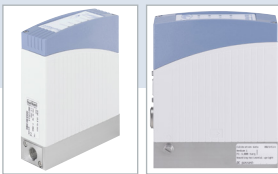





Mass Flow Meter for Gases (MFM)

- Nominal flow ranges from 0.010 l/min to 80 l/min
- High accuracy
- Very fast response times
- IP 65 protection class
- Optional: fieldbus interface



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

Can be combined with

	Type 0330 Direct-acting 2/2 or 3/2-way pivoted armature valve	▶
	Type 8611 eCONTROL – Universal controller	▶
	Type 8619 multiCELL – multi-channel/ multi-function transmitter/ controller	▶
	Type 6027 Direct-acting 2/2-way plunger valve	▶

Type description

The mass flow meter (MFM) Type 8702 is suited for measuring the mass flow of gases over a big flow range. The thermal MEMS sensor is located directly in the gas stream and therefore reaches very fast response times. Type 8702 can optionally be calibrated for two different gases; the user can switch between these two gases. As electrical interfaces both, analog standard signals and fieldbuses are available. Type 8712 is especially designed for use in harsh environments due to the high protection class.

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1. General technical data

Product properties	
Dimensions	Further information can be found in chapter "4. Dimensions" on page 6.
Material	
Seal	FKM or EPDM (others on request)
Housing	PC (polycarbonate)
Base block	Stainless steel
Total weight	1000 g
LED display	Status indication: 1. Power 2. Communication (only in fieldbus variant), limit (only in analogue variant) 3. Error
Performance data	
Nominal flow range (Q_N) ¹⁾	0.01...80 l/min (N_2) ²⁾ Further information can be found in chapter "6.2. Nominal flow range of typical gases" on page 10.
Operating pressure ³⁾	Max. 10 bar (145 psi) (depending on the nominal valve size)
Measuring accuracy	± 0.8 % of reading ± 0.3 % FS (under calibration conditions and after 1 min warm-up time to achieve best measurement results)
Repeatability	± 0.1 % FS
Turndown ratio	1:50 (higher on request)
Response time ($t_{95\%}$)	< 300 ms
Electrical data	
Operating voltage	24 V DC
Power consumption	3.5 W (4 W with fieldbus)
Residual ripple	< 2 %
Voltage tolerance	± 10 %
Electrical connection	
Standard	M16 socket, round, 8-pin and D-Sub socket HD15, 15-pin
Additionally with PROFIBUS DP	M12 socket, 5-pin (for IP65) or D-Sub socket, 9-pin
Additionally with CANopen	M12 plug, 5-pin
Medium data	
Operating medium	Neutral, pure gases (others on request)
Calibration medium	Operating gas or air (with conversion factor)
Medium temperature	- 10 °C...+ 70 °C (- 10 °C...+ 60 °C for oxygen)
Process/Port connection & communication	
Analogue interfaces	4...20 mA, 0...20 mA, 0...10 V or 0...5 V Input impedance > 20 k Ω (voltage) resp. < 300 Ω (current) Maximum current: 10 mA (voltage output) Maximum load: 600 Ω (current output)
Digital outputs	2 relay outputs: 1. Limit (desired value cannot be reached) 2. Error (i.e. sensor fault) Loading capacity: max. 60 V, 1 A, 60 VA
Digital inputs	3 digital inputs: 1. Not assigned, e.g. to switch between 2 calibrated gases 2. Not assigned 3. Not assigned
Digital communication interface	RS232, Modbus RTU (via RS adapter), RS485, RS422 or USB (via adapter) Fieldbus option: PROFIBUS DP, CANopen (see "8.4. Ordering chart accessories" on page 12)
Port connection	G 1/4, NPT 1/4 (screw-in fitting on request)
Approvals and conformities	
Protection class (with connected cables)	IP65
North America (USA/Canada)	Further information can be found in chapter "2.4. North America (USA/Canada)" on page 4.
Foods and Beverages/Hygiene	Further information can be found in chapter "2.5. Foods and beverages/Hygiene" on page 4.
Oxygen	Further information can be found in chapter "2.6. Oxygen" on page 4.

Environment and installation	
Installation position	Horizontal or vertical
Ambient temperature	- 10 °C...+ 50 °C

- 1.) The nominal flow rate is the maximum calibrated and measurable flow rate value. The nominal flow range indicates the range of possible nominal flow rates.
- 2.) Index N: flow rates with respect to 1.013 bar abs and 0 °C, alternatively: Index S with respect to 1.013 bar abs and + 20 °C
- 3.) Overpressure to atmospheric pressure

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. North America (USA/Canada)

Approval	Description
	<p>Optional: UL Listed for the USA and Canada The products are UL Listed for the USA and Canada according to:</p> <ul style="list-style-type: none"> • UL 61010-1 (ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE – Part 1: General Requirements) • CAN/CSA-C22.2 No. 61010-1

2.5. Foods and beverages/Hygiene

Conformity	Description
FDA	<p>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.</p>
USP	<p>United States Pharmacopeial Convention (USP) (valid for variable code PL04) All wetted materials are biocompatible according to the manufacturer's declaration.</p>
	<p>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.</p>

2.6. Oxygen

Conformity	Description
	<p>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.</p>

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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](#)

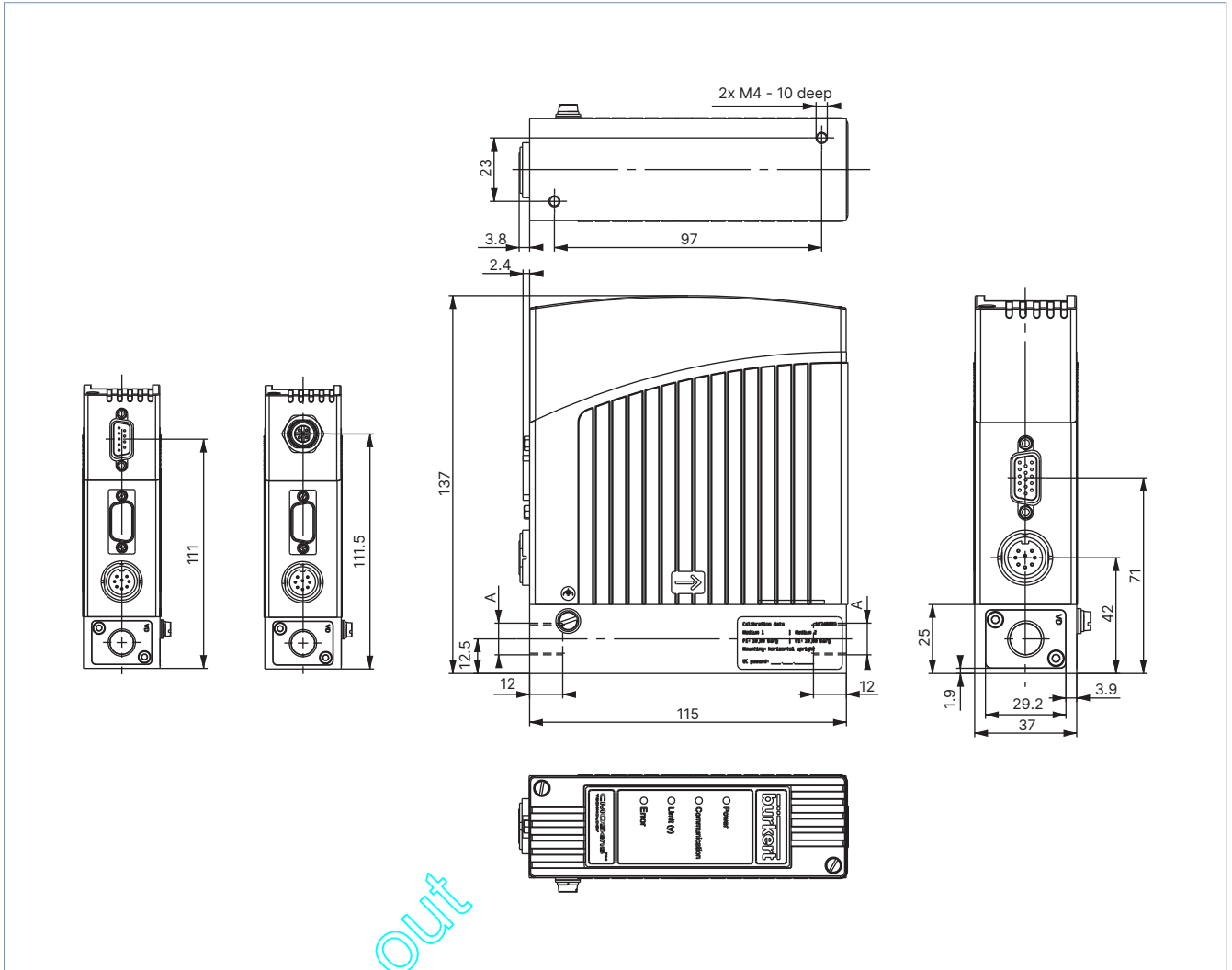
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4. Dimensions

4.1. Threaded variant

Note:

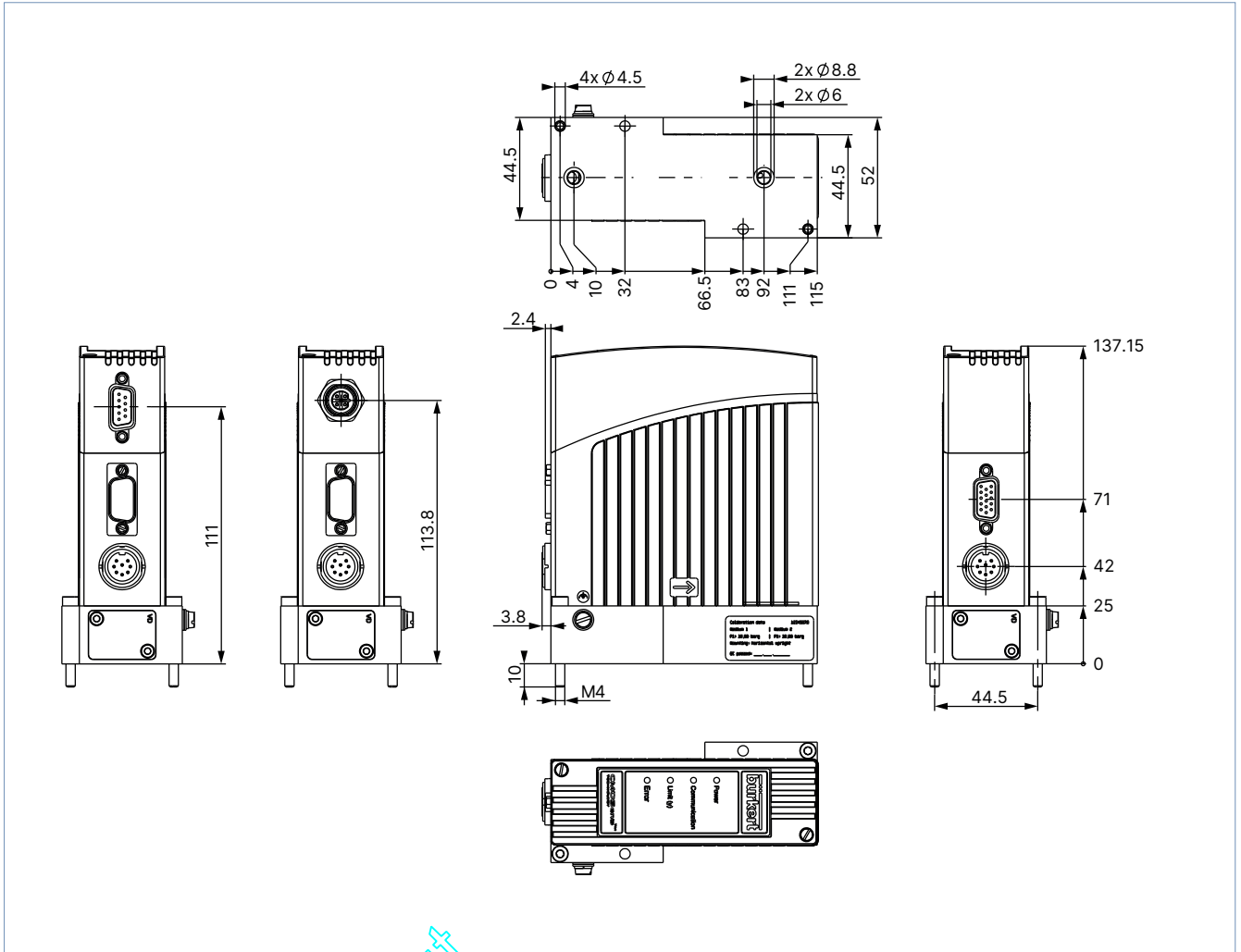
Dimensions in mm



4.2. Sub-base variant

Note:

Dimensions in mm



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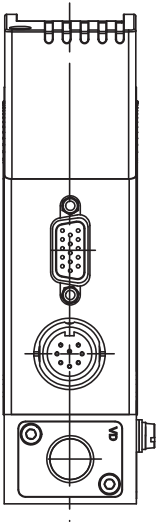
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5. Device/Process connections

5.1. Analogue variant

Note:

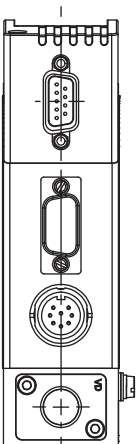
The cable length for RS232/actual value signal is limited to 30 meters.



M16 socket, round, 8-pin	Pin	Assignment
	1	24 V supply +
	2	Relay 1 – reference contact
	3	Relay 2 – reference contact
	4	Relay 1 – normally open
	5	Relay 1 – normally closed
	6	24 V supply GND
	7	Relay 2 – normally closed
	8	Relay 2 – normally open

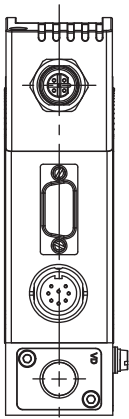
D-Sub HD15 socket, 15-pin	Pin	Assignment	
		Analogue control unit	Bus actuation
	1	Not connected	Not connected
	2	Not connected	Not connected
	3	Actual value output +	Not connected
	4	Binary input 2	
	5	12 V output (only for in-plant use)	
	6	RS232 TxD (direct connection to PC)	
	7	Binary input 1	
	8	GND (for binary inputs)	
	9	Only for in-plant use (do not connect)	
	10	12 V output (only for in-plant use)	
	11	12 V output (only for in-plant use)	
	12	Binary input 3	
	13	Actual value output GND	Not connected
	14	RS232 RxD (direct connection to PC)	
	15	DGND (for RS232 interface)	

5.2. Fieldbus variant



PROFIBUS DP: D-Sub socket, 9-pin	Pin	Assignment
	1	Shielding
	2	Not connected
	3	RxD/TxD - P (B-line)
	4	RTS (control signal for repeater)
	5	GND
	6	VDD (only for termination resistor)
	7	Not connected
	8	RxD/TxD - N (A-line)
	9	Not connected

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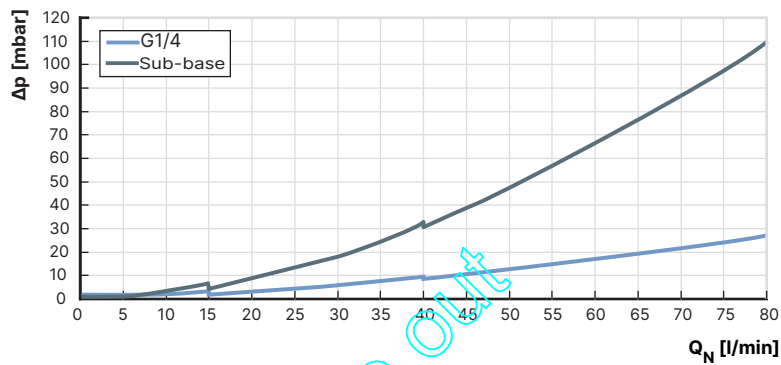
PROFIBUS DP: M12 socket, B-coded (DP max. 12 Mbaud)	Pin	Assignment
	1	VDD (only for termination resistor)
	2	RxD/TxD – N (A-Line)
	3	DGND
	4	RxD/TxD – P (B-Line)
	5	Not connected

CANopen: M12 plug, A-coded	Pin	Assignment
	1	Shielding
	2	Not connected
	3	DGND
	4	CAN_H
	5	CAN_L

6. Performance specifications

6.1. Pressure loss diagram of MFMs

The diagram shows exemplary the pressure loss characteristics when air flowing through. To determine the pressure loss with another gas, you need to calculate the air equivalent and respect the fluidics needed with the other gas.



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6.2. Nominal flow range of typical gases

Note:

All values regarding 1.013 bar abs and 0 °C (Index N)

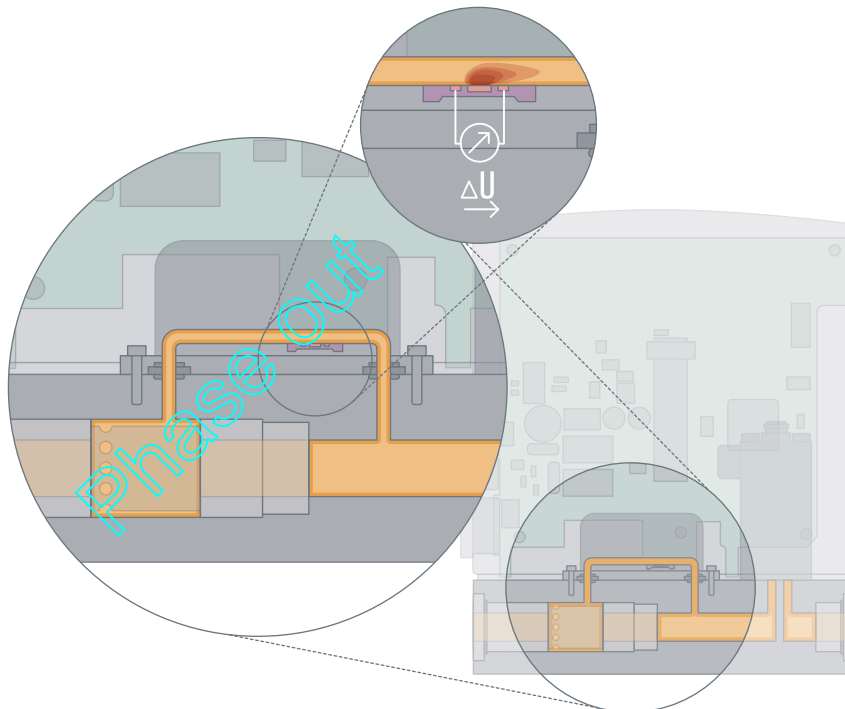
Gas	Min. Q_N	Max. Q_N
	[l/min]	[l/min]
Argon	0.01	80
Helium	0.01	500
Carbon dioxide	0.02	40
Air	0.01	80
Methane	0.01	80
Oxygen	0.01	80
Nitrogen	0.01	80
Hydrogen	0.01	500

7. Product operation

7.1. Measuring principle


The mass flow sensor 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.



8. Ordering information

8.1. 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](#)

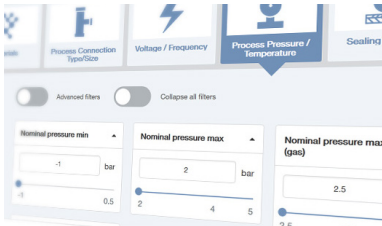
8.2. Recommendation regarding product selection

Note:

Contact your Bürkert partner for device design.

The media compatibility, the maximum inlet pressure and the correct selection of the flow measuring span are decisive for the proper function of the device within the application. The pressure loss depends on the nominal flow rate and operating pressure.

8.3. 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](#)

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









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8.4. Ordering chart accessories

Overview of accessories

Note:

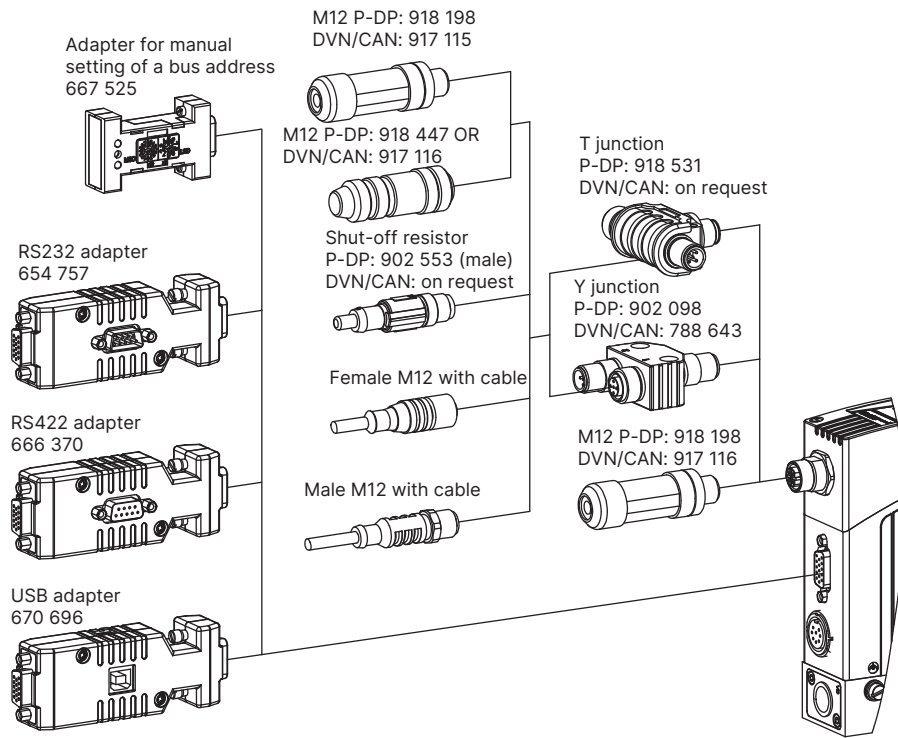
The adapters serve mainly for initial operation or diagnosis. Those are not obligatory for continuous operation.

Description	Article no.
Connections/Cables	
M16 circular plug, 8-pin, soldered connection	918299 
M16 circular plug with cable, 8-pin, cable length: 5 m, assembled on one side	787733 
M16 circular plug with cable, 8-pin, cable length: 10 m, assembled on one side	787734 
D-Sub HD15 plug with cable, 15-pin, cable length: 5 m, assembled on one side	787735 
D-Sub HD15 plug with cable, 15-pin, cable length: 10 m, assembled on one side	787736 
Adapters	
RS232 adapter (for connecting a PC in combination with an extension cable)	654757 
Extension cable for RS232, M12 socket and/or M12 plug, 9-pin, cable length: 2 m	917039 
USB adapter	670696 
USB connection cable, cable length: 2 m	772299 
Adapter for manual bus address setting (instead of via AF)	667525 
Accessories for Fieldbus	
PROFIBUS DP (B-coded)	
M12 plug, 5-pin, straight, B-coded ¹⁾	918198 
M12 socket (coupling), straight ¹⁾	918447 
Y-distributor ²⁾	902098 
PROFIBUS T-distributor	918531 
PROFIBUS terminating resistor, M12 plug, B-coded	902553 
GSD file (PROFIBUS), EDS file (CANopen)	LINK ▶
CANopen (A-coded)	
M12 plug, 5-pin, straight ¹⁾	917115 
M12 circular socket with plastic threaded clamping ring, 5-pin, straight, to be wired ¹⁾	917116 
Y push-in connector, M12, 5-pin, LUM ¹⁾	788643 
T-distributor	On request
Termination resistor	On request
GSD-File (PROFIBUS), EDS-File (CANopen)	LINK ▶

1.) For space reasons, M12 individual cable plugs may not be suitable for simultaneous use on the same side as a Y-distributor. Use a commercially available covered cable in this case.

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Adapter sketch



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