

INSTALLATION INSTRUCTIONS FOR THE INTELLIGENT PARTICULATE MATTER SENSORS (IPM SERIES)

USM-IPM-001

Issue 1

MECHANICAL DESIGN & ASSEMBLY INSTALLATION GUIDELINES: IPM SERIES

PREFACE

The IPM Series particulate matter sensors work on laser scattering principles and detects particles ranging from 0.3 μm to 10 μm . IPM Series PM sensor output is expressed in concentration values for PM1, PM2.5, PM4 and PM 10, at a data rate of 1 sample per second over 1²C, UART, or PWM (PM2.5 only).

To ensure the intended performance of the sensor in the end-user's device, it is important to consider a few suggestions when designing a product using our sensors. These installation instructions will present the main design and assembly guidelines for the intended sensor performance.

1. PACKAGE

IH-PMC-001 and IH-PMC-002 have one air inlet and one air outlet that should not be obstructed and should be properly coupled to ambient air. When powered, an internal fan creates an airflow through the sensor.

Figure 1. IH-PMC-001

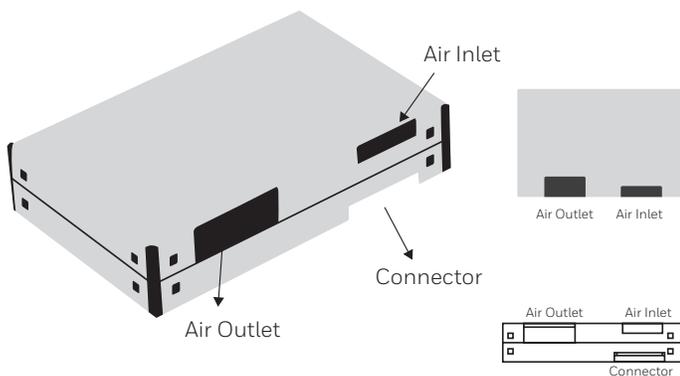
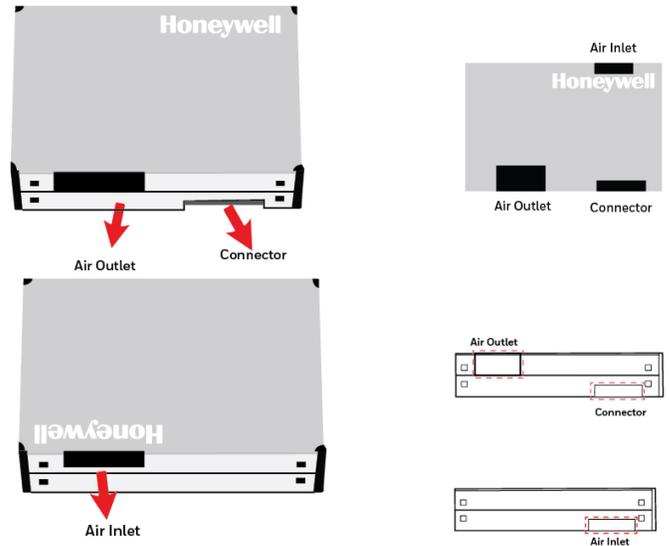


Figure 2. IH-PMC-002



2. SENSOR PLACEMENT

2.1 Coupling to Ambient

A good coupling of the inlet and outlet of the sensor to the ambient air via the device openings and a suitable device design is essential in order to accurately measure the ambient particles concentration.

Ideally, the sensor is placed as close as possible to the device's outer shell. Honeywell recommends large openings for a better air exchange between sensor and environment, which promotes a faster response time. Place sensor inlet/outlet as close to the ambient air as possible.

Figure 3. Coupling to Ambient (IH-PMC-001)

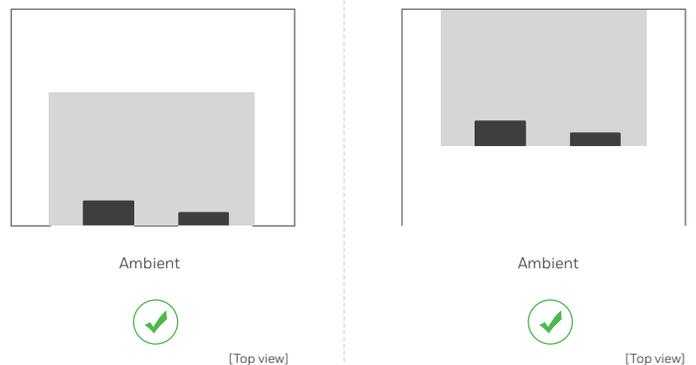


Figure 4. Coupling to Ambient (IH-PMC-001)

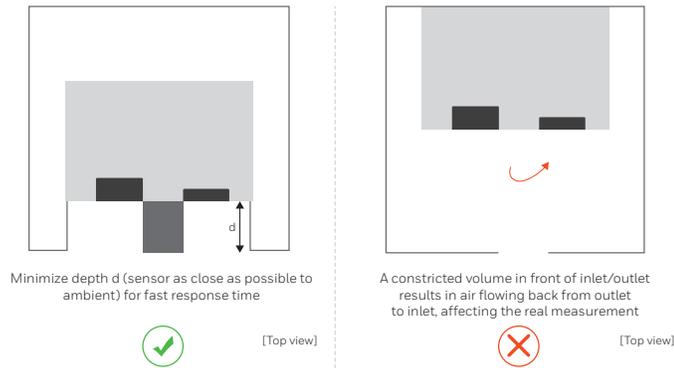


Figure 5. Coupling to Ambient (IH-PMC-002)

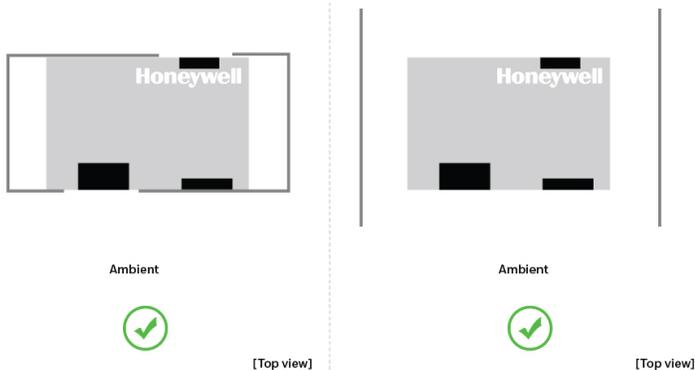
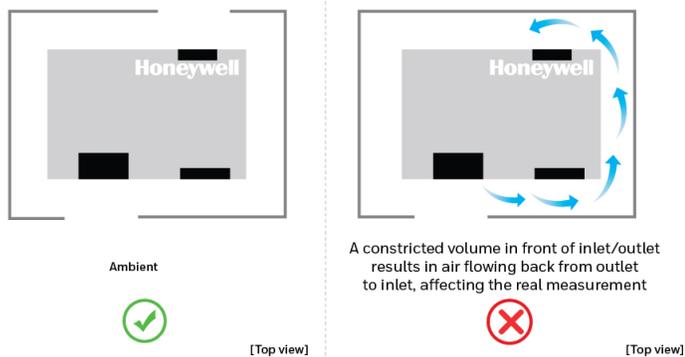


Figure 6. Coupling to Ambient (IH-PMC-002)



Avoid designs that result in air flow from the outlet back to the inlet.

2.2 Vertical placement

Place the sensor with the inlet/outlet facing down to avoid dust accumulation and accelerated sensor aging.

Figure 7. Vertical Placement (IH-PMC-001)

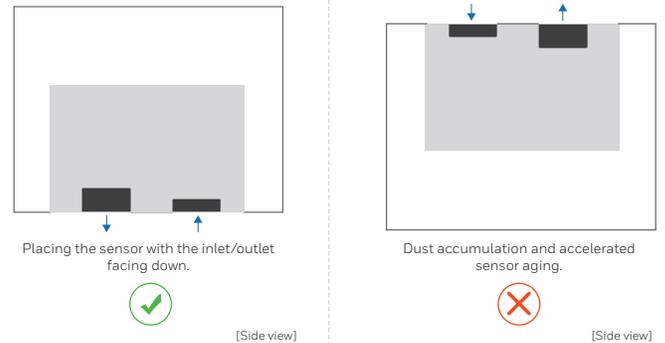
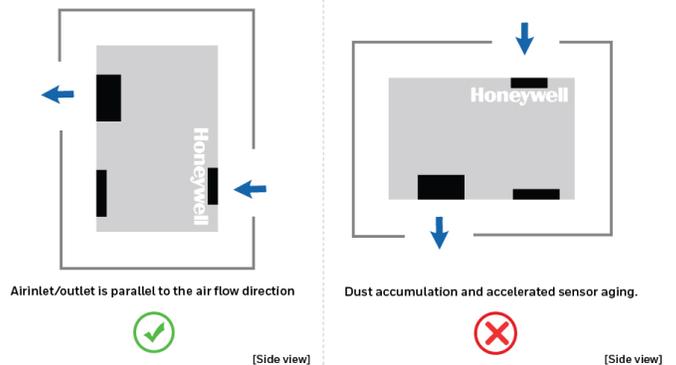


Figure 8. Vertical Placement (IH-PMC-002)



2.3 Lateral placement

Inlet should always be above outlet to avoid particles getting back from the outlet to the inlet due to gravity.

Figure 9. Lateral Placement (IH-PMC-001)

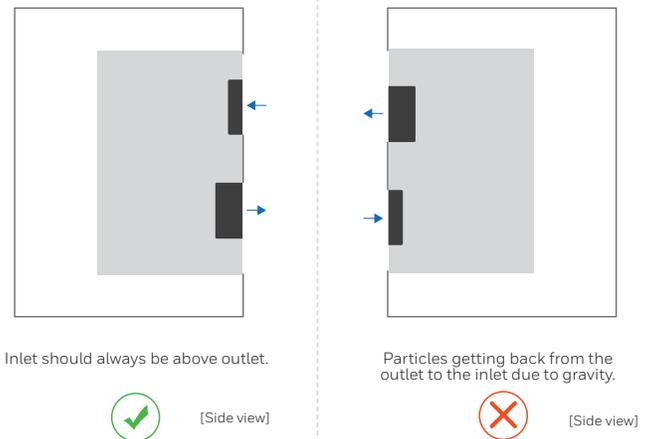


Figure 10. Lateral Placement (IH-PMC-002)

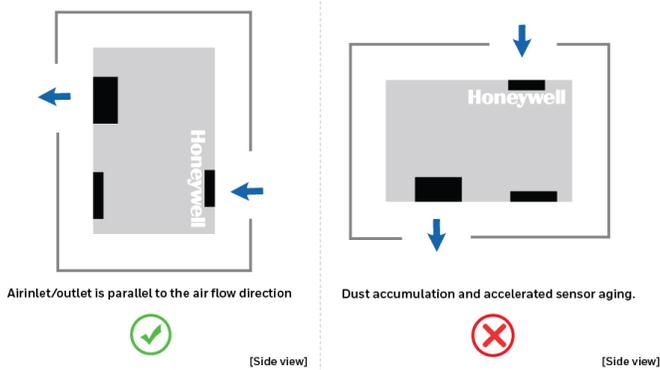
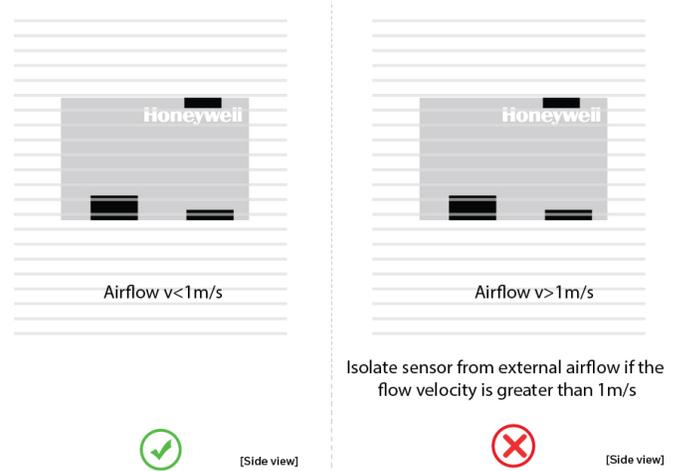


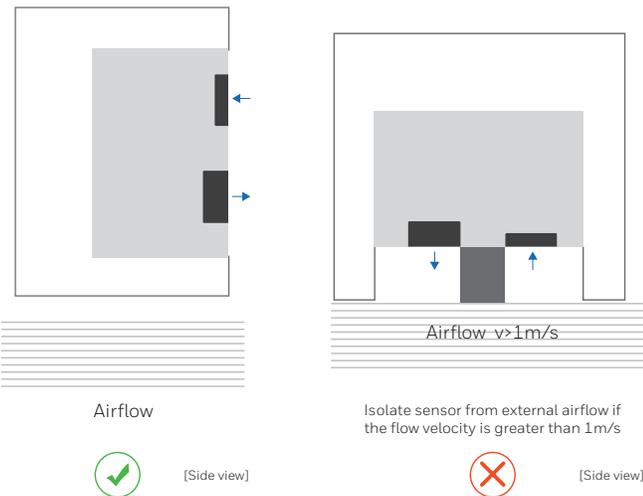
Figure 12. Isolation from Airflow (IH-PMC-002)



2.4 Isolation from Airflow

External airflows can generate a pressure drop between inlet and outlet and alter the sensor reading. Strong flows can also physically prevent particles from entering the sensor inlet channel. The sensor should be isolated from the airflow of the final device (e.g. air purifier) if the velocity of this flow is greater than 1 m/s.

Figure 11. Isolation from Airflow (IH-PMC-001)



2.5 Away from External Heat Sources

The IPM Series sensors are designed for intended performance and stability at different environmental temperature conditions. However, heat sources such as external microcontrollers, power supply boards or any other heat-generating elements might induce thermal stress on the sensor, degrading its long-term performance. To avoid overheating, place the sensor away from heat source and below rising heat.

Figure 13. External Heat Source Placement (IH-PMC-001)

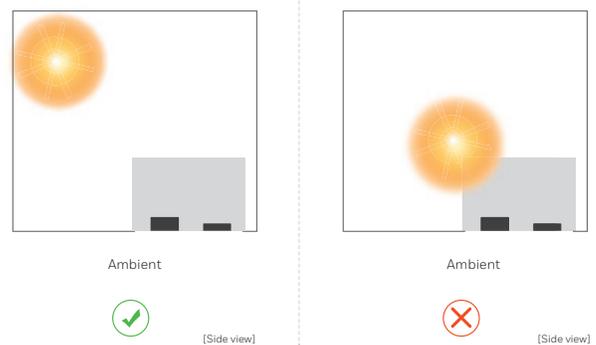
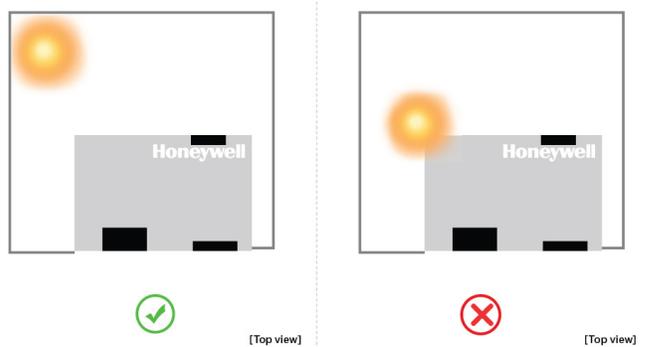


Figure 14. External Heat Source Placement (IH-PMC-002)



2.6 Protection from Sunlight

Avoid exposure of the sensor to direct sunlight, as it might cause accelerated aging resulting in shorter operational life. This can be achieved via a suitable housing design or by using a light shade.

Figure 15. Sunlight Placement (IH-PMC-001)

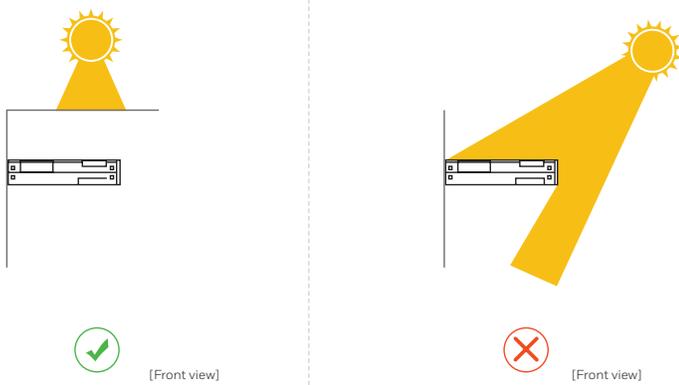
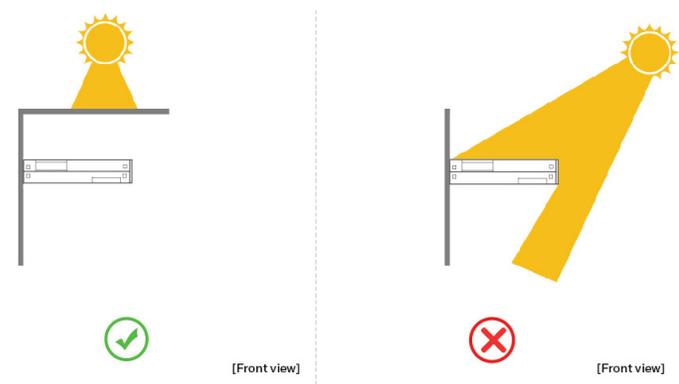


Figure 16. Sunlight Placement (IH-PMC-002)



3. MECHANICAL ASSEMBLY GUIDELINES

The following instructions should be followed when assembling the sensor:

- Do not obstruct inlet and outlet
- Firm mechanical fixations should be used to reduce unwanted noise caused by loose mechanical coupling
- Foam or thin rubber can be used to further reduce noise
- If an all-around casing is used, it is recommended to not cover the entire sensor surface to avoid overheating

A few mounting examples are shown in the next Figures.

Figure 17. Mounting Examples (IH-PMC-001)

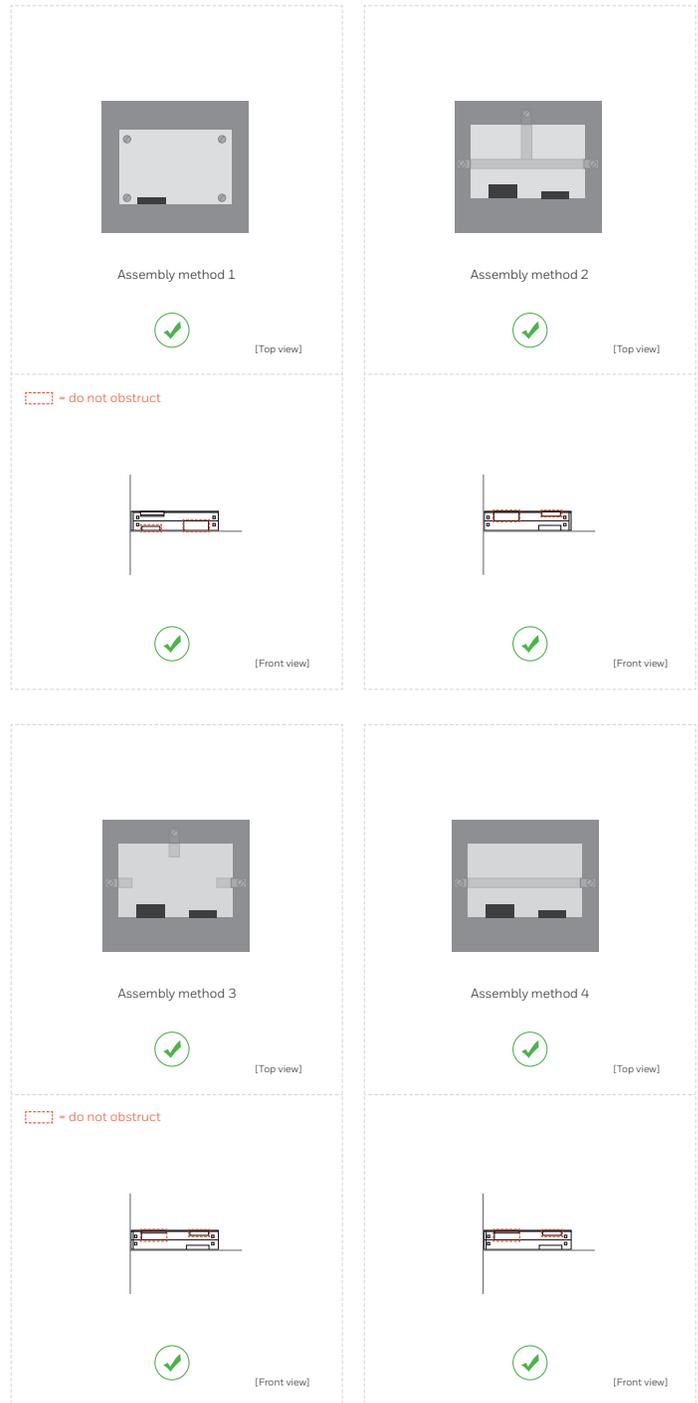
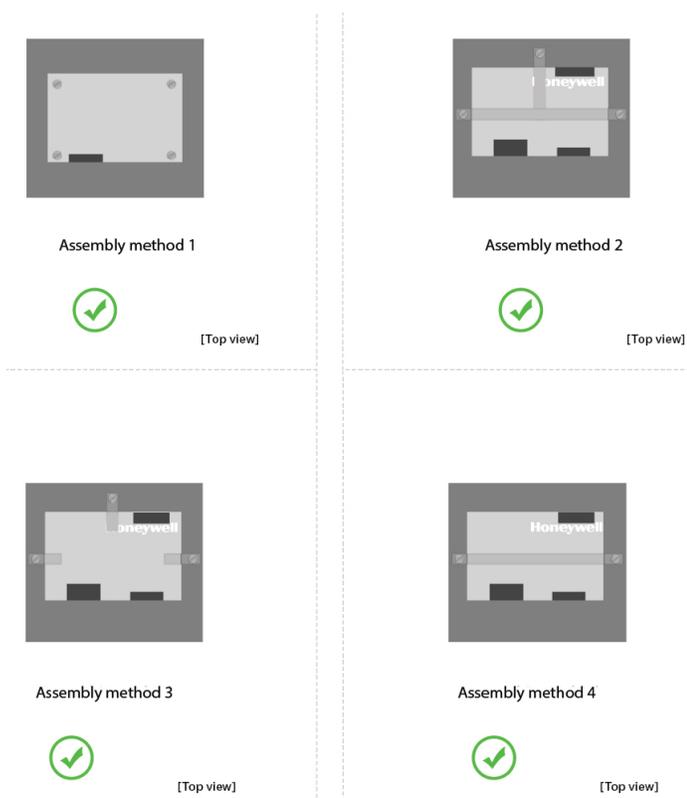


Figure 18. Mounting Examples (IH-PMC-002)



- 4.6 Installation position of the sensor should be 20 cm [7.87 in] higher than ground, otherwise there may be large dust particles (>10 μm) that may affect the fan operation and further affect the measurement accuracy. If particle size exceeds 10 μm , filters to be decided by customer based on end application.
- 4.7 Do not disassemble the sensor, even the metal shell, to avoid irreversible damage on sensor.
- 4.8 Sensor has been tested before delivery.
- 4.9 This sensor is suitable for normal indoor environment. Sensor data consistency may decrease due to excessive dust accumulation, oil accumulation or water ingress if the end user device is used in the following environments:
 - Dust concentration is larger than 300 $\mu\text{g}/\text{m}^3$ for most time (50 %) of the year, or greater than 500 $\mu\text{g}/\text{m}^3$ for 20 % of the year
 - Oily smoky environment
 - High water vapor/mist environment
 - Outdoor environment

4. DESIGNING ADVICE

The IPM Series has a wide range of application scenarios such as air purifier, fresh air system, air quality monitor, air conditioner, portable instruments etc. Particulate sensors are used as core components in these applications. When designing a product using the IPM Series, please consider the following suggestions:

- 4.1 Since the metal shell of the sensor is connected to the internal power ground, do not short-circuit the sensor shell with other external circuits.
- 4.2 The recommended way to install the sensor is to place the plane where the air inlet and air outlet are located close to the air hole of the product.
- 4.3 No obstructions within 2 cm [0.78 in] around the air outlet. There should be airflow isolation between the air inlet and air outlet to prevent the back flow from the air outlet directly to the air inlet.
- 4.4 The opening size of the air inlet and outlet of the product should be larger than the opening size of the air inlet and outlet of the sensor.
- 4.5 When using the sensor in air purifier, avoid placing the sensor directly in the purifier's air duct. An independent space should be designed, where the sensor should be placed in, and to isolate the sensor from the air duct of the purifier.

⚠️ 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.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement 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 it 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.**

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USA/Canada	+1 302 613 4491
Latin America	+1 305 805 8188
Europe	+44 1344 238258
Japan	+81 (0) 3-6730-7152
Singapore	+65 6355 2828
Greater China	+86 4006396841

Honeywell Sensing & Safety Technologies

830 East Arapaho Road
Richardson, TX 75081
www.honeywell.com