ONMEAS®

Rev.B4

AT4808~32

HANDHELD Multi Channel Temperature Meter



User's Guide

Scan QR code for operation video

Safety Summary

Warning  Dangerour：

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

Safety Sign:

 Provide double insulation or reinforced insulation protection

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

 Do not leave in the trash can

CERTIFIACTION, LIMITED & LIMITATION OF UABILITY

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.

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People's Republic of China
Jiangsu Province
Changzhou Applent Instruments Inc.
Oct. 2009
Rev.A1

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1. Unpacking and Inspection

This chapter provides the following information:

- Packing List
- Power Supply
- Operation Environment
- Cleaning
- Battery Change
- Bracket Adjustment

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.

1.2 Power Supply

The Handheld Temperature Meter only can use our configured AC Adapter ATL909 and Li-battery ATL801
AC Adapter

Input Voltage: 90V-260VAC，49Hz~62Hz
Power: Max 10VA

Warning: Other model AC Adapter is forbidden. Only Applent Instruments Inc. L909 and L801 rechargeable Li-battery can be used.

1.3 Operation Environment

Ensure the operation environment meets the following requirements

Temperature Range: 0℃～55℃，
Humidity: 23℃, < 70%RH
Altitude: 0~2000m

1.4 Cleaning

Do not attempt to clean the internal of AT4808

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 Battery Change

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

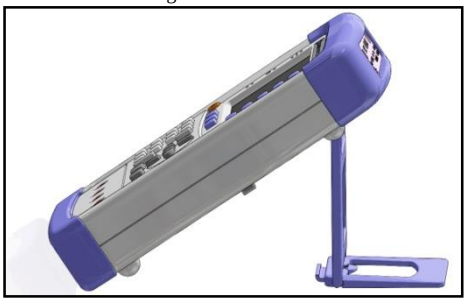
Two positions are provided: degree 60 and degree 45
Degree 45 can provide a better stability for the instrument

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. General

This chapter provides the following information:

- Index
- Main Specification
- Main Function

2.1 Index

Thank you for purchasing AT4808 Multi-channel Handheld Temperature Meter
AT4808 Multi-channel Handheld Temperature Meter adopts high-performance ARM microprocessor control, collects multi-channel temperature data simultaneously. The AT4808 can be extended to 128 channels, compatible with a variety of temperature sensors, fast response, data stability while with the burnout detection function.
Configuration Mini-USB (virtual serial port) interface, through the software to achieve data acquisition, analysis and printing.
Support USB disk storage, real-time save of the sampling data. You can separately calibrate the data of each channel.

2.2 Main Specification

Technique specifications of AT4808 Multi-channel Handheld Temperature Meter includes the basic technique data and allowed test range. All these can be achieved while input market.

- Graduation: thermocouple J ,K, T, E, S, N, B
- Basic Accuracy: 0.2%±1℃
- Measurement Range: -200.0℃~1800.0℃（change according to different thermocouple type）
- Resolution: 0.1℃
- Channel: 8 channels (can be extended to 128 channels)

2.3 Main Function

2.3.1 Functions

1. Comparator Setting
2. Speed Setting
3. Beep Setting
4. Baud Rate Setting
5. Temperature Unit Setting

2.3.2 Sorting Setting

Build-in sorting data, each temperature data can be set both up limit and low limit

2.3.3 Correction Function

Each channel data can been corrected by the user.

2.3.4 FAT Save Function

Users are allowed to create file suffix [.csv], every channel data can be saved in USB memory (do not support removable hard disk)

2.3.5 System Setting

1. Keypad Lock Function
2. Switch both in English and Chinese
3. Date and Time Setting
4. Administrator and user accounts, password is available to the administrator
5. Backlight setting
6. Automatic screen-off time setting

2.3.6 Remote Control

Support Max 115200bps baud rate, compatible with SCPI protocol, ASCII transfer

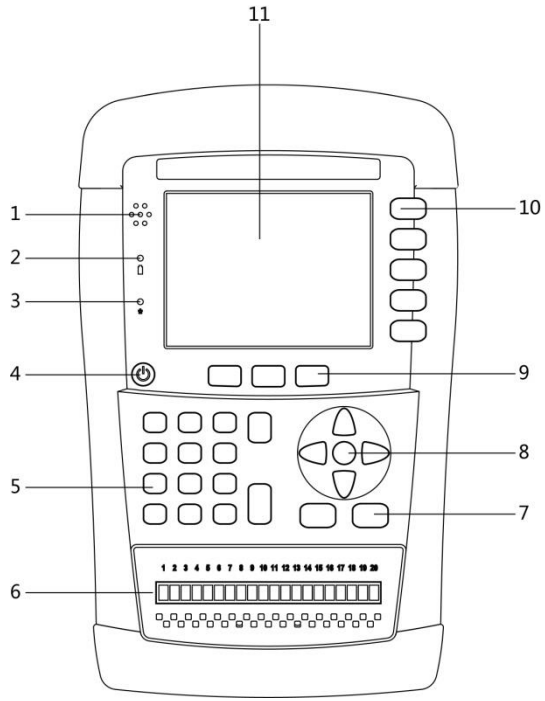
3. Start Up

This chapter provides the following information:

- A tour of front panel
- A tour of interface panel
- Use an external power supply
- Power up
- Connection of the test terminal

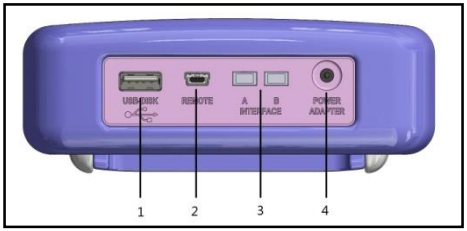
3.1 A tour of front panel

Figure 3-1 description of front panel

Front panel	Item	Function
	1	Beeper
	2	Charging Indicator
	3	Trigger Indicator
	4	Power Switch
	5	Numeric Keypad
	6	Test Terminal
	7	Main Interface Shortcuts
	8	Cursor Keys
	9	Taskbar Function Keys
	10	Sidebar Function Keys
	11	LCD Window

3.2 Interface Panel

Figure 3-2 Function Description of Interface Panel



1. USB Interface, used to save data
2. Mini-USB Communication Interface, used to realize telecommunications
3. RS485 extended interface
4. External power and charger interface

3.3 Use an External Power Supply

Configured AC Adaptor ATL909
In addition to provide power to the instrument, it also charges to Li-Battery of the instruments. Please use our Configured AC Adapter L909, do not replace.

Figure 3‑3 Connection of External AC Adapter to the instrument



Input the AC Adapter to the jack socket in the instrument

3.3.1 Battery Charging Function

If the battery power is not full, after plug in the power adapter, the charging circuit of the instrument will automatically start with charging for the internal lithium battery, the build-in indicator of the power switch will be lighted, indicating charging state. Unless the power is full, the indicator is still lighting, even the instrument is turn off

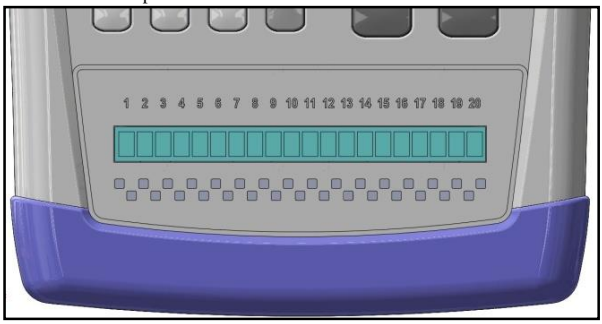
Figure 3‑4 Indicator is blue while charging



Note！ While charging, the indicator is lighted, even the instrument is turn off.

3.4 Connection of the thermocouple

Figure 3-5 Thermocouple Terminals



PIN 1	Channel 1, positive pole of the thermocouple
PIN 2	Channel 1, negative pole of the thermocouple
PIN 3	NG
PIN 4	Channel 2, positive pole of the thermocouple
PIN 5	Channel 2, negative pole of the thermocouple
PIN 6	Channel 3, positive pole of the thermocouple
PIN 7	Channel 3, negative pole of the thermocouple
PIN 8	NG
PIN 9	Channel 4, positive pole of the thermocouple
PIN 10	Channel 4, negative pole of the thermocouple
PIN 11	Channel 5, positive pole of the thermocouple
PIN 12	Channel 5, negative pole of the thermocouple
PIN 13	NG
PIN 14	Channel 6, positive pole of the thermocouple
PIN 15	Channel 6, negative pole of the thermocouple
PIN 16	Channel 7, positive pole of the thermocouple
PIN 17	Channel 7, negative pole of the thermocouple
PIN 18	NG
PIN 19	Channel 8, positive pole of the thermocouple
PIN 20	Channel 8, negative pole of the thermocouple

4. [Meas] Page

This chapter provides the following information:

- <Measurement Display> Page

4.1 <Measurement Display> Page

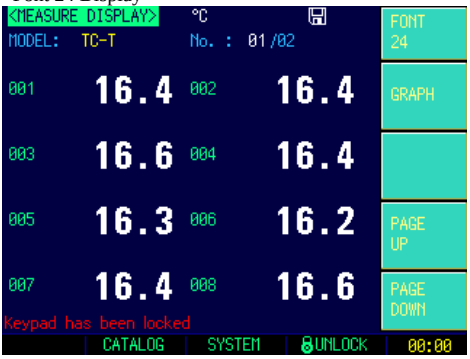
Whenever what page, just press the shortcut key [Meas] to enter <measurement display> interface.
<Measurement Display> mainly highlights the measurement results, and current sorting results will be displayed in different font and color.
One common function can be set in this page, including:

- Model: Chose the type of the thermocouple
- 001 – Channel Setting

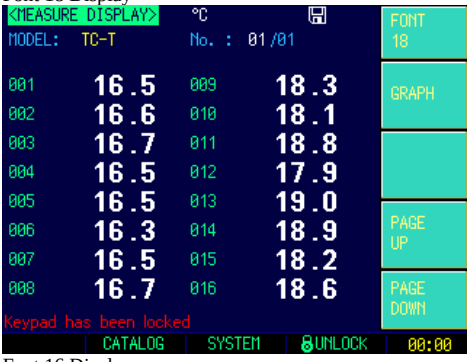
Note: Measurement data and sorting results only validity in the page of <Measurement Display>

Figure 4-1 <Measure Display> Page

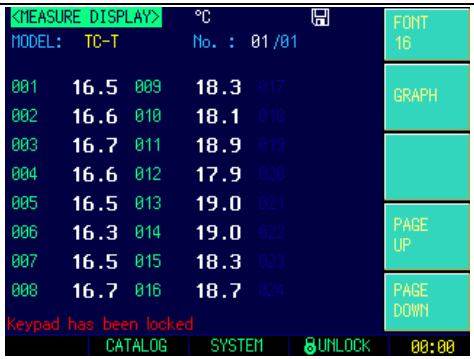
Font 24 Display



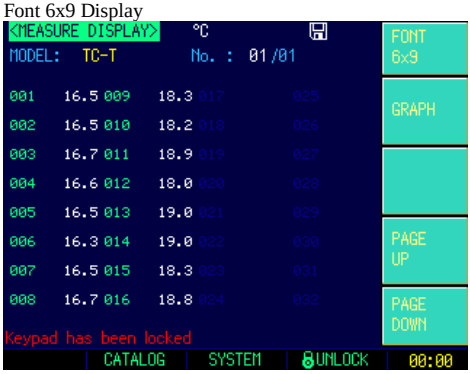
Font 18 Display



Font 16 Display



Font 6x9 Display



4.1.1 [MODEL]

The instrument supports 8 types thermocouple: T,K,J,N,E,S,R,B

■ Steps to Set Sensor Model

Step 1	Press shortcut[Meas]to enter <MEASURE DISPLAY> main interface	
Step 2	Use the cursor keys to select[TC-T]field	
Step 3	Use function keys to select	
	Function Key	Function
	TC-T	Setting the thermocouple T type
	TC-K	Setting the thermocouple K type
	TC-J	Setting the thermocouple J type
	TC-N	Setting the thermocouple N type
	TC-E	Setting the thermocouple E type
	TC-S	Setting the thermocouple S type
	TC-R	Setting the thermocouple R type
	TC-B	Setting the thermocouple B type

4.1.2 Channel[001]

■ Steps to close or open the channel

Step 1	Press shortcut[Meas]to enter < MEASURE DISPLAY > main interface	
Step 2	Use the cursor keys to select[001]field	
Step 3	Use function key to select	
	Function Keys	Function
	OFF	Close the current channel
	ON	Open the current channel

The same steps to close or open other channels

■ Steps to modify the channels of display

Step 1	Press shortcuts[Meas]to enter < MEASURE DISPLAY > main interface

Step 2	Use the cursor keys to select[001]field
Step 3	Input the channel number you wanted to display in current position by pressing numeric keys, press [Enter]to end.

- The same steps to close or open other channels

Figure 4-1 Icon Function

Icon	Function
	Internal power (Li-battery) is using
	While using the external power supply, observing the light beside the screen: lighting means is charging；Off means charging is completed. Or oberve the battery icon: power change means is charging; no change means charging is completed.
	U-disc inserted
	Unit of current temperature
	Comparator open

5. [Setup] Page

This chapter provides the following information：

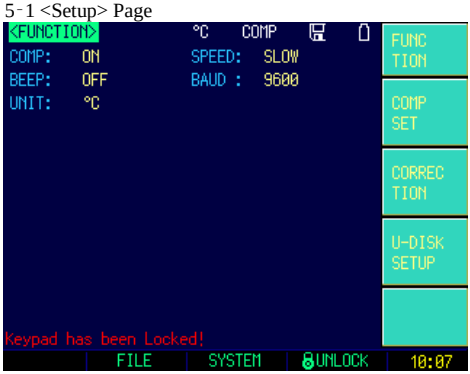
- <Setting Display> Page
- Temperature Correction
- Temperature Reset

5.1 <Setup> Page

At any time, press [Setup] key to enter <**Setup**> page
<**Setup**> page can complete all settings concerned with the measurement, measurement and sorting results will not displayed and the instrument is in waiting state. Following parameters are included:

- Speed – Sampling Speed
- Beep – Beep Setting
- Baud Rate – Baud Rate Setting
- Unit – Temperature Unit Setting

Figure 5-1 <Setup> Page



5.1.1 [Comparator] Setting

Comparator setting includes: ON and OFF

■ Steps to set the comparator

Step 1	Press Shortcut[Setup]and then press function key <FUNCTION> to enter <FUNCTION> page	
Step 2	Use the cursor keys to select[COMP]field	
Step 3	Use function key to select	
	Function Keys	Function
	OFF	COMP function open and Icon disappeared
	ON	COMP function close and Icon appeared

5.1.2 [Speed] Setting

There are three kinds speed: Slow, Middle and Fast

■ Steps to set the speed

Step 1	Press shortcut [Setup] to enter < FUNCTION > main interface	
Step 2	Use cursor keys to select[SPEED]field	
Step 3	Use function key to select	
	Function Key	Function
	SLOW	Set the sampling speed in slow

	MED	Set the sampling speed in middle
	FAST	Set the sampling speed in fast

5.1.3 [Beep] Setting

Beep Settings includes: OFF and ON

■ Steps to set Beep

Step 1	Press shortcut [Setup] to enter < FUNCTION > page	
Step 2	Use cursor keys to select[BEEP]field	
Step 3	Use function keys to select	
	Function Key	Function
	OFF	Close the Beep
	ON	Open the Beep

5.1.4 [Baud] Setting

Before you can control the AT4808 by issuing RS-232 commands from built-in RS-232 to USB controller connected via its mini-USB connector, you have to configure the RS-232 baud rate.

The AT4808's built-in RS-232 to USB interface uses the SCPI language.
RS-232 configuration is as follows:
Data bits: 8-bit
Stop bits: 1-bit
Parity: none

■ Steps to Set the Baud Rate

Step 1	Press shortcut [Setup] to enter < FUNCTION > page	
Step 2	Use cursor keys to select[BAUD]field	
Step 3	Use sidebar function keys to select baud rate	
	Function Key	Function
	9600	Chose the baud rate if you use the opto-isolated communication converter
	19200	
	38400	
	57600	
	115200	Chose this high-speed baud rate while communication with the PC

5.1.5 [Unit] Setting

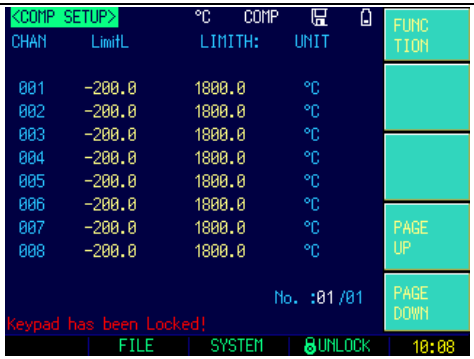
Units Includes: ℃，K，℉。

■ Steps to Set the Unit:

Step 1	Press shortcuts[Setup]to enter < FUNCTION > page	
Step 2	Use cursor keys to select[UNIT]field	
Step 3	Use function keys to select	
	Function Key	Function
	℃	Degree Celsius
	K	Degree Kelvin
	℉	Degree Fahrenheit

5.2 Comparator Setup

Press[Setup] key and then [COMP SET] function key to enter <COMP SETUP> page
In this page, you can set the HIGH and LOW limits for each channel
Figure 5-2 <COMP SETUP> Page



5.2.1 [001]

■ Steps to set LOW limit for 001 Channel

Step 1	Press[Setup]to enter <FUNCTION> page
Step 2	Press[COMP SET]to enter <COMP SETUP> page
Step 3	Use cursor keys to select [-200.0] field
Step 4	Use numeric key to set low value, then press[Enter]to end

■ Steps to set HIGH limit for 001 Channel

Step 1	Press[Setup]to enter <FUNCTION> page
Step 2	Press[COMP SET]to enter <COMP SETUP> page
Step 3	Use cursor keys to select[1800.0]field
Step 4	Use numeric key to set up value, press [Enter]to end

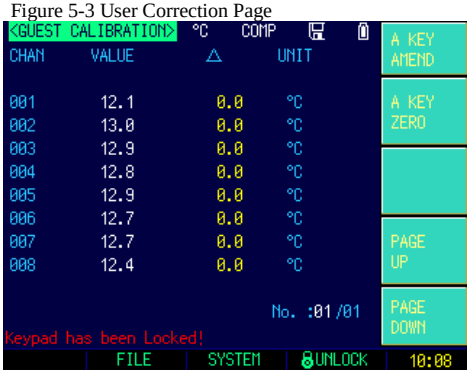
■ Steps to Switch Channel Page

Step 1	Press[Setup]to enter <FUNCTION> page
Step 2	Press[COMP SET]to enter <COMP SETUP> page
Step 3	Press function key[PAGE UP]or[PAGE UP]to switch the page

5.3 User Correction

Press [Setup] and then function key [CORRECTION]to enter <GUEST CALIBRATION> page

Figure 5-3 User Correction Page



[001]

■ Steps to correct channel 001

Step 1	Press [Setup] to enter <FUNCTION> page
Step 2	Press [CORRECTION] to enter <GUEST CALIBRATION> page

Step 3	Use cursor keys to select [0.0] field	
Step 4	Use function key to select	
Step 5	Function Key	Function
	INPUT AMEND	Input correction temperature value in selected channel, using numeric key to input data, press [Enter]to end
	DELETE AMEND	Delete all the channels correction temperature values

*The same steps to correct other channel values

■ Steps to One-key Correction

Step1	Press [Setup] to enter <FUNCTION> page
Step2	Press[CORRECTION]to enter <GUEST CALIBRATION> page
Step3	Press function key[A KEY AMEND]
Step4	Use numerical key to input Up Values, press[Enter]to end

■ Steps to One-key Zero-setting

Step1	Press [Setup] to enter <FUNCTION> page	
Step2	Press function key[CORRECTION]to enter <GUEST CALIBRATION> page	
Step3	Press function key[A KEY ZERO]	
Step4	Function Key	Function
	YES	Delete the current page correction value
	NO	Cancel “delete”, exit
	CANCEL	Cancel “delete”, exit

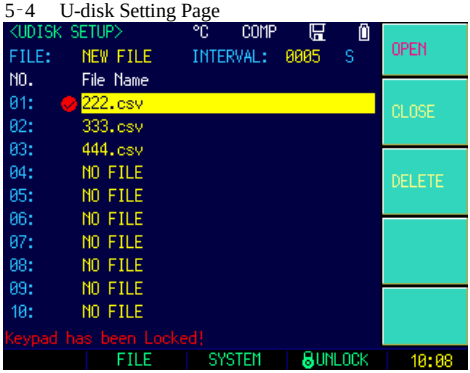
■ Steps to Switch Channel Page

Step1	Press [Setup] to enter <FUNCTION> page
Step2	Press function key[CORRECTION]to enter <GUEST CALIBRATION> page
Step3	Function key[PAGE UP]or [PAGE DOWN]to switch the page

5.4 UDisk

Press [Setup] and then press [U-DISK SETUP] to <UDISK SETUP > page
In this page, you can complete U-disk file settings

Figure 5-4 U-disk Setting Page



5.4.1 [Create File]

■ Steps to Create New File

Step 1	Press[Setup] to enter[FUNCTION]page
Step 2	Press function key[U-DISK SETUP]to enter <UDISK SETUP> page
Step 3	Use cursor key to select[FILE]field

Step 4d	Use function key to select	
	Function Key	Function
	CREAT FILE	Create new file, use numerical key to input the file name, press[Enter]to end with format *.csv。

5.4.2 [Recording Time]

■ Steps to Set Recording Time

Step 1	Press[Setup] to enter[FUNCTION]page
Step 2	Press function key[U-DISK SETUP]to enter <UDISK SETUP> page
Step 3	Use cursor key to select[INTERVAL]field
Step 4	Use function key to select
Step 5	Use numerical key to input time value （fast 5second，slow 3600 second），press[Enter]to end

*The same steps to correct other channels

5.4.3 [01]

■ Steps to Bin-setting

Step 1	Press[Setup] to enter[FUNCTION]page	
Step 2	Press function key[U-DISK SETUP]to enter <UDISK SETUP> page	
Step 3	Use cursor key to select[01]field	
Step 4	Use function key to select	
Step 5	Function Key	Function
	OPEN	Open the current selected file, save the data record in the file
	CLOSE	Colse the current selected file
	DELETE	Delete the current selected Bin

6. System Configuration

This chapter provides the following information:

- System Configuration Page
- System Information Page
- System Service Page

6.1 <System Configuration> Page

In any place, just press shortcut [Meas] or [Setup] and select taskbar key [SYSTEM] to enter <SYSTEM CONFIG> page

<**System Configuration**> Page Includes the following settings:

- Language
- Date/Time Setting
- Account/Password Setting
- Backlight Setting [BKLED]
- Close LED Setting

Figure 6-1 System Configuration Page



6.1.1 System [Language]

AT4808 supports both English and Chinese

■ Steps to Language Setting

Step 1	Press shortcuts [Meas] or [Setup]	
Step 2	Select key [SYSTEM] in taskbar to enter <SYSTEM CONFIG> page	
Step 3	Use cursor key to select [LANGUAGE] field	
Step 4	Use function key to set language	
	Function Key	Function
	CHINESE	Chinese
	ENGLISH	English

6.1.2 [Date], [Time]

The instrument adopts 24-hour time

■ Steps to set date

Step 1	Press shortcut [Meas] or [Setup]
Step 2	Select bottom soft key [SYSTEM], enter <SYSTEM CONFIG> page
Step 3	Use cursor key to select [DATE] field
Step 4	Use function key to set date

	Function Key	Function
	YEAR INCR+	+1 year
	YEAR DECR-	-1 year
	MONTH INCR+	+1 month
	MONTH DECR-	-1 month
	DAY INCR+	+1 day
	DAY DECR-	-1 day

■ Steps to set time

Step 1	Press shortcut [Meas] or [Setup]	
Step 2	Select bottom soft key [SYSTEM], enter <SYSTEM CONFIG> page	
Step 3	Use cursor key to select [TIME] field	
Step 4	Use sidebar function key to set time	
	Function Key	Function
	HOUR INCR+	+1 Hour
	HOUR DECR-	-1 Hour
	MINUTE INCR+	+ Minute
	MINUTE DECR-	-1Minute
	SECOND INCR+	+1Second
	SECOND DECR-	-1 Second

6.1.3 [Account]

The AT4808 has two accounts, administrator and user.
Administrator: All functions can be configured by administrator except <SYSTEM SERVICE> page.
User: All functions can be configured by user except < SYSTEM SERVICE> page and <FILE> page.

■ Steps to set Account

Step 1	Press shortcuts [Meas] or [Setup]	
Step 2	Select key[SYSTEM]in taskbar to enter <SYSTEM CONFIG> page	
Step 3	Use cursor key to select [ACCOUNT] field	
Step 4	Use sidebar function key to change account	
	Function Key	Function
	ADMIN	Except page < SYSTEM SERVER > , all the functions are available to the administrator
	USER	Except page [SYSTEM SERVER] and [FILE], all the functions can be operated by the user.

■ Steps to Set Password of the Administrator:

Step 1	Press shortcuts [Meas] or [Setup]	
Step 2	Select key [SYSTEM]in the taskbar to enter <SYSTEM CONFIG> page	
Step 3	Use cursor key to select [PASSWORD] field	
Step 4	Use the sidebar function key to set password	
	Function Key	Function
	CHANGE PASSWORD	Input 9 digits numerical password. If you forget the password, please contact our sales department.
	DELETE PASSWORD	

6.1.4 Backlight [BKLED]

The darker, the lower of the power consumption, the longer use time. 5 level backlights can be set to meet the requirements in different lights.

■ Steps to set backlight

Step 1	Press shortcut [Meas] or [Setup]	
Step 2	Select key [SYSTEM] to enter <SYSTEM CONFIG> page	
Step 3	Use cursor key to select [BKLED] field	
Step 4	Use function key in the sidebar to adjust backlight	
	Function Key	Function

	Bright 0%	
	Bright 25%	
	Bright 50%	
	Bright 75%	default light
	Bright 100%	

6.1.5 [CLOSE LED]

The instrument will automatically turn off the screen to save power if long time no operations

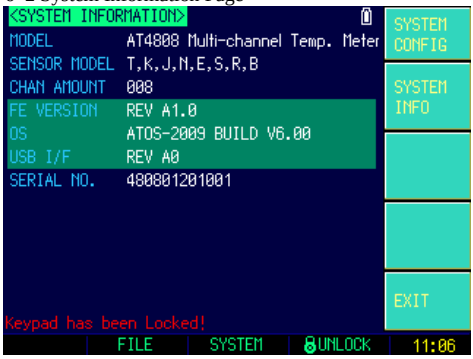
■ Steps to Turn Off the Power

Press 1	Press shortcut [Meas] or [Setup]	
Press 2	Select key [SYSTEM] to enter <SYSTEM CONFIG> page	
Press 3	Use cursor key to select [CLOSE LED] field	
Press 4	Use function key in the sidebar to adjust backlight	
	Function Key	Function
	5MIN	Default
	15MIN	
	30MIN	
	60MIN	
	OFF	

6.2 <SYSTEM INFORMATION> Page

When press the [Meas] or [Setup] key followed by [SYSTEM] bottom soft key, and press [SYSTEM INFO] soft key, the <SYSTEM INFO> page appears.
There are no configurable options in the <SYSTEM INFO> page.

Figure 6-2 System Information Page



6.3 <System Service> Page

This page is used to calibrate data while input market. Non-professional person is forbidden.

7. Files Operation

This chapter provides the following information

- Files Management Page

7.1 < CATALOG > Page

When press the [Meas] or [Setup] key followed by [FILE] bottom soft key, the <CATALOG> page appears.
<**CATALOG**> page includes the following settings

- CONFIG 0

Figure 7-1 <CATALOG> Page



■ Steps to Save Settings

Step 1	Press shortcut [Meas] or [Setup]	
Step 2	Select key [FILE] to enter <CATALOG> page	
Step 3	Use cursor key to select [CONFIG 0] field	
Step 4	Use function key in sidebar to set files	
	Function Key	Function
	SAVE	Save the current settings of the instrument
	RECALL	Read the saved settings of the instrument
	ERASE	Delete the saved settings of the instrument

8. Remote Control

This chapter provides the following information to remotely control the FM8116R via the RS-232C or USB interface.This chapter provides the following information

- Select Baud Rate.
- About SCPI

8.1 To Select Baud Rate

Before you can control the FM8116R by issuing RS-232 commands from built-in RS-232 controller connected via its DB-9 connector, you have to configure the RS-232 baud rate.
The FM8116R's built-in RS-232 interface uses the SCPI language.
The configuration of RS-232
RS-232 configuration is as follows:
Data bits: 8-bit
Stop bits: 1-bit
Parity: none

To set up the baud rate

Step 1. Press the [Setup] key
Step 2. Use the cursor key to select [BAUD] field
Step 3. Use the soft keys to select baud rate.

Soft key	Function
9600	
19200	
38400	
57600	
115200	Recommend

8.2 SCPI Language

Standard Commands for Programmable Instruments (SCPI) is fully supported by the

NOTE:
FM8116R ONLY supports the SCPI Language.

9. Command Reference

This chapter contains reference information on programming FM8116R with the SCPI commands.

- Terminator
- Notation Conventions and Definitions
- Header and Parameters
- Command Reference

This chapter provides descriptions of all the FM8116R's available RS-232 commands which correspond to Standard Commands for Programmable Instruments (SCPI) command sets, listed in functional subsystem order.

9.1 Terminator

<NL>：The EOI line is asserted by New Line or ASCII Line Feed character (decimal 10, Hex 0x0A，or ASCII '\n')

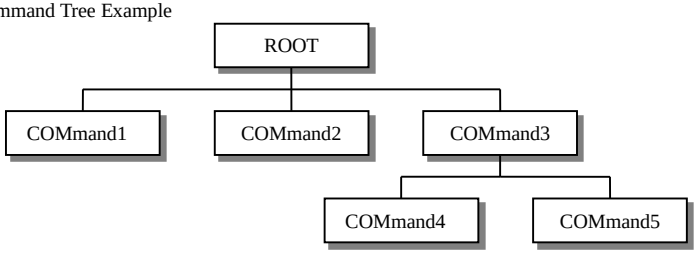
9.2 Notation Conventions and Definitions

The following conventions and definitions are used in this chapter to describe RS-232 operation.
< > Angular brackets enclose words or characters that are used to symbolize a program code parameter or an RS-232 command.
[ ] A square bracket indicates that the enclosed items are optional.
\n Command Terminator

9.3 Command Structure

The FM8116R commands are divided into two types: Common commands and SCPI commands.
The common commands are defined in IEEE std. 488.2-1987, and these commands are common for all devices.
The SCPI commands are used to control all of the FM8116R's functions.
The SCPI commands are tree structured three levels deep. The highest level commands are called the subsystem commands in this manual. So the lower level commands are legal only when the subsystem commands have been selected.
A colon (:) is used to separate the higher level commands and the lower level commands.
Semicolon (;) A semicolon does not change the current path but separates two commands in the same message.

Figure 9-1 Command Tree Example



Example:

ROOT:COMmand3:COMmand5 ppp
ROOT Subsystem Command
COMmand3 Level 2
COMmand5 Level 3
ppp Parameter

- The basic rules of the command tree are as follows.
  - Letter case (upper and lower) is ignored.
    For example,
    ROOT:COMMAND3 = root:command3
  - Spaces (_ used to indicate a space) must not be placed before and/or after the colon (:).
    For example,
    ☒ **root_:_command3** → ☑ **root:command3**
  - The command can be completely spelled out or in abbreviated.(The rules for command abbreviation are described later in this section)
    For example,
    root:command3 = root:com3
  - The command header should be followed by a question mark (?) to generate a query for that command.
    For example,
    root:com3?
  - The semicolon (;) can be used as a separator to execute multiple commands on a single line. The multiple command rules are as follows.
    Commands at the same level and in the same subsystem command group can be separated by a semicolon (;) on a multiple command line.
    For example,
    root:com3:com5 ppp;com4 ppp
    To restart commands from the highest level, a semicolon (;) must be used as the separator, and then a leading colon (:), which shows that the restarted command is a command at the top of the command tree, must follow.
    For example,
    root:com3:com5 ppp;:root:com1 ppp

The FM8116R accepts the three forms of the same SCPI commands: all upper case, all lower case, and mixed upper and lower case.

9.4 Header and Parameters

The commands consist of a command header and parameters. (See the following.)

Example: comp:nom 100.0e3
Header Parameter

- Headers can be of the long form or the short form. The long form allows easier understanding of the program code and the short form allows more efficient use of the computer.
- Parameters may be of two types as follows.
  (A) Character Data and String Data Character data consists of ASCII characters. The abbreviation rules are the same as the rules for command headers.
  (B) Numeric Data
    (a) <integer>:For example, 1,+123,-123
    (b) <float>: For example, 1.23e3, 5.67e-3, 123k, 1.23M, 2.34G, 1.234
    (c) <scifloat>: For example, +1.23456e+03

The available range for numeric data is 9.9E37. When numeric data is used as a parameter, the suffix multiplier mnemonics and suffix units (The suffix multiplier must be used with the suffix unit) can be used for some commands as follows.

Table 9-1 Multiplier Mnemonics

Definition	Mnemonic
1E18 (EXA)	EX
1E15 (PETA)	PE
1E12 (TERA)	T
1E9 (GIGA)	G
1E6 (MEGA)	MA
1E3 (KILO)	K
1E-3 (MILLI)	M
1E-6 (MICRO)	U
1E-9 (NANO)	N
1E-12 (PICO)	P
1E-15 (PEMTO)	F
1E-18 (ATTO)	A

9.5 Command Reference

All commands in this reference are fully explained and listed in the following functional command order.

- MEAS Subsystem
- SYST Subsystem
- FETCH Subsystem
- ERROR Subsystem
- IDN?

9.5.1 MEAS SUBSYSTEM

The MEAS Subsystem command group sets the meas page.

Figure 9-2 MEAS Command Tree

Meas	**:MODEL**	**{tc-t,tc-k,tc-j,tc-n,tc-e, tc-s,tc-r,tc-b}**
	:RATE	**{fast,med,slow}**
	:KEYLOCK	**{on,off}**
	:CHAN	**<integer>**

9.5.1.1 MEAS:MODEL

The :MODEL command sets the Model.

Command Syntax	**MEAS:MODEL <tc-t,tc-k,tc-j,tc-n,tc-e,tc-s,tc-r,tc-b>**
Example	**SEND> MEAS:MODEL TC-T<NL> //Set MODEL to T-type thermocouple**
Query Syntax	**MEAS:MODEL?**
Query Response	**< tc-t,tc-k,tc-j,tc-n,tc-e,tc-s,tc-r,tc-b ><NL>**
Example	**SEND> MEAS:MODEL?<NL>** **RET> tc-t<NL>**

9.5.1.2 MEAS:RATE

The :RATE command sets the Speed.

Command Syntax	**MEAS:RATE <fast,med,slow>**
Example	**SEND> MEAS:RATE fast<NL> //Set to fast speed**
Query Syntax	**MEAS:RATE?**

Query Response	**<fast,med,slow><NL>**
Example	**SEND> MEAS:RATE?<NL>** **RET> fast<NL>**

9.5.1.3 MEAS:KEYLOCK

The :KEYLOCK command sets the KEYPAD.

Command Syntax	**MEAS:KEYLOCK <on,off>**
Example	**SEND> MEAS:KEYLOCK off<NL> //Set to close Keypad**
Query Syntax	**MEAS:KEYLOCK?**
Query Response	**<on,off><NL>**
Example	**SEND> MEAS:KEYLOCK?<NL>** **RET> on<NL>**

9.5.1.4 MEAS:CHAN

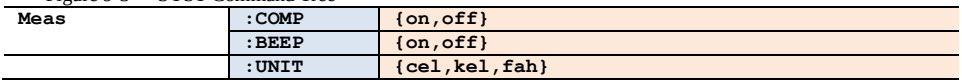
The :CHAN command sets the Channel.

Command Syntax	**MEAS:CHAN <integer>**
Parameter	<integer> Convert from decimal to binary , four high address bits , the lower 8 bits of the channel control bits , example: address bits 1,8 channel fully open , binary 1,11111111 , The channel label starting from the low minimum bit channel CH01 , BIT for each channel corresponding to 1 to open the channel , and 0 to close the channel
Example	**SEND> MEAS:chan 510<NL> //Set to close channel 9**
Query Syntax	**MEAS:CHAN?**
Query Response	**<integer,integer><NL>**
Example	**SEND> MEAS:CHAN?<NL>** **RET> 255,254<NL>**

9.5.2 SYST SUBSYSTEM

The SYST Subsystem command group sets the setup page.

Figure 9-3 SYST Command Tree



9.5.2.1 SYST:COMP

The :COMP command sets the comp feature.

Command Syntax	**MEAS:COMP <on,off>**
Example	**SEND> SYST:comp on<NL> //Set to open comparator**
Query Syntax	**MEAS:comp?**
Query Response	**<on,off><NL>**
Example	**SEND> SYST:comp?<NL>** **RET> on<NL>**

9.5.2.2 SYST:BEEP

The :BEEP command sets the beep feature.

Command Syntax	**MEAS:BEEP <on,off>**

Example	**SEND> SYST:beep on <NL> //Set to open beep**
Query Syntax	**MEAS:beep?**
Query Response	**<on,off><NL>**
Example	**SEND> SYST:beep?<NL>** **RET> on<NL>**

9.5.2.3 SYST:UNIT

The :UNIT command sets the unit feature.

Command Syntax	**MEAS:UNIt <cel,kel,fah>**
Parameter	<cel,kel,fah> **cel: Degrees Celsius** **kel: Degrees Kelvin** **fah: Fahrenheit**
Example	**SEND> SYST:unit cel<NL> //Set to Degrees Celsius**
Query Syntax	**MEAS:unit?**
Query Response	**<℃,K,F><NL>**
Example	**SEND> SYST:unit?<NL>** **RET> ℃<NL>**

9.5.3 FETCH SUBSYSTEM

The FETCh subsystem command group is a sensor-only command which retrieves the measurement data taken by measurement(s) initiated by a trigger, and places the data into the output buffer

Figure 9-4 FETCH Command Tree

fetch?	

9.5.4 FETCH ?

The FETCh? retrieves the latest measurement data and comparator result.

Query Syntax	**Fetch?**
Query Response	**<float, float, float><NL>** **//Returns the number related to the number of channels**
Example	**SEND> fetch?<NL>** **RET> +1.00000e-05, +1.00000e-05, +1.00000e-05<NL>**

9.5.5 ERROR SUBSYSTEM

The ERRor subsystem retrieves last error information.

Query Syntax	**ERROR?**
Query Response	**Error string**
Example	**SEND> ERR?<NL>** **RET> no error<NL>**

9.5.6 IDN SUBSYSTEM

The *IDN? query returns the instrument ID.

Query Syntax	**IDN? Or *IDN?**
Query Response	**<MODEL>,<Revision>,<SN>,< Manufacturer>**

10. Appendix

This chapter provides the following information:

- RS485 Connection method

10.1 RS485 Connection method

You can use a dedicated ATL106 mini USB-232 communication cable to connect an external acquisition board , bringing the total to 128 channel expansion.



The ATL106 mini USB connector into INTERFACE A- B interface or interfaces



The ATL106 232 collector into boxes BUS <1> or BUS <2>, collection boxes plug 9V power supply.

BUS <1> and BUS <2> is a parallel interface is universal.

Other acquisition board using ATL104 communication cables connected in series , each four acquisition board to add a 9V power supply.

11. Specification

This chapter provides the following information:

- Basic Technology Index
- Specifications

11.1 General Specification

The Data is Achieved under the Following Conditions:

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

Test Environment:

- Temperature 15℃~35℃ Humidity: <80%RH

Thermocouple Type:	T,K,J,N,E,S,R,B
Display:	5 digits, main parameters
Test Speed:	Fast, Medium, Slow
Max Reading:	1800.0
Min Reading:	-200.0
Data Recorder:	USB Disk
Beep:	ON/OFF
Interface:	RS232 to USB Interface
Language:	SCPI
Auxiliary Function:	Keypad Lock

11.2 Accuracies

Instrument Accuracy does not include the standard contact compenstation Precision.

Model	Range（℃）	Accuracy (℃)
T	-150℃ to 0℃ 0℃ to 400℃	±1.0℃ ±0.8℃
K	-100℃ to 0℃ 0℃ to 1350℃	±1.2℃ ±0.8℃
J	-100℃ to 0℃ 0℃ to1200℃	±1.0℃ ±0.7℃
N	-100℃ to 0℃ 0℃ to 1300℃	±1.5℃ ±0.9℃
E	-100℃ to 0℃ 0℃ to 850℃	±0.9℃ ±0.7℃
S	0℃ to 100℃ 100℃ to 300℃ 300℃ to 1750℃	±4.5℃ ±3.0℃ ±2.2℃
R	0℃ to 100℃ 100℃ to 300℃ 300℃ to 1750℃	±4.5℃ ±3.0℃ ±2.2℃
B	600℃ to 800℃ 800℃ to 1000℃ 1000℃ to 1800℃	±5.5℃ ±3.8℃ ±2.5℃

Standard connection compensation need to add ±0.5℃ based on thermocouple measuring accuracy.
The measuring accuracy of thermocouple sensor gives priority to sensor supplier's standard.

11.3 Specifications

- 3.5 inches, true color 16M, TFT-LCD display
- Two kinds power supply: battery and external power
- Comparator (Sorting) Function: Build-in sorting recorder
- Keypad Lock Function
- Switch in both English and Chinese
- Adjustable Backlight
- Automatically Screen Turn Off Setting

- Build-in Mini-USB Communication Interface
- RS485 Expansion Interface
- Compatible SCPI Instruction Set
- 8.4V，Li，2200mAh Rechargeable Battery
- Charging Time: <5 hours
- Max Power: ≤5W
- Longest continuously working time: ≥8h
- Length*Width*Height: 210.76mm*130.23mm
- Weight: 650g

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