

Installation Instructions for the Honeywell Zephyr™ Digital Airflow Sensors: HAF Series – High Accuracy, ±50 SCCM to ±750 SCCM

ISSUE 4
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GENERAL INFORMATION

CAUTION

IMPROPER USE

Do not use to sense liquid flow.

Failure to comply with these instructions may result in product damage.

CAUTION

IMPROPER CLEANING

- Avoid cleaning the sensor; however, if it must be cleaned use isopropyl alcohol and dry the device thoroughly before use. Cap the ports or connect housing to the ports before cleaning the sensor with alcohol. Using alcohol may remove the text on the sensor label; however, the label ID is hard coded inside the sensor.
- Do not use III Tri-chloroethane, methylene chloride, methyl pyrrolidone, or any oxidizing type acid such as formic acid.
- Do not use ultrasonic cleaning.

Failure to comply with these instructions may result in product damage.

CAUTION

LARGE PARTICULATE DAMAGE

Use a 5-micron filter upstream of the sensor to keep media flow through the sensor free of condensing moisture and particulates. Large, high-velocity particles or conductive particles may damage the sensing element.

Failure to comply with these instructions may result in product damage.

Table 1. Absolute Maximum Ratings¹

Characteristic	Parameter
Supply voltage	-0.3 Vdc to 6.0 Vdc
Voltage on output pin	-0.3 V to Vsupply
Storage temperature range	-40 °C to 125 °C [-40 °F to 257 °F]
Maximum flow change	5.0 SLPM/s
Maximum common mode pressure	25 psi at 25 °C [77 °F]
Maximum flow	10 SLPM

NOTICE

Absolute maximum ratings are the extreme limits that the device will withstand without damage to the device. However, the electrical and mechanical characteristics are not guaranteed as the maximum limits (above recommended operating conditions) are approached, nor will the device necessarily operate at absolute maximum ratings.

Table 2: Operating Characteristics

Characteristic	Parameter	Note
Supply voltage	3.3 Vdc ±10%; 5.0 Vdc ±10%	–
Supply current	16 mA max.	–
Power:		
3.3 Vdc	23 mW	–
5.0 Vdc	38 mW	–
Operating temp. range	-20 °C to 70 °C [-4 °F to 158 °F]	–
Compensated temp. range	0 °C to 50 °C [32 °F to 122 °F]	1
Start up time	17 ms	–
Warm up time	30 ms	2
Calibration media	gaseous nitrogen	3
Bus standards	I ² C, fast mode (up to 400 kHz)	4
Reverse polarity protection	no	–

Notes:

1. Custom and extended compensated temperature ranges are possible. Contact Honeywell for details.
2. Warm-up time: time to the first valid flow measurement after power is applied.
3. Default calibration media is dry nitrogen gas. Please contact Honeywell for other calibration options.
4. For additional details on the use of Zephyr with digital output see the Technical Note "[I²C Communications with Honeywell Digital Airflow Sensors](#)".

Table 3. Environmental Characteristics

Characteristic	Parameter
Humidity	0% to 95% RH, non-condensing
Shock	100 g, 11 ms
Vibration	15 g at 20 Hz to 2000 Hz
ESD	Class 3B per MIL-STD 883G
Radiated immunity	Level 3 from (80 MHz to 1000 MHz) per spec IEC61000-4-3

Table 4. Wetted Materials

Characteristic	Parameter
Covers	high temperature polymer
Substrate	PCB
Adhesives	epoxy
Electronic components	silicon, gold
Compliance	RoHS, WEEE

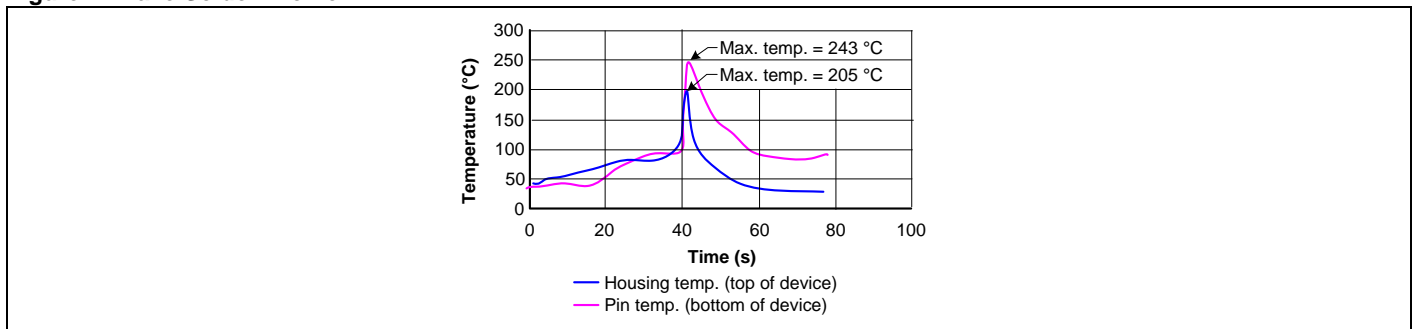
Table 5. Recommended Mounting and Implementation

Characteristic	Parameter
Mounting screw size	5-40
Mounting screw torque	0.68 N m [6 in lb]
Tubing for long port style	70 durometer, size 0.125 inch inside diameter, 0.250 inch outside diameter silicone tubing
O-ring: short port style	AS568A, Size 7, Silicone, Shore A 70
O-ring: long port style	AS568A, Size 10, Silicone, Shore A 70
Filter recommendation	5-micron filter upstream of sensor

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Figure 1. Wave Solder Profile

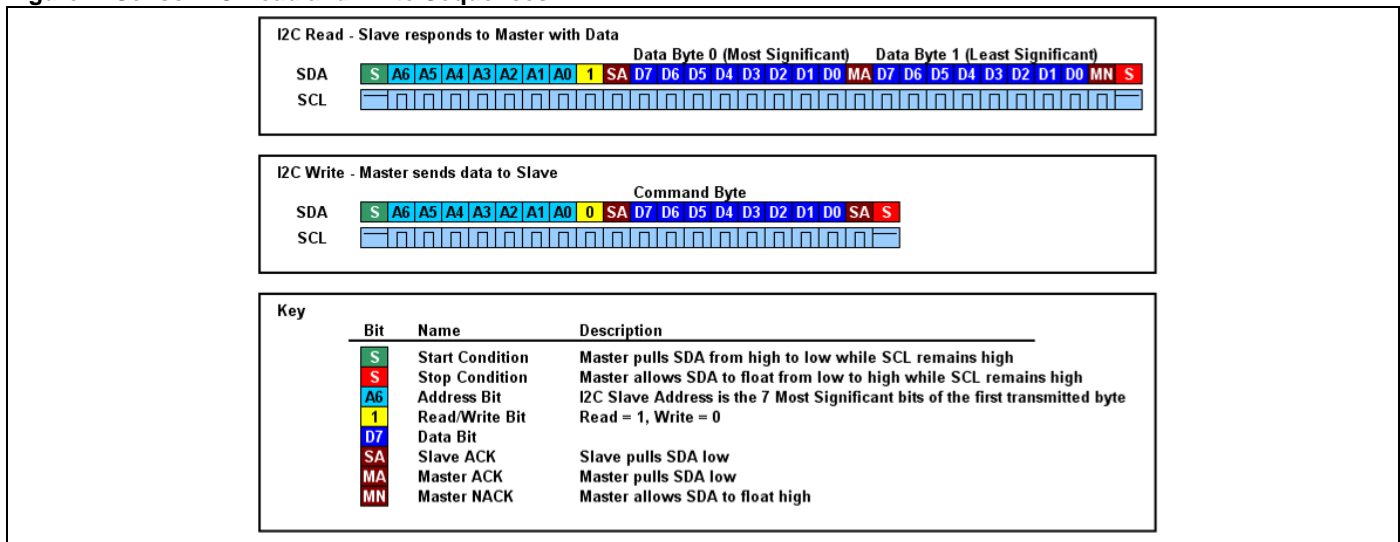


Digital Interface

For additional details on the use of Zephyr with digital output see the Technical Note [“I²C Communications with Honeywell Digital Airflow Sensors”](#).

The sensor uses the I²C standard for digital communication with a slave address specified in the Nomenclature and Order Guide in Figure 4. Following sensor power-up, each of the first two read sequences shown in Figure 2 will respond with 2 bytes of the unique 4-byte Serial Number. The first read after power-up will respond with the two most significant bytes of the Serial Number, while the second read will respond with the two least significant bytes of the Serial Number. For reliable performance, allow sensor to be powered for the sensor startup time before performing the first read, then allow a 10 ms command response time before performing the second read.

Figure 2. Sensor I²C Read and Write Sequences



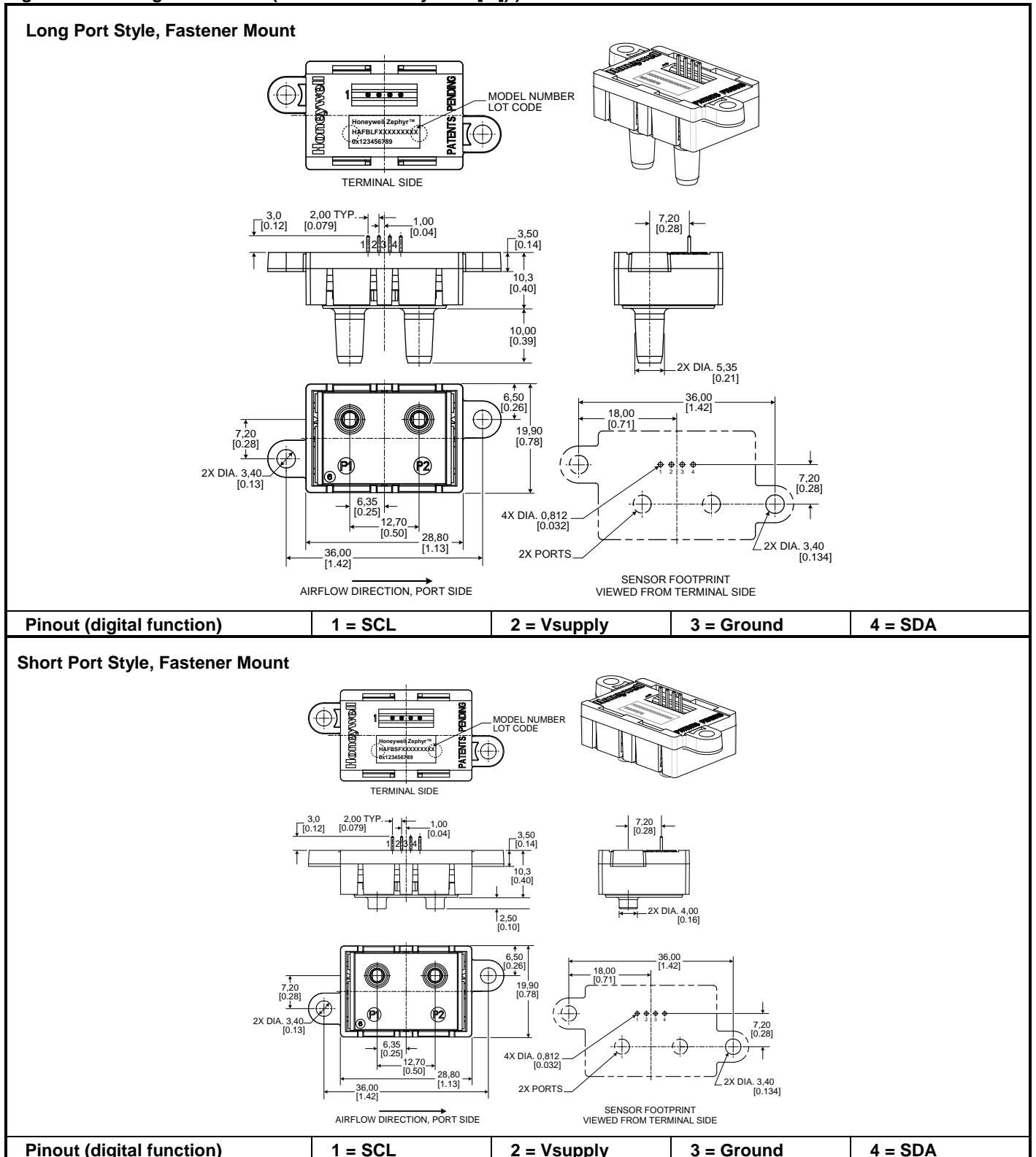
After the power-up read sequence described above, the sensor will respond to each I²C read request with a 16-bit (2 byte) digital flow reading. Read requests taken faster than the Response Time (1 ms) are not guaranteed to return fresh data. The first two bits of each flow reading will be ‘00’, while non-flow responses (such as error and status codes) will begin with ‘11’.

The maximum sink current on SCL or SDA is 2 mA. Therefore, if the pull-up resistors are biased by V_{DD} and if V_{DD} reaches the maximum supply voltage of 6 V, then the pull-up resistors for SCL and SDA must be greater than 3.0 kΩ to limit the sink current to 2 mA. The typical value for SCL and SDA pull-up resistors is 4.7 kΩ (this value depends on the bus capacitance and the bus speed).

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Figure 3. Mounting Dimensions (For reference only: mm [in].)



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Figure 3. Mounting Dimensions (For reference only: mm [in], continued.)

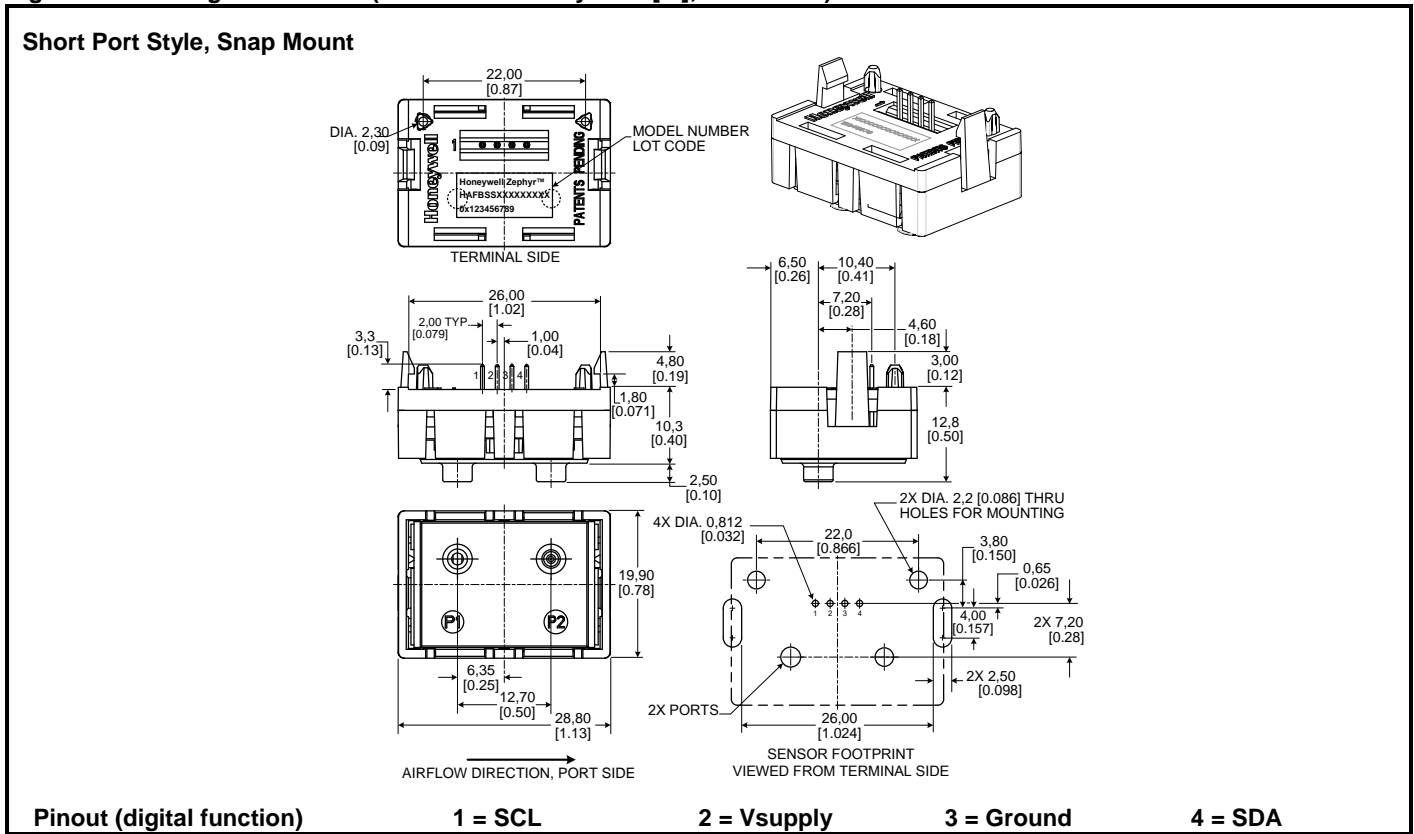


Figure 4. Nomenclature and Order Guide

For example, a **HAFBLF0200C4AX5** part number defines a Honeywell Zephyr™ Digital Airflow Sensor, bidirectional forward flow optimized, long port, fastener mount, 200 SCCM, I²C output with address 0x49, 10% to 90% transfer function, 5.0 Vdc supply voltage.

Product Series	Flow Direction	Port Style	Housing Style	Flow Range ²	Unit	Output Format	Transfer Function	Reserved for Future Use	Supply Voltage
HAF Series High Accuracy Airflow Sensor	B Bidirectional forward flow optimized S Bidirectional symmetric	L Long port ¹ S Short port	F Fastener mount S Snap mount ¹	0050 50 long port style only 0100 100 long port style only 0200 200 long or short port 0400 400 long port style only 0750 750 long port style only	C SCCM	4 Digital I ² C address: 0x49 5 Digital I ² C address: 0x59 6 Digital I ² C address: 0x69 7 Digital I ² C address: 0x79	A 10% to 90% of Full Scale Output (FSO)	X XXXXX	3 3.3 Vdc 5 5.0 Vdc

Notes:

1. The Long Port **Port Style** with the Snap Mount **Housing Style** is not a valid configuration.
2. The 200 SCCM **Flow Range** is available in the long and short **Port Styles**.

Customer-specific Requirements

Apart from the general configuration required, other customer-specific requirements are also possible. Please contact Honeywell.

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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.

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.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer 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 printing. However, we assume no responsibility for its use.

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

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