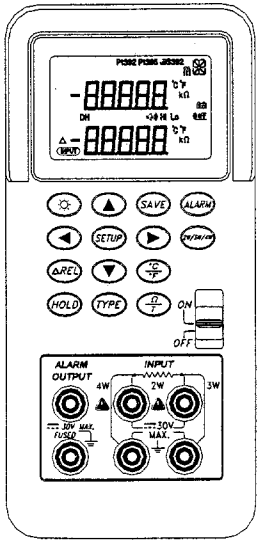
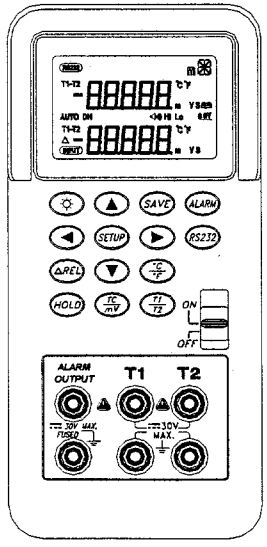
THERMOMETERS

J.K.T.E/RTD/TC THERMOMETER INSTRUCTION MANUAL

J/K/T/E THERMOMETER
RTD THERMOMETER
TC THERMOMETER





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SAFETY INFORMATION

☐ **SAFETY INFORMATION**

To ensure that you use this device safely, follow the safety guidelines listed below:

- Read this operation manual completely before using this device and follow all safety instructions.
- This device is for indoor use, altitude up to 2,000 m.
- Avoid working alone.
- Use the device only as specified in this manual, otherwise the protection provided by the meter may be impaired.
- Do not opeate the device if it is damaged.
- Never apply more than DC 30V between any two terminals or any terminals to earth ground.
- Do not use this device if it looks damaged.
- Inspect the leads for damaged insulation or exposed metal. Check test lead continuity. Replace damaged leads.
- Disconnect the power or over DC 30V, Otherwise the device will be damaged.
- When making measurements, keep your fingers away from the exposed metal of the probe.
- Select the proper function and TYPE for your measurement and output . To avoid damaging this device, disconnect the test leads from test points before changing functions.
- Before you operate the device, make sure the battery door is closed and locked.
- Take away the signal an remove test leads from the device before open the battery door.
- CE requirement: Under the influence of R.F field according to standard, the suplied test leads will pick up induced noise. To have better shielding effect, a short-twisted lead should be used.

  The standard of test requirement shows below:

  1. EN-61326-1: Electrical equipment for measurement, control and laboratory use-EMC requirements.
  2. EN-61010-1: LVD (Low Voltage Directive) test.

USING THIS DEVICE SAFELY

⚠ *WARNING*

Read SAFETY INFORMATION before using the device.

A WARNING identifies conditions and actions that may cause hazard(s) to the user; a CAUTION identifies conditions and actions that may damage the Device. International electrical symbols used are explained in Table 1.

CE	**Conform to European Union directives**
⎓	**DC – Direct Current**
≂	**AC and DC – Alternating and Direct Current**
⏚	**Earth ground**
⧈	**Double Insulation**
⚠	**See Explanation in The Manual**

Table 1. International Electrical Symbols

TC / RTD THERMOMETER

☐ **INTRODUCTION:**

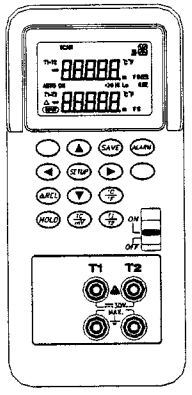
- **J/K/T/E TC Thrmometer.** It can measure temperature by using J. K.T.E etc. 4 types of thermocouple, and mV with dual input T1 and T2.
- **RTD Thrmometer** . It can measure temperature by using RTD Pt385 100 Ω, 200Ω, 500Ω,1KΩ, Pt392 100Ω,JIS392 100Ω and Ni 100Ω etc. input RTD types and 400Ω,800Ω,1KΩ,2KΩ resister with 2wires / 3 wires / 4 wires.
- **TC Thrmometer**. It can measure temperature by using J. K. T. E. R. S. B. N. G. C. D. U. L etc. 13 types of thermocouple, mV with dual input T1 and T2, and with RS232 communication capability.
- All models have audible warning for High-Low limit, Data Hold and Relative founctions.

The comparison of **J/K/T/E Thermometer, RTD Thermometer, TC Thermometer** is as follow:

Item \ Model	J/K/T/E Thermometer	RTD Thermometer	TC Thermometer
TC Thermometer	4 Types (J. K. T.E)		13 Types (J. K. T. E. R. S B. N. G.C.D. U. L)
mV Measurement	✓		✓
RTD Thermometer		✓	
Ohm Measurement		✓	
T1 / T2 Dual Input	✓		✓
2W / 3W / 4W Input		✓	
External adapter			Optional
Hi-Lo Alert output		✓	✓
Hi-Lo Alert Beeper	✓	✓	✓
EL Back- lit for display		✓	✓
RS 232 Interface			Optional
External RTD sensor for cold juntion compensation	Optional		Optional

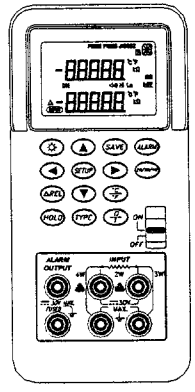
J/K/T/E THERMOMETER

- J / K / T / E four T/C types selectable
- mV / V / Temperature measurement
- Internal/external RTD for cold junction compensation selectable
- Audible warning for High / Low limit setting
- 0.1° resolutions
- °C / °F displays
- Dual inputs T1, T2 or T1-T2 measurements
- ITS-90 / IEC-60584 thermocouples
- DATA HOLD
- Relative
- Dual display
- Auto power off
- Protective Holster



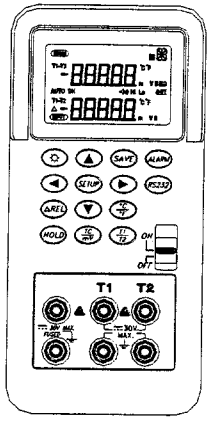
RTD THERMOMETER

- Pt392/Pt385/JIS392/Ni100 types selectable
- 2W/3W/4W input selectable
- Ω or Temperature measurements
- 0.1° resolutions
- °C / °F displays
- DATA HOLD
- Relative
- Audible warning for High / Low limit function
- Alarm output to control external device
- Auto power off
- EL Back-lit
- Protective Holster



TC THERMOMETER

- Thirteen types J.K.T.E.R.S.B. N.G.C.D.U.L TC selectable
- mV / V / Temperature measurement
- Internal/external RTD for cold junction compensation selectable
- Power by battery or external adapter
- Audible warning for High / Low limit function
- Alarm output to control external device for High / Low limit function
- 0.1° resolutions
- °C / °F displays
- Dual inputs T1, T2 or T1-T2 measurements
- ITS-90 / IEC-60584 thermocouples
- DATA HOLD
- Relative
- Dual display with EL back-lit



LCD DISPLAY ILLUSTRATION

1. INPUT : Unused
2. △ : Zero (Delta) mode annunciator
3. -8.8.8.8.8 : Lower digits for Input
4. T1-T2 : T1 or T2 input selection for TC Thermometer
5. DH : Data hold annunciator
6. AUTO : AUTO range mode
7. MAX AVG MIN : Unused
8. MAX : Unused
9. AVG : Unused
10. MIN : Unused
11. OUTPUT : Unused
12. 24V : Unused
13. -8.8.8.8.8 : Upper digits for TC or RTD input Types
14. T1-T2 : T1 or T2 input selection for TC Thermometer
15. RS232 : RS232 Communication ON annunciator
16. SCAN : Unused
17. RAMP : Unused
18. PT392 : RTD input type
19. 0°C : Unused
20. PT385 : RTD input type
21. RJ : Unused
22. JIS392 : RTD input type
23. ERJ : Unused
24. m : Annunciation for K.J.E.T.R.S.B.N.G.C.D.U.L.mV. and V. for TC Ni for RTD Input types
25. ℃ ℉ : Temperature units for upper digits
26. CPM : Unused
27. KΩ : Input units of RTD Thermometer
28. mA, V : Unused
29. : Battery power is weakening
30. : High –Low limit function annunciator
31. Hi : High limit function is available
32. Lo : Low limit function is available
33. : Unused
34. @OFF : Auto power off is enabled
35. ℃ ℉ : Tempearature units for Input function
36. CMP : Unused

37. kΩ : Input units of RTD Thermometer
38. % : Unused
39. mA : Unused
40. mV,V : Voltage unit for Input
41. S : Means unit (second) of time for setting
42. ʃ : Unused

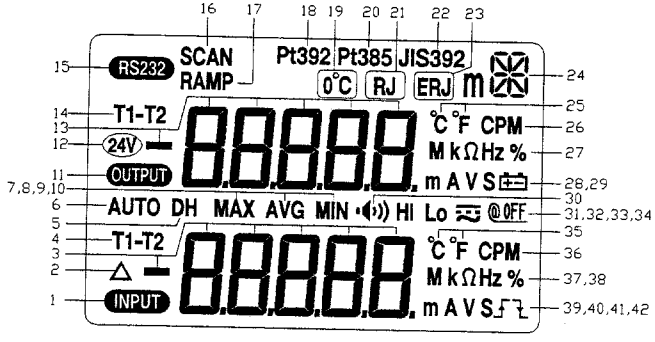


Figure 1. LCD Display

GETTING ACQUAINTED WITH YOUR METER

☐ Slide Switch

The switch is for slide the power from "OFF" position to "ON" position to turn on the device.

Please set the slide switch to "OFF" position if you finish your work. If the device is in "SLEEP" mode, you can either slide the power switch to "OFF" then slide to "ON" position again to re-start your device, or just press any button to re-start the device.

☐ Input and Output Terminal

This device has four terminals for Input fucntion that are protected against overloads to the limits show in the specification. The other two terminals use for alarm output. The overload protection is DC 30 Volts.
There are two output terminals for RTD Thermometer and TC Thermometer, the overload form terminal 6 (+) to terminal 5 (-) is protected by FS2 (63mA / 250V) with DC +30V.

WARNING

To avoid damaging the device, do not exceed the Input limit show below Table

Model	Input Terminal	Overload Protection
TC Thermometer	T1 (3 to 4) / T2 (1 to 2)	DC30V Maximum
RTD Thermometer	2W / 3W 4W (1 , 2 , 3 , 4)	DC30V Maximum

Table 2. Input limit specification

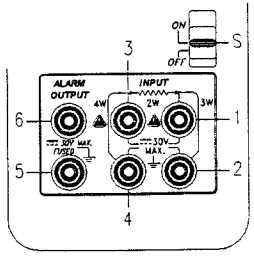


Figure 2. Input / Alarm Output Terminals for RTD Thermometer

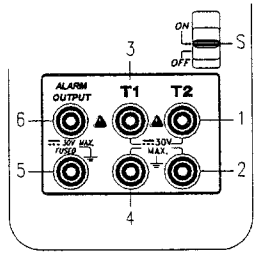


Figure 3. Input / Alarm Output Terminals for TC Thermometer

PUSH-BUTTON OPERATIONS

The operation of push-button is described below.

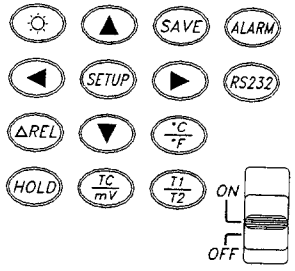


Figure 4. Push-buttons of TC Thermometer.

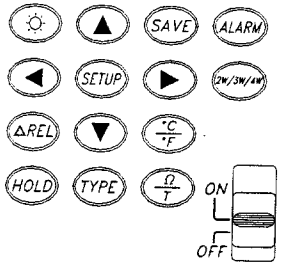


Figure 5. Push buttons of RTD Thermometer.

1. ◄ ►:

For select the digits or polarity to be adjusted for setup mode.

2. ▲ ▼ :

Adjust the selected digit or polarity. Press ▲ button momentarily to increase 1 count for the selected digit or toggle the polarity. Press and hold ▲ button to increasing count continuously. Press ▼ button momentarily to decrease 1 count for the selected digit or toggle the polarity. Press and hold ▼ button to decreasing count continuously.

3. ☼ " Back-light " : (for RTD Thermometer and TC Thermometer)

Press this button to turn the back-light ON or OFF. The back-light will be turned OFF automatically when setting time expired.

4. SAVE :

- In "SETUP" mode, Before change anther pages or to exit, presses this button to save the setting configuration of each setting into the memories.
- In measurement mode, you can press this button to save present type, unit (" °C "or " °F") for next power ON.

5. °C / °F :

Press this button to toggle display the unit of " °C / °F".

6. Δ REL :

The relative function shows the difference between the reading of present measured value and the stored reading. Press the button to toggle Relative (Δ) ON or OFF, for lower digits.

7. DH :

The data hold function allows operator to freeze the display reading by press the button to toggle it on or off.

8. TC/mV :

- Press this button to select the thermocouple type for measurement. The annunciator on the right-up corner of LCD is used to indicate which type will be measured . Following table you will find its sequential selection.

Type \ Model	J/K/T/E Thermometer		TC Thermometer	
	T1	T2	T1	T2
J	•	•	•	•
K	•	•	•	•
T	•	•	•	•
E	•	•	•	•
R			•	•
S			•	•
B			•	•
N			•	•
G			•	•
C			•	•
D			•	•
U			•	•
L			•	•
mV	•	•	•	•

Type \ Model	RTD Thermometer
	INPUT
Pt100-385	•
Pt200-385	•
Pt500-385	•
Pt1K-385	•
Pt100-392	•
Pt100-JIS	•
Ni100	•

9. T1/T2 : (for J/K/T/E TC Thermometer and TC Thermometer)

In TC mode press this button to select input mode **"T2", "T1-T2" , "T1&T2" or "T1"**.
In mV mode press this button to select input mode **"V2", "V1&V2" or "V1"**.

Key operation	Lower digits	Upper digits
Push Dual	T2	
Push Dual (TC only)	T1-T2	
Push Dual	T1	T2
Push Dual	T1	

10. Ω / T : (for RTD Thermometer)

Press this button to toggle display the unit of "Ω" or " °C / °F ".

11. ALARM:

Press this button to enter HI/LO alert mode. Press the button again to exit the mode.

12. RS232 : (TC Thermometer only)

Press this button to toggle RS232 function ON / OFF. When the RS232 function is activated, the annunciator of RS232 will light and all the functions will controlled by the PC (personal computer).

13. 2W.3W.4W : (RTD Thermometer)

Press this button to select input mode for 2 wires, 3 wires or 4wires (**2W/ 3W / 4W**) .

Key operation	Lower digits	Upper digits
Push Dual	xxxxx	3 – xxx (3W)
Push Dual	xxxxx	4 – xxx (4W)
Push Dual	xxxxx	2 – xxx (2W)

12. SAVE :

Press this button to save the setting configuration of each setting into the memory.

13. SETUP :

Press this button for 1 second or longer to enter or exit the "SETUP" function. Press **SETUP** button momentarily to select the desire setup item forwardly and circularly. The setup items as shown in following table:

SETUP Item	Operation	Annunciator	Lower digits	Upper digits
Beeper	Push SETUP		On/OFF	BEEP
Auto power off	Push SETUP	AOFF	*1 0~99 m (minutes)	SLEEP
Back-lit	Push SETUP		*2 0~99 s (seconds)	B-Lit
Alarm area	Push SETUP	Hi Lo	*3 HI-LO (signal selection)	
Hi-Low limit Setting	Push SETUP		**Low setting Value**	**High setting Value**

*Note
* 1 : 00 Minute means the sleeping (Auto Power Off) mode will be disable .
* 2 : 00 second means the back light will be turn on continuously.
* 3 : For TC Thermometer and RTD Thermometer only.
Press **SAVE** button to save the setting and press **SETUP** button to enter another setting item.

a. Beeper

The upper digits will display **" bEEP "** and the lower digits will show **"On"** or **"OFF"**. Press the ▲ ▼ buttons to change it.

b. Auto power off

The upper digits will indicate **"SLEEP"** and the existing time setting is shown on the lower digits. The timer of auto power off can be set from 1 to 99 minutes by press ▲ ▼ ◀ ▶ buttons. The auto power off will be disable and the annunciator of AOFF will disappear when you set 0 minute.

c. Back-lit (For TC Thermometer and RTD Thermometer)

The upper digits will indicate **"b-Lit"** and the existing time setting is shown on the lower digits. The timer can be set from 1 to 99 seconds by press ▲ ▼ ◀ ▶. Set timer to 00 second to disable the auto off of back-lit.

d. Alarm range

This setup can set the condition of the beeper alert and output mode.

It has three states of condition, see the following table:

Annunicator ON	Hi Lo	Hi	Lo
Range	Low limit ≤ Reading ≤ High limit	Reading> High Limit	Reading< Low Limit

- Press ◀ ▶ button to change above setup.
- Press ▲ ▼ button to select **"HI-LO"** and **"LO-HI"** signals for the output level condition.
- **"HI-LO"** means the output will be changed from high level to low level condition, when the alarm was activated. **"LO-HI"** means the output will be changed from low level to high condition, when the alarm was activated.

11. *HI / Low value setting*

- The annunciator of **"Hi"** lit and the upper digits indicate the value of High limit, and The annunciator of **"Lo"** lit and lower digits indicate the value of low limit.
- Press **Δ REL** button to select the " high setting value " or " low setting value ", the digit flashed which will be adjusted. Press ▲ ▼ ◀ ▶ buttons to adjust the setting values .
- Press the ***SAVE*** button to record the setting value into the memory. The beeper will sound two tones, it means the set has been recorded. If the current setting can not meet the rule that the high limit must equal or greater than the low limit, the beeper sounds three tones.

SPECIAL FUNCTIONS

This device provides operators with various functions including:

- Data Hold
- Relative
- Sleeping Mode
- Alarm output for High – Low Limit
- Back-lit Display for easy reading in dark
- Communication with Optical Duplex RS232

☐ DATA HOLD

The data hold function allows operators to freeze the displayed reading. Press **DH** button to freeze the reading, the **"DH"** will be displayed. Press the button again to exit.

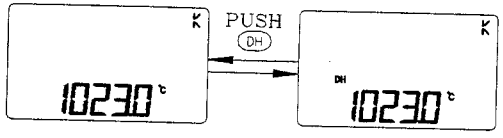


Figure 6. Data Hold Operation

☐ RELATIVE (ZERO)

In the relative function, the present measured data will substrate the stored value and display the result.

1) Press **ΔREL** button momentarily to set the relative mode. This sets the display to zero and stores the displayed reading as a reference value, also " Δ " will be displayed.

2) The relative mode can't be set when an overload has occurred.

3) Press this button again to exit the relative mode.

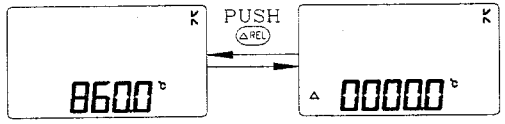


Figure 7. Relative (Zero) Operation.

☐ Sleeping Mode

1. The instrument will auto-power off within 15 minutes (The first initial value in memory), if the push button was never to be pressed for longer than the setting time.

2. The timer can be set from 0 to 99 minutes with "SETUP" function.

3. If the setting time is **"00"** minute that means the auto-power off function will be disable.

4. When the instrument wake-up again with pressing any buttons, the types and basic functions will be called again.

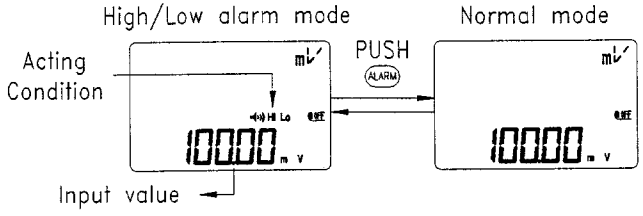
☐ Alarm Output / Audible warning for Hi-Lo alert

You can use this function to produce warning message and recognize the Input condition (For lower display of input only). The operational procedures are described below:

1) Press **Alarm** button to enter HI/LO alert mode. The range of meter locks in this mode.

The annunciator of " HI Lo " will be shown according to the setting of SETUP. If the reading is greater than High limit value or less than Low limit value, the beeper sounds continuously.

2) Press **Alarm** button to exit the " HI/LO limit " mode.



☐ External RTD Sensor for Cold junction compensation

1) For TC Thermometer, when the external RTD sensor is plug in the R.J. Input jack, the cold juntion compensation will detected by the External RTD .
2) If the external RTD sensor is plug in the R.J. Input jack , in the meanwhile the loop of External RTD is open, the digits will show " r.JErr " RJ Error. Please check and repair it.

☐ Back-Lit Display for easy reading in the dark

- Press ☼ button to toggle back-light ON/OFF.
- Back-light turns off time is according to setting of memory from "SETUP" (Initial time is 30 seconds). The timer can be set from 0 to 99 seconds .
- If the setting time is " **00** " seconds that means the Back-light will lit until you press ☼ button again.

☐ COMMUNICATION WITH OPTICAL DUPLEX RS232 (TC Thermometer only)

- This device has a communication capability with optional duplex RS232. This function will assist user to control the function of this device and recording data easily.
- We have offered CP-06 to option accessories. The CP-06 include a cable with optional translater/receiver and a software disk.
- Please refer following procedures if you want to communicate with personal computer.

1. Press **RS232** button to toggle communication ON/OFF.
2. Fixes one side of cable to the holster of meter and connect the 9 pin's terminal of cable to communication port 1 or 2 of computer.
3. Execute the software to take the data for your necessary.

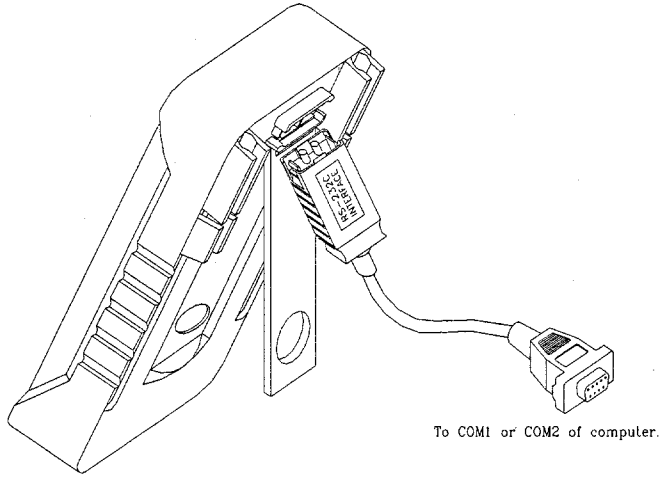


Figure 9. Cable Connection for Communication

HOW TO OPERATE

□TEMPERATURE MEASUREMENT FOR J/K/T/E THERMOMETER AND TC THERMOMETER

1) Slide the power switch from ***OFF*** position to ***ON*** position.
2) Press **TC/mV** button to select input thermocouple type.
3) Press ℃/℉ button to select " ℃ " or " ℉ " (Celsius / Fahrenheit).
4) Press **T1/T2** button to select input mode **T2** , **T2&T2** , **T1-T2** or **T1**.

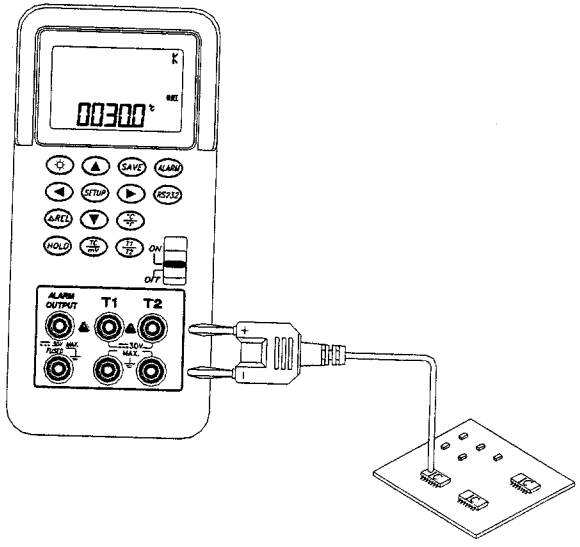


Figure 10. Surface temperature measurement.

□ DC VOLTAGE MEASUREMENT FOR J/K/T/E THERMOMETER AND TC THERMOMETER

1) Slide the power switch from *OFF* position to ***ON*** position.
2) Press **TC/mV** button to select input **"mV"** or **"V "** type .
3) Press **T1/T2** button to select input mode **V2** , **V1&V2** or **V1**.

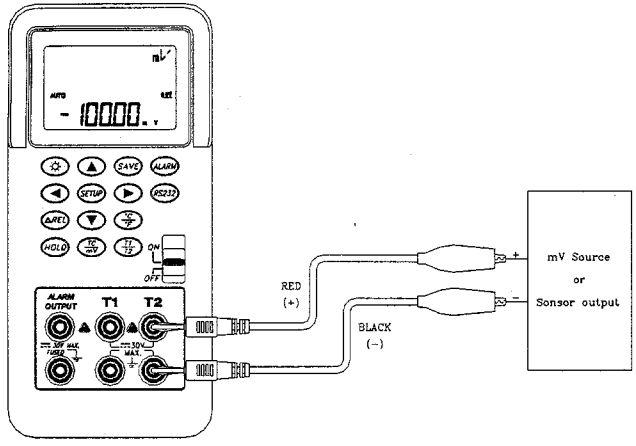


Figure 11. DC Voltage Measurement

☐ RESISTANCE / RTD MEASUREMENT FOR RTD THERMOMETER

1) Set the slide switch from ***OFF*** position to ***ON*** position.

2) Press **TYPE** button to select input types .

3) Press **Ω/ T** button to select the display unit "Ω" or " ℃/ ℉ " (Celsius / Fahrenheit).

4) Press **2w/3w/4w** button to select 2 wire / 3wires / 4 wires of the Input mode

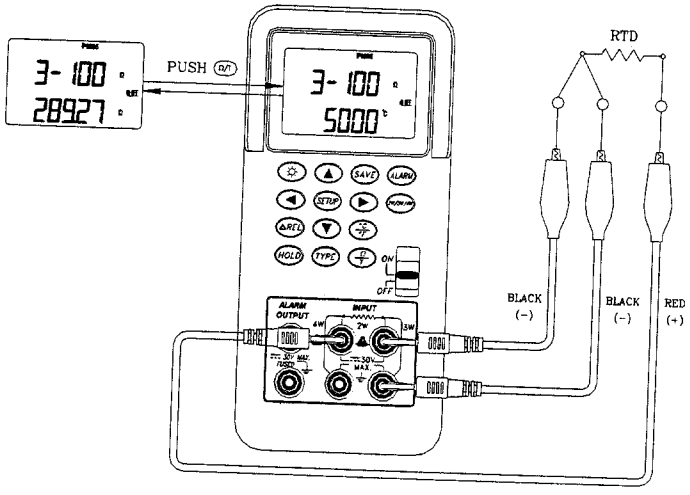


Figure 12. DC Current Measurement

☐ ALARM OUTPUT (For TC Thermometer and RTD Thermometer)

1) Set the slide switch from ***OFF*** position to ***ON*** position.

2) Press **ALARM** button to enter HI/LO alert mode. The annunciator of "HI Lo" will be shown.

3) Press **ALARM** button to exit this mode.

4) To connect the circuit as following (see Figure :

- Put a resistor Between positive end (+) of Vcc and plus " + " terminal of alarm output.
- Connect the negative end (-) of Vcc to minus " – " terminal of alarm output .
- Output the signal from plus " + " terminal and minus " – " terminal of alarm output.
- The supply voltage (Vcc) range : 3V < (Vcc) < 24V DC .
- The current (Is) of circuit range : 0.1mA < (Is) < 3mA .

Note : Before enter the Alarm function, the Alarm output always stay at High Level.

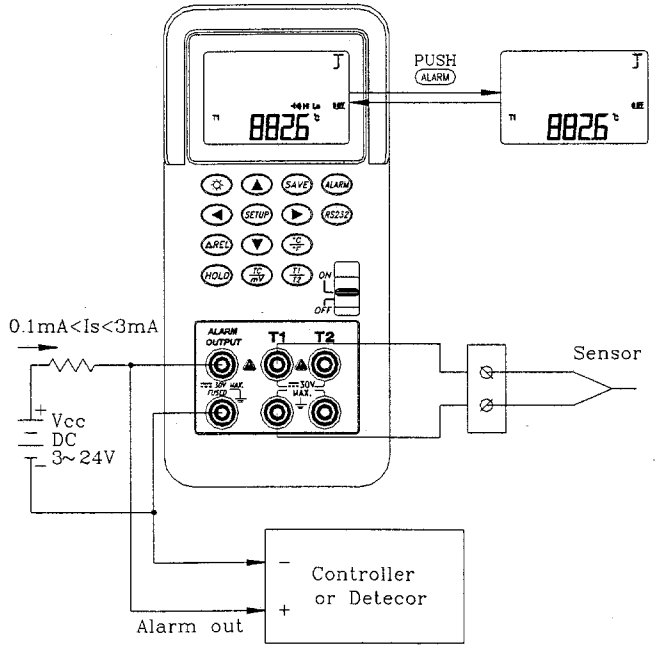


Figure 13. Circuit of Alarm output

GENERAL SPECIFICATIONS

Display:
- Both primary and secondary displays have 5 digits liquid crystal display (LCD).
- Automatic polarity indication.

Function:
- Thirteen types of thermocouple temperature test and source, addition voltage measurement
- External RTD sensor for cold junction compensation.
- Power by battery or external adapter.
- Back-light display for easy reading in the dark.

Measuring rate: 1 time per second.

Low battery indicator:
- The "[+ −]" appears when the internal battery voltage drops below 6.7V (approx.)

Operating temperature: 0°C to 40 °C, 0 - 80 % R.H.

Storage temperature:
- -20°C to 60°C, 0 - 80 % R.H. with BATTERY REMOVED.

Temperature coefficient:
- 0.15 * (specified accuracy) / °C (from 0°C to 18°C or 28°C to 40°C)

Safety: Design to meet LVD (IEC-1010-I, EMS), ULc

Power supply:
- Single standard NEDA1604, JIS006P, IEC6F22 carbon-zinc or alkaline type 9V battery.

Dimension: 37 (H) * 90 (W) * 192 (L) mm.

Weight: 1240 grams with standard accessories.

Standard Accessories:
1) Instruction Manual
2) 9V battery
3) Protective holster
4) TP-01 Thermocouple probe

Optional Accessories:
1) RS232C package (CP – 06)
2) 12V AC adapter
3) Pt1k RTD probe(stainless)

ELECTRICAL SPECIFICATIONS

Specifications are based on a one year calibration cycle, and the accuracy is given as ±(% of reading + no. of least significant digits) at 23°C ± 5°C, with relative humidity Less than 80% R.H.

J/K/T/E Thermometer and TC Thermometer

☐ Thermocouple Temperature Measurement

Type	Range		Resolution	Accuracy	R.J *1 Accuracy
J	-210°C ~ 0°C	-346°F ~ 32°F	0.1°	±(0.03%+ 1.0°C)	± 0.3°C
	0°C ~ 1200°C	32°F ~ 2192°F		±(0.03%+ 0.6°C)	
K	-200°C ~ 0°C	-328°F ~ 32°F	0.1°	±(0.03%+ 1.0 °C)	± 0.3°C
	0°C ~ 1372°C	32°F ~ 2502°F		±(0.03%+ 0.6°C)	
E	-200°C ~ 0°C	-328°F ~ 32°F	0.1°	±(0.03%+ 1.0°C)	± 0.3°C
	0°C ~ 1000°C	32°F ~ 1832°F		±(0.03%+ 0.6°C)	
T	-200°C ~ 0°C	-328°F ~ 32°F	0.1°	±(0.03%+ 1.0°C)	± 0.3°C
	0°C ~ 400°C	32°F ~ 752°F		±(0.03%+ 0.6°C)	
R	-50°C ~ 1768°C	-58°F ~ 3214°F	1°	±(0.03%+ 2°C)	± 0.3°C
S	-50°C ~ 1768°C	-58°F ~ 3214°F	1°	±(0.03%+ 2°C)	± 0.3°C
B	300°C ~ 1820°C	572°F ~ 3308°F	1°	±(0.03%+ 2°C)	± 0.3°C
N	-200°C ~ 0°C	-328°F ~ 32°F	0.1°	±(0.03%+ 1.5°C)	± 0.3°C
	0°C ~ 1300°C	32°F ~ 2372°F		±(0.03%+ 1.0°C)	
G	0°C ~ 2320°C	32°F ~ 4208°F	1°	±(0.03%+ 2°C)	± 0.3°C
C	0°C ~ 2320°C	32°F ~ 4208°F	1°	±(0.03%+ 2°C)	± 0.3°C
D	0°C ~ 2320°C	32°F ~ 4208°F	1°	±(0.03%+ 2°C)	± 0.3°C
U	-200°C ~ 0°C	-328°F ~ 32°F	0.1°	±(0.03%+ 1.0°C)	± 0.3°C
	0°C ~ 600°C	32°F ~ 1112°F		±(0.03%+ 0.6°C)	
L	-200°C ~ 0°C	-328°F ~ 32°F	0.1°	±(0.03%+ 1.0°C)	± 0.3°C
	0°C ~ 900°C	32°F ~ 1652°F		±(0.03%+ 0.6°C)	

- Maximum input voltage: 30V
- Note1:The external RTD (R.J input) sensor is used.

☐ Environmental Temperature Measurement of External RTD Sensor

Cold Junction Type	Range	Resolution	Accuracy
External Pt 385/1kΩ	0~40°C	0.1°C	±(0.03%+ 0.9°C)
	-20~250°C	0.1°C	±(0.03%+ 1.2°C)

☐ Voltage measurement

Range	Resolution	Accuracy	Maximum input voltage
100mV	0.01mV	± (0.03%+3dgts)	30V
1V	0.1mV	± (0.03%+3dgts)	30V

☐ Alarm output (TC Thermometer only)

External Supply voltage Vcc	Limit Current (mA)	High Level	Low Level	Maximum input voltage
3 ~ 24V	0.1mA ~ 3mA	> 2 / 3 Vcc	< 1 / 3 Vcc	+ 30V

RTD Thermometer

☐ RTD temperature measurement

Sensor Type	Range	Resolution	Accuracy		
			2 Wires	3 Wires	4 Wires
Pt 385	-200~850°C (328 ~1562°F)	0.1°	±(0.05%+0.6°C)	±(0.04%+0.4°C)	±(0.03%+0.3°C)
Pt 392	-100~457°C (-148 ~ 855°F)	0.1°	±(0.05%+0.6°C)	±(0.04%+0.4°C)	±(0.03%+0.3°C)
JIS392	-200~500°C (-328 ~932°F)	0.1°	±(0.05%+0.6°C)	±(0.04%+0.4°C)	±(0.03%+0.3°C)
Ni100	-25~250°C (-13 ~ 482°F)	0.1°	±(0.05%+0.6°C)	±(0.04%+0.4°C)	±(0.03%+0.3°C)

- The tolerance of RTD sensor is not included.
- Pt 385 include 100Ω, 200Ω, 500Ω, 1000Ω types.

☐ Resistance measurement

Range	Resolution	Accuracy		
		2 Wires	3 Wires	4 Wires
400Ω	0.01Ω	±(0.05%+15dgts)	±(0.04%+6dgts)	±(0.03%+5dgts)
800Ω	0.1Ω	±(0.05%+2dgts)	±(0.04%+2dgts)	±(0.03%+2dgts)
2000Ω	0.1Ω	±(0.05%+6dgts)	±(0.04%+5dgts)	±(0.03%+4dgts)
4000Ω	0.1Ω	±(0.05%+8dgts)	±(0.04%+6dgts)	±(0.03%+5dgts)

- The resistance of test leader is not included.

☐ Alarm output

External Supply voltage Vcc	Limit Current (mA)	High Level	Low Level	Maximum input voltage
3 ~ 24V	0.1mA ~ 3mA	> 2 / 3 Vcc	< 1 / 3 Vcc	+ 30V

MAINTENANCE

⚠ *WARNING*

To avoid electrical shock, do not perform any service unless you are qualified to do so.

☐ SERVICE

If the instrument fails to operate, check battery, test leads, etc. and replace them if necessary. If the instrument still does not work, double check operating procedure as described in this instruction manual. When servicing, use specified replacement parts only.

⚠ *CAUTION*

To avoid electrical shock or damage to the meter. Do not get water inside the case. Remove the test leads and any input signals before opening the case.

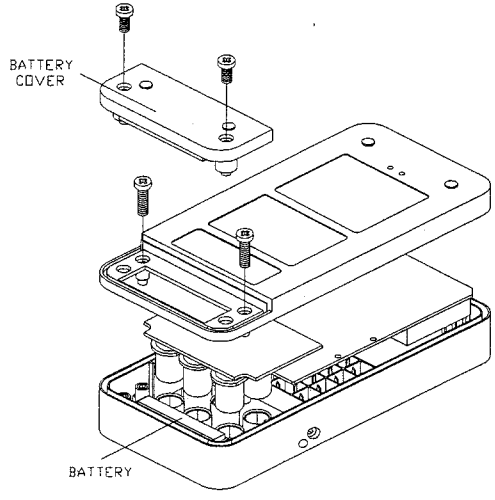


Figure 14. External Battery Replacement.

□ BATTERY REPLACEMENT

The meter is powered by a single 9V battery (NEDA1604, JIS006P,IEC6F22 carbon-zinc or alkaline battery). Replace battery if the low battery sign ( ) is displayed and flashes. Use the following procedures to replace the battery.

1. Slide power switch to ***OFF*** position and disconnect the test leads.
2. Loosen screws on bottom cover and remove the cover.
3. Replace the battery.

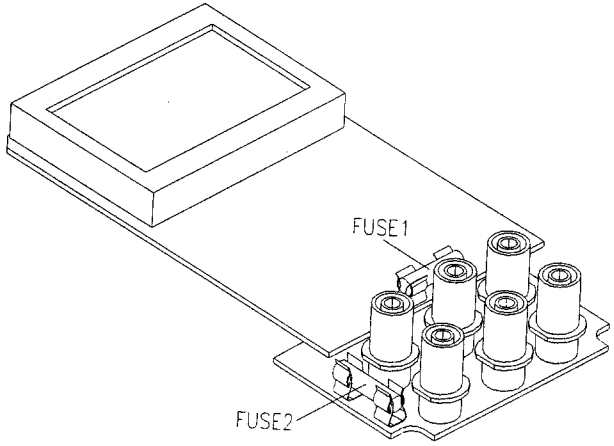


Figure 15. Fuse Replacement

□ FUSE REPLACEMENT

1. Set the slide switch to ***OFF*** position and disconnect the test leads.
2. Loosen screws on battery cover and remove the battery cover.
3. Loosen screws from top case and lift the circuit board.
4. Remove the defective fuse by gently prying one end of the fuse loose and sliding the fuse out of the fuse bracket.
5. Install a new fuse of the same size and rating. Make sure the new fuse is centered in the fuse holder.
6. Ensure that the slide switch and rubber key are on the top case. Then re-fasten the circuit board to the top case.
7. Then re-fasten the bottom cover and the battery cover respectively.

The rate, size, and location of the fuses shown as below:

MODEL	LOCATION	RATE VOLTAGE	RATE CURRENT	SIZE	TYPE
RTD Thermometer	Fuse 2	250 V	63mA	5x20 mm	Time-lag acting
TC Thermometer	Fuse 1	250 V	63mA	5x20 mm	Time-lag acting
TC Thermometer	Fuse 2	250 V	63mA	5x20 mm	Time-lag acting

Note: Fuse1 for external power supply.
Fuse2 for alarm output.

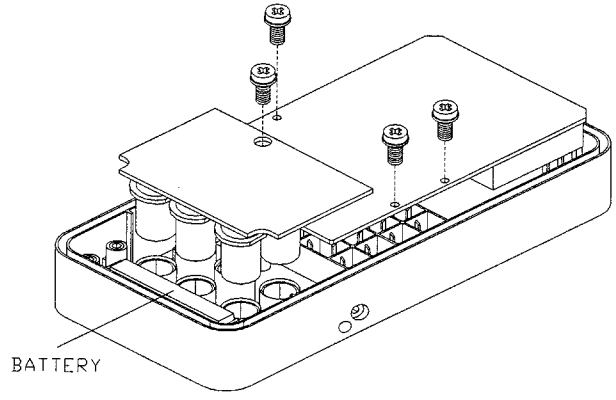


Figure 16. Circuit Board from Top Case

☐ CLEANING

To clean the instrument, use a soft cloth dampened in a solution of mild detergent and water. Do not spray cleaner directly onto the instrument, since it may leak into the cabinet and cause damage.
Do not use chemicals containing benzine, benzene, toluene, xylene, acetone or similar solvents.

ACCESSORIES AND REPLACEMENT PARTS

☐ STANDARD ACCESSORIES:

P / N	Description
61-25027-1	9 Volts Battery
15A-25595-2	Protective Holster with Bracket
* 1 30-25775-1	TP 01 K type bead probe
30A-25641-1/2	Alligator clip with banana leads
62-25593-1U	63mA / 250V, Time-lag fuse

*** Note 1 : J/K/T/E Thermometer and TC Thermometer Only**

☐ OPTIONAL ACCESSORIES:

P / N	Description
*2 20-25002-14	CP-06 communication package, included full isolation optical cable and software disc.
63-2601-1	EA-112A: AC 110V, 12V/300mA Adapter
63-2302-1	EA-55A : AC 220V, 12V/300mA Adapter
*3 30-25776-1	TP-RIK RTD probe
*3 30-25670-2	DP-26 K-type miniature to banana Transition Adapter

*** Note 2 : TC Thermometer Only**
*** Note 3: J/K/T/E Thermometer and TC Thermometer Only**