

Pro'sKit®



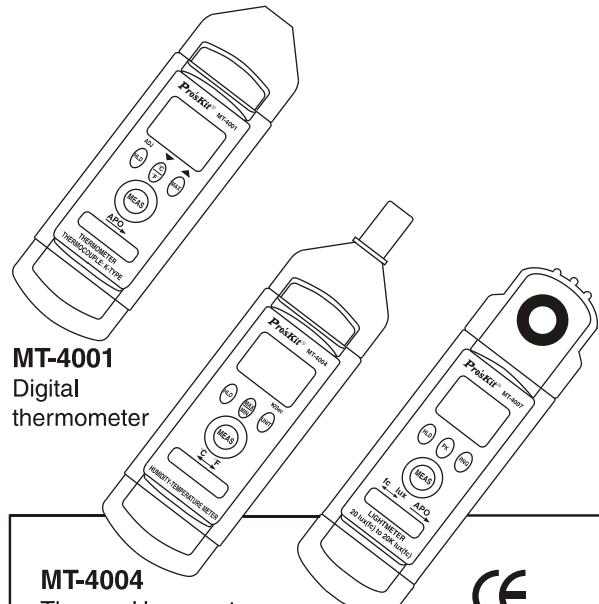
Certificate Number : TW98/12323QA

Digital-meter

Pro'sKit®

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寶工實業股份有限公司
PROKIT'S INDUSTRIES CO., LTD.



MT-4001

Digital
thermometer

MT-4004

Thermo-Hygrometer



MT-4007

Digital lightmeter

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Thank you for purchasing the **Pro'sKit**® Digital-meter series. Before using the Digital-meter series for the first time, please read the instruction manual.

GENERAL OFFICE	
ENVIRONMENT	UNIT(LUX)
design room, general office	2000-1500
lobby, store, typing	1500-700
meeting room, telephone switchboard room, printer room, entertainment, restaurant	750-300
dancing house, security room, hall, rest-room	300-150
tea room, warehouse	150-75
outdoor stair	75-30

HOSPITAL	
ENVIRONMENT	UNIT(LUX)
Vision examination	10000-5000
operating room	1500-750
clinic room, drug room, nursing room	750-300
waiting room	300-150
x-ray room	150-75
elevator	75-30

FACTORY	
ENVIRONMENT	UNIT(LUX)
Precision working, design	3000-1500
research & development department	1500-750
packing, measurement, hall, rest-room	750-300
dye, passway, haoo, rest-room	300-150
warehouse	150-75

SCHOOL	
ENVIRONMENT	UNIT(LUX)
computer room	1500-300
classroom, laboratory, workshop, office, library, meeting room, indoor stadium	750-200
hall, stair, rest-room, outdoor stadium	300-150
warehouse, garage, safety door	75-30

HOTEL	
ENVIRONMENT	UNIT(LUX)
check-in, check-out desk	1500-750
lobby, office, parking, kitchen	750-300
restaurant, rest-room	300-150
hall, escalator, stair, shower, garden	150-75
elevator	75-30

HOUSE	
ENVIRONMENT	UNIT(LUX)
sawing	2000-750
writing	1000-500
study desk, make-up desk, island, phone station	750-300
laundry room, entertainment, living room, entrance	300-150
closet, bedroom, stair, hall	150-75
balcony, porch	75-30

MODEL: MT-4001 DIGITAL THERMOMETER

INTRODUCTION

This instrument is a portable 3½ digit, compact-sized digital thermometer designed to use external K-type Thermocouple as temperature sensor. Temperature indication follows Reference Temperature/Voltage Tables N.I.S.T. Monograph 175 Revised to ITS-90 for K-type thermocouples.

SAFETY INFORMATION

It is recommended that you read the safety and operation instructions before using the thermometer.

WARNING

To avoid electrical shock, do not use this instrument when voltages at the measurement surface exceed 24V AC or DC.

WARNING

To avoid damage or burns, do not make temperature measurement in microwave ovens.

CAUTION

Repeated sharp flexing can break the thermocouple leads. To prolong lead life, avoid sharp bends in the leads, especially near the connector.

SPECIFICATIONS

ELECTRICAL

- Temperature Scale: Celsius or Fahrenheit user-selectable.
- Measurement Range: -100°C to 850°C, -148°F to 1562°F.

3. Temperature Coefficient: 0.1 times the applicable accuracy specification per °C from 0°C to 18°C and 28°C to 50°C(32°F to 64°F and 83°F to 122°F).
4. Accuracy: Accuracy is specified for operating temperatures over the range of 18°C to 28°C(64°F to 83°F), for 1 year, not including thermocouple error.

$\pm(0.3\% \text{ rdg} + 1^\circ\text{C})$ on °C ranges
 $\pm(0.3\% \text{ rdg} + 2^\circ\text{F})$ on °F ranges

5. Resolution: 1°C/1°F, 0.1°C/0.1°F(Auto)

Resolution	Range
0.1°C	-59.9°C to 199.9°C
1°C	-100°C to -60°C 200°C to 850°C
0.1°F	-59.9°F to 199.9°F
1°F	-148°F to -60°F 200°F to 1562°F

6. Input Protection: 24V dc or 24V ac rms maximum input voltage on any combination of input pins.

7. Input Connector: Accepts standard miniature thermocouple connectors (flat blades spaced 7.9mm, center to center).

GENERAL

Display: 3½ digit liquid crystal display (LCD) with maximum reading of 1999.

Low battery indication: The "■" is displayed when the battery voltage drops below the operating level.

Measurement rate: 1.5 times per second, nominal.

Operating Environment: 0°C to 50°C at < 70% relative humidity.

Storage Temperature: -20°C to 60°C, 0 to 80% R.H. with battery removed from meter.

Accuracy: Stated accuracy at 23°C±5°C, <75% R.H.

Standby consuming current: <10mµA.

Auto power off: 15 minutes

Battery Life: 140 hours (continuity) typical.

Battery: 3 pcs 1.5V (AAA size) UM-4 R03.

Dimensions(HxWxD): 148mm(H) x 48mm(W) x 24mm(D).

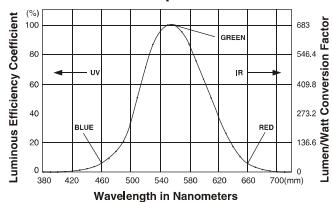
Weight: Approx. 73.4g including battery.

維護事項

電池更換及保養

- 顯示器上如有"■"符號出現時，表示電池電力不足，敬請更換1.5V電池(AAASize)三只，以維持測試準確性。
- 將電池蓋之一只螺絲鬆離，打開電池蓋換上三只新1.5V電池(AAA Size)。
- 電錶長時間不使用時，請將電池取出電錶，並避免存放於高溫、高溼之處。

CIE Photopic Curve



清潔

定期的使用軟濕布沾上中性清潔劑輕擦外殼或鏡片，不能使用紗布或有溶解能力之溶劑。

Wavelength (nm)	V λ CIE Photopic Luminous Efficiency Coefficient	Photopic Lumen/Watt Conversion Factor
380	0.0000	0.05
390	0.0001	0.13
400	0.0004	0.27
410	0.0012	0.82
420	0.0040	2.73
430	0.0116	7.91
440	0.0230	15.7
450	0.0380	25.9
460	0.0600	40.9
470	0.0910	62.1
480	0.1390	94.8
490	0.2080	142.0
500	0.3230	220.0
510	0.5030	343.0
520	0.7100	484.0
530	0.8620	588.0
540	0.9540	650.0
550	0.9950	679.0
555	1.0000	683.0
560	0.9950	679.0

Wavelength (nm)	V λ CIE Photopic Luminous Efficiency Coefficient	Photopic Lumen/Watt Conversion Factor
570	0.9520	649.0
580	0.8700	593.0
590	0.7570	516.0
600	0.6310	430.0
610	0.5030	343.0
620	0.3810	260.0
630	0.2650	181.0
640	0.1750	119.0
650	0.1070	73.0
660	0.0610	41.4
670	0.0320	21.8
680	0.0170	11.6
690	0.0082	5.59
700	0.0041	2.78
710	0.0021	1.43
720	0.0010	0.716
730	0.0005	0.355
740	0.0003	0.170
750	0.0001	0.020
760	0.0001	0.041

● PK : 功能

按"PK"鍵啟動或關掉PEAK-HOLD的功能，在此模式裡液晶顯示" PH " 和"MAX"符號。

操作程序

- 1.選擇功能開關至所需之lux(勒克司)或fc(呎燭光)照度單位。
- 2.將照度感應頭之保護蓋拿下收好。
- 3.將照度感應頭穩穩，並且確定光源能完全覆蓋住餘弦修正擴散板上。
- 4.確實避免陰影遮住擴散板，照度感應頭有1.5公尺之測試線長，可供觀察者與測試區之距離可供應用。
- 5.顯示器上讀值即為欲測之照度值。如不知被測照度值的大小，可先按 "RANGE" 檔位鍵至最高檔位，再逐步降低檔位至能得到最大有效位數之檔位，即可獲得最佳之讀值。
- 6.測量完後，請將照度感應頭蓋上保護蓋，以延長感應器之壽命，減少老化現象。

特殊考慮事項

- 經常保持照度感應頭上餘弦修正擴散板之乾淨並避免被刮傷，可使用軟布沾消毒用酒精清潔之。
- 當光源接受自很多不同的方向直接同時照至感應頭時，特別留意身體不要有反射光或身影產生於感應頭上。
- 為得到最佳的準確性，需重複測試幾次，以能確保光源是否持續維持安定。
- 請避免將測試線兩端線尾根部過度扭轉。
- 光的平方反比定律：一表面上的照度(E)和光源的燭光數(l)成正比，而和離光源的距離(d)平方成反比。假如光源直接入射到表面上的一點，則公式表示為： $E = l/d^2$ (illuminance)：照度符號，單位時間內單位面積上可見光輻射到表面的能量，即每單位時間的光通量，它由勒克司(lux) (每平方公尺流明)為單位來測量，或由呎燭光(fc)(每平方呎燭光)為單位來測量。

I(luminous intensity)：不論是在一般或一特定方向上，光源發光能力的量度，量度單位為尼特(nit)。

餘弦定律

光的入射線與被測表面的法線成 θ 角，則被測表面的照度與 $\cos \theta$ 成正比。此定律可與光的平方反比定律結合使用為 $-E = (I \cos \theta) / d^2$

OPERATING INSTRUCTIONS

MEAS (MEASURE) Button

Press "MEAS" button to turn on the meter for measuring temperature.
Press "MEAS" button again turns meter off.

DATA HOLD Mode

Press the "HLD" key to enter the Data Hold mode, the " H " annunciator is displayed. When DATA HOLD mode is selected, the thermometer holds the present readings and stops all further measurements. Press the "HLD" key again cancels DATA HOLD mode, causing thermometer to resume taking measurements.

°C/F Selecting the Temperature Scale

Readings displayed in either degrees Celsius(°C) or degrees Fahrenheit(°F). When the thermometer is turned on, it is set to the temperature scale that was in use when the thermometer was last turned off. To change the temperature scale, press the "°C/F" key.

MAX HOLD Mode

Press the "MAX" key to enter the MAX HOLD mode. The thermometer then records and updates the maximum absolute values and the "MAX" annunciator appears on the display. Press the "MAX" key again to exit the MAX HOLD recording mode. In the MAX HOLD mode, press "HLD" key to stop the recording, press "HLD" key again to resume recording.

ADJ Function

Thermocouple offset adjustment. Press "ADJ" button for more than 2 seconds to enter ADJ Function which can adjust the offset of thermocouple in the ambient temperature. Insert the bead wire into a known temperature (T) until the display equal to known temperature (T). ex: room temperature at 25°C

Ice point at 0°C

boiled water at 100°C

Press " ▲ " or " ▼ " to add or subtract the value.

It can be adjusted 0±3°C.

Press "ADJ" button again to confirm and exit ADJ function.

APO (Auto power off) Function

To remove rubber cover on front and slide the switch to right to enable "APO" function. To slide the switch to left to disable "APO" function. It will turn off automatically after approximately 15 minutes to lengthen battery life.

OPERATOR MAINTENANCE

WARNING

To avoid possible electrical shock, disconnect the thermocouple connectors from the thermometer before removing the cover.

MAINTENANCE

Battery Replacement

1. Power is supplied by three 1.5V (AAA size) batteries.
2. The "  " appears on the LCD display when replacement is needed.
To replace the batteries, remove the screw from the back of the meter and lift off the battery cover.
3. Remove the batteries from battery contacts.
4. When not use for long time remove battery.
5. Don't keep in place with high Temp. or high humidity.

Cleaning

Periodically wipe the case with a damp cloth and detergent, do not use abrasives or solvents.

電器規格

測光學照度公式 :

$$\text{lux(勒司)} = \text{lumens/m}^2 \text{ (流明/米}^2\text{)} = 10.764 \text{ footcandles (呎燭光)}$$

$$1 \text{ footcandles (呎燭光)} = \text{lumens/ft}^2 \text{ (流明/呎}^2\text{)} = 0.0929 \text{ lux(勒司)}$$

檔位 : 20lux, 200lux, 2000lux, 20klux, 20fc, 200fc, 2000fc, 20kfc

解析度 : 0.01lux , 0.01fc

光譜反應 : CIE photopic (依據國際照明協會明視光譜光效率平均曲線)

國際照明協會規定的明視光譜光效率平均曲線是國際標準光度曲線 ,

依據人眼對光譜顏色之響應而訂定。(視見函數)

可受光角度 : $f' < 2\%$ 餘弦修正(150°內)

總準確性(對CIE標準照度A(2856K) : $\pm 3.0\%$ 讀值+10位

CIE標準照度A實質上可稱為CIE標準光源A, 定義為：一充氣的鎢絲燈泡動作於相對的2856K色溫。

溫度係數：在超出18°C至28°C(64.4°F至82.4°F)的環境下，每增減1°C會使誤差增加10%

操作說明

● MEAS : 測試鍵

按下"MEAS"鍵去啟動電錶並開始照度測量，再按下"MEAS"鍵去關閉電錶。

● APO : 自動關機功能

移開電錶下方的橡膠蓋，將開關移到右邊即可啟動APO功能，LCD顯示" P "的符號，將開關移到左邊即可關閉APO功能，LCD " P "的符號會消失。在APO狀態下，超過15分鐘沒有使用這台錶，電源將自動關閉。當電錶自動關機後，按下"MEAS"鍵可再次啟動電錶。

● RNG : 功能鍵

按"RNG"鍵來選擇想要的檔位每一次"RNG"鍵，檔位往下跳一檔並顯示一個新讀值。

● HOLD : 讀值鎖定功能

按"HLD"鍵進入讀值鎖定功能液晶顯示器顯示 " H " 符號，照度計鎖定現在讀值，並停止lux的量測，再按"HLD"鍵則取消此功能，照度計繼續量測。

MT-4007 數位式照度計

此產品為一只手攜式、使用簡易、3½位(1999讀值)、設計堅實之數位式照度計，專門設計為可單手操作使用。此產品照度單位為lux(勒克司)及fc(呎燭光)兩種單位的測量，峰值鎖定功能(Peak-Hold)，峰值脈波寬度50ms以上，才可鎖定峰值)及讀值鎖定功能(Data-Hold)。

使用安全事項

使用此產品前，務請先閱讀使用說明書及安全

注意事項：

警告事項

- 請勿使用此產品於雨中或潮濕環境中，以免被電擊。
- 請勿使用此產品於會爆炸的氣體中，以免傷及身體或引起火災。
- 有可能曝露於高強度光線之下時，請先戴上防護眼罩，以免眼睛受損。
- 請勿將照度感應頭浸入液體中，且只能使用濕軟布清潔感應頭。
- 照度計不用時，請將照度感應頭蓋上保護蓋，以延長矽質光二極體感應器之壽命，防止老化。

一般規格

顯示器：3½位液晶顯示器(LCD)表示，最大讀值1999。

過載指示："OL"顯示。

低電池指示：當電池電壓低於可正常動作電壓時，" " 符號顯示。

測量速率：2.5次/每秒。

電池：標準1.5V電池(AAA 尺寸) 三只。

電池壽命：碳鋅電池約可使用90小時

操作環境：溫度0至50°C，相對溼度<75%RH。

儲存環境：溫度-20至60°C，相對溼度<80%RH。(電池須自錶內取出)

準確性環境：溫度23°C±5°C，相對溼度<75%RH。

尺寸：15.2cm高x4.8cm寬x2.6cm厚。

重量：約81.2g(含電池)。

MODEL: MT-4004 THERMO-HYGROMETER

INTRODUCTION

This instrument is a portable easy use 3 1/2 digit, compact digital Thermo-Hygrometer designed for simple on hand operation. It use Thermistor as temperature sensor, and a thin polymer capacitive type relative humidity sensor as the hygrometer sensor.

SAFETY INFORMATION

It is recommended that you read the safety and operation instructions before using the thermometer.

CAUTION

- Do not immerse the hygrometer sensor head into liquids since this causes permanent damage to the sensor.
- The meter when not in use, please use protective metal cap cover the sensor head and screw it to extend

SPECIFICATIONS

● GENERAL

1. Display: 3½ digit liquid crystal display (LCD) with maximum reading of 1999.
2. Low battery indication: The " " is displayed when the battery voltage drops below the operating level.
3. Measurement rate: 0.5 times per second, nominal
4. Accuracy: Stated accuracy at 23°C ± 5°C, <75% relative humidity
5. Operating environment: 0°C to 55°C at <75% relative humidity
6. Storage environment: -20°C to 55°C at <80% relative humidity.
7. Battery life: 200 hours typical with carbon zinc battery.
8. Battery: 3 pcs 1.5V (AAA size) UM-4 R03.
9. Dimensions(HxWxD): 167mm(H) x 48mm(W) x 24mm(D).
10. Weight: 87g including battery.

ELECTRICAL

● TEMPERATURE

1. Temperature Scale: Celsius or Fahrenheit user-selectable
2. Temperature Sensor: Thermistor
3. Measurement Range: -20°C to 60°C / -4°F to 140°F
4. Resolution: 0.1°C/F
5. Accuracy: ±1.0°C on -20°C to 0°C, 45°C to 60°C
 ±0.5°C on 0°C to 45°C
 ±2.0°F on -4°F to 32°F, 113°F to 140°F
 ±1.0°F on 32°F to 113°F

● RELATIVE HUMIDITY

1. Humidity Sensor: Electronic capacitance polymer film sensor. (The sensor is unaffected by water condensate, is immune to most reagent vapors).
2. Measurement Range: 0% to 100%RH.
3. Resolution: 0.1%RH.
4. Accuracy: ±2.5%RH (10% to 90%RH) @25°C
 ±5.0%RH (<10%, > 90%RH) @25°C
5. Sensor Response Time for 90% of Total Range: 60sec with 1m/s air movement,
6. Sensor Hysteresis (excursion of 10% to 90% to 10% RH): ±1%RH typical.
7. Sensor Temperature Dependence: Negligible between 0°C to 50°C.

OPERATING INSTRUCTIONS

MEAS (Measure) Button

Pressing MEAS button turns on the power and LCD annunciator "APO" will be turn on. The Auto-Power-Off mode turns the meter off automatically when the meter does not used for 10 minutes. When the power is down, pressing MEAS button turns on the power. When enters the RECORD mode, the Auto-Power-Off will be disabled automatically, and LCD annunciator "APO" will be turn off.

操作程序

1. 打開感應頭保護蓋。
2. 按"MEAS"鍵開啟電源，即開始偵測。
3. 切換"C/F"開關來改變溫度的量測單位。
4. 讀取顯示器讀值即為所欲測的溫度值及相對濕度值。
5. 此產品不使用時，請蓋上保護蓋，以延長感應器壽命，避免傷及感應器。

特殊考慮

- 如要得到更為可靠的測量值前，最好能在欲測環境能達到溫度及濕度均交換平衡下，再讀取讀值。
- 溫度測量之誤差造成原因
測量時間太短、測量時有日光照射到感應器、熱源輻射、牆外壁太冷、空氣流動(如風扇在吹)、手或人體之輻射熱量等。
- 濕度測量之誤差造成原因
水蒸氣、水濺濺、滴水或其它凝結(非水凝結)到感應器上均會影響。然而重複性地及長期安定性的如此，並不會損傷感應器。
- 污染
污染空氣中有灰塵及測試環境中有粉末物質時，最好使用相關的過濾網，可以大部份避免並解決污染問題。但過濾網必須依據污染程度大小而定期性地清洗或更換過濾網，才不影響溫濕度之測量及傷及感應器。

維護事項

電池更換

- 1.顯示器上如有" "符號出現時，表示電池電力不足，敬請更換1.5V電池 (AAA Size)三只，以維持測試準確性。
- 2.將電池蓋之一只螺絲鬆離，打開電池蓋換上三只新1.5V電池(AAA Size)。
- 3.電錶長時間不使用時，請將電池取出電錶，並避免存放於高溫、高溼之處。

清潔

定期的使用軟濕布沾上中性清潔劑輕擦外殼或鏡片，不能使用紗布或有溶解能力之溶劑。

相對濕度規格

濕度感應器：電子式電容變化型高分子濕度感應器。(此感應器不受水凝結的影響，並對大部份的蒸氣具有免疫力)

測試範圍：0%至100%RH

解析度：0.1%RH

準確度： $\pm 2.5\%$ RH(10%RH至90%RH)@25°C

$\pm 5.0\%$ RH(<10%RH, >90%RH)@25°C

感應器反應至欲測濕度讀值90%所需時間：約60秒,空氣流量必須在1m/s以上。

感應器遲滯現象(濕度變化自10%RH至90%RH再回到10%RH)： $\pm 1.0\%$ RH

感應器溫度影響：0°C至50°C內，幾乎不影響。

操作說明

● MEAS鍵：

按"MEAS"鍵開啟電源，並且APO功能會被啟動。當超過10分鐘沒有使用這台錶時，電源將自動關閉。當自動關上電源時，再按一次"MEAS"鍵即可開啟電源。在"RECORD"模式，APO功能不會被執行，並且LCD的"APO"符號亦不會顯示。

● UNIT：露點/濕球

按住"UNIT"鍵超過2秒，可切換至露點和濕球溫度。露點溫度的符號(tb)，濕球溫度的符號(WB)，其符號顯示在LCD的左下角。

● HOLD：讀值鎖定功能

按"HOLD"鍵可啟動或關閉讀值鎖定功能。當選擇此功能時，讀值就會被鎖住，並停止量測的功能，顯示器上會出現"HOLD"符號。

● MAX/MIN：最大最小絕對值讀值記錄功能

按"MAX/MIN"鍵可進入讀值鎖定功能，即進入"最大最小值記錄"功能。在這個模式下，"APO"、"°C/°F"及"UNIT"的功能都不能動作。連續按下"MAX/MIN"鍵，"最大值" "最小值" "最大值-最小值"及"平均值"，這四種功能能夠循環顯示。若按下"HOLD"鍵，會停止記錄讀值，並凍結讀值，直到再一次按下"HOLD"鍵，才可繼續記錄。為防止在無意中遺失這些已記錄的讀值，需持續按"MAX/MIN"鍵2秒，才可離開此功能。

● °C ↔ °F：溫度單位切換

可在攝氏溫度(°C)及華氏溫度(°F)做測量。先打開橡皮蓋，將開關切至右邊，顯示"°F"；將開關切至左邊，顯示"°C"。

Push Button

Dew Point/Wwt Bulb

Press "UNIT" button for 2 seconds to change the temperature unit dew point or wet bulb. The temperature unit "td" dew point or "WB" wet bulb is displayed in the lower left hand side corner of the display.

DATA HOLD Button

Pressing the HOLD key to enter the Data Hold mode, the "HOLD" annunciator is displayed. When DATA HOLD mode is selected, the hygrometer held the present readings and stops all further measurements. Pressing the HOLD key again cancels DATA HOLD mode, causing hygrometer to resume taking measurements.

MAX MIN Record Mode

Press MIN/MAX button to enter the MIN MAX Recording mode. In this mode the automatic power-off feature is disabled and °C/°F button, unit button are disabled too.

Push MIN MAX key to cycle through the MAX(maximum), MIN(minimum), MAX-MIN(maximum minus minimum) and AVG(average)readings.

In the this mode, press HOLD key to stop the recording of readings, all values are frozen, press again to restart recording.

To prevent accidental loss of MIN, MAX and AVG data, in this mode can only be cancelled by pressing and hold down the MIN MAX key for 2 seconds to exit and erased recorded readings.

°C/°F Selecting the Temperature Scale

Readings are displayed in either degrees Celsius(°C) or degrees Fahrenheit(°F). To change the temperature scale, set the °C/°F switch to °C or °F.

OPERATION

1. Remove protective cap.
2. Pressing MEAS button turns on the power.
3. Set the °C/°F switch to change the temperature scale.
4. Read the display.
5. Cover sensor head to extend sensor life when not in use.

SPECIAL CONSIDERATIONS

● Before a reliable measurement can be made, the measuring hygrometer and medium to be measured must be in temperature and humidity equilibrium.

● Temperature measurement errors

Due to too short measurement time, sunshine during the measurement, heating, cold outer walls, air draft (e.g. fans), radiating hand and / or body heat etc.

● Humidity measurement errors

Due to steam, water splashes, dripping water or condensation (not water condensate) on the sensor etc. However, repeatability and long-term stability are not impaired by this.

● Contamination

By dust in the air or measurements in powdery substances. This can be largely avoided by using a corresponding filter. The filter must be cleaned or replaced periodically depending upon the degree of contamination of the measuring site.

MAINTENANCE

Battery Replacement

1. Power is supplied by three 1.5V (AAA size) batteries.
2. The "  " appears on the LCD display when replacement is needed. To replace the batteries, remove the screw from the back of the meter and lift off the battery cover.
3. Remove the batteries from battery contacts.
4. When not use for long time remove battery.
5. Don't keep in place with high Temp. or high humidity.

Cleaning

Periodically wipe the case with a damp cloth and detergent, do not use abrasives or solvents.

MT-4004 數位式溫濕度計

此產品為一只手攜式、使用簡易、3 1/2位(1999最大讀值)、設計堅實之數位式溫濕度計，專門設計為可單手操作使用。其中溫度測量使用一只熱敏電阻作為溫度感應器，而相對濕度測量使用一只電容變化型高分子濕度感測器作為感應器。

使用安全事項

使用此產品前，務請先閱讀使用說明書及安全

注意事項：

- 請勿將溫度感應頭浸入任何液體中，否則會造成感應器永久的破壞。
- 此產品不使用時，請蓋上保護蓋，以延長感應器壽命。

一般規格

顯示器：3 1/2位液晶顯示器(LCD)表示，最大讀值1999。

低電池指示：當電池電壓低於可正常動作電壓時，“  ”符號顯示。

測量速率：0.5次/秒。

準確性環境：溫度 $23\pm 5^{\circ}\text{C}$ ，相對溼度 $<75\%\text{RH}$ 。

操作環境：溫度0至 55°C ，相對溼度 $<75\%\text{RH}$ ，空氣流量必須在 1m/s 以上。

儲存環境：溫度-20至 60°C ，相對溼度 $<80\%\text{RH}$ 。(電池須自錶內取出)

電池：標準1.5V電池3只。(AAA Size) UM-4 R03

電池壽命：碳鋅電池約可使用200小時

尺寸：16.7cm高x4.8cm寬x2.4cm厚。

重量：約87g(含電池及感應頭)。

溫度規格

溫度單位：攝氏溫度($^{\circ}\text{C}$)或華氏溫度($^{\circ}\text{F}$)單位顯示。

溫度感應器：熱敏電阻。

量測範圍： -20°C 至 60°C / -4°F 至 140°F

解析度： $0.1^{\circ}\text{C}/^{\circ}\text{F}$

準確度： $\pm 1.0^{\circ}\text{C}$ 在 -20°C 至 0°C ， 45°C 至 60°C

$\pm 0.5^{\circ}\text{C}$ 在 0°C 至 45°C

$\pm 2.0^{\circ}\text{F}$ 在 -4°F 至 32°F ， 113°F 至 140°F

$\pm 1.0^{\circ}\text{F}$ 在 32°F 至 113°F

- MAX：最大絕對值鎖定功能

按"MAX"鍵可進入或離開此功能，進入時LCD會顯示" MAX "之符號。本溫度即顯示最大絕對值，直到量得另一個更高的絕對值才以之更新LCD上的顯示值。按"MAX"鍵啟動MAX功能，再按一次"MAX"鍵離開此功能。在本模式中，啟動"HOLD"功能會使本溫度計停止記錄功能。只要一離開"HOLD"則又立即回復"MAX"之記錄功能。

- 自動校正功能：熱耦器校正

按"ADJ"鍵大於 2秒，可在室溫的狀態之下校 正熱耦器。將熱耦器放入一個已知的溫度，按"▲"或"▼" 鍵，以增加或減少LCD值，直到LCD值與已知的溫度值相同調整後，按"ADJ"鍵以確認並離開自動校正功能。

- 溫度校正範圍為 $\pm 3^{\circ}\text{C}$ 。

- 溫度參考如：室溫 25°C 。冰點 0°C 。沸點 100°C 。

- APO：自動關機功能

移開電錶下方的橡膠蓋，將開關移到右邊即可啟動APO功能，LCD顯示 " P " 的符號，將開關移到左邊即可關閉APO功能，LCD " P " 的符號會消失。在APO狀態下，超過15分鐘沒有使用這台錶，電源將自動關閉。當電源自動電源關上時，按下"MEAS"鍵可再次啟動電錶。

維護事項

警告：更換電池前，務必將熱電耦線拔離電錶，以避免可能之電擊

電池更換及保養

- 1.顯示器上如有"  "符號出現時，表示電池電力不足，敬請更換1.5V 電池 (AAA Size)三只，以維持測試準確性。
- 2.將電池蓋之一只螺絲鬆離，打開電池蓋換上三只新1.5V 電池(AAA Size)。
- 3.電錶長時間不使用時，請將電池取出電錶，並避免存放於高溫、高溼之處。

清潔

定期的使用軟濕布沾上中性清潔劑輕擦外殼或鏡片，不能使用紗布或有溶解能力之溶劑。

MODEL: MT-4007 DIGITAL LIGHTMETER

INTRODUCTION

This instrument is a portable easy use 3½ digit, compact-sized digital lightmeter designed for simple one hand operation. It provides measurements in lux and fc units. PEAK-HOLD (50ms pulse light) and DATA-HOLD features.

SAFETY INFORMATION

It is recommended that you read the safety and operation instructions before using the lightmeter.

WARNING

- To avoid electric shock, do not operate this product in wet or damp conditions.
- To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.
- To avoid eye injury, wear eye protection if there is a possibility of exposure to high-intensity rays.
- Do not immerse in liquids, clean the sensor head using only a damp cloth.
- Cover sensor head when not in use to extend silicon photodiode sensor life.

SPECIFICATIONS

GENERAL

1. Display: 3½ digit liquid crystal display (LCD) with maximum reading of 1999.
2. Overrange: (OL) is displayed
3. Low battery indication: The "  " is displayed when the battery voltage drops below the operating level.
4. Measurement rate: 2.5 times per second, normal.
5. Operating Environment: 0°C to 50°C at < 75% relative humidity.
6. Storage Temperature: -20°C to 60°C, 0 to 80% R.H. with battery removed from meter.
7. Accuracy: Stated accuracy at $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$, <75% relative humidity.
8. Auto power off: 15 minutes.

9. Battery: 3 pcs 1.5V(AAA size)UM-4 R03

10. Battery Life: 90 hours.

11. Dimensions(HxWxD): 152mm(H) x 48mm(W) x26mm(D).

12. Weight: approx. 81.2g including battery.

ELECTRICAL

Photometric Formulas: $10.764 \cdot \text{footcandles} = \text{lux (lumens/meter}^2)$

$$0.0929 \cdot \text{lux} = \text{footcandles(lumens/foot}^2)$$

Range: 20 lux, 200 lux, 2000 lux, 20000 lux

20 fc, 200fc, 2000fc, 20000fc

Resolution: 0.01lux, 0.01fc

Spectral response: CIE photopic

The CIE photopic curve is an international standard
for the color response of the average human eye

Acceptance angle: $f' < 2\%$ cosine corrected (150)

Total accuracy for CIE standard illuminant A (2856K): $\pm(3\% \text{rdg} + 10\text{dgts})$

CIE standard illuminant A can be realised by means of CIE standard source A, which is defined as: A gasfilled tungsten-filament lamp operating at a correlated colour temperature of 2856K.

Temperature Coefficient: 0.1x (specified accuracy) $^{\circ}\text{C}$ ($<18^{\circ}\text{C}$ or $>28^{\circ}\text{C}$)

OPERATING INSTRUCTIONS

Push buttons

● MEAS (MEASURE) Button

Press "MEAS" button to turn on the meter for measuring illumination.

Press "MEAS" button again to turn off the meter.

● Range Select Button

Press "RNG" button to select the desired lux range. Each time you press "RNG" button, the range (and the input range annunciator) increments, and a new value is displayed.

● DATA HOLD Mode

Press the "HLD" key to enter the Data Hold mode, the " H " annunciator is displayed. When DATA HOLD mode is selected, the lightmeter holds the present readings and stops all further measurements. Press the "HLD" key again cancels DATA HOLD mode, causing lightmeter to resume taking measurements.

溫度規格

溫度單位：攝氏溫度($^{\circ}\text{C}$)或華氏溫度($^{\circ}\text{F}$)單位顯示。

量測範圍： -100°C 至 850°C (-148°F 至 1562°F)

溫度係數：自 0°C 至 18°C 及 28°C 至 50°C ，每增減 1°C ，規格準確性增加十分之一規格值。

準確度：一年內，不包括熱電耦器誤差，最佳的精確度是在 18°C 至 28°C

$\pm(0.3\% \text{讀值} + 1^{\circ}\text{C})$ $^{\circ}\text{C}$ 檔位

$\pm(0.3\% \text{讀值} + 2^{\circ}\text{F})$ $^{\circ}\text{F}$ 檔位

解析度： $1^{\circ}\text{C}/1^{\circ}\text{F}$ ， $0.1^{\circ}\text{C}/0.1^{\circ}\text{F}$ (自動)

解析度	檔位
0.1°C	在 -59.9°C 至 199.9°C
1°C	在 -100°C 至 -60°C 在 200°C 至 850°C
0.1°F	在 -59.9°F 至 199.9°F
1°F	在 -148°F 至 -60°F 在 200°F 至 1562°F

輸入保護：溫度輸入座最大輸入電壓值為 24V 直流電壓或交流電壓。

溫度輸入座：可插入標準小型之熱電耦插頭(兩端子之中心間隔為 7.9mm)。

操作說明

● MEAS : 測試鍵

按下"MEAS"鍵去啟動電錶並開始測量溫度，再按下"MEAS"鍵去關閉電錶

● HOLD : 讀值鎖定功能

按"HLD"鍵進入讀值鎖定功能液晶顯示器

顯示 " H " 符號，溫度計鎖定現在讀值，並停止爾後之測量，再按"HLD"鍵則取消此功能，溫度計繼續進行測量溫度。

● °C/F : 溫度量測功能鍵

可在攝氏溫度($^{\circ}\text{C}$)及華氏溫度($^{\circ}\text{F}$)做測量。按一下，顯示" $^{\circ}\text{C}$ "；再按一下，顯示" $^{\circ}\text{F}$ "。

● 溫度校正範圍為 $\pm 3^{\circ}\text{C}$ 。

● 溫度參考如：室溫 25°C 。冰點 0°C 。沸點 100°C 。

MT-4001 K型數位溫度計

此產品為一只手攜式、使用簡易、3 1/2位(1999最大讀值)、設計堅實之數位式溫度計，專門設計為可單手操作使用。(使用的是外加的熱耦器當感應器)

這台K-TYPE溫度錶的溫度是以 < N.I.S.T. MONOGRAPH 175 Revised to ITS-90 >為依據。

使用安全事項

使用此產品前，務請先閱讀使用說明書及安全注意事項：

警告：

- 當表面測量電壓超過24V DC/AC需停止測量，以免電擊。
- 不可在微波爐內使用，以免燒燬。

注意事項：

- 重複彎折熱耦線，會使其折斷。
- 避免折彎熱耦線，尤其是接近角落之部份，可延長熱耦線之使用壽命。

一般規格

顯示器：3 1/2位液晶顯示器(LCD)表示，最大讀值1999。

低電池指示：當電池電壓低於可正常動作電壓時，“ ” 符號顯示。

測量速率：1.5次/秒。

操作環境：溫度0°C至50°C，相對溼度<70%RH。

儲存環境：溫度-20°C至60°C，相對溼度<80%RH(電池須自錶內取出)

最佳精確度：23°C±5°C，<75%RH。

自動關機：約15分鐘

自動關機消耗電流： $<10\mu A$

電池：標準1.5V電池三只。(AAA Size)UM-4 R03

電池壽命：碳鋅電池約可使用140小時。

尺寸：148cm高x48cm寬x24cm厚。

重量：約73.4g(含電池)

● PEAK HOLD Mode

Press "PK" button to toggle in and out of PEAK Hold mode. In the PEAK Hold mode, the " PH " annunciator is displayed.

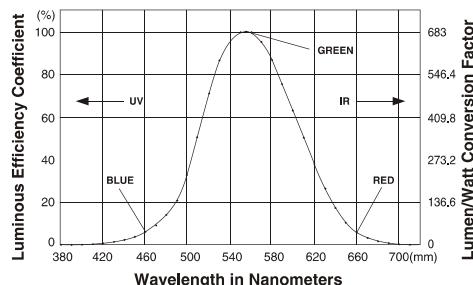
OPERATION

1. Set the power switch to the desired range (use range button)select 20lux(fc), 200lux(fc), 2000lux(fc), 20000lux(fc) range.
2. Remove the cover of sensor head.
3. Hold the sensor head steady and make certain that the light source completely fills the cosine correction dome.
4. Move away from the sensor head to avoid shadowing it.
5. Read the illuminance value from the display. If magnitude of lux (or fc) is not known, press "RNG" button to the highest range and reduce until a satisfactory reading is obtained.
6. Cover sensor head to extend sensor life.

APO (Auto power off) Function

Remove rubber cover on front case and slide the switch to right to enable "APO" function, the " P " annunciator is displayed. It will turn off automatically after approximately 15 minutes to lengthen battery life. Slide the switch to left to disable "APO" function.

CIE Photopic Curve



SPECIAL CONSIDERATIONS

- Keep the plastic domed cosine corrector clean and free of scratches. It may be cleaned with a soft cloth and isopropyl alcohol.
- When light is received from many directions simultaneously, take special care to avoid reflections or shadowing the sensor with your body.
- For best accuracy, repeat the measurement several times to ensure that the light source has remained stable.

The Inverse-square Law

The law stating that the illuminance E at a point on a surface varies directly with the intensity I of a point source, and inversely as the square of the distance d between the source and the point. If the surface at the point is normal to the direction of the incident light, the law is expressed by $E=I/d^2$.

Cosine Law

The law that the illuminance on any surface varies as the cosine of the angle of incidence. The angle of incidence q is the angle between the normal to the surface and the direction of the incident light. The inverse-square law and the cosine law can be combined as $E=(I \cos \theta)/d^2$.

MAINTENANCE

Battery Replacement

1. Power is supplied by three 1.5V (AAA size) batteries.
2. The "  " appears on the LCD display when replacement is needed.
To replace the batteries, remove the screw from the back of the meter and lift off the battery cover.
3. Install three 1.5V batteries.
4. When not use for long time remove battery.
5. Don't keep in place with high Temp. or high humidity.

Cleaning

Periodically wipe the case with a damp cloth and detergent, do not use abrasives or solvents.

Wavelength (nm)	$V\lambda$ CIE Photopic Luminous Efficiency Coefficient	Photopic Lumen/Watt Conversion Factor
380	0.0000	0.05
390	0.0001	0.13
400	0.0004	0.27
410	0.0012	0.82
420	0.0040	2.73
430	0.0116	7.91
440	0.0230	15.7
450	0.0380	25.9
460	0.0600	40.9
470	0.0910	62.1
480	0.1390	94.8
490	0.2080	142.0
500	0.3230	220.0
510	0.5030	343.0
520	0.7100	484.0
530	0.8620	588.0
540	0.9540	650.0
550	0.9950	679.0
560	0.9950	679.0

Wavelength (nm)	$V\lambda$ CIE Photopic Luminous Efficiency Coefficient	Photopic Lumen/Watt Conversion Factor
570	0.8520	649.0
580	0.8700	593.0
590	0.7570	516.0
600	0.6310	430.0
610	0.5030	343.0
620	0.3810	260.0
630	0.2650	181.0
640	0.1750	119.0
650	0.1070	73.0
660	0.0610	41.4
670	0.0320	21.8
680	0.0170	11.6
690	0.0082	5.59
700	0.0041	2.78
710	0.02021	1.43
720	0.02010	0.716
730	0.0005	0.355
740	0.0003	0.170
750	0.0001	0.020
760	0.0001	0.041

GENERAL OFFICE	
ENVIRONMENT	UNIT(LUX)
design room, general office	2000-1500
lobby, store, typing	1500-700
meeting room, telephone switchboard room, printer room, entertainment, restaurant	750-300
dancing house, security room, hall, rest-room	300-150
tea room, warehouse	150-75
outdoor stair	75-30

HOSPITAL	
ENVIRONMENT	UNIT(LUX)
Vision examination	10000-5000
operating room	1500-750
clinic room, drug room, nursing room	750-300
waiting room	300-150
x-ray room	150-75
elevator	75-30

FACTORY	
ENVIRONMENT	UNIT(LUX)
Precision working, design	3000-1500
research & development department	1500-750
packing, measurement, hall, rest-room	750-300
dye, passkey, hape, rest-room	300-150
warehouse	150-75

SCHOOL	
ENVIRONMENT	UNIT(LUX)
computer room	1500-300
classroom, laboratory, workshop, office, library, meeting room, indoor stadium	750-200
hall, stair, rest-room, outdoor stadium	300-150
warehouse, garage, safety door	75-30

HOTEL	
ENVIRONMENT	UNIT(LUX)
check-in, check-out desk	1500-750
lobby, office, parking, kitchen	750-300
restaurant, rest-room	300-150
hall, escalator, stair, shower, garden	150-75
elevator	75-30

HOUSE	
ENVIRONMENT	UNIT(LUX)
sawing	2000-750
writing	1000-500
study desk, make-up desk, island, phone station	750-300
laundry room, entertainment, living room, entrance	300-150
closet, bedroom, stair, hall	150-75
balcony, porch	75-30