Requirements
  - Operation Environment
  - Cleaning
  - Replace Battery
  - Adjusting Tilt Stand
- 

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## 1.1 Packing List

After you receive the instrument, carry out checks during unpacking according to the following procedure.

Check that the packing box or shock-absorbing material used to package the instrument has not been damaged.

Referring to the packing list, check that all packaged items supplied with the meter have been provided as per the specified optioned.

If damaged or accessories shortage, please contact the sales department or our agent.

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## 1.2 Power Supply

The Handheld Temperature Meter only can use our configured AC Adapter ATL909 and Li-battery ATL805

AC Adapter

Input Voltage: 90V-260VAC , 49Hz~62Hz

Power: Max 10VA

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Warning: Other model AC Adapter is forbidden. Only L909 and L805 rechargeable Li-battery can be used.

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## 1.3 Operation Environment

Ensure the operation environment meets the following requirements

Temperature Range: 0°C ~ 55°C,

Humidity: 23°C, <70%RH

Altitude: 0~2000m

## 1.4 Cleaning

Do not attempt to clean the internal of AT720



**Warning:**  
Don't Use Organic Solvents (such as alcohol or gasoline) to clean the Instrument.

Use a dry cloth or a cloth slightly dipped in water to clean the casing.

## 1.5 Replace Battery

Build-in rechargeable Li-battery, battery has been installed in the instruments before factory. Change the battery according to the following steps:

Figure 1-1 Battery Change



1. Use the screwdriver to loosen the screw in the battery cover and remove the cover.
2. Remove the plug on the old battery, plug a new one, main direction of the plug.
3. Put the new battery in the instrument, recover and tighten the screws.

## 1.6 Adjusting Tilt Stand

Two positions are provided: degree 60 and degree 45

Degree 45 can provide a better stability for the instrument

Figure 1-2 Position of Degree 60



Folded up the bottom of the bracket to achieve degree 45 position  
Figure 1-3 Position of Degree 45



## 2. Overview



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This chapter provides the following information:

- Overview
  - Main Specification
  - Main Function
- 

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### 2.1 Overview

Thank you for purchasing AT720 Temperature Calibrator

The AT720 adopts high-performance ARM microprocessor control. AT720 has a DC Voltage, thermocouple, resistance, RTD output, fast response, data stability. True-color TFT liquid crystal display, keypad and touch screen double control. Use Li-battery supply power and USB communication. Switch in both English and Chinese.

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### 2.2 Main Specification

- Graduation: thermocouple J, K, T, E, S, N, B, R  
RTD PT100, CU50  
Resistance, DC Voltage
- Automatic temperature compensation provides high accuracy
- Basic Accuracy: 0.05%,

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### 2.3 Main Function

#### 2.3.1 FUNCTION

1. DC Voltage output
2. Thermocouple output
3. Resistance output
4. RTD output

#### 2.3.2 System Setup

- Keypad Lock Function
- Switch in Both Chinese and English
- Data File will Be Saved Automatically
- Touch Screen Setup
- Power Saving Mode



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### 2.3.3 Interface

**USB Host Port:**

USB high-speed mode: 48 MHz, USD-HID Protocol, ASCII Transfer.

## 3. Startup

This chapter describes:



- Front Panel Summary
- LCD Screen
- Interface
- Extern power and Battery
- Power up
- Connection of the Thermocouple

### 3.1 Front Panel Summary

Figure 3-1 Front Panel

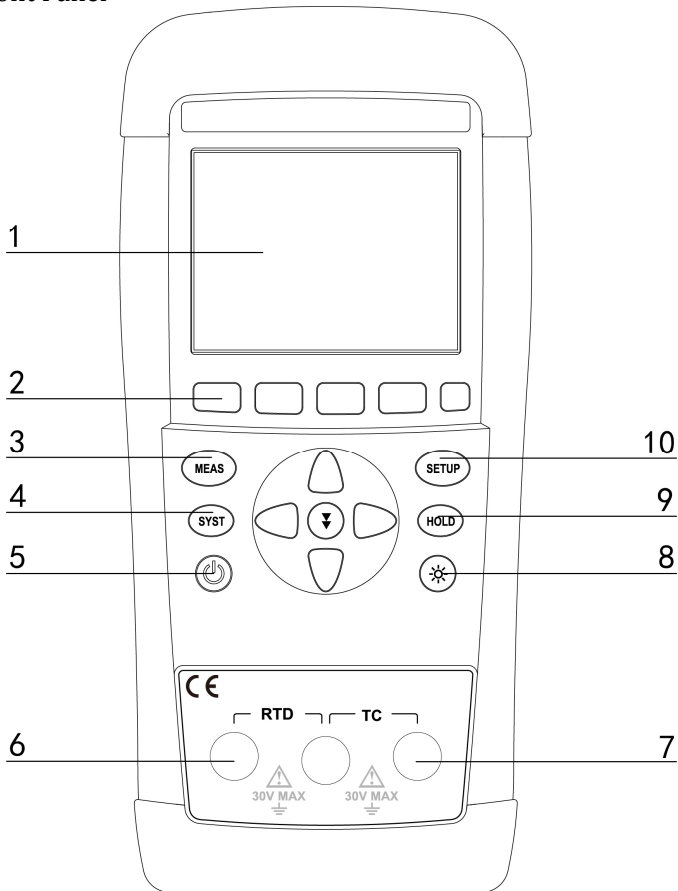


Table 3-1 Description of the Front Panel

1	TFT-LCD Screen
2	Select Keys
3	<b>MEAS</b> Measurement Key——Enter Measurement Page (Page 14:[MEAS] Page)
4	<b>SYST</b> System Key ——Enter System Setting Page (Page 18: [SYSTEM] Page)
5	Power On/Off Battery Charging Indicator
6	RTD Sensor access terminal
7	Thermocouples Sensor access terminal
8	⊗ Background Brightness——30%,50%,70%, 100% Unlock the Keypad Lock
9	<b>HOLD</b> NULL
10	<b>SETUP</b> Enter Setup (Page 15:[SETUP] page)

## 3.2 LCD Screen

Figure 3-2 LCD Screen

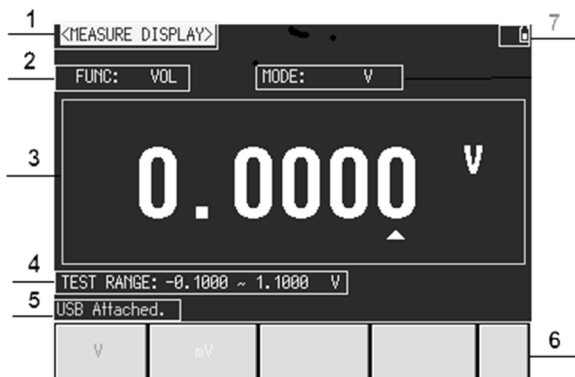


Table 3-2 LCD Screen descriptions

1	The Page Title
2	Blue for the tab bar , white for functional information
3	Signal output settings
4	Blue for the tab bar , white output signal value range
5	Help and Information line
6	Functional areas, each position corresponds to a function key

### 3.3 Interface

Figure 3-3 Interface panel

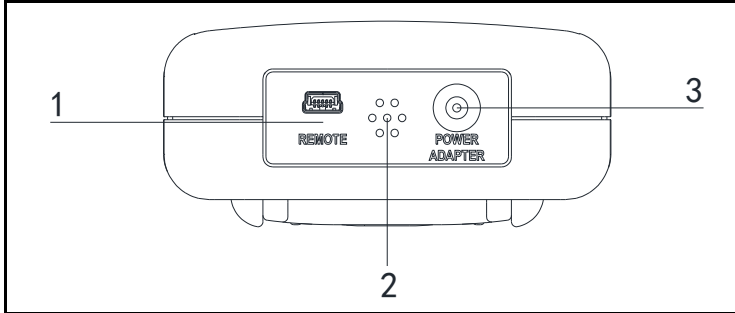


Table 3-3 Interface panel description

1	Remote Control Interface (USB-HID)
2	Buzzer
3	Power Adapter Jack (+9VDC)

### 3.4 External power and Battery

The Battery can only be charged by Power Adapter ATL909.

While using the external power supply, the power adapter is also charging the battery.

Figure 3-4 Power Adapter

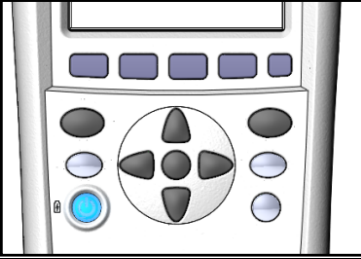


#### 3.4.1 Charge Li Battery

When the battery power is low, you could use the power adapter to charge the

battery. The Power key is orange indicating while charging the battery.

Figure 3-5 Charging LED (Orange)



*Attention!* The key is also orange which charging even when the calibrator meter is off previously.)

### 3.5 Power up

Press the Power key softly to start it.

## 4. [MEAS] Page



This section includes all measure result display information.

- <Measure Display>Page

### 4.1 <MEAS DISPLAY>

When press [Meas] key, the <MEAS DISPLAY> page appears.

<MEASURE DISPLAY> page mainly highlights the measurement results.

The following measurement controls can be set:

- Set output value

Figure 4-1 AT720 <MEAS DISPLAY> Page



#### 4.1.1 Setting Output Value

- Steps to Set output value

Step 1	Press [Meas] key to enter <MEASURE DISPLAY>page
Step 2	Use [◀] and [▶] keys to select the output setting bit
Step 3	Use [▲] and [▼] keys to change the set bit value can be automatically carry or abdicate

## 5. [SETUP]Page



This section includes all setup functions

At any time, press [SETUP] to enter <SETUP> page.

- <SETUP> Page

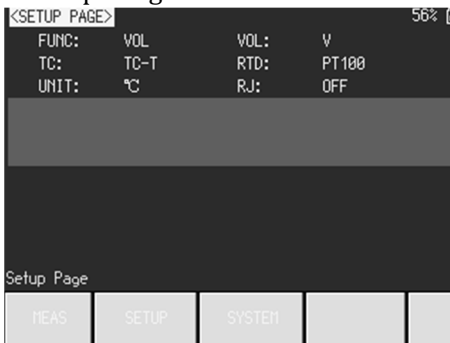
### 5.1 <Setup>Page

In < SETUP> page, the Instrument does not display any results, testing is not in progress.

The setup includes

- FUNC –Chose the type of the thermocouple
- VOL –Temperature Unit Setting
- TC – Sampling Rate
- RTD – Beep Setting
- UNIT – Temperature Unit
- RJ – Temperature Compensation

Figure5- 1<Setup> Page



#### 5.1.1 [FUNC] Setting

The FUNC set includes: DC Voltage, thermocouple, Resistance, RTD

Steps to set the FUNC

Step 1	Press [Setup] key to enter <SETUP>page	
Step 2	Use cursor keys to select [FUNC]field	
Step 3	Use soft key to select	
	<b>Soft Key</b>	<b>Function</b>
	VOL	Output DC voltage
	TC	Output thermocouple
	R	Output Resistance
	RTD	Output RTD

### 5.1.2 [V] Setting

V set Includes: V, mV

#### ■ Steps to set V

Step 1	Press [Setup] key to enter <SETUP> page	
Step 2	Use cursor keys to select [V] field	
Step 3	Use soft keys to select	
	<b>Soft Key</b>	<b>Function</b>
	V	Voltage output range [-0.1~1.1V]
	mV	Voltage output range [-10.00~110.00mV]

### 5.1.3 [TC] Setting

The TC set includes: TC-T, TC-K, TC-J, TC-N, TC-E, TC-S, TC-R, and TC-B

#### ■ Steps to set TC

Step 1	Press [Setup] key to enter <SETUP> page	
Step 2	Use cursor keys to select [TC]field	
Step 3	Use soft keys to select	
	<b>Soft Key</b>	<b>Function</b>
	TC-T	T-type thermocouples
	TC-K	K-type thermocouples
	TC-J	J-type thermocouples
	TC-N	N-type thermocouples
	TC-E	E-type thermocouples
	TC-S	S-type thermocouples
	TC-R	R-type thermocouples
	TC-B	B-type thermocouples

### 5.1.4 [RTD] setting

The RTD set includes: PT100, CU50

#### ■ Steps to Set the RTD:

Step 1	Press [Setup] key to enter <SETUP >page	
Step 2	Use cursor keys to select [RTD]field	
Step 3	Use soft keys to select	
	<b>Soft Key</b>	<b>Function</b>
	PT100	PT100 thermal resistance
	CU50	CU50 thermal resistance

### 5.1.5 [UNIT] setting

The UNIT set includes: °C,K,F

#### ■ Steps to Set the UNIT:

Step 1	Press [Setup] key to enter <SETUP >page	
Step 2	Use cursor keys to select [UNIT]field	
Step 3	Use soft keys to select	



	Soft Key	Function
	°C	Celsius
	K	Degrees Kelvin
	F	France Degree

### 5.1.6 [RJ] setting

The RJ set includes: OFF, ON

■ Steps to Set the RJ:

Step 1	Press [Setup] key to enter <SETUP >page	
Step 2	Use cursor keys to select [RJ]field	
Step 3	Use soft keys to select	
	Soft Key	Function
	OFF	Close temperature compensation
	ON	Open temperature compensation

## 6. [SYSTEM]Page



This section includes all system information.

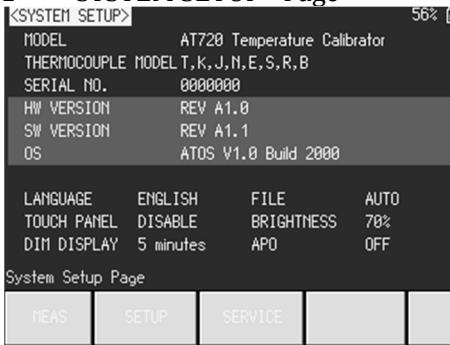
At any time, press [SYST] key to enter [SYSTEM] page.

### 6.1 <SYSTEM CONFIG> page

Following information can be configured in the <SYSTEM CONFIG> page.

- LANGUAGE
- FILE
- TOUCH PANEL
- BRIGHTNESS
- DIM DISPLAY
- APO – Auto Power Off

Figure 6-1 <SYSTEM SETUP> Page



#### 6.1.1 [LANGUAGE]

You can switch system language in both Chinese and English.

##### ■ Procedure to change language

Step 1	Press [SYST] key to enter <SYSTEM SETUP> page.	
Step 2	Select [LANGUAGE]	
Step 3	中文 (CHS)	Switch into Chinese
	ENGLISH	Switch into English

#### 6.1.2 [FILE]

##### ■ Procedure of file setting

Step 1	Press [SYST] key to enter <SYSTEM SETUP> page.
--------	--

Step 2	Select [FILE] field	
Step 3	AUTO	All parameters set by user will be saved in system.
	IGNORED	The parameters will be lost after power off
	SAVE	All parameters set by user will be saved in system.
	NOW	

### 6.1.3 [TOUCH PANEL]

#### Tips

The calibrator meter can work well without touch panel. But you cannot type number without touch panel. When you need to input numbers, the touch panel will be activated even it is shut down in system setting.

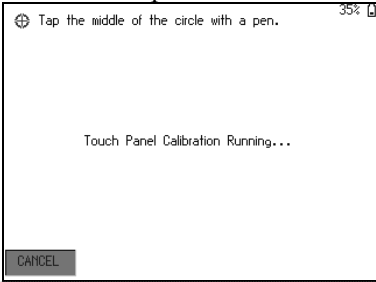
#### ■ Procedure of setting touch panel

Step 1	Press [SYST] key to enter <SYSTEM SETUP > page.	
Step 2	Select [TOUCH PANEL] field	
Step 3	ENABLE	Enable touch panel
	DISABLE	Disable touch panel
	CALIBRATE	Calibrate touch panel
	RESET	Reset touch panel data

#### ■ Procedure to calibrate touch panel

#### Tips

You will need a screen pen to calibrate touch panel.  
Do not use your finger!

Step 1	Press [SYST] key to enter <SYSTEM SETUP > page.
Step 2	Select [TOUCH PANEL] soft key
Step 3	Select [CALIBRATE] soft key
Step 4	Use a screen pen to click screen softly to start calibration 
Step 5	Tap the middle of the circle with a pen on Left-Up corner. Then tap the middle of the circle with a pen on the Right-Bottom corner to finish the calibration.
Step 6	Click on the screen softly to exit.

### 6.1.4 [BRIGHTNESS]

Four degrees of brightness: 30%, 50%, 70%, 100%

Tips	If powered by external power, the brightness is 100%.
	If powered by battery, the low brightness can make the meter work longer.


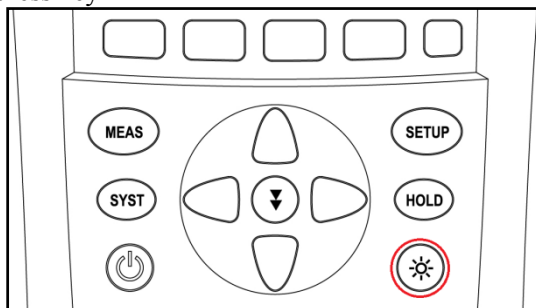
Also, press [] to change the brightness.

Figure6-2The Brightness key



#### ■ Procedure to change brightness

Step 1	Press [SYST] key to enter <SYSTEM SETUP > page.	
Step 2	Select [BRIGHTNESS] field.	
Step 3	30%	30% of full brightness
	50%	50% of full brightness
	70%	70% of full brightness
	100%	Full brightness

### 6.1.5 DIM DISPLAY [DIM]

#### ■ Procedure to dim display:

Step 1	Press [SYST] key to enter <SYSTEM SETUP > page.	
Step 2	Select [DIM DISPLAY]	
Step 3	5 minutes	5 minutes later, brightness becomes 30%
	10 minutes	10 minutes later, brightness becomes 30%
	20 minutes	20 minutes later, brightness becomes 30%
	30 minutes	30 minutes later, brightness becomes 30%
	OFF	Dim display off

Tips:	Timer will be reset when press any keys or touch screen.
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### 6.1.6 AUTO POWER OFF [APO]

#### ■ Procedure of set auto power off:

Step 1	Press [SYST] to enter<SYSTEM SETUP > page.	
Step 2	Select[APO]	
Step 3	5 minutes	5 minutes later, power off
	10 minutes	10 minutes later, power off
	20 minutes	20 minutes later, power off
	30minutes	30 minutes later, power off
	OFF	[APO] off

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Tips:                   Timer will be reset when press any keys or touch screen.

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## 7. Specification



This chapter describes the specifications and supplemental performance characteristics of the AT720:

- Specifications
- Dimension

### 7.1 General Specification

The Data is Achieved under the Following Conditions:

- Temperature: 23°C±5°C
- Humidity: ≤65% R.H.
- Warm-up Time: >60 minutes
- Calibration Time : 12months

Test Environment:

- Temperature and humidity range: 15°C~35°C,80% RH or less
- Storage temperature and humidity range: 10°C~40°C,10~90% RH

FUNCT ION	RANGE	SOURCE	RESOLUTIO N	ACCURACY	REMARK
DCV	100mV	-10.00 ~ 110.00mV	0.01mV	±0.05% Setpoint ±30uV	Max output current ±5mA
	1000mV	-100.0 ~ 1100.0mV	0.1mV	±0.05% Setpoint ±0.3mV	Max output current ±5mA
OHM	400Ω	0.0 ~ 400.0Ω	0.1Ω	±0.05% Setpoint ±0.2Ω	±1mA Excitation current Note1,Note2
TC	T	-200.0 ~ 400.0°C	0.1°C	±0.05% Setpoint ±2°C ( ≤-100°C ) ±1°C ( >-100°C )	ITS-90 Note3
	K	-200.0 ~ 1350.0°C	0.1°C		
	J	-200.0 ~ 1200.0°C	0.1°C		
	N	-200.0 ~ 1300.0°C	0.1°C		
	E	-200.0 ~ 1000.0°C	0.1°C		
	S	-20.0 ~ 1750.0°C	1°C	±0.05% Setpoint ±3°C ( ≤100°C ) ±2°C ( >100°C )	
	R	-20.0 ~ 1750.0°C	1°C	±0.05% Setpoint ±3°C ( ≤400~600°C ) ±2°C ( >600°C )	
RTD	PT100	-200.0 ~ 400.0°C	0.1°C	±0.05% Setpoint ±0.6°C	PT100-385 Note1,Note2
	CU50	-50.0 ~ 150.0°C	0.1°C		

Note:

1. Excluding ancillary lead resistance
2. Excitation current range 0.5mA ~ 2mA, maximum output voltage 1.1V

3. Accuracy does not include internal temperature compensation sensor error
4. Internal temperature compensation sensor range  $-50.0\text{ }^{\circ}\text{C} \sim 50.0\text{ }^{\circ}\text{C}$ ,  $0.5\text{ }^{\circ}\text{C}$  compensation error

## 7.2 Dimension

