

## HPM Series Particle Sensor

**32322550**  
Issue A

Datasheet



### DESCRIPTION

The Honeywell HPM Series Particle Sensor is a laser-based sensor which uses the light scattering method to detect and count particles in the concentration range of 0  $\mu\text{g}/\text{m}^3$  to 1,000  $\mu\text{g}/\text{m}^3$  in a given environment. A laser light source illuminates a particle as it is pulled through the detection chamber. As particles pass through the laser beam, the light source becomes obscured and is recorded on the photo or light detector. The light is then analyzed and converted to an electrical signal providing particulate size and quantity to calculate concentrations in real time. The Honeywell particle sensor provides information on the particle concentration for given particle concentration range.

### VALUE TO CUSTOMERS

- Enables the ability to more accurately and cost-effectively monitor or control environmental particulate contaminants
- Industry-leading long life of 20,000 hours of continuous use essentially equates to seven years of product life (based on eight hours of operation per day)
- Proven EMC performance enables the ability to perform more accurately in a variety of tough industrial environments
- Enhanced reliability allows for use in harsh environments

### DIFFERENTIATION

- Industry-leading long life of 20,000 hours provides stable operation and continuous use
- Proven EMC performance, based on IEC61000 stable operation,  $\pm 15\%$  accuracy

### FEATURES

- Laser-based light scattering particle sensing
- Concentration range: 0  $\mu\text{g}/\text{m}^3$  to 1,000  $\mu\text{g}/\text{m}^3$
- Fully calibrated
- EMC: Heavy industrial level IEC61000
- Response time: <6 s
- Supply current: 80 mA max.
- Output signal: UART (Universal Asynchronous Receiver/Transmitter)
- PM2.5 output (PM10 output optional with additional programming)
- RoHS compliant

### POTENTIAL INDUSTRIAL APPLICATIONS

- HVAC:
  - Air conditioners
  - Air quality monitors
  - Environmental monitoring
- Consumer products:
  - Air cleaners
  - Air conditioners
  - Air purifiers
  - Car air cleaners
  - Handheld air quality detectors

# Particle Sensor HPM Series

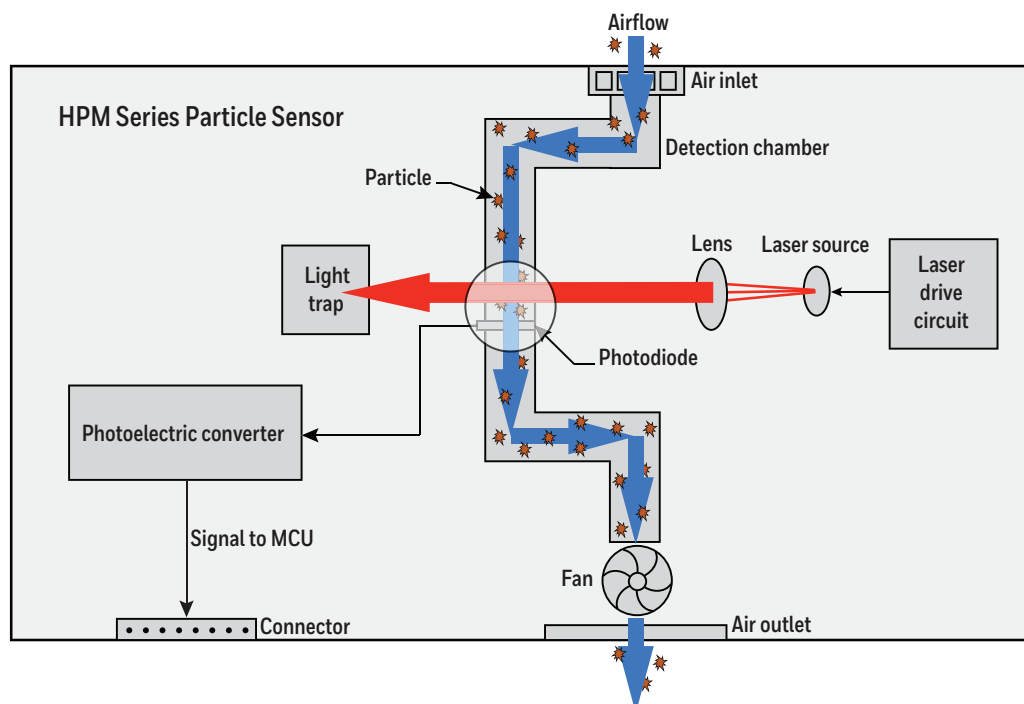
**Table 1. Specifications**

Characteristic	Parameter
Operating principle	laser scattering
Detection <sup>1</sup>	PM2.5 or PM10
Output data <sup>1</sup>	PM2.5 in $\mu\text{g}/\text{m}^3$ (PM10 in $\mu\text{g}/\text{m}^3$ with additional programming)
Concentration range	0 $\mu\text{g}/\text{m}^3$ to 1,000 $\mu\text{g}/\text{m}^3$
Accuracy (at 25°C ±5°C): 0 $\mu\text{g}/\text{m}^3$ to 100 $\mu\text{g}/\text{m}^3$ 100 $\mu\text{g}/\text{m}^3$ to 1000 $\mu\text{g}/\text{m}^3$	$\pm 15 \mu\text{g}/\text{m}^3$ $\pm 15 \%$
Response time	6 s
Supply voltage	5 V ±0.2V
Standby current (at 25°C ±5°C)	<20 mA
Supply current (at 25°C ±5°C)	<80 mA
Temperature: operating storage	-10°C to 50°C [-14°F to 122°F] -30°C to 65°C [-22°F to 149°F]
Humidity (operating and storage)	0 %RH to 95 %RH non-condensing
Output protocol <sup>2</sup>	UART; baud rate: 9600, databits: 8, stopbits: 1, parity: no
Operating time: continuous mode intermittent mode	20,000 hr depends on duty cycle
ESD	±4 kV contact, ±8 kV air per IEC 61000-4-2
Radiated immunity	1 V/m (80 MHz to 1000 MHz) per IEC 61000-4-3
Fast transient burst	±0.5 kV per IEC61000-4-4
Immunity to conducted disturbances radiated emissions	3 V per IEC61000-4-6
Radiated emissions	40 dB 30 MHz to 230 MHz; 47 dB 230 MHz to 1000 MHz per CISPR 14
Conducted emissions	0.15 MHz to 30 MHz in compliance with CISPR 14

<sup>1</sup> PM2.5 is particulate matter  $\leq 2.5 \mu\text{m}$  in diameter; PM10 is particulate matter  $\leq 10 \mu\text{m}$  in diameter.

<sup>2</sup> Contact Honeywell for other output options.

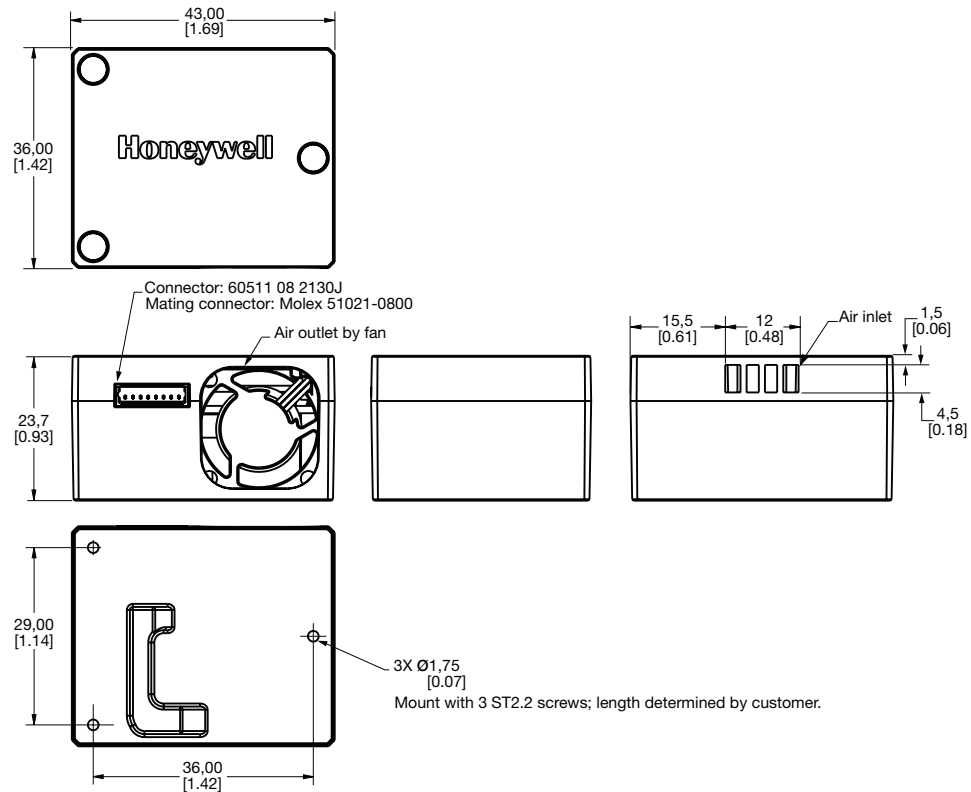
**Figure 1. HPM Series Operation**



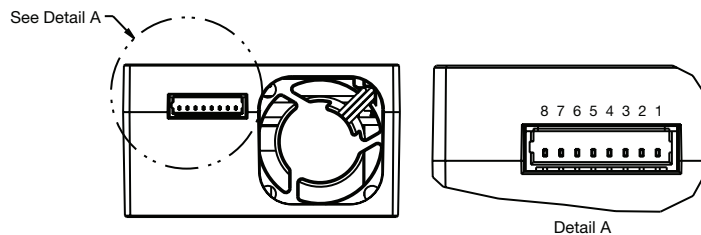
# Particle Sensor

## HPM Series

**Figure 2. Mounting Dimensions (mm/[in] For reference only.)**



**Table 2. Connector Pinout**



Pin	Name	Description
1	+3.3 V	power output (+3.3 V/100 mA)
2	5 V	power input (5 V)
3	N/A	N/A
4	N/A	N/A
5	TEST	used for testing (NA)
6	TX	UART TX output (0 - 3.3 V)
7	RX	UART RX input (0 - 3.3 V)
8	GND	power input (ground terminal)

**Table 3. Order Guide**

Catalog Listing	Description
HPMA115S0-XXX	HPM Series PM2.5 Particle Sensor with UART output

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**Table 4. Customer Use Protocol**

Command Length (Bytes)	HEAD	LEN	CMD	Data	CS	Example
<b>Read Particle Measuring Results</b>						
Send	0x68	0x01	0x04	NA	CS = MOD ((65536-(HEAD+LEN+CMD+DATA)), 256)	68 01 04 93
Response, Pos ACK	0x40	0x05	0x04	“DF1, DF2, DF3, DF4 PM2.5 = DF1 * 256 + DF2 PM10 = DF3 * 256 + DF4”	CS = MOD ((65536-(HEAD+LEN+CMD+DATA)), 256)	40 05 04 00 30 00 31 56
Response, Neg ACK						0x9696
<b>Start Particle Measurement</b>						
Send	0x68	0x01	0x04	NA	CS = MOD ((65536-(HEAD+LEN+CMD+DATA)), 256)	68 01 01 96
Response, Pos ACK						0xA5A5
Response, Neg ACK						0x9696
<b>Stop Particle Measurement</b>						
Send	0x68	0x01	0x02	NA	CS = MOD ((65536-(HEAD+LEN+CMD+DATA)), 256)	68 01 02 95
Response, Pos ACK						0xA5A5
Response, Neg ACK						0x9696
<b>Set Customer Adjustment Coefficient</b>						
Send	0x68	0x02	0x08	DF1: 30 ~ 200 (Default, 100)	CS = MOD ((65536-(HEAD+LEN+CMD+DATA)), 256)	68 02 08 64 2A
Response, Pos ACK						0xA5A5
Response, Neg ACK						0x9696
<b>Read Customer Adjustment Coefficient</b>						
Send	0x68	0x01	0x10	NA	CS = MOD ((65536-(HEAD+LEN+CMD+DATA)), 256)	68 01 10 87
Response, Pos ACK	0x40	0x02	0x10	DF1: 30 ~ 200 (Default, 100)	CS = MOD ( ( (65536-(HEAD+LEN+CMD+DATA)), 256)	40 02 10 64 4A
Response, Neg ACK						0x9696
<b>Stop Auto Send</b>						
Send	0x68	0x01	0x20	NA	CS = MOD ((65536-(HEAD+LEN+CMD+DATA)), 256)	68 01 20 77
Response, Pos ACK						0xA5A5
Response, Neg ACK						0x9696
<b>Enable Auto Send</b>						
Send	0x68	0x01	0x40	NA	CS = MOD ((65536-(HEAD+LEN+CMD+DATA)), 256)	68 01 40 57
Response, Pos ACK						0xA5A5
Response, Neg ACK						0x9696

<sup>1</sup>Life may vary depending on the specific application in which the sensor is utilized.

## ADDITIONAL INFORMATION

The following associated literature is available on the Honeywell web site at [sensing.honeywell.com](http://sensing.honeywell.com):

- Installation instructions

### Find out more

Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office.

To learn more about Honeywell's sensing and switching products, call **+1-815-235-6847** or **1-800-537-6945**, visit [sensing.honeywell.com](http://sensing.honeywell.com), or e-mail inquiries to [info.sc@honeywell.com](mailto:info.sc@honeywell.com)

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## **⚠ WARNING** **PERSONAL INJURY**

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

**Failure to comply with these instructions could result in death or serious injury.**

## **⚠ WARNING** **MISUSE OF DOCUMENTATION**

- The information presented in this datasheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

**Failure to comply with these instructions could result in death or serious injury.**

### Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship during the applicable warranty period. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgment or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items that Honeywell, in its sole discretion, finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While Honeywell may provide application assistance personally, through our literature and the Honeywell web site, it is buyer's sole responsibility to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this writing. However, Honeywell assumes no responsibility for its use.

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