Thermologger
AM-9000 Series

User's Manual

Anritsu Meter Co., Ltd.

For safe use

Please observe the following cautions of this product to ensure your safety, to prevent damage of this product, and to maintain accurate measurement results.

⚠ Cautions

- Do not use this product for any purpose other than for temperature measurements.
- Stop using this product immediately if any abnormality is discovered.
- Do not disassemble or modify this product.
- Do not use any power supply other than commercially available dry-cell batteries or the dedicated power adaptor.
- Measurements may become unstable in an electromagnetic environment.
- Do not touch the input plug in an environment where static electricity may be generated.

*This product is not rechargeable.

About batteries

Please read the following warnings and cautions in order to prevent battery leakage, heat generation, and ignition.

⚠ Warnings

- Never incinerate, short-circuit, disassemble, or heat any battery.
- Never recharge dry-cell batteries.
- Use only specified batteries for the instrument.

⚠ Cautions

- Make sure that the polarity of the batteries is correct.
- Remove the batteries if they run out or if you do not intend to use the instrument for a long time.
- Do not mix new and old batteries or batteries of different types together.
- Battery life varies significantly depending on the ambient temperature.

Introduction

Thank you for purchasing this product from Anritsu Meter.
This manual is intended to ensure the safety and correct use of this product.
Please thoroughly read this manual to understand each function of this product, so as to use it correctly.

Note:

■ The contents of this manual and the specifications of this product are subject to change without prior notice.
■ Unauthorized reproduction of all or part of the contents of this manual is prohibited.
■ Although this manual was prepared with the utmost care, if it has an omission or unclear point, please contact Anritsu Meter or our nearest distributor.
■ Anritsu Meter will not be liable for any consequences arising from the use of this product.

Warranty and after-sales service
● Warranty
Our products are shipped after strict internal inspection. However, should you find any failure resulting from manufacture defects, damage during transportation, or the like, please contact your distributor or Anritsu Meter.
The warranty period for our products is one year from the date of delivery. If a failure that is clearly attributable to Anritsu Meter occurs during this period, then we will offer a free-of-charge repair.
Note that the warranty does not cover any failure attributable to the following causes:
- Failure due to force majeure such as fire and earthquake
- Failure due to misuse or improper handling or modification
  (Please note that opening the case or loosening the screws is considered to be a modification.)
  *Our thermocouple sensors are disposables and therefore are not included in the warranty.

● After-sales service
When the instrument is not working properly, refer to this manual again to identify the cause. If the problem still persists, please contact your distributor or Anritsu Meter.
During the warranty period, repairs are carried out according to the terms and conditions of the warranty. After the warranty period, a repair is offered only if the functions of the product are restored or maintained by the repair.

When you return our product for repair or calibration, use the original shipping container that we used to deliver the product. If you do not have the original shipping container, wrap sufficient cushioning material around the product to prevent damage before returning it.

Table of Contents

1 Overview

1.1 Overview

The AM-9000 Series Thermologger is a temperature measuring instrument with multi-channel memory. This instrument accurately stores 6 or 12-channel thermocouple sensor data and voltage input data in its internal memory (memory capacity: 120,000 pieces of data). The stored data can then be transferred to a personal computer through USB communication where it can be used in a wide range of applications, such as graph drawing and documenting, by using dedicated analysis software. Also, the AM-9000 Series Thermologger has a remote control function that allows the setting values to be changed from a personal computer. (The dedicated personal computer software is optionally available.)

Model

AM - 9 0 0 0 E

Thermocouple type: E, K, J, T, R (not indicated for multi-input models)
*Specified at the time of ordering

Model　　0: Fixed thermocouple type/6ch
　　　　　1: Fixed thermocouple type/12ch
　　　　　2: Multi-input/6ch
　　　　　3: Multi-input/12ch
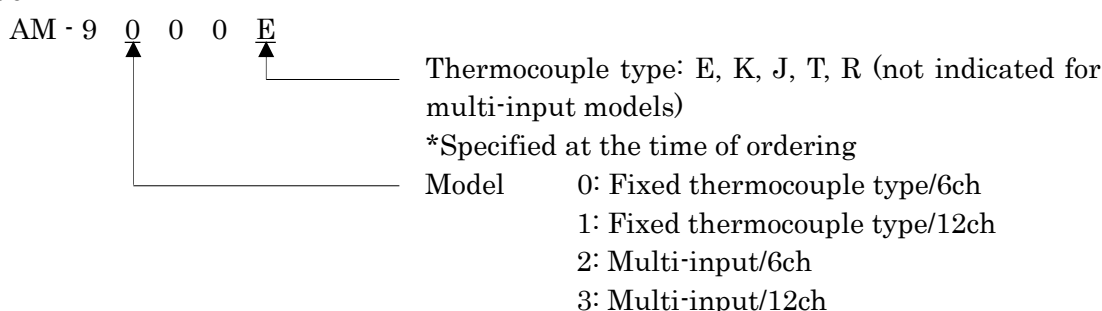
	Fixed thermocouple type/6ch	Fixed thermocouple type/12ch	Multi-input 6ch	Multi-input 12ch
Temperature	AM-9000*	AM-9100*	AM-9200	AM-9300

"*" denotes the thermocouple type (E, K, J, T, or R).

2 Unpacking and Repacking

2.1 Unpacking

Open the container of this product, and then check for the following included items.
Although this product is packed with the utmost care, it may not include all the items or may contain a faulty item. In that case, please contact your distributor or Anritsu Meter.

Thermologger main unit　　　　　……………………... 1 unit
USB communication cable　　　　 ……………………... 1 cable
User's manual (this document)　　 ……………………... 1 copy
Written warranty　　　　　　　　……………………... 1 copy
Soft case　　　　　　　　　　　　……………………... 1 case
AA alkaline battery　　　　　　　 ……………………... 4 batteries

[Note]
The USB communication cable is for data transfer and not for charging.
Also, this measuring instrument is not USB-rechargeable.

2.2 Repacking

When transporting the AM-9000 Series Thermologger (e.g., by car), repack it in its original shipping container.
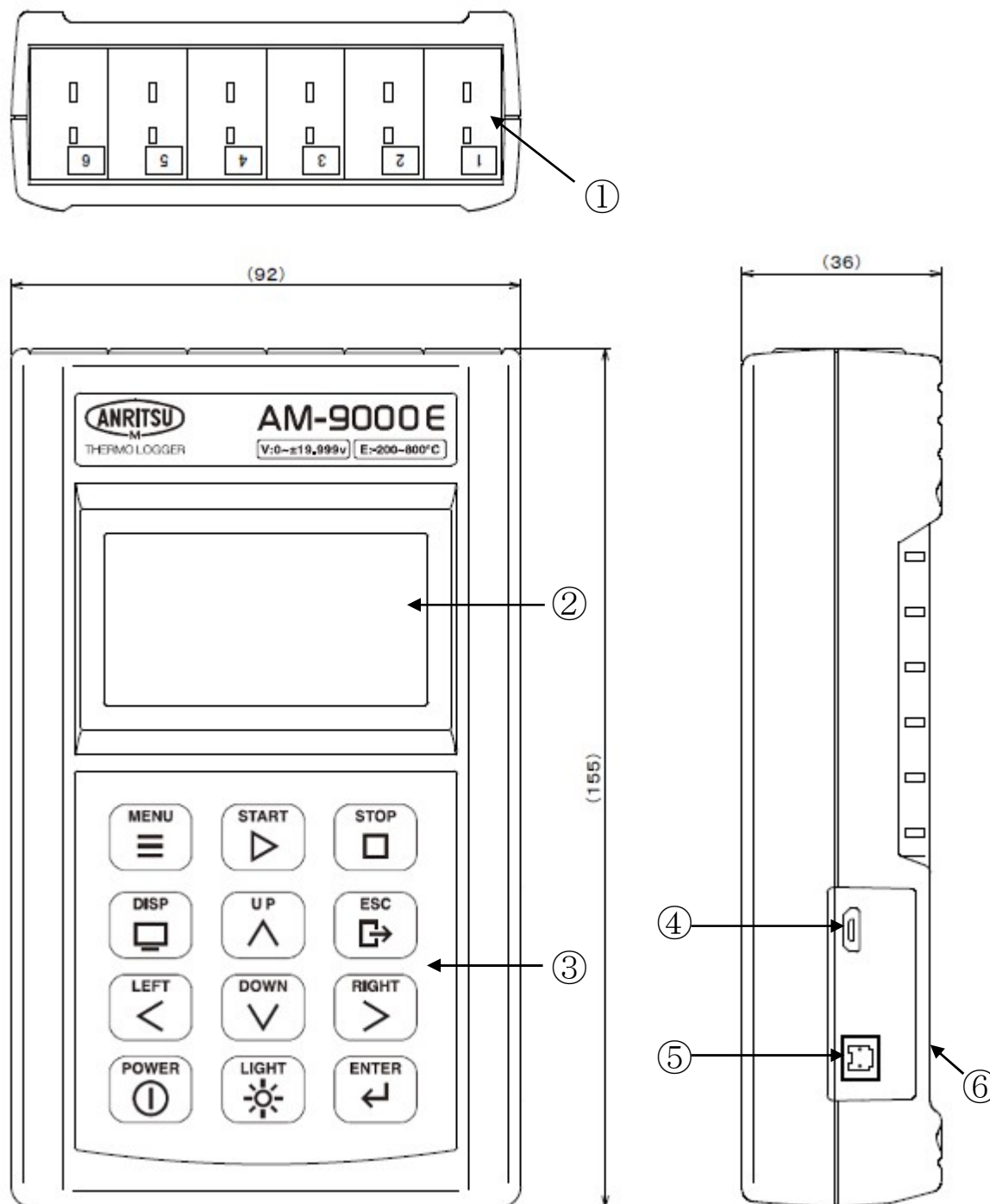
If you do not have the original shipping container, sufficiently pack the instrument with shock absorbing material (e.g., polystyrene foam).

The packaging material must be dry and must not produce dust or water; otherwise the instrument may become damaged.
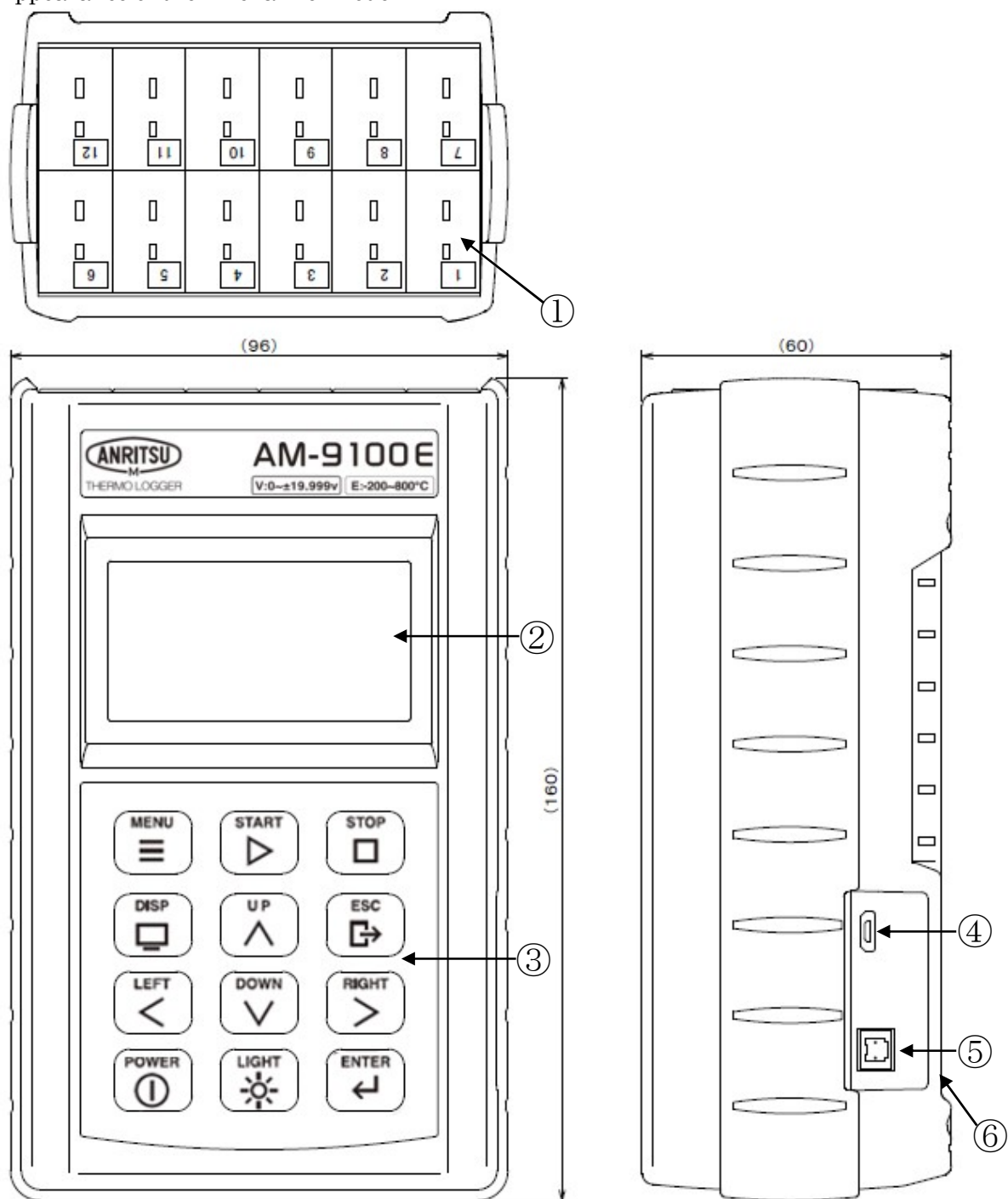
3　Preparing for Operation

3.1　Names of the Components

Appearance of the 6-channel model:

① 　Sensor inputs
② 　Display
③ 　Keypad
④ 　Communication connector
⑤ 　DC jack
⑥ 　Battery compartment

Appearance of the 12-channel model:

①   Sensor inputs
②   Display
③   Keypad
④   Communication connector
⑤   DC jack
⑥   Battery compartment

3.2 Key Names and Functions

Key name	Function
MENU ≡	Displays the main menu screen.
START ▷	Starts the measurement from the command waiting screen.
STOP ☐	Terminates the measurement.
DISP ⬛	Changes the display mode during measurement or reproduction.
ESC ⏏	Redisplays the command waiting screen during menu setup.
POWER ⏻	Turns on or turns off the main power.
ENTER ↵	Confirms the selection of items or the entry of data.
LIGHT ☼	Turns on the backlight.
UP ∧	Moves the cursor up. Increments the value at the cursor position. During measurement in one-channel display mode, it increments the displayed channel.
DOWN ∨	Moves the cursor down. Decrements the value at the cursor position. During measurement in one-channel display mode, it decrements the displayed channel.
LEFT ‹	Moves the cursor left.
RIGHT ›	Moves the cursor right.

3.3 Power Supply
3.3.1   Installing Dry-cell Batteries
  1) Open the cover of the battery compartment, and insert the batteries with the correct
       polarity.
  2) Close the cover.

   * The springs are strong enough to hold the batteries tight, so as to prevent
       instantaneous power failure.
       When removing the batteries, begin with the lowermost one. (The uppermost one is
       held particularly tight.)
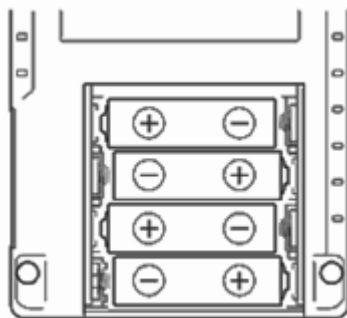

```
[Note]
   Before replacing the batteries, be sure to turn off the power.
```

3.3.2   Using the AC Adaptor
  1) Turn off the power of the main unit, and then connect the jack plug of the AC adaptor as
       shown in the figure below.
  2) Connect the power plug of the AC adaptor to the utility power supply (AC100V).
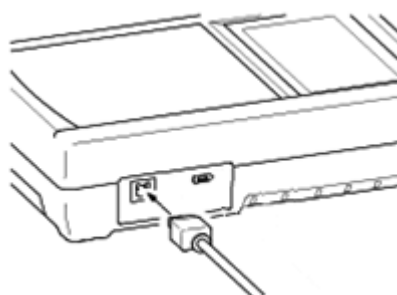

```
[Note]
In order to prevent measurements from being interrupted during power shutdown
such as blackout, it is recommended not to remove the batteries even when using the
AC adaptor.
```

3.3.3　Inserting Input Plugs

1) Check the polarity (+/-) of the input plugs.
   (For the polarity, see the figure below.)

2) Check the polarity (+/-) of the inputs of the main unit.
   Then connect the plugs as shown in the figure on the right.
   (The positive polarity is closest to side of the display.)
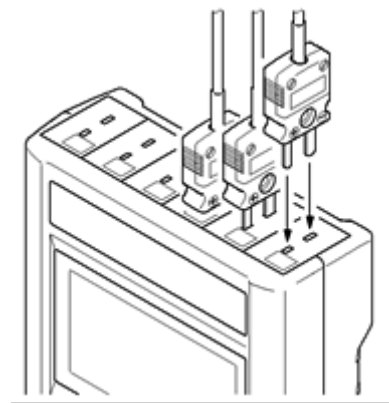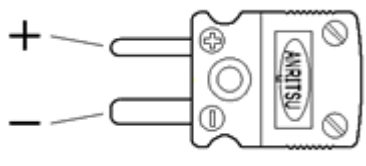
> [Note]
> The input plugs must be optionally-available dedicated plugs (ANP series: dedicated thermocouple/voltage input).
> In a fixed-thermocouple type model (AM-9000/AM-9100), a connector constructed of the same type of metal as that of the thermocouple is used for the inputs of the main unit; however, the internal temperature distribution of the instrument is the only occurrence factor for thermo-electromotive force during voltage measurement, having sufficiently smaller effects on voltage measurements than allowable error.

＊　Set the measurement mode to "OFF" for unused channels. (See section 6.2.2.1.)

4　Power-up and Initial Screen

4.1　Power-up

After preparing for operation, press the $\boxed{\text{P OWE R}}$ key to turn the power on and the initial screen will display.

　　　Display contents:
　　　　　1st line: Product name
　　　　　2nd line: Version number
　　　　　3rd line: Company name

<Initial screen of AM-9000 Series>

After about three seconds, the display will change to the command waiting screen.
　　　Display contents:
　　　　　1st line: Date & time
　　　　　2nd line: Available memory/interval/machine number
　　　　　3rd line: Channel settings

<Command waiting screen of AM-9000>　　　<Command waiting screen of AM-9300>
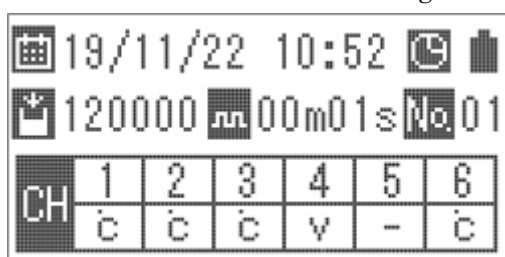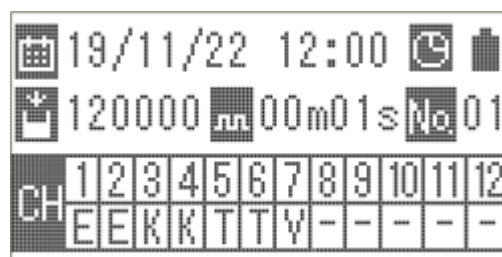
Pictograms:

	Calendar		Interval
	Memory		Machine number
	Timer		Battery

4.2 Descriptions of Displayed Symbols
　　Some units of measurement shown on the display are simplified. Their meanings are described below.

Displayed symbol	Description
00m01s	Represents minutes and seconds.
C	Represents Celsius (°C).
c	Represents Celsius (°C).
v	Represents voltage (V).

5　Power Supply

5.1 Turning the Power Off

5.1.1　　Turning the Power Off by Key Operation
　　Pressing the 　POWER　 key turns the power off.

5.1.2　　Battery Voltage Decrease
　　When the battery voltage decreases, the battery voltage decrease indicator " ▓ " (battery pictogram) appears on the display as shown in the figure on the right. When this occurs, replace the batteries with new ones immediately.
　　Before replacing the batteries, turn the power off.

Battery pictogram

＜Indication of battery voltage decrease＞
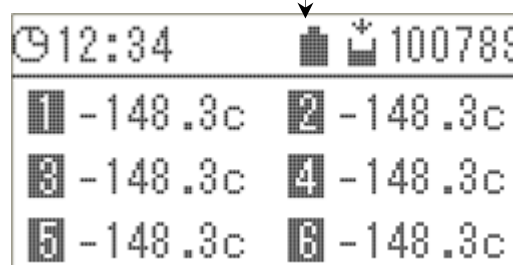
[Note]
If the batteries need to be replaced during measurement, change the power supply of the measuring instrument to the AC adaptor before battery replacement. If the batteries are removed without changing the power supply to the AC adaptor, the measurement will be interrupted and data may be lost.

5.2 AC Adaptor
　　Power supplied by the AC adaptor is recommended during long-term measurement or real-time measurement.
　　It is also recommended that the batteries remain installed even when the AC adaptor is in use. This is because if the AC power supply is cut off, power can be supplied by the batteries.
　　The main unit cannot be powered up or powered down by using the AC adaptor to turn on or off the AC power supply.
　　(The AC adaptor is optionally available.)

6 Starting Measurement and Configuring Settings

You can perform four operations on the command waiting screen.

$\boxed{\text{START}}$ key: Starts measurement at the displayed interval.
(See section 6.1.1.)
$\boxed{\text{MENU}}$ key: Allows you to configure settings such as the interval and calendar.
(See section 6.2.)
$\boxed{\text{POWER}}$ key: Turns the power off.
(See section 5.1.1.)
$\boxed{\text{LIGHT}}$ key: Turns the backlight on.
(See section 6.2.6.)

<Command waiting screen of AM-9000>   <Command waiting screen of AM-9300>
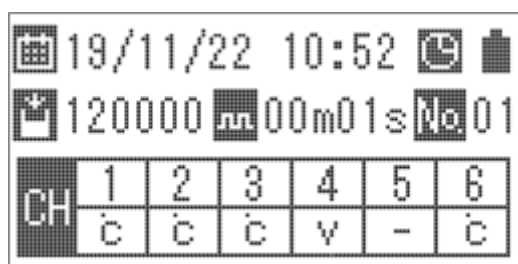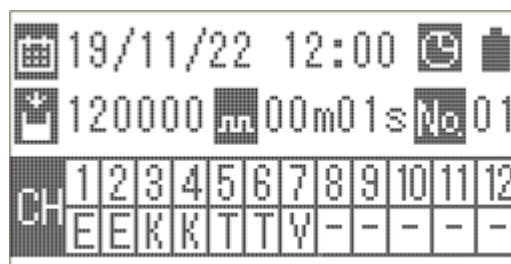
6.1 Types of Measurements

This instrument can perform measurements in four modes: normal measurement, manual measurement, scheduled measurement, and real-time measurement.

In normal measurement, measurement data is recorded at the specified interval.
(See section 6.1.1.)

In manual measurement, measurement data is recorded with an arbitrary timing.
(See section 6.1.3.)

In scheduled measurement, measurement data is recorded in the specified interval during the period between the specified start date & time and end date & time.
(See section 6.1.2.)

In real-time measurement, measurement data is sent to a personal computer through real-time communication at the specified interval. (See section 6.1.4.)

6.1.1   Normal Measurement
Pressing the $\boxed{\textbf{S T A R T}}$ key on the
command waiting screen starts the
measurement. Measurement data is recorded
in memory according to the specified channel
information and interval.
Available intervals vary depending on the
model
.
- AM-9000
         0.1 sec to 99 min 59 sec
- AM-9100/AM-9200/AM-9300
         0.2 sec to 99 min 59 sec

<Command waiting screen>

Current time   Available memory

<Measurement screen>

Also, during measurement, measurement data
is displayed on the measurement screen, or
when the selected channel is viewed.
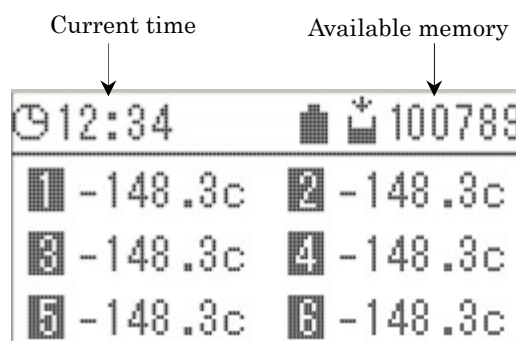
Active keys during measurement:
$\boxed{\textbf{S T O P}}$ key: Terminates the
         measurement and redisplays the
         command waiting screen.
$\boxed{\textbf{D I S P}}$ key: See below.
$\boxed{\textbf{L I G H T}}$ key: Turns the backlight on.
             (See section 6.2.6.)

Pressing the $\boxed{\textbf{D I S P}}$ key changes the
channels to be viewed.

<Screen to view the selected channel
         during normal measurement>
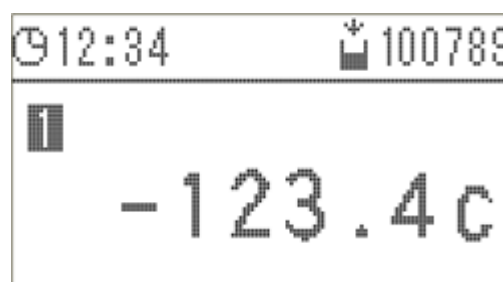
On AM-9000/AM-9200 (6-ch models), the screen changes as follows: data of channels 1 to
6 -> viewing of the selected channel -> data of channels 1 to 6 ->…

On AM-9100/AM-9300 (12-ch models), the screen changes as follows: data of channels
1 to 6 -> data of channels 7 to 12 -> viewing of the selected channel -> data of
channels 1 to 6 ->…

When a selected channel is viewed, use the $\boxed{\wedge}$ and $\boxed{\vee}$ keys to select the channel you
want to view.

- Long-interval measurement is carried out in sleep mode. During the measurement, operation and display are as usual, but communication from outside is not accepted. For communication, see the user's manual of the dedicated personal computer software (AMS-950).
- If an indication such as "OVER" and "B-OUT" is displayed during measurement, see section 7.1.
- If the available memory reaches "0" or becomes smaller than the number of configured channels, then the measurement is terminated.
  To save the data again, see section 7.2.
- If the number of data blocks recorded in memory[*1] reaches 100, the measurement is not carried out.
  To save the data again, see section 7.2.

  *1 The number of data blocks: One block is a data file of one measurement (process from the pressing of the $\boxed{\textsf{S T A R T}}$ key to the pressing of the $\boxed{\textsf{S T O P}}$ key).

6.1.2 Scheduled Measurement

Use the "RESERVE" function to set the start date & time and the end date & time of the measurement (year/month/day, hour, minute). Normal measurement is carried out at the start date & time, and the measurement is terminated at the end date & time. (See section 6.2.2.5.)

If a measurement is scheduled and starts by using the $\boxed{\text{S T A R T}}$ key, it is terminated at the specified end date & time. Also, if an ongoing measurement is terminated by using the $\boxed{\text{S T O P}}$ key, the schedule is cancelled.

6.1.3 Manual Measurement

Use the "MANUAL" function (see section 6.2.2.6) to perform manual measurement.

If the interval is not displayed on the command waiting screen, the manual measurement function is enabled.

Pressing the $\boxed{\text{S T A R T}}$ key stores the latest measurement data in the memory. Also, during measurement, measurement data is displayed on the manual measurement screen, or when the selected channel is viewed.

Manual measurement display

\<Command waiting screen\>

Current time   Available memory

\<Manual measurement screen\>

Active keys during manual measurement:
$\boxed{\text{S T O P}}$ key: Terminates the measurement and redisplays the command waiting screen.
$\boxed{\text{D I S P}}$ key: See below.
$\boxed{\text{L I G H T}}$ key: Turns the backlight on. (See section 6.2.6.)

Pressing the $\boxed{\text{D I S P}}$ key changes the channels to be viewed.

On AM-9000/AM-9200 (6-ch models), the screen changes as follows: data of channels 1 to 6 -> viewing of the selected channel -> data of channels 1 to 6 ->…

\<Screen to view the selected channel during manual measurement\>

On AM-9100/AM-9300 (12-ch models), the screen changes as follows: data of channels 1 to 6 -> data of channels 7 to 12 -> viewing of the selected channel -> data of channels 1 to 6 ->…

When a selected channel is viewed, use the $\boxed{\wedge}$ and $\boxed{\vee}$ keys to select the channel you want to view.

- If an indication such as "OVER" and "B-OUT" is displayed during measurement, see section 7.1.
- If the available memory reaches "0" or becomes smaller than the number of configured channels, then the measurement is terminated.
- If the number of data blocks recorded in memory reaches 100, the measurement is not carried out.   For how to handle this, see section 7.2.
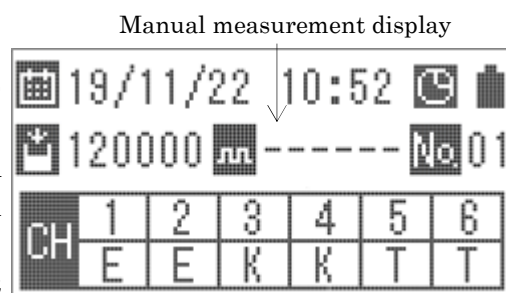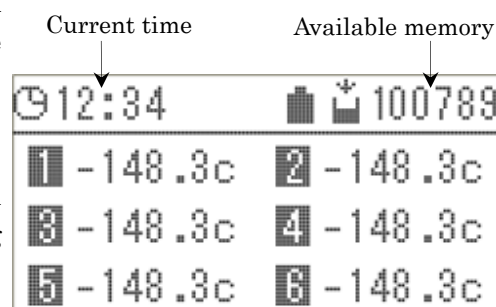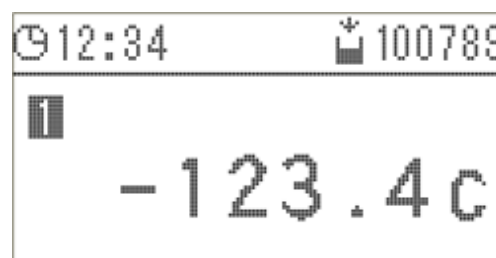
6.1.4   Real-time Measurement

Connect a personal computer and this instrument with the supplied USB communication cable.

Next, use the real-time measurement function of the dedicated personal computer software (AMS-950) on the command waiting screen to set the interval, and then start the measurement.

<Command waiting screen>

In real-time measurement, data is not recorded in the internal memory of this instrument. Available intervals range from 1 sec to 99 min 59 sec.

For details, see the user's manual of the dedicated personal computer software.
(The dedicated personal computer software is optionally available.)

No indication of available memory

<Real-time measurement screen>

Do not perform any key operation on the instrument during real-time measurement.
During real-time measurement, the personal computer cannot detect any decrease in battery power. Also, during real-time measurement, the consumption of current increases.
It is therefore recommended to use the edicated AC adaptor.
(The POWER key is disabled during real-time measurement. When powering down the measuring instrument, terminate the real-time measurement.)
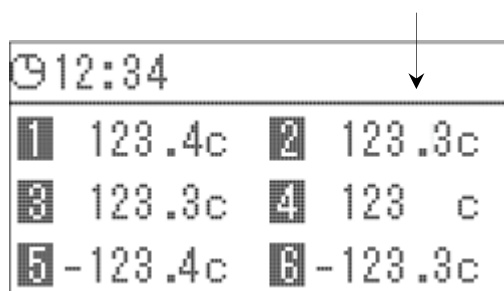
-    If an indication such as "OVER" and "B-OUT" is displayed during measurement, see section 7.1.

6.2 Configuration

You can configure settings for various functions according to the measurement conditions. These functions include simplified check measurement, internal memory data checking and erasing, and interval and calendar setting.

Cursor

Pressing the MENU key on the command waiting screen displays the main menu (MAIN MENU) screen.

<Main menu screen>

In MAIN MENU, you can select from four modes: check measurement, setting of measurement conditions, reproduction and display of recorded data, and erasing of recorded data. Use the ≪, ≫, ⋀, and ⋁ keys to select an item, and then press the ENTER key to confirm the selection.
Pressing the ESC key redisplays the command waiting screen.
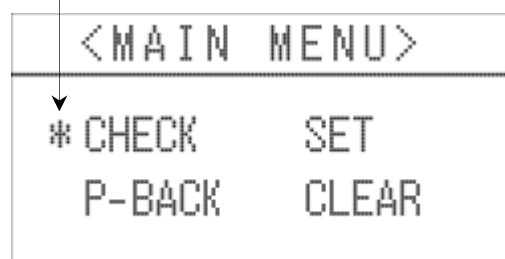
6.2.1   CHECK (Check Measurement)

This function carries out a check measurement in which the measurement data is not recorded in memory.

On the main menu screen, place the cursor at "CHECK" and then press the ENTER key to confirm the selection. A check measurement will start.

Note that check measurements are carried out at a fixed interval of 1 second.

Measurement data is displayed on the check measurement screen, or when the selected channel is viewed.

No indication of available memory

```
⊙12:34
1  123.4c    2  123.3c
3  123.3c    4  123   c
5 -123.4c    6 -123.3c
```

<Check measurement screen>
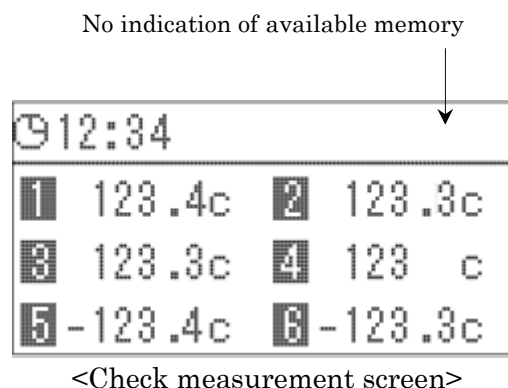
Active keys during check measurement:

STOP key: Terminates the measurement and redisplays the command waiting screen.

DISP key: See below.

POWER key: Turns the power off. (See section 5.1.1.)

LIGHT key: Turns the backlight on. (See section 6.2.6.)

Pressing the DISP key changes the channels to be viewed.

On AM-9000/AM-9200 (6-ch models), the screen changes as follows: data of channels 1 to 6 -> viewing of the selected channel -> data of channels 1 to 6 ->…

No indication of available memory

On AM-9100/AM-9300 (12-ch models), the screen changes as follows: data of channels 1 to 6 -> data of channels 7 to 12 -> viewing of the selected channel -> data of channels 1 to 6 ->…

When a selected channel is viewed, use the ⋀ and ⋁ keys to select the channel you want to view.

- If an indication such as "OVER" and "B-OUT" is displayed during measurement, see section 7.1.

```
⊙12:34
1
   -123.4c
```

<Screen to view the selected channel during check measurement>

6.2.2   SET (Configuration)

This function allows you to set measurement conditions.

On the main menu screen, place the cursor at "SET" and then press the ENTER key to confirm the selection. The measurement condition setup (CONDITION SET) screen will appear.

Next, place the cursor at the item you want to configure, and then press the ENTER key to confirm the selection.

After configuring each item, press the ESC key to return to the command waiting screen.

The settings are backed up in internal memory.

Cursor   Cursor

```
<MAIN MENU>

CHECK    *SET
P-BACK   CLEAR
```
<Main menu screen>

```
< CONDITION SET >
*CHANNEL   RESOL
 INT&MNo.  CLOCK
 RESERVE   MANUAL
```
<Measurement condition setup screen>
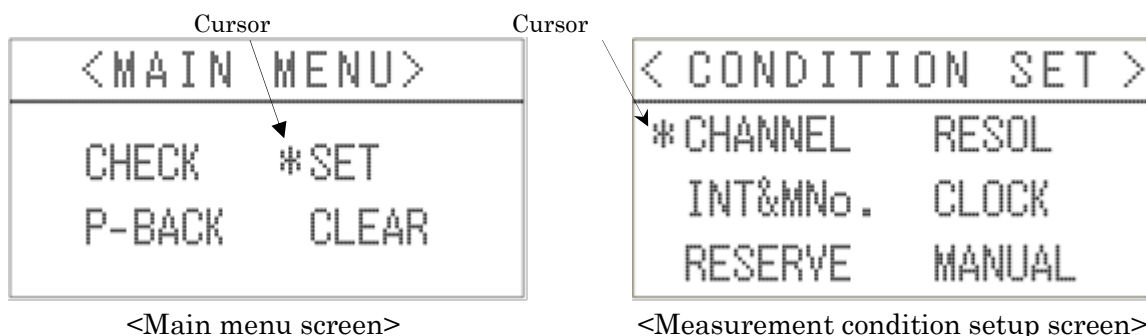
6.2.2.1　CHANNEL (Channel Setup)

This function allows you to set the measurement mode for each channel.

On the measurement condition setup screen, place the cursor at "CHANNEL" and then press the E N T E R key to confirm the selection. The channel setup (CHANNEL SET) screen will appear.

On AM-9100/AM-9300 (12-ch models), pressing the D I S P key changes the screen as follows: channels 1 to 6 -> channels 7 to 12 -> channels 1 to 6 ->…

Use the 《 and 》 keys to place the cursor at each channel, and then use the ⋀ and ⋁ keys to change the setting.

Highlighted   Highlighted

```
<CHANNEL SET>

1:TEMP    2:TEMP
3:TEMP    4:TEMP
5:VOLT    6:TEMP
```
<Channel setup screen of AM-9000/AM-9100>

```
<CHANNEL SET>

1:TEMP-E   2:TEMP-K
3:TEMP-T   4:TEMP-K
5:VOLT     6:TEMP-E
```
<Channel setup screen of AM-9200/AM-9300>
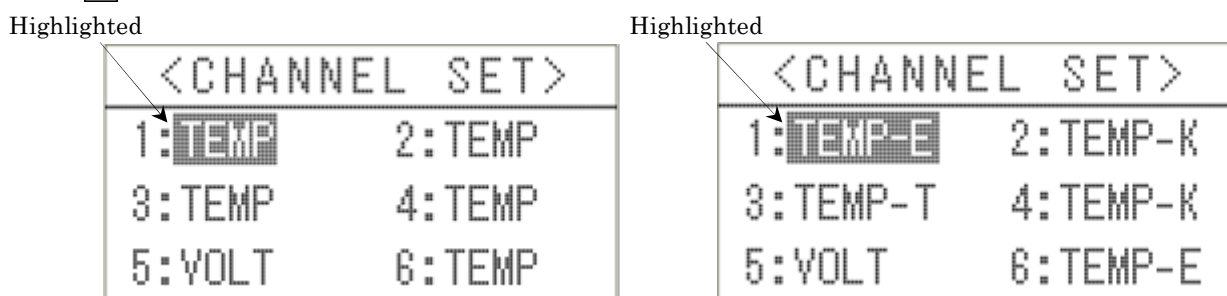
● AM-9000/AM-9100 (models with a fixed thermocouple type)
Pressing the ⋁ key changes the setting as follows: TEMP -> VOLT -> OFF -> TEMP…

● AM-9200/AM-9300 (multi-input models)
Pressing the ⋁ key changes the setting as follows: TEMP-E -> TEMP-K -> TEMP-J -> TEMP-T -> TEMP-R -> VOLT -> OFF -> TEMP-E ->…

* If you use a multi-input model, make sure that the thermocouple type of each channel is the same as that of the temperature sensor connected to it.

After configuring the setting, press the E N T E R key to confirm it.
After configuring each item, press the E S C key to return to the measurement command waiting screen.

* Set the measurement mode to "OFF" for unused channels.

6.2.2.2 RESOL (Resolution Setup)

Highlighted

This function allows you to set the
measurement resolution.
On the measurement condition setup screen,
place the cursor at "RESOL", and then press
the $\boxed{\text{E N T E R}}$ key to confirm the selection.
The measurement resolution setup
(RESOLUTION SET) screen will appear.

```
<RESOLUTION  SET>
1:→  0.1c    2:    0.1c
3:    0.1c    4:      1c
5:    0.1c    6:    0.1c
```

<Resolution setup screen>

On AM-9100/AM-9300 (12-ch models), pressing the $\boxed{\text{D I S P}}$ key changes the screen as
follows: channels 1 to 6 -> channels 7 to 12 -> channels 1 to 6 ->…

Use the $\boxed{\ll}$ and $\boxed{\gg}$ keys to place the cursor at each channel, and then use the $\boxed{\wedge}$ and
$\boxed{\vee}$ keys to change the setting.
Pressing the $\boxed{\vee}$ key changes the setting as follows: 0.1c -> 1c -> 0.1c ->…
Press the $\boxed{\text{E N T E R}}$ key to confirm the setting.

After configuring each item, press the $\boxed{\text{E S C}}$ key to return to the measurement
command waiting screen.
* If a channel is configured for voltage, 0.1c or 1c is displayed, but the resolution for the
  voltage measurement cannot be changed.

6.2.2.3 INT&MNo. (Interval and Machine Number Setup)

This function allows you to set measurement
intervals and the machine number.

Highlighted

On the measurement condition setup screen,
place the cursor at "INT&MNo.", and then press
the $\boxed{\text{E N T E R}}$ key to confirm the selection. The
interval and machine number setup (INTERVAL
SET) screen will appear.
Use the $\boxed{\ll}$ and $\boxed{\gg}$ keys to place the cursor at
the number you want to change, and then use
the $\boxed{\wedge}$ and $\boxed{\vee}$ keys to change it.

```
<INTERVAL  SET>
INTERVAL   00m00s
              000ms
MACHINE No.   01
```

<Interval and machine number setup
screen>

Available intervals vary depending on the model.
- AM-9000: 0.1 sec to 99 min 59 sec
- AM-9100/AM-9200/AM-9300: 0.2 sec to 99 min 59 sec

The interval can be set in increments of 1 sec from 1 sec to 99 min 59 sec and in
increments of 10 msec from 100 to 990 msec. To assign a value less than 1 sec, set the
minutes and seconds to 0 (00m00s).

If you have two or more Thermologger series products, then use "MACHINE No." to
identify them. (01 to 99 can be assigned.)
After configuring each item, press the $\boxed{\text{E S C}}$ key to return to the measurement
command waiting screen.

* If the interval is set to 10 sec or longer, the system enters sleep mode when not
   performing measurements, allowing a reduction in power consumption.
* The 50/60Hz filter is enabled if the interval is set to 0.7 sec or longer.
* If there is an effect of noise, then set the interval to 1 sec or longer and consider other
   measures such as using a non-ground sensor.

6.2.2.4   CLOCK (Date & Time Setup)

This function allows you to set the date &
time (calendar).
On the measurement condition setup screen,
place the cursor at "CLOCK" and press the
ENTER key to confirm the selection. The
calendar setup (CLOCK SET) screen will
appear.
The screen shows the date (year/month/day)
on the 2nd line and the time (hour, minute) on the 3rd line.
Use the ⧏ and ⧐ keys to place the cursor at the number you want to change, and
then use the ⋀ and ⋁ keys to change it.
After configuring the setting, press the ENTER key to confirm it. The seconds are
set to "00".
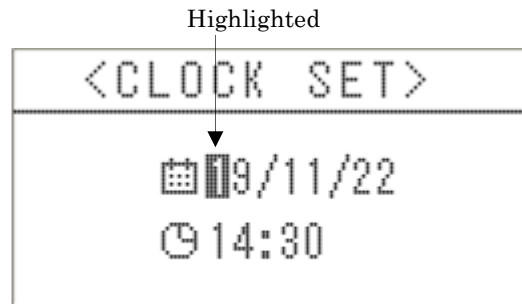
Highlighted

<CLOCK SET>

📅 ▌9/11/22
🕐 14:30

<Calendar setup screen>

After configuring each item, press the ESC key to return to the measurement
command waiting screen.

6.2.2.5   RESERVE (Measurement Start Time Setup)

This function allows you to schedule and cancel a measurement.
Set the start date & time and end date & time for measurement (year/month/day, hour,
minute).

① Time setup:
On the measurement condition setup screen,
place the cursor at "RESERVE" and then press
the ENTER key to confirm the selection.
The measurement schedule setup (RESERVE
SET) screen will appear.
Use the ⋀ and ⋁ keys to place the cursor at
"ON" (or "OFF" to cancel the setting), and then
press the ENTER key to confirm the setting.
The measurement time setup screen will appear.

Cursor

<RESERVE SET>

✳ ON
OFF

<Measurement schedule setup screen>

Highlighted

On the measurement time schedule setup screen,
use the ⧏ and ⧐ keys to place the cursor at
the number you want to change in the
measurement start (upper line) and end (lower
line) times, and then use the ⋀ and
⋁ keys to change it.
After configuring the setting, press the
ENTER key to confirm it.

<RESERVE SET>

▶ ▌9/11/22 14:30
⬣ 19/11/22 14:30

<Measurement time schedule setup screen>

② Start of scheduled measurement:
When the measurement schedule setting is set to "ON", the timer pictogram is displayed on the top right of the command waiting screen.
Afterwards, at the start time, normal measurement starts.
For normal measurement, see section 6.1.1.

<Command waiting screen with scheduled measurement>
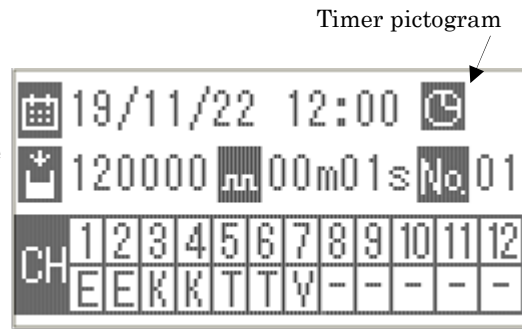
- When measurement starts, it takes a while to confirm the temperature data because of the acquisition of correction data.
- After the measurement, pressing the **MENU** key cancels the scheduled measurement.
- If MANUAL (manual setting) is "ON", the setting will cancel and normal measurement takes place.

6.2.2.6 MANUAL (Manual Setup)

This function allows you to enable or disable manual measurement.

On the measurement condition setup screen, place the cursor at "MANUAL" and then press the | E N T E R | key to confirm the selection. The manual setup (MANUAL SET) screen will appear.

Use the ⬡ and ⬡ keys to place the cursor at "ON" (or "OFF" to cancel the setting), and then press the | E N T E R | key to confirm the setting.

Cursor

```
<MANUAL  SET>

  ⟶* ON
     OFF
```

<Manual setup screen>
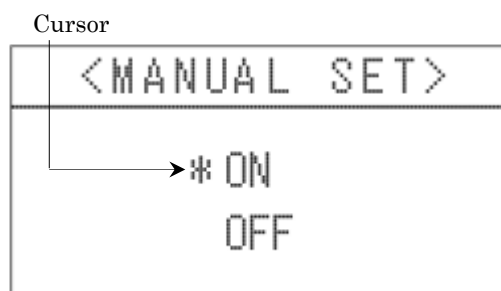
* For manual measurement, see section 6.1.3.

6.2.3   P-BACK (Reproduction)

This function searches for the measurement data recorded in the memory and reproduces it for display.

On the main menu screen, place the cursor at "P-BACK" and then press the | E N T E R | key to confirm the selection. The reproduction setup (PLAY BACK) screen will appear.

Use the ⬦ and ⬦ keys to place the cursor at the number you want to change, and then use the ⬡ and ⬡ keys to change it.

For details on the setting items, see below.

After configuring the setting, press the | E N T E R | key to confirm it.

Highlighted

```
<PLAY  BACK>

TOTAL BLOCK    001
BLOCK ⟶00█-000001
SAMPLE      000001
```

<Reproduction setup screen>
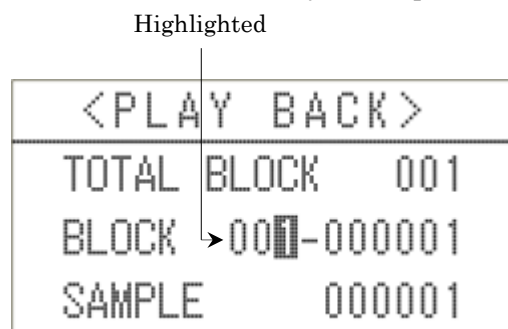
Data search will begin, and measurement data will be reproduced for display.

"TOTAL BLOCK"

The total number of data blocks recorded in the internal memory. One block is a piece of data obtained from the start (| S T A R T | key) to end (| S T O P | key) of a measurement.
Up to 100 blocks can be recorded.

"BLOCK"

Specifies the number of the block to be reproduced for display.
The number shown on the right is the total number of pieces of sample data recorded in the block.

"SAMPLE"

Specifies the sample number of the first piece of the data to be reproduced for display.
This cannot exceed the total number of pieces of sample data, which is shown to the right of the block number.

Key operations on the reproduction data display screen are as follows:

⟨△⟩ key: Shows the next one sample of data.
⟨▽⟩ key: Shows the previous one sample of data.
⟨≫⟩ key: Skips forward four samples of data.
⟨≪⟩ key: Skips back four samples of data.

|E S C| key: Returns to the reproduction setup
              screen.
|D I S P| key: See below.

Block number / Sample number

021-100789
1 -148 .3c   2 -148 .3c
3 -148 .3c   4 -148 .3c
5 -148 .3c   6 -148 .3c
<Reproduction data display screen>
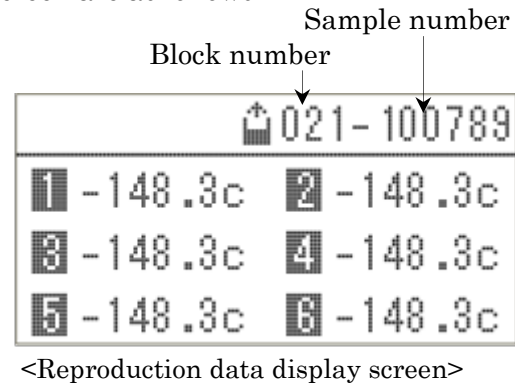
Pressing the |D I S P| key shows the measurement condition screen (reproduction measurement condition screen) for the reproduced data along with the measurement data.

Pressing the |D I S P| key changes the channels to be viewed.

<PLAYBACK INFO>
📅 19/11/22 10:52
〽 00m01s
<Reproduction measurement
condition screen>

On AM-9000/AM-9200 (6-ch models), the screen changes as follows: data of channels 1 to 6 -> measurement conditions -> data of channels 1 to 6 ->...

On AM-9100/AM-9300 (12-ch models), the screen changes as follows: data of channels 1 to 6 -> data of channels 7 to 12 -> measurement conditions -> data of channels 1 to 6 ->...

The measurement condition screen shows the data measurement start date & time and the interval.

6.2.4   CLEAR (Data Erase)
This function erases all of the data recorded in the internal memory.
On the main menu screen, place the cursor at "CLEAR" and then press the |E N T E R| key to confirm the selection. The clear operation selection (CLEAR) screen will appear.
Use the ⟨△⟩ and ⟨▽⟩ keys to place the cursor at "DELETE" (or "CANCEL" to cancel the operation), and then press the |E N T E R| key to confirm the operation.

Cursor

<CLEAR>

→ * DELETE
   CANCEL
<Clear operation selection screen>
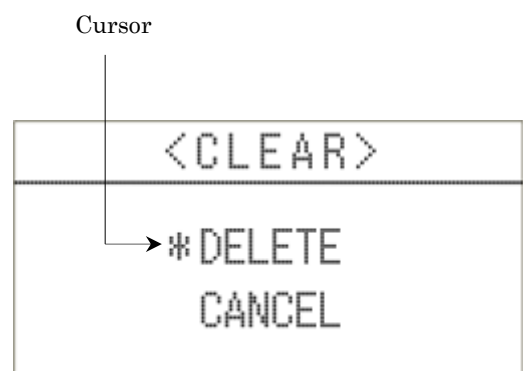
*   Note that once you erase data, it cannot be restored. Be careful not to erase important data.

6.2.5　DISP Function (Display Change)

When the measurement screen is displayed, pressing the $\boxed{\text{D I S P}}$ key changes display mode.

For details, see the description of each measurement function.

6.2.6　LIGHT Function (Backlight)

Pressing the $\boxed{\text{L I G H T}}$ key turns the backlight on.

If the screen is too dim, use this function.

Also, when the backlight is turned on, pressing the $\boxed{\text{L I G H T}}$ key turns the backlight off. When the backlight is turned on, the consumption of current increases and the batteries are consumed more heavily.

6.3　Memory Capacity

Up to 120,000 pieces of measurement data can be stored. The instrument has a setup data memory area for 100 data blocks*1.

<Screen showing there is

no available memory>

If the available internal memory reaches "0" or becomes smaller than the number of configured channels, then the measurement is terminated and the command waiting screen appears. Further measurement is impossible.

In addition, if the available internal memory is not "0", but the number of data blocks used is 100, then further measurement is also impossible.

In the two cases above, in order to continue measurement, it is necessary to erase the data recorded in the internal memory after saving it onto the personal computer, etc.

When saving data onto a personal computer, use the data input function of the dedicated personal computer software.

For details, see section 9 "How to Take Out Data from the Measuring Instrument (AMS-950)" and the user's manual of the dedicated personal computer software.

For how to erase data in memory, see section 6.2.4.

*1 The number of data blocks: One block is a data file of one measurement

(process from the pressing of the $\boxed{\text{S T A R T}}$ key to

the pressing of the $\boxed{\text{S T O P}}$ key).

6.4　Initializing Setting Values

If a malfunction occurs, or if setting values need to be initialized, then press the $\boxed{\text{P OWE R}}$ key while holding down the $\boxed{\text{E N T E R}}$ key to turn the power on. This will cause the buzzer to sound twice in succession after normal power-up, restoring the internal memory to the factory setting*2.

*2 See section 11 "Specifications".

*　Calendar setting values are not changed.

*　Note that once you erase data, it cannot be restored. Be careful not to erase important data.

7 Error Messages and Corrective Measures to Take

7.1 Overrange and Sensor Burnout

If an overrange or sensor burnout occurs, "OVER" or "B-OUT" is displayed, respectively.
If "OVER" is displayed, check whether the measured value is within the applicable range.
If "B-OUT" is displayed, check whether the sensor is burned out.

Overrange   Burnout

<Overrange/burnout indication>
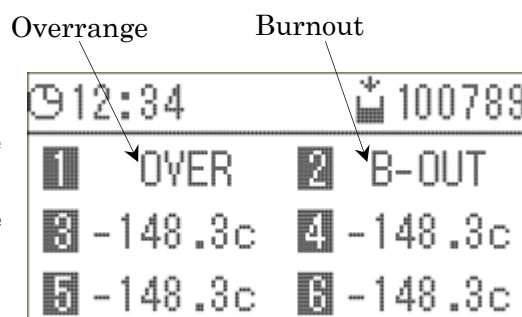
* If the probe burns out during voltage measurement, a reading near 0V is displayed instead of "B-OUT".

* Set the measurement mode to "OFF" for unused channels. (See section 6.2.2.1.)

* This instrument uses an oscillation method to detect a burnout. Therefore, an abnormal temperature value may be displayed instead of "B-OUT", depending on the timing of the measurement or the connection conditions of the sensor.

7.2 Memory Shortage

If the available internal memory reaches 0 or becomes smaller than the number of configured channels, then a buzzer will sound and the measurement is terminated. The command waiting screen will reappear, and further measurement cannot be performed.

In order to continue measurement, it is necessary to erase the data recorded in the internal memory after saving it onto a personal computer, etc.

When saving data onto the personal computer, use a data input function of the dedicated personal computer software.
For details, see section 8.2 "How to Take Out Data from the Measuring Instrument (AMS-950)" and the user's manual of the dedicated personal computer software.

For how to erase data in memory, see section 6.2.4.

8　Dedicated Software AMS-950

The use of the dedicated personal computer software allows the Thermologger AM-9000 Series to communicate with a personal computer.

Install AMS-950 (optionally available) according to the user's manual of the software.

This software requires the following operating environment:
Supported OS: Microsoft Windows 10
　　　　　　　　Microsoft Windows 11
A personal computer that has the specs required for the above OSs to operate normally.

*　Operation is not guaranteed for all personal computers with the recommended environment.

*　The software is available only for users with administrator rights.

*　Macintosh is not supported.

*　Microsoft® Windows® 10 and Windows® 11 are registered trademarks or trademarks of Microsoft Corporation in the United States, Japan, and other countries.

8.1　USB Connection

Use a USB communication cable that has a USB A plug on the side of the personal computer and a USB micro-B plug on the side of the measuring instrument. Connect the plug to a connector with a ⟨⟨USB⟩⟩ mark on the personal computer.

USB micro-B plug　　　　　　USB A plug

Measuring instrument　　　　　　　　　　　Personal computer
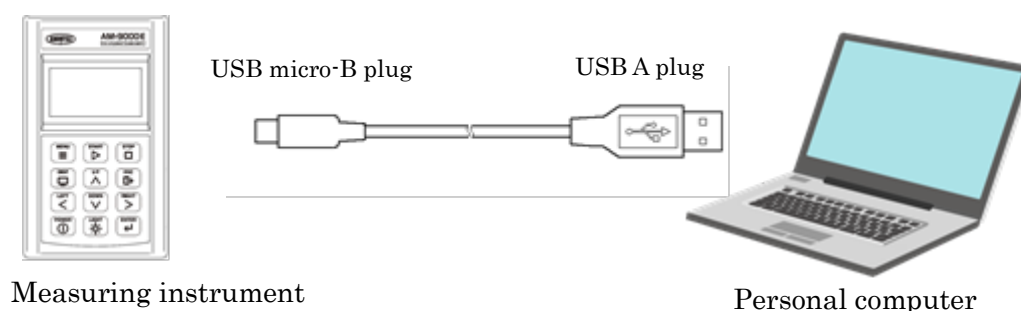
[Note]
For details on the communication connectors of a personal computer, see the user's manual of the personal computer software, etc.
When not communicating with the personal computer, be sure to disconnect the measuring instrument from the personal computer (remove the communication cable). If other application software is used with the measuring instrument when remaining connected, it may malfunction or break down.

8.2 How to Take Out Data from the Measuring Instrument (AMS-950)
Upload the data stored in the measuring instrument onto a personal computer to create a file.

1) Make sure that the measuring instrument and the personal computer are connected, and turn on the measuring instrument.
2) Start up the dedicated personal computer software AMS-950 (optionally available).
3) Configure [Destination folder to save file] and [Serial port setting] on the [Setting(S)] menu.
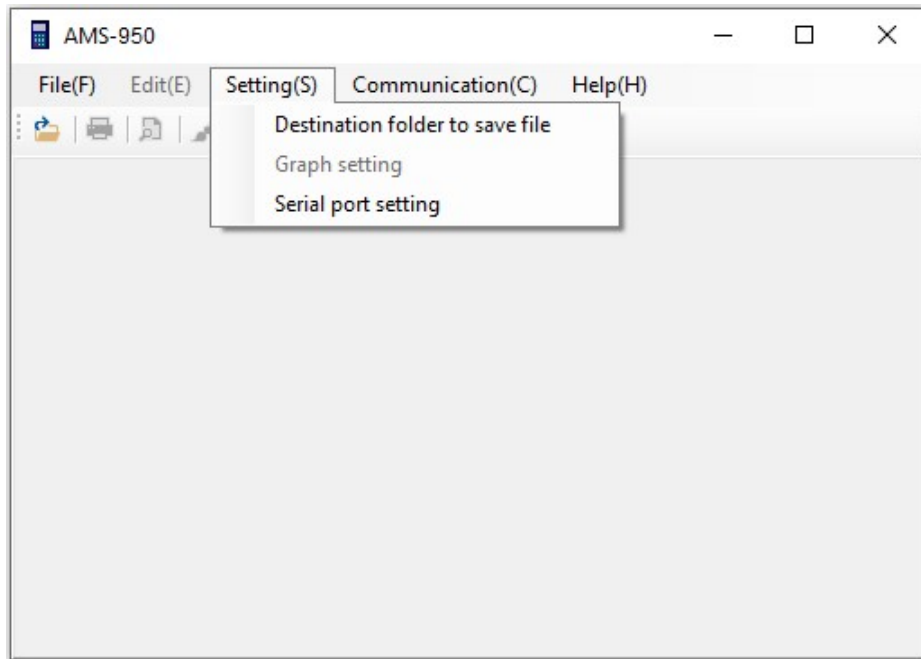
A file will be saved into the location where the transferred data is saved.
Create and specify a folder in an easy-to-find location on the personal computer.
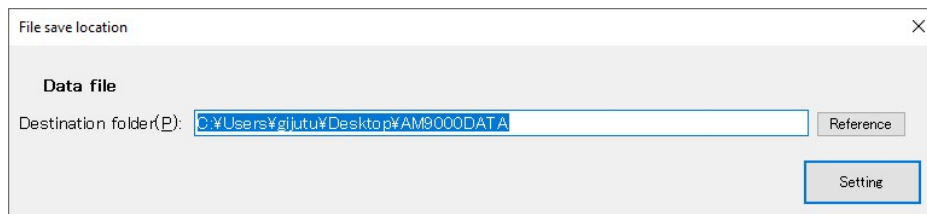
Set a serial port each time you start up AMS-950.
For details on the COM port number, see the user's manual of AMS-950.
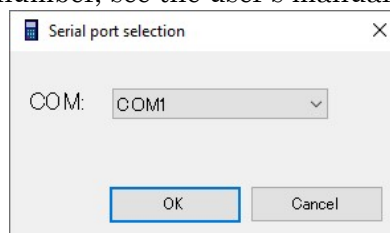
4) Select [Input data] from the [Communication(C)] menu.
A dialog box will appear, asking " Start data input? "
Selecting "Yes" starts the data input.
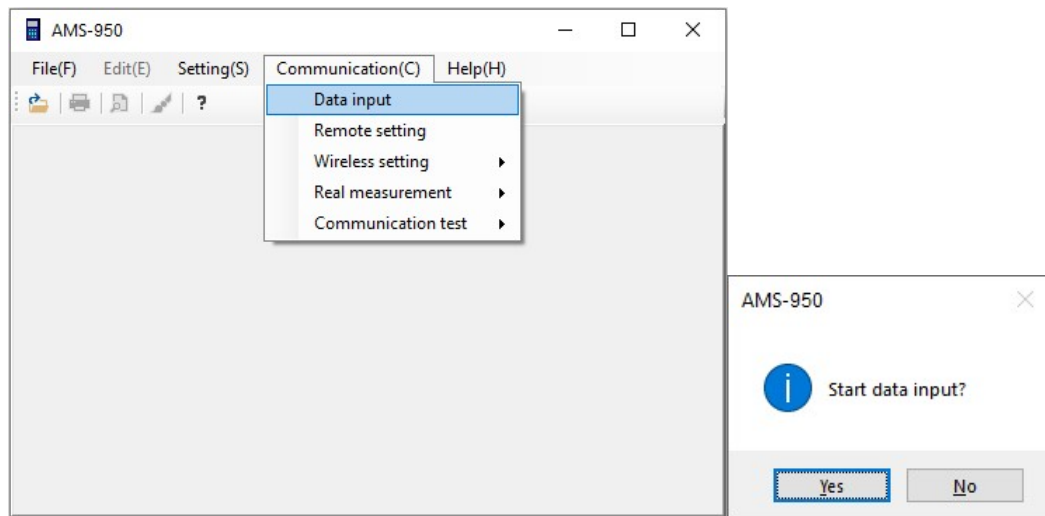
5) During communication, the transfer progress bar is displayed as shown below, allowing you to check the status of data transfer. If you press [Interruption], the communication is interrupted, and a file will not be created.
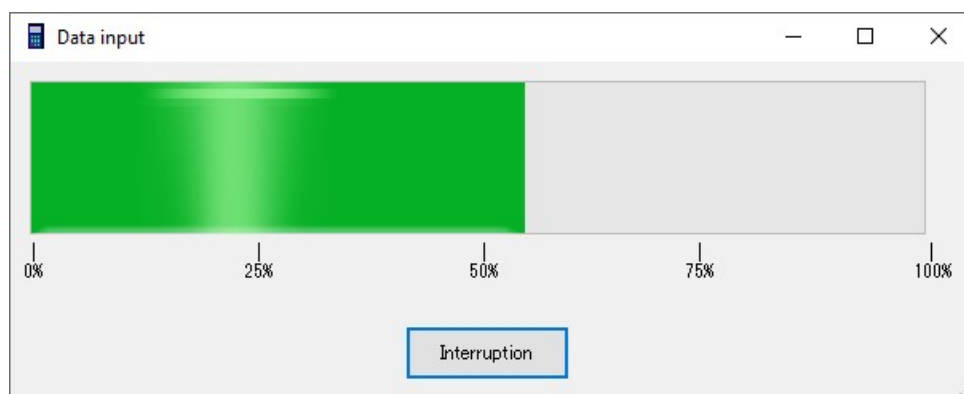
Do not perform any key operation on the measuring instrument during communication; otherwise, an abnormal termination or malfunction may occur.
* After data input, the data still exists in the measuring instrument. If a communication error or the like has occurred, perform the data input again.

6) Upon completion of the data input, a newly created data file is displayed.

AMS-950 ✕

ⓘ Data file Am-0001.an4 has been created.

OK
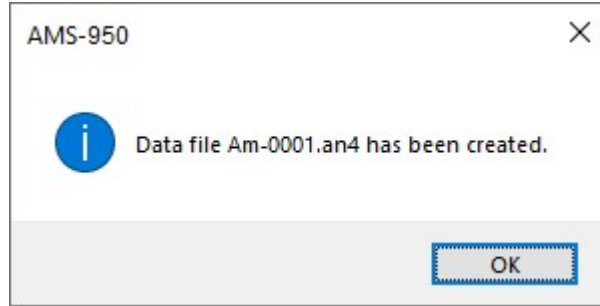
[Note] About file names:
A file is named Am-****.an4.
"****" denotes sequential numbers from 0001 to 9999, which are assigned to each directory.
Also, even if you delete a file, the numbers of other files remain unchanged.
For example, if files numbered up to 9999 are stored on the hard disk and the files numbered 0001 to 9998 are deleted, then the file numbered 9999 is left alone.
In this case, it is impossible to save an additional file into the directory where the highest numbered file (9999) is stored.
To store new data in this directory, change the file name.
   (Example)
     Change "Am-9999.an4" to "Am-0001.an4" or another name.

The use of the personal computer software allows you to perform real-time measurement.
For details, see the user's manual of the dedicated personal computer software AMS-950.

9 Maintenance

9.1 Storage

When storing the Thermologger, avoid the following conditions:

- Exposure to direct sunlight
- Strong vibration
- High humidity (85% R.H. or higher)
- High temperatures (50°C or higher)
- Environment containing dust, waste, corrosive gas, or saline matter
- Strong electromagnetic field

If the instrument is kept in storage for a long time, it is recommended to store it in the original box used for delivery.

Also, since the batteries have a risk of battery leakage, they should be removed before storing the instrument.

9.2 Case Cleaning

If the case of the instrument becomes dirty, gently wipe clean with a damp cloth (water). Do not use solvents such as alcohol, thinner, or benzine, as this they may discolor or deform the case or keypad of the instrument.

10 Precautions

- To perform normal measurement (sleep mode measurement) at long intervals, be sure to use new batteries or the AC adaptor.

- If the AC power supply goes down while the AC adaptor is in use, then power will be supplied from the installed batteries.

- If batteries are not installed and the instrument is operated with only the AC adapter, then operation is not restored after recovery from a power failure unless the main unit is switched on again.
  Thus, it is impossible to turn on or turn off the main unit by turning on or off the AC power supply.

11 Specifications

Fixed thermocouple type models:

Model		AM-9000	AM-9100
Number of inputs		6 inputs: ANP connector (Input with the same type of metal as that of thermocouple)	12 inputs: ANP connector (Input with the same type of metal as that of thermocouple)
Input type		Temperature: Select one from types E, K, J, T, or R at the time of ordering *1 Voltage: V	
Measurement range	Temperature	See table 1.	
	Voltage	±20.000V	
Measurement accuracy	Temperature	See table 2.	
	Voltage	±(0.05% of reading + 0.003V)	
Reference contact compensation accuracy		±0.3°C (within 25°C ±10°C)	
Temperature coefficient		±(0.04 × Δt°C) △t°C : Excess of temperature when the environmental temperature is other than 15-35°C Example: Environmental temperature 40°C △t=5°C, Temperature coefficient=±0.2°C	
Signal source resistance		500Ω or less (measurement interval of 1 sec or more)/100Ω or less (measurement interval of less than 1 sec)	
Input resistance (voltage input)		Approx. 5MΩ	
Linearize		Digital linearize method (compliant with JIS C1602-2015)	
Permissible applied voltage		Between input pins on the same channel: ±30VDC	
		Between input pins on adjacent channels: 150Vp-p	
Memory capacity		120,000 pieces of data	
Measurement interval		1 sec to 99 min 59 sec (in increments of 1 sec) 0.1 sec to 1 sec (in increments of 0.01 sec)	1 sec to 99 min 59 sec (in increments of 1 sec) 0.2 sec to 1 sec (in increments of 0.01 sec)
Interface		USB 2.0 (micro-B)	
Display		Monochrome graphic LCD	
Operating switch		12-key membrane switch	
Operating environment		0 to 40°C, 15 to 80% R.H. (no condensation)	
Storage environment		-10 to 50°C, 10 to 85% R.H. (no condensation)	
External dimensions/weight		Approx. 92 (W) × 155 (H) × 36 (D) mm Approx. 380g (including the batteries)	Approx. 96(W)×160(H)×60(D) mm Approx. 480g (including batteries)
Power supply		Internal: 4 AA alkaline batteries (LR6); External: dedicated AC adaptor (optionally available)	
Accessories		4 AA alkaline batteries, user's manual, communication cable, certificate of analysis, and soft case	
Optionally available items		Dedicated AC adaptor, dedicated data analysis software, and carrying case	
Conforming standards		RoHS Directive / CE Marking EN61326 classA	

*1 Types J, T, and R are optional.

Multi-input models:

Model		AM-9200	AM-9300
Number of inputs		6 inputs: ANP connector (copper/copper)	12 inputs: ANP connector (copper/copper)
Input type		Temperature: Multi-input (E, K, J, T, R) Voltage: V	
Measurement range	Temperature	See table 1.	
	Voltage	±20.000V	
Measurement accuracy	Temperature	See table 2.	
	Voltage	±(0.05% of reading + 0.003V)	
Reference contact compensation accuracy		±0.5°C (within 25°C ±10°C)	
Temperature coefficient		±(0.04 × Δt°C) Δt°C : Excess of temperature when the environmental temperature is other than 15-35℃ Example: Environmental temperature 40°C 　　　　　△t=5°C,　　Temperature coefficient=±0.2°C	
Signal source resistance		500Ω or less (measurement interval of 1 sec or more) / 100Ω or less (measurement interval of less than 1 sec)	
Input resistance (voltage input)		Approx. 5MΩ	
Linearize		Digital linearize method (compliant with JIS C1602-2015)	
Permissible applied voltage		Between input pins on the same channel: ±30VDC	
		Between input pins on adjacent channels: 150Vp-p	
Memory capacity		120,000 pieces of data	
Measurement interval		1 sec to 99 min 59 sec (in increments of 1 sec) 0.2 sec to 1 sec (in increments of 0.01 sec)	
Interface		USB 2.0 (micro-B)	
Display		Monochrome graphic LCD	
Operating switch		12-key membrane switch	
Operating environment		0 to 40°C, 15 to 80% R.H. (no condensation)	
Storage environment		-10 to 50°C, 10 to 85% R.H. (no condensation)	
External dimensions/weight		Approx. 92 (W) × 155 (D) × 36 (H) mm Approx. 410g (including batteries)	Approx. 96 (W) × 160 (D) × 60 (H) mm Approx. 540g (including batteries)
Power supply		Internal: 4 AA alkaline batteries (LR6); External: dedicated AC adaptor (optionally available)	
Accessories		4 AA alkaline batteries, user's manual, communication cable, certificate of analysis, and soft case	
Optionally available items		Dedicated AC adaptor, dedicated data analysis software, and carrying case	
Conforming standards		RoHS Directive / CE Marking EN61326 classA	

Table 1: Measurement range

Thermocouple type	Measurement range
Type E	-200 to 800°C
Type K	-200 to 1370°C
Type J	-200 to 1100°C
Type T	-200 to 400°C
Type R	0 to 1760°C

Table 2: Measurement accuracy
(excluding reference contact compensation accuracy, at 25°C ± 10°C)

Thermocouple type	Accuracy compensation range	AM-9000/AM-9100	AM-9200/AM-9300
Type E/K/J/T	-200.0 to -100.1°C	±1.0°C	±1.5°C
	-100.0 to -0.1°C	±0.5°C	±1.0°C
	0.0 to 200.0°C	±0.3°C	±0.5°C
	200.1 to 500.0°C	±0.5°C	±0.7°C
	500.1°C or more	±0.7°C	±1.0°C
Type R	0.0 to 500.0°C	±1.5°C	±2.0°C
	500.1°C or more	±2.0°C	±2.5°C

*   If the measurement interval is less than 1 sec, ±0.5°C is added for type E/K/J/T and ±1°C is added for type R

- Factory default settings
    Fixed-thermocouple type models

Channel setting	Temperature
Resolution	0.1
Interval	1s
Machine No.	1

Multi-input models

Channel setting	E
Resolution	0.1
Interval	1s
Machine No.	1

12 Appendix

12.1 Maximum Continuous Operating Time
(25°C standard value during operation with AA alkaline batteries)

Measurement interval	Allowable operating time
0.2 sec	Approx. 50 hours
1 sec (wired)	Approx. 55 hours
1 sec (wireless)	Approx. 20 hours
10 sec (wired)	Approx. 140 hours

12.2 Measurement Interval and Allowable Memory Recording Time (Operation with AC Adaptor)

Measurement interval	Number of channels used					
	1ch	2ch	3ch	4ch	5ch	6ch
1 sec	33 hours	17 hours	11 hours	8 hours	6 hours	5 hours
10 sec	13 days	6 days	4 days	3 days	2 days	2 days
30 sec	41 days	20 days	13 days	10 days	8 days	6 days
600 sec	833 days (Approx. 2 years)	416 days (Approx. 1 year)	277 days (Approx. half year)	208 days	166 days	138 days (Approx. 4 months)

Measurement interval	Number of channels used					
	7ch	8ch	9ch	10ch	11ch	12ch
1 sec	4 hours	4 hours	3 hours	3 hours	3 hours	2 hours
10 sec	1 day	1 day	1 day	1 day	1 day	1 day
30 sec	5 days	5 days	4 days	4 days	3 days	3 days
600 sec	119 days (Approx. 4 months)	104 days (Approx. 3 months)	92 days	83 days	75 days	69 days (Approx. 2 months)

12.3 Operation Overview

Membrane keys:

Key name	Function
START	Starts measurement
STOP	Terminates measurement
DISP	Changes the display*1
MENU	Displays the main menu
ESC	Displays the command waiting screen
$\ll, \gg, \wedge, \vee$	Move the cursor and changes the number of the data to be displayed*2.
$\vee, \wedge$	Increase and decrease numbers or change mode*3 Change the channel to be displayed*4
ENTER	Confirms the selection of items or the entry of data
LIGHT	Turns on the backlight

*1: Enabled only during measurement or P-BACK data display
*2: Enabled only during P-BACK data display
*3: Enabled only during measurement condition setup
*4: Enabled only when the selected item is viewed during measurement

Main menu screen (MAIN MENU)

Item name	Function
CHANNEL	Configures the channels to be used
RESOL	Sets the resolution
INT&MNo	Sets the measurement interval and machine number
CLOCK	Sets the date & time
RESERVE	Sets the measurement start time
MANUAL	Configures manual mode

Menu name	Function
CHECK	Performs check measurement
SET	Measurement condition setup
P-BACK	Reproduces measurement data
CLEAR	Erases measurement data

■　Note that turning the power on while holding down the ⌈E N T E R⌋ key erases all setup and measurement data including measurement conditions.

■　To erase measurement data, use the "CLEAR" command on the main menu.

■　The interval for check measurement is 1 sec. Also, the measurement data is not recorded in memory during check measurement.