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FLUID CONTROL SYSTEMS

Mass Flow Controller (MFC) for Gases

- Direct flow measurement with CMOSens® technology for nominal flow rates from 20 ml_N/min to 80 l_N/min
- High accuracy and reproducibility
- Ingress protection IP65
- Fieldbus option

Type 8712 can be combined with...

Type 1150
Multi-channel program controller

Type 0330
3/2 or 2/2-way solenoid valve

Type 6013
2/2-way solenoid valve

MFC
Communications software

Type 8712 controls the mass flow of gases that is relevant for most applications in process technology. The measured value provided by the sensor (see the description on page 2) will be compared in the digital control electronics with the predefined set point according to the signal; if a control difference is present, the control value output to the proportional valve will be modified using a PI-control algorithm. Due to the fact that the sensor is directly placed in the bypass channel a very fast settling time of the MFC is reached. In this way, the mass flow can be maintained at a fixed value or a predefined profile can be followed, regardless of pressure variations or other changes in the system. Type 8712 can optionally be calibrated for two different gases, the user is able to switch between these two gases. As the control element, a proportional valve working at low friction guarantees a high sensitivity and the good control characteristics of the unit. Typical application areas are gas dosing or rather the production of gas mixtures in:

- Pharmaceutical
- Food and beverage
- Environmental technology
- Heat treatment

Technical data	
Full scale ranges [1] (Q_{nenn})	0.02 to 80 l_N/min N_2 equivalent
Operating media	Neutral, non-contaminated gases (others on request)
Max. operating pressure (Inlet pressure)	To max. 10 bar, depending on the orifice of the valve
Calibration medium	Operating gas or air with conversion factor
Medium temperature	-10 to +70°C
Ambient temperature	-10 to +50°C
Accuracy (after 1 min. warm up time)	±0.8% of rate. ±0.3% F.S.
Linearity	±0.1% F.S.
Repeatability	±0.1% F.S.
Control range	1:50, higher span on request
Settling time ($t_{95\%}$)	<300ms
Body material	Stainless steel 1.4305
Electr. housing material	PBT
Sealing material	FKM, EPDM (others on request)
Port connections	G 1/4, NPT 1/4 or screw-in fitting
Control valve (proportional valve) Valve orifice k_{VS}-value	Normally closed 0.05 to 2mm 0.00006 to 0.09m^3/h
Electr. connection	Round socket 8-pin Sub-HD socket 15-pin Sub-D socket 9-pin (for fieldbus option)
Power supply	24V DC
Voltage tolerance	±10%
Residual ripple	<2%
Power consumption	Max. 7.5 W at 24V DC, Max. 10 W at 24V DC with fieldbus communication

[1] At reference conditions 1.013 bar(a) and 0°C

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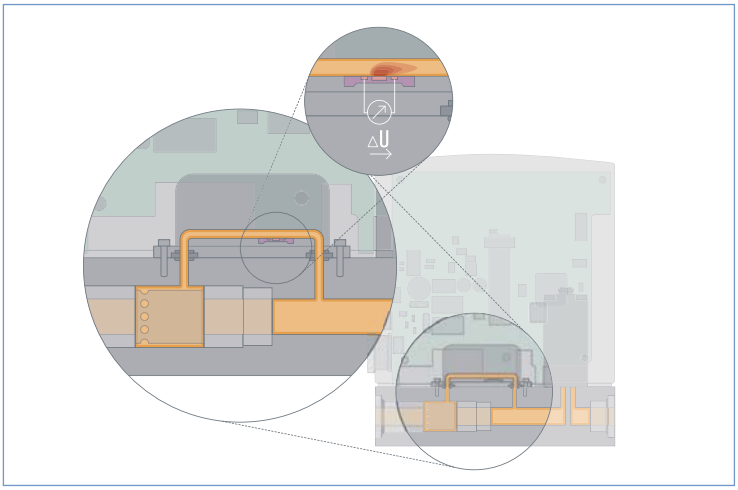
Technical data

Technical data (cont.)	
Set point (signal setting) Feed impedance	0–5V, 0–10V, 0–20 mA or 4–20 mA >20 k Ω (voltage) <300 Ω (current)
Output signal (signal output) Max. current, volt. output Max. load, current output	0–5 V, 0–10 V, 0–20 mA or 4–20 mA 10 mA 600 Ω
Fieldbus communication	PROFIBUS-DP, DeviceNet, CANopen, others on request
Protection class	IP65
Dimensions [mm] (without fitting)	115 x 137.5 x 37 (B x H x D)
Total weight	1200 g
Mounting position	horizontal or vertical
Light emitting diodes (Default, other functions programmable)	Indication for Power, Communication, Limit, Error
Binary input (Default, other functions programmable)	Three 1. Start Autotune 2. Not assigned, Switch between gases when cal. for two gases 3. Not assigned
Binary output (Default, other functions programmable)	Two relay-outputs for (Default, other functions possible) 1. Limit (setpoint not reached) 2. Error (e.g. sensor fault) Max. Load: 60 V, 1 A, 60 VA

Measuring principle



The actual flow rate is detected by a sensor operating according to a thermal principle which has the advantage of delivering the mass flow without any corrections for pressure or temperature being needed.

A small part of the total gas stream is diverted into a small, specifically designed bypass channel, that ensures laminar flow conditions. The sensor element is a chip immersed into the wall of this channel. The chip, produced in CMOSens® technology, contains a heating resistor and two temperature sensors (thermopiles) being arranged symmetrically upstream and downstream of the heater. The differential voltage of the thermopiles is a measure of the mass flow rate passing this bypass channel. The calibration procedure effectuates a unique assignment of the sensor signal to the total flow rate passing the device.

Notes regarding the selection of the unit

For the proper choice of the actuator orifice within the MFC, not only the required maximum flow rate Qnom, but also the pressure values directly before and after the MFC (p_1, p_2) at this flow rate Q_{nom} should be known. In general, these pressures are not the same as the overall inlet and outlet pressures of the whole plant, because usually there are additional flow resistors (tubing, additional shut-off valves, nozzles etc.) present both before and after the controller.

Please use the specification sheet (p. 4) to indicate the pressures directly before and after the MFC. If these should be unknown or not accessible to a measurement, estimates are to be made by taking into account the approximate pressure drops over the flow resistors before and after the MFC, respectively, at a flow rate of Qnom.

In addition, please quote the maximum inlet pressure p_{1max} to be encountered. This data is needed to make sure the actuator is able to provide a close-tight function within all the specified modes of operation.

Please use the form on page 5 for your design specification requirements

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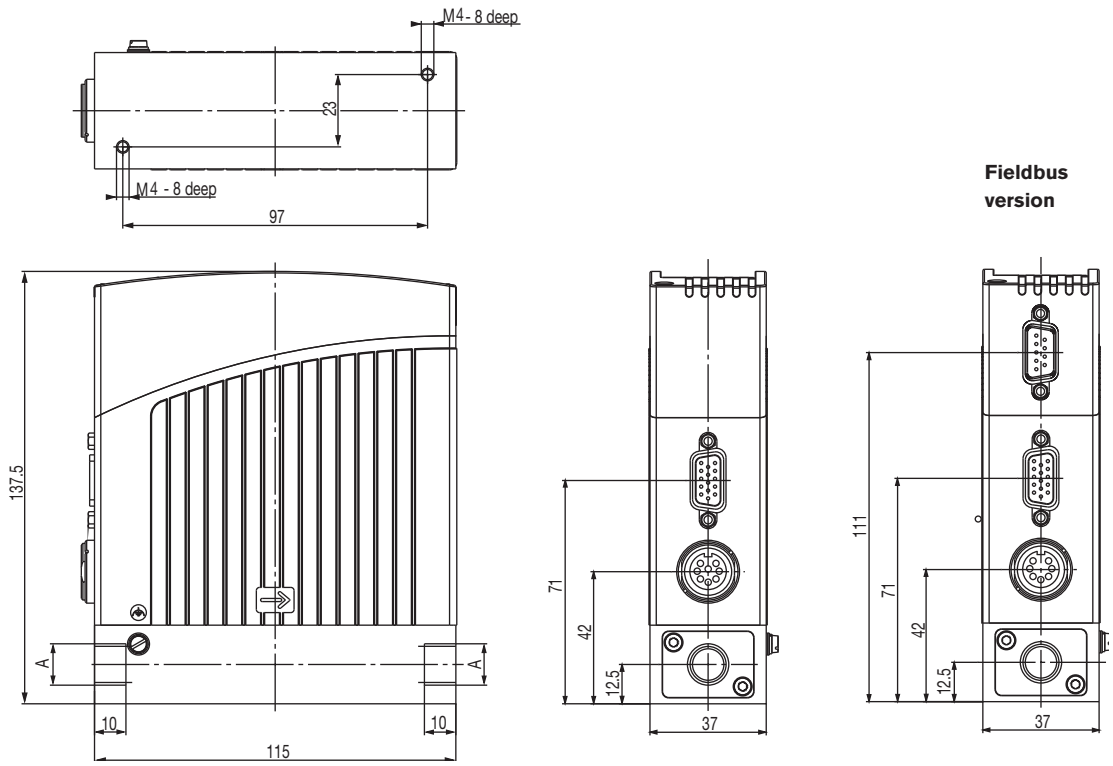
Dimensions [mm]



Size A
G 1/4
NPT 1/4

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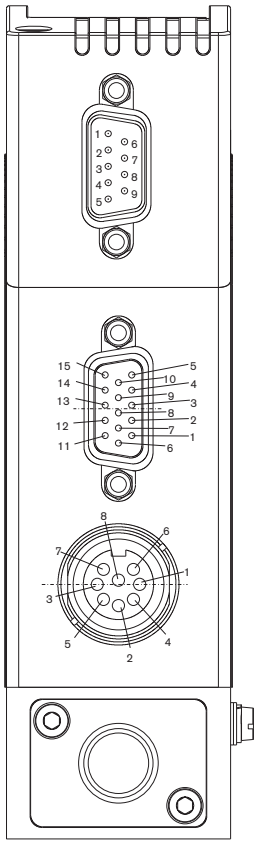
Pin configuration



Sub-D socket, 9-pin

with PROFIBUS-DP

Pin	Connection
1	shield
2	not used
3	RxD/TxD - P (B-line)
4	RTS (control signal for repeater)
5	GND
6	VDD
7	not used
8	RxD/TxD - N (A-line)
9	not used

with DeviceNet, CANopen

Pin	Connection
1	Shield
2	CAN_L
3	GND
4	not used
5	not used
6	not used
7	CAN_H
8	not used
9	not used

Sub-HD socket, 15-pin

Pin	Connection
1	Signal input +
2	Signal input GND
3	Signal output +
4	Binary input 2
5	12V-output (only company internal use.)
6	RS232 TxD (direct connection to PC)
7	Binary input 1
8	DGND (for binary inputs)
9	Only company internal use (do not connect!)
10	12V-output (only internal company use)
11	12V-output (only internal company use)
12	Binary output 3
13	Signal output GND
14	RS232 R x D (direct connection to PC)
15	DGND (for RS232 interface)

(with bus version 1-3 and 13 not used)

Round socket, 8-pin

Pin	Connection
1	24V+ supply
2	Relay 1 – middle contact
3	Relay 2 – middle contact
4	Relay 1 – opener
5	Relay 1 – shutter
6	24V supply GND
7	Relay 2 – shutter
8	Relay 2 – opener

Ordering chart for accessories (Connectors are not included in the delivery)

Article	Item no.
Round 8-pin binder plug (solder connection)	918 299
round 8-pin plug with prefabricated 5m cable on one side	787 733
Round 8-pin plug with prefabricated 10m cable on one side	787 734
SUB-HD 15-pin plug with prefabricated 5m cable on one side	787 735
SUB-HD 15-pin plug with prefabricated 10m cable on one side	787 736
RS232 adapter for connection to a PC, connection with an extension cable (item no. 917039)	654 757
Extension cable for RS232 9-pin. Buchse/Stecker 2m	917 039
RS485 adapter	658 499
USB adapter	670 696
Communicaton software (Mass Flow Communicator)	Download at www.burkert.com

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Note

You can fill out the fields directly in the PDF file before printing out the form.

Specification sheet for MFC/MFM applications

Please complete and send to your nearest Bürkert sales centre

Company	Contact person
Customer no.	Department
Address	Tel./Fax
Postcode/Town	E-Mail

☐ MFC-application ☐ MFM-application ☐ Quantity ☐ Desired delivery date

Medium data

Type of gas (or gas proportion in mixtures)

Density [kg/m³][1)]

Medium temperature [°C or °F] °C °F

Moisture content [g/m³]

Abrasive components/solid particles ☐ no ☐ yes, as follows:

Fluidic data

Maximum flow Q_{nenn} l_N/min [1)] cm_N^3/min [1)]

m_N^3/h [1)] cm_S^3/min (sccm) [2)]

kg/h l_S/min (slpm) [2)]

Minimal flow Q_{min} l_N/min [1)] cm_N^3/min [1)]

m_N^3/h [1)] cm_S^3/min (sccm) [2)]

kg/h l_S/min (slpm) [2)]

Inlet pressure at Q_{nenn} p_1 = barg ■

Outlet pressure at Q_{nenn} p_2 = barg ■

Max. inlet pressure P_{1max} barg ■

Pipe run (external-Ø) metric, mm imperial, inch

MFC/MFM port connection

☐ without screw-in fitting
- ☐ 1/4" G-thread (DIN ISO 228/1)
- ☐ 1/4" NPT-thread (ANSI B1.2)

☐ with screw-in fitting

Installation ☐ horizontal ☐ vertical

Ambient temperature °C

Material data

Body material ☐ Stainless steel

Seal material ☐ FKM ☐ EPDM ☐ other: _____

Electrical data

Output/Input signal	Standard signal		with Fieldbus
	Output	Input	
	☐ 0-5 V	☐ 0-5 V	☐ Profibus-DP
	☐ 0-10 V	☐ 0-10 V	☐ DeviceNet
	☐ 0-20 mA	☐ 0-20 mA	☐ CANopen
	☐ 4-20 mA	☐ 4-20 mA	

■ Please quote all pressure values as overpressures with respect to atmospheric pressure [barg]

reset form

1) at: 1.013 bar (a) and 0°C 2) at: 1.013 bar (a) and 20°C

To find your nearest Bürkert facility, click on the orange box → www.burkert.com

In case of special application conditions, please consult for advice.

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