



Mass Flow Controller (MFC)/ Mass Flow Meter (MFM) for Gases

- Nominal flow ranges from 0.010 I_N/min to 160 I_N/min
- High accuracy and repeatability
- Very fast response times
- Easy device exchange through configuration memory
- Optional: USP Class VI, FDA, EG 1935 conformity

Product variants described in the data sheet may differ from the product presentation and description.

Can be combined with

	Type 6011 Plunger valve 2/2 way direct-acting	▶
	Type 6013 Plunger valve 2/2 way direct-acting	▶
	Type 6027 Direct-acting 2/2 way plunger valve	▶
	Type 0330 Direct-acting 2/2 or 3/2-way pivoted armature valve	▶
	Type ME43 Fieldbus gateway	▶

Type description

The mass flow controller (MFC) / meter (MFM) Type 8741 for gases is suitable for a wide range of applications and available with Industrial Ethernet, analogue or fieldbus interfaces. The version with CANopen based Bürkert system bus (büS) is suitable for the integration into existing CANopen networks, as well as Industrial Ethernet or fieldbus networks in combination with the fieldbus gateway of Type ME43. The second option is tailor-made for applications with many control loops. Up to 32 MFC / MFM can be connected to one fieldbus gateway. Type ME43 translates the internal CANopen based communication to industry standards for both Industrial Ethernet and fieldbuses. The mass flow controller / meter can always be switched between büS and CANopen communication.

Type 8741 can be configured as MFM or MFC. Optional, up to four different gases calibrations can be stored in the device. The thermal MEMS sensor is located directly in the gas stream and therefore reaches very fast response times. A direct-acting proportional valve as regulating unit guarantees high sensitivity. The integrated PI controller ensures outstanding control characteristics of the MFC / MFM.

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1. General technical data

Product properties

Materials

Body	Aluminium or stainless steel
Housing	PC (Polycarbonate)
Seal	FKM or EPDM (dep. on gas)
Dimensions	Detailed information can be found in chapter „3. Dimensions“ on page 5.
Total weight	Approx. 500 g (aluminium body)
Protection class	IP20
Configuration memory (included in delivery)	Industrial μ SIM card for ease of replacement
Device status	RGB-LED based on NAMUR NE107

Electrical data

Power Supply	24 V DC
Voltage tolerance	$\pm 10\%$
Residual ripple	$\pm 2\%$
Power consumption ^{1.)}	1 ... 3 W (as MFM) Max. 3...19.5 W (as MFC, depending on type of solenoid control valve)

Electrical connection (options)

Industrial Ethernet	PROFINET, Ethernet/IP, EtherCAT, Modbus-TCP via 2 x RJ45 (Switch) ^{2.)}
Fieldbus	büS (CAN-based Bus) / CANopen via terminal block, 4 pin
Analogue	4 ... 20 mA, 0 ... 20 mA, 0 ... 10 V or 0 ... 5 V via D-Sub 9 ^{3.)} or terminal block 6 pin Input impedance > 20 k Ω (voltage) or < 300 Ω (current) Max. Current: 10 mA (voltage output); Max. Load: 600 Ω (current output)

Performance data

Nominal flow range (Q_{nom})	10 ml _N /min to 160 l _N /min (N ₂)
Turn-down ratio	1:50, optional 1:100
Max. operating pressure (overpressure to the atmospheric pressure)	10 bar (145 psi), for MFCs the max. operating pressure depends on the medium and the nominal valve size
Measuring accuracy	$\pm 0.8\%$ o.R. $\pm 0.3\%$ F.S. (after 1 min. warm up time)
Repeatability	$\pm 0.1\%$ F.S.
Settling (MFC) /response (MFM) time ($t_{95\%}$)	<300 ms
Control valve (proportional valve)	Normally closed
Valve orifice range	0.05...8 mm
K _{VS} value range	0.00006...1.1 m ³ /h

Medium data

Operating medium	Neutral, non-contaminated gases, others on request
Calibration medium	Operating gas or air
Medium temperature	-10 °C ... +70 °C (-10 °C ... +60 °C with oxygen)

Product connections

Port connection	NPT 1/4, G 1/4, flange, clamp ring or vacuum fitting, others on request
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Environment and installation

Ambient temperature	-10 ... +50 °C (higher temperatures on request)
Installation	Horizontal or vertical

Accessories

Software	Bürkert Communicator
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1.) Data refers to the typical power consumption (at 23 °C ambient temperature, nominal flow rate and 30 min. control mode). The specifications according to UL 61010-1 can differ (see instruction manual).

2.) Supply voltage via separate terminal block

3.) The analogue version with D-Sub 9 features an additional digital input and a relay output

2. Approvals

Note:

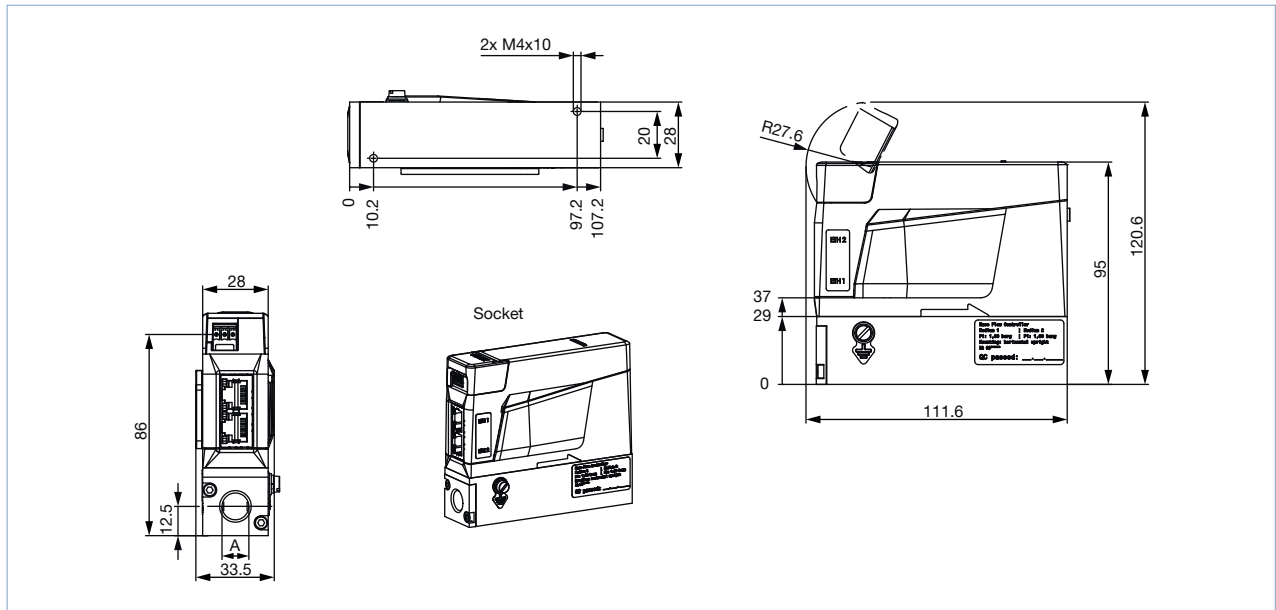
- The approvals and conformities listed below must be stated when making enquiries. This is the only way to ensure that the product complies with all required specifications.
- Not all available types can be supplied with the above approvals or conformities.

Approvals	Description
	UL Listed according to DIN EN 61010-1 for USA and Canada
Conformity	Description
	Conformity of all materials in contact with the medium USP Class VI Kapitel "87 in vitro" and "88 in vivo, Implantation" – Code of Federal Regulations Title 21 Paragraph 177 (CFR 21 177.2600)
FDA	Conformity of all materials in contact with the medium FDA – Code of Federal Regulations Title 21 Paragraph 177 (CFR 21 177.2600)
	Description
	Conformity of all materials in contact with the medium Regulation (EC) No 1935/2004 on materials and objects intended to come into contact with food

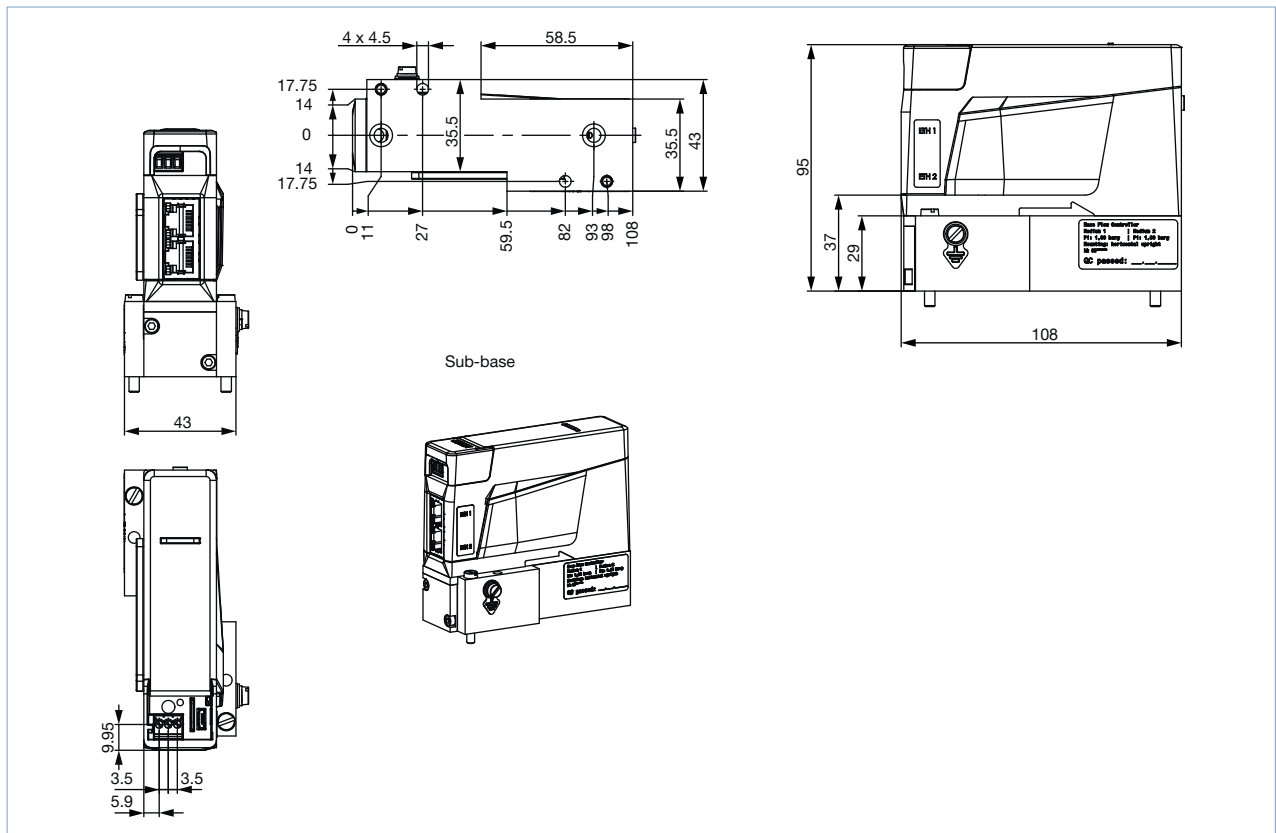
3. Dimensions

3.1. Analogue or Industrial Ethernet

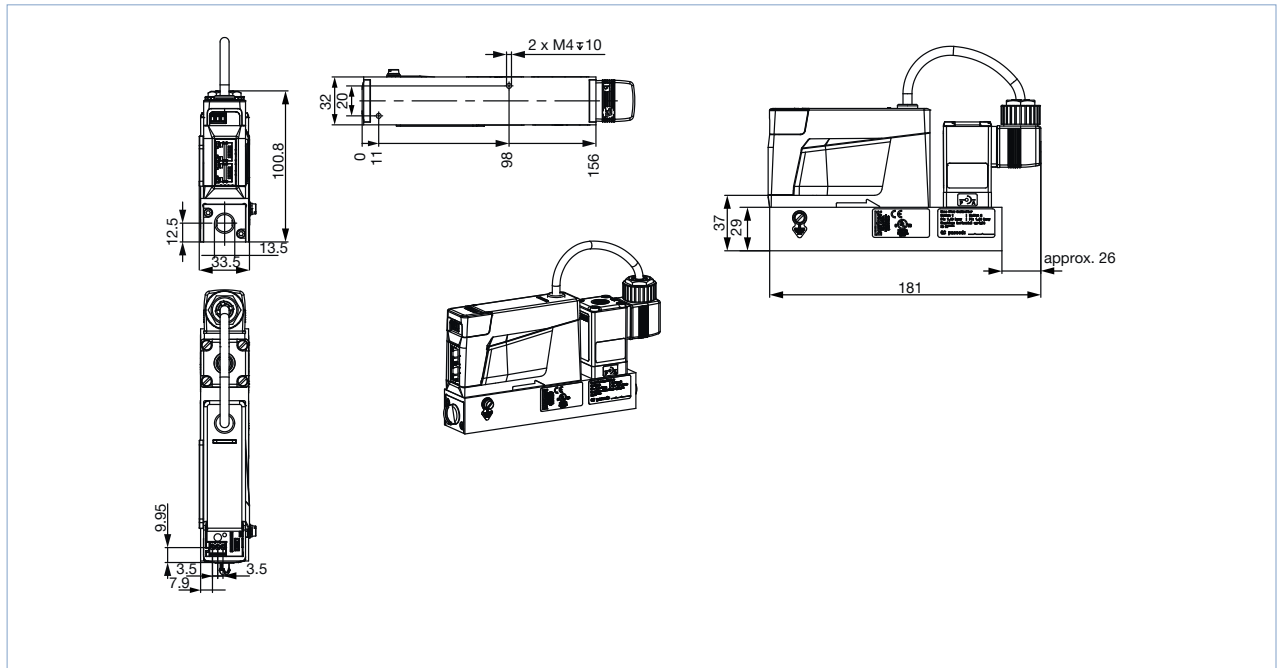
MFM or MFC with internal valve (Type 2871)



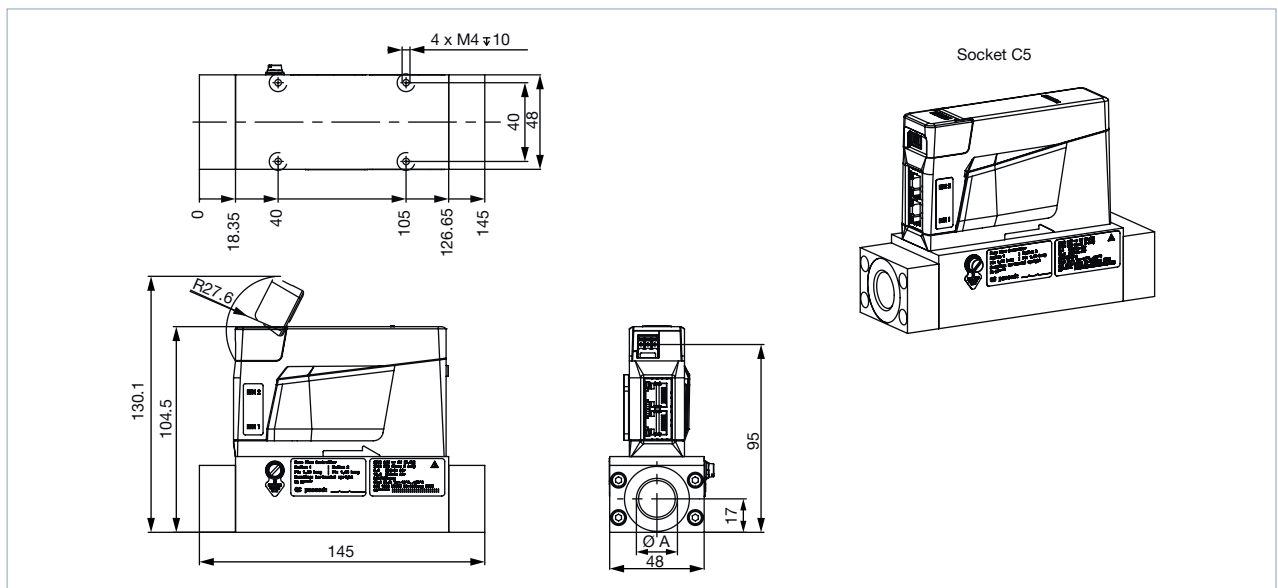
Sub-base version of MFM or MFC with internal valve (Type 2871)



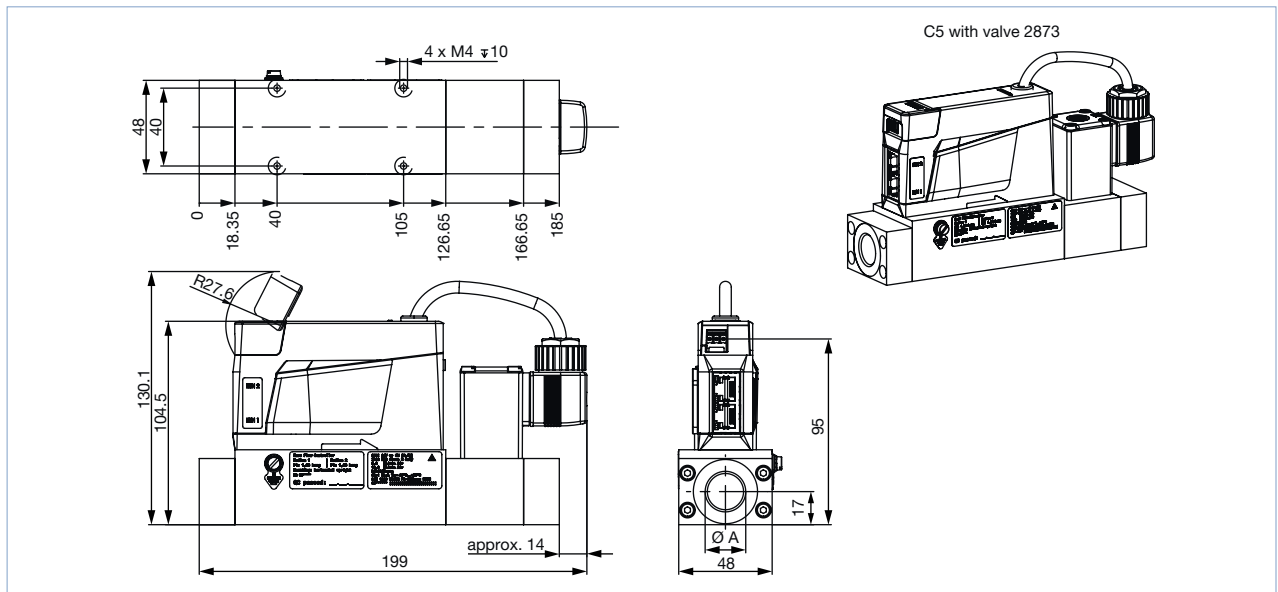
MFC with external valve (Type 2873)



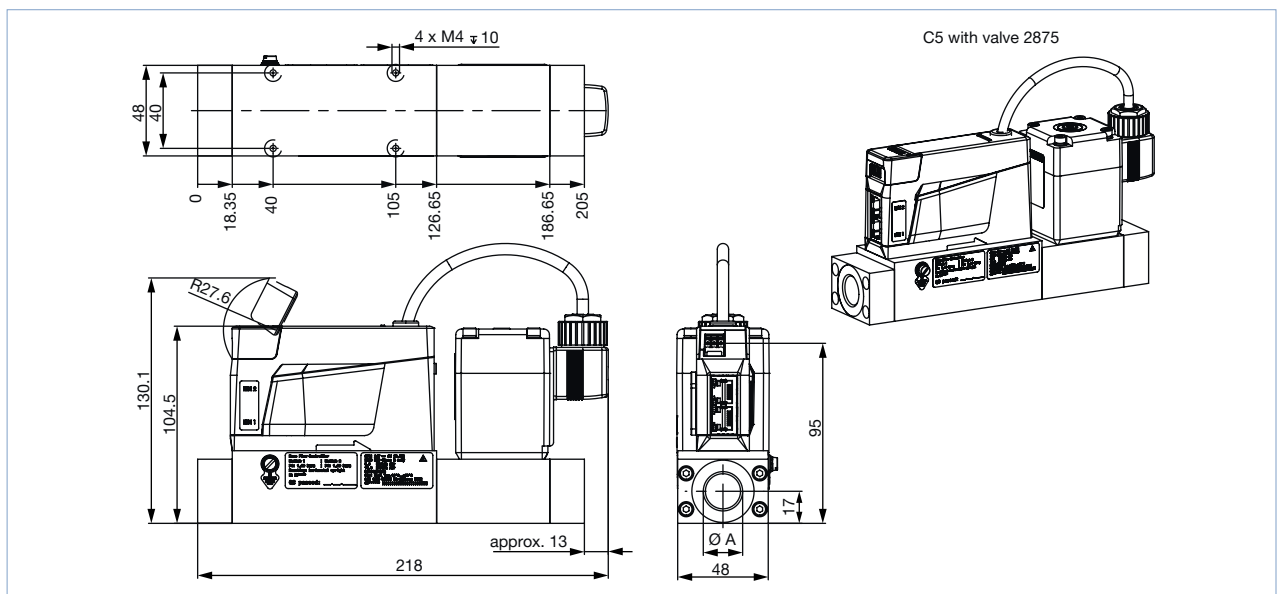
MFM for large nominal flow rates



MFC with external valve (Type 2873) for large nominal flow rates

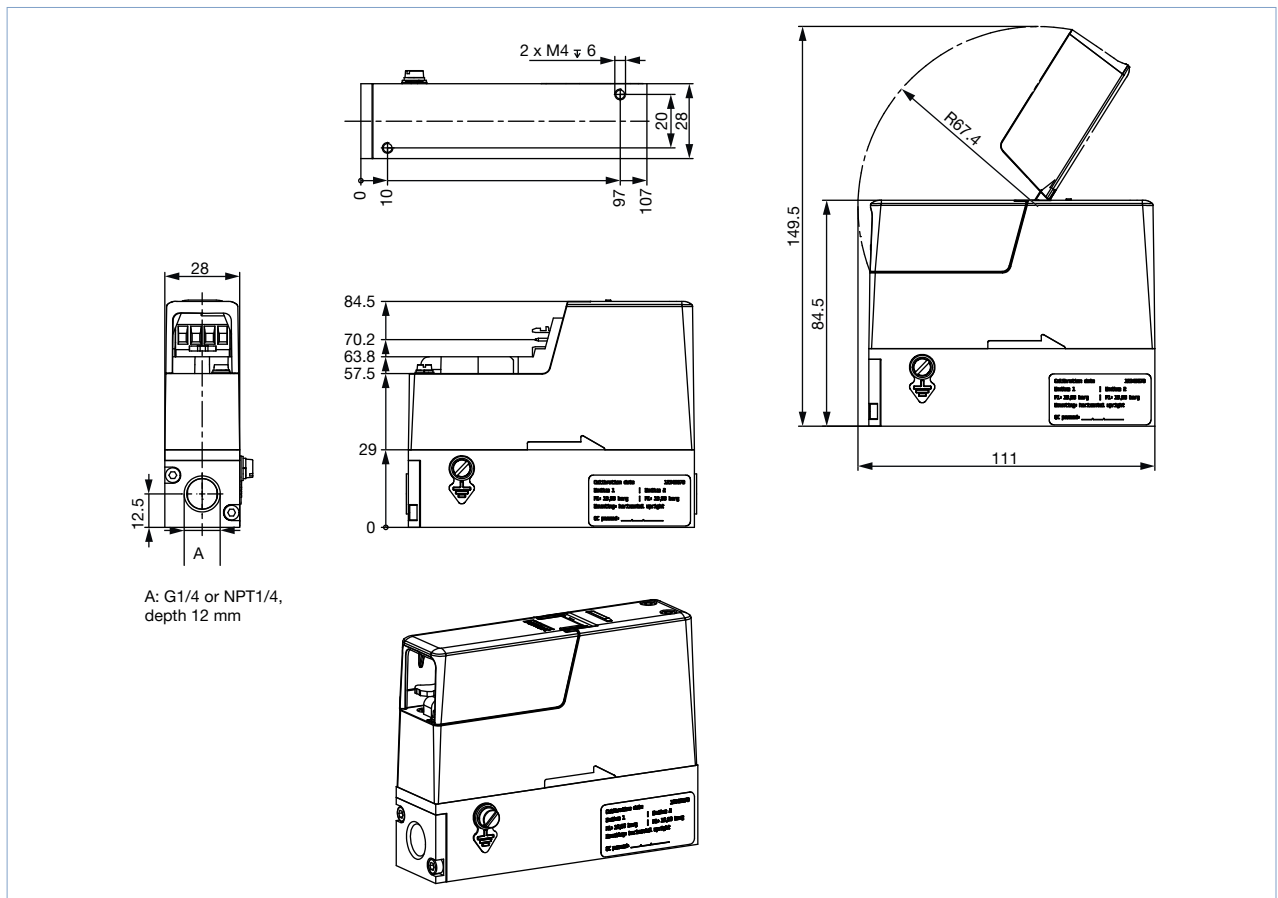


MFC with external valve (Type 2875) for large nominal flow rates

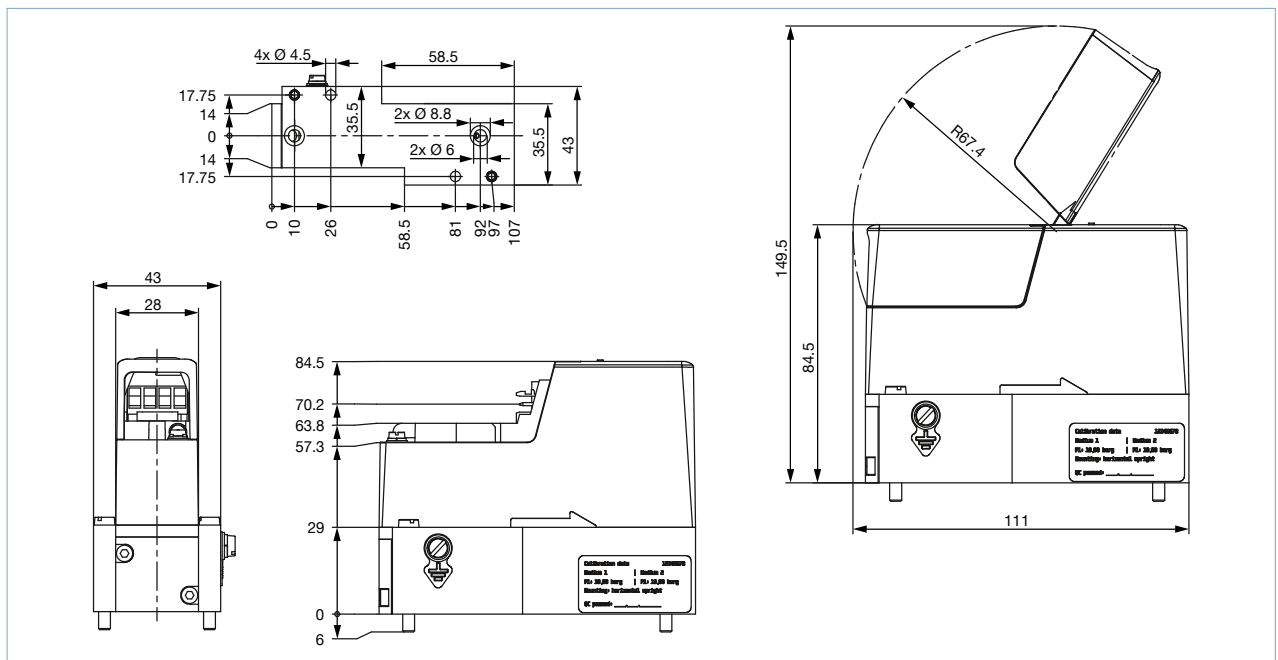


3.2. 8741 büS/CANopen

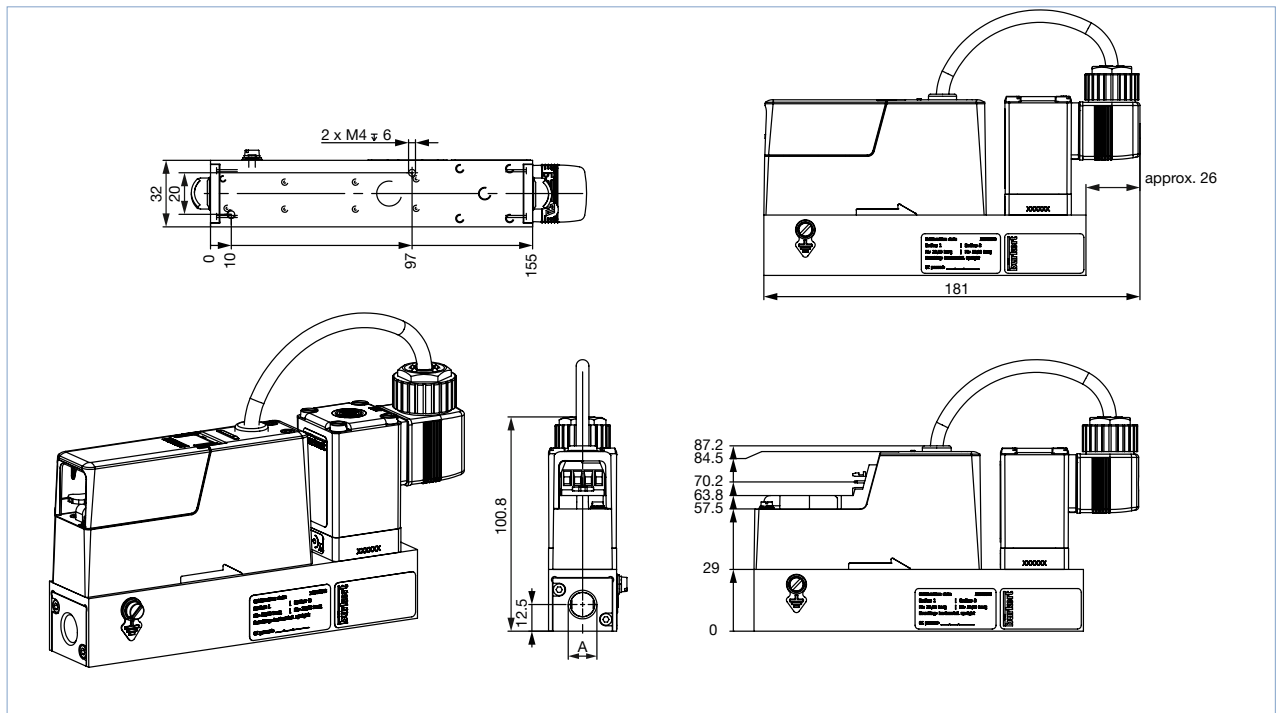
MFM or MFC with internal valve (Type 2871)



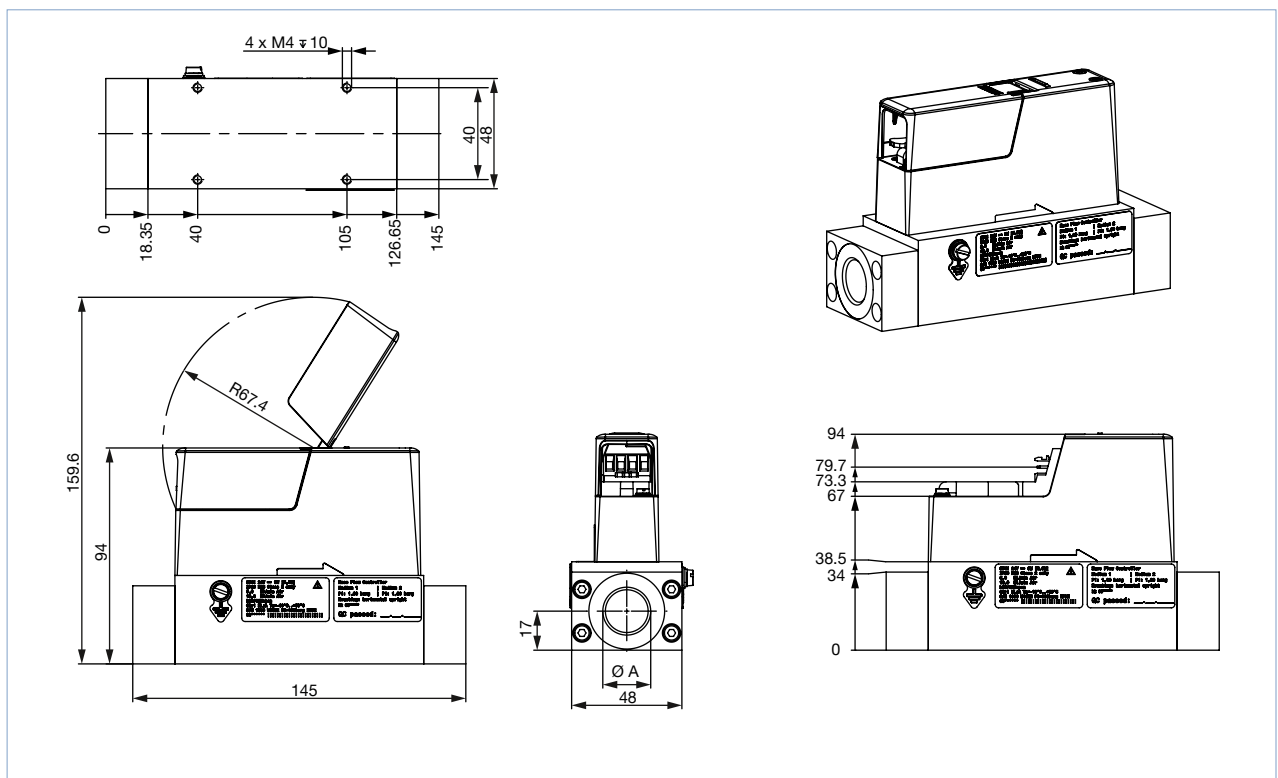
Sub-base version of MFM or MFC with internal valve (Type 2871)



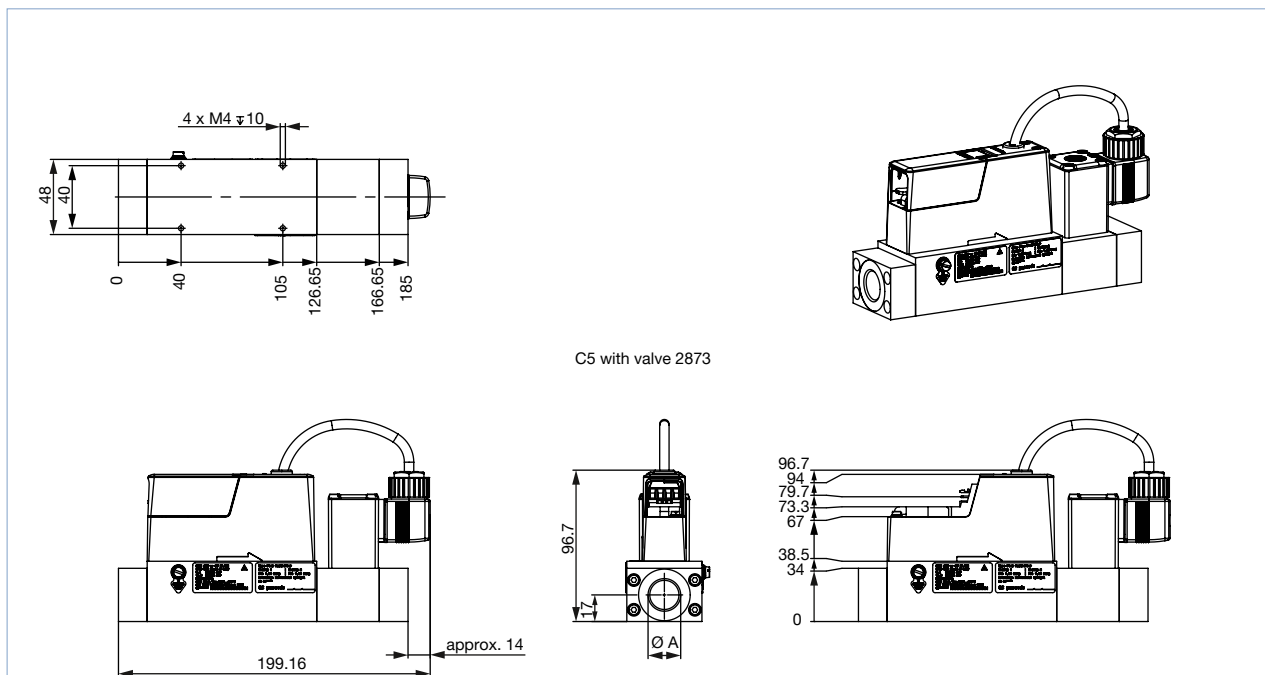
MFC with external valve (Type 2873)



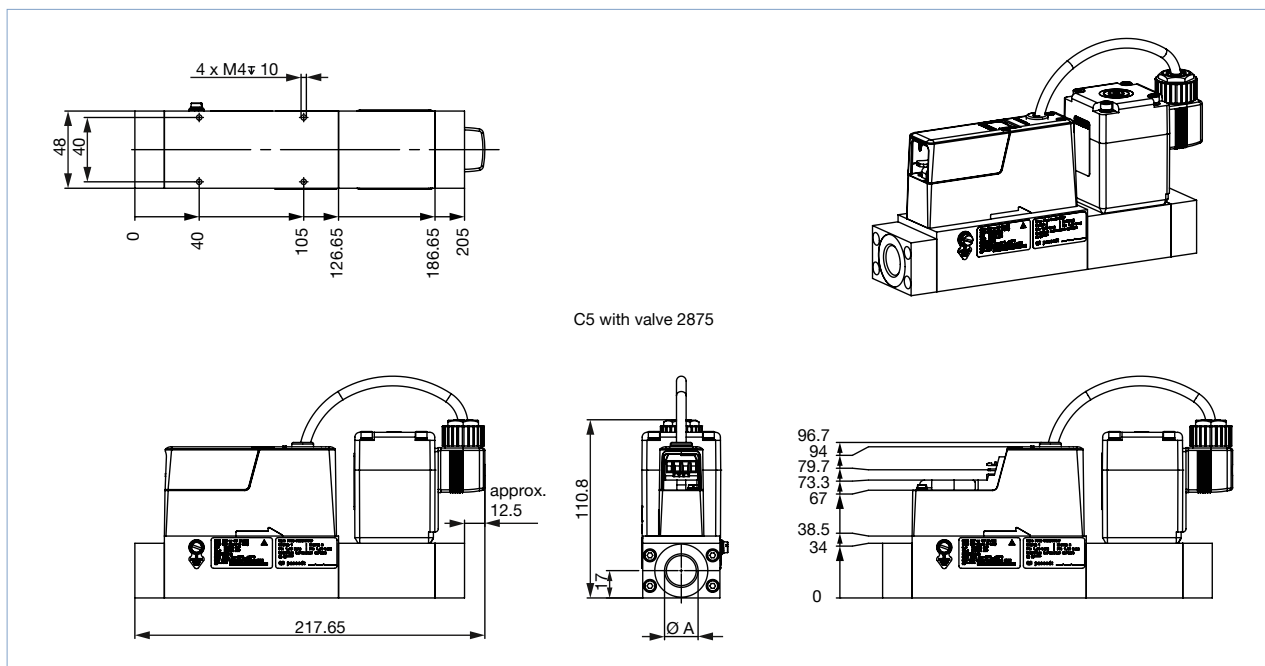
MFM for large nominal flow rates



MFC with external valve (Type 2873) for large nominal flow rates

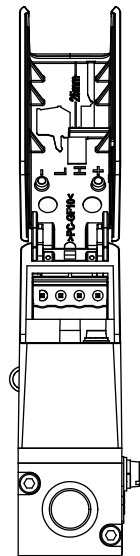


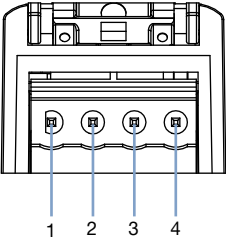
MFC with external valve (Type 2875) for large nominal flow rates

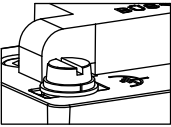


4. Device / Process connections

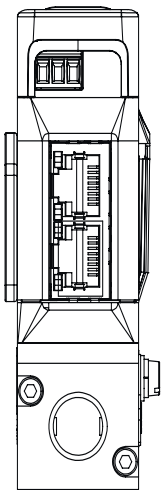
4.1. büS / CANopen

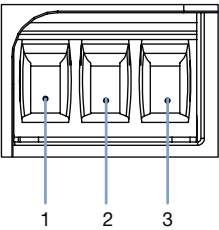


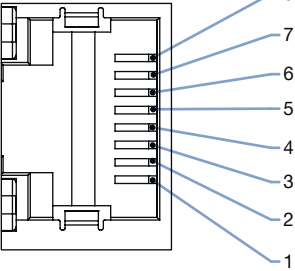
Terminal block, 4 pin	Pin	Assignment
	1	DGND
	2	CANL
	3	CANH
	4	+ 24 V DC

Screw M3	
	When using Bürkert büS cables, the following colour coding applies: • Red + 24 V DC • Blue CANL • White CANH • Black GND

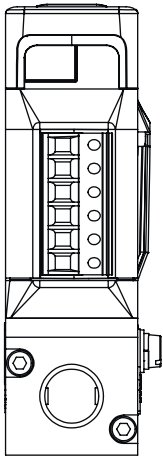
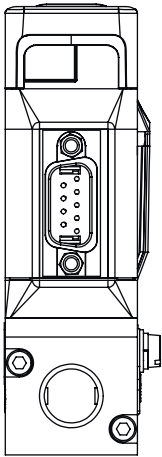
4.2. Industrial Ethernet



Terminal block, 3 pin	Pin	Assignment
	1	FE (functional earth)
	2	DGND
	3	+ 24 V DC

RJ45 Socket	Pin	Assignment
	1	TX +
	2	TX -
	3	RX +
	4	Not connected
	5	Not connected
	6	RX -
	7	Not connected
	8	Not connected
Body		Shield

4.3. Analogue



D-Sub 9 pin, plug	Pin	Assignment
	1	Digital input
	2	GND (For supply voltage and digital input)
	3	+ 24 V DC
	4	Relay - Opener
	5	Relay - Reference contact
	6	Set value input +
	7	Set value input GND
	8	Actual value output
	9	Actual value output GND
	Body	Shield

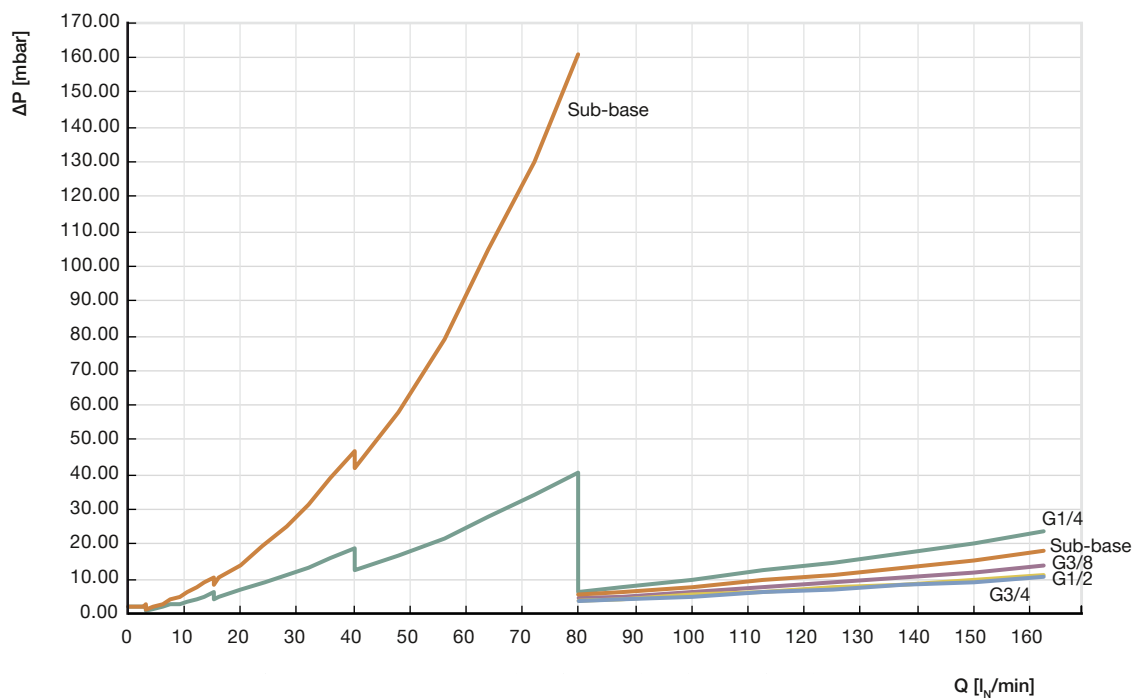
Terminal block 6 pin	Pin	Assignment
	1	+ 24 V DC
	2	GND
	3	Set value input +
	4	Set value input GND
	5	Actual value output +
	6	Actual value output GND

5. Performance specifications

5.1. Pressure loss diagram of the MFM

The diagram shows an example of the pressure loss characteristics when air flows through. To determine the pressure loss of another gas, the corresponding air equivalent must first be calculated and the basic fluidics used for the other gas taken into account.

Chip Sensor up to 160 l_N/min



5.2. Flow characteristic

Nominal flow range of typical gases

Note:

All values refer to 1.013 bar(a) and 0 °C (Index N)

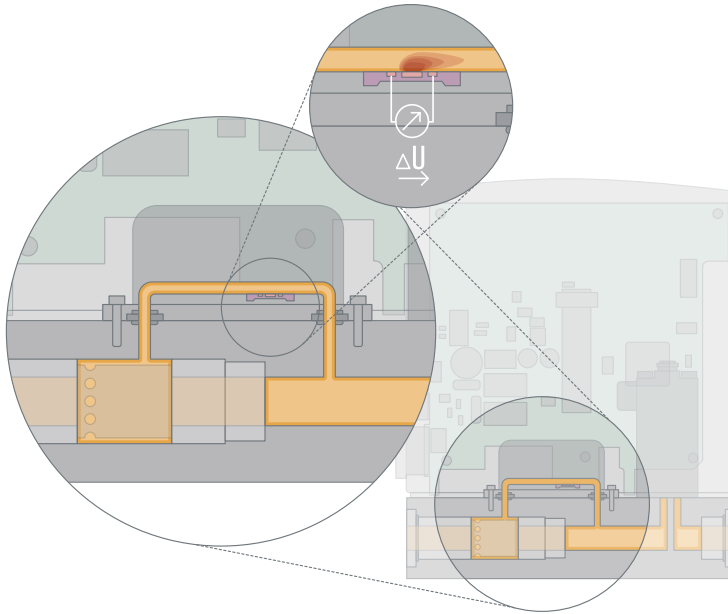
Gas	Min. Q _{nom} [l _N /min]	Max. Q _{nom} [l _N /min]
Argon	0.01	160
Acetylene	0.01	65
Helium	0.01	1000
Carbon dioxide	0.02	80
Air	0.01	160
Methane	0.01	160
Oxygen	0.01	160
Nitrogen	0.01	160
Hydrogen	0.01	1000
Propane	0.03	44

6. Product operation

6.1. Measuring principle

The actual flow rate is detected by a sensor. This operates according to a thermal principle which has the advantage of providing the mass flow which is independent on pressure and temperature.

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



7. Product accessories

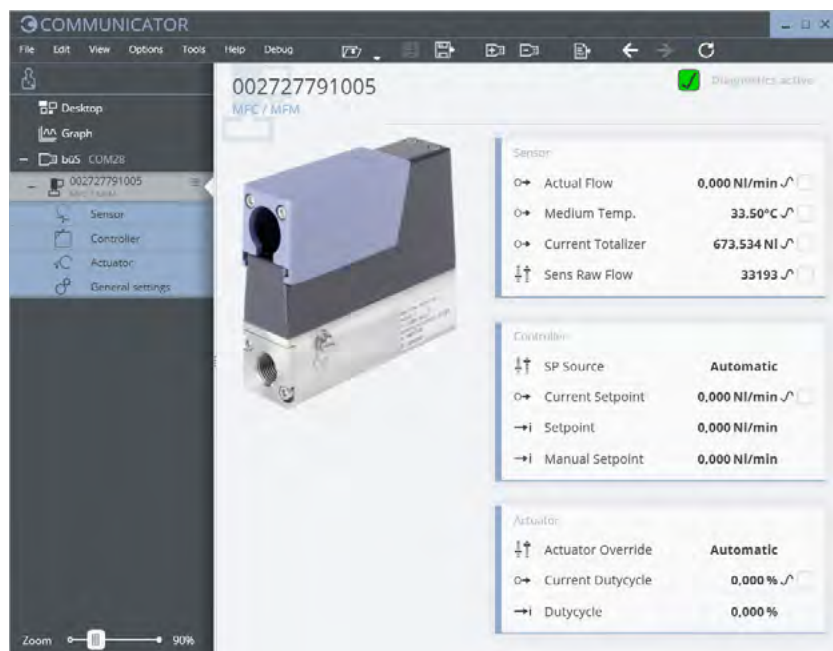
7.1. Bürkert Communicator Software

Note:

To install the software, click [here](#).

Part of Bürkert's EDIP program (Efficient Device Integration Platform) is the Bürkert Communicator. This software can be run under MS-Windows and it is available on Bürkert's website for free. The Bürkert Communicator allows convenient system configuration and parametrisation of all connected field devices. An accessory part, the bÜS-stick serves as the interface between computer and process instruments (see „8.4. Ordering chart accessories“ on page 16). It transfers “USB data” to “CAN data”. The Communicator allows:

- Diagnosis
- Parametrization
- Registration and storage of process data
- To watch graph of process
- To update firmware of the bÜS device connected
- Guided re-calibration



Type 8741 connection with Bürkert Communicator software

The interface to the “Bürkert Communicator” software tool is based on CANopen. The appropriate bus termination is mandatory. Hence, please activate, for Type 8741 with analogue or Industrial Ethernet interface, the termination resistor switch on the bÜS-stick. For Type 8741 bÜS / CANopen, this termination resistor should not be activated, in case the device is already integrated in a properly terminated bus network

To connect the MFC / MFM with the “Bürkert Communicator” software tool, you need a bÜS-stick. The bÜS-stick sets contain the necessary accessories.

- For Type 8741 bÜS / CANopen, the connection is made directly via the 4 pin terminal block (bÜS-stick Set 1 contains the necessary accessories).
- For Type 8741, with analogue or Industrial Ethernet, the connection is made via the micro-USB socket on the device (bÜS-stick Set 2 contains the necessary accessories).

ATTENTION: No external power supply may be connected to the micro-USB socket! The power supply to the unit must be provided as described in chapter „4. Device / Process connections“ on page 11.

7.2. Web server for Industrial Ethernet versions

The Industrial Ethernet based devices (with the exception of the EtherCAT protocol) from software version A.13.00.00 have an integrated web server. This can be accessed via a web browser by entering the IP address of the device (factory setting IP 192.168.1.100).

8. Ordering information

8.1. Bürkert eShop – Easy ordering and quick delivery



Bürkert eShop – Easy ordering and fast delivery

You want to find your desired Bürkert product or spare part quickly and order directly? Our online shop is available for you 24/7. Sign up and enjoy all the benefits.

[Order online now](#)

8.2. Advice on product choice

Note:

The product questionnaire form on last page contains the relevant fluid specification. Using the experience of Bürkert engineers already in the design phase provide us with a copy of the request containing the necessary data together with your inquiry or order.

For the proper choice of the actuator orifice within the MFC, not only the required maximum flow rate Q_{nom} , 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 product questionnaire form on last page to indicate the pressures directly before and after the MFC. If these are 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 Q_{nom} . In addition, please quote the maximum inlet pressure p_1 max. 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.

8.3. Bürkert product filter



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8.4. Ordering chart accessories

Description	Article-No.
büS-stick Set 1 (incl. cable (M12 and Micro-USB), büS-stick with integrated terminating resistor, power supply and other accessories)	772426
büS-stick Set 2 (incl. cable (M12 and Micro-USB) and büS-stick with integrated terminating resistor)	772551
Power supply Type 1573 for rail mounting, 100...240 V AC/ 24 V DC, 1.25 A, NEC Class 2 (UL 1310)	772438
Power supply Type 1573 for rail mounting, 100...240 V AC/ 24 V DC, 1 A, NEC Class 2 (UL 1310)	772361
Power supply Type 1573 for rail mounting, 100...240 V AC/ 24 V DC, 2 A, NEC Class 2 (UL 1310)	772362

Description	Article-No.
Power supply Type 1573 for rail mounting, 100 ... 240 V AC/ 24 V DC, 4 A	772363 
µSIM-card (included in delivery of MFC)	on request
LabVIEW device driver (for bÜS / CANopen version)	on request
Device description files for CANopen (EDS), PROFINET (GSDML), Ethernet/IP (EDS), EtherCAT (ESI)	Download from www.burkert.com
Bürkert Communicator Software	Download from www.burkert.com
For 8741 bÜS / CANopen	
Terminal block 4 pin (included in delivery)	565876 
Terminal block 4 pin with integrated 120 Ohm resistance for bÜS-ending	566066 
bÜS cable, 50 m	772413 
bÜS cable, 100 m	772414 
Fieldbus Gateway Type ME43 for Industrial Ethernet (PROFINET, Ethernet/IP, Modbus/TCP, EtherCAT)	307390 
Fieldbus Gateway Type ME43 for PROFIBUS DPV1	307393 
For 8741 Analogue	
Terminal block 6 pin (for 8741 Standard; included in delivery of the corresponding analogue version)	on request
Connector cable D-Sub 9 to leads, 5 m	580882 
Connector cable D-Sub 9 to leads, 10 m	580883 

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DTS 1000222224 EN Version: AA Status: RL (released | freigegeben | valide) printed: 25.06.2021

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South Africa

United
Arab
Emirates

Australia
New Zealand

China
Hong Kong
India
Japan
Korea
Malaysia
Philippines
Singapore
Taiwan

Product Enquiry Form - Mass Flow Controller For Gases

Thank you for your interest in our products! In order to provide you with optimum advice, please fill out the following form and send it to your **Bürkert representative** or e-mail address: info@buerkert.com. All information submitted will of course be kept strictly confidential.

Please fill in the **required fields!** *

*Note: The interactive functions of this PDF may be restricted depending on the PDF reader used.

Personal Information			
Company		Contact person	
Customer no.		Department	
Street		Postcode / Town	
Telephone no.		Email	

Delivery			
MFC Application	MFM Application	Quantity	Required delivery date

Medium data			
Type of gas or gas mixture			
Medium temperature	°C	/	°F
Ambient temperature	°C	/	°F

Fluidic data					
Flow range Q_{Nom}	Min.	Max.	Ref. N ^{1.)}	unit	Ref. S ^{1.)}
Inlet pressure at Q_{Nom} ^{2.)}	p_1	=	barg ^{3.)}		
Outlet pressure at Q_{Nom}	p_2	=	barg ^{3.)}		
Max. inlet pressure	p_{1max}	=	barg ^{3.)}		
Port connection	Compression fitting	Subbase	Vacuum fitting		
	Thread:	G (DIN ISO 228/1)	NPT (ANSI B1.2)		
		1/4"	3/8"	1/2"	3/4" 1"
Installation	horizontal, valve upright horizontal, valve horizontal		vertical, upward flow vertical, downward flow ^{4.)}		

1.) Reference conditions: Ref. N: T=0°C, P=1,013 bar(a); Ref. S: T=20°C, P=1,013 bar(a)

2.) Corresponds to the calibration pressure

3.) Please indicate all pressure values as overpressure to atmospheric pressure [barg] (g = relative pressure)

4.) Possible reduction of the setting range to 1:10 for a vertical downwards flow

Material specifications		
Body	Aluminium	Stainless steel
Seals	FKM	EPDM

Electrical data				
IP protection	Yes (IP65)	No (IP20 or better)		
Control / Communication	Normsignal	CANopen/büS	PROFIBUS DP	Industrial Ethernet
Note: Please choose one of the following options!	0 ... 5 V	CANopen		PROFINET
	0 ... 10 V	büS		Ethernet IP
	0 ... 20 mA			Modbus TCP
	4 ... 20 mA			EtherCAT
Connection	D Sub socket	M12 socket	D Sub socket	(RJ45 always standard)
Note: Please choose one of the following options!	Terminal block	Terminal block	M12 socket	

Approvals / Conformities
UL
ATEX II Cat. 3 G/D, IECEx
USP Class VI conformity
FDA conformity
EG 1935/2004 conformity

Additional Requirements / Comment