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■ TH-3800 specifications

Measuring Range	Temperature: -40.0~85.0°C (-40.0~185.0°F) Relative humidity: 0.0~100.0% RH Dew Point: -70~85°C (-94~+185°F)
Accuracy(at 25°C)	Temperature: ±0.3°C (±0.5°F) Relative humidity: ±2% (0~95% RH)
Resolution	0.1% RH, 0.1°C/0.1°F
Sampling rate	2 seconds to 2 hours (User selectable)
Main Functions	Calculate the dew point, Perpetual calendar, Data hold, Max./Min./Avg values record, Record data displayed, °C/°F Switchable, Digital USB / RS-232 output, AC and DC dual-use, Battery sign and low battery warning, Outside calibration function, LED Back-light, IP66 water and dust proof.
Output	USB, RS-232, 0.1°C/ 1 BIT (protocol provided)
Power source	One 9 V battery or AC Adaptor
Dimensions	150 x 75 x 28 mm, Approx.320g (battery included)
Input Connections	Five wire connector water proof socket
Operating environment	-20 ~ + 60°C ; 0 ~ 100 %RH

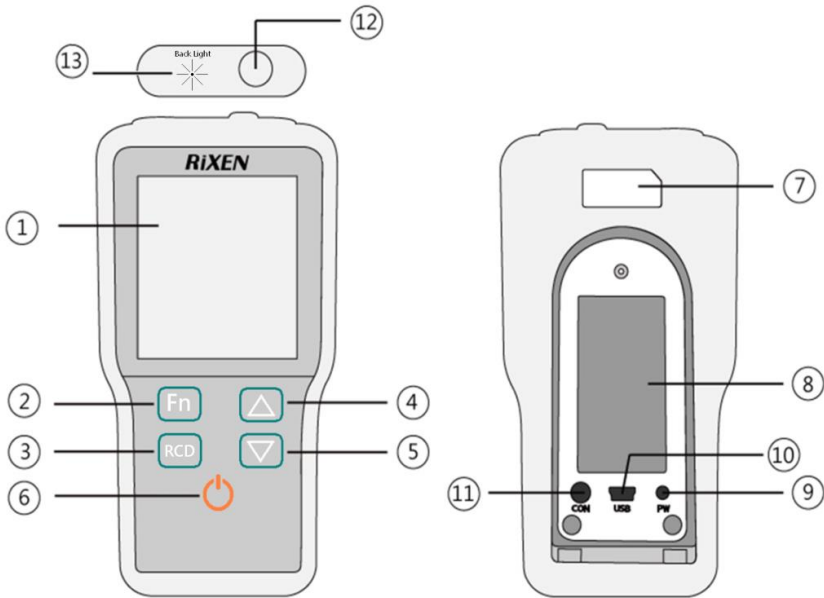
Accessories

A Type Probe	φ18×192mm/Approx. 96g
B Type Probe	φ6×260mm/Approx. 115g
TU-RS232-W	Specified RS-232 computer interface cable and windows software
TU-USB-W	Specified USB computer interface cable and windows software
TU-655C	Plastic carrying case
TU-6019/6029	AC Adaptor

※Above accuracy and sampling rate excludes errors generated by Temp./Humidity probe.

※Specifications are subject to change without notice.

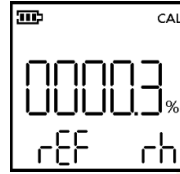
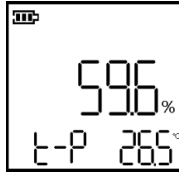
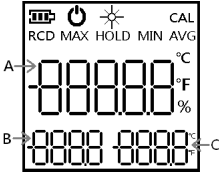
Instrument descriptions



- ① Large LCD Display
- ② Function and Setting key
- ③ Record and Record setting key
- ④ Move key
- ⑤ Move key
- ⑥ Power switch
- ⑦ Model No. and Serial No.
- ⑧ Battery cover
- ⑨ AC Adaptor Input
- ⑩ USB Output port
- ⑪ RS-232 Output connector
- ⑫ Probe socket
- ⑬ LED backlight

※This instrument is completely waterproof (IP66), in order to maintain the stability of its characteristic function, please avoid falling, physical impact or disassemble.

■ Display descriptions



Display	Descriptions
	Battery Power
	Manual shut down
	Buzzer on
CAL	Under Calibrating
HOLD	Data Hold
RCD	Record
MAX	Maximum Value
MIN	Minimum Value
AVG	Average Value
Area Digit A.B.C.	Testing Value
°C/°F	°C: Celsius units ; °F: Fahrenheit units
Hidden Symbol	Shows in the setting mode or the device is abnormal








































Abnormal displays

A. When Area A shows -----, please release all keys until the device restored to a normal status.

B. When Area A or Area C shows -L, the situations below may be the causes:

1. The read value exceeds measurement range
2. The Temperature probe is damaged or not inserted the connector correctly.
3. If -L appears when turn on the instrument, please release all keys and tune it on again.



Key descriptions

Key	Function	Descriptions	LCD display
	On/Off	Press  one second (Be-) to turn on the instrument. The meter automatically switches OFF after 5 minutes without any button activity.	
 + 	Manual turn off	When the device is on OFF state, press and hold  , then press  in the same time to turn on the meter. When symbol  appears in the display, please release all keys to finish setting the manual turn off mode.	
	Change the value	Press  to change the values in any mode	--
	Change the value	Press  to change the values in any mode	--
	turn on back light	Press  to turn on the backlight in any mode. Press  again to turn it off. The auto-off time for active backlight is 20 seconds. Note: The LED back light will be unavailable when the battery power falls below 25%.	
	RCD Recode mode	On the testing mode, and which is without recording data, press  to entering the RCD record mode. The symbol  will flashes when recording. Press  or  to stop recording. The symbol  will stop flash in the meanwhile. The screen will display FULL when the data value reach to 9999 records, and the symbol ---- will display in area B. Press  or  to finish recording. When there are records internal, the symbol  will show up.	
	RCD Reading mode	Under the testing mode, press  to entering the reading mode. Press   to switch the displayed record value; Press and hold it can be switch quickly. Press and hold  can switch 100 readings at once; the records can be read up to 9999 readings. Press  to exit. Press and hold  switch to the RCD clear mode.	
	RCD Clear mode	Under the testing mode, RCD reading mode, or hold mode, press and hold  two seconds to entering the RCD Clear mode. The CLEAR will displayed. Use   to select options, and press  or  to confirm. The  twinkled means do not clear the data, and the  twinkled means to clear the data. It needs 7 to 10 seconds when processing this instruction.	

Fn (2s)	Hold mode	Under testing mode, press Fn to enter the reading HOLD mode. Press ▲ and ▼ to change the displayed functions. Press Fn to exit this mode. If the RCD data has been stored inside, press and hold RCD to switch to RCD clear mode	
	Setting mode (Ref,Span, date,time, sampling rate, temperature unit)	Under testing mode, press and hold Fn more than two seconds, when area A appears SET , release Fn to entering the setting mode. There are several setting options in the setting mode, press Fn to select it. Ref, Span setting: Entering when REF and SPAN appears on the screen, press ▲ to switch the value and ▼ to switch the digit. Press Fn to determine the value. Date setting: Entering when DATE appears, press ▲ to switch the value and ▼ to switch the digit. Press Fn to determine the value. Sampling rate setting: Entering when SPLT appears, press ▲ and ▼ to switch it, press Fn to determine the value. Temperature unit setting: Entering when °C °F appears, press ▲ and ▼ to switch the value, press Fn to determine the value. Exit: when the screen shows END , press Fn to exit.	

■ Instructions

A. Testing Mode:

Press  and  to switch display conditions.

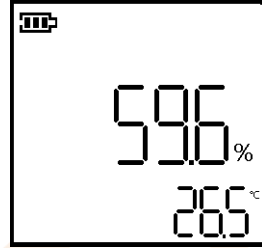
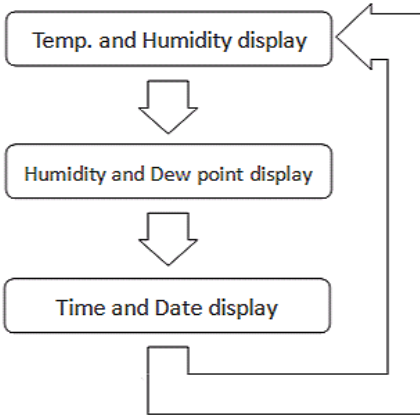


Fig. Temp. and Humidity display

Under the testing mode, the display contents describe as below:

Display	Display contents
Normal conditions	Probe condition, battery level
Temperature and Humidity	Humidity measured value (Area A) Temperature measured value (Area C)
Humidity and Dew point	Humidity measured value (Area A) Dew point measured value (Area C)
Time and Date	Hour, Minute (Area A) Month (Area B) Day (Area C)

- ※ When return to testing mode from hold mode or setting mode, it takes few seconds, do not press any keys at this moment.
- ※ The humidity and temperature will displayed when connected to the computer, the symbol **-PC-** show up means the connection is successful.

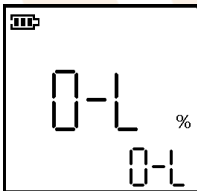


Fig. Probe is not connected or connection exception

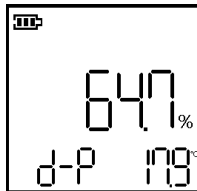


Fig. Humidity and Dew point

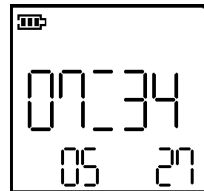
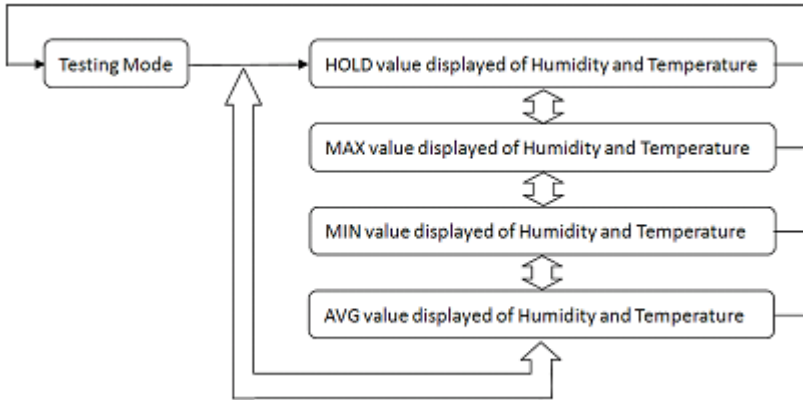


Fig. Time and Date

B. Hold mode

Under testing mode, press **[Fn]** to entering the HOLD mode. Press **[△]** and **[▽]** to change the displayed functions. Press **[Fn]** return to the testing mode.

If there are recording data internal, it will display the Max., Min., and Avg. of the record.



Under HOLD mode, the display contents describe as below:

Display (Humidity and Temp.)	Display contents (area A and area C)
HOLD value	Humidity and Temp. value HOLD
MAX value	The Maximum of Humidity and Temp. value
MIN value	The Minimum of Humidity and Temp. value
AVG value	The Average of Humidity and Temp. value

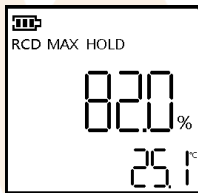


Fig. MAX. value display

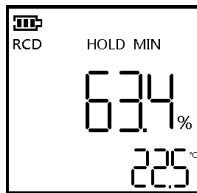


Fig. MIN. value display

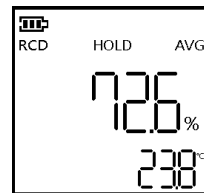


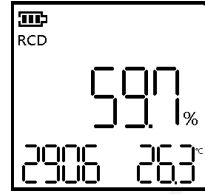
Fig. AVG. value display

C. RCD Recode mode

Under the testing mode, press **RCD** to entering the RCD record mode. Sampling rate will shows before recording.

Press **▲** and **▼** to switch the display status. The **RCD** will flashes when recording. Press **RCD** or **⏻** to finish recording.

When there are records on the internal, the symbol RCD will show up.



D. RCD Reading mode

Under testing mode, press **RCD** to entering the RCD reading mode. Press **▲** **▼** to switch the displayed record value;

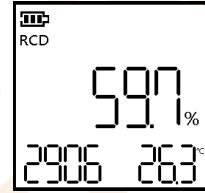
Press **RCD** return to the HOLD mode.

Press and hold **RCD** can switch to the RCD clear mode.

Press **▲** **▼** to switch the displayed record value; Press and

hold it can be switch quickly. Press and hold **Fn** and press

▲ or **▼** can switch 100 readings at a time.



E. RCD Clear mode

Under the testing mode, RCD reading mode, press and hold **RCD** to entering the RCD Clear mode, and the symbol **CLEAR** will

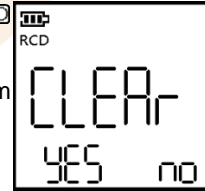
displayed. Use **▲** **▼** to select options, and press **RCD** confirm

it. The **NO** twinkled means not to clearing the data, and the **YES**

twinkled means to clearing the data. The **CLEAR** twinkled when

clearing mode process, please waiting until the below symbol –

disappear.



F. Setting Mode

Under the testing mode, press **[Fn]** more than 2 seconds, when **SEt** shows up, release **[Fn]** to entering the setting mode. Press **[Δ]** **[▽]** to select the setting option, press **[Fn]** to entering the selected mode. Press **[Fn]** again to exit.

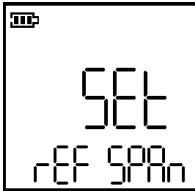
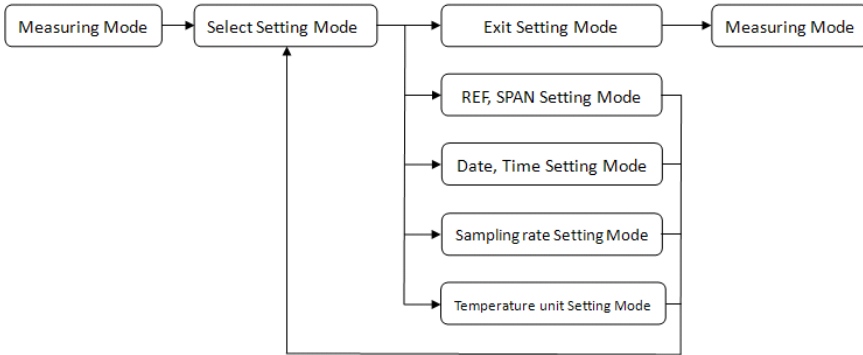


Fig. REF, SPAN Setting

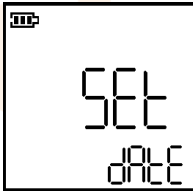


Fig. Date, Time Setting

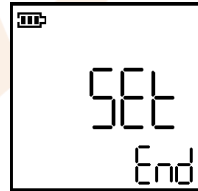






Fig. Exit Setting

Under the Setting mode, the display contents describe as below:

Display content	Description
rEF SPAN	Entering REF and SPAN Setting Mode
dAtE	Entering Date and Time Setting Mode
SP-t	Entering Sampling rate Setting Mode
°C °F	Entering Temperate unit Setting Mode
End	Entering Exit Setting Mode

■ Setting Mode Description

1. REF, SPAN setting mode

This mode are using for setting the REF and SPAN. Press  to select the number of digits you want to change, and press   to select its cycled figures from 0 to 9. When setting the REF, the thousands digit can be switched to the negative sign. Press  confirm the setting, set the humidity first then set the temperature. Area C displayed rh when calibrating humidity, and t-P displayed when calibrating temperature.






REF setting range of humidity: 100.0% to -100.0%

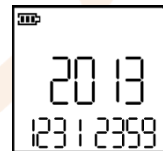
SPAN setting range of humidity: 200.00% to 0.00%

REF setting range of temperature: 100.0°C ~ -100.0°C (180.0°F ~ -180.0°F)

SPAN setting range of temperature: 200.00% to 0.00%

2. Date / Time setting mode



This mode are using for setting the date and time. Press  to select its cycled figures. Press and hold  can speed up the cycle. The seconds cannot be set and the year can be set up to 2099. Press  confirm the setting.



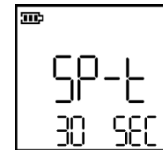
The area A displayed " Year" ; The area B displayed " month" and "date"
The area C displayed " hour" and" minute"

3. Sampling rate setting mode

This mode is use to setting the sampling rate.

press   to switch the rate. Display format is "second"

Press  to confirm the setting.






Sampling rate setting:

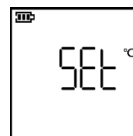
2 seconds, 5 seconds, 10 seconds, 20 seconds, 30 seconds, 1 minute,

2 minutes, 5 minutes, 10 minutes, 30 minutes, 1 hour, 2 hours

4. Temperature unit setting mode

This mode is for setting the temperature unit.

Press   to switch the unit, press  to confirm.



5. Exit the setting mode

Use this option when you finish your setting.

■ RS-232 Transmission Agreements

※Please connect the AC Adaptor if it were required a long time to transfer the data.

RS-232 is for one-way data transfer, receive and input the signal by three grounded wires. Recommending using the transmission line which is manufacture by OE factory or use the cable shorter than 10 meters to connect the computer and the instrument.

Transfer rate: 57600

Transfer Status: /8 / N / 1

Transmission Content: (8 BIT)

Read instructions: by function 03H (Read Holding Registers)

Modbus RTU CRC16 check

A. Request Data Frame

Ex: Read the data from address 00h

(Read 1 Word of data from address 0000H)

Slave address	Function	Starting address Hi	Starting address Lo	No. of Word Hi	No. of Word Lo	CRC Lo	CRC Hi
38H	03H	00H	00H	00H	01H	81H	63H

Response Data Frame

Ex: response data 2 Word = 0x109D

Slave address	Function	Byte count	Data Hi	Data Lo	CRC Lo	CRC Hi
38H	03H	02H	01H	ECH	24H	5CH

$0x01EC=492 \cdot \text{actual value}=\text{Data}/10=49.2$

B. Request Data Frame

Ex: Read the data from address 02h

(Read 5 Word of data from address 0002H)

Slave address	Function	Starting address Hi	Starting address Lo	No. of Word Hi	No. of Word Lo	CRC Lo	CRC Hi
38H	03H	00H	00H	00H	05H	80H	A0H

Response Data Frame Ex. response data 10-Byte

Slave address	Function	Byte count	Data(1) Hi	Data(1) Lo	Data(2) Hi	Data (2) Lo
38H	03H	0AH	02H	04H	02H	D6H

Data(3) Hi	Data(3) Lo	Data(4) Hi	Data(4) Lo	Data(5) Hi	Data(5) Lo	CRC Lo	CRC Hi
00H	78H	00H	02H	16H	5CH	D2H	02H

Data (1) is Humidity value $0x0204=516$, actual value= $Data/10=51.6$

Data (2) is Temp. value $0x02D6=726$, actual value= $(Data-500)/10=22.6$

Data (3) is Dew Point value $0x0078=120$, actual value= $Data/10=12.0$

Data (4) Hi and Data (4) Lo is MOD value $0x0002$

1. Data(4) Lo $05=^{\circ}F/^{\circ}C$ Judgment

>>> Value =0 represent $^{\circ}C$

>>> Value =1 represent $^{\circ}F$

2. Data(4) Lo 04 No value

3. Data(4) Lo $03=$ Temperature-Error judgment

>>> Value =1 represent Temperature values abnormal

4. Data(4) Lo $02=$ Humidity -Error judgment

>>> Value =1 represent Humidity values abnormal

5. Data(4) Lo $01\sim 00=$ Power gauge

>>> Value =1 represent battery power of 74~50%

Data (5) is number of records, value $0x165C=5724$, actual value= $Data/2=2862$

Example

- Setting mode
1. Temperature unit= $^{\circ}C$
 2. Humidity values normally
 3. Temperature values normally
 4. Power 74~50%

MOD setting mode

Bit 07	Bit 06	Bit 05	Bit 04	Bit 03	Bit 02	Bit 01~ Bit 00
X	X	$^{\circ}F=1$ $^{\circ}C=0$	X	Temp. Error=1	Humidity Error=1	Power

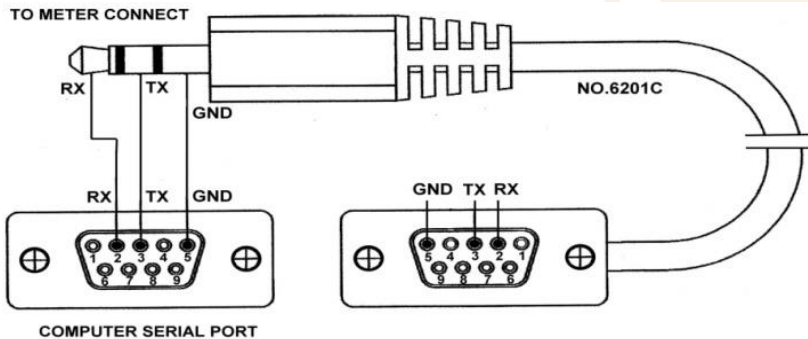
☆Power Meter is divided into 4 parts 11=100~75% 10=74~50%

01=49~25% 00=24~0%

Address/ Data name Comparison Table

Address	Data name
0000h	Real-Time Humidity Data(Hold)
0001h	Real-Time Temperature Data(Hold)
0002h	Real-Time Dew Point Data(Hold)
0003h	Status
0004h	RCD readings

D. RS-232 connecting cable



■ Precautions

1. This instrument has a waterproof function; please do not use it in a high temperature Environment or with corrosive materials to avoid leakage or damage.
2. To avoid the problems that might occur when connecting to the computer, the Rixen USB computer interface cable and windows software (Model No. TU-USB-C) is recommended.
4. When the instrument shows power shortage warning, please immediately replace the batteries to avoid incorrect readings.
5. When the instrument is not in use for a long time, please put the instrument and all Accessories in the protective case, and kept it in a clean and dry environment, and please avoid direct sunlight
6. If there are any operation questions or malfunction, please contact your local distributor or our service department

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