FINE CONTROLS (UK) LTD

Fine Controls have been supplying process controls & instrumentation equipment since 1994, & now serves an ever expanding customer base, both in the UK & globally.

We offer a full range of valve & instrumentation products & services, with our product rangerepresenting leading technologies & brands:

Flow: Flow Meters & Transmitters, Flow Switches, Flow Control Valves & Batch Control Systems

Temperature: Temperature Probes & Thermowells, Temperature ransmitters,Temperature Regulators & Temperature Displays

Level: Level Transmitters & Switches

Pressure: Pressure Gauges &Transmitters, Precision & High Pressure Regulators & I-P Converters, Volume boosters.

Precision Pneumatics: Pressure Regulators, I-P Converters, Volume Boosters, Vacuum Regulators

Valves: Solenoid & Pneumatic Valves, Control Valves & Positioners, Actuated Ball, Globe or Diaphragm Valves & Isolation Valves

Services: Repair, Calibration, Panel Build, System Design & Commissioning

FAIRCHILD
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SIEMENS

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FLUID CONTROL SYSTEMS

Mass Flow Meter (MFM) for Gases

- Inline MFM for nominal flow rates from 25 l_N/min to 1,500 l_N/min; 1/4" to 3/4"
- High accuracy
- Fast response time
- Fieldbus option

Type 8006 can be combined with…

Type 1150
Multi-channel
program controller

Type 0330
3/2 or 2/2-way
solenoid valve

Type 6013
2/2-way
solenoid valve

MFC
Communications
Software

Mass flow meters are used in process technology for the direct measurement of the mass flow of gases. In case of volumetric flow meters, it is necessary to measure the temperature and the pressure either the density, because gases change their density or rather their volume depending on the pressure. The measurement of the mass flow, on the other hand, is independent of the pressure and the temperature. The digital mass flow meter Type 8006 uses an inline sensor based on the thermal principle (see the description on page 2) located directly in the main channel. Due to the fact that the sensor is directly in the main channel a very fast response time of the MFM is reached. Another benefit of this main stream measurement is that it is less sensitive to contamination. The actual flow is given as an analog output signal or could be read out over fieldbus communication. Type 8006 can optionally be calibrated for

two different gases, the user is able to switch between these two gases. The materials of the parts that come into contact with the medium are selected according to customer specification so that the unit can be operated with the complete range of standard process gases.

Typical application areas are gas flow measurements in:

- Heat treating processes
- Test benches
- Packaging
- Food and beverage processes
- Environmental technology

Technical data			
Full scale ranges [1] **(Q_{nom})**	25 to 1,500 l_N/min Reference medium N_2	**Power supply**	24V DC
		Voltage tolerance	±10%
Operating media	Neutral, non-contaminated gases, others on request	**Residual ripple**	< 2%
		Power consumption	Max. 10W Max. 12.5 W (Bus version)
Max. operating pressure	Up to max. 10 bar		
Max. pressure drop	120 mbar (with air and 6 barg inlet pressure)	**Output signal** (actual value output) Max. current, (voltage output) Max. load, (current output)	0–5 V, 0–10 V, 0–20 mA or 4–20 mA 10 mA 600 Ω
Calibration medium	Operating gas or air with conversion function		
Medium temperature	-10 to +70°C		
Ambient temperature	-10 to +45°C	**Fieldbus communication**	PROFIBUS-DP, DeviceNet, CANopen
Accuracy (after 15 min. warm up time)	±1.5% of rate ±0.3% F.S.	**Protection class**	IP65
		Dimensions [mm]	See drawings on p. 4
Linearity	±0.25% F.S.	**Total weight** (Examples for standard blocks)	1.2 kg (Al) 3.0 kg (VA)
Repeatability	±0.1% F.S.		
Control range	1:50	**Mounting position**	Horizontal or vertical [2]
Response time ($t_{95\%}$)	<500 ms	**Light emitting diodes** (Default, other allocations possible)	Indication for power, communication, limit, error
Body material	Stainless steel or aluminium (anodised)		
Electronics housing material	Aluminium (coated)	**Binary input** (Default, other functions possible)	Three, different functions possible – with default not assigned
Sealing material	FPM, EPDM (others on request)		
Port connection	G 1/4, 3/8, 1/2, 3/4, NPT 1/4, 3/8, 1/2, 3/4	**Binary output** (Default, other functions possible)	Two relay outputs for 1. limit (Q_{nom} almost reached) 2. error (e.g. sensor fault) max. load 30VDC, 1A/30VAC, 0,5A
Elec. connection	Round socket 8-pin Sub-HD socket 15-pin Sub-D socket 9-pin (only for fieldbus)		

[1] At reference conditions 1.013 bar(a) and 0°C
[2] With flow downwards limited span

Functional principle of the Sensor Element
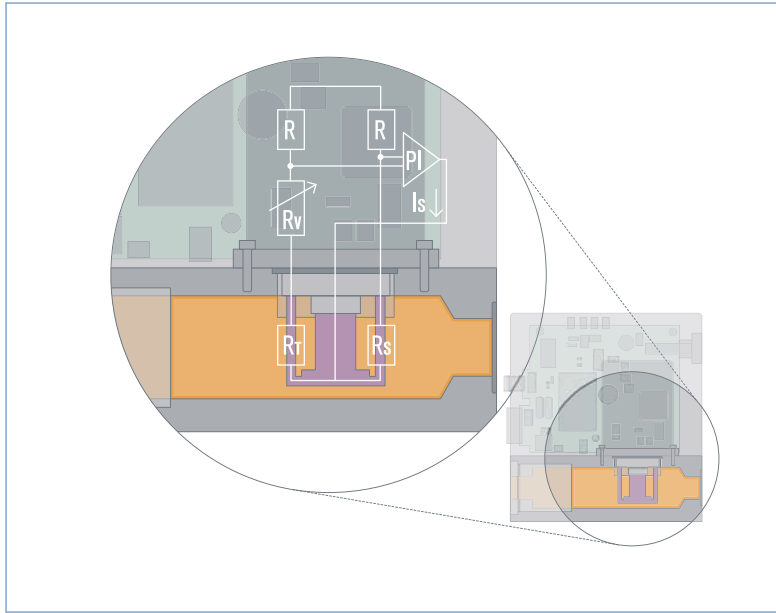
This sensor works as a hot-film anemometer in the so-called CTA operational mode (Constant Temperature Anemometer). To do this, two resistors with precisely specified temperature coefficients are located directly in the media flow and three resistors are located outside the flow are connected together to form a bridge.

The first resistor in the medium flow (R_T) measures the fluid temperature, the second, low-value resistor (R_S) 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.

Notes regarding the selection of the unit

The decisive factors for the perfect functioning of an MFM within the application are the fluid compatibility, the normal inlet pressure and the correct choice of the flow meter range. The pressure drop over the MFM depends on the flow rate and the operating pressure.

▶ **The questionnaire on page 5 contains the relevant fluid specification. Please use in this way the experience of Burkert engineers already in the design phase and provide us with a copy of the questionnaire containing the data of your application together with your inquiry or order.**

Ordering table for accessories (connectors are not included in the delivery)

Article	Item no.
Round plug 8-pin Binder (solder connection)	918 299
Round plug 8-pin with 5m – cable, on one side prefabricated	787 733
Round plug 8-pin with 10m – cable, on one side prefabricated	787 734
SUB-HD-plug 15-pin with 5m – cable, on one side prefabricated	787 735
SUB-HD-plug 15-pin with 10m – cable, on one side prefabricated	787 736
RS232 adapter – for connection to a PC	654 757
Cable for RS232 adapter, 9-pin socket/plug 2m	917 039
RS485 adapter	658 499
USB adapter	670 696
Communications software (Mass Flow Communicator)	Info at **www.buerkert.com**

Pin Assignment
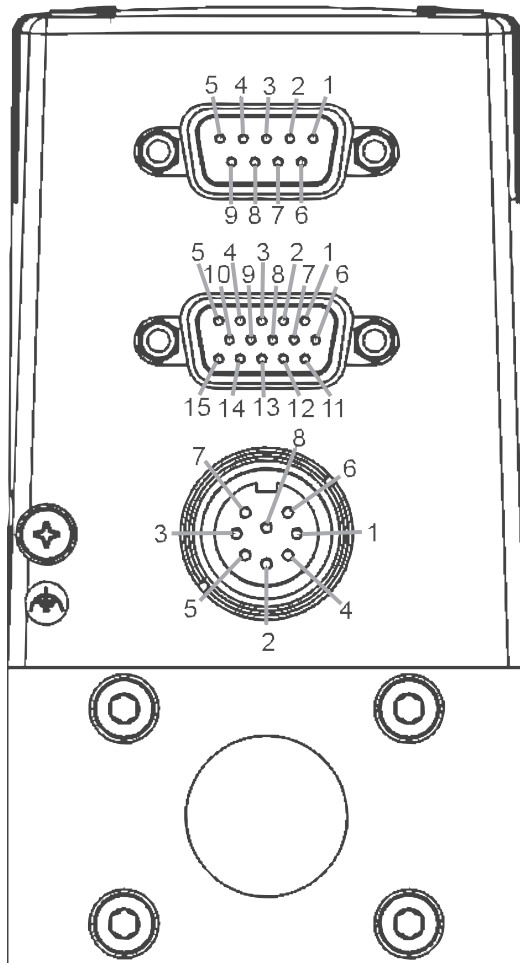
Sub-D socket 9-pin

with PROFIBUS-DP	
Pin	Connection
1	shield
2	not used
3	RxD/TxD - P (B-line)
4	RTS (control signal for repeater)
5	GND
6	VDD
7	not used
8	RxD/TxD - N (A-line)
9	not used

with DeviceNet, CANopen	
Pin	Connection
1	shield
2	CAN_L
3	GND
4	not used
5	not used
6	not used
7	CAN_H
8	not used
9	not used

| Sub-HD socket 15-pin	
Pin	**Connection**
1	not used
2	not used
3	signal output +
4	binary input 2
5	12V-output (only company internal use)
6	RS232 TxD (direct connection to PC)
7	binary input 1
8	DGND (for binary inputs)
9	only company internal use (do not connect!)
10	12V-output (only company internal use)
11	12V-output (only company internal use)
12	binary input 3
13	signal output GND
14	RS232 RxD (direct connection to PC)
15	DGND (for RS232)

(with bus version 3 and 13 not used)

Socket round 8-pin	
Pin	Connection
1	supply 24V +
2	relay 1 - middle contact
3	relay 2 - middle contact
4	relay 1 - opener
5	relay 1 - closer
6	supply GND
7	relay 2 - closer
8	relay 2 - opener

Dimensions [mm]

with fieldbus
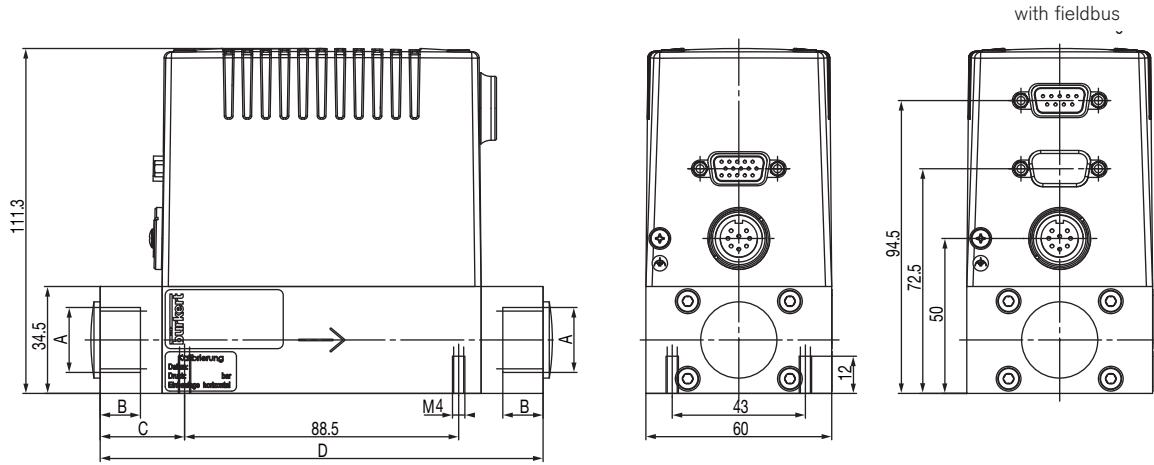
A	B	C	D
G 3/4; NPT 3/4	14	27.25	143
G 1/2; NPT 1/2	13	27.25	143
G 3/8; NPT 3/8	10	22.25	133
G 1/4; NPT 1/4	10	22.25	133

with fieldbus
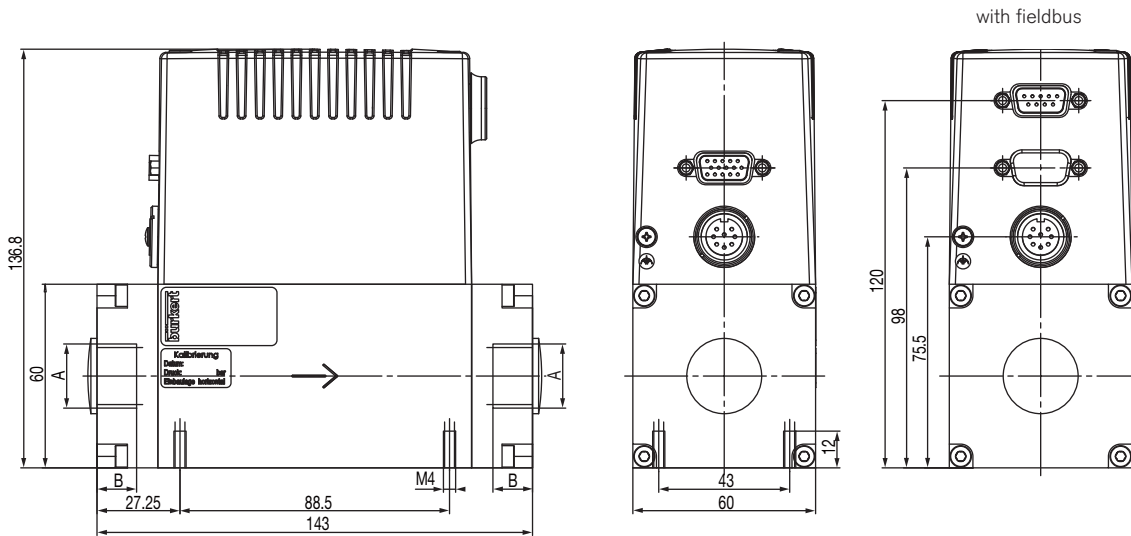
A	B
G 3/4; NPT 3/4	15
G 1/2; NPT 1/2	13

bürkert

MFC/MFM Applications - Request for Quotation

Please fill out and send to your nearest Bürkert sales centre* together with your inquiry or order

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] [1]		
Medium temperature [°C or °F]	°C	°F
Moisture content [g/m³]		
Abrasive components / solid particles	☐ no	☐ yes as follows

Fluidic data

Maximum flow Q_{nom}

	l_N/min [1]	cm_N^3/min [1]
	m_N^3/h [1]	cm_s^3/min (sccm) [2]
	kg/h	l_s/min (slpm) [2]

Minimum flow Q_{min}

	l_N/min [1]	cm_N^3/min [1]
	m_N^3/h [1]	cm_s^3/min (sccm) [2]
	kg/h	l_s/min (slpm) [2]

Inlet pressure at Q_{nom}　p_1 ___ barg or　___ psig ▪

Outlet pressure at Q_{nom}　p_2 ___ barg or　___ psig ▪

Max. inlet pressure p_{1max}　___ barg or　___ psig ▪

Pipe run (external-Ø)　___ metric, mm　___ imperial, inch

MFC/MFM- port connection
☐ without screw-in fitting
☐ G 1/4　☐ G 3/8　☐ G 1/2　☐ G 3/4
☐ NPT 1/4　☐ NPT 3/8　☐ NPT 1/2　☐ NPT 3/4
☐ with screw-in fitting, pipe size ___

Installation
☐ horizontal, upright　　☐ horizontal, inclined to the side
☐ vertical, flow downwards　　☐ vertical, flow upwards

Ambient temperature　___ °C

Material data

Body material　☐ Stainless steel　☐ Aluminium
Sealing material　☐ FKM　☐ EPDM　___ Other

Electrical data

Output signal
☐ 0-20 mA　　☐ 4-20 mA
☐ 0-10 V　　☐ 0-5 V

Fieldbus communication
☐ PROFIBUS-DP　　☐ DeviceNet　　☐ CANopen

▪ Please quote all pressure values as overpressures with respect to atmospheric pressure [barg]
[1] at: 1.013 bar (a) and 0°C　　[2] at: 1.013 bar (a) and 20°C

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