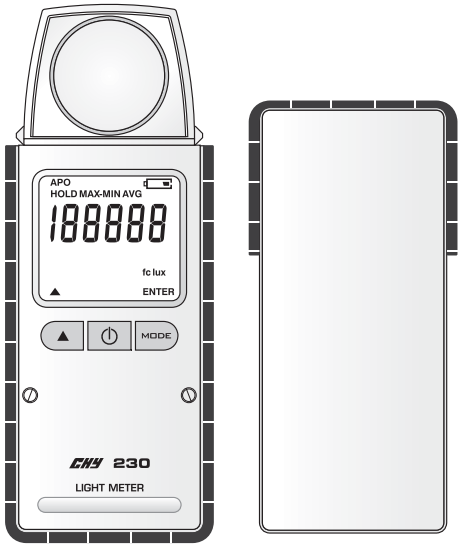
OPERATING INSTRUCTIONS

MODEL 230 CE

LIGHT METER



INTRODUCTION

The pocket size meter is used to measurement of light intensity with user selectable units of lux and fc.

SAFETY INFORMATION

It is recommended that you read the safety and operation instructions before using the absolute pressure meter.

1. Only operate the measuring instrument properly, for its intended purpose and within the parameters specified. Do not use force.
2. Never store the product together with solvents, acids or other aggressive substances.
3. Don't keep in place with high Temp, or high humidity.
4. When not use for long time remove battery.

SPECIFICATIONS

Range: 0 to 200000 lux, 0 to 18580 fc
Units: lux, fc
Resolution:
1 lux (0 to 19999), 10 lux (20000 to 200000)
1 fc (0 to 18580)
Spectral response: CIE photopic.

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

Spectral angle: $f'1 < 8\%$
Acceptance angle:
$f'2$ <2% cosine corrected (150°)
Total accuracy for CIE standard illuminant A (2856K): ±(3%rdg + 10dgts)

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

Accuracy:
Stated accuracy at 23°C±5°C, <70% R.H.
Temperature Coefficient: 0.1 times the applicable accuracy specification per °C out of 23°C±5°C.
Measurement rate: 1 times/second.
Operating environment: 0°C to 50°C at <70% R.H.
Storage temperature: -20°C to 50°C, 0 to 80% R.H. with battery removed from meter.
Battery: 1.5V (AAA size) x 2pcs.
Battery Life: 180 hours typical.
Low battery indication: The "▭" is displayed when the battery voltage drops below the operating level.
Dimensions:
24.7mm (T) x 50.9mm (W) x 132.9 mm (H).
Weight: Approx. 116g including batteries.

OPERATIONS

There are 3 operation modes, namely Measurement Mode, Set Mode and Hold Mode.

1. Turning on and off the meter:
When power is off, a short push on "⏻" key turns on the meter and enter Measurement Mode.
When power is on, press and hold "⏻" key for 2 seconds turns the power off.
Right after power on, all the indicators on the LCD display lights up for one second.

2. Measurement Mode:
When power is on, the meter starts measuring and refresh every second.

Changing unit:
In measurement mode, press "▲" key to switch between lux and fc.

Backlight:
In measurement mode, a short push on "⏻" key turns on the backlight for dark environment, it goes off automatically after 15 seconds if without further operation.

3. Set Mode:
In set mode, user can turn on/off APO function. (APO = Auto Power Off, when APO is ON, the meter power off automatically if no operation in 10 minutes)
When power is off, press and hold "⏻" key for 2 seconds to enter Set Mode.
Short push on "▲" key switches between ON and OFF.
Push "MODE" key to save the setting, exit APO setting mode and enter measuring mode.

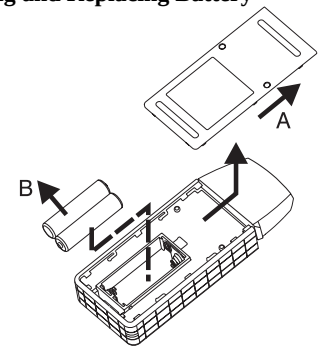
※**Note:** To turn off power in Set Mode abandon the current setting and previous settings remain unchanged. If "▭" indicator appeared, the setting value can works till power off but did not save to meter.

4. Hold Mode:
In Measurement Mode, short push "Mode" key to enter Hold Mode with indicator "**HOLD**" shows at upper left corner of LCD.
Right after entering this mode, shown in the LCD is the last measurement and the reading will not be updated with new measurement.
Push "Mode" key each time the display changes in following sequence:
(1) Last Measurement: with indicator "HOLD".
(2) Maximum value recorded: with indicator "HOLD" + "MAX".
(3) Minimum value recorded: with indicator "HOLD" + "MIN".
(4) Maximum-Minimum value recorded: with indicator "HOLD" + "MAX-MIN".
(5) Average of values recorded: with indicator "HOLD" + "AVG".
(6) Exit the Hold Mode and return to Measurement Mode.

To clear the recorded values:
In Hold Mode and during viewing MAX, MIN, MAX-MIN or AVG, press and hold "Mode" key for 2 seconds, to clear the recorded data and return to measurement mode.

MAINTENANCE

Installing and Replacing Battery



A. Battery Cover
B. Battery

1. Power is supplied by 2pcs 1.5V (AAA SIZE).
2. The "▭" appears in the display when battery replacement is needed.
3. Push the Battery Cover and lift it in the direction as shown in the figure.
4. Remove the batteries from battery compartment.
5. Replace with 2 new AAA batteries with polarity as indicated on the bottom of Battery Compartment.
6. Replace the Battery Cover.

Cleaning

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

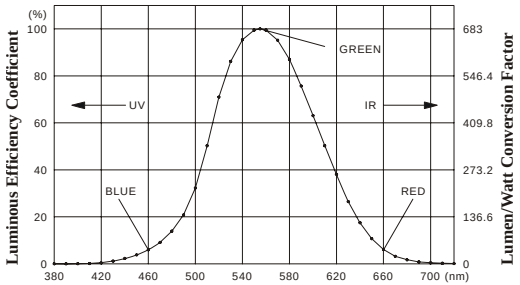
SPECIAL CONSIDERATIONS

- 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/d2.
- Cosine Law

  The law that the illuminance on any surface varies as the cosine of the angle of incidence. The angle of incidence θ is the angle between the normal to the surface and the direction of the incident light. The inverse-square low and the cosine law can be combined as E=(I cos θ)/d2.

CIE Photopic Curve



Wavelength in Nanometers

Wavelength (nm)	Vλ CIE Photopic Luminous Effciency 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
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	0.820
760	0.0001	0.041

GENERAL OFFICE	
ENVIRONMENT	UNIT (LUX)
design room, general office	2000~1500
lobby, store, typing	1500~750
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

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

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

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	150~70
balcony, porch	70~30

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