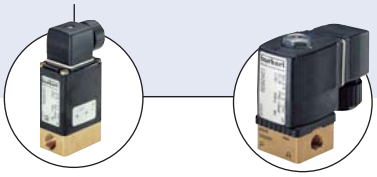
bürkert
FLUID CONTROL SYSTEMS

Mass Flow Controller (MFC) for Gases

- Bypass MFC with capillary technology for nominal flow rates from 5 ml_N/min to 15 l_N/min
- Applicable for aggressive gases
- Compact design and digital communication

Type 8715 can be combined with...



Typ 0330
3/2 or 2/2-way valve

Typ 6013
2/2-way valve

Type 8715 controls the mass flow of gases through a sensor element which is not in direct contact with the gas itself. The measured value provided by the sensor (see the description on page 2) will be compared in the digital control electronics with the predefined set point according to the signal; if a control difference is present, the control value output to the proportional valve will be modified using a PI control algorithm. In this way, the mass flow can be maintained at a fixed value or a predefined profile can be followed, regardless of pressure variations or other changes in the system.

Type 8715 can optionally be calibrated for two different gases, the user can switch between these two gases. As control element a direct-acting proportional valve guarantees a high sensitivity and a good control characteristics of the MFC. This instrument communicates digitally with master devices, no further A/D conversions needed. The MassFlowCommunicator software can be used for parameterisation and diagnosis.

Technical data

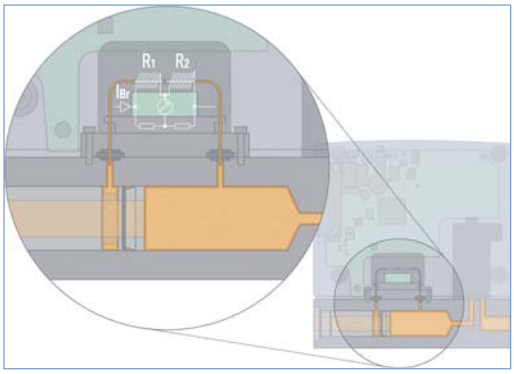
Full scale range[1] (Q_{nom})	5 to 15000 ml_N/min[2] N_2 equivalent
Control range	1:50
Operating gases	Neutral, or aggressive gases
Calibration gas	Operating gas or air with conversion factor
Max. operating pressure (Inlet pressure)	10 bar (145 psi), depending on the orifice of the valve
Medium temperature	-10 to +70°C (-10 to +60°C for oxygen)
Ambient temperature	-10 to +50°C[3], others on request
Accuracy	±1.5% o.R. ±0.3% F.S. (after 30min. warm-up time)
Repeatability	±0.1% F.S.
Settling time ($t_{95\%}$)	<3 s
Materials Body Housing Seals	 Stainless steel PC (Polycarbonate) or metal FKM, EPDM or FFKM
Port connections	NPT 1/4, G 1/4, Screw-in fitting or sub-base, others on request
Control valve (proportional valve) Valve orifice k_{VS}-value	Normally closed 0.05 to 2.0 mm 0.00006 to 0.09 m^3/h

Electr. connection	D-Sub plug 9-pin
Power supply	24V DC
Voltage tolerance	±10 %
Residual ripple	<2 %
Power consumption	3.5 - 11.5 W (depends on proportional vale)
Communication	Digital via RS485 (half duplex or full duplex), RS422
Protection class	IP40
Dimensions [mm]	See drawings on pages 5 and 6
Total weight	ca. 850 g (stainless steel)
Mounting position	Horizontal or vertical
Light emitting diode display (default, other allocations possible)	Indication for Power, Limit Error
Binary input (default, other functions possible)	Start Autotune
Binary output (default, other functions possible)	One relay-output for 1. setpoint not reached, Max. load: 25V, 1A, 25VA

[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] When an internal 5 W valve is used: Max. 40°C

DTS 1000205028 EN Version: B Status: RL (released | freigegeben | validé) printed: 24.10.2016

Measuring principle



The measurement is based on the bypass principle. A laminar flow element in the main channel generates a small pressure drop. This drives a small flow, proportional to the main flow, through the bypass (sensor tube).

Two heating resistors, which are connected in a measuring bridge, are wounded on this stainless steel tube. In the zero-flow state, the bridge is balanced, but with flow, heat is transported in the flow direction and the bridge becomes unbalanced.

The dynamics of the measurement is limited by the tube walls, which act as a thermal barrier. Through use of suitable software in the controller, response times are obtained (in the range of a few seconds) that are adequate for a wide range of applications.

With contaminated gases we recommend to install filter elements upstream. This avoids changes in the division ratio between main flow and sensor tube, as well as changes in the heat transmission caused by deposits on the walls of the sensor tube.

With these sensors even aggressive gases can be controlled, because all essential parts in contact with the gas are fabricated in stainless steel. With this sensor principle it is also possible to convert between different gases.

$Q(Gas) = f \times Q(N_2)$

gas	factor f
N_2	1.00
Luft	1.00
O_2	0.98
H_2	1.01
Ar	1.4
He	1.42
CO_2	0.77

By using the gas factors it is possible that the accuracy is not within the datasheet specification.
For applications which need high accuracy it is recommended to calibrate under application conditions.

The compatibility of the sealing materials of the MFCs should be checked before use with another gas.

Notes regarding the selection of the unit

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 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 request for quotation form on p. 7 to indicate the pressures *directly* before and after the MFC. If these should be 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 MFC, respectively, at a flow rate of Q_{nom}.
In addition, please quote the maximum inlet pressure p_{1max} 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.

The request for quotation form on page 7 contains the relevant fluid specification. Please use in this way the experience of Bürkert engineers already in the design phase and provide us with a copy of the request containing the data of your application together with your inquiry or order.

DTS 1000205028 EN Version: B Status: RL (released | freigegeben | validé) printed: 24.10.2016

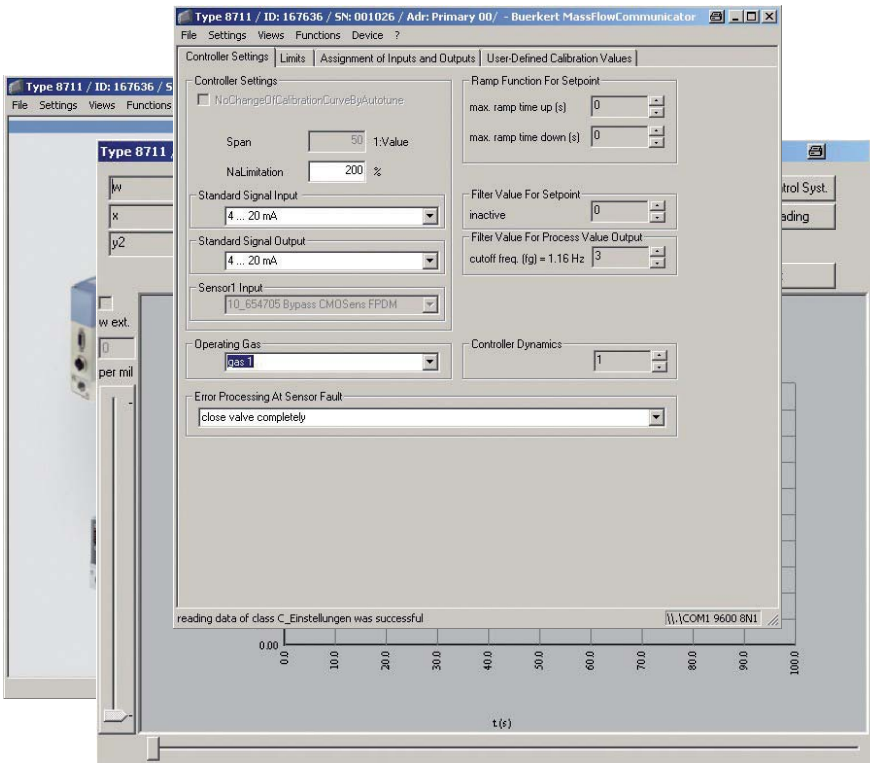
Ordering table for accessories

Article	Item no.
9-pin electrical connection	
D-Sub socket 9-pin solder connection with housing	917 623
Adapters [4]	
USB adapter (version 1.1, USB-socket type B)	670 693
USB connection cable 2 m	772 299
Communication software “MassFlowCommunicator”	Info at www.burkert.com

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

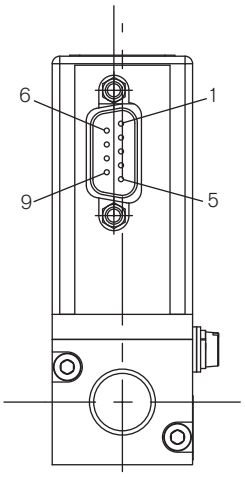
Software MassFlowCommunicator for Communication with Bürkert MFC/MFM

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.



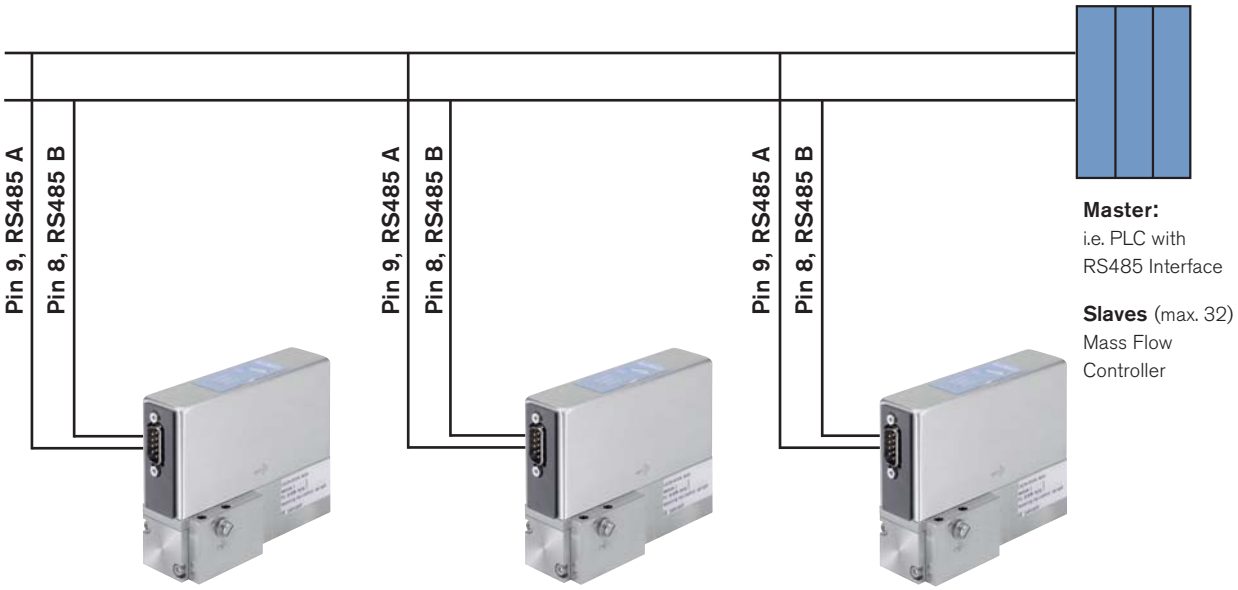
DTS 1000205028 EN Version: B Status: RL (released | freigegeben | validé) printed: 24.10.2016

Pin Assignment



Pin	Connection
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)

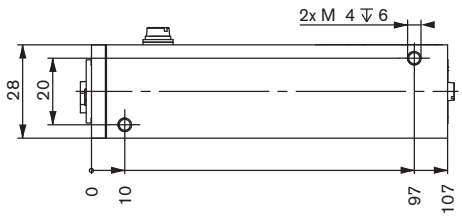
Networking

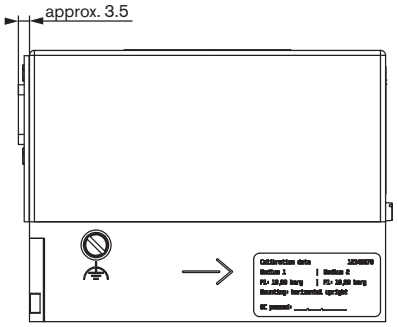


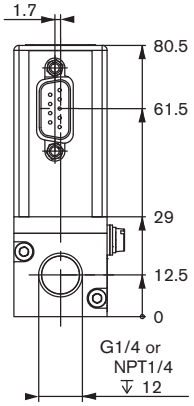
DTS 1000205028 EN Version: B Status: RL (released | freigegeben | validé) printed: 24.10.2016

Dimensions [mm]

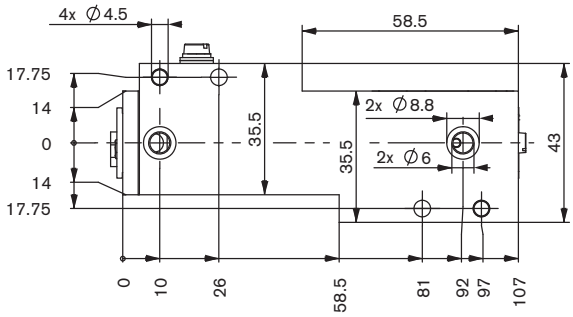
Threaded version

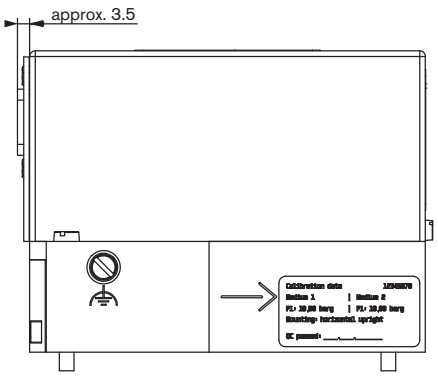


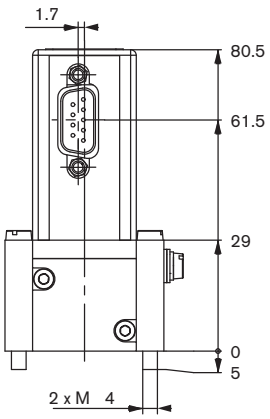




Sub-base version

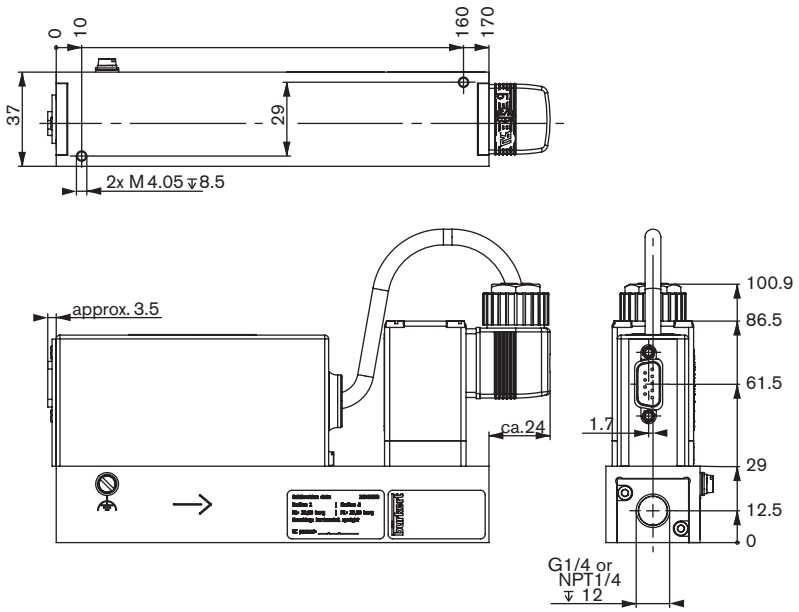






Dimensions [mm], continued

Version with external valve



DTS 1000205028 EN Version: B Status: RL (released | freigegeben | validé) printed: 24.10.2016

bürkert

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

Medium data

Type of gas (or gas proportion in mixtures)

Density kg/m³ 5)

Gas temperature [°C or °F] °C °F

Moisture content g/m³

Abrasive components/solid particles ☐ no ☐ yes, as follows:

Fluidic data

Flow range Q_{nom} Min. / Max.

☐ l_N/min 5) ☐ l_S/min (slpm) 6)
☐ m_N^3/h 5) ☐ kg/h
☐ cm_N^3/min 5) ☐ cm_S^3/min (sccm) 6)
☐ l_N/h 5) ☐ l_S/h 6)

Inlet pressure at Q_{nom} 7) 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)

☐ with screw-in fitting (acc. to specification for pipeline)
- mm pipeline (external Ø)
- inch pipeline (external Ø)

☐ Flange version

Installation

☐ horizontal
☐ vertical, flow upwards ☐ vertical, flow downwards

Ambient temperature °C

Material data

Body ☐ Stainless steel

Seal ☐ FKM ☐ EPDM ☐ FFKM

■ Please quote all pressure values as overpressures with respect to atmospheric pressure bar(ü)

5) at: 1,013 bar(a) and 0°C 6) at: 1.013 bar (a) and 20°C 7) matches with calibration pressure

reset form

To find your nearest Bürkert facility, click on the orange box → **www.burkert.com**

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

1501/1_EU-en_00895247

DTS 1000205028 EN Version: B Status: RL (released | freigegeben | validé) printed: 24.10.2016