Specification

Product Name: **24GHz Large-space presence sensor（0-10V/PWM version）**

Product Model: **MSA207D RC**

Product Version: **V1.3**

Versions	Release/ change Date	Publishing
V1.0	2022.10.10	Jacky
V1.1	2022.11.09	Jacky
V1.2	2023.01.09	Jacky
V1.3	2023.02.03	Jacky

【Product Description】

Based on the 24G millimeter wave radar technology of Merrytek and the new generation of breathing algorithm, it can accurately identify the biological signal of people in the static state of breathing,to detect presence or absence status, output 0-10V or PWM signal,which is ideal for application in office,education,kitchen and washing room illumination.

【Highlights】

Based on Merrytek 24G millimeter wave radar technology

The 3db horizontal beam angle reaches 80 °, and the vertical beam angle reaches 96 °. With high measurement accuracy and wide detection range, it is very suitable for accurate presence/absence detection under indoor ceiling installation.

【Product Feature】

- Merrytek patent human breath detection technology
- Detect presence / absence status accurately
- Daylight threshold / daylight harvesting function
- Output 0-10V/PWM signal
- Apply 24GHz mm wave radar technology
- Same detection range for breath,slight motion and motion signal
- Detection range: 4-6 in diameter
- Circled radiation pattern without blind detection area
- Parameters can be set by remote or dip switches
- Not affected by temperature, humidity, noise, airflow, dust, light and other environments
- Blind time from absence to presence status: 0.5s
- Blind time from presence to absence status: over 30s
- Realization of intelligent perception function based on Doppler radar technology
- Ultra low RF power output, harmless to human health

Model：	MSA207D-A	MSA207D-B	MSA207D-C	MSA207D-D
Function:	Daylight threshold	Daylight threshold	Daylight harvesting	Daylight harvesting
Output：	0-10V	3.3V PWM	0-10V	3.3V PWM

【Applied fixture】

- Panel
- Linear
- Ceiling lamb
- Kitchen and bathroom lamp

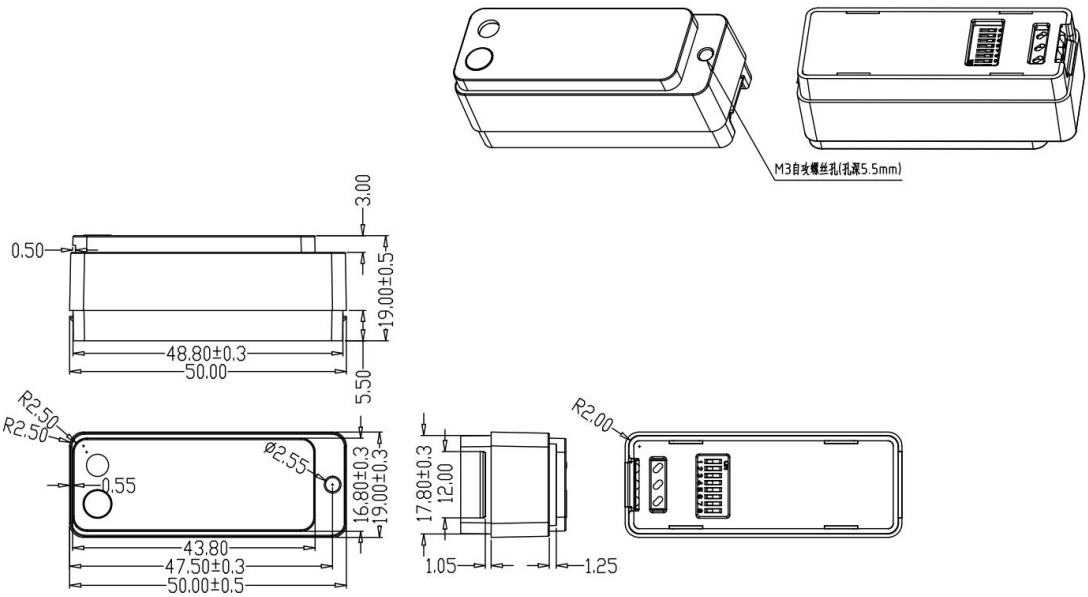
【Housing】

- Dimension: 50*19*19mm
- Wiring: by 3pin terminals

【Parameters】

Input/Output	Input voltage	12-24V DC
	Rated voltage	12V DC
	Working current	≤50mA（@Vdc=12V）
	Ripple voltage	<100mVp-p
	Power consumption	≤0.6W @12V DC
	Output signal	3.3V PWM (Model B/D) or 0-10V（Model A/C）
Sensor parameters	Operating Frequency	24GHz-24.25GHz ISM Band.
	Microwave Transmitting Power	2mW Max
	Detection Area	25% 50% 75% 100%
	Hold time	5s/30s/1min/3min（dip switches） 5s/30s/1min/3min/5min/10min/20min/30min（remote）
	Standby period	0S/5min（dip switches） 0S/10S/1min/3min/5min/10min/30min/+∞（remote）
	Daylight threshold / harvesting	30Lux（Model A/B） （dip switches） 5Lux/30Lux/100Lux/Disable（Model A/B） （remote） Or daylight harvesting（Model C/D）
	Standby dimming level	10%/50%（dip switches） 10%/20%/30%/50%（remote）
	Detecting Area (100%,radius)	Normal movement detection（3m in height）：2-3m
		Presence detection（3m in height）：2-3m
	Mounting height	2.5-4m，typical:3m
	3db beam angle	80° (horizontal)
		96° (Vertical)
Environment	Operating Temperature	0℃...+50℃
	Storage Temperature	-25℃...80℃ humidity:≤85% (no condense)
Certificate	Complied by	FCC / RED
	Environmental requirements	Comply with RoHS
	IP rating	IP20
	Others	N/A
Note:		
“N/A” means not available		

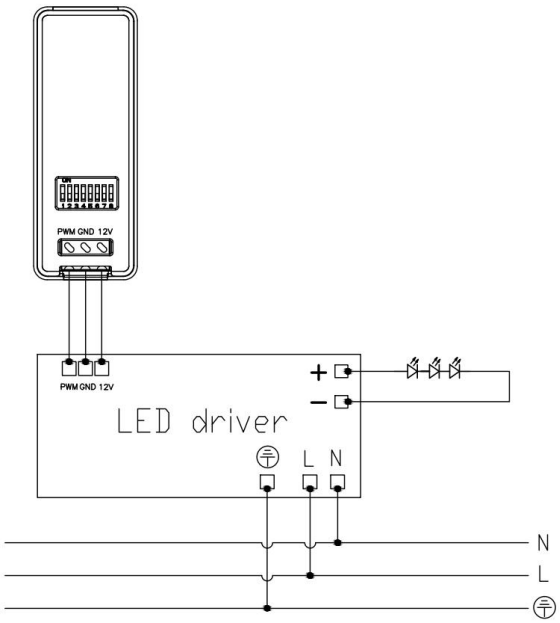
【Dimension】



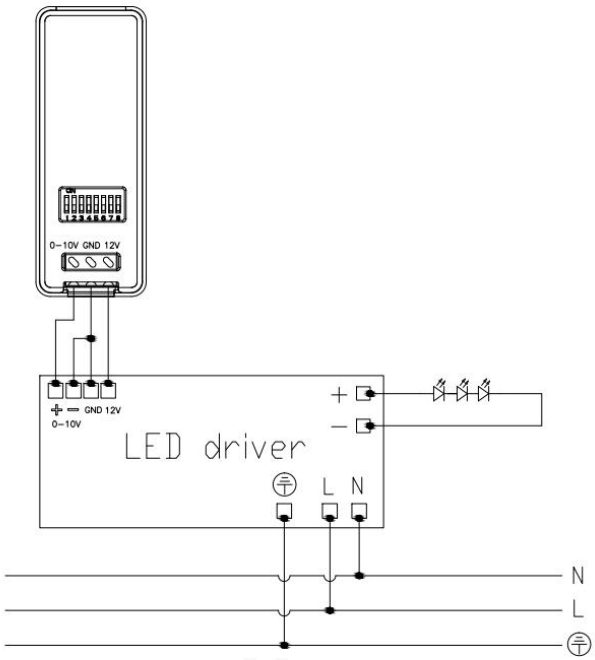
【Terminal instruction】

Terminal No.	Des.	Typical value	Function
1	VCC	12V DC	Input +
2	GND/0-10V（-）		GND / 0-10V-
3	0-10V/PWM（+）		0-10V/PWM +

【Wiring】

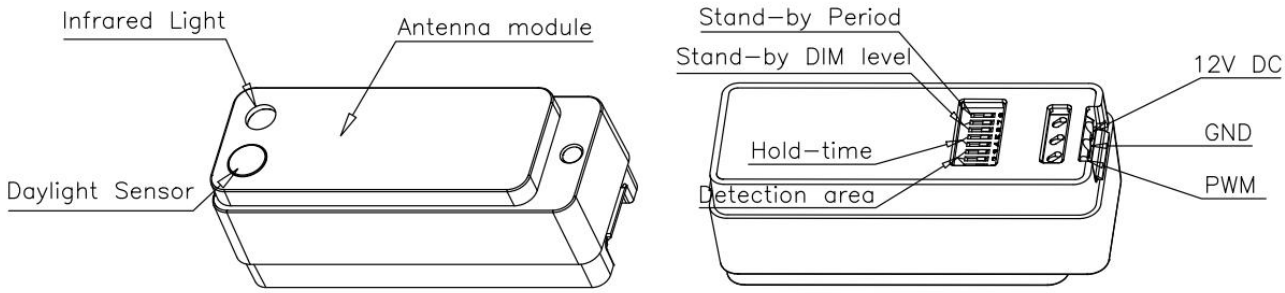


3.3V PWM（Model B/D）

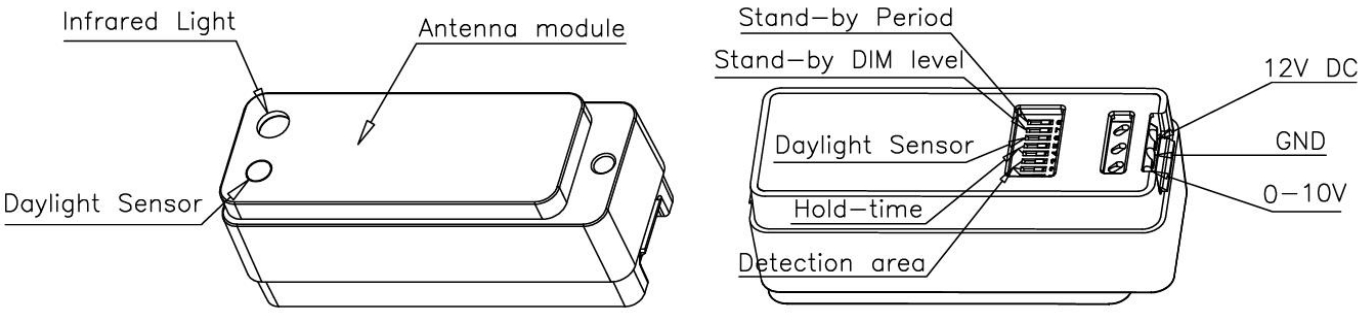


0-10V（Model A/C）

【Function instruction】



PWM（Model B/D）



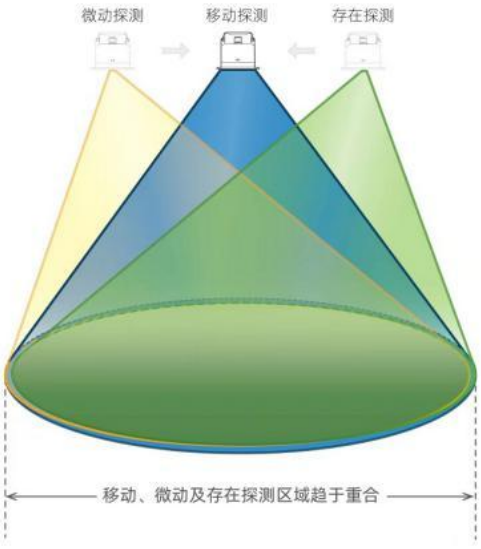
0-10V（Model A/C）

【Performance】

- **ceiling mount is suggested, and its radiation range is as follows：**

Movement detection

1. Max detection range: 4-6 in radius
2. Respond <0.2m/s
3. Respond time <100ms



Presence(breath) detection

1. Max detection range: 4-6 in radius
2. Please set hold time over 30s

【Typical application】

● Kitchen and washing room illumination

For the kitchen and bathroom,most of time where people will stay stationary or move slowly, it is necessary to detect whether there is anyone in the place, so as to realize the intelligent switch of kitchen and bathroom lamps under the effective protection of personal privacy

Typical application：Kitchen and washing room fixtures

● Office illumination

For lighting applications in open office spaces, conference rooms and other office spaces, more and more users have a growing demand for constant illuminance lighting, automatic control of lighting dimming and switching, and energy saving and emission reduction. The presence / absence signals accurately output by the radar module can meet this demand together with the unique constant illuminance regulation technology(daylight harvesting) from Merrytek

Typical application：linear, panel or ceiling lamp

● Education illumination

In view of the increasing myopia rate of children in the compulsory education stage in recent years, how to effectively reduce the myopia rate has become a hot topic. Therefore, there is a growing demand for the transformation of classroom lighting and the optimization of household table lamps as eye protection lights, equipped with daylight harvesting, and presence /absence automatic switching lights The presence / absence signals accurately output by the radar module can meet such needs together with the unique constant illuminance regulation technology(daylight harvesting) from Merrytek

Typical application：Educational lighting fixtures

【Detection signal instruction】

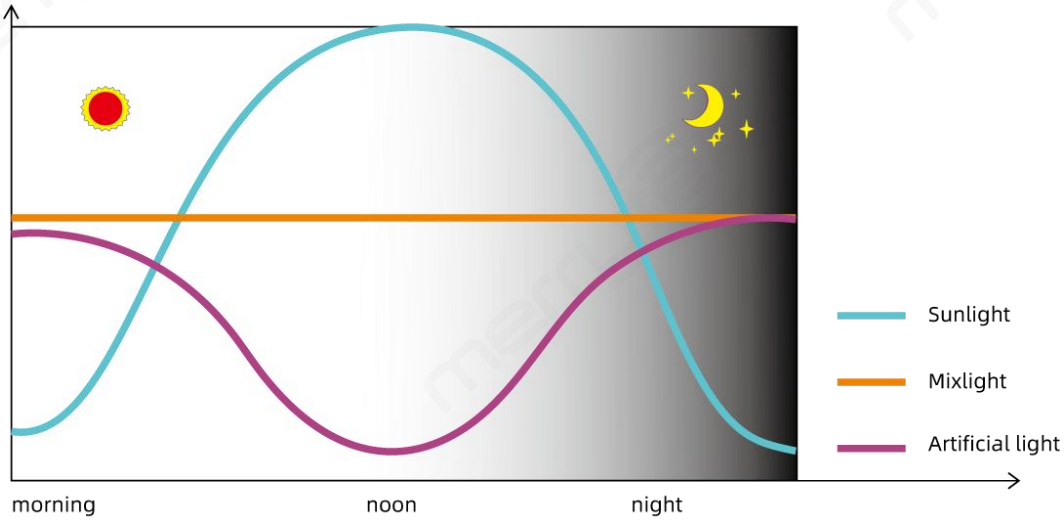
- **Normal motion signal: detect normal movement (walking) in detection range**
- **Presence(breath) signal:** signal from human respiratory vital (abdominal cavity and thoracic cavity expansion behavior)

Note: Presence and normal movement signal are motion signal

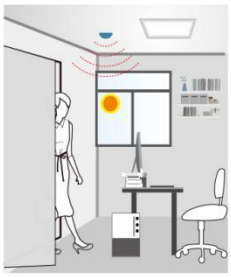
【Daylight harvesting control】

The built-in constant light controller automatically detects the intensity of natural light to adjust the artificial light according to the preset lux level, to maintain target illumination. It can be used in offices, airports, shopping malls and other occasions where the brightness of lamps needs to be adjusted according to sunlight during the day

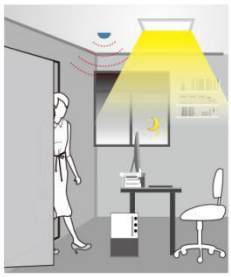
Note: Daylight harvesting function only available on model C/D,press "DH Mode" on remote control MH10 for 3s to start this function， load fixtures switch off and on once means the function is set successfully "DIM+"/ "DIM-" and remote MH10 can be used to set target lux level.After the setting is successful, when the external natural light becomes dark (brighter), the sensor will increase (lower) the brightness of the lamp to maintain preset target lux level（this status is short in "With DH" in following）
Press "Override DH" 3s on remote control to override daylight harvesting function,load fixtures switch off and on once means the function is closed successfully（this status is short in "Without DH" in following）



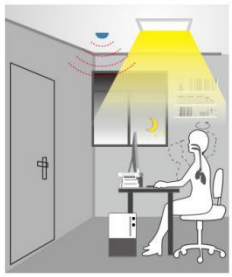
ON/OFF function(stand-by period be set to “0”s, without DH mode)



■ When the ambient light is sufficient, the light will not turn on even if the moving signal is detected.



■ When the ambient light is insufficient, a moving signal is detected and the light will turn on automatically.

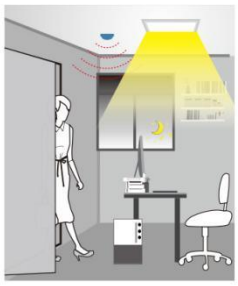


■ The body, head and other small movements in normal work can be detected, and the light is always on.

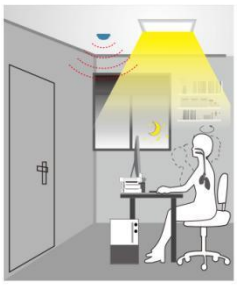
■ When the sensor fails to detect movement and inching signal, the light will automatically turn off after the delay time.

Step dimming function (stand-by period be set to “+∞”, without DH mode)

■ When the sensor does not detect the movement signal, the light remains low bright.



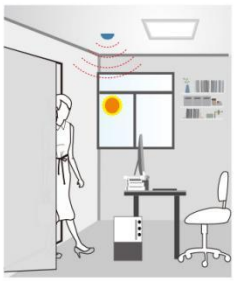
■ When the moving signal is detected, the light will turn on automatically.



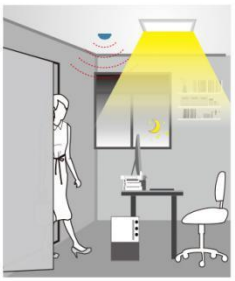
■ The body, head and other small movements in normal work can be detected, and the light is always on.

■ When the sensor does not detect movement and inching signal, the light will automatically turn on low after the delay time.

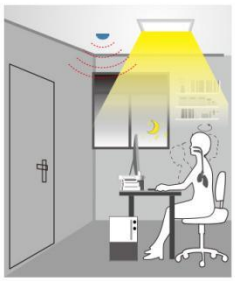
3 step dimming function (stand-by period be set to “1min/3min/10min/30min”, without DH mode)



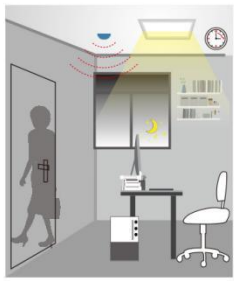
■ When the ambient light is sufficient, the light will not turn on even if the moving signal is detected.



■ When the ambient light is insufficient, a moving signal is detected and the light will turn on automatically.



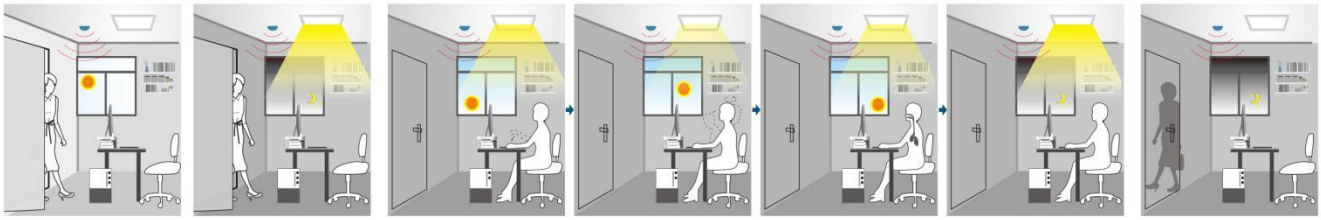
■ The body, head and other small movements in normal work can be detected, and the light is always on.



■ When the sensor does not detect movement and inching signal, the light will automatically turn on low after the delay time.

■ After the waiting time, there is still no moving signal detected, and the light will automatically turn off.

Breath detection on / off function (stand-by period be set to “0s”, with DH mode)



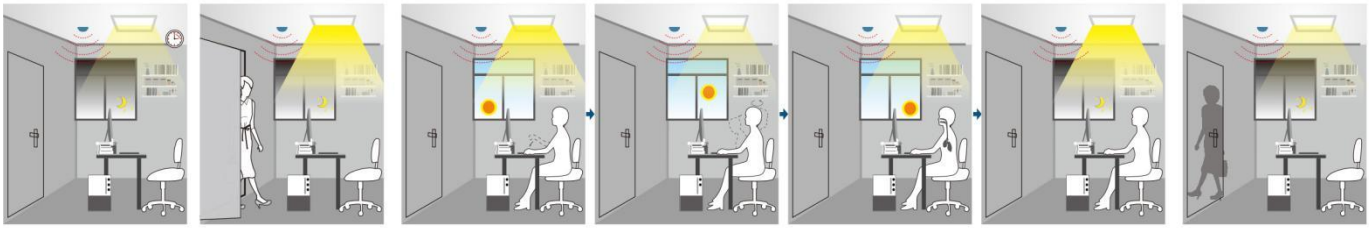
■ When the ambient light is sufficient, the light will not turn on even if the moving signal is detected.

■ When the ambient light is insufficient, a moving signal is detected and the light will turn on automatically.

■ The body, head and other small movements in the work can be detected, and the luminescence ratio of the lamp itself can be adjusted according to the strength of the ambient light to maintain a constant desktop illumination.

■ When the ambient light is sufficient, the light will not turn on even if the moving signal is detected.

Breath detection with 2 step dimming function (stand-by period be set to “+∞”, with DH mode)



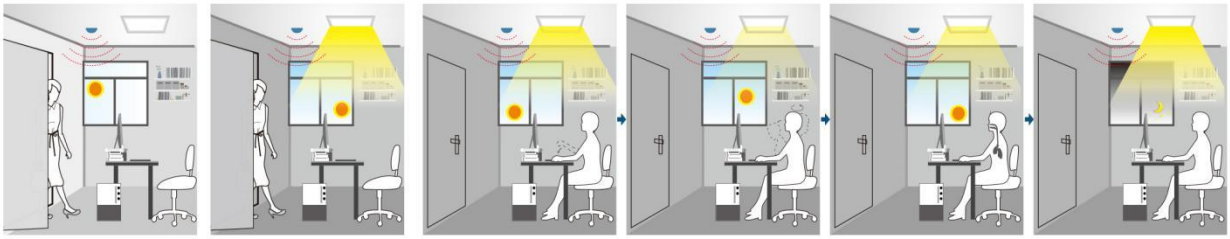
■ When the moving signal is detected, the light will turn on automatically.

■ When the sensor does not detect the movement signal, the light remains low and bright.

■ The body, head and other small movements in the work can be detected, and the luminescence ratio of the lamp itself can be adjusted according to the strength of the ambient light to maintain a constant desktop illumination.

■ When the sensor does not detect any movement signal, the light will automatically turn on low after the delay time.

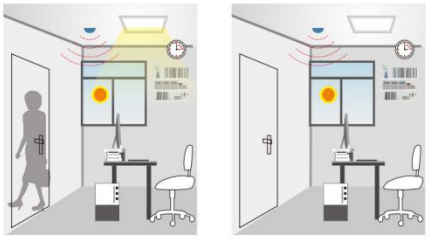
Breath detection with3 step dimming function (stand-by period be set to “1min/3min/10min/30min”, with DH mode)



■ When the ambient light is sufficient, the light will not turn on even if the moving signal is detected.

■ When the ambient light is insufficient, a moving signal is detected and the light will turn on automatically.

■ The body, head and other small movements in the work can be detected, and the luminescence ratio of the lamp itself can be adjusted according to the strength of the ambient light to maintain a constant desktop illumination.

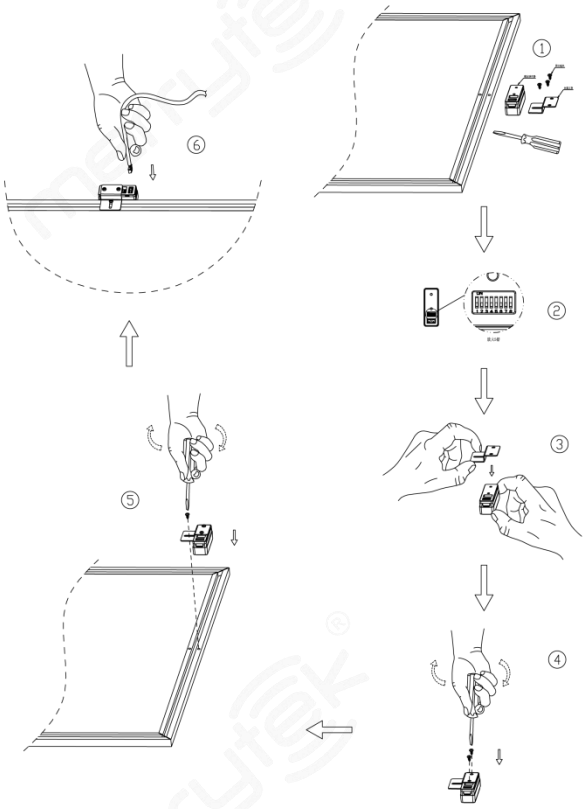


■ When the sensor does not detect any movement or micro-movement signal, the light will automatically turn on low after the delay.

■ After the waiting time, there is still no moving signal detected, and the l ight will automatically turn off.

【Installation example】

LED Panel：



1) Prepare required materials and tools

2) Use tools to adjust the dip switches and set the appropriate setting

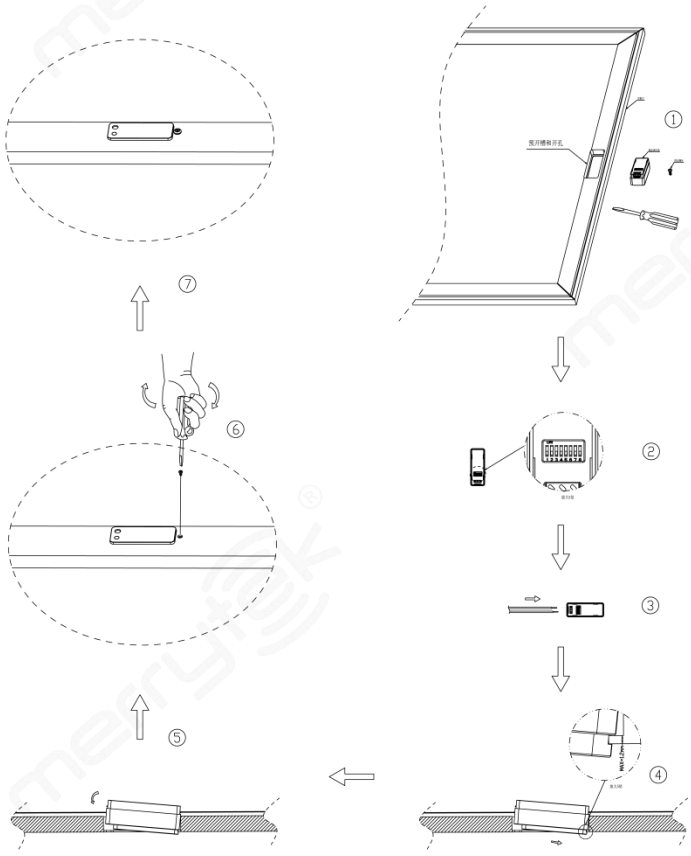
3) Place the hand-held metal bracket on the microwave inductor ground cover, and align the screw hole of the microwave inductor ground cover with the screw hole of the bracket

4) Then place the set screw in the screw hole, and use tools to lock the screw

5) Then hang the whole assembly at the preset position of the lamp, make the holes align with each other, and use tools to lock the screws

6) Hold the lead on the lamp, insert the terminal on the lead into the female base of the inductor, and ensure the connection is stable

LED Panel Border Embedding：



1) Prepare required materials and tools

2) Use tools to adjust the dip switches and set the appropriate setting

3) The input line is well connected with the terminal block to ensure stability and reliability after installation

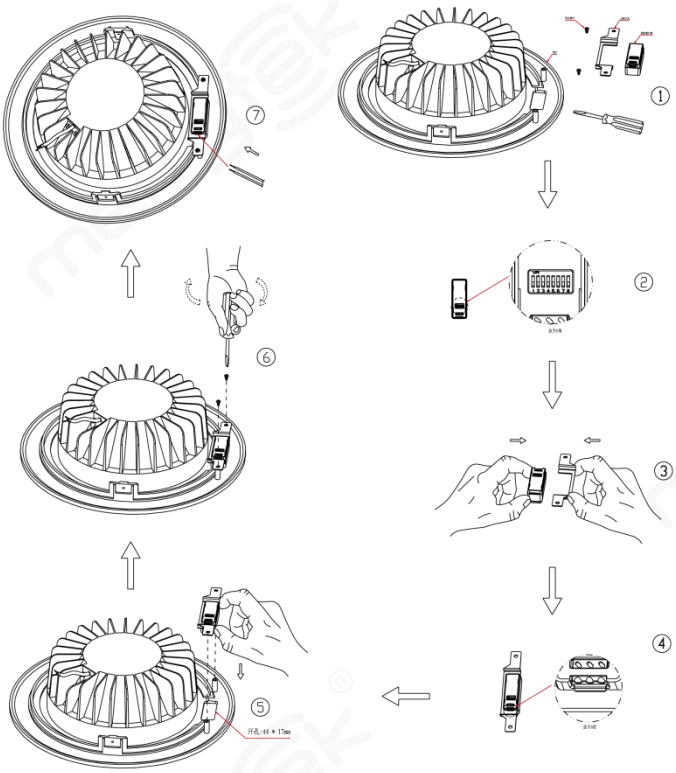
4) Hold the microwave inductor so that the groove of the microwave inductor shell corresponds to the opening edge of the fixed plate. Push it in at a certain angle, so that the edge is completely inserted into the groove

5) Then take the open edge as the rotation axis to make the microwave inductor fit the fixed plate

6) Then place the set screw in the screw hole, and use tools to lock the screw

7) Check whether the microwave inductor is fixed properly and whether the connection between the terminal and the lamp is stable and reliable

Big power downlight：



1) Prepare required materials and tools

2) Use tools to adjust the dip switches and set the appropriate setting

3) The two buttons on the side of the inductor are pushed horizontally along the opening of the metal bracket to make the button hang the metal bracket

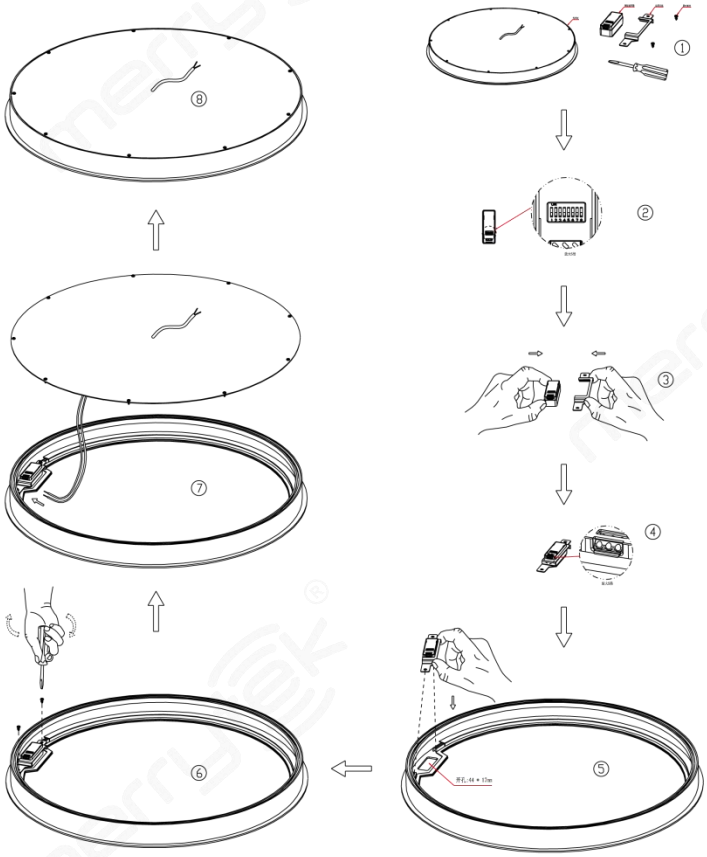
4) Check whether the assembly is correct (only the pushed opening can be moved, and the other directions are fixed)

5) Then hang the whole assembly at the preset position of the lamp to make the holes align with each other

6) Then place the set screw in the screw hole, and use tools to lock the screw

7) The input line is well connected with the terminal block to ensure stability and reliability after installation

Ceiling lamp：



1) Prepare required materials and tools

2) Use tools to adjust the dip switches and set the appropriate setting

3) The input line and terminal block shall be well connected to ensure stability and reliability after installation

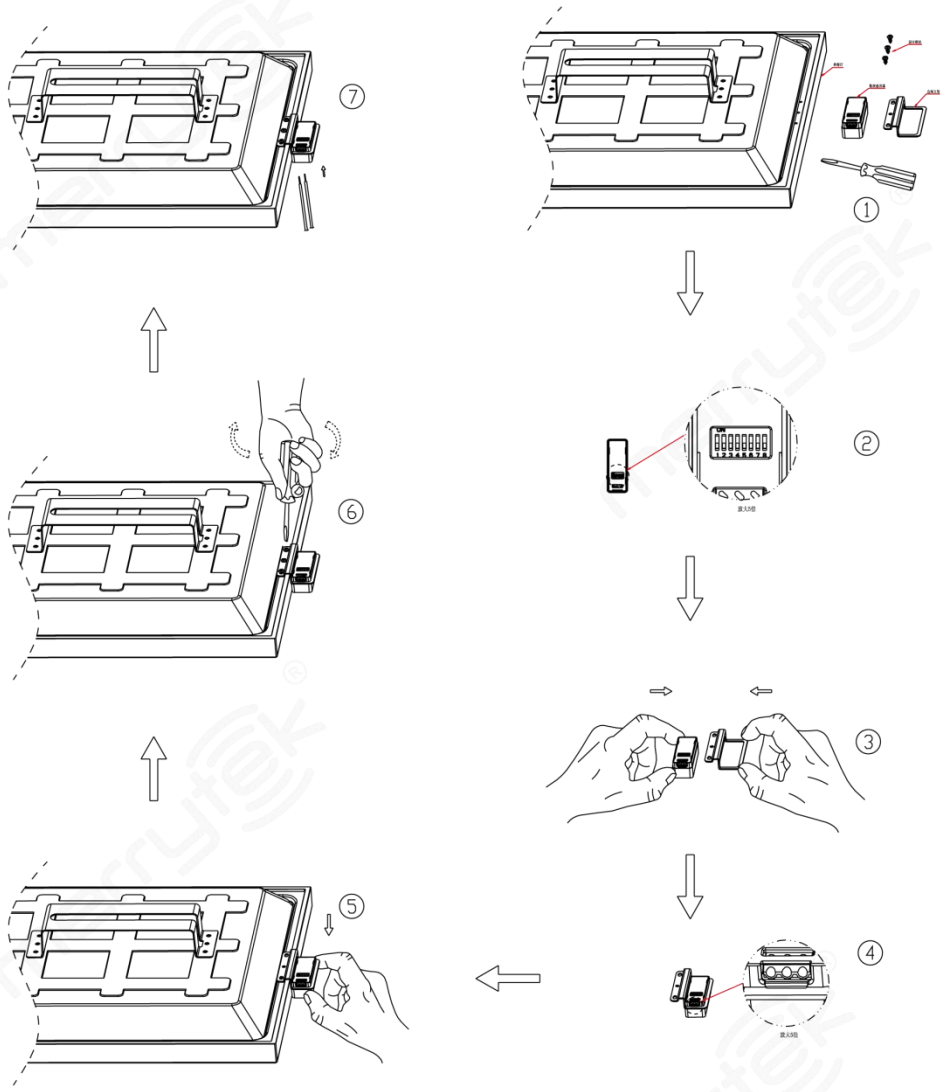
4) Hold the microwave inductor so that the groove of the microwave inductor shell corresponds to the opening edge of the fixed plate, and push it in at a certain angle, so that the edge is completely inserted into the groove

5) Then take the open edge as the rotation axis to make the whole microwave inductor fit the fixed plate

6) Then place the set screw in the screw hole, and use tools to lock the screw

7) Check whether the microwave inductor is fixed properly and whether the connection between the terminal and the lamp is stable and reliable

Education lighting fixtures：



1) Prepare required materials and tools

2) Use tools to adjust the dip switches and set the appropriate setting

3) The two buttons on the side of the inductor are pushed horizontally along the opening of the metal bracket to make the button hang the metal bracket

4) Check whether the assembly is secure (only the pushed opening can be moved and other directions are fixed)

5) Then hang the whole assembly at the preset position of the lamp to make the holes align with each other

6) Then place the set screw in the screw hole, and use tools to lock the screw

7) The input line is well connected with the terminal block to ensure stability and reliability after installation

【Notes】

(1) The sensor should be installed by a professional electrician. Please turn off the power before installing, wiring, changing the setting of the DIP switch.

(2) Do not place the sensor close to high-density objects such as metal, glass,concrete walls, etc, false triggering could happen.

(3) The motion signal nearly sensor could trigger sensor,such as swing fan,vibration machine.

(4) Avoid invalid light sources illuminating sensor and interfere with the measurement of ambient light.

(5) keep sensor far from wireless router, at least 1m.

(6) Detection distance is related to moving speed of objects, size of moving objects, mounting height, mounting angle, working environment, reflecting materials and etc. Given detecting area is typical value that was measured by 165cm high testers in an indoor open place.

(7)The microwave sensor has a certain ability to penetrate the building wall, motion signal outside wall could trigger sensor. In order to avoid false triggering, attention should be paid to the selection of the installation location and the appropriate detection area during installation.for example:

A.In the room with length x width 2x2m or smaller one,set detection area 25%(washing or reception room)

B.In the room with length x width 3x3m or similar one,set detection area 50% (washing or reception room,entrance)

C.In the room with length x width 4x4m or similar one,set detection area 75% (meeting room,study room）

D.In the room with length x width 5x5m or bigger one,set detection area100% (big office,meeting room,library)

Note: Please set detection area accroding to actual installation environment,choose a right detection area,above scenes are only for reference,you are advised to test 5pcs in installation site before mass installation)

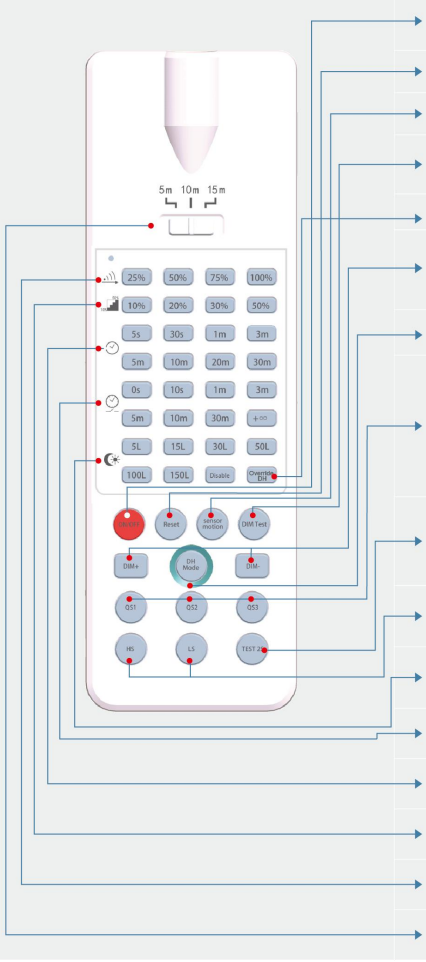
(8) Hold time setting:1-3 minutes for single person space; 30s-1min for multiple person space; it is not recommend to set hold time over 5min, to avoid false triggering by slight motion signal around.

(9) The product spec. or parameters can be varied without prior notice.

【Default setting】

Detection area: 100%　Hold time: 1min　Daylight sensor: Disable Standby dimming level: 10% ： Standby period: 0s

【Remote control instruction】

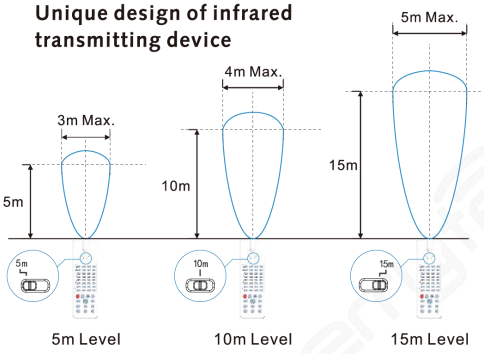
Remote Control Setting	Button	Remarks
	ON/OFF	Press "ON/OFF", the load lamp will enter normal ON mode, sensor function will be override. In normal ON mode, DIM+ / DIM- can be used to dim up / down load. Dimming level has memory after restart power supply.
	Reset	Press "RESET", sensor parameters return to default setting.
	Sensor motion	Press "Sensor motion", return to sensor mode (previous parameters setting is valid)
	DIM Test	Press "DIM Test", automatically test dimming function and correct wiring. After 2S, return to previous status.
	Override DH	Long press >3S, exit daylight harvesting mode, back to daylight threshold mode
	DIM + DIM -	Short press "DIM+/DIM-"to dim up/down load,each press will dim 2% of full power; long press will dim up/down load, Load power is adjusted in 1% increments; Dimming range: 10% to 100% (only applicable for sensor with daylight harvesting function) Note: Press "DIM+ / DIM-" to dim up/down load in normal ON mode
	DH Mode	Long press >3S, exit daylight harvesting mode, back to daylight threshold mode
	Q1 Q2 Q3	QS1: High Sensitivity Mode QS2: Low Sensitivity Mode QS3: N/A Note: High Sensitivity Mode is suitable for ceiling light, downlight and other lights with mounting heights of 2.5-3.0m. Low Sensitivity Mode is suitable for strip light and other lights with mounting heights of 1.8-2.5m.
	TEST 2S	N/A
	HS LS	HS: Turn ON indicator light LS: Turn OFF indicator light
		Daylight Sensor Set up daylight threshold: 5LUX/30LUX/100LUX/Disable(N/A for other keys)
		Stand-by period Set up stand-by time: 0S/10S/1min/3min/5min/10min/30min/+∞
		Hold time Set up hold time: 5S/30S/1min/3min/5min/10min/20min/30min
		Stand-by dim level Set up stand-by dim level: 10%/20%/30%/50%
		Detection Area Set up detection area: 25%/50%/75%/100%
		Remote Distance Toggle bottom can set the remote distance of remote control and sensoer.

Remote control and code setting conversion

1.DIP switch setting convert to remote control Press any bottom except "RESET" on the remote control, and the sensor settings convert to the function currently selected by the remote control. (No function button settings invalid)

2 remote control convert to DIP switch setting
Turn off the power, toggle any DIP switch,connect to the power, and all settings return to the DIP switch settings when supply power again.

Unique design of infrared transmitting device



【Dip switches instruction】

Instruction for Model A & B：

Detection Area

	1	2	3
100%	ON	ON	ON
75%	-	ON	ON
50%	ON	-	ON
25%	ON	ON	-
10%	-	-	-

Hold Time

	4	5	
Ⅰ	ON	ON	5S
Ⅱ	-	ON	30S
Ⅲ	ON	-	1min
Ⅳ	-	-	3min

Daylight Sensor

	6	
Ⅰ	ON	30Lux
Ⅱ	-	Disable

*When set Disable,sensor will switch on light when detection motion regardless of ambient brightness level.

Stand_by DIM Level

	7	
Ⅰ	ON	10%
Ⅱ	-	50%

Stand_by Period

	8	
Ⅰ	ON	0S
Ⅱ	-	5min

Instruction for Model C & D

Detection Area

	1	2	3
100%	ON	ON	ON
75%	-	ON	ON
50%	ON	-	ON
25%	ON	ON	-
10%	-	-	-

Hold Time

	4	5	
Ⅰ	ON	ON	5S
Ⅱ	-	ON	30S
Ⅲ	ON	-	1min
Ⅳ	-	-	3min

Stand_by DIM Level

	6	
Ⅰ	ON	10%
Ⅱ	-	30%

Stand_by Period

	7	8	
Ⅰ	ON	ON	0S
Ⅱ	ON	-	1min
Ⅲ	-	ON	3min
Ⅳ	-	-	5min

【Disclaimer】

Due to the complexity of product technology and differences in application environment, it is difficult to guarantee a completely accurate or complete description, so this specification is only for user reference.

We will reserve the right to make changes to the product specifications without notifying the user, and do not make any commitments and guarantees in the legal sense.

At the same time, our company encourages users to supplement or modify the contents of our specifications after using our products.