Specification

Product series: Low-mounting PIR motion sensor (dry contact version)

Product model: MSA236D IR 485

Product version: V1.0

Versions	Release Date	Record	Publishing
V1.0	2025.1.7	Initial version	Jacky

【Product description】

MSA236D IR 485 is an compact PIR motion sensor with daylight detection function. Combined with the unique software algorithm of Merrytek, it can accurately detect human movements in almost all indoor spaces to trigger smart scene application in smart home, smart hotel, and smart office.

【Product Feature】

- PIR motion detection
- Exquisite appearance with planar fresnel lens
- Accurate RS485 protocol output
- Daylight sensor detection available
- Detection area,hold time,ID edit etc can be set by remote
- Max detection range: 8-10m in diameter
- Factory setting is NO dry contact,yet can switch to NC by remote
- Hallway and Toilet motion detection highly recommended
- Flush mounting and surface mounting available
- Compacted mini size for perfect ceiling mounting

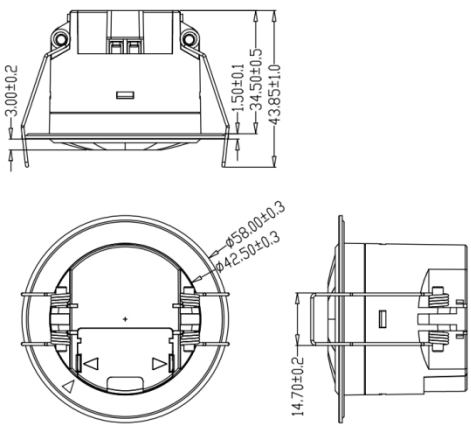
【Dimension】

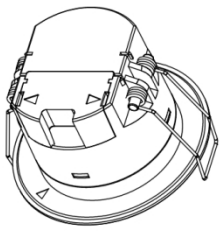
- Product size: ϕ58x36mm
- Connection interface: 4-pin terminal

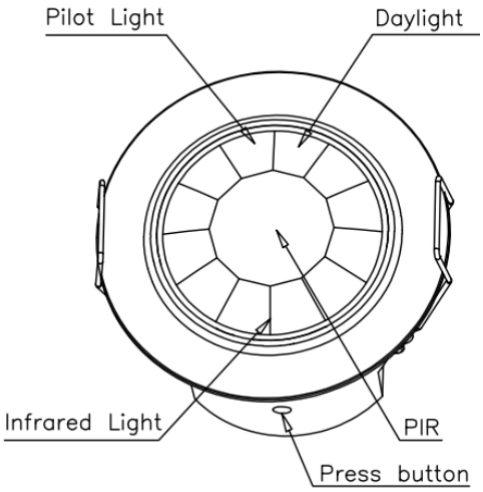
【Parameter】

Input/Output	Input voltage	12-24V DC
	Rated voltage	12/24V DC
	Working current	20mA max
	Power consumption	≤0.5W @12/24V DC
	Output signal	RS485
Sensor parameter	Function	PIR motion detection+ daylight sensor
	Detection Area	RS485 protocol/remote setting: 100%/75%/50%/25%
	Hold Time	RS485 protocol/remote setting:10S/30S/1min/5min/10min/20min/30min
	Daylight Sensor report range	0-1200lux
	Radius detection range(based on 100% sensitivity)	Tangential moving based on 3m high installation: 4-5m @25℃（radial moving detection range will shorten）
	Remote control	Available
	Mounting height	2.5-4m typical value:3m
Application environment	Drill hole	Φ45mm
	Working temperature	-25℃...+50℃(detection range might differ based on different temperature)
	Storage temperature	-40℃~+80℃
	Warranty	3 years（available due to product quality problem under indoor application）
Certificate Standard	Certificate	Compliant to CE
	Environmental requirements	Compliant to RoHS
	IP rating	IP20
“N/A” means not available		

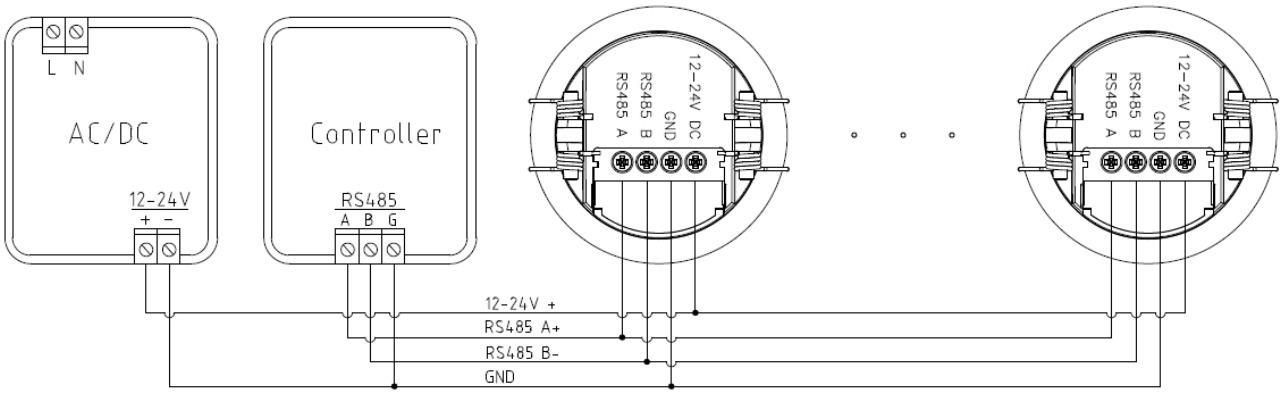
【Dimension and Function diagram】







【Wiring instruction】



Wiring layout suggestion：

1. Hand-in-hand wiring is highly recommended,yet star-topology or tree-topology is strongly deprecated
2. RS485 layout wire length shall not longer than 300m and 12pc sensor is the max quantity layout in one circuit
3. 4-pin shield wire or class 6 network wire is highly recommended for layout
4. Our sensor don't have terminal resistance,if there's impedance matching problem in RS485 bus, we recommend connect 2pc 120Ω resistance in the terminal

【Initialization】

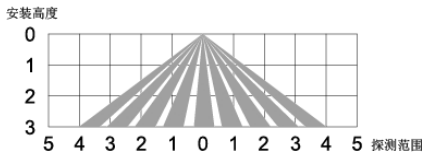
When power on,our sensor will enter self-checking mode and will not respond to any motion movement for 10s. After 10s,our sensor can detect motion normally,and all sensor parameter such as detection range,hold time etc can be set by remote or RS485 protocol.

【Factory setting】

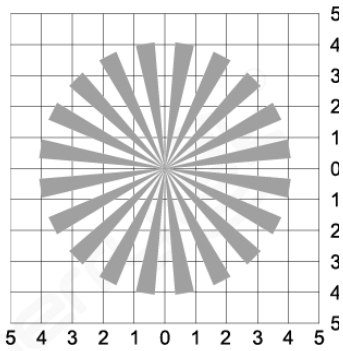
Detection Area:100%, Hold Time: 10s,Daylight Sensor: Disable

【Detection radiation】

MSA236D IR is highly recommended ceiling flush mounting and its detection radiation is as below shows:



Side view



Top view

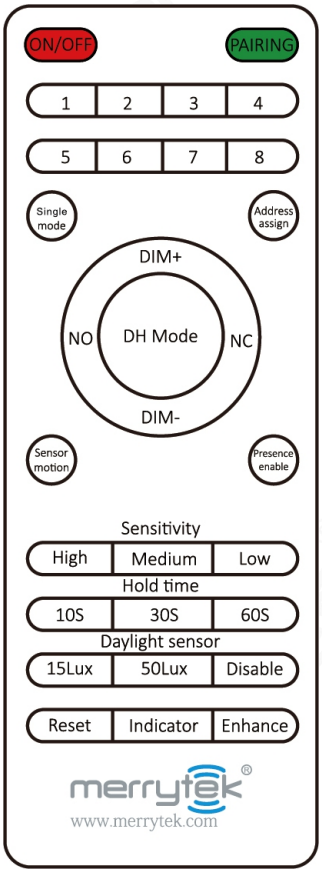
【Detection Signal】

The product detects human moving signals and below is a description of the moving signals:

- **Moving signal:** detect the human significant moving (walking) in the detection area.

【Remote manual】

MH18 remote



ON/OFF: disable sense function

Detection range:
1=100%,2=75%,3=50%,4=25%

DIM+:short press to disable sense function

Address assign: long press>3s to enter sensor ID(from 1 to 65535) edit,and short press address assign button to confirm your set ID

Sensor motion: enable sense function

Hold time: short press to switch 10s/30s/60s,
5=5min,6=10min,7=20min,8=30min

Daylight sensor threshold: short press to switch 15lux/50lux/disable

Reset: all parameter back as factory setting

Indicator:short press to open indicator,long press to close indicator

【RS485 protocol】

Baud rate	9600
Data bit	8
Stop bit	1
DATA0	Frame header
DATA1	ID high bit
DATA2	ID low bit
DATA3	Data length
DATA4	Function
DATA5/DATA6/DATA7	Value （if DATA7 is blank,then DATA6 is check code;if DATA8 is blank,then DATA7 is check code)
DATA8	Check code
Communication data type	HEX TX/RX
Data communication requirement	Each data command interval shall>210ms

Example	Header	ID high bit	ID low bit	length	function	value	Check code
	DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6
	51	FF	FF	06	05	64	BE

Check code: 51+FF+FF+06+05+64= 2BE take last 2 bit:BE

Example	Header	ID high bit	ID low bit	length	function	value			Check code
	DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7	DATA8
	51	FF	FF	08	07	09	27	C0	4E

Check code: 51+FF+FF+08+07+09+27+C0=34E take last 2 bit: 4E

Merrytek radar presence sensor protocol introduction:

Command	Function	Description	Data range	w/r	Default value
0x00	Read Function data	Read Function data		w	
0x03	Presence/absence report	Presence/absence value	1-2	w/r	01
0x05	Detection area setting	Detection area	0-100	w/r	100%
0x07	Blocking time setting	Blocking time time	0-FFFFFF	w	0
0x08	LED Indicator	LED Indicator	0-1	w/r	01
0x09	Light sensor	Light sensor	0-1200lux	r	
0x0A	Daylight difference value setting	When daylight difference hit this value,daylight value will update	10-100	w/r	10Lux
0x0D	Hold Time setting	Hold Time	3-7200	w/r	30s
0x17	Update firmware version	Firmware version	0.0.0-100.0.0	r	Current version
0x18	Setting device ID	Device ID	0x0000-0xFFFF	w/r	0xFFFF
0x20	Setting daylight compensation	Daylight Level Compensation（multiple)	0x01-0x64	w/r	0x0a
0x21	Edit device ID availability	Edit ID is enabled or not	0-1	w	0x00
0x22	Report or Reading mode	Report or Reading mode switch	0-1	w/r	01
0x23	Status flip	Status flip	1	w	1
0x25	Daylight threshold function	Switch Daylight sensor report mode to daylight threshold mode	0-1200lux，65535	w/r	65535
0x26	Sensor function activation	Motion detection enable or disable	0-1	w/r	0

0x30	Recover factory setting	Reset factory setting parameter	1	w	

Command value introduction

Command	When you're using reading data mode,you shall take below data format as reference					
Example / Function	HEAD (DATA0)	ID (DATA1-DATA2)	LEN (DATA3)	Format (DATA4)	Function (DATA5)	CRC (DATA6)
Inquire presence/absence status	0x51	0xFFFF	0x06	0x00	0x03	data0+...+data5
Inquire detection area	0x51	0xFFFF	0x06	0x00	0x05	data0+...+data5
Inquire LED status	0x51	0xFFFF	0x06	0x00	0x08	data0+...+data5
Inquire daylight value	0x51	0xFFFF	0x06	0x00	0x09	data0+...+data5
Inquire daylight difference value	0x51	0xFFFF	0x06	0x00	0x0A	data0+...+data5
Inquire hold time	0x51	0xFFFF	0x06	0x00	0x0D	data0+...+data5
Inquire firmware version	0x51	0xFFFF	0x06	0x00	0x17	data0+...+data5
Inquire device ID	0x51	0xFFFF	0x06	0x00	0x18	data0+...+data5
Inquire daylight compensation value	0x51	0xFFFF	0x06	0x00	0x20	data0+...+data5
Inquire data report or reading mode	0x51	0xFFFF	0x06	0x00	0x22	data0+...+data5
Inquire daylight value	0x51	0xFFFF	0x06	0x00	0x25	data0+...+data5
Inquire sensor activation status	0x51	0xFFFF	0x06	0x00	0x26	data0+...+data5

1.	Presence/absence report: our radar will report if it's presence or absence within detection area					
Data Example / Function	HEAD (DATA0)	ID (DATA1-DATA2)	LEN (DATA3)	Function (DATA4)	Value (DATA5)	CRC (DATA6)
Absence	0x51	0xFFFF	0x06	0x03	0x01	data0+...+data5
Presence	0x51	0xFFFF	0x06	0x03	0x02	data0+...+data5

Presence/absence report:

Our radar will report presence/absence data ONLY when radar sees presence switch to absence or absence switch to presence,if current status doesn't change,our radar with not report same presence/absence information

2.	Detection area setting：this function mainly used to adjust detection area based on When setting 0%~25% value,detection range is 25% When setting 26%~50% value,detection range is 50% When setting 51%~75% value,detection range is 75% When setting 76%~100% value,detection range is 100%					
Data example / Data value	HEAD (DATA0)	ID (DATA1-DATA2)	LEN (DATA3)	Function (DATA4)	Value (DATA5)	CRC (DATA6)
Min:0%	0x51	0xFFFF	0x06	0x05	0x00	data0+...+data5
Max:100%	0x51	0xFFFF	0x06	0x05	0x64	data0+...+data5

3.	Blocking time: it's used to block sensor detection function within certain time					
Data example / Data value	HEAD (DATA0)	ID (DATA1-DATA2)	LEN (DATA3)	Function (DATA4)	Value (DATA5-DATA7)	CRC (DATA8)
0ms	0x51	0xFFFF	0x08	0x07	0x000000	data0+...+data7
1h	0x51	0xFFFF	0x08	0x07	0x36EE80	data0+...+data7

4.	Indicator activation: it's used to turn on/off indicator					
Data example / Function	HEAD (DATA0)	ID (DATA1-DATA2)	LEN (DATA3)	Function (DATA4)	Value (DATA5)	CRC (DATA6)
Disable	0x51	0xFFFF	0x06	0x08	0x00	data0+...+data5
Enable	0x51	0xFFFF	0x06	0x08	0x01	data0+...+data5

5.	Daylight value report: current daylight value will update only when daylight difference value is meet					
Data example / Function	HEAD (DATA0)	ID (DATA1-DATA2)	LEN (DATA3)	Function (DATA4)	Value (DATA5-DATA6)	CRC (DATA7)
Min：0Lux	0x51	0xFFFF	0x07	0x09	0x0000	data0+...+data6
Max：1200Lux	0x51	0xFFFF	0x07	0x09	0x04B0	data0+...+data6

6.	Daylight difference: it means how much daylight changed from last second to current					
Data example / Data value	HEAD (DATA0)	ID (DATA1-DATA2)	LEN (DATA3)	Function (DATA4)	Value (DATA5)	CRC (DATA6)
Min：10Lux	0x51	0xFFFF	0x06	0x0A	0x0A	data0+...+data5
Max：100Lux	0x51	0xFFFF	0x06	0x0A	0x64	data0+...+data5

7.	Hold time: it refers to the time period radar switch from presence to absence after people leaves detection area					
Data example / Data value	HEAD (DATA0)	ID (DATA1-DATA2)	LEN (DATA3)	Function (DATA4)	Value (DATA5-DATA6)	CRC (DATA7)
Min：3s	0x51	0xFFFF	0x07	0x0D	0x0003	data0+...+data6
Max：7200s	0x51	0xFFFF	0x07	0x0D	0x1C20	data0+...+data6

8.	Firmware version:it can inquiry radar’s firmware version					
Data example / Data value	HEAD (DATA0)	ID (DATA1-DATA2)	LEN (DATA3)	Function (DATA4)	Value (DATA5-DATA6)	CRC (DATA7)
Min:v0.0.0	0x51	0xFFFF	0x07	0x17	0x0000	data0+...+data6
Max:v100.0.0	0x51	0xFFFF	0x07	0x17	0x2710	data0+...+data6

9.	Setting device ID: it can set device ID to distinguish from others					
Data example / Function	HEAD (DATA0)	ID (DATA1-DATA2)	LEN (DATA3)	Function (DATA4)	Value (DATA5-DATA6)	CRC (DATA7)
Min:0x0000	0x51	0xFFFF	0x07	0x18	0x0000	data0+...+data6
Max:0xFFFF	0x51	0xFFFF	0x07	0x18	0xFFFF	data0+...+data6

1) When our sensor is powered and self-inspection finished(ie 20s after sensor powered),you can short press the pairing button,there'll be 51 FF FF 06 21 01 77 displayed and our indicator flashing,it means you can start set the sensor's ID,when succeed,the indicator will stop flashing(if you want finish ID setting soon after the indicator flashing,you can repeat short press the pairing button)

2) Each sensor's default ID is 0xFFFF

3) 0x0000 is broadcast address,it can receive all device's information

4) You can long press the pairing button>3s to recover factory setting fastly

5) Device factory setting parameter:100% sensitivity,;10s hold time;indicator open

6) Important tips: there can only be one sensor under ID setting in an RS485 bus,or there might be communication error

10.	Daylight compensation:it's used to compensate operating environment's daylight tolerance:0A is 1 times,64 is 10 times					
Data example / Function	HEAD (DATA0)	ID (DATA1-DATA2)	LEN (DATA3)	Function (DATA4)	Value (DATA5)	CRC (DATA6)
Min:0x01	0x51	0xFFFF	0x06	0x20	0x01	data0+...+data5
Max:0x64	0x51	0xFFFF	0x06	0x20	0x64	data0+...+data5

11.	ID edit activation: it refers if the device can edit, send 51 FF FF 06 00 21 76 to inquiry if the sensor ID can be edit,0 is available,1 is unavailable					
Data example / Function	HEAD (DATA0)	ID (DATA1-DATA2)	LEN (DATA3)	Function (DATA4)	Value (DATA5)	CRC (DATA6)
Disable	0x51	0xFFFF	0x06	0x21	0x00	data0+...+data5
Enable	0x51	0xFFFF	0x06	0x21	0x01	data0+...+data5

12.	Report or Reading mode switch. 00 is reading mode 01 is report mode					
Data example / Function	HEAD (DATA0)	ID (DATA1-DATA2)	LEN (DATA3)	Function (DATA4)	Value (DATA5)	CRC (DATA6)
Disable	0x51	0xFFFF	0x06	0x22	0x00	data0+...+data5

Enable	0x51	0xFFFF	0x06	0x22	0x01	data0+...+data5

13.	Status flip: it's used to fastly switch presence to absence or from absence to presence					
Data example / Function	HEAD (DATA0)	ID (DATA1-DATA2)	LEN (DATA3)	Function (DATA4)	Value (DATA5)	CRC (DATA6)
Enable	0x51	0xFFFF	0x06	0x23	0x01	data0+...+data5

14.	Daylight threshold value : when you set a certain value as daylight threshold,if environment daylight is higher than this value and sensor is absence status,then sensor will not report presence when people enter detection area.If you set 0xFFFF command,then daylight threshold will disable,and daylight will report its actual lux value					
Data example / Function	HEAD (DATA0)	ID (DATA1-DATA2)	LEN (DATA3)	Function (DATA4)	Value (DATA5-DATA6)	CRC (DATA7)
Min：0Lux	0x51	0xFFFF	0x07	0x25	0x0000	data0+...+data6
Max：1200Lux	0x51	0xFFFF	0x07	0x25	0x04B0	data0+...+data6
65535(it means daylight threshold disabled)	0x51	0xFFFF	0X07	0X25	0xFFFF	data0+...+data6

15.	If you enable sensor,then it can detect all movement signal,if disable,it'll block detect all movement signal,when you enable sensor from disable status,then there'll be 10s freezing time,and after that sensor can work normally					
Data example / Function	HEAD (DATA0)	ID (DATA1-DATA2)	LEN (DATA3)	Function (DATA4)	Value (DATA5)	CRC (DATA6)
Enable	0x51	0xFFFF	0x06	0x26	0x01	data0+...+data5
Disable	0x51	0xFFFF	0x06	0x26	0x00	data0+...+data5

16.	Back to factory setting parameter					
Data example / Function	HEAD (DATA0)	ID (DATA1-DATA2)	LEN (DATA3)	Function (DATA4)	Value (DATA5)	CRC (DATA6)

Factory setting	0x51	0xFFFF	0x06	0x30	0x01	data0+...+data5

Remark:

1. If you set wrong command,it'll report 51XXXX06FF02XX
2. If above command setting not succeed,there'll no data report

【Application tips】

1. Our sensor shall be installed by professional electrician under power-off state
2. Our sensor support 8m high installation for indoor use only.And it's strongly suggested installed far away from hot or temperature-change-fast area to avoid false trigger
3. To ensure normal detection,there shall be no big object within our sensor's detection area because our sensor can't detect by penetrating object
4. There shall also no strong-reflect object,wifi router,microwave oven etc before our sensor to avoid false trigger
5. Our sensor's detection area function is based on 25℃ environment temperature,when environment temperature is higher/lower than this temperature,our sensor will be dull/sensitive,such the detection area will be shorter/longer
6. Our sensor's detection area function is based on tangential movement,and become short if you test by radial movement due to PIR character

【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.