Mass Flow Meter (MFM)

- Nominal flow ranges from 20 l/min up to 2500 l/min
- High accuracy
- Fast response time
- IP65 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 8611 ▸
eCONTROL – Universal controller

Type 0330 ▸
Direct-acting 2/2 or 3/2-way pivoted armature valve

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 8006 is suited for measuring the mass flow of high gas flows. The thermal inline sensor is located directly in the gas stream and therefore reaches very fast response times. Type 8006 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. The MFM Type 8006 is especially designed for use in harsh environments due to a low sensitivity to contamination and the high protection class.

Phase out

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Visit product website ▸

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1. General technical data

Product properties	
Dimensions	Further information can be found in chapter "4. Dimensions" on page 5.
Material	
Seal	FKM or EPDM (depending on gas)
Housing	Aluminium (coated)
Base block	Aluminium (black anodised) or stainless steel
Total weight	1.2 kg (aluminium) 3.0 kg (stainless steel)
LED display	Status indication: 1. Power 2. Communication 3. Limit 4. Error
Performance data	
Nominal flow range [1.] (Q_N)	20...2500 l/min (N_2) [2.] Further information can be found in chapter "6.2. Nominal flow range of typical gases" on page 9.
Operating pressure [3.]	Max. 10 bar (145 psi) N_2, air, argon: max. 25 bar (363 psi)
Measuring accuracy	± 1.5 % of reading ± 0.3 % FS (under calibration conditions)
Repeatability	± 0.1 % FS
Turndown ratio	1:50 (with vertical installation position with flow from top to bottom, the turndown ratio is 1:10)
Response time ($t_{95\,\%}$)	< 500 ms
Electrical data	
Operating voltage	24 V DC
Power consumption	Max. 3.5 W (4 W with fieldbus)
Residual ripple	< 2 %
Voltage tolerance	± 10 %
Electrical connection	
Standard	M16 socket, round, 8-pin and D-Sub HD15 socket, 15-pin
Additionally with PROFIBUS DP	M12 socket, 5-pin and D-Sub socket, 9-pin
Additionally with CANopen	M12 plug, 5-pin or D-Sub plug, 9-pin
With RS485 variant only	D-Sub plug, 9-pin
Medium data	
Operating medium	Neutral, pure gases (others on request)
Calibration medium	Operating gas or air (with conversion factor)
Medium temperature	-10...+70 °C (-10...+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 kΩ (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. for switching between 2 calibrated gases 2. Not assigned 3. Not assigned
Digital communication interfaces	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 11)
Port connection	G or NPT ¼, ⅜, ½, ¾, 1 (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.
Oxygen	Further information can be found in chapter "2.5. Oxygen" on page 4.

Environment and installation	
Installation position	Horizontal or vertical
Ambient temperature	- 10...+ 45 °C (higher temperatures on request)

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 and 0 °C, alternatively Index S: flow rates 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)

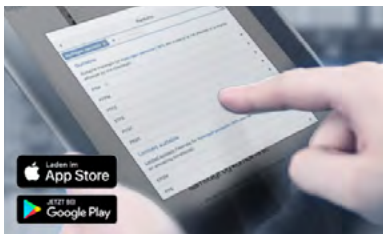
Approval	Description
c UL us LISTED	**Optional: UL Listed for the USA and Canada** The products are UL Listed for the USA and Canada according to: • UL 61010-1 (ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE – Part 1: General Requirements) • CAN/CSA-C22.2 No. 61010-1

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

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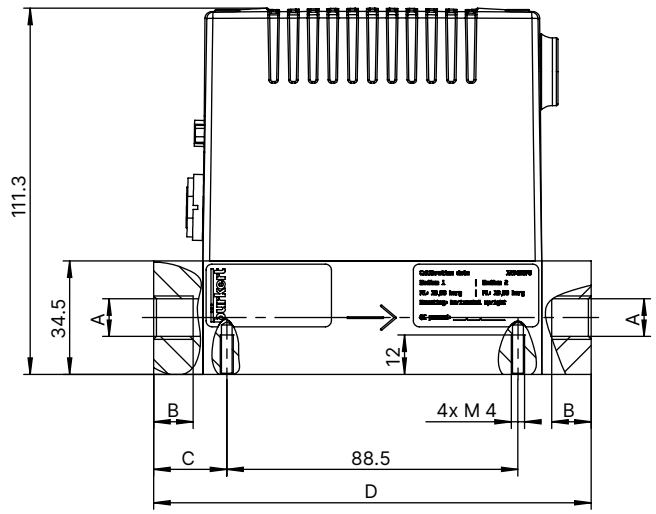
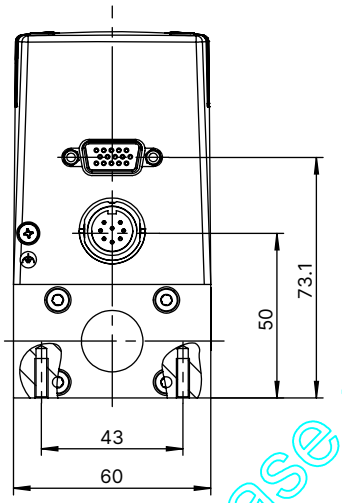
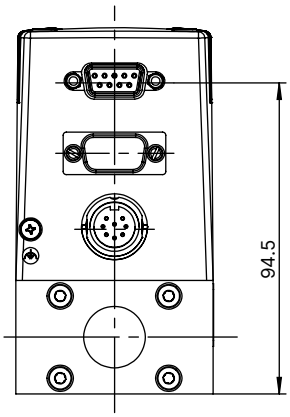
4. Dimensions

4.1. MFM

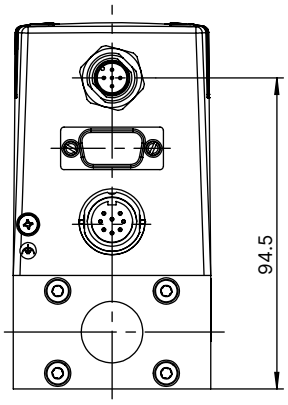
Note:
Dimensions in mm







Version:
BUSB: D-SUB



Version:
BUSB: M12

A	B	C	D
G ¼, NPT ¼	10	22.25	133
G ⅜, NPT ⅜	10	22.25	133
G ½, NPT ½	13	27.25	143
G ¾, NPT ¾	14	27.25	143

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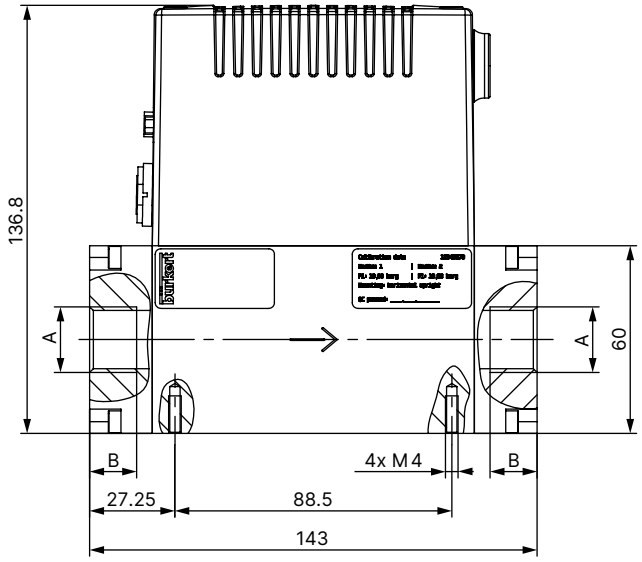
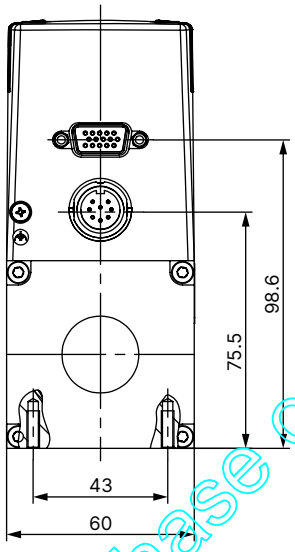
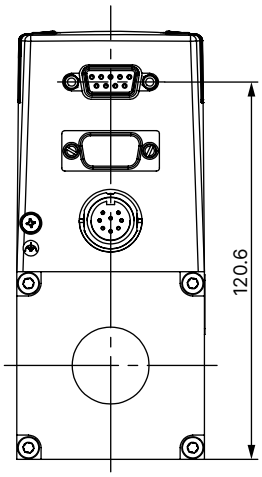
4.2. MFM for large nominal flow rates

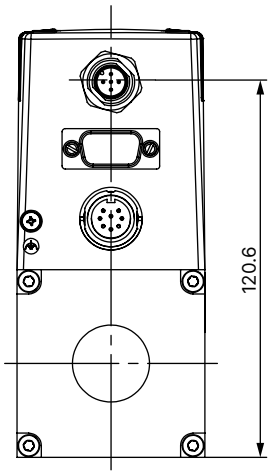
Note:
Dimensions in mm







Version:
BUSB: D-SUB



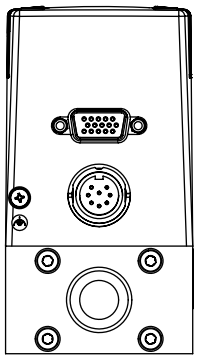
Version:
BUSB: M12

A	B
G ½, NPT ½	14
G ¾, NPT ¾	15
G 1	17

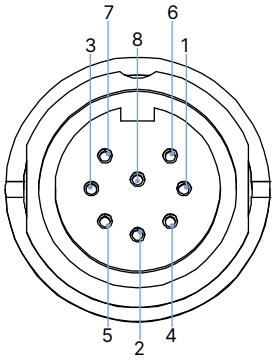
5. Device / process connections

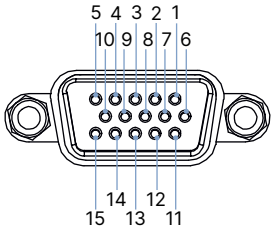
5.1. Analogue variant

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

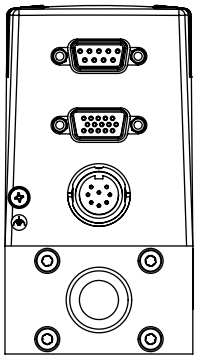


Standard

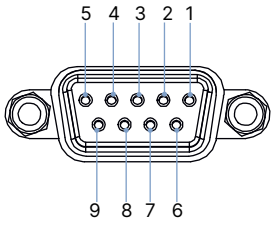
M16 socket, round, 8-pin	Pin	Assignment
	1	24 V supply +
	2	Relay 1 – reference contact
	3	Relay 2 – reference contact
	4	Relay 1 – normally closed contact
	5	Relay 1 – normally open contact
	6	24 V supply GND
	7	Relay 2 – normally open contact
	8	Relay 2 – normally closed contact

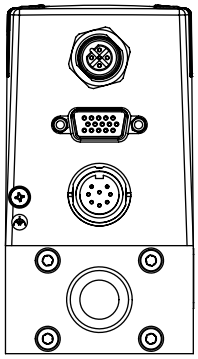
D-Sub HD15 socket, 15-pin (not used with fieldbus variant)	Pin	Assignment	
		Analogue control unit	Bus actuation
	1	Not connected	Not connected
	2	Not connected	Not connected
	3	Actual value output +	Not connected
	4	Binary input 2	
	5	12 V output (only for in-plant use)	
	6	RS232 TxD (direct connection to computer)	
	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 computer)	
	15	DGND (for RS232 interface)	

5.2. Fieldbus variant

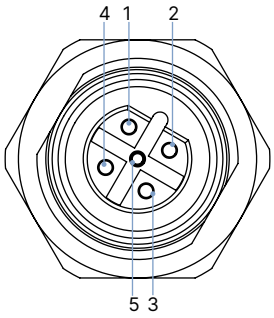


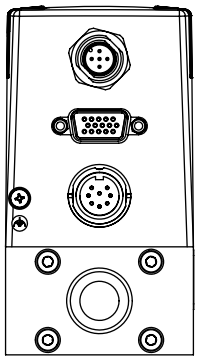
Fieldbus D-Sub

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

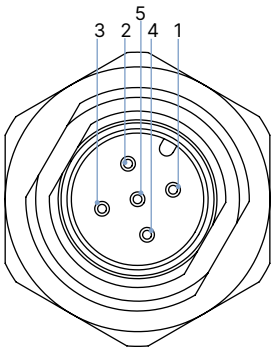


M12 PROFIBUS

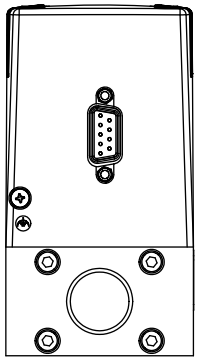
PROFIBUS DP: M12 socket, B-coded (DP max. 12 Mbaud)	Pin	Assignment
	1	VDD (only for termination resistor)
	2	RxD/TxD – N (A-line)
	3	DGND
	4	RxD/TxD – P (B-line)
	5	Not connected



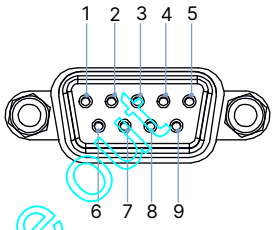
M12 CANopen

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

5.3. RS485 variant



RS485

D-Sub plug, 9-pin	Pin	Assignment
	1	Binary input (related to GND Pin 2)
	2	GND
	3	24 V supply +
	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)

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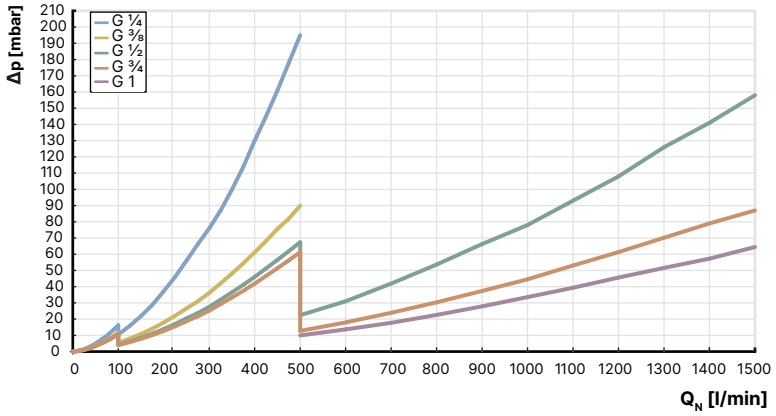
6. Performance specifications

6.1. Pressure loss diagram of MFM

The diagram shows examplary 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.



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 [l/min]	Max. Q_N [l/min]
Acetylene	20	975
Ammonia	20	1250
Argon	20	1500
Carbon dioxide	20	800
Air	20	2500
Methane	20	750
Propane	20	400
Oxygen	20	2500
Nitrogen	20	2500

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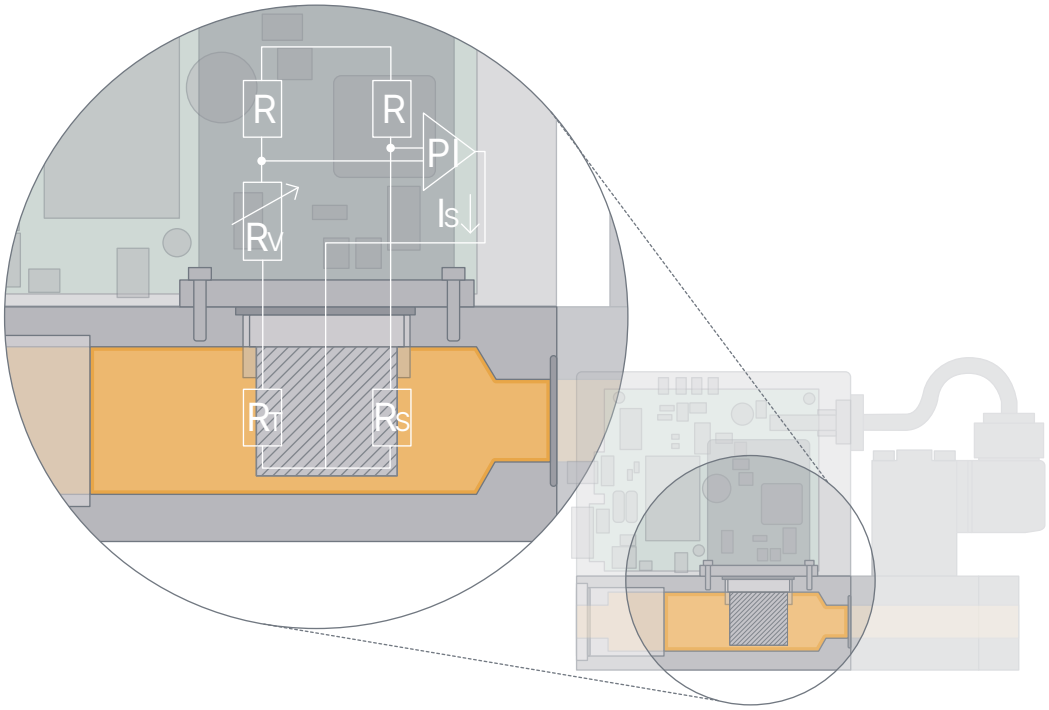
7. Product operation

7.1. Measuring principle

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 (RT) measures the fluid temperature, while the second, low-value resistor (RS) is heated so that it is maintained at a fixed, predefined over-temperature with respect to the fluid temperature.
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 MFM 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.



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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

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

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Description	Article no.
Y-distributor [1.)]	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