



Model PFLOW4008 Series

MEMS Mass Flow Sensors

(VB.5)



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PFLOW4008 Series

PFLOW4008 is specially customized for Angst+Pfister AG for their proprietary applications.

The sensor is utilizing the Company's MEMS mass flow sensor with customized circuitry and enclosure.

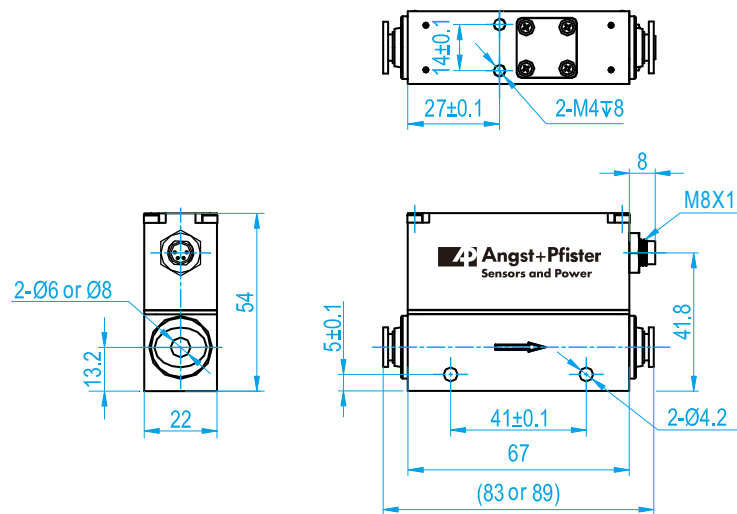


Specifications

Model	Value		Unit
DN	8		mm
Flow range	0 ~ 2, 5, 10	0 ~ 20, 50	SLPM
Accuracy	$\pm(1.5 + 0.2FS)$		%
Gas compatible	Non-corrosive/non-explosive		
Max. pressure (0 ~ +50°C)	8		bar(g)
(-10 ~ 0°C, +50 ~ +55°C)	5		bar(g)
Burst pressure (0 ~ +50°C)	10		bar(g)
(-10 ~ 0°C, +50 ~ +55°C)	8		bar(g)
Mechanical connector	Ø6 mm/Ø8 mm One-touch connectors		
Electrical interface	Linear: IO-Link and analog 0 ~ 10 VDC / I ² C		
Body	Al-alloy 6063		
Protection rating	IP67		
Power supply	12 ~ 30		Vdc
Working current	< 20		mA
Null shift	± 30		mVdc
Temperature coefficient	< ± 0.12		%/°C
Maximum pressure loss	30, 200, 800	1100, 4700	Pa
Response time	10		msec
Operation temperature	-10 ~ +55		°C
Humidity	<95%RH, no condensation		
CE	EN50081/50082		
Electrical connection	M8		
Standard condition	0 °C, 1013 mbar		
Maximum Overflow *	30	200	SLPM

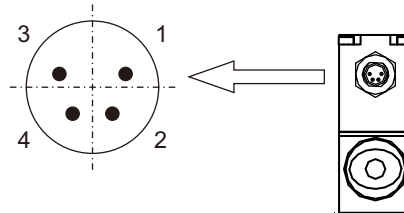
* The sensors of 0 ~ 2, 0 ~ 5 and 0 ~ 10 SLPM have same flow channels, the maximum overflow is 30 SLPM; While the sensors of 0 ~ 20 and 0 ~ 50 SLPM have same flow channels, the maximum overflow is 200 SLPM.

Dimensions



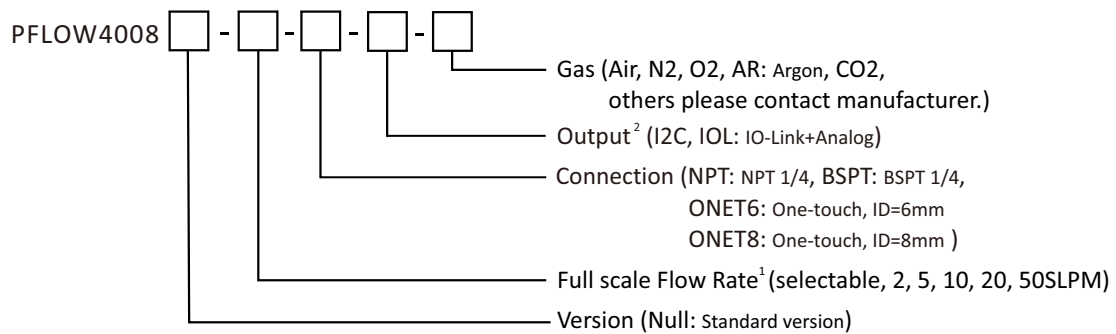
Electrical connection

Pin #	Definition
1	Power Supply (12 ~ 30 VDC)
2	Analog Output (0 ~ 10 VDC) / I ² C-SDA
3	GND
4	IO-Link output / I ² C-SCL



Sensor selection

The sensor part number is composed of the product model number and suffix indicating the full scale flow rate, mechanical connection, output format as well as the application gas. Refer the following for details.

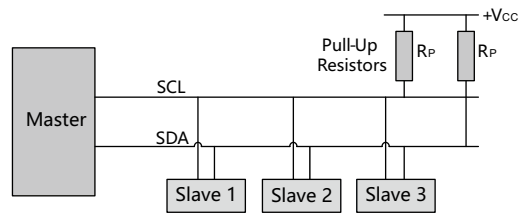


1, Max. flow rate number and Unit, for example, 10SLPM.

2, I²C = I²C only; IOL: Comes with IO-Link and also an analog output as standard on pin 2 (0 ~ 10 VDC).

I²C Communication

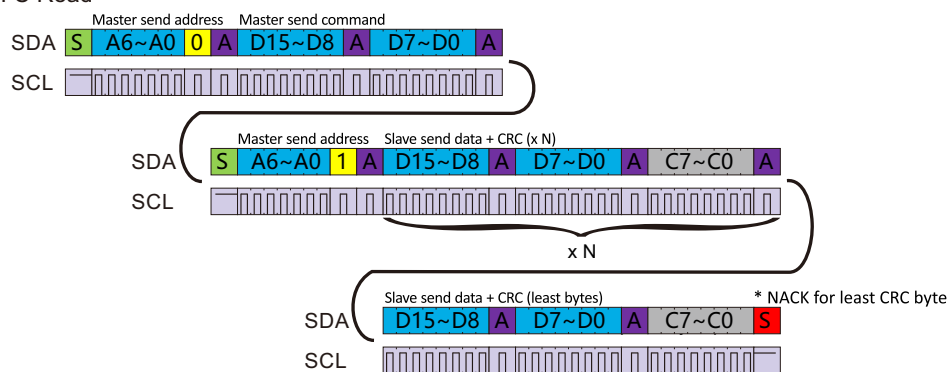
1. I²C Connection



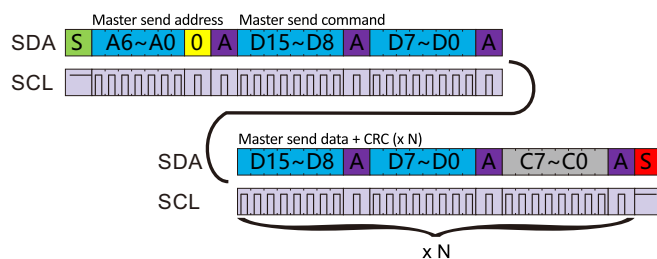
V_{CC}: 3.0 ~ 5.5 Vdc
 R_P: 1.0 ~ 10.0 kΩ
 I²C bus clock frequency: 100 kHz

2. I²C Read and Write Sequences

I²C Read



I²C Write



Notes

Bit	Name	Description
S	Start bit	Master pulls SDA from high to low while SCL remains high.
S	Stop bit	Master allows SDA to float from low to high while SCL remains high.
A	ACK	
1	Read (1 bit)	
0	Write (1 bit)	
A ₆	Address	7 bits, the 7 Most Significant bits of the first transmitted byte. Default address 1 (0000 001x).
D ₇	Data bit	16 bits
C ₇	CRC bit	8 bits

3. I²C Commands Description

Command Byte	Length (int16)	Command Name	R/W	Notes
0x00A4	1	I ² C address	R/W	Int16. bit15 ~ bit8 = 0, bit7 ~ bit1 are available ⁽¹⁾ , bit0 is the R/W flag bit.
0x0030	6	Sensor SN	R	ASCII
0x003A	2	Flow rate	R	Int32(/1000 SLPM)
0x00F0	1	Calibrate the offset of differential pressure	W	Fixed value, 0xAA55

1. The address is set with bit7 ~ bit1. For instance, sensor I²C address 4, write address will be 0x08 (0000 1000) , while read address will be 0x09 (0000 1001).

4. CRC Checksum Calculation

The 8-bit CRC checksum transmitted after each two data bytes (int 16) is generated by a CRC algorithm. Its properties are listed in below table. To calculate the checksum, only these two previously transmitted data bytes are used.

Property	Value
Name	CRC-8
Protected data	I ² C read and write
Width	8 bits
Polynomial	0x07 ($x^8 + x^2 + x + 1$)
Initialization	0x00
Reflect input	False
Reflect output	False
Final XOR	0x00
Example	CRC(0x4E20) = 0x6D

Safety and Maintenance

Safety Precautions

The sensors cannot be used for gas metrology of fluoride or fluoride containing gases. For updates of the product certification information, please contact manufacturer or visit www.sensorsandpower.angst-pfister.com. Use for other gases such as extreme corrosive and toxic may cause the product malfunctioning or even severe damages. The product sealing is ensured to work under working pressure of 0.8 MPa and is leakage proof before the shipment But cautions and further leakage test are important at installation as well since any leakage could cause severe safety issue. The power supply for this product is a lithium battery, all precautions and measures for electrical voltage handling must apply.

Attention: any alternation and/or improper use of the product without the permission of the manufacturer can cause unpredicted damages and even injuries or other severe situations. APSP or any of its employees, subsidiaries shall not be hold and indemnified against such consequences due to such circumstances via improper use of the product.

Maintenance

Attention: without prior permission of the manufacturer, please do not attempt to alter any parts of the product as it may cause unrecoverable damages. If there are questions or doubts, please contact manufacturer immediately before further actions.

All maintenance of the sensor should be performed by trained and certified personnel by APSP.

For further information, please contact the manufacturer.

This document contains information for a product that is just released or under further development. APSP AG and its subsidiaries reserve the rights to change the specifications and or descriptions without prior notice.

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