bürkert
FLUID CONTROL SYSTEMS

Mass Flow Meter (MFM)

- Nominal flow ranges from 20 l/min up to 2500 l/min
- High accuracy
- Fast response time
- Protection class IP65
- 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 and 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.

Flu-Tech บริษัท ฟลูเทค จำกัด FLU-TECH CO.,LTD

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1. General technical data

Product properties	
Dimensions	Detailed information can be found in chapter "3. Dimensions" on page 5.
Materials	
Housing	Aluminium (black anodized) or stainless steel
Body	Aluminium (coated)
Seal	FKM or EPDM (depending on gas)
Weight	1.2 kg (Al) 3.0 kg (VA)
LED display	Indication for: 1. Power 2. Communication 3. Limit 4. Error
Performance data	
Operating pressure (max.)	10 bar…25 bar (N_2, air, Argon)
Response time (t95 %)	<500 ms
Nominal flow range[1.)] (Q_{Nom})	20…2500 I_N/min[2.)], Reference medium N_2 Detailed information can be found in chapter "5.2. Flow characteristic" on page 9.
Measuring accuracy	±1.5 % o. R.[3.)] ±0.3 % F. S.[4.)]
Repeatability	±0.1 % F. S.
Measuring range	1:50 (With vertical installation position with flow from top to bottom the measuring range is 1:10)
Electrical data	
Electrical connection	
Standard	Socket M16, round, 8 pin and socket D-Sub HD15, 15 pin
Additionally for PROFIBUS DP	M12 socket, 5 pin or D-Sub 9 pin
Additionally for CANopen	Plug M12, 5 pin or D-Sub 9 pin
RS485 version only	Plug D-Sub 9 pin
Operating voltage	24 V DC
Power consumption (max.)	3.5…10 W for fieldbus: 4…12.5 W (depending on version)
Residual ripple (at DC)	<2 %
Voltage tolerance	±10 %
Medium data	
Operating medium	Neutral, non-contaminated gases, others on request
Calibration medium	Operating gas or air with conversion factor
Temperature of gas	-10…+70 °C (-10…+60 °C for oxygen)
Process/Port connection & communication	
Port connection	G ¼, G ⅜, G ½, G ¾, G 1 NPT ¼, NPT ⅜, NPT ½, NPT ¾, NPT 1 With screw-in fitting For more detailed information, please refer to the **product enquiry form** at the end of the document.
Analogue communication	
Output signal (Actual value)	Analogue signal version: 0…5 V, 0…10 V, 0…20 mA or 4…20 mA Field bus version: None RS485 version (only D-Sub, 9 pin): None
Max. Current Voltage output	Analogue signal version: 10 mA Field bus version: None RS485 version (only D-Sub, 9 pin): None
Max. Load current output	Analogue signal version: 600 Ω Field bus version: None RS485 version (only D-Sub, 9 pin): None
Fieldbus option	
(D-Sub HD15 covered by sealing cap), pins for analogue inputs/outputs not assigned)	Analogue signal version: None Fieldbus version: PROFIBUS-DP, CANopen RS485 version (only D-Sub, 9 pin): Modbus RTU (via RS interface)

Digital communication

Possible via adapter:	Analogue signal version: RS232 (supports Modbus RTU) RS485, RS422 or USB Fieldbus version: None
Possible via adapter:	RS485 version (only D-Sub, 9 pin): RS485, RS422 USB

Binary inputs (Default, other functions selectable)	Analog signal version: Three: 1. not assigned / 2. not assigned/ 3. not assigned Fieldbus version: Three: 1. not assigned / 2. not assigned / 3. not assigned RS485 version (only D-Sub, 9 pin): One: not assigned

---

Binary outputs (Default, other functions selectable)	Analog signal version: Two relay outputs: 1. Limit (Q_{Nom} alomost reached) 2. Error (e.g. sensor fault) Load capacity: max. 60 V, 1 A, 60 VA Fieldbus version: Two relay outputs: 1. Limit (Q_{Nom} alomost reached) 2. Error (e.g. sensor fault) Load capacity: max. 60 V, 1 A, 60 VA RS485 version (only D-Sub, 9 pin): One relay output: 1. Limit (Q_{Nom} alomost reached) Load capacity: max. 25 V, 1 A, 25 VA

Environment and installation

Installation position	Horizontal or vertical
Ambient temperature	-10…+45 °C (higher temperatures on request)
Degree of protection (with connected cables)	IP65

1.) The nominal flow rate is the largest calibrated and measurable flow rate value.

  The nominal flow range indicates the range of possible nominal flow values.

2.) Index N: Flow values with respect to 1.013 bar and 0 °C, alternatively

  Index S: flow values with respect to 1.013 bar and 20 °C

2. Materials

2.1. Chemical Resistance Chart – 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.
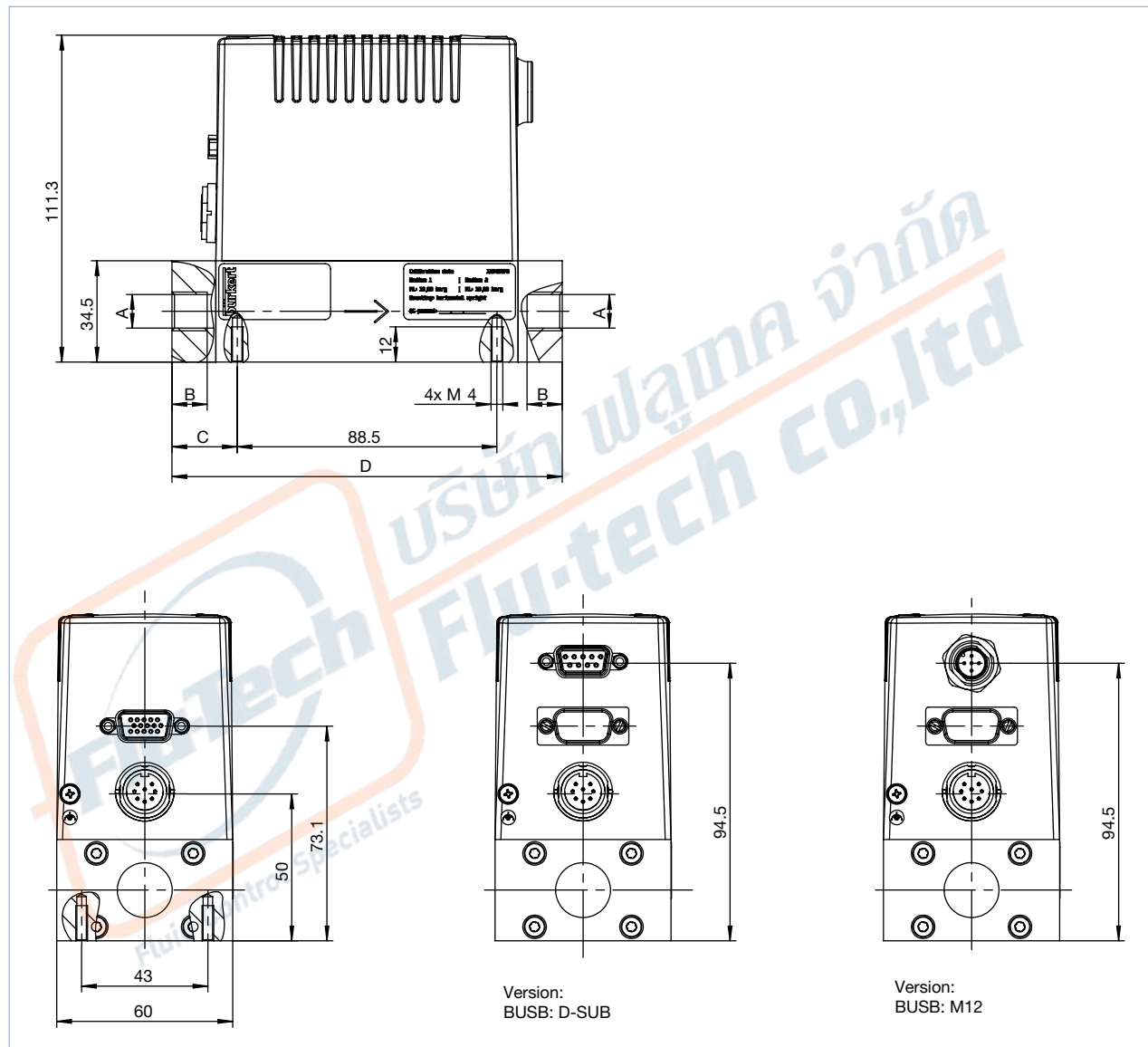
Start Chemical Resistance Check

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3. Dimensions

3.1. 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

Visit product website ▶

3.2. 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

Visit product website ▶
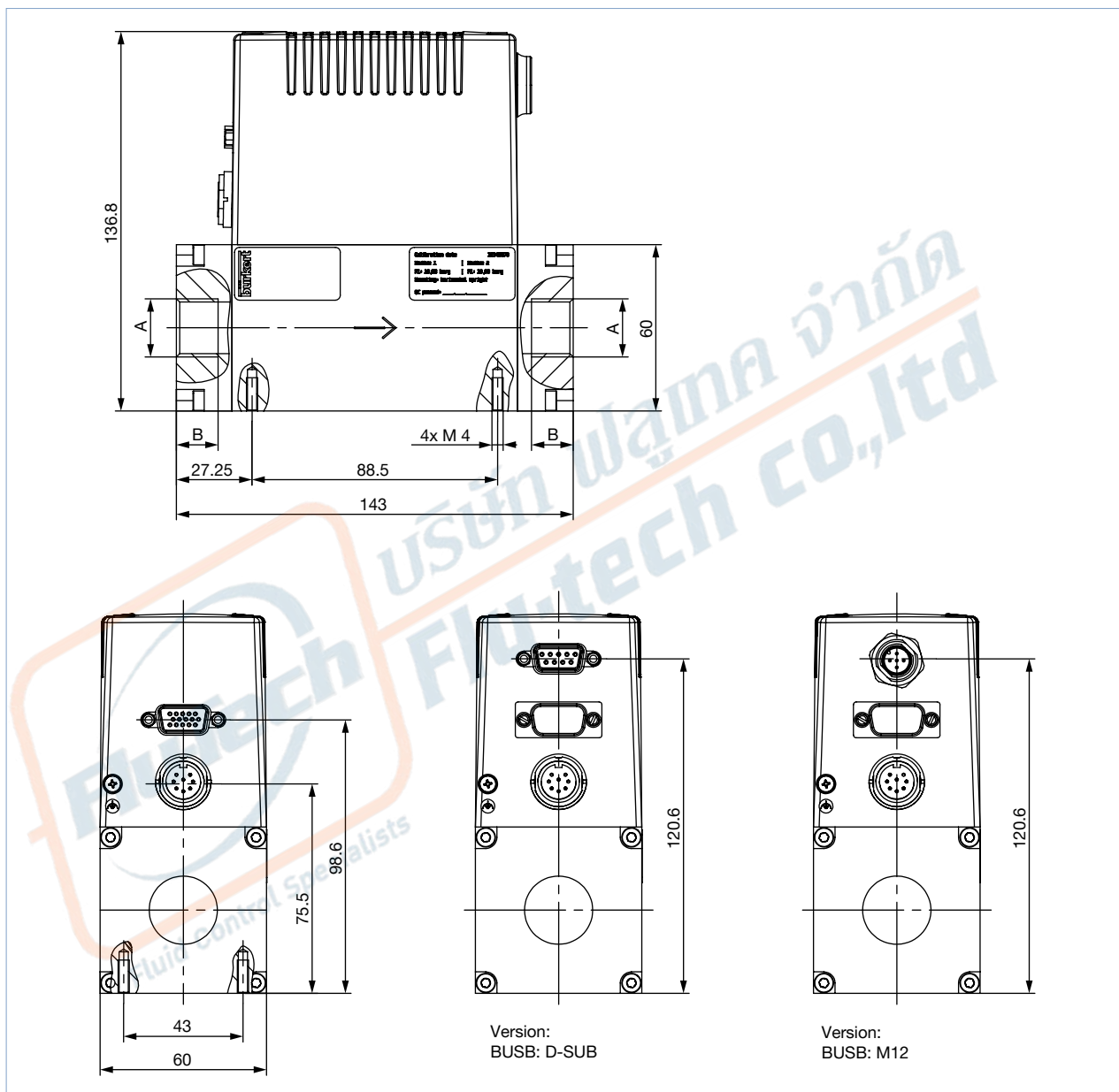
4. Device / process connections

4.1. Pin assignment
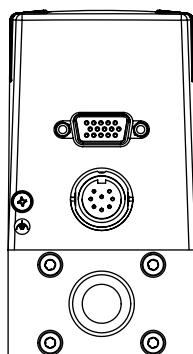
Standard

Terminal block 4 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 factory use)	
	6	RS232 TxD (direct connection to computer)	
	7	Binary input 1	
	8	GND (for binary inputs)	
	9	Only internal use (do not occupy!)	
	10	12 V-Output (only for factory use)	
	11	12 V-Output (only for factory use)	
	12	Binary input 3	
	13	Actual value output GND	Not connected
	14	RS232 RxD (direct connection to computer)	
	15	DGND (for RS232-interface)	

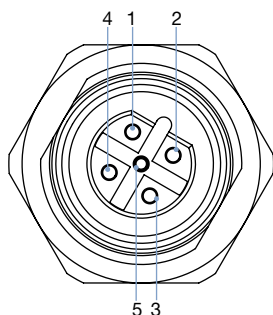| Socket M16 round 8 pin	Pin	Assignment
	1	24 V-Supply +
	2	Relay 1 – reference contact
	3	Relay 2 – reference contact
	4	Relay 1 – Normally closed contact
	5	Relay 1 – Normally open contact
	6	24 V-Supply GND
	7	Relay 2 – Normally open contact
	8	Relay 2 – Normally closed contact
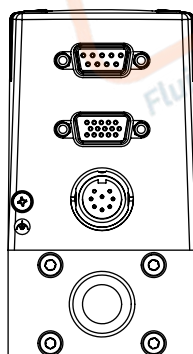
Fieldbus D-SUB

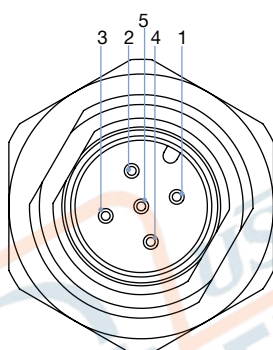| Socket D-Sub 9 pin (only for fieldbus version)	Pin	Assignment	
		PROFIBUS DP	**CANopen**
	1	Shield	Shield
	2	Not connected	CAN-L data line
	3	RxD/TxD - P (B-line)	GND
	4	RTS (control signal for repeater)	Not connected
	5	GND	Not connected
	6	VDD (only for termination resistor)	Not connected
	7	Not connected	CAN-H data line
	8	RxD/TxD - N (A-line)	Not connected
	9	Not connected	Not connected

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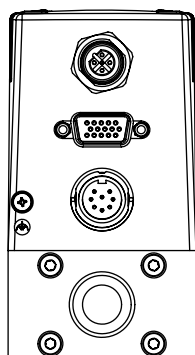
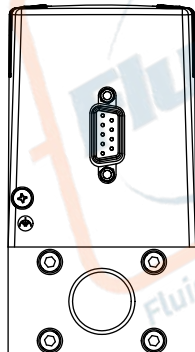| PROFIBUS DP – Socket B-coded M12 (DPV1 max. 12 Mbaud)	Pin	Assignment
	1	VDD (only for termination resistor)
	2	RxD/TxD – N (A-line)
	3	DGND
	4	RxD/TxD – P (B-line)
	5	Not connected

M12 Profibus
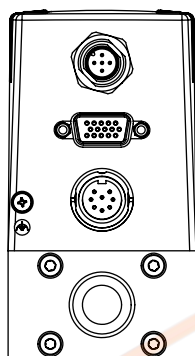
CANopen – Plug A-coded M12	Pin	Assignment
	1	Shield
	2	Not connected
	3	DGND
	4	CAN_H
	5	CAN_L

M12 CANopen
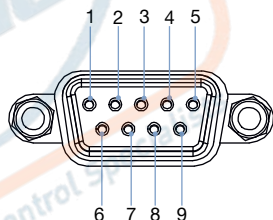
Plug D-Sub 9 pin	Pin	Assignment
	1	Binary input (related to GND Pin2)
	2	GND
	3	Power supply +24 V DC
	4	Relay, normally opened
	5	Relay, normally closed
	6	TX+ (RS485-Y) – bridge with pin 9 at half duplex
	7	TX- (RS485-Z) – bridge with pin 8 at half duplex
	8	RX- (RS485-B)
	9	RX+ (RS485-A)

RS485 version

Visit product website ▶

5. Performance specifications

5.1. Pressure loss diagram of MFM

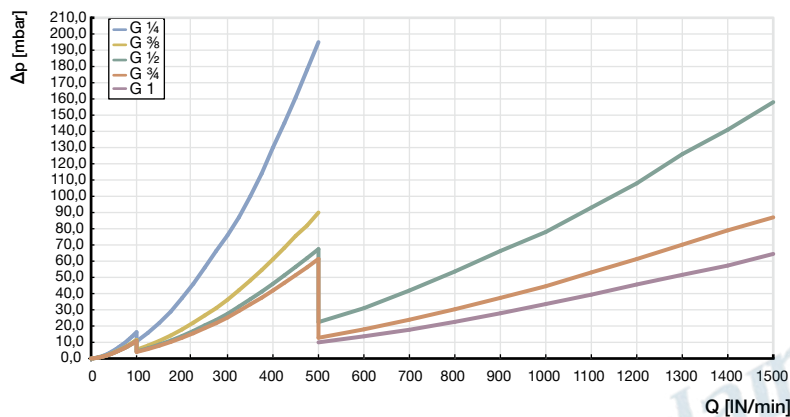The diagram shows examplary the pressure loss characteristics when air flowing through. For determining the pressure loss with another gas it needs to calculate the air equivalent and respect the fluidics needed with the other gas.

5.2. Flow characteristic

Nominal flow range of typical gases

Note:
All values regarding 1.013 bar(a) and 0 °C (Index N)

Gas	Min. Q_{Nom} [l_N/min]	Max. Q_{Nom} [l_N/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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6. Product operation

6.1. 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.
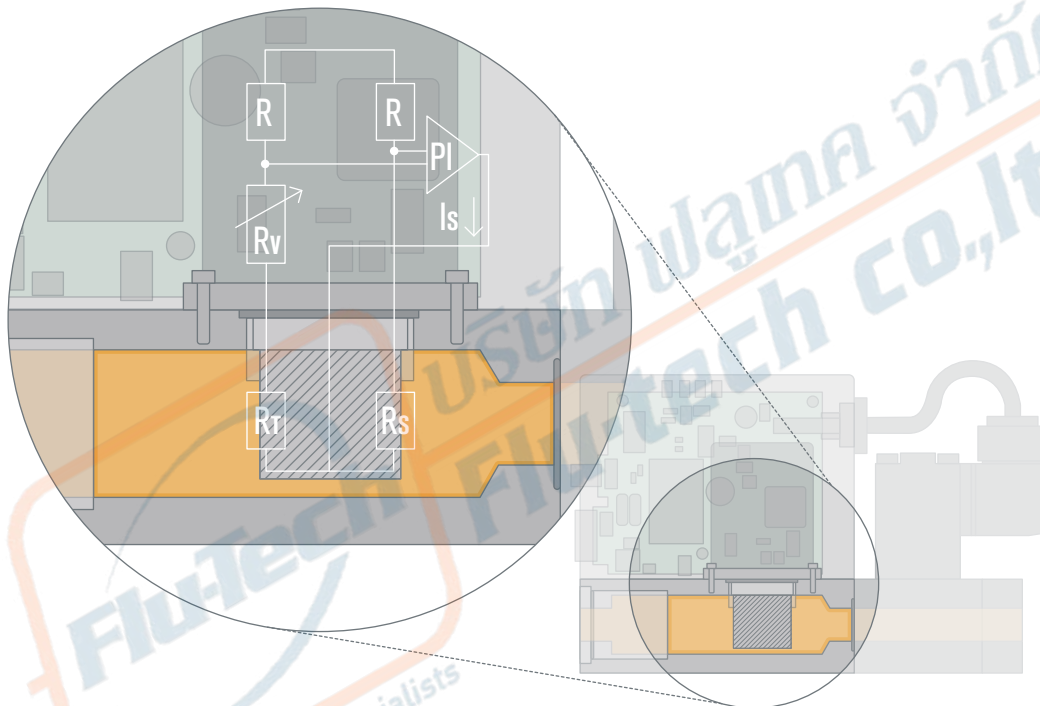
7. Ordering information

7.1. 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

7.2. Recommendation regarding product selection

Note:
The **Product Enquiry Form** at the end of this document 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 MFM, not only the required maximum flow rate Q_{Nom}, but also the pressure values directly before and after the MFM (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 Enquiry Form** at the end of this document to indicate the pressures directly before and after the MFM. 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 MFM, 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.

7.3. 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

7.4. Ordering chart accessories

Description	Article no.
Connections/Cables	
Round plug M16, 8 pin (solder connection)	918299
Round plug M16, 8 pin with 5 m cable	787733
Round plug M16, 8 pin with 10 m cable	787734
Plug D-Sub HD15, 15 pin with 5 m cable	787735
Plug D-Sub HD15, 15 pin with 10 m cable	787736
Adapters[1]	
RS232 adapter for connection to a computer, connection with an extension cable (Article no. 917039)	654757
Extension cable for RS232 9 pin socket/plug 2 m	917039
RS422 adapter (RS485 compatible)	666370
USB adapter	670696

Description	Article no.
USB connection cable 2 m	772299 🛒
Adapter for manual setting of bus address	667525 🛒
Communication software Mass Flow Communicator	**LINK** ▶
Accessories for Fieldbus	
PROFIBUS-DP (B-coded)	
Plug M12[2.]	918198 🛒
Socket M12 (coupling)[2.]	918447 🛒
Y-junction[2.]	902098 🛒
T-junction	918531 🛒
Termination resistor	902553 🛒
GSD-File (PROFIBUS), EDS-File (CANopen)	**LINK** ▶
CANopen (A-coded)	
Plug M12[2.]	917115 🛒
Socket M12 (coupling)[2.]	917116 🛒
Y-Stück[2.]	788643 🛒
T-junction	On request
Termination resistor	On request
GSD-File (PROFIBUS), EDS-File (CANopen)	**LINK** ▶

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

2.) The M12 single connectors as listed here are not suitable for their simultaneous use with the Y-piece for reasons of space. Please always use at least one commercially available overmoulded cable whose connector is usually smaller.

7.5. Adapter sketch

Adapter for manual setting of a bus address
667 525

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

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

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

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

Male M12 with cable

USB adapter
670 696