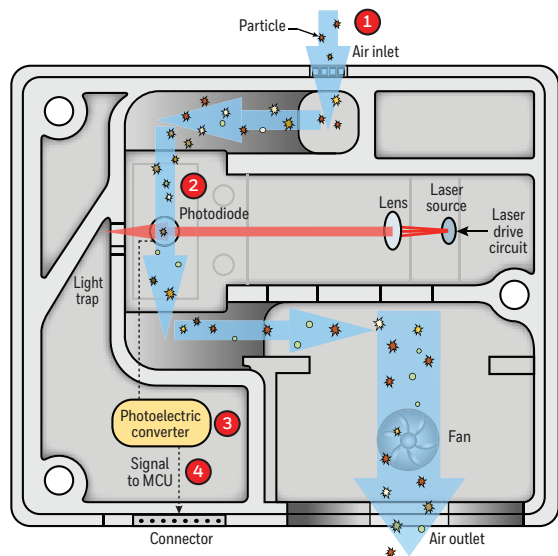


# Particulate Matter Sensors

## HPM Series

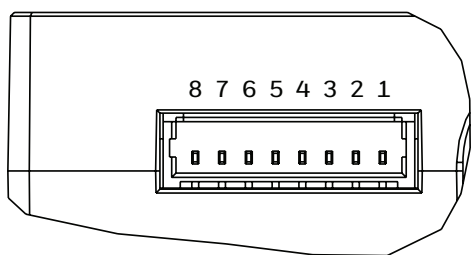
Figure 1. HPM Series Operation (standard version shown top down)



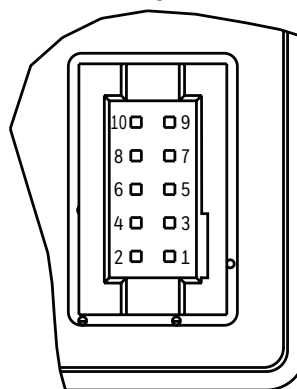
- 1 Fan draws in air through inlet.
- 2 Air passes through the laser where the light reflected off the particles is captured by the photodiode.
- 3 The photodiode passes information to the photoelectric converter. The photoelectric converter processes the signal from the particles into density.
- 4 Signal is transmitted to micro control unit where a proprietary algorithm processes the data and supplies outputs for the density of the particulate ( $\mu\text{g}/\text{m}^3$ ).

Table 3. Standard and Compact Connector Pinout

### Standard



### Compact



| Pin | Name             | Description                  | Pin | Name             | Description                                  |
|-----|------------------|------------------------------|-----|------------------|--|
| 1   | V <sub>OUT</sub> | power output (+3.3 V/100 mA) | 1   | V <sub>OUT</sub> | power output (+5 V)<br>(output max.: 300 mA) |
| 2   | V <sub>CC</sub>  | power input (5 V)            | 2   | V <sub>CC</sub>  | power input (+5 V)                           |
| 3   | N/A              | N/A                          | 3   | GND              | ground                                       |
| 4   | N/A              | N/A                          | 4   | GND              | ground                                       |
| 5   | RES              | reserved for future use      | 5   | RES              | reserved for future use                      |
| 6   | TX               | UART TX output (0 V - 3.3 V) | 6   | N/A              | N/A  |
| 7   | RX               | UART RX input (0 V - 3.3 V)  | 7   | RX               | UART RX input (0 V - 3.3 V)                  |
| 8   | GND              | ground                       | 8   | N/A              | N/A  |
| -   | —                | —                            | 9   | TX               | UART TX output (0 V - 3.3 V)                 |
| -   | —                | —                            | 10  | SET              | reserved for future use                      |

# Particulate Matter Sensors

## HPM Series

**Table 4. Standard Version Customer Use Protocol<sup>1</sup>**

| Command Length (Bytes)                       | HEAD | LEN  | CMD  | Data  | CS   | Example                    |
|--|------|------|------|---|--|----------------------------|
| <b>Read Particle Measuring Results</b>       |      |      |      |   |  |                            |
| Send   | 0x68 | 0x01 | 0x04 | NA  | CS = MOD<br>((65536-(HEAD+LEN+CMD+DATA)), 256) | 68 01 04 93                |
| Response, Pos ACK                            | 0x40 | 0x05 | 0x04 | “DF1, DF2, DF3, DF4<br>PM2.5 = DF1 * 256 + DF2<br>PM10 = DF3 * 256 + DF4” | CS = MOD<br>((65536-(HEAD+LEN+CMD+DATA)), 256) | 40 05 04 00<br>30 00 31 56 |
| Response, Neg ACK                            |      |      |      |   |  | 0x9696                     |
| <b>Start Particle Measurement</b>            |      |      |      |   |  |                            |
| Send   | 0x68 | 0x01 | 0x01 | NA  | CS = MOD<br>((65536-(HEAD+LEN+CMD+DATA)), 256) | 68 01 01 96                |
| Response, Pos ACK                            |      |      |      |   |  | 0xA5A5                     |
| Response, Neg ACK                            |      |      |      |   |  | 0x9696                     |
| <b>Stop Particle Measurement<sup>2</sup></b> |      |      |      |   |  |                            |
| Send   | 0x68 | 0x01 | 0x02 | NA  | CS = MOD<br>((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<br>(Default, 100)   | CS = MOD<br>((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<br>((65536-(HEAD+LEN+CMD+DATA)), 256) | 68 01 10 87                |
| Response, Pos ACK                            | 0x40 | 0x02 | 0x10 | DF1: 30 ~ 200<br>(Default, 100)   | CS = MOD<br>((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<br>((65536-(HEAD+LEN+CMD+DATA)), 256) | 68 01 20 77                |
| Response, Pos ACK                            |      |      |      |   |  | 0xA5A5                     |
| Response, Neg ACK                            |      |      |      |   |  | 0x9696                     |
| <b>Enable Auto Send<sup>3</sup></b>          |      |      |      |   |  |                            |
| Send   | 0x68 | 0x01 | 0x40 | NA  | CS = MOD<br>((65536-(HEAD+LEN+CMD+DATA)), 256) | 68 01 40 57                |
| Response, Pos ACK                            |      |      |      |   |  | 0xA5A5                     |
| Response, Neg ACK                            |      |      |      |   |  | 0x9696                     |

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

<sup>2</sup>Shuts down the fan, helping to extend the life of the product.

<sup>3</sup>See Table 6 for data format.