![bürkert FLUID CONTROL SYSTEMS]

Mass flow controller (MFC)/mass flow meter (MFM) for gases

- Nominal flow range from 0.01 l/min to 100 l/min (ref. nitrogen)
- High accuracy in measurement and repeatability
- Suitable for aggressive gases
- User-friendly gas conversion
- Easy device exchange via configuration memory

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

Can be combined with

Type 7011 ▶
Direct-acting 2/2-way plunger valve

Type 6724 ▶
2/2 or 3/2-way Whisper Valve with media separation

Type description

The Type 8743 mass flow controller (MFC)/mass flow meter (MFM) is suitable for controlling or measuring aggressive gases, gas mixtures and in the area of application for alternating gases. A thermal capillary sensor, with non-wetted sensor elements, is used for this. This also enables easy conversion to the process gas in question. The forms in contact with medium are made of high-quality stainless steel and FFKM as seal material for high chemical resistance. The MFC version achieves high control accuracy thanks to the use of Bürkert proportional valve technology and the application-appropriate layout of the valve orifice. The MFC can be implemented with low pressure loss as required, due to the diversity of the available valve orifices. These MFCs and MFMs either communicate the set-point and actual values of the flow value via an analogue interface, or other values, as well as the set-point and actual values, that can be selected via software via an Ethernet interface. Type 8744 represents the IP65 variant of the Type 8743 and contains the CAN-based büS version for integration into CAN or büS networks. A wide range of devices can easily and efficiently be integrated into the control level in this way via an Ethernet gateway. The communication data is configured via the Bürkert Communicator software.

Visit product website ▶

Table of contents

1. General technical data

Product properties	
Dimensions	Further information can be found in chapter "4. Dimensions" on page 5.

Materials	
Seal	FKM, EPDM and FFKM, seat seal PCTFE for valve orifices of DN0.05 and DN0.1
Housing	PC (polycarbonate)
Base block	Stainless steel 1.4404/316L
Wetted parts	MFM/MFC: stainless steel 316/1.4401, 1.4404/316L, 1.4435/316L, PCTFE and seal material

Total weight	Variant for nominal flow rates <20 l/min:	Variant for nominal flow rates >20 l/min:
	• Approx. 700 g (MFM, without valve)	• Approx. 900 g (MFM, without valve)
	• Approx. 1000 g (MFC with valve Type 2871)	• Approx. 1400 g (MFC with valve Type 2871)
		• Approx. 1500 g (MFC with valve Type 2873)

Configuration management	Further information can be found in chapter "8.3. Configuration management for easy device replacement" on page 20.
LED display [1]	RGB LED according to NAMUR NE107

Performance data	
Nominal flow range (Q_N)	10 ml/min…100 l/min (N_2)
Maximum operating pressure (overpressure to atmospheric pressure)	MFM: 10 bar For MFCs, the maximum operating pressure depends on the medium and nominal valve size.
Measuring accuracy [2]	±0.8 % of reading ±0.3 % FS (under calibration conditions)
Repeatability	±0.1 % FS
Measuring span	1:20 at Q_N <25 ml/min, 1:50 at Q_N >25 ml/min (higher on request)
Temperature coefficient	± (0.05 % FS +0.05 % of reading)/K (deviation from gas temperature during calibration and adjustment)
Pressure coefficient	±0.1 % of reading/bar (deviation from operating pressure during calibration and adjustment, referring to N_2)
Settling time (MFC)/Response time (MFM) ($t_{95\%}$)	<2 s

Control valve (proportional valve)	**Normally closed**
Valve orifice	0.05…4 mm
K_{vs} value range	0.00006…0.32 m³/h

Electrical data	
Operating voltage	24 V DC
Power consumption [3]	MFM: 1…3 W MFC: Max. 3…19 W (depending on type of proportional valve)
Residual ripple	±2 %
Voltage tolerance	±10 %

Electrical connection	
Analogue variant	D-Sub 9 [4] or terminal block, 6-pin
Industrial Ethernet variant	2 x RJ45 (switch) [5]
Modbus RTU variant	D-Sub 9

Medium data	
Operating medium	Aggressive and neutral, pure gases (others on request)
Calibration medium	Nitrogen
Medium temperature	-10 °C…+40 °C

Process/Port connection & communication	
Analogue interface	4…20 mA, 0…20 mA, 0…10 V or 0…5 V Input impedance >20 kΩ (voltage) resp. <300 Ω (current) Maximum current: 10 mA (voltage output) Maximum load: 600 Ω (current output)
Digital communication interface	Modbus RTU, Industrial Ethernet: EtherCAT®, EtherNet/IP, Modbus TCP, PROFINET
Port connection	G ¼, NPT ¼, compatible with VCR® ¼, compression fitting (others on request)

Approvals and conformities	
Protection class	IP20
Certificate	Material certificate 3.1 (optionally)
Foods and Beverages/Hygiene	Further information can be found in chapter "2.4. Foods and beverages/Hygiene" on page 4.

Oxygen	Further information can be found in chapter **"2.5. Oxygen" on page 4**.
Environment and installation	
Installation position	Horizontal or vertical [6.)]
Ambient temperature	-10 °C…+40 °C (higher temperatures on request)
Accessories	
Software	Bürkert Communicator Further information can be found in chapter **"8.1. Bürkert Communicator software" on page 19**.

1.) For a detailed description of LED colours see **operating instructions Type 8743** ▶

2.) If the operating medium is different from the calibration medium, the actual measurement accuracy might vary from the indicated value. If the operating medium is natural gas, the measurement accuracy depends on the composition of the natural gas, which can vary depending on the origin and season.

3.) Information in relation to the typical power consumption (at +23 °C ambient temperature, nominal flow and 30 min closed-loop control mode). Information according to UL 61010-1 may vary (see **operating instructions Type 8743** ▶).

4.) An additional digital input and a relay output are available for the analogue variant with D-Sub 9.

5.) Supply voltage via separate terminal block

6.) Calibrated in horizontal installation position, zero-point adjustment is necessary if another installation position is selected.

2. Approvals and conformities

2.1. General notes

- 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 variants can be supplied with the below mentioned approvals or conformities.

2.2. Conformity

In accordance with the Declaration of Conformity, the product is compliant with the EU Directives.

2.3. Standards

The applied standards which are used to demonstrate compliance with the EU Directives are listed in the EU-Type Examination Certificate and/or the EU Declaration of Conformity.

### 2.4. Foods and beverages/Hygiene

Conformity	Description
FDA	**FDA – Code of Federal Regulations (valid for variable code PL02, PL03)** All wetted materials are compliant with the Code of Federal Regulations published by the FDA (Food and Drug Administration, USA) according to the manufacturer's declaration.
USP	**United States Pharmacopeial Convention (USP) (valid for variable code PL04)** All wetted materials are biocompatible according to the manufacturer's declaration.
🍴	**EC Regulation 1935/2004 of the European Parliament and of the Council (valid for variable code PL01, PL02)** All wetted materials are compliant with EC Regulation 1935/2004/EC according to the manufacturer's declaration.

2.5. Oxygen

Conformity	Description
O_2	**Optional: Suitability for oxygen (valid for the variable code NL02)** The products are suitable for use with gaseous oxygen, according to the manufacturer's declaration.

3. Materials

3.1. Bürkert resistApp
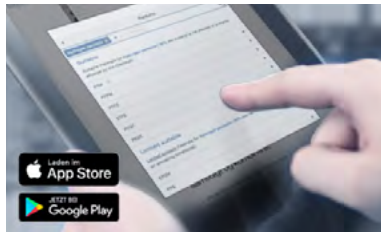
Bürkert resistApp – Chemical Resistance Chart

You want to ensure the reliability and durability of the materials in your individual application case? Verify your combination of media and materials on our website or in our resistApp.

Start Chemical Resistance Check

4. Dimensions

4.1. Thread depths of base blocks

MFC or MFM for nominal flow rates <20 l/min

Note:
The following table applies to base blocks B0…B4.

Thread (A)	Thread depth [mm]
G ¼	12
NPT ¼	12

MFC or MFM for nominal flow rates >20 l/min

Note:
The following table applies to base blocks B5…B9.

Thread (A)	Thread depth [mm]
G ¼	12.5
NPT ¼	10
G ⅜	12.5
NPT ⅜	11
G ½	15
NPT ½	14

4.2. Variant with analogue signal interface and Modbus RTU

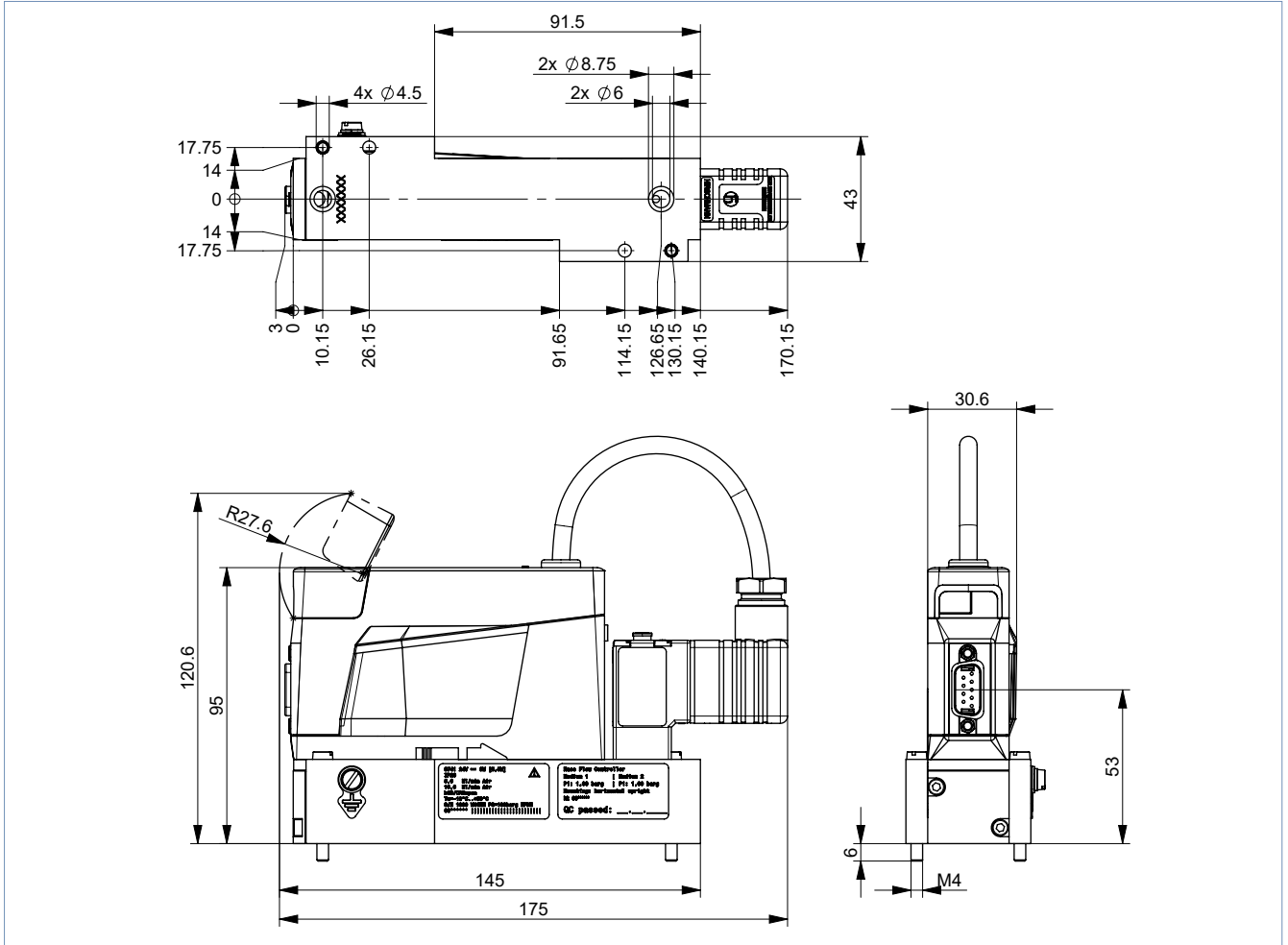**MFC with valve Type 2871 for nominal flow rates < 20 l/min**

NPT/G ¼ variant

Note:
Dimensions in mm

Type 8743

Sub-base variant

Note:
Dimensions in mm

Type 8743

MFC with valve Type 2871 for nominal flow rates > 20 l/min

NPT/G ¼ variant

Note:
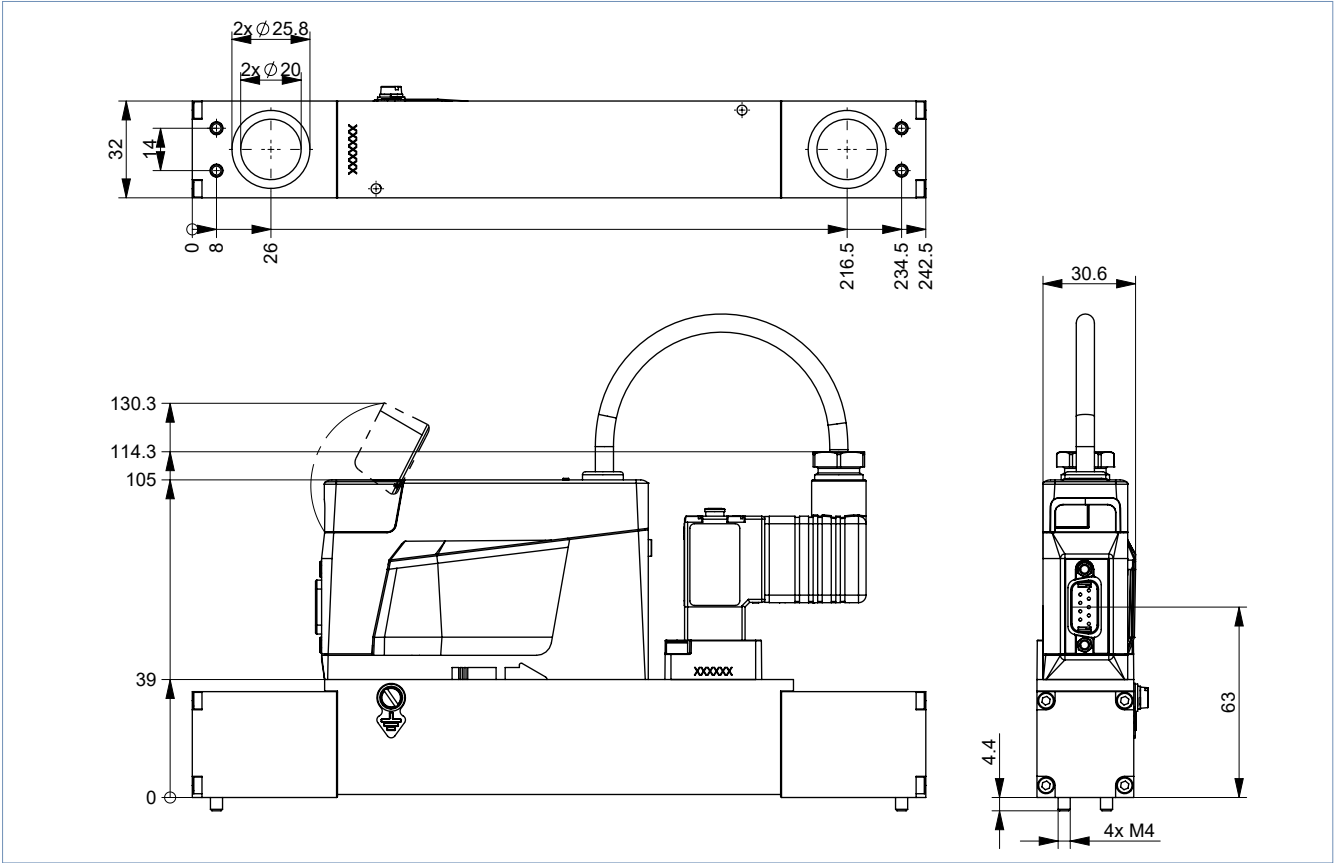Dimensions in mm

Type 8743
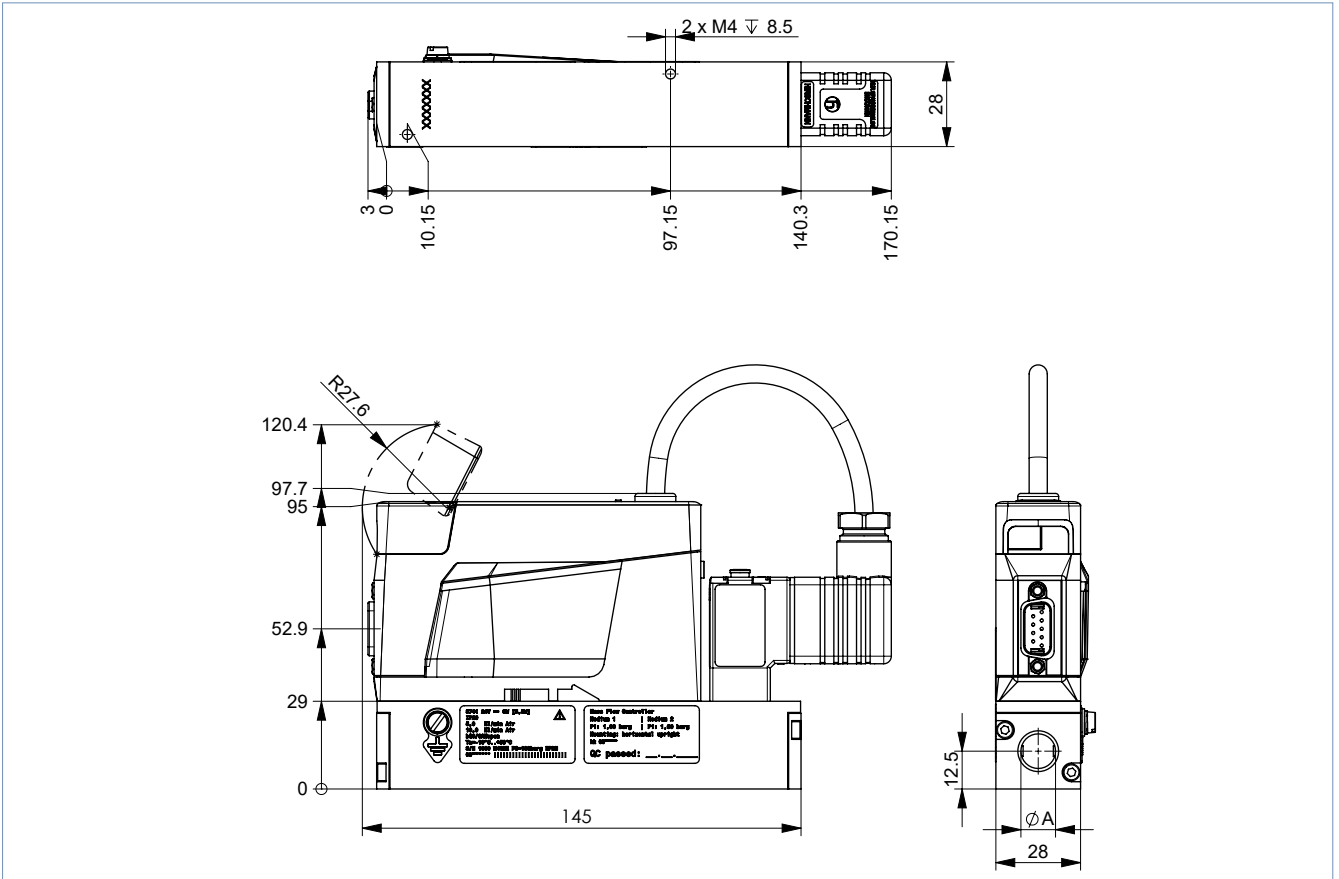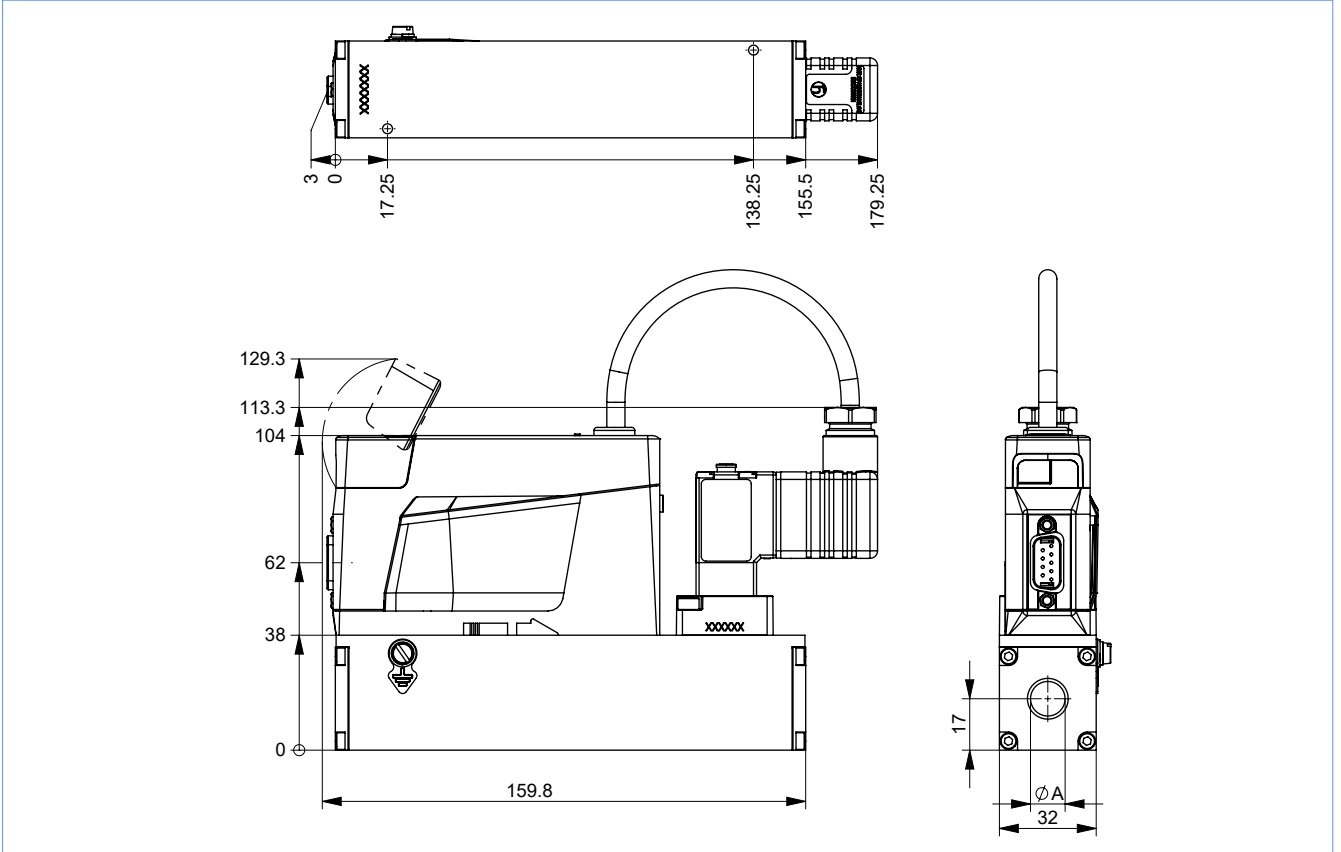
Sub-base variant

Note:
Dimensions in mm

MFC with valve Type 2873 for nominal flow rates > 20 l/min

NPT/G ¼ variant

Note:
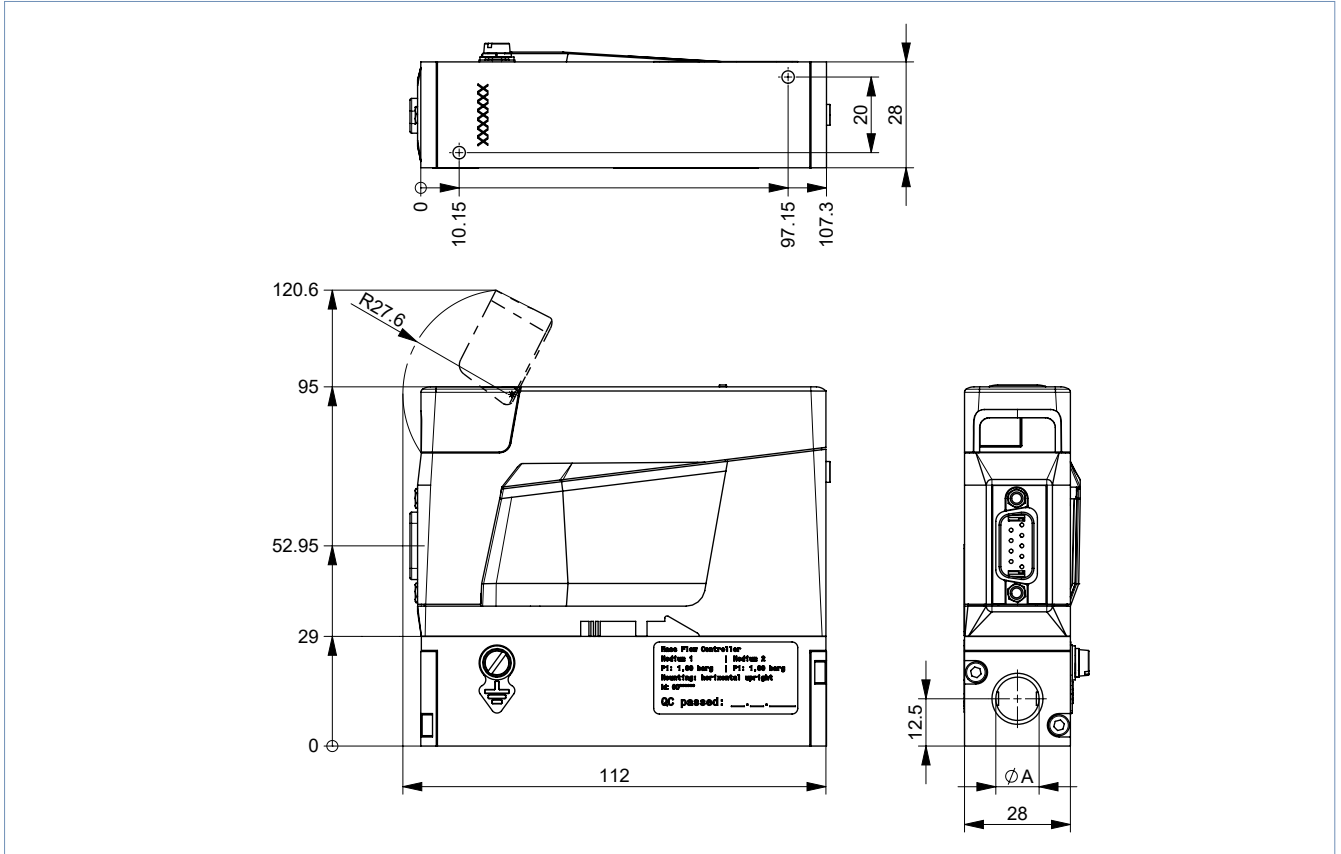Dimensions in mm

Type 8743

Sub-base variant

Note:
Dimensions in mm

Type 8743

MFM for nominal flow rates < 20 l/min

Note:
Dimensions in mm

Type 8743

MFM for nominal flow rates > 20 l/min

Note:
Dimensions in mm

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4.3. Variant with interface for analogue signals and VCR®-compatible port connection

MFC with valve Type 2871 for nominal flow rates < 20 l/min
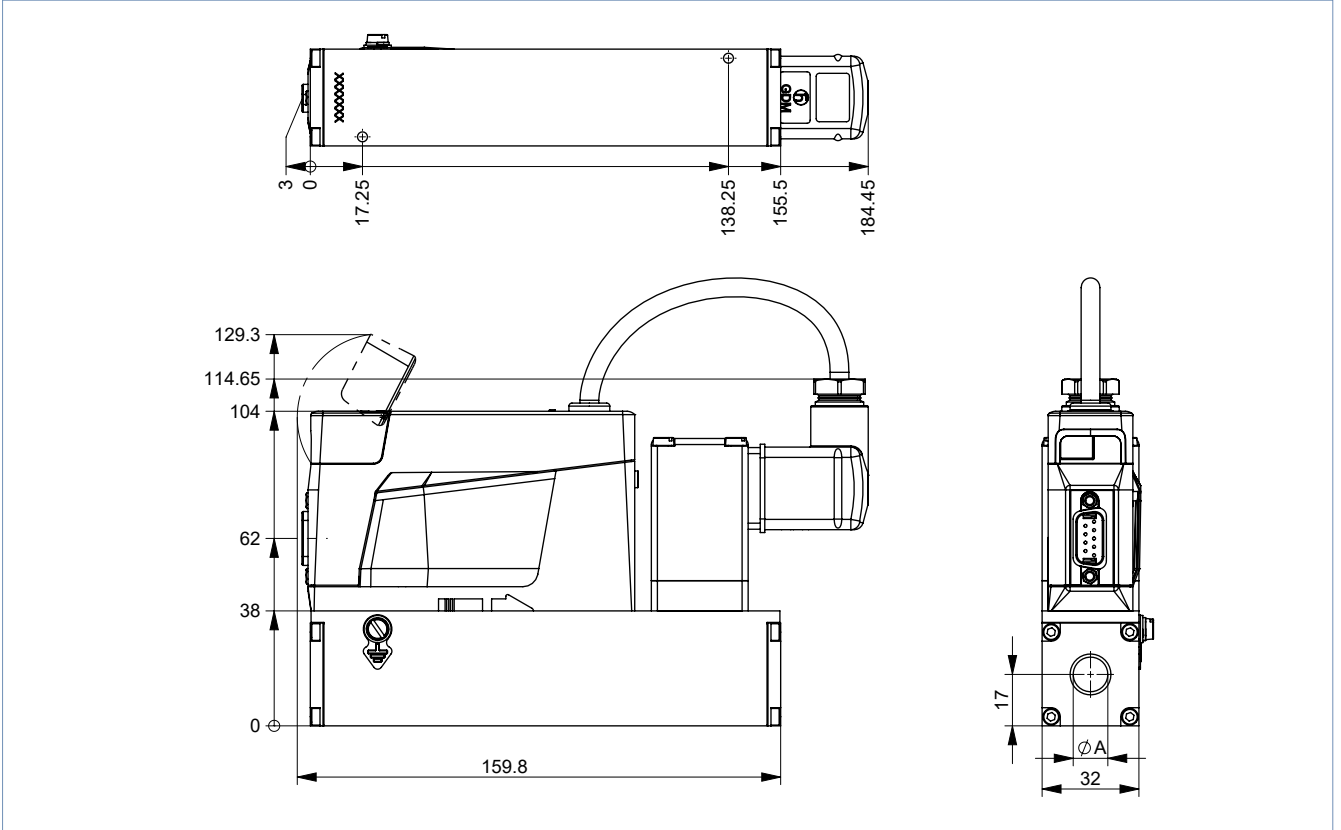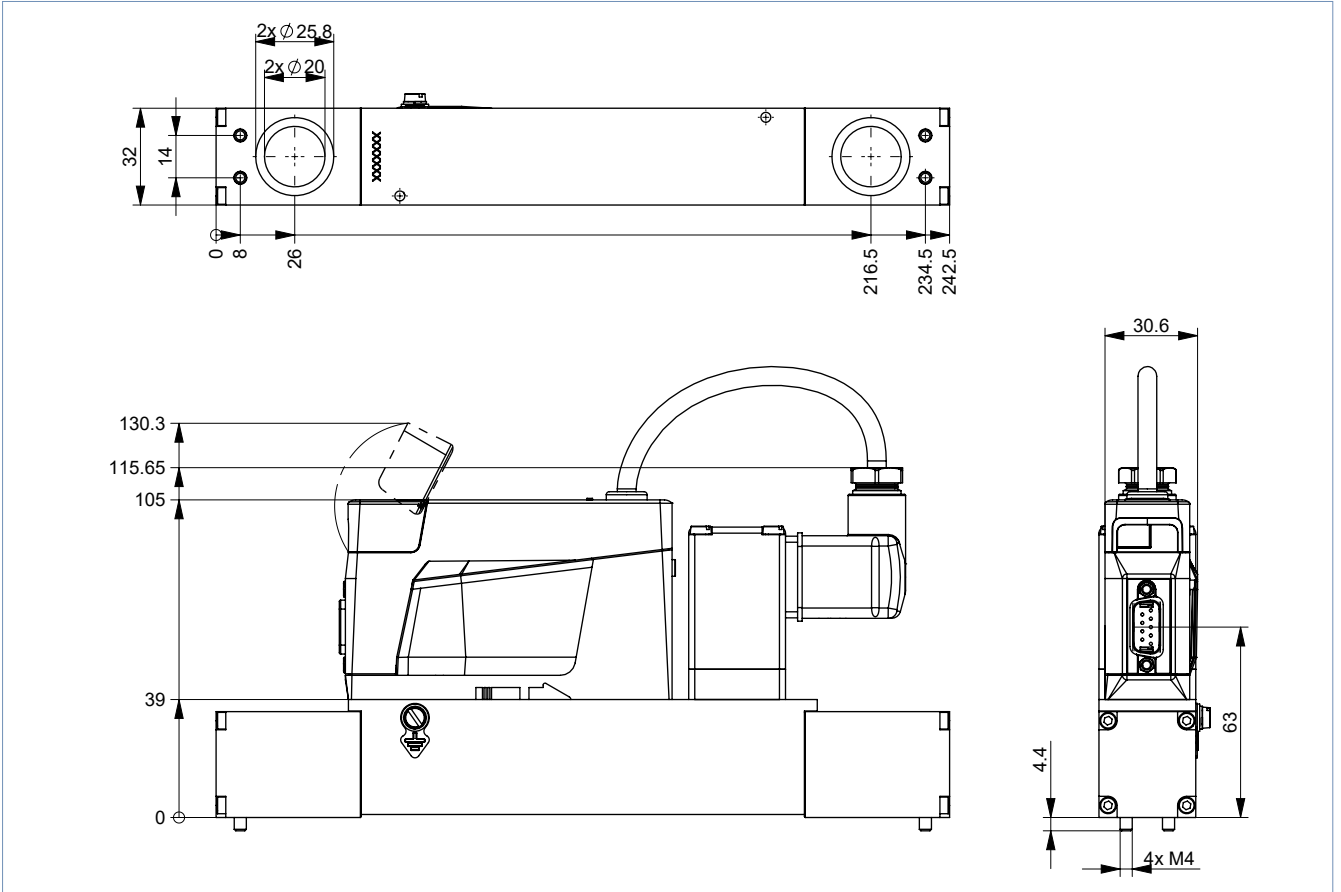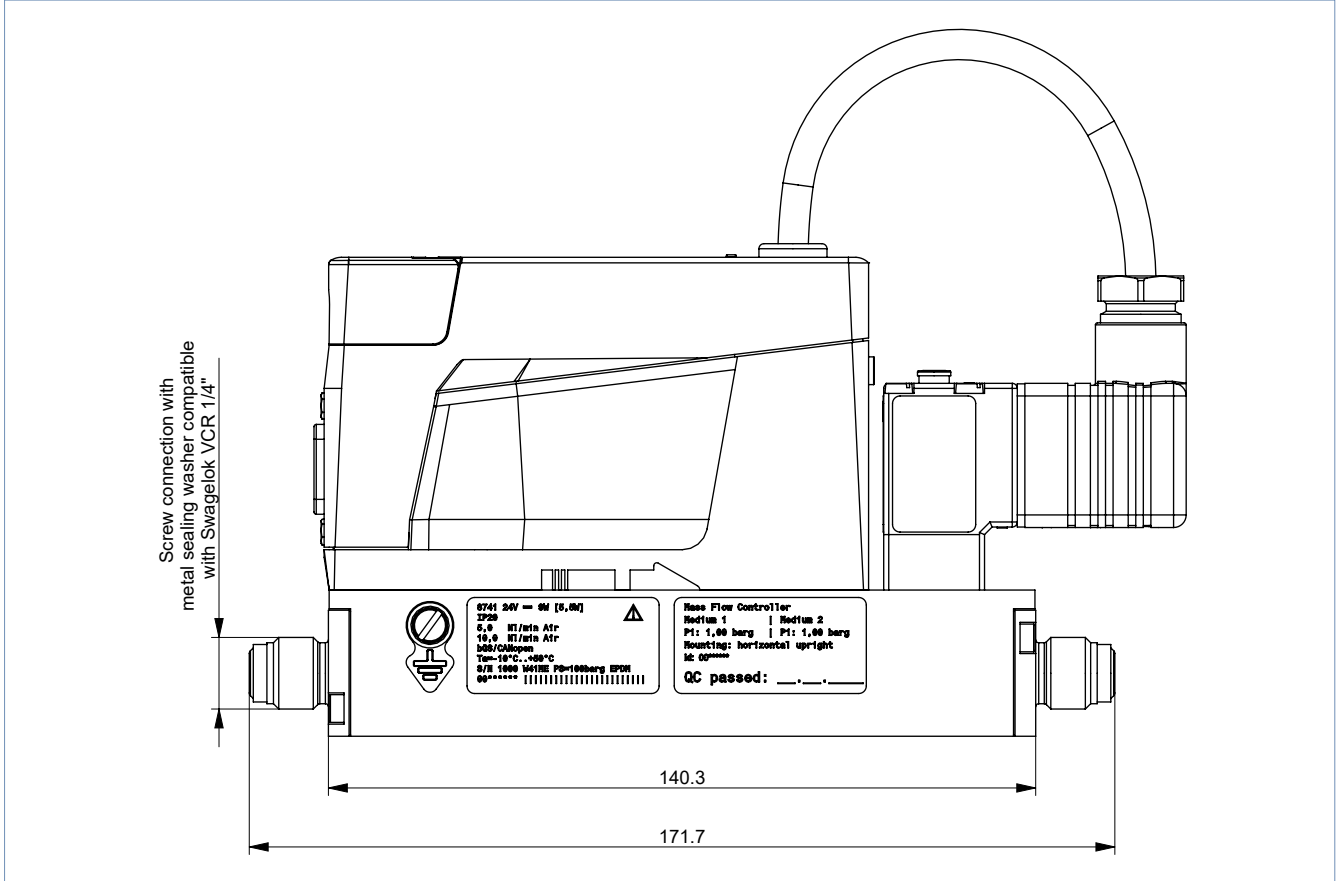
Note:
Dimensions in mm

MFM for nominal flow rates < 20 l/min
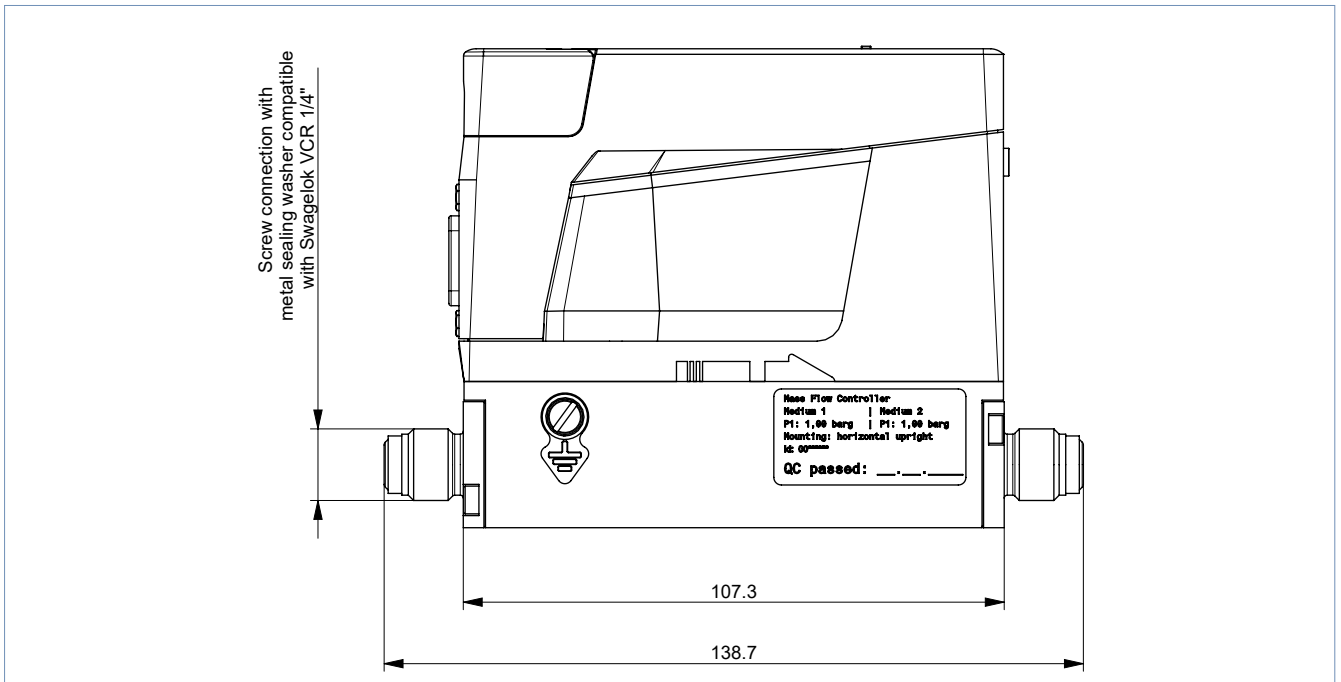
Note:
Dimensions in mm

5. Device / Process connections

5.1. Industrial Ethernet
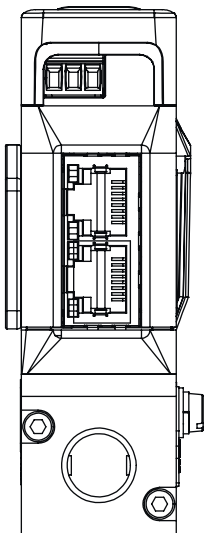
Terminal block, 3-pin	Pin	Assignment
	1	FE (functional earth)
	2	DGND
	3	24 V

RJ45 socket	Pin	Assignment
	1	TX +
	2	TX –
	3	RX +
	4	Not used
	5	Not used
	6	RX –
	7	Not used
	8	Not used
	Housing	Shielding

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5.2. Analogue
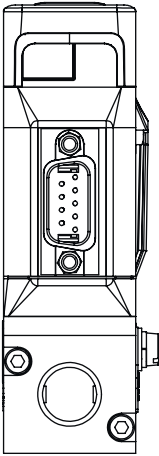
D-Sub, 9-pin, plug	Pin	Assignment
	1	Digital input
	2	GND for supply voltage and digital input
	3	24 V
	4	Relay, normally closed contact
	5	Relay, reference contact
	6	Set-point value input +
	7	Set-point value input GND
	8	Actual value output +
	9	Actual value output GND
	Housing	Shielding
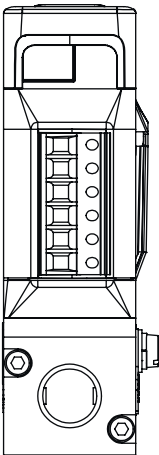
Terminal block, 6-pin	Pin	Assignment
	1	24 V
	2	GND
	3	Set-point value input +
	4	Set-point value input GND
	5	Actual value output +
	6	Actual value output GND
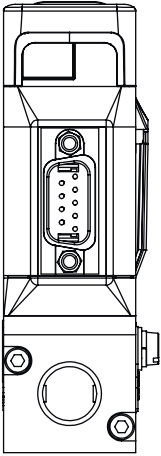
Visit product website ▶

5.3. Modbus RTU

D-Sub, 9-pin, plug		Pin	Assignment
		1	Not connected
		2	GND
		3	24 V
		4	Not connected
		5	Not connected
		6	RS485-Y
		7	RS485-Z
		8	RS485-B
		9	RS485-A
		Housing	Shielding

6. Performance specifications

6.1. MFM pressure loss diagram

The diagram shows an example of the pressure loss characteristics when nitrogen flows through. To determine the pressure loss of other gases, the corresponding air equivalent must first be calculated and the base block used for the other gas taken into account.
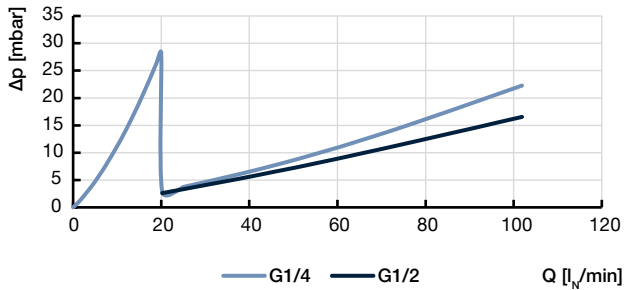
7. Product operation

7.1. Measuring principle

Measurement takes place via bypass. A laminar flow element (LFE) in the main channel creates a low pressure drop. A part of the gas flow is thereby directed into a side channel. This partial flow is proportional to the main channel's flow rate (through the LFE). Two heating resistors are wound around the thin stainless steel tube. At flow rate, heat is transported in flow direction. In this way, a flow value can be inferred via the heat transport. The sensor tube's wall acts as a thermal barrier and determines measurement dynamics. It is therefore slower than sensors with resistors directly placed in the gas flow.

These sensors can also be used to measure many aggressive gases, as all the main parts that come into contact with the medium are made of stainless steel. In addition, with this sensor principle, conversion between different gases is possible.
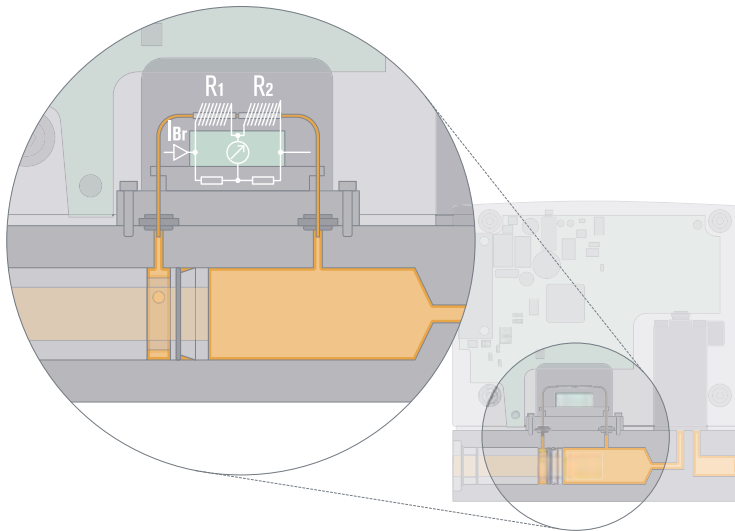
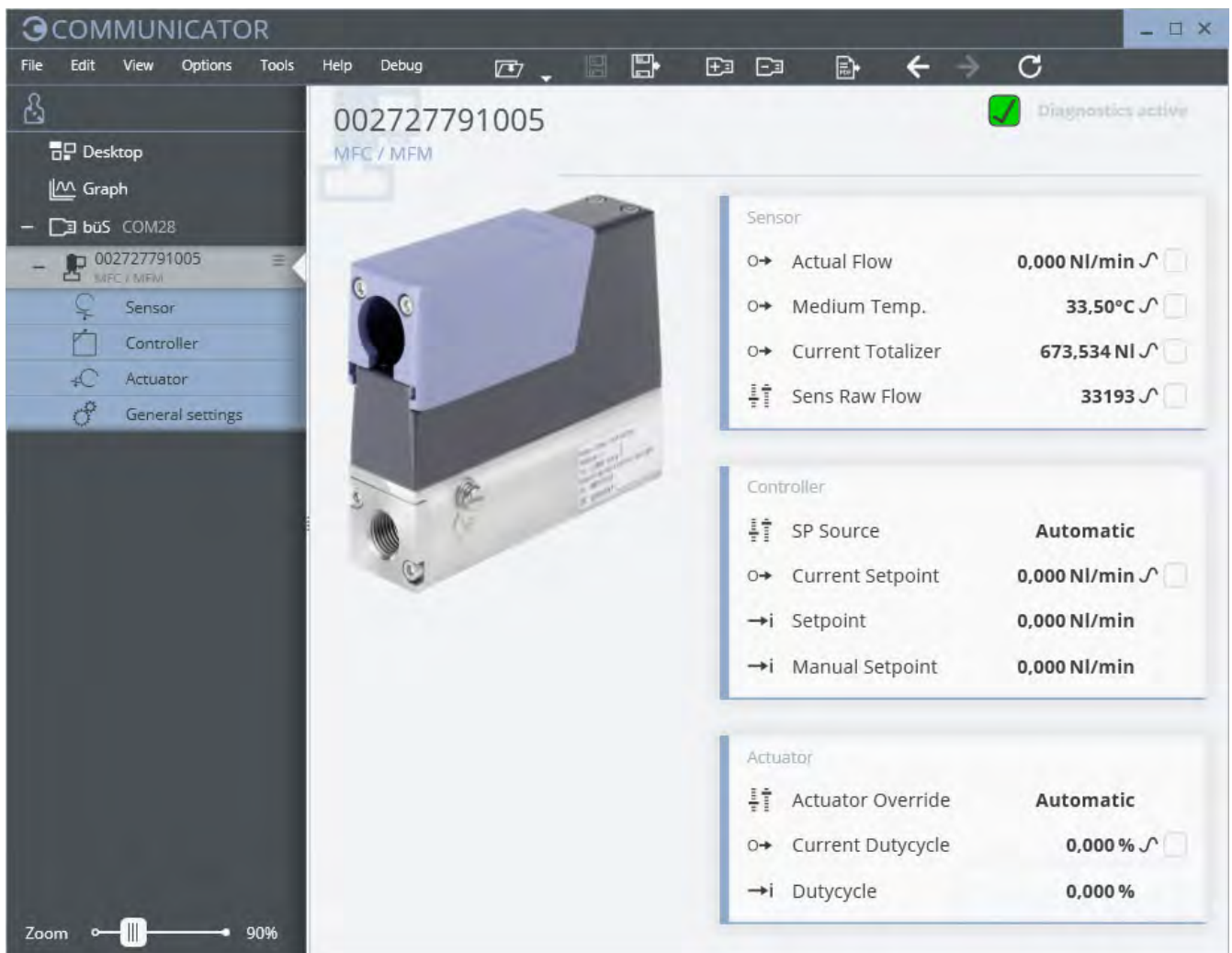# 8. Product accessories

8.1. Bürkert Communicator software

Note:
The corresponding communication software can be downloaded from the website **Type 8920 ▶**.

The Bürkert Communicator is the most important software component of the EDIP (Efficient Device Integration Platform). Various features of this universal tool simplify the configuration and parametrisation of devices equipped with a digital CANopen-based interface. With this tool, the user has a complete overview of cyclic process values as well as acyclic diagnostic data. The integrated graphical programming environment enables the creation of decentralised sub-system control functions. The connection to the PC is established with a USB büS interface set. The adapter is available as an accessory (see).

The Bürkert Communicator enables:

• Configuration, parametrisation and diagnosis of EDIP devices / networks
• Switching between defined gases
• Easy and comfortable mapping of cyclic values
• Graphic display, monitoring and storage of process values
• Firmware update of the connected EDIP devices
• Saving and restoring device configurations
• Zero-point adjustment in case of changed ambient conditions
• Guided re-calibration routine

8.2. Connecting Type 8743 with the Bürkert Communicator software

The Bürkert Communicator interface is based on CANopen. The appropriate bus termination is mandatory. Activate the termination resistor switch on the büS stick.
Connection is established via the device's micro USB socket (USB büS interface set 2 contains the necessary accessories).
Please note: no external power supply may be connected to the micro USB socket. The device must be provided with power as described in chapter **"5. Device / Process connections" on page 15**.

8.3. Configuration management for easy device replacement

If a device needs to be replaced, the memory card can be removed from the defective device and inserted into the new one. This transfers all data of the device to be replaced to the new device. The memory card is available as an accessory and must be ordered separately (see **"9.5. Ordering chart accessories" on page 21**).
In order to successfully exchange the device, it is necessary that both the new device and the device to be replaced possess the same device ID.

8.4. Web server for Industrial Ethernet variant

All Industrial Ethernet-based devices (except for the EtherCAT® protocol) from software version A.13.00.00 and higher dispose of an integrated web server. The server can be accessed via a web browser when entering the device's IP address (factory setting IP192.168.1.100).

9. Ordering information

9.1. Bürkert eShop

Bürkert eShop – Easy ordering and quick 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

9.2. Recommendation regarding product selection

Note:
Use the Product Enquiry Form (see **"9.4. Bürkert Product Enquiry Form" on page 21**) for the device details and send it to us once completed.

For the proper choice of the actuator orifice within the MFC, you need to know not only the required maximum flow rate Q_N, but also the pressure values directly before and after the MFC (p_1, p_2) at Q_N. In general, these pressures are not the same as the overall inlet and outlet pressures of the whole plant, because usually, additional flow resistors (tubing, additional shut-off valves, nozzles etc.) are present both before and after the MFC.

Please use the Product Enquiry Form to indicate the pressures directly before and after the MFC. If these are unknown or not accessible to measurement, estimates are to be made by taking into account the approximate pressure drops over the flow resistors before and after the MFC, at Q_N.flow rate. 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.
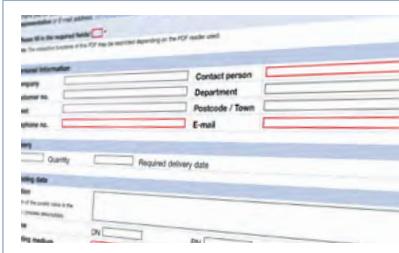
9.3. Bürkert product filter

Bürkert product filter – Get quickly to the right product

You want to select products comfortably based on your technical requirements?
Use the Bürkert product filter and find suitable articles for your application quickly and easily.

Try out our product filter

9.4. Bürkert Product Enquiry Form

Bürkert Product Enquiry Form – Your enquiry quickly and compactly

Would you like to make a specific product enquiry based on your technical requirements?
Use our Product Enquiry Form for this purpose. There you will find all the relevant information for your Bürkert contact. This will enable us to provide you with the best possible advice.

Fill out the form now

9.5. Ordering chart accessories

Description	Article no.
General accessories	
USB büS interface set 2 (Type 8923) for connection to the Bürkert Communicator software: including büS stick, connection cable to M12 plug, M12 connection cable on micro USB for the büS service interface and Y-distributor, cable length: 0.7 m	772551
Power supply unit Phoenix Class2 (Type 1573), 85…240 V AC/24 V DC, 1.25 A, NEC Class 2 (UL 1310)	772438
Power supply unit for standard rail (Type 1573), 100…240 V AC/24 V DC, 1 A, NEC Class 2 (UL 1310)	772361
Power supply unit for standard rail (Type 1573), 100…240 V AC/24 V DC, 2 A, NEC Class 2 (UL 1310)	772362
Power supply unit for standard rail (Type 1573), 100…240 V AC/24 V DC, 4 A	772363
Memory card	On request
Device description files for software interfaces	Download from **Type 8743 ▶**
Bürkert Communicator software	Download from **Type 8743 ▶**
For Type 8743 Analogue	
Terminal block 6-pin (standard for Type 8743, included in delivery of the corresponding analogue variant)	On request
D-sub adapter cable, on strand, cable length: 5 m	580882
D-sub adapter cable, on strand, cable length: 10 m	580883

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