PFLOW4008 Series

MEMS Mass Flow Sensors   VB.4

MEMS Mass Flow Sensor

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

Parameters	Value		Unit
DN	8		mm
Flow range	0~2, 5, 10	0~20, 50	SLPM
Accuracy	±(1.5+0.2FS)		%
Gas compatibility	Non-corrosive / non-explosive		
Max. Pressure (0~+50°C) (-10~0°C / +50~+55°C)	8 5		bar(g) bar(g)
Burst pressure (0~+50°C) (-10~0°C / +50~+55°C)	10 8		bar(g) bar(g)
Mechanical connector	Φ6 / Φ8mm one-touch connectors		
Electrical interface	Linear: IO-Link / Analog 0~10Vdc / I²C		
Enclosure	Al-alloy 6063		
Protection	IP67		
Power supply	12~30		Vdc
Working current	< 20		mA
Null shift	±30		mVdc
Temperature coefficient	< ±0.12		%/°C
Max. pressure loss	30, 200, 800	1100, 4700	Pa
Response time	10		msec
Operation temperature	-10 ~ +55		°C
Humidity	< 95, no condensation		%RH
Electrical connection	M8		
Max. overflow*	30	200	SLPM
Standard conditions	0°C, 1013 mbar		
CE	EN50081 / 50082		

*Flow channel size for full-scale flowrates of 2, 5, and 10SLPM is identical, the maximum overflow allowed is 30SLPM while the flow channel size for a full-scale flowrate of 20 and 50SLPM is identical and the corresponding overflow allowed is 200SLPM.
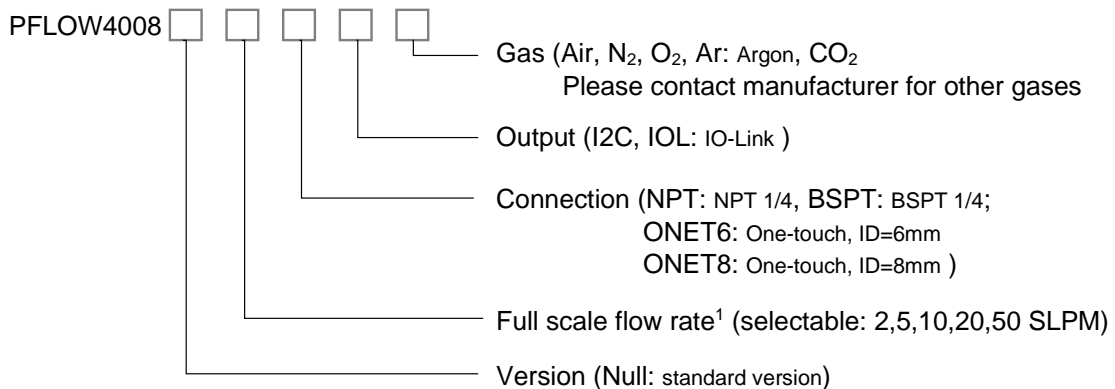
Dimensions
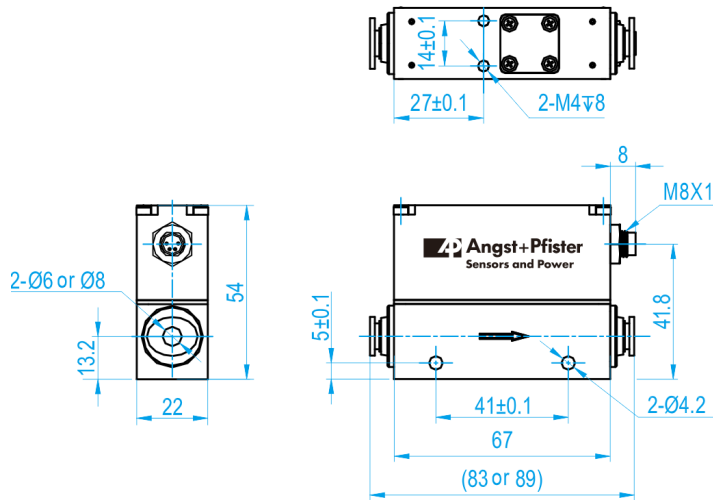
Electrical connection
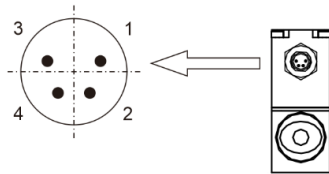
Pin#	Definition
1	Power supply (12~30 Vdc)
2	Analog output (0~10 Vdc) / I^2C – SDA
3	GND
4	IO-Link / I^2C – SCL

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 application gas. Refer to the following for details.

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Gas (Air, N₂, O₂, Ar: Argon, CO₂
   Please contact manufacturer for other gases

Output (I2C, IOL: IO-Link)

Connection (NPT: NPT 1/4, BSPT: BSPT 1/4;
   ONET6: One-touch, ID=6mm
   ONET8: One-touch, ID=8mm)

Full scale flow rate[1] (selectable: 2,5,10,20,50 SLPM)

Version (Null: standard version)

Note: 1. Maximum flowrate value and unit, for example, 10SLPM.

I²C communication

1. I²C connection
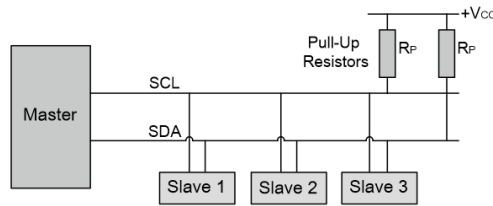
Vcc: 3.0 ~ 5.5 Vdc
Rp: 1.0 ~ 10.0 kΩ
I²C bus clock frequency: 100 kHz

2. I2C read and write sequences

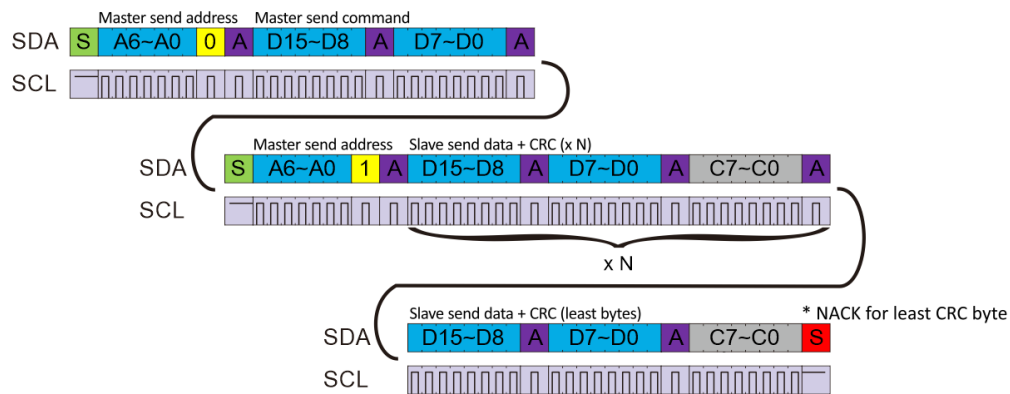**I²C Read**

Master send address   Master send command
SDA S A6~A0 0 A D15~D8 A D7~D0 A
SCL

Master send address   Slave send data + CRC (x N)
SDA S A6~A0 1 A D15~D8 A D7~D0 A C7~C0 A
SCL
x N

Slave send data + CRC (least bytes)   * NACK for least CRC byte
SDA D15~D8 A D7~D0 A C7~C0 S
SCL

I²C Write

Master send address   Master send command
SDA S A6~A0 0 A D15~D8 A D7~D0 A
SCL

Master send data + CRC (x N)
SDA D15~D8 A D7~D0 A C7~C0 A S
SCL
x N
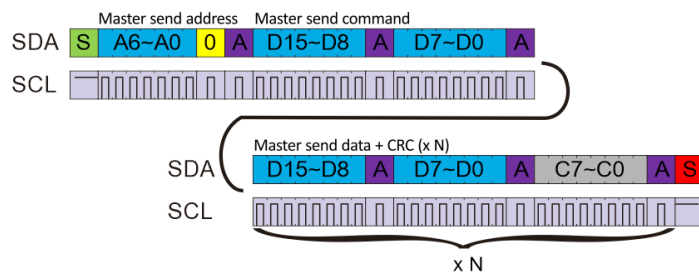
Notes

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)	
A6	Address	7 bits, the 7 Most Significant bits of the first transmitted byte. Default address 1 (0000 001x) .
D7	Data bit	16 bits
C7	CRC bit	8 bits

3. I²C command description

Command Byte	Length (Int 16)	Command Name	R/W	Notes
0x00A4	1	I²C 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	Flowrate	R	Int32 (/1000 SLPM)
0X00F0	1	Offset calibration	W	Fixed value, 0xAA55

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 the table below. To calculate the checksum, only these two previously transmitted data bytes are used.

Property	Value
Name	CRC – 8
Protected data	I²C 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 on the product certification information, please contact the manufacturer. 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 a working pressure of 8 bar and is leakage proof tested before the shipment. However, cautions and further leakage tests are important at installation since any leakage could cause severe safety issues. The power supply for this product is DC voltage, all precautions and measures for electrical voltage handling must be applied.

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. The manufacturer or any of its employees, subsidiaries shall not be held and indemnified against such consequences due to such circumstances via improper use of the product.

Maintenance

Attention: without the 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 the manufacturer immediately before further action.

All maintenance of the sensor should be performed by trained and certified personnel by the manufacturer.
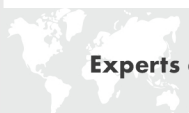
We are here for you. Addresses and Contacts.

Headquarter Switzerland:

Angst+Pfister Sensors and Power AG

Thurgauerstrasse 66
CH-8050 Zurich

Phone +41 44 877 35 00
sensorsandpower@angst-pfister.com

Office Germany:

Angst+Pfister Sensors and Power Deutschland GmbH

Edisonstraße 16
D-85716 Unterschleißheim

Phone +49 89 374 288 87 00
sensorsandpower.de@angst-pfister.com

Scan here and get an overview of personal contacts!

sensorsandpower.angst-pfister.com