bürkert
FLUID CONTROL SYSTEMS

Mass Flow Meter (MFM) for Gases

- Nominal flow ranges from 0.010 l_N/min to 80 l_N/min
- High accuracy
- Very fast response times
- Digital communication via RS485
- Compact version

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

Can be combined with

Type 6013 ▸
Plunger valve 2/2 way direct-acting

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

Type 8611 ▸
eCONTROL - Universal controller

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 8703 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 8703 can optionally be calibrated for two different gases; the user can switch between these two gases. The communication with master devices is fully digital, therefore no further analog/digital conversions are needed.

DTS 1000085464 EN Version: J Status: RL (released | freigegeben | validé) printed: 23.04.2021

Visit product website ▸

Table of contents

DTS 1000085464 EN Version: J Status: RL (released | freigegeben | validé) printed: 23.04.2021

1. General Technical Data

Product properties	
Material	
Block	Aluminium or stainless steel
Body	Metal
Seal	FKM, EPDM
Dimensions	Detailed information can be found in chapter "3. Dimensions" on page 4.
Total weight	approx. 500 g (Aluminium)
LED display	Indication for power, limit and error
Performance data	
Nominal flow range (Q_{Nom})	10 ml_N/min…80 l_N/min (N_2) Detailed information can be found in chapter "6.2. Flow characteristic" on page 7.
Measuring range	1:50 (2…100 %), higher measuring range on request
Max. operating pressure	10 bar (145 psi)
Measuring accuracy	±0.8 % o. R. ±0.3 % F. S. (after 1 min. warm-up time)
Repeatability	±0.1 % F. S.
Response time (t95 %)	<300 ms
Electrical data	
Operating voltage	24 V DC
Power consumption	5 W
Voltage tolerance	±10 %
Residual ripple	<2 %
Electrical connection	Plug D-Sub 9 pin
Medium data	
Operating medium	Neutral, non-contaminated 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	
Port connection	NPT ¼, G ¼, screw-in fitting or sub-base, others on request
Fieldbus option	PROFIBUS DP, DeviceNet, CANopen
Digitale Outputs	Relay outputs 1. Limit (Q_{Nom} almost reached) Load capacity: 25 V, 1 A, 25 VA
Digital inputs	Not connected
Digital (communication) interface	Digital via RS485 (Half-duplex or full duplex), RS422
Environment and installation	
Installation position	Horizontal or vertical
Ambient temperature	-10 °C…+50 °C
Degree of protection	IP40
Accessories	
Software-Tool	Mass Flow Communicator

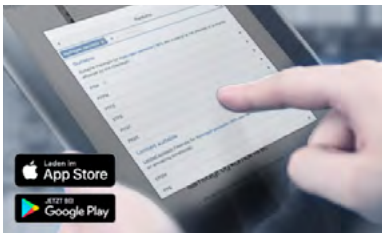
1.) The nominal flow value is the max. flow value calibrated which can be measured.
The nominal flow range defines the range of nominal flow rates (full scale values) possible.

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.

DTS 1000085464 EN Version: J Status: RL (released | freigegeben | validé) printed: 23.04.2021

2. Materials

2.1. Chemical Resistance Chart – Bürkert resistApp



Bürkert resistApp – Chemical Resistance Chart

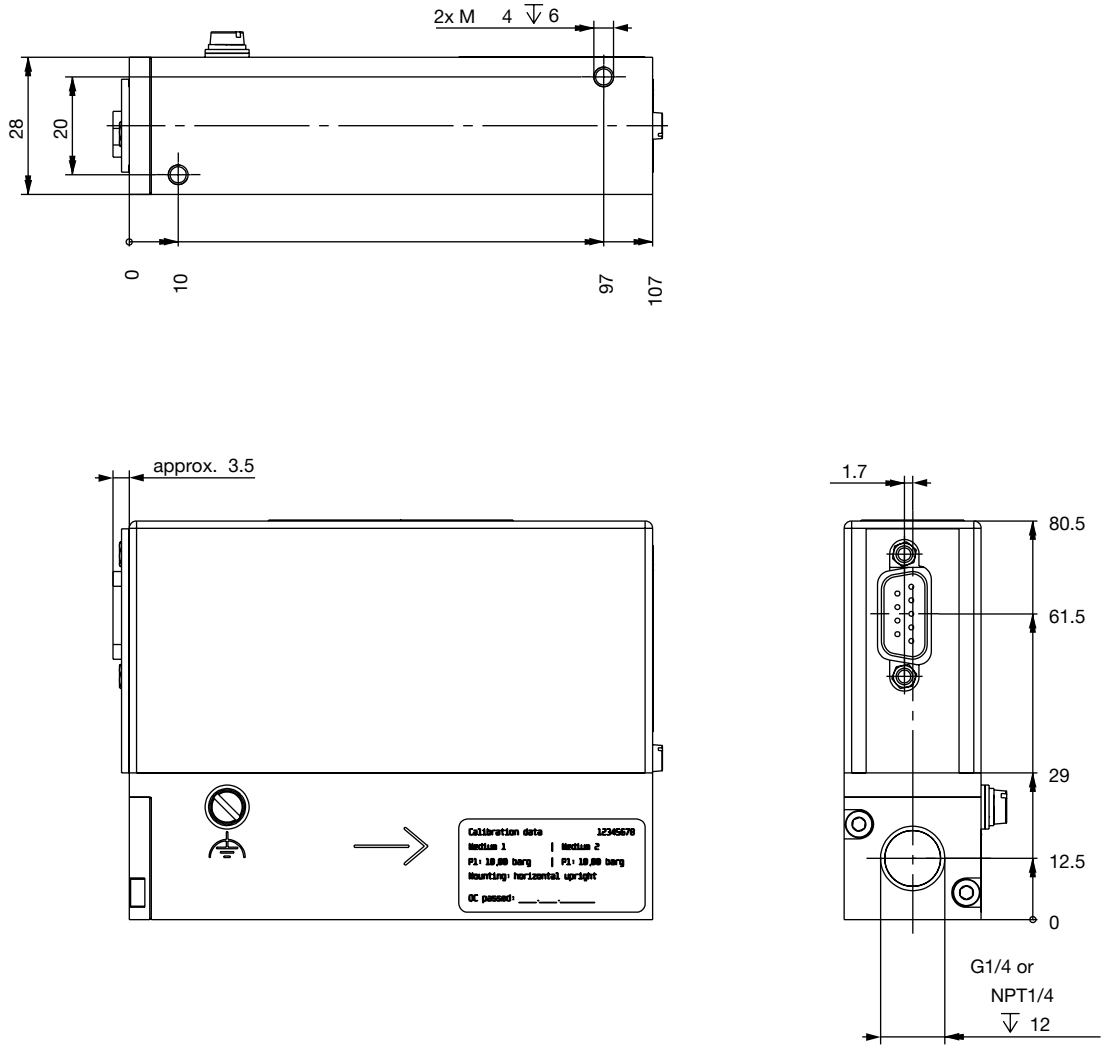
You want to ensure the reliability and durability of the materials in your individual application case? Verify your combination of media and materials on our website or in our resistApp.

Start Chemical Resistance Check

3. Dimensions

3.1. Threaded version

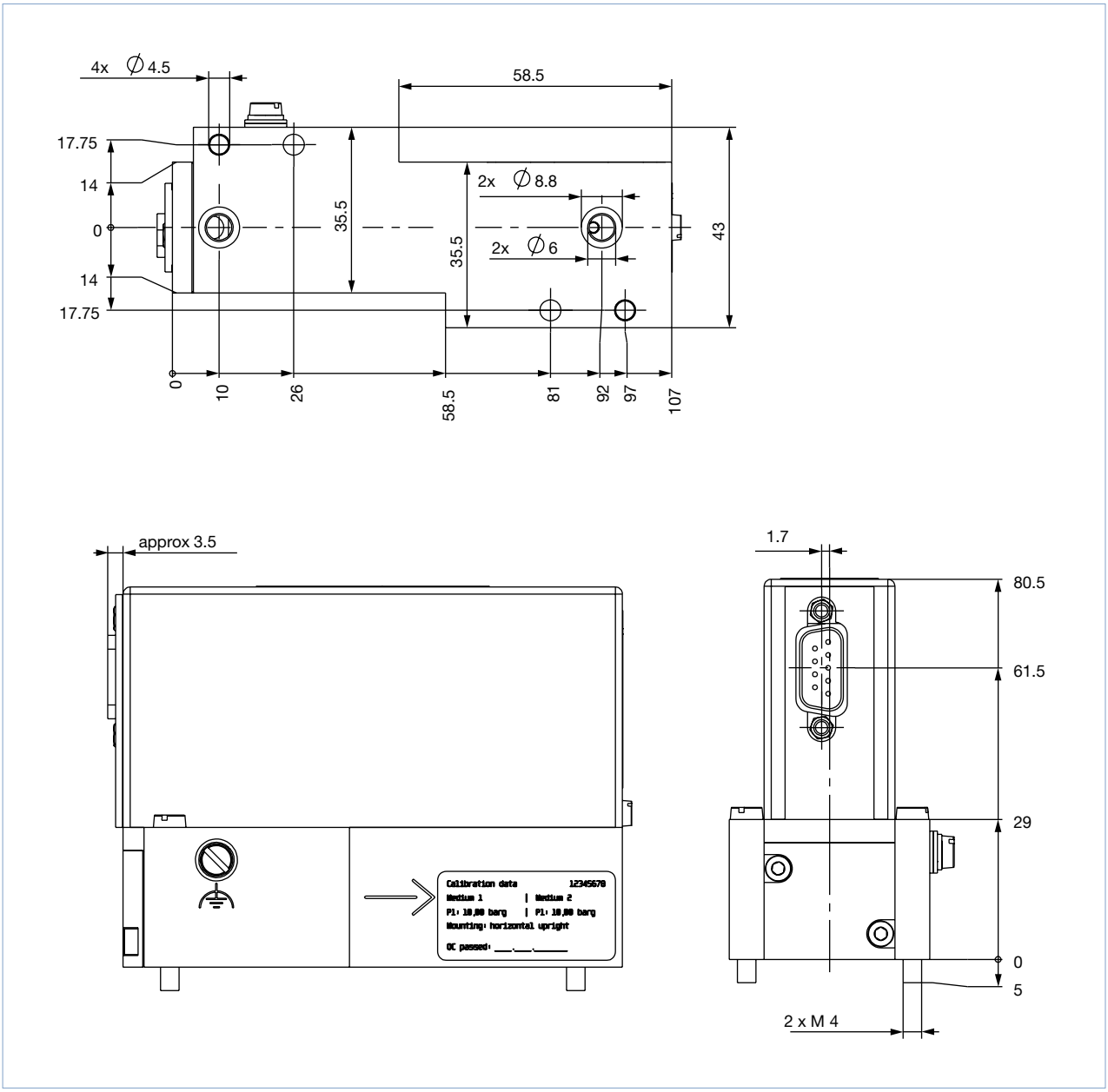
Note:
Dimensions in mm



DTS 1000085464 EN Version: J Status: RL (released | freigegeben | validé) printed: 23.04.2021

3.2. Sub-base version

Note:
Dimensions in mm



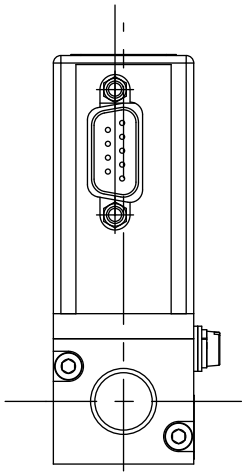
DTS 1000085464 EN Version: J Status: RL (released | freigegeben | validé) printed: 23.04.2021

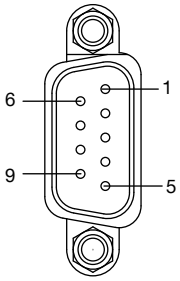
4. Device/Process connections

4.1. Analogue version

Note:

- Optionally pin 7 and pin 8 with bus version as transmitter input possible.
- The cable length for RS232/actual value signal is limited to 30 m.



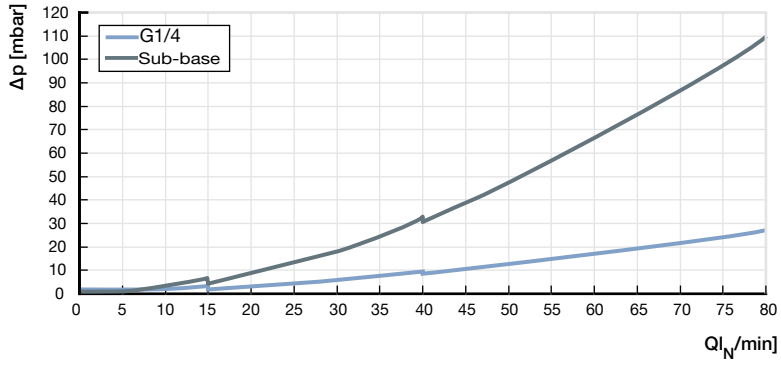
Plug D-Sub, 15 pin	Pin	Assignment
		Analogue control unit
	1	Binary input (related to GND Pin2)
	2	GND
	3	Power supply +24 V DC
	4	Relay, normally opened
	5	Relay, normally closed
	6	TX+ (RS485-Y) – bridge with pin 9 at half duplex
	7	TX- (RS485-Z) – bridge with pin 8 at half duplex
	8	RX- (RS485-B)
	9	RX+ (RS485-A)

1.) RS232 interface only to be operated via RS232 adapter with integrated level adjustment

5. Performance specifications

5.1. Pressure loss diagram of MFMs

The diagram shows exemplary the pressure loss characteristics when air flowing through. To determine the pressure loss of another gas, it must first be converted to the corresponding air flow.



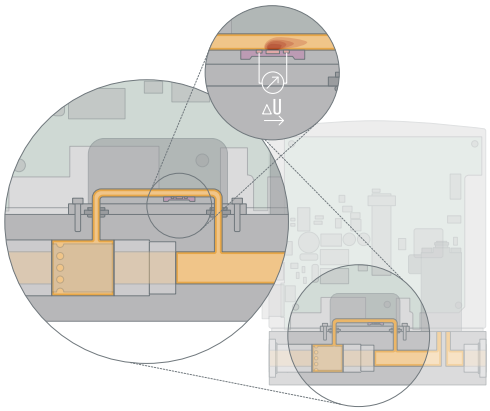
DTS 1000085464 EN Version: J Status: RL (released | freigegeben | validé) printed: 23.04.2021

6. Product operation

6.1. 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.



6.2. Flow characteristic

Nominal flow range of typical gases

Note:

- Q(Gas) = f x Q(N_2)
- When using the gas factors, measurement errors may occur that are outside the data sheet specification. For applications requiring high accuracy, calibration under field conditions is recommended.
- Furthermore, the media compatibility of the sealing materials of the MFM should be checked before use with another gas.

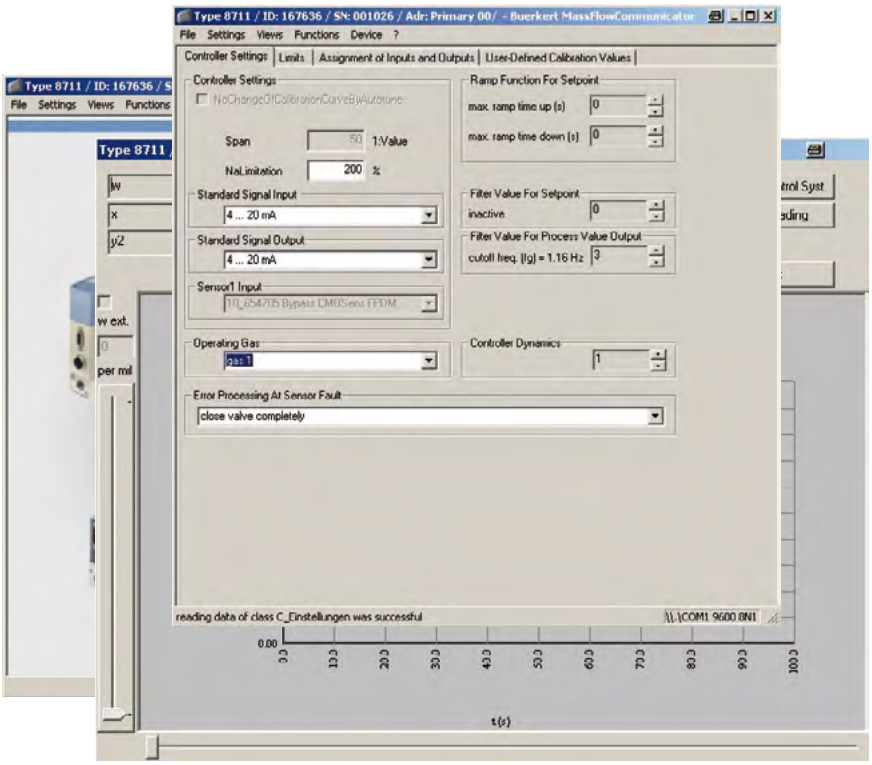
Gas	Min. Q_{Nom} [l_N/min]	Max. Q_{Nom} [l_N/min]
Argon	0.01	80
Helium	0.01	500
Carbon dioxide	0.02	40
Air	0.01	80
Methane	0.01	80
Oxygen	0.01	80
Nitrogen	0.01	80
Hydrogen	0.01	500

DTS 1000085464 EN Version: J Status: RL (released | freigegeben | validé) printed: 23.04.2021

6.3. Software Bürkert Communicator

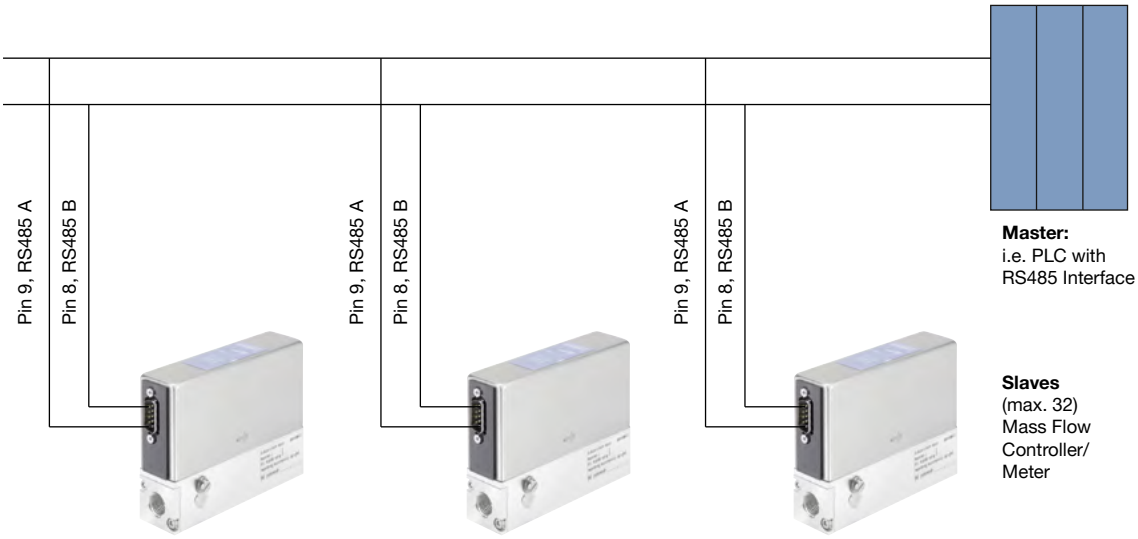
Note:
To install the software, click **here** ▶.

The communication software allows the user to program additionally various functions. For that purpose the MFC or MFM has to be connected to the computer by a RS232 adapter.



6.4. Networking

Note:
To install the software, click **here** ▶.



DTS 1000085464 EN Version: J Status: RL (released | freigegeben | validé) printed: 23.04.2021

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

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

Description	Article no.
Connections/Cables	
Socket D-Sub 9 pin solder connection	917623
Adapter accessories	
USB adapter (Version 1.1, USB socket type B)	670693
USB connection cable 2 m	772299
Communication software Mass Flow Communicator	**LINK**

Bürkert – Close to You

For up-to-date addresses
please visit us at
www.burkert.com

DTS 1000085464 EN Version: J Status: RL (released | freigegeben | validé) printed: 23.04.2021

bürkert

Product Enquiry Form - Mass Flow Controller For Gases

Thank you for your interest in our products! In order to provide you with optimum advice, please fill out the following form and send it to your **Bürkert representative** or e-mail address: info@burkert.com. All information submitted will of course be kept strictly confidential.

Please fill in the **required fields**! ☐ *

***Note:** The interactive functions of this PDF may be restricted depending on the PDF reader used.

Personal Information			
Company		**Contact person**	
Customer no.		**Department**	
Street		**Postcode / Town**	
Telephone no.		**Email**	

Delivery

○ MFC Application ○ MFM Application ☐ Quantity ☐ Required delivery date

Medium data		
Type of gas or gas mixture		
Medium temperature	☐	○ °C / ○ °F
Ambient temperature	☐	○ °C / ○ °F

Fluidic data	
Flow range Q_{Nom}	☐ Min. ☐ Max. ☐ unit ○ Ref. N[1.] ○ Ref. S[1.]
Inlet pressure at Q_{Nom} [2.]	p_1 = ☐ barg[3.]
Outlet pressure at Q_{Nom}	p_2 = ☐ barg[3.]
Max. inlet pressure	p_{1max} = ☐ barg[3.]
Port connection	○ **Compression fitting** ○ **Subbase** ○ **Vacuum fitting** ○ **Thread:** G (DIN ISO 228/1) ¼" ⅜" NPT (ANSI B1.2) ½" ¾" 1"
Installation	○ horizontal, valve upright ○ horizontal, valve horizontal ○ vertical, upward flow ○ vertical, downward flow[4.]

1.) Reference conditions: Ref. N: T=0°C, P=1,013 bar(a); Ref. S: T=20°C, P=1,013 bar(a)

2.) Corresponds to the calibration pressure

3.) Please indicate all pressure values as overpressure to atmospheric pressure [barg] (g = relative pressure)

4.) Possible reduction of the setting range to 1:10 for a vertical downwards flow

Material specifications		
Body	○ Aluminium	○ Stainless steel
Seals	○ FKM	○ EPDM

Electrical data				
IP protection	○ Yes (IP65)	○ No (IP20 or better)		
Control / Communication **Note:** Please choose **one** of the following options!	**Normsignal**	**CANopen/büS**	**PROFIBUS DP**	**Industrial Ethernet**
	○ 0 … 5 V	○ CANopen		○ PROFINET
	○ 0 … 10 V	○ büS		○ Ethernet IP
	○ 0 … 20 mA			○ Modbus TCP
	○ 4 … 20 mA			○ EtherCAT
Connection **Note:** Please choose **one** of the following options!	○ D Sub socket	○ M12 socket	○ D Sub socket	(RJ45 always standard)
	○ Terminal block	○ Terminal block	○ M12 socket	

DTS 1000085464 EN Version: J Status: RL (released | freigegeben | validé) printed: 23.04.2021

Approvals / Conformities
☐ UL
☐ ATEX II Cat. 3 G/D, IECEx
☐ USP Class VI conformity
☐ FDA conformity
☐ EG 1935/2004 conformity

Additional Requirements / Comment

Send form Delete form

DTS 1000085464 EN Version: J Status: RL (released | freigegeben | validé) printed: 23.04.2021