Mass Flow Controller (MFC) for Gases

- Inline MFC for full scale rates from 20 l_N/min to 1500 l_N/min; 1/4" to 1"
- High accuracy
- Short settling time
- Optional fieldbus

Type 8626 can be combined with…

Type 8619
Multichannel program controller

Type 0330
3/2-way valve

Type 6013
2/2-way valve

The Type 8626 mass flow controller forms an integrated system, consisting of the flow sensor, control electronics and control valve. Using this controller, mass flows of gases can be kept constant or can follow a predefined set-point profile regardless of interfering influences (such as pressure or temperature variations). The sensor works according to the thermal principle (constant-temperature anemometer). The measurement is made in the main channel and provides the mass flow directly without any corrections (see description on page 2). The digital flow controller compares the set point with the actual value and calculates the control signal for the proportional valve. The direct-acting solenoid control valve works according to the well-tried plunger-type principle, and is driven by a PWM voltage signal. Besides its control function an

intelligent algorithm ensures that the valve closes tight with 0% set point. The measurement in the main flow of the MFC Type 8626 is characterized by an excellent dynamics and a low sensitivity to contamination. The MFC can be used in versatile flow control tasks.

- Process technology
- Heat treatment
- Environmental technology
- Material coating
- Burner controls
- Fuel cell technology

Technical Data			
Nominal flow range [1] **(Q_{nom})**	20 to 1500 l_N/min[2], N_2 equivalent see table on page 2, higher flows on request	**Port connection**	G 1/4", 3/8", 1/2", 3/4", 1" NPT 1/4", 3/8", 1/2", 3/4", 1"
Turn-down ratio	1:50 [3]	**Control valve**	Normally closed
Operating gas	Neutral, non-contaminated gases, others available on request	Valve orifice	0.8 to 12 mm
		k_{Vs} value	0.02 to 2.8 m³/h
Calibration gas	Operating gas or air with correcting function	**Electr. connection**	Socket M16, round, 8-pin and socket D-Sub HD15, 15-pin
Max. operating pressure (inlet pressure)	Up to max. 10 bar, depending on the orifice of the valve	Additionally with:	
Gas temperature	-10 to +70°C (-10 to +60°C with oxygen)	-PROFIBUS-DP:	Socket M12 5-pin or D-Sub 9-pin
Ambient temperature	-10 to +45°C (higher temperatures on request)	-DeviceNet/CANopen:	Plug M12 5-pin or D-Sub 9-pin
		with RS485 version only:	Plug D-Sub 9-pin
Accuracy (after 15 min warm up time)	±1.5% o.R. ±0.3% F.S. (o.R.: of reading; F.S.: of full scale)	**Operating voltage**	24V DC
Repeatability	±0.1% F.S.	**Voltage tolerance**	±10%
Settling time ($t_{95\%}$)	<500 ms	**Residual ripple**	< 2%
Materials		**Power consumption**	12,5 W–37 W (depending on version)
Body	Aluminium (black anodized) or stainless steel	**Type of protection** (with connected cables)	IP65
Housing	Aluminium (coated)	**Dimensions**	See drawings on p. 6–9
Seals	FKM, EPDM	**Total weight** (examples)	2,5 kg (Al, 16 W-valve) 4,5 kg (VA, 16 W-valve)
		Mounting position	Horizontal or vertical
		Light emitting diodes (Default, other functions programmable)	Indication for 1. Power, 3. Limit 2. Communication 4. Error

[1] The nominal flow value is the max. flow value calibrated which can be controlled. The nominal flow range defines the range of nominal flow rates (full scale values) possible.
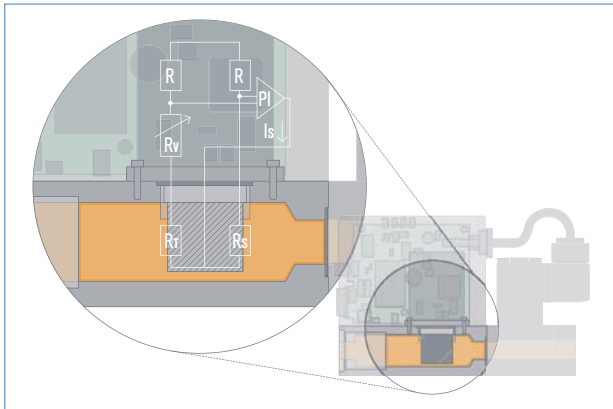[2] Index N: Flow rates referred to 1.013 bar and 0° C. Alternatively there is an Index S available which refers to 1.013 bar and 20° C
[3] With vertical installation and flow downwards the turn-down ratio is 1:10

Technical Data *(cont.)*

Device variant	Analog signal version	Fieldbus version	RS485 version (only D-Sub, 9-pin)
Analog communication Input signal (set point) Input impedance Output signal (actual flow) Max. current voltage output Max. load current output	0-5 V, 0-10 V, 0-20 mA or 4-20 mA >20 kΩ (voltage) <300 Ω (current) 0-5 V, 0-10 V, 0-20 mA or 4-20 mA 10 mA 600 Ω	None	None
Fieldbus option (D-Sub HD15 covered with sealed plate for, pins for analogue inputs/outputs not connected)	None	PROFIBUS-DP, DeviceNet, CANopen	Modbus RTU (via RS interface)
Digital communication via adapter possible:	RS232 (supports Modbus RTU) RS485, RS422 or USB		RS485, RS422 USB
Binary inputs (Default, other functions programmable)	Three: 1. Start Autotune 2. not assigned 3. not assigned		One: Start Autotune
Binary outputs (Default, other functions programmable)	Two relay outputs 1. Limit (desired value cannot be achieved) 2. Error (e.g. sensor fault) Load capacity: max. 60 V, 1 A, 60 VA		One relay output 1. Limit (desired value cannot be achieved) Load capacity: max. 25 V, 1 A, 25 VA

Measuring Principle

Nominal Flow Ranges of Typical Gases
(other gases on request)

Gas	Min. Q_{nom} [I_N/min]	Max. Q_{nom} [I_N/min]
Acetylene	20	975
Ammonia	20	1250
Argon	20	1500
Carbon dioxide	20	800
Air	20	1500
Methane	20	750
Propane	20	400
Oxygen	20	1500
Nitrogen	20	1500

This sensor works as a hot-film anemometer in the so-called CTA operational mode (Constant Temperature Anemometer). To do this, two resistors with precisely specified temperature coefficients located directly in the media flow and three resistors located outside the flow are connected together to form a bridge.

The first resistor in the gas flow (R_T) measures the fluid temperature, while the second, low-value resistor (R_S) is heated so that it is maintained at a fixed, predefined over-temperature with respect to the fluid tem-perature. The heating current required to maintain this is a measure of the heat being removed by the flowing gas, and represents the primary measurement.

An adequate flow conditioning within the MFC and the calibration with high-quality flow standards ensure that the mass of gas flowing per time unit can be derived from the primary signal with high accuracy.

Notes Regarding the Configuration

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 out-let pressures of the whole plant, because there are usually additional flow resistors (tubing, additional shut-off valves, nozzles etc.) present both before and after the controller.

Please use the specification sheet (p. 10) to indicate the pressures directly before and after the MFC. If these should be unknown or not ac-cessible to a measurement, estimates are to be made by taking into ac-count 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_{1max} to be encoun-tered. This data is needed to make sure the actuator is able to provide a close-tight function within all the specified modes of operation.
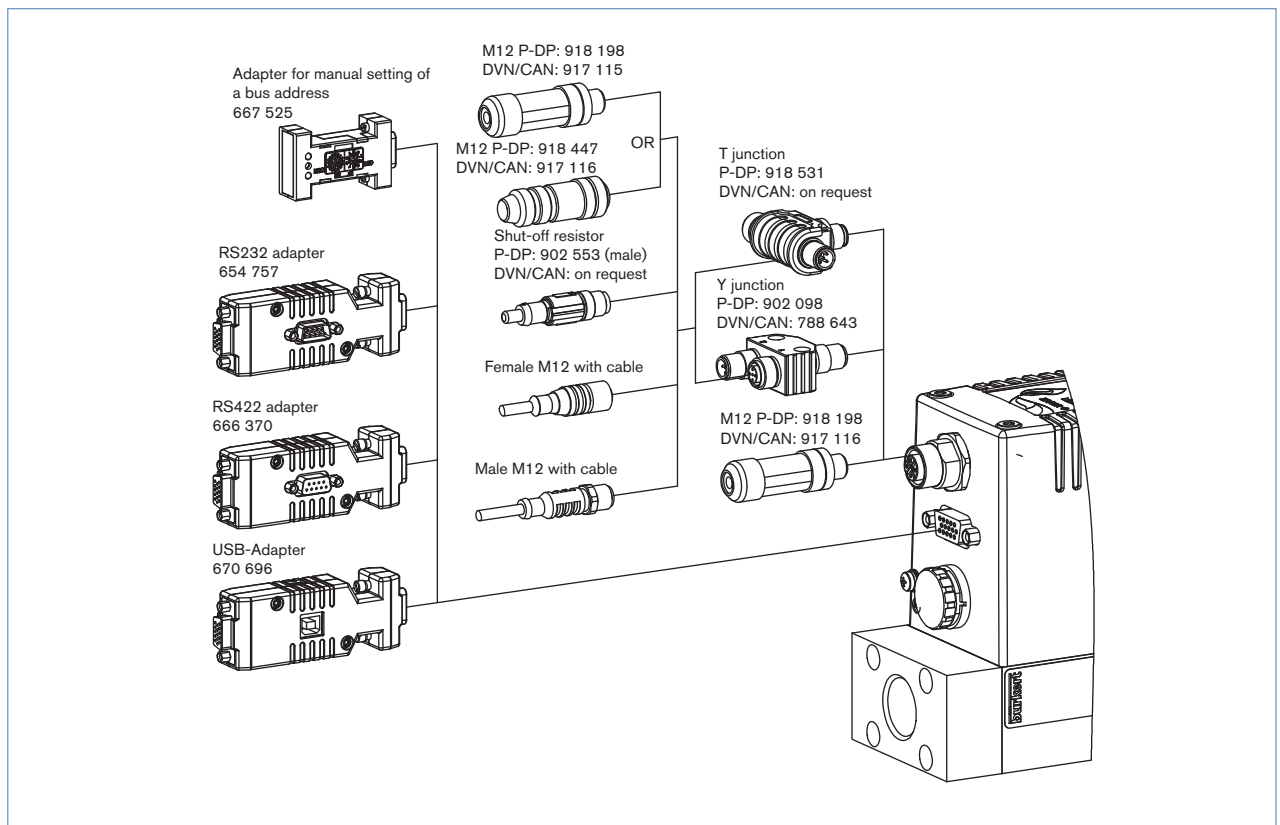
▶ **Please use the form on page 10 for the information about your specific requirements.**

Ordering Chart for Accessories

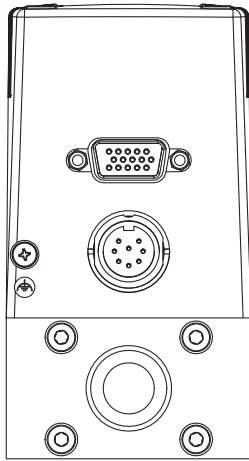| Article		Item No.
Connectors/Cables		
Round plug M16 8-pin (solder connection)		918 299
Round plug M16 8-pin with 5 m cable		787 733
Round plug M16 8-pin with 10 m cable		787 734
Plug D-Sub HD15 15-pin with 5m cable		787 735
Plug D-Sub HD15 15-pin with 10m cable		787 736
Adapters [4]		
RS232 adapter for connection to a computer, connection with an extension cable (item no. 917039)		654 757
Extension cable for RS232 9-pin socket/plug 2 m		917 039
RS422-Adapter (RS485 compatible)		666 370
USB-Adapter for D-Sub HD15		670 696
USB-Adapter for D-Sub 9-pin (RS485 Version)		670 693
USB connection cable 2 m		772 299
Adapter for manual bus adresse settings (instad of SW)		667 525
Software MassFlowCommunicator		Download from www.buerkert.com
Accessories for Fieldbus	**PROFIBUS DP (B-coded)**	**DeviceNet/ CANopen (A-coded)**
M12-Plug [5]	918 198	917 115
M12-socket (coupling) [5]	918 447	917 116
Y-junction [5]	902 098	788 643
T-junction	918 531	(on request)
Shut-off resistor	902 553	(on request)
GSD-File (PROFIBUS), EDS-File (DeviceNet, CANopen)	Download from www.buerkert.com (see Type 8626)	

[4] The adapters serve mainly for initial operation or diagnosis. Those are not obligatory for continuous operation.

[5] The two M12 connectors as listed above cannot be used together on the same side of the Y-junction. At least one of the two M12 connection needs to be a prefabricated cable which uses typiclly a thinner connector.
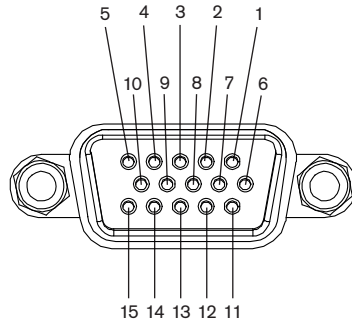

Adapter for manual setting of a bus address
667 525

M12 P-DP: 918 198
DVN/CAN: 917 115

M12 P-DP: 918 447
DVN/CAN: 917 116

OR

T junction
P-DP: 918 531
DVN/CAN: on request

RS232 adapter
654 757

Shut-off resistor
P-DP: 902 553 (male)
DVN/CAN: on request

Y junction
P-DP: 902 098
DVN/CAN: 788 643

Female M12 with cable

RS422 adapter
666 370

Male M12 with cable

M12 P-DP: 918 198
DVN/CAN: 917 116

USB-Adapter
670 696

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Pin Assignment

Standard

Fieldbus D-SUB

Socket D-Sub HD15	Pin	Assignment	
		Analogue Control	Bus control
	1	Set value input +	N.C. [6]
	2	Set value input GND	N.C.
	3	Actual value output +	N.C.
	4	Binary input 2	
	5	12V-Output (only for internal company use)	
	6	RS232 TxD (direct connection to computer)	
	7	Binary input 1	
	8	GND (for binary inputs)	
	9	only company internal use (do not connect!)	
	10	12V-Output (only for internal company use)	
	11	12V-Output (only for internal company use)	
	12	Binary input 3	
	13	Actual value output GND	N.C.
	14	RS232 RxD direct connection to computer)	
	15	DGND (for RS232-interface)	

[6] N.C.: not connected (not used)
Note:
– Optional Pin 1 and 2 with bus version as transmitter input possible
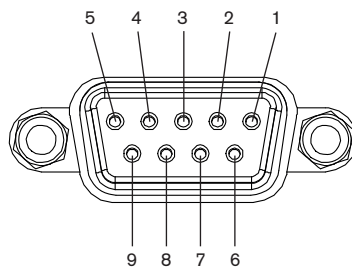– The cable length for RS232/ Setpoint and flow value signal is limited to 30 meters.
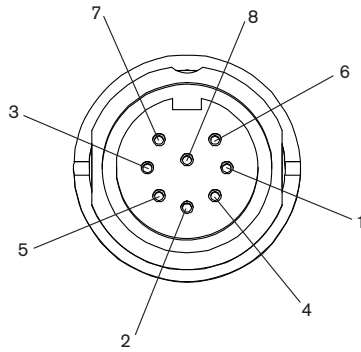
Socket M16, round, 8-pin	Pin	Assignment
	1	24V-Supply +
	2	Relay 1 – reference contact
	3	Relay 2 – reference contact
	4	Relay 1 – normally closed
	5	Relay 1 – normally opened
	6	24V-Supply GND
	7	Relay 2 – normally opened
	8	Relay 2 – normally closed

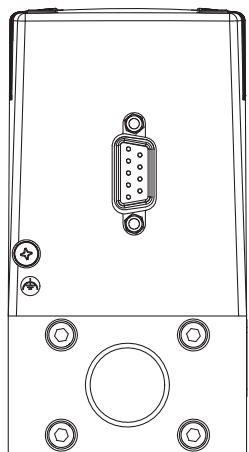| Socket D-Sub 9-pin (only with fieldbus version)	Pin	Assignment	
		PROFIBUS DP	DeviceNet/ CANopen
	1	Shield	Shield
	2	N.C.	CAN-L data line
	3	RxD/TxD - P (B-line)	GND
	4	RTS (control signal for repeater)	N.C.
	5	GND	N.C.
	6	VDD (only for termination resistor)	N.C.
	7	N.C.	CAN-H data line
	8	RxD/TxD - N (A-line)	N.C.
	9	N.C.	N.C.

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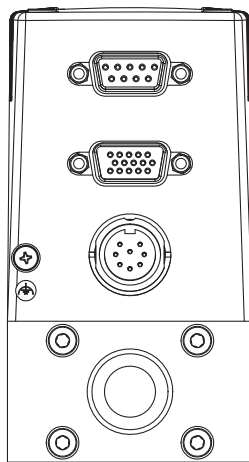
Pin Assignment *(continued)*
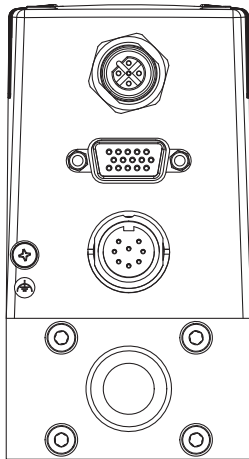
M12 Profibus
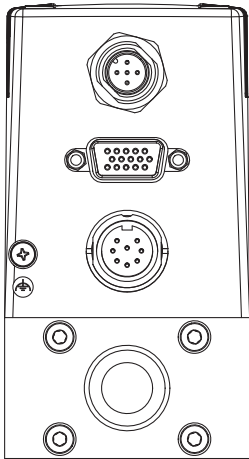
M12 DeviceNet

RS485 version

PROFIBUS DP – socket B-coded M12 (DPV1 max. 12 Mbaud)	Pin	Assignment
	1	VDD (only for termination resistor)
	2	RxD/TxD – N (A-line)
	3	DGND
	4	RxD/TxD – P (B-line)
	5	N.C.
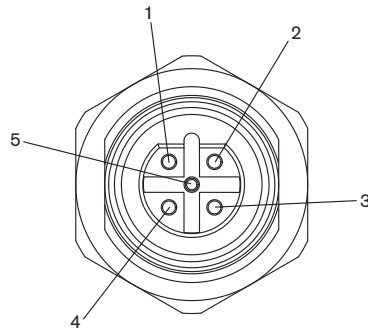
DeviceNet/ CANopen – Plug A-coded M12	Pin	Assignment
	1	Shield
	2	N.C. [7]
	3	DGND
	4	CAN_H
	5	CAN_L
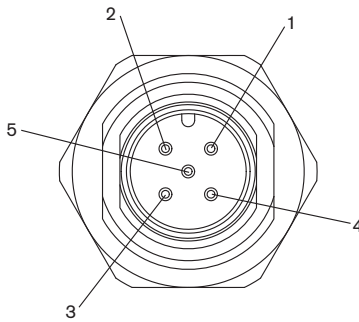
[7] Optional configuration with 24V DC possible for power supply via fieldbus connector. With this no power supply connection on round M16 plug needed.
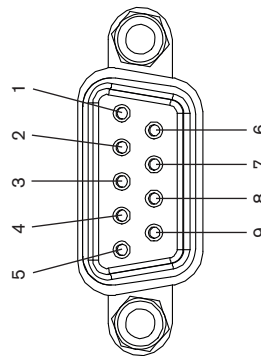
Plug D-Sub 9-pin	Pin	Assignment
	1	Binary input (related to GND Pin 2)
	2	GND
	3	Power supply +24V DC
	4	Relay, normally opened
	5	Relay, normally closed
	6	TX+ (RS485-Y) – bridge with pin 9 at half duplex
	7	TX- (RS485-Z) – bridge with pin 8 at half duplex
	8	RX- (RS485-B)
	9	RX+ (RS485-A)

Dimensions [mm]

MFC 8626 with valve type 2833 (9W coil)

Fieldbus: D-SUB

Fieldbus: M12

A	B	C	D
G 1/4; NPT 1/4	10	22.25	181
G 3/8; NPT 3/8	11	22.25	181
G 1/2; NPT 1/2	14	27.25	191
G 3/4; NPT 3/4	15	27.25	191
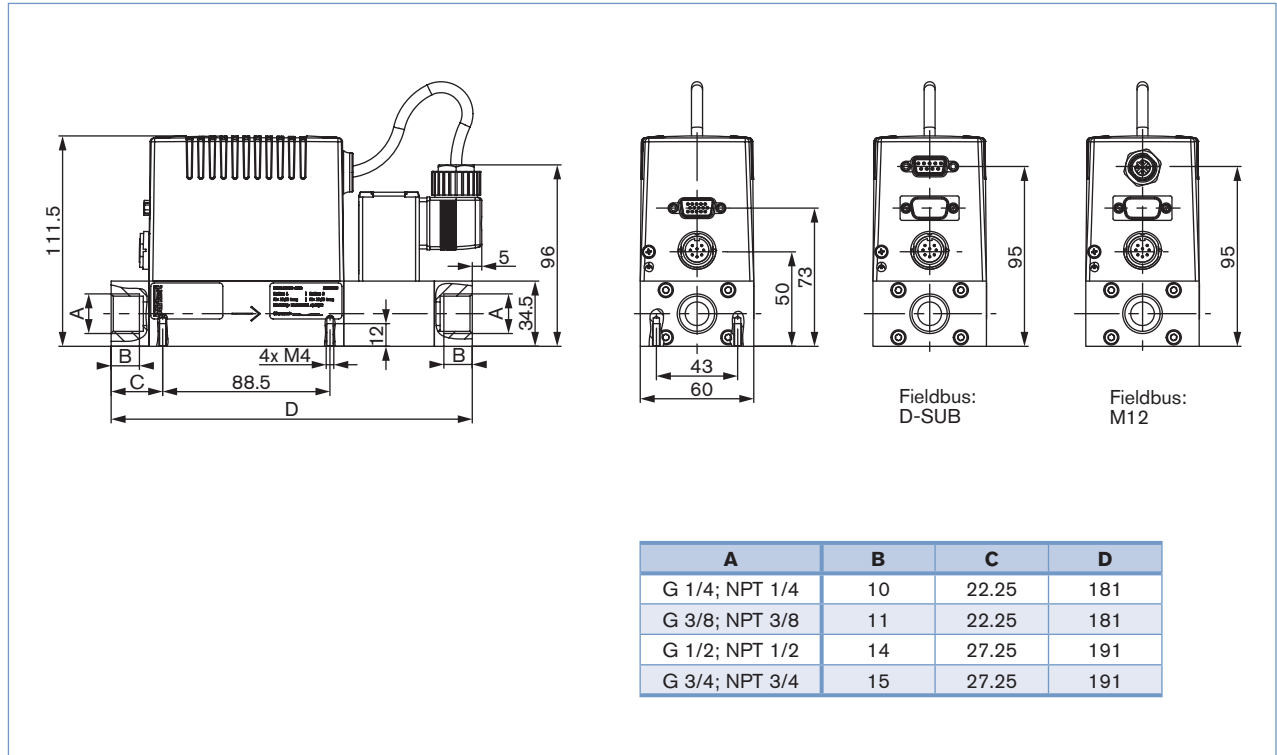
MFC 8626 with valve type 2833 (9W coil) and base block for large nominal flow rates

Fieldbus: D-SUB

Fieldbus: M12

A	B	C	D
G 3/8; NPT 3/8	12	27.25	191
G 1/2; NPT 1/2	14	27.25	191
G 3/4; NPT 3/4	15	27.25	191

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Dimensions [mm]

MFC 8626 with valve type 2835 (16W coil)

Fieldbus:
D-SUB

Fieldbus:
M12

A	B	C	D
G 1/4; NPT 1/4	10	22.25	200.5
G 3/8; NPT 3/8	11	22.25	200.5
G 1/2; NPT 1/2	14	27.25	210.5
G 3/4; NPT 3/4	15	27.25	210.5
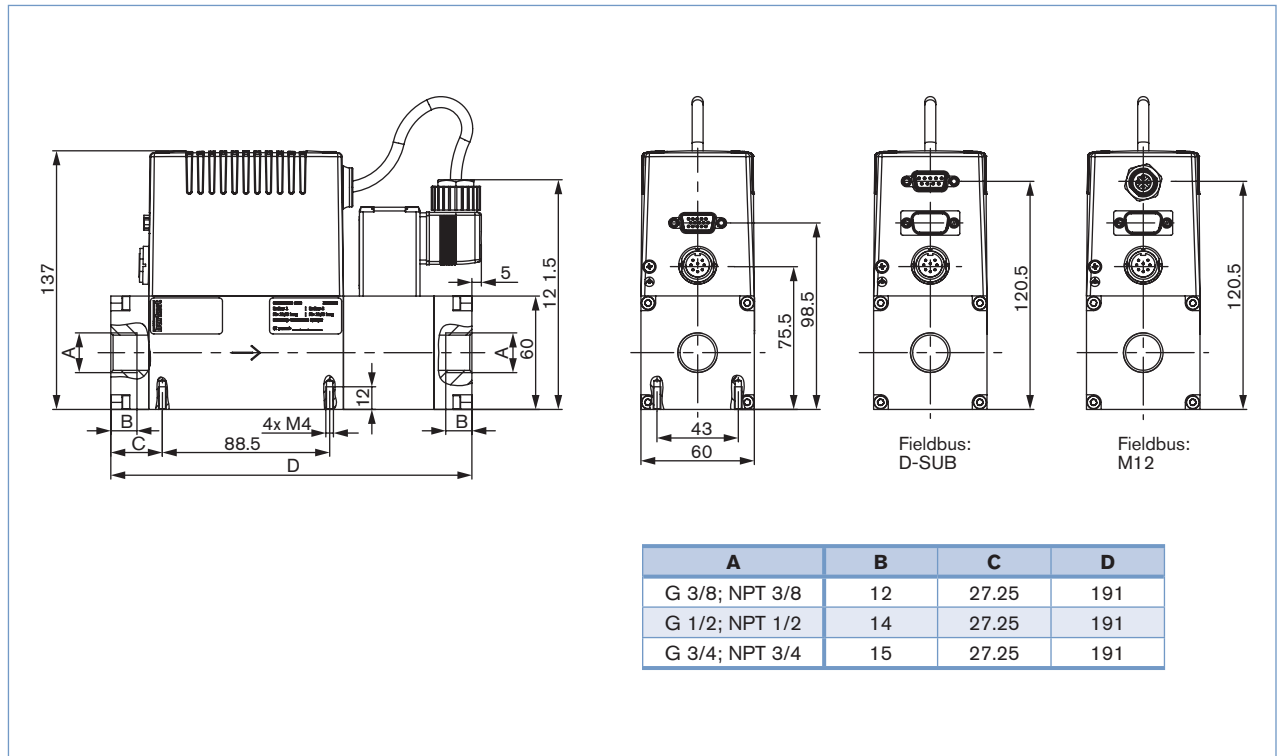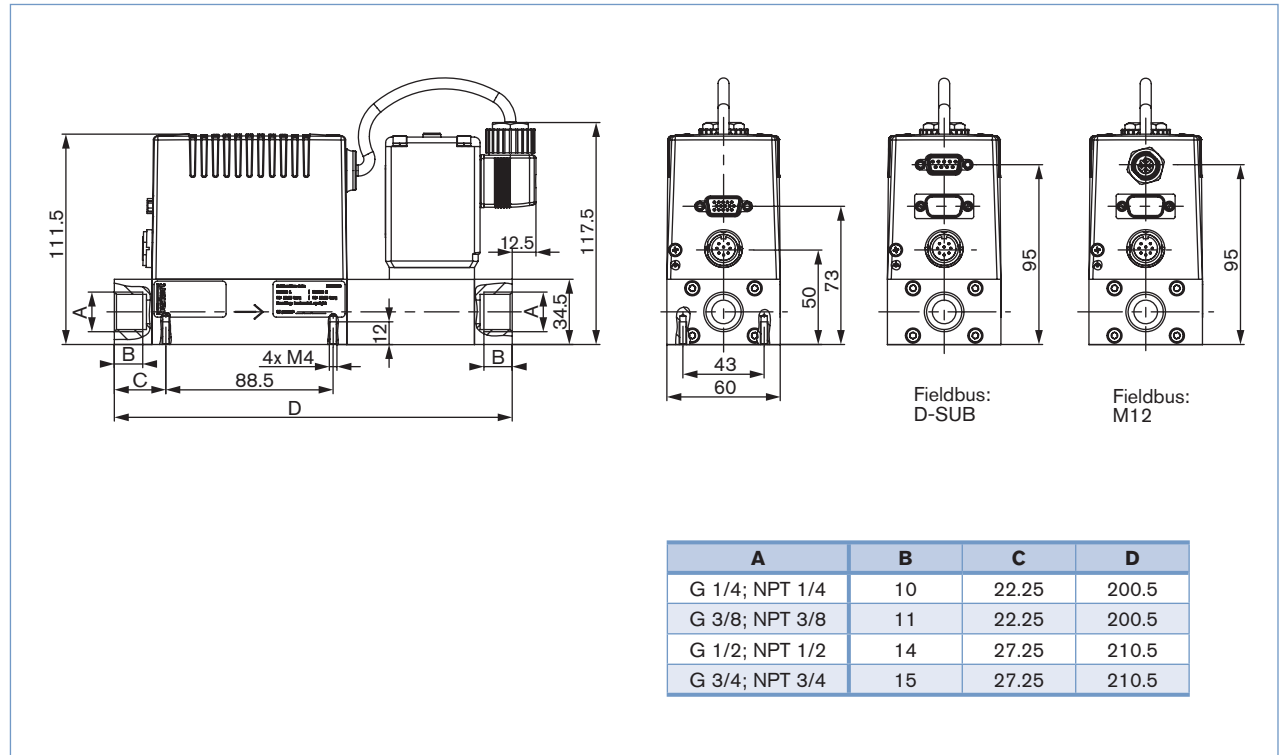
MFC 8626 with valve type 2835 (16W coil) and base block for large nominal flow rates

Fieldbus:
D-SUB

Fieldbus:
M12

A	B	C	D
G 3/8; NPT 3/8	12	27.25	210.5
G 1/2; NPT 1/2	14	27.25	210.5
G 3/4; NPT 3/4	15	27.25	210.5

Dimensions [mm]

MFC 8626 with valve type 6024 (18W coil)

Fieldbus:
D-SUB

Fieldbus:
M12

A	B	C	D
G 1/4; NPT 1/4	10	22.25	207
G 3/8; NPT 3/8	11	22.25	207
G 1/2; NPT 1/2	14	27.25	217
G 3/4; NPT 3/4	15	27.25	217
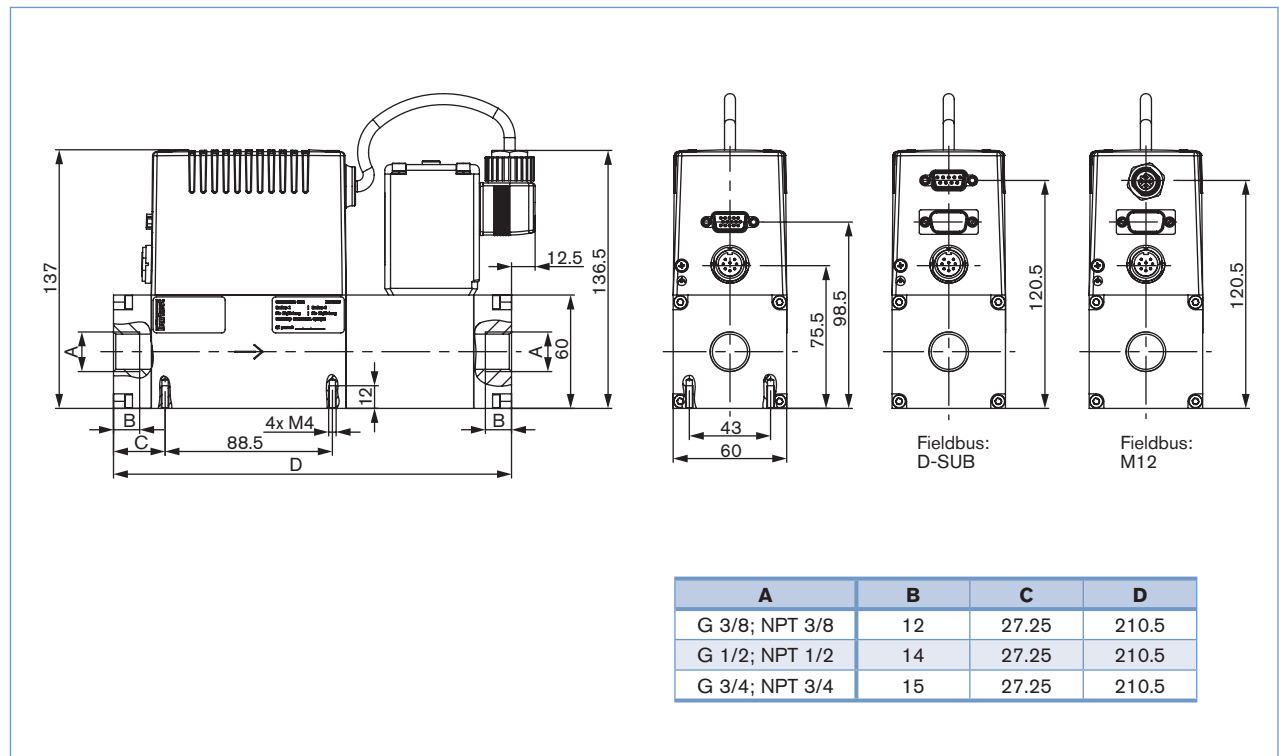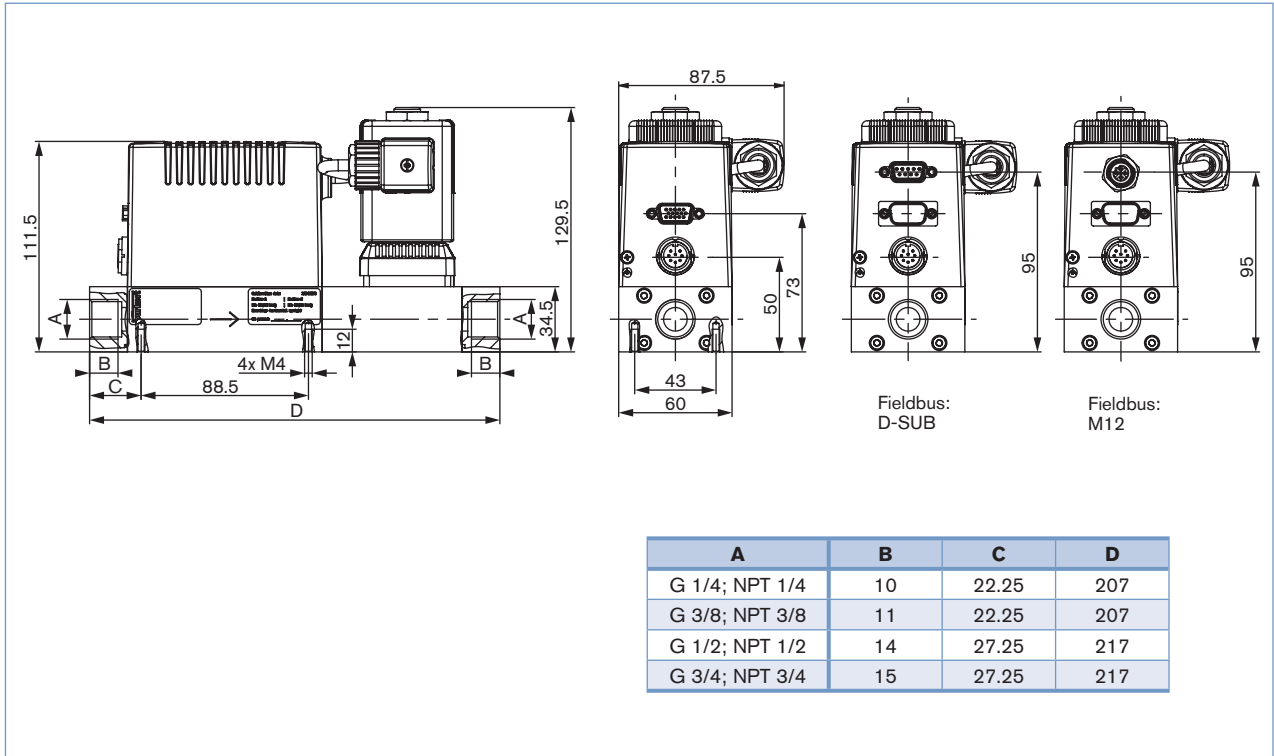
MFC 8626 with valve type 6024 (18W coil) and base block for large nominal flow rates

Fieldbus:
D-SUB

Fieldbus:
M12

A	B	C	D
G 3/8; NPT 3/8	12	27.25	217
G 1/2; NPT 1/2	14	27.25	217
G 3/4; NPT 3/4	15	27.25	217

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Dimensions [mm]

MFC 8626 with valve type 2836 (24W coil)

A	B	C	D
G 1/4; NPT 1/4	10	22.25	207
G 3/8; NPT 3/8	11	22.25	207
G 1/2; NPT 1/2	14	27.25	217
G 3/4; NPT 3/4	15	27.25	217
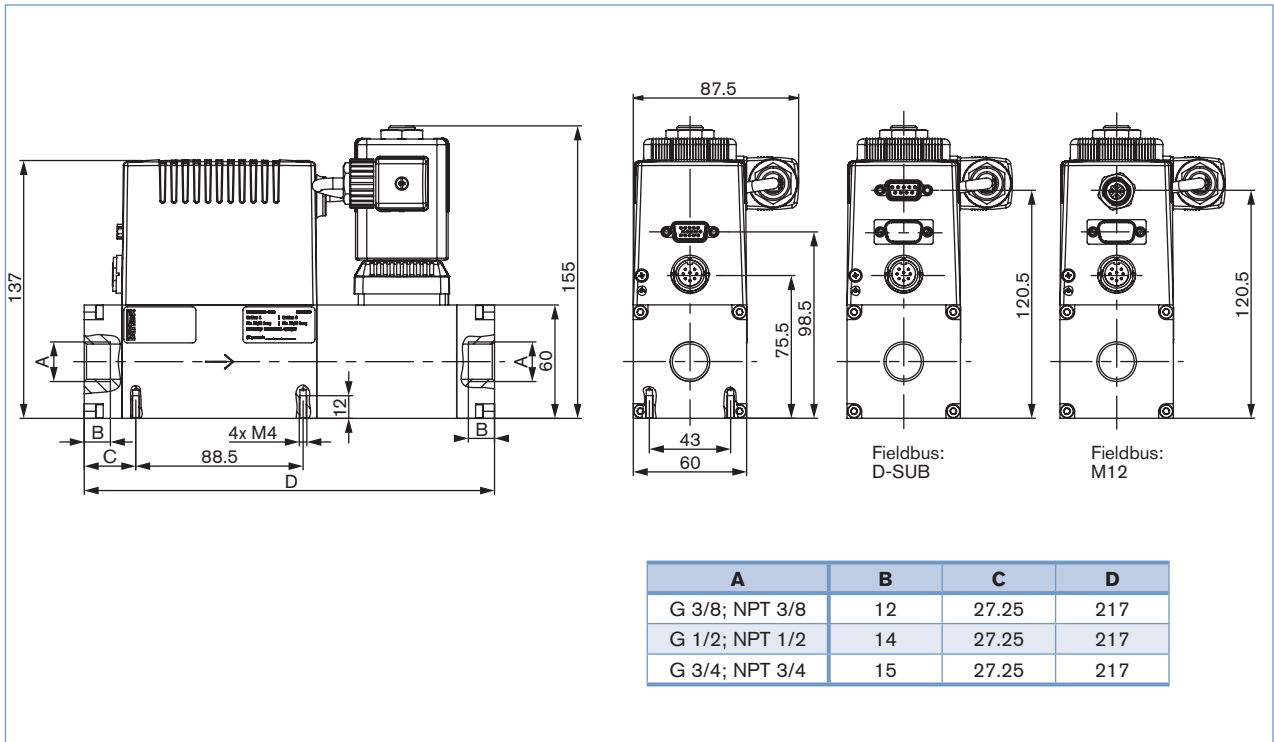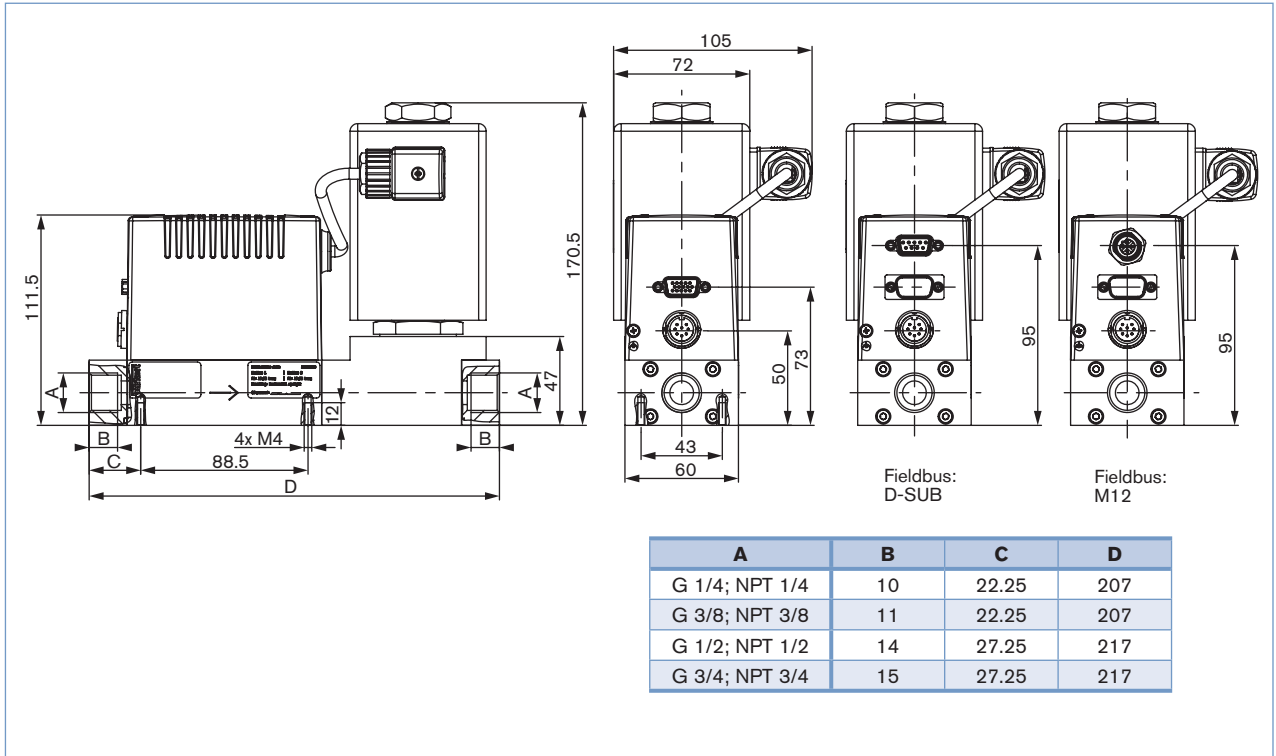
MFC 8626 with valve type 2836 (24W coil) and base block for large nominal flow rates

A	B	C	D
G 3/8; NPT 3/8	12	27.25	217
G 1/2; NPT 1/2	14	27.25	217
G 3/4; NPT 3/4	15	27.25	217
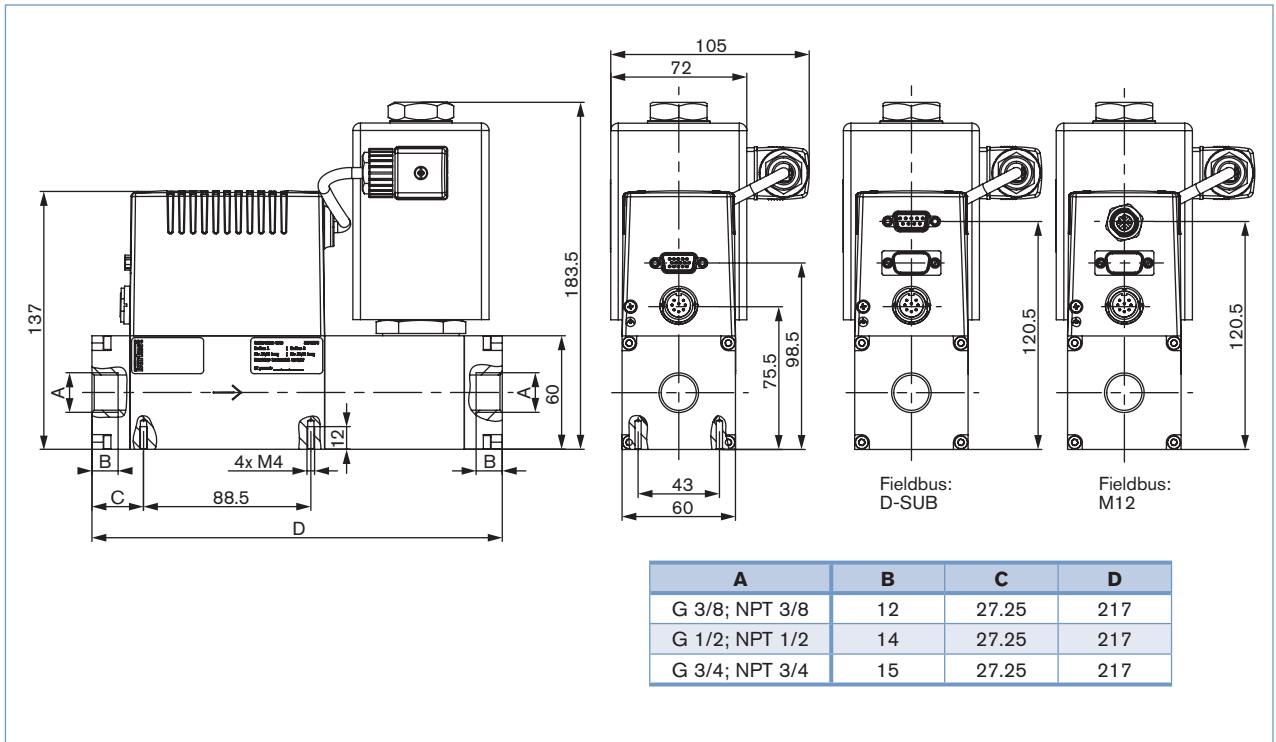
Note
You can fill out the fields directly in the PDF file before printing out the form.

MFC/MFM Applications – Request for Quotation

▶ **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 ☐ Required delivery date

Fluid data

Type of gas (or gas proportion in mixtures)	
Density	$kg/m^{3\ 8)}$
Gas temperature	°C °F
Moisture content	g/m^3
Abrasive components/solid particles	☐ no ☐ yes, as follows:

Fluidic data

Flow range Q_{nom}	Min.	☐ l_N/min [8)] ☐ l_S/min (slpm) [9)]
	Max.	☐ m_N^3/h [8)] ☐ kg/h
		☐ cm_N^3/min [8)] ☐ cm_S^3/min (sccm) [9)]
		☐ l_N/h [8)] ☐ l_S/h [9)]

Inlet pressure at Q_{nom} [10)] $p_1 =$ ____ bar(g) ■

Outlet pressure at Q_{nom} $p_2 =$ ____ bar(g) ■

Max. inlet pressure p_{1max}   ____ bar(g) ■

MFC/MFM port connection   ☐ without screw-in fitting

☐ 1/4" G-thread (DIN ISO 228/1)   ☐ 1/4" NPT-thread (ANSI B1.2)
☐ 3/8" G-thread (DIN ISO 228/1)   ☐ 3/8" NPT-thread (ANSI B1.2)
☐ 1/2" G-thread (DIN ISO 228/1)   ☐ 1/2" NPT-thread (ANSI B1.2)
☐ 3/4" G-thread (DIN ISO 228/1)   ☐ 3/4" NPT-thread (ANSI B1.2)

☐ with screw-in fitting

____ mm Pipeline (external Ø)

____ inch Pipeline (external Ø)

Installation   ☐ horizontal, valve upright (standard)   ☐ horizontal, valve on side
☐ vertical, flow upwards   ☐ vertical, flow downwards

Ambient temperature   ____ °C

Material data

Body (base block)	☐ Aluminium (anodised)	☐ Stainless steel
Seal material	☐ FKM	☐ EPDM

Electrical data

Signals for set point and actual value	Standard signal Setpoint / Actual value	with fieldbus	with RS485
	☐ 0-5 V ☐ 0-20 mA ☐ 0-10 V ☐ 4-20 mA	☐ PROFIBUS DP ☐ D-Sub ☐ DeviceNet ☐ M12 ☐ CANopen	☐ D-Sub

■ Please quote all pressure values as overpressures with respect to atmospheric pressure [bar(ü)]
8) at: 1,013 bar(a) and 0°C   9) at: 1.013 bar (a) and 20°C   10) matches with calibration pressure

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

Subject to alteration.
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