

CMOSens[®] SFC3000

Digital OEM Mass Flow Controller for Gases

- High performance digital Mass Flow Controller
- CMOSens[®] technology with unbeatable price/performance ratio
- For high-volume OEM applications
- Fully digital (interface, control, calibration & temperature compensation)
- Small size, manifold mountable
- Multigas option (switchable by software)
- NIST traceable calibration

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CMOSens[®] SFC3000 Product Summary

The CMOSens[®] SFC3000 family offers fully digital Mass Flow Controllers, Mass Flow Meters, and Pressure Controllers for analytical instruments featuring an RS485 interface. Its leading performance is based on Sensirion's unsurpassed CMOSens[®] sensor technology which combines a high precision sensor element with the amplification and A/D converter circuit on one single CMOS chip. The analog sensor signal is converted directly on the CMOSens[®] chip into digital calibrated and temperature compensated signal which is used in a

microprocessor running a sophisticated controlling algorithm. This results in very high flexibility, ultra-high stability and repeatability over a large dynamic range. Different gas types and control ranges can be switched by software, even during operation. The SFC3000 provides a standard digital RS485 hardware interface for setting and reading flows. It requires a standard supply voltage of +15 VDC. The MFC can be operated at input pressures of up to 10 bar (145 psi).

1 Technical concept

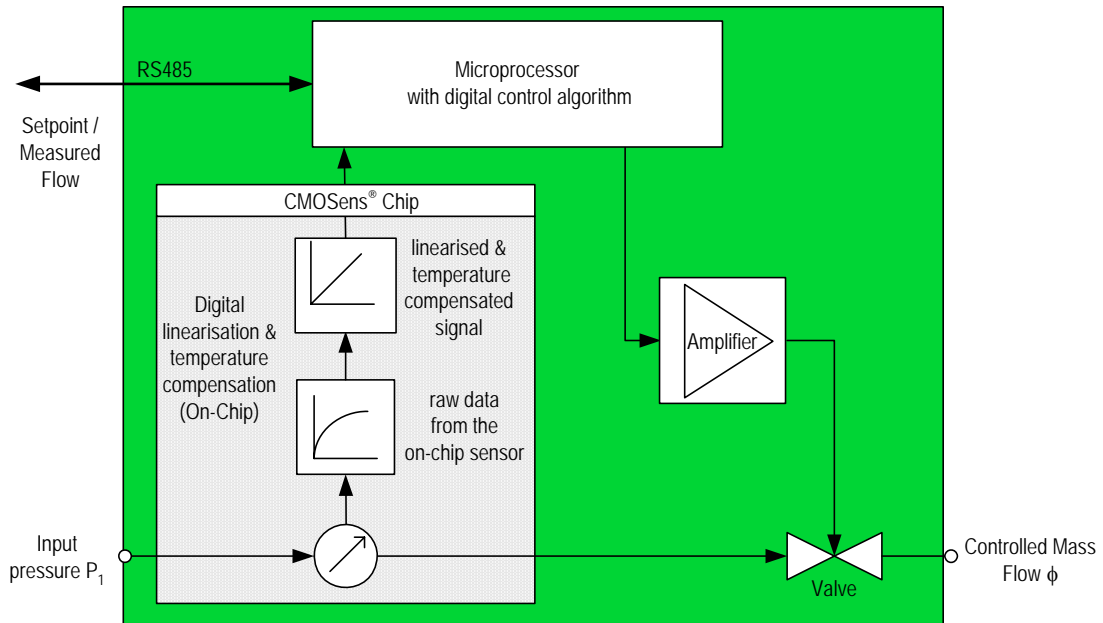


Figure 1: Block Diagram CMOSens® SFC3000 Mass Flow Controller.

Due to the digital RS485 interface up to 255 SFC3000 mass flow controller can basically be connected through one bus interface.

Using a typical standard flat ribbon cable (type 28AWG) a maximum of 3 mass flow controllers can be connected due to the limited current rating of this cable type. Using cables with higher current rating will increase the maximum units.

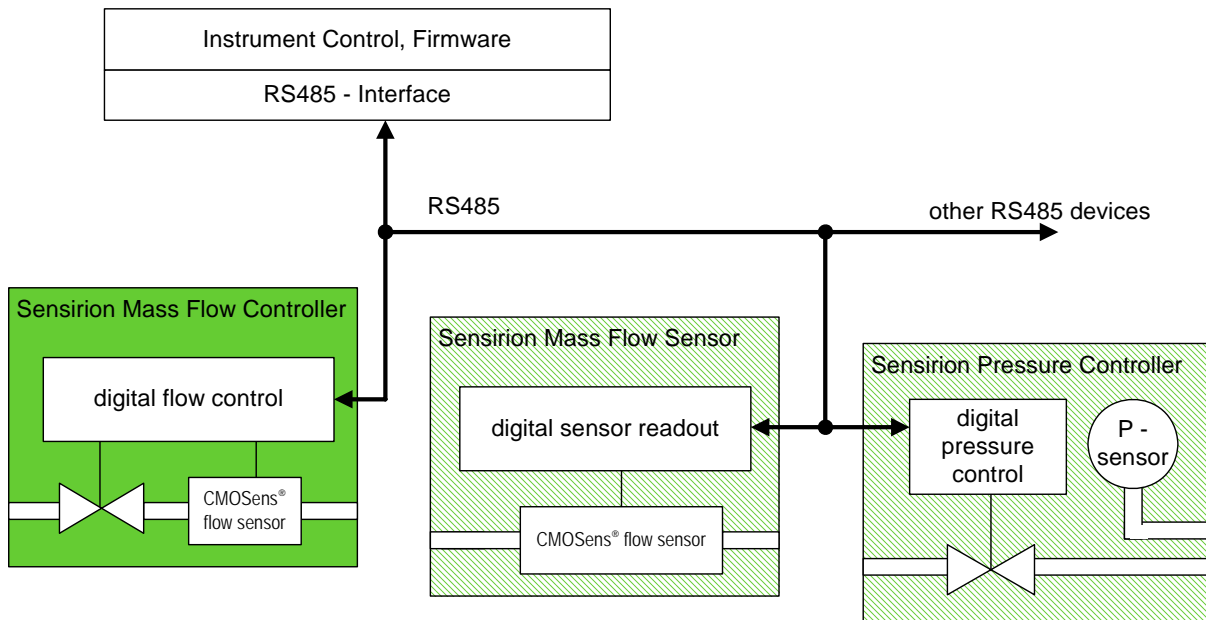


Figure 2: Interfacing concept RS485¹

¹ Mass flow control available; for flow meter and pressure control option in volume OEM applications, please contact Sensirion AG.

2 Specification of the Control Units

2.1 Versatile Mass Flow Controller

Feature	SFC3100 – typical specifications	Notes
Fluids	N2 / He / H2 / Ar	Other dry and clean media on request
Flow ranges SFC3100	0-200 sccm	Possibility to have several gases and ranges calibrated in one unit with mode selection by software. Other flow ranges subject to discussion.
Accuracy	2% of set point	Over range 1:40, for flows >10 sccm.
	±0.2 sccm	for flows <10 sccm.
Temperature dependency	15 – 20 °C	Add temp. coefficient as defined below
	20 – 30 °C	Accuracy as defined above
	30 – 55 °C	Add temp. coefficient as defined below
Repeatability	0.1% of rate (Flow > 10 sccm)	
Reproducibility	0.2% of rate (Flow > 10 sccm)	1 week
Input Pressure	Output Pressure + 200 kPa	
Output Pressure	10-500 kPa ¹ (1.5 – 72 psi)	
Temperature Coefficient	Zero: < 0.002 % FS ² / °C Sensitivity: < 0.05% of set point ³ /°C	
Input Pressure Dependency	< 0.2 % of set point/bar	
Materials Valve (wetted)	Steel/Brass, Viton	
Materials Body	Aluminium anodized	
Materials Sealings (static)	Viton	
Materials Sensor	Stainless steel, Gold, Glass, Silicon, GlobTop	
Working temperature	15 –55 °C	
Storage temperature	0 – 70 °C	

Note:

All specifications are 'typical specifications'. For an exact configuration, please contact Sensirion AG for availability. For a compatible flow meter, pressure controller, or pressure sensor, please contact Sensirion for availability.

¹ Overpressure over atmosphere

² FS = Full Scale

³ Set point = of actual flow set point

3 Electrical Specifications and Interface

3.1 Interface Hardware

Hardware interface is a standard RS485, on a SubD-9 (male connector at Sensirion device).
For connector pin-out and footprint see chap 4.1

3.2 Interface Software

Easy software protocol (RS485-FKE protocol).
Contact Sensirion AG for further information.

3.3 Power Supply Ratings

The power supply for both controllers:

	Min	Nominal	Maximum	Unit
+15 Vdc supply voltage	14.25	15	15.75	Vdc
Ripple on +15 Vdc at max. current			0.5	Vpp

3.4 Current Rating

Device	Min	Typical (normal operation)	Max (peak)	Unit
MFC		150..300	330	mA

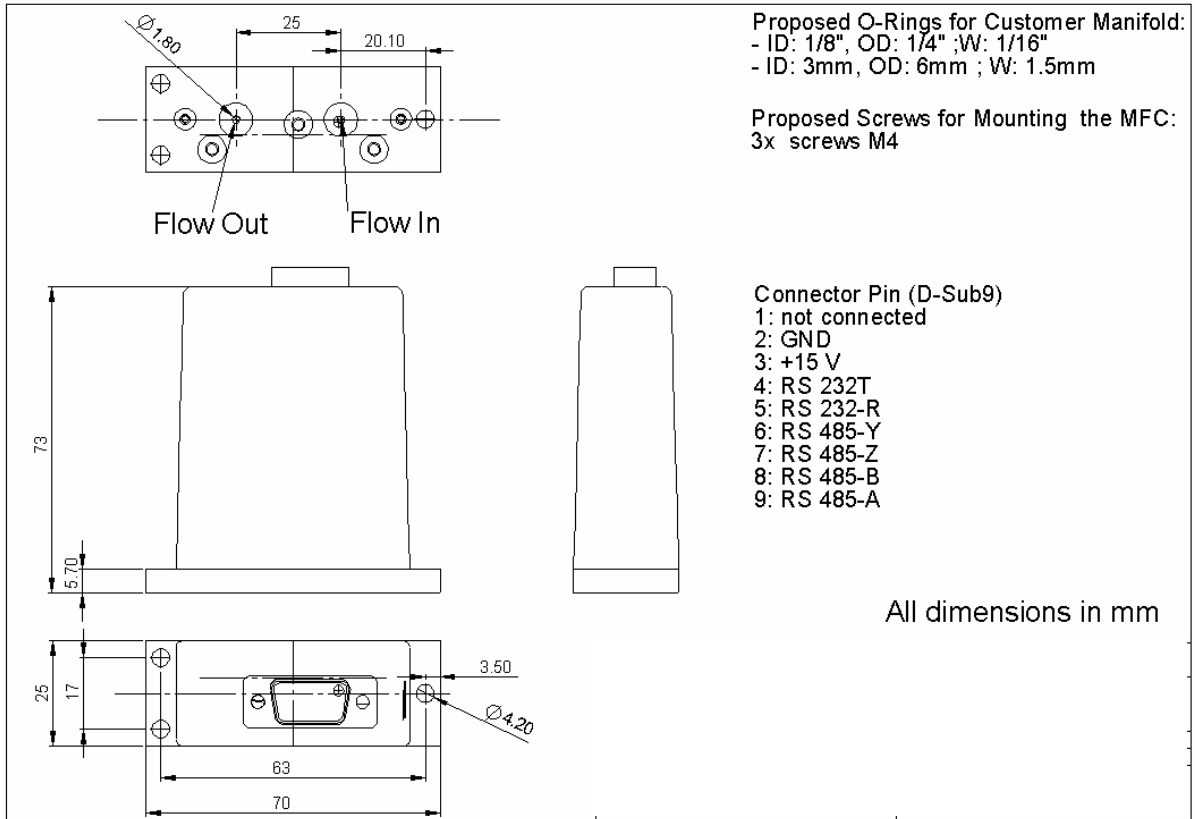
Note: The instruments +15Vdc power supply shall be designed with reserve. Nominal supply current of 400mA per device connected is recommended for calculation.

Regular flat ribbon cable (type 28AWG) allows for connection of up to 3 mass flow controllers (1A current).

4 Physical Dimensions and Mounting Information

4.1 SFC3100

4.1.1 Footprint and Mechanical Dimensions



Note
 O-Ring for sealing the flow inlet/outlet has to be in the customer manifold.

5 Ordering information

5.1 Order code for SFC3000 Mass Flow Controllers:

If available provide the complete product code as written on the product

e.g. SFC3100 UAGS2V N2 300 mln/min

If the complete product code is not known, provide the following information:

1. Product base code (typically SFC3100 UAGS2V)
2. Gas type (for available gas types see Table 2)
3. max. flow range with required flow unit (for available flow units see Table 2)

Example 1: SFC3100 UAGS2V N2 200 mln/min, He 100 mln/min, Ar 50 mln/min

This order code corresponds to: SFC3000 family, calibrated for N2 200 mln/min, He 100 mln/min, Ar 50 mln/min, norm milliliter per minute i.e. milliliter per minute at 0 °C / 32° F and 1013 mbar / 14.69 psi.

5.2 Available Delivery Options

Table 1: Available Versions of CMOSens® SFC3000 Mass Flow Controller

Base order code	Calibration Gas	Max. Flow Full Scale Flow in ln/min or slm
SFC3100 UAGS2V	Air, N ₂ , O ₂ , He, H ₂ , Ar	0.05
		0.10
		0.20

5.3 Supported Flow Units

Table 2: Typical units used for gas flow definition

Typical flow unit	Reference condition	
	Gas Temperature	Gas Pressure
mln/min (norm milliliter per minute)	0 °C / 32° F	1013 mbar / 14.69 psi
ln/min (norm liter per minute)		
sccm (standard cubic centimeter per minute)	20 °C / 68° F	
slm (standard liter per minute)		

Example: Relationship for N₂ between:

ln/min (0°C, 1013 mbar)	and	slm (20°C / 68°F, 1013 mbar / 14.69)
1 ln/min	=	1.073 slm
10 ln/min	=	10.73 slm

Important Notices

Warning, personal injury

Do not use this product as safety or emergency stop device or in any other application where failure of the product could result in personal injury. Do not use this product for applications other than its intended and authorized use. Before installing, handling, using or servicing this product, please consult the data sheet and application notes. Failure to comply with these instructions could result in death or serious injury.

If the Buyer shall purchase or use SENSIRION products for any unintended or unauthorized application, Buyer shall defend, indemnify and hold harmless SENSIRION and its officers, employees, subsidiaries, affiliates and distributors against all claims, costs, damages and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if SENSIRION shall be allegedly negligent with respect to the design or the manufacture of the product.

ESD Precautions

The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation, take customary and statutory ESD precautions when handling this product.

Warranty

SENSIRION warrants solely to the original purchaser of this product for a period of 12 months (one year) from the date of delivery that this product shall be of the quality, material and workmanship defined in SENSIRION's published specifications of the product. Within such period, if proven to be defective, SENSIRION shall repair and/or replace this product, in SENSIRION's discretion, free of charge to the Buyer, provided that:

- notice in writing describing the defects shall be given to SENSIRION within fourteen (14) days after their appearance;

- such defects shall be found, to SENSIRION's reasonable satisfaction, to have arisen from SENSIRION's faulty design, material, or workmanship;
- the defective product shall be returned to SENSIRION's factory at the Buyer's expense; and
- the warranty period for any repaired or replaced product shall be limited to the unexpired portion of the original period.

This warranty does not apply to any equipment which has not been installed and used within the specifications recommended by SENSIRION for the intended and proper use of the equipment. EXCEPT FOR THE WARRANTIES EXPRESSLY SET FORTH HEREIN, SENSIRION MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO THE PRODUCT. ANY AND ALL WARRANTIES, INCLUDING WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY EXCLUDED AND DECLINED.

SENSIRION is only liable for defects of this product arising under the conditions of operation provided for in the data sheet and proper use of the goods. SENSIRION explicitly disclaims all warranties, express or implied, for any period during which the goods are operated or stored not in accordance with the technical specifications.

SENSIRION does not assume any liability arising out of any application or use of any product or circuit and specifically disclaims any and all liability, including without limitation consequential or incidental damages.

All operating parameters, including without limitation recommended parameters, must be validated for each customer's applications by customer's technical experts. Recommended parameters can and do vary in different applications.

SENSIRION reserves the right, without further notice, (i) to change the product specifications and/or the information in this document and (ii) to improve reliability, functions and design of this product.

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FCC and CE Statement

The SFC3000 product has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules (FCC CFR 47). These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult a dealer or an experienced radio/TV technician for help.



The CMOSens® SFC3000 device fully complies with norm EN 61000-6-1 to EN 61000-6-4 (Immunity and Emission Test Series).

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