5 Fonksiyon *1* Cihazda

Hava Akımı Hızı, Nem, Işık, Sıcaklık ve Ses Ölçer

Model : LM-8102

Bu 5'i 1 arada CİHAZI satın almanız, hassas ölçüm alanında sizin için ileri atılmış bir adım olur. Cihaz çok fonksiyonlu ve hassasdır,dayanıklı yapısı, uygun çalıştırma teknikleri sayesinde uzun yıllar kullanıma uygundur.

Lütfen aşağıdaki talimatları dikkatlice okuyun ve bu kılavuzu her zaman kolayca erişebileceğiniz bir yerde saklayın.

KULLANIM KILAVUZU

İÇİNDEKİLER

1. ÖZELLİKLER

* * 5'i 1 arada profesyonel ölçüm cihazı: Anemometre, Higrometre, K Tipi Termometre, Işık ölçer, Ses seviyesi ölçme cihazı.
* Anemometre, düşük sürtünmeli bilyalı rulman kullanır tekerlek tasarımı yüksek doğruluk sağlar.
* Işık ölçer özel foto diyot ve renk düzeltme filtresi ışık sensörü kullanır, spektrum C.I.E. fotopik.
* Tip K termometre, her türlü tipe uygun standart tip K (NiCr-NiAl) termokupl giriş jakı kullanır.
K sondası.
* Nem ölçer, yüksek hassasiyetli nem sensörü kullanır hızlı tepki süresi ile.
* Ses seviyesi ölçerin özelliği şu şekilde simüle edilir: "İnsan Kulağı Listeleme" yanıtı, IEC'yi karşılamak için "A" frekans ağırlığını ve "Hızlı" zaman ağırlığını kullandı 61672 2. sınıf.
* Ses seviyesi ölçer, harici 94 dB ses kalibratörü ile birlikte çalışabilir ve kalibrasyonu yapmak için ön düğmelere basmanız yeterlidir
* Dahili mikroişlemci devresi, mükemmel performans ve doğruluk sağlar.
* Özlü ve kompakt düğme düzenlemesi, kolay kullanım.
* Geri çağırma ile maksimum ve minimum değeri ezberleyin.
* Mevcut okuma değerini dondurmak için tutma işlevi.
* °C/°F ön paneldeki düğmesine basarak algılama.
* Ön düğmeye basarak Lüks/Ayak-mum seçimi.
* Beş çeşit birim için ön paneldeki düğmeye basarak hava hızı ölçüm birimleri seçimi.
* Aynı anda bağıl nem ve sıcaklık ölçüm değerleri veya hava hızı ve sıcaklık ölçüm değerleri için çok kanallı ekran.
* Sıfır buton tasarımı, ışık ölçer kalibrasyonu yapar.
* Tek elle kullanıma uygun kaba gövde kasası,

2. SPECIFICATIONS

2-1 General Specifications

Display	LCD display, LCD soze : 41.5 x 31.5 mm.
Measurement	5 in 1 : *Anemometer (Air velocity + Temp.)* *Humidity (%RH + Temp.)* *Light* *Thermometer (type K)* *Sound level*
Operating Humidity	Max. 80 %RH.
Operating Temperature	0 to 50° C (32 to 122° F)
Over Input Display	Indication of "- - - - "
Data Output	RS 232/USB PC serial interface. ** Connect the optional RS232 cable UPCB-02 will get the RS232 plug.* ** Connect the optional USB cable USB-01 will get the USB plug.*
Power Supply	DC 1.5 V battery (UM4, AAA) x 6 PCs,
	Or DC 9V adapter input. *@ AC/DC power adapter is optional.*
Power Consumption	Anemometer : Approx. DC 11 mA. Other functions : Approx. DC 7.5 mA.
Weight	335 g/0.74 LB (battery included).
Dimension	HWD 248 x 70 x 34 mm (9.8 x 2.8 x 1.3 inch).
Standard Accessory	Instruction Manual..... 1 PC
Optional Accessories	Carrying case, Type K Temperature probe, Sound Calibrator/SC-941. USB cable/USB-01, RS232 cable/UPCB-02, Data Acquisition software, SW-U801-WIN

2-2 Electrical Specification (23 ± 5℃)

Anemometer (Air velocity/Temp.)

Measurement		*Range*	*Resolution*
Air velocity	ft/min	80 to 5910 ft/min	1 ft/min
	m/s	0.4 to 30.0 m/s	0.1 m/s
	km/h	1.4 to 108.0 km/h	0.1 km/h
	MPH	0.9 to 67.0 mile/h	0.1 MPH
	knots	0.8 to 58.3 knots	0.1 knots
	Temperature	32 to 122 ℉	0.1 ℉
	(Semiconductor)	0 to 50 ℃	0.1 ℃

Measurement	*Range*	*Accuracy*
Air velocity	80 to 5910 ft/min	≦ 20 m/s : ± 3% F.S. > 20 m/s : ± 4% F.S.
	0.4 to 30.0 m/s	
	1.4 to 108.0 km/h	
	0.9 to 67.0 mile/h	
	0.8 to 58.3 knots	
	32 to 122 ℉	± 2.5 ℉
	0 to 50 ℃	± 1.2 ℃

Remark :

ft/min : feet per minute *MPH : miles per hour*

m/s : meters per second *knots : nautical miles per hour*

km/h : kilometers per hour

Type K Thermometer

Measurement	*Range*	*Resolution*
Temperature (Type K)	-148 to 2372 ℉	0.1 ℉
	-100 to 1300 ℃	0.1 ℃

Measurement	*Range*	*Accuracy*
Temperature	-148 to 2372 ℉	± (1% rdg + 2℉)
(Type K)	-100 to 1300 ℃	± (1% rdg + 1℃)

Hygrometer (Humidity/Temp.)

Measurement		*Range*	*Resolution*
Humidity	%RH	10 to 95 %RH	0.1 %RH
	Temperature	32 to 122 ℉	0.1 ℉
	(Semiconductor)	0 to 50 ℃	0.1 ℃

Measurement	*Range*	*Accuracy*
Humidity	10 to 95 %RH	*< 70 %RH :* ± 4 %RH *≧70 %RH :* ± (4%rdg + 1.2 %RH)
	32 to 122 ℉	± 2.5 ℉
	0 to 50 ℃	± 1.2 ℃

Light

Measurement		*Range*	*Resolution*
Light	Lux	0 to 2,200 Lux	1 Lux
		1,800 to 20,000 Lux	10 Lux
** auto range*	Ft-cd	0 to 204.0 Fc	0.1 Ft-cd
		170 to 1,860 Fc	1 Ft-cd
Temperature (Type K)		-148 to 2372 ℉	0.1 ℉
		-100 to 1300 ℃	0.1 ℃

Measurement	*Range*	*Accuracy*
Light	0 to 20,000 Lux	± 5% rdg ± 8 dgt
	0 to 1,860 Fc	
Temperature	-148 to 2372 ℉	± (1% rdg + 2℉)
(Type K)	-100 to 1300 ℃	± (1% rdg + 1℃)

Remark : Ft-cd : feet candle

Sound Level

<table>
<tr><td>Measurement Range</td><td colspan="2">35 to 130 dB, Auto range</td></tr>
<tr><td>Resolution</td><td colspan="2">0.1 dB.</td></tr>
<tr><td>Measurement Frequency</td><td colspan="2">31.5 Hz to 8,000 Hz.</td></tr>
<tr><td rowspan="2">Weighting</td><td>Frequency Weighting</td><td>Characteristics of " A " frequency weighting network.
* A weighting :
The characteristic is simulated as " Human Ear Listing " response.</td></tr>
<tr><td>Time Weighting</td><td>" Fast " time weighting.</td></tr>
<tr><td>Accuracy
(23± 5 ℃)</td><td colspan="2">Characteristics of " A " frequency weighting network meet IEC 61672 class 2.
Under 94 dB input signal, the accuracy are :
<table>
<tr><td>31.5 Hz</td><td>± 3.5 dB</td></tr>
<tr><td>63 Hz</td><td>± 2.5 dB</td></tr>
<tr><td>125 Hz</td><td>± 2.0 dB</td></tr>
<tr><td>250 Hz</td><td>± 1.9 dB</td></tr>
<tr><td>500 Hz</td><td>± 1.9 dB</td></tr>
<tr><td>1 K Hz</td><td>± 1.4 dB</td></tr>
<tr><td>2 K Hz</td><td>± 2.6 dB</td></tr>
<tr><td>4 K Hz</td><td>± 3.6 dB</td></tr>
<tr><td>8 K Hz</td><td>± 5.6 dB</td></tr>
</table></td></tr>
<tr><td>Calibrator</td><td colspan="2">B & K (Bruel & kjaer), multi-fuction acoustic calibrator, model : 4226.</td></tr>
<tr><td>Microphone</td><td colspan="2">Electric condenser microphone.</td></tr>
<tr><td>Size of microph</td><td colspan="2">1/2 inch standard size.</td></tr>
<tr><td>Data Hold</td><td colspan="2">Hold function to freeze the display value.</td></tr>
<tr><td>Optional Accessories</td><td colspan="2">94 dB Sound Calibrator,
Model : SC-941</td></tr>
</table>

@ Above specification tests under the environment RF Field Strength less than 3 V/M & frequency less than 30 MHz only.

3. FRONT PANEL DESCRIPTION

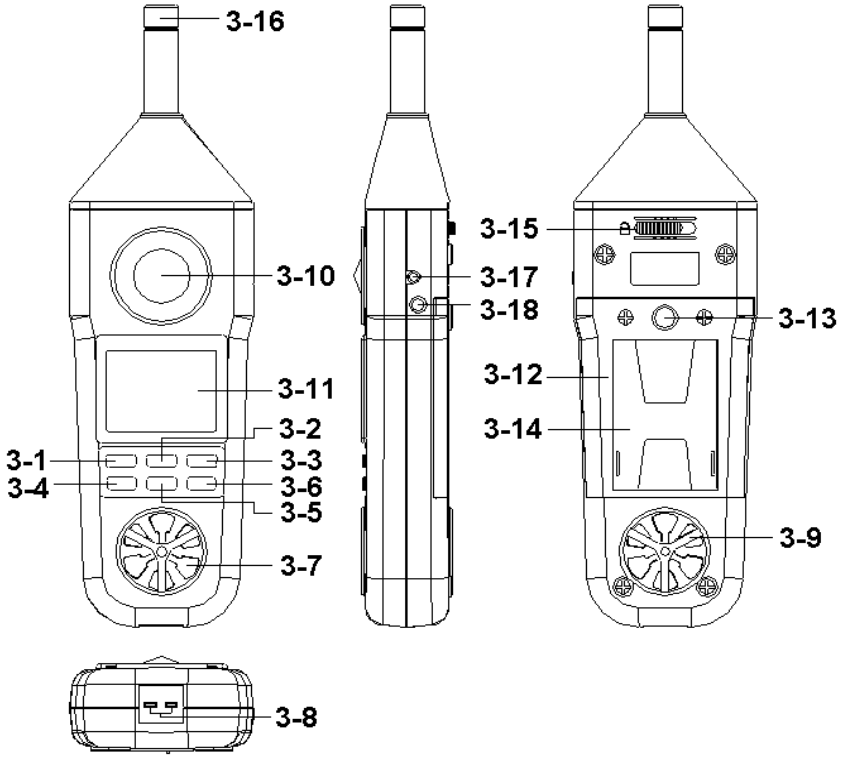


Fig. 1

3-1 Power Button
3-2 Hold Button
3-3 Max. / Min. Button
3-4 Unit / Zero Button
3-5 ℃/℉ Button
Lux/Ft-cd Button
3-6 Function Button
3-7 Air Flow Sensor
3-8 Temp. Input Socket
3-9 Humidity Sensor
3-10 Light Sensor
3-11 LCD display
3-12 Battery Compartment / Cover
3-13 Tripod Fix Nut
3-14 Stand
3-15 Lock Switch (no use)
3-16 Sound Probe Head
3-17 RS-232 Output Terminal
3-18 DC 9V Power Adapter
Input Socket

4. MEASURING PROCEDURE

4-1 Air Velocity Measurement

1) Power on the instrument by pressing the " Power Button " (3-1, Fig. 1).
2) Select the Anemometer function by pressing " Function Button " (3-6, Fig. 1) until the display show the the Anemometer unit (ft/min, m/s, km/h, MPH, knots).
3) Press the " Unit/Zero Button " (3-4, Fig. 1) to select unit that you want and then face the " Air Flow Sensor " (3-7, Fig. 1) to the source of wind.

Remark :

* *The display digits of " Air velocity measurement " are oriented 180° from the other function displays for easy exposure and output reading.*
* *The display will show the environment Temp. at the same time.*

4) Allow time for the reading to become stable and note the value indicated. From a practical point of view the velocity may fluctuate.

4-2 Temperature Measurement (Thermocouple)

1) Power on the instrument by pressing the " Power Button " (3-1, Fig. 1)..
2) Plug a type K thermocouple probe (optional) in the " Thermocouple Input Socket " (3-8, Fig. 1).
3) Select the Temperature function by pressing " Function Button " (3-6, Fig. 1) unit the Display only show the Temp. unit (℃ or ℉).
4) Contact the Thermocouple Sensor Head with measuring object and the reading value will be displayed on the LCD display.

Measuring Consideration of Temperature Measurement (Thermocouple)

* Please make sure the polarity is correct when you plug a thermocouple probe in the Temp. input socket.
* The temperature difference between thermocouple probe and thermometer will cause an inaccurate measuring result. Therefore, for the best measuring and accuracy performance, whenever change a probe or plug a new probe, thermal equivalent between probe plug and meter's input socket is a necessary condition. Thermal equivalent procedure may take few minutes and apply only when the probe has been exposed to an ambient temperature different from the meter.

4-3 Humidity & Ambient Temperature Measurement

1) Power on the instrument by pressing the " Power Button " (3-1, Fig. 1).
2) Select the Relative Humidity function by pressing " Function Button " (3-6, Fig. 1) until the Display show the unit (%RH).
3) The reading value of humidity and temperature that are sensing from the " Humidity Sensor " (3-9, Fig. 1) will be displayed on the LCD display.
4) When the meter is applied in a new environment, a few minutes are required to reach a stable condition.

4-4 Light Measurement

1) Power on the instrument by pressing the " Power Button " (3-1, Fig. 1).
2) Select the Light Measurement function by pressing the " Function Button " (3-6, Fig. 1) until the light unit (Lux, Ft-cd) is displayed.
3) Press the " Lux/Ft-cd Button " (3-5, Fig. 1) to select measuring unit " Lux " or " Ft-cd ".

4) The Display will show the lighting value that sensing from the " Light Sensor " (3-10, Fig. 1)

Zero Offset Adjustment of Light Function :

* For best results zero the light sensor prior to use in a dark environment. Placing the light sensor end of the meter under a desktop or flat surface so as to block any light can accomplish this. Then press the "Unit/Zero Button" (3-4, fig. 1) to set the meter indication to zero.
* Zero point can drift due to environment temperature and battery power change as well as for other reasons. It is recommended that the zero be checked frequently using the above procedure.

4-5 Sound Level Measurement

1) Power on the instrument by pressing the " Power Button " (3-1, Fig. 1).
2) Select the Sound Level function by pressing the " Function Button " (3-6, Fig. 1) until the Sound level unit (dB) is displayed.
3) Hold the instrument in hand and point the " Sound Probe Head /microphone " (3-16, Fig. 1) at measured noise source, the sound level value (dB) will be displayed on LCD.

** The sound level measurement is auto range (35 to 130 dB).*

4-6 Change ℃,℉

During the temperature measurement, if intend to change the temperature unit from " ℃ " to " ℉ " or " ℉ " to " ℃ " , then just press the " ℃/℉ Button " once.

5. OTHER FUNCTIONS

5-1 Hold Function

Whenever press the "Hold Button (3-2, Fig. 1)" will freeze the current reading value with a "HOLD" symbol on the display.

5-2 Data Record Function

1) The Data Record function records & displays the maximum and minimum reading values. Start the Data Record function by pressing the " Max./Min. Button " (3-3, Fig. 1) once. There will be a " REC " symbol on the display.
2) With the REC symbol on the display :
   (a) Press the " Max./Min. Button " (3-3, Fig. 1) once and the " Max " symbol along with the maximum value will appear on the display.
   (b) Press the " Max./Min. Button " again, the " Min " symbol along with the minimum value will appear on the display.
   (c) To exit the memory record function, press the " Max./Min. Button " continuously for at least 2 seconds. The display will revert to the current reading.
   (d) Clear the Max./Min. value recorded by pressing the " Hold Button " (3-2, Fig. 1) once. Previous recorded Max./Min. value will be given up and then revert to the REC. function keep on recording.

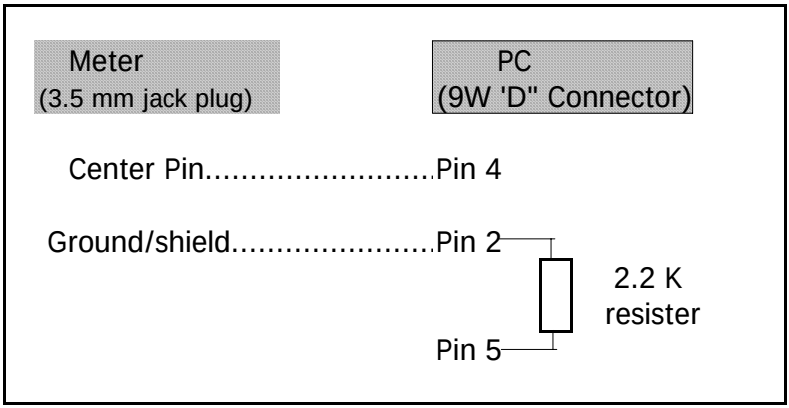
5-3 Auto Power Off Disable

In order to prolong the battery life, the instrument has "Auto Power Off " function. The meter will switch off automatically if no buttons are pressed for around 10 minutes.

6. RS232 PC SERIAL INTERFACE

The instrument has RS232 PC serial interface via a 3.5 mm terminal (3-17, Fig. 1).

The data output is a 16 digit stream which can be utilized for user's specific application. A RS232 lead with the following connection will be required to link the instrument with the PC serial port.



The 16 digits data stream will be displayed in the following format :

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

Each digit indicates the following status :

D15	Start Word = 02		
D14	4		
D13	When send the upper display data = 1 When send the lower display data = 2		
D12 & D11	Annunciator for Display		
	℃ = 01	℉ = 02	m/S = 08
	km/h = 10	mph = 12	knot = 09
	FPM = 11	%RH = 04	dB = 17
	LUX = 15	Ft-cd = 16	
D10	Polarity 0 = Positive 1 = Negative		
D9	Decimal Point(DP), position from right to the left 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP		
D8 to D1	Display reading, D8 = MSD, D1 = LSD For example : If the display reading is 1234, then D8 to D1 is : 00001234		
D0	End Word = 0D		

RS232 setting

Baud rate	9600
Parity	No parity
Data bit no.	8 Data bits
Stop bit	1 Stop bit

7. BATTERY REPLACEMENT

1) When the LCD display shows "  " symbol, it is necessary to replace the battery. However measurement may still be made for several hours after the low battery indicator appears.
2) Open the " Battery Compartment / Cover " (3-12, Fig. 1) and remove the battery.
3) Install the batteries DC 1.5 V battery, UM4/AAA x 6 PCs, and reinstate the cover.

8. OPTIONAL TEMPERATURE PROBE AND OTHER ACCESSORIES

Thermocouple Probe (Type K) TP-01	* Measuring Range : -40 to 250 ℃ (-40 to 482 ℉) * Max. short-term operating temperature: * It's an ultra fast response naked-bead thermocouple suitable for many general purpose application.
Thermocouple Probe (Type K) TP-02A	* Measuring Range : -50 to 900 ℃ (-50 to 1650 ℉) * Dimension: 10 cm tube, 3.2 mm Dia.
Thermocouple Probe (Type K) TP-03	* Measuring Range : -50 to 1200 ℃ (-50 to 2200 ℉) * Dimension: 10 cm tube, 8 mm Dia.
Thermocouple Probe (Type K) TP-04 ** surface Temp. probe.*	* Measuring Range : -50 to 400 ℃ (-50 to 752 ℉) * Size : Temp. sensing head - 15 mm Dia. Probe length - 12 mm.

RS232 cable UPCB-02	* Isolated RS232 cable. * Used to connect the meter to the computer
Data Acquisition software SW-U801-WIN	* The SW-U801-WIN is a multi displays (1/2/4/6/8 displays) powerful application software, provides the functions of data logging system, text display, angular display, chart display, data recorder high/low limit, data query, text report, chart report.. .xxx.mdb data file can be retrieved for EXCEL, ACESS.., wide intelligent applications.

94 dB SOUND CALIBRATOR Model : SC-941	* Professional, 1 KHz. * Die casting aluminum alloy housing case. * DC 9V batteries x 2 PCs. * Size : round 50 mm Dia. x 82 mm.

Carrying case CA-05A	* Soft carrying case with sash. * 260 x 110 x 55 mm.