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

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FLUID CONTROL SYSTEMS

Mass Flow Controller (MFC) for Gases

- Bypass MFC with capillary technology for nominal flow rates from 5 ml_N/min to 10 l_N/min
- Applicable for aggressive gases
- Fieldbus option

Type 8710 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

MassFlowCommunicator
Communications software

Type 8710 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 8710 can optionally be calibrated for two different gases, the user is able to switch between these two gases.
The control element, a proportional valve working at low friction, guarantees a high sensitivity and a good control characteristics of the unit.
Typical application areas are gas dosing or rather the production of gas mixtures in:

- Heat treatment,
- Metal melting treatment,
- Environmental technology,
- Material coating and
- Fuel cell technology.

Technical data

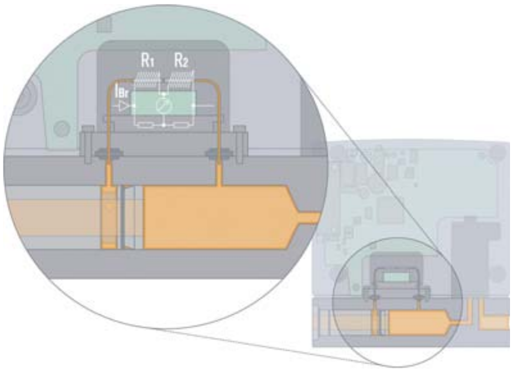
Full scale ranges[1] (Q_{nom})	5 to 10,000 ml_N/min N_2 equivalent
Operating media	neutral, or aggressive gases, others on request
Max. operating pressure (inlet pressure)	10 bar (145 psi), depending on the orifice of the valve
Calibration medium	operating gas or air with conversion factor
Medium temperature	-10 to +70°C
Ambient temperature	-10 to +50°C
Accuracy (after 30 min. warm up time)	±1.5% o.R. ±0.3% F.S.
Linearity	±0.1% F.S.
Repeatability	±0.1% F.S.
Control range	1:50
Settling time ($t_{95\%}$)	<3 s
Body material	stainless steel
Electr. housing material	PC (Polycarbonate)
Sealing material	FKM, EPDM, 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 m³/h
Electr. connection	Sub-D plug 15-pin M12 plug 5-pin (DeviceNet, CANopen) M12 socket, 5-pin (PROFIBUS DP)

Power supply	24V DC
Voltage tolerance	±10 %
Residual ripple	<2 %
Power consumption	max. 7.5 W, max. 10 W (Fieldbus version)
Setpoint Feed impedance	0-5 V, 0-10 V, 0-20 mA or 4-20 mA > 20 kΩ (voltage), < 300 Ω (current)
Output signal 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
Digital communication	PROFIBUS DP, DeviceNet, CANopen, RS232/485 (RS Interface only with adapter)
Protection class	IP40
Dimensions [mm]	see drawings
Total weight	ca. 850 g (stainless steel)
Mounting position	horizontal or vertical
Light emitting diode display (default, other allocations possible)	indication for Power, Limit (with analog signals) / Communication (with fieldbus), Error
Binary input (default, other functions possible)	two 1. start autotune 2. not assigned
Binary output (default, other functions possible)	one relay-output for 1. setpoint not reached max. load: 25V, 1A, 25VA

[1] at standard conditions 1.013 bar (a) and 0°C

DTS 1000095464 EN Version: B Status: RL (released I freigegeben I validé) printed: 04.05.2009

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 heater resistors, which are connected in a measuring bridge, are wound 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 media 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 medium are fabricated in stainless steel. With this sensor principle it is also possible to convert between different gases.

Q(Gas) = f x Q(N2)

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. 5 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.

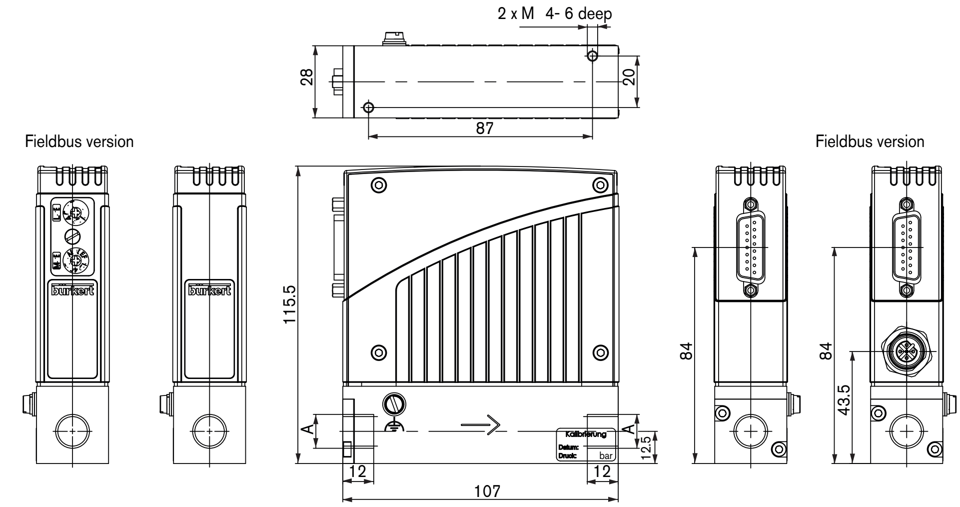
The request for quotation form on page 5 contains the relevant fluid specification. Please use in this way the experience of Bürkert engineers already in the design phase and provide us with a copy of the request containing the data of your application together with your inquiry or order.

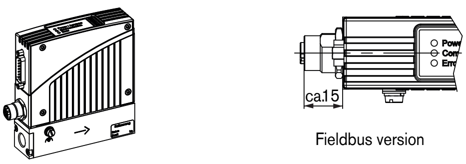
Ordering table for accessories (connectors are not included in the delivery)

Article	Item no.
15-pin electrical connection	
Sub-D socket 15-pin solder connection	918 274
Sub-D hood for Sub-D socket, with screw locking	918 408
Sub-D socket 15-pin with 5m cable, ass. on one side	787 737
Sub-D socket15-pin with 10m cable, ass. on one side	787 738
PROFIBUS DP	
M12 socket direct	918 198
M12 socket (coupling) direct	918 447
PROFIBUS T-connector	902 098
Adapter	
RS232 Adapter	654 748
RS485 Adapter	654 538
PC cable for RS232 9-pin socket/plug 2m	917 039
USB Adapter	670 639
Communication software MassFlowCommunicator	Info at www.burkert.com

Dimensions [mm]

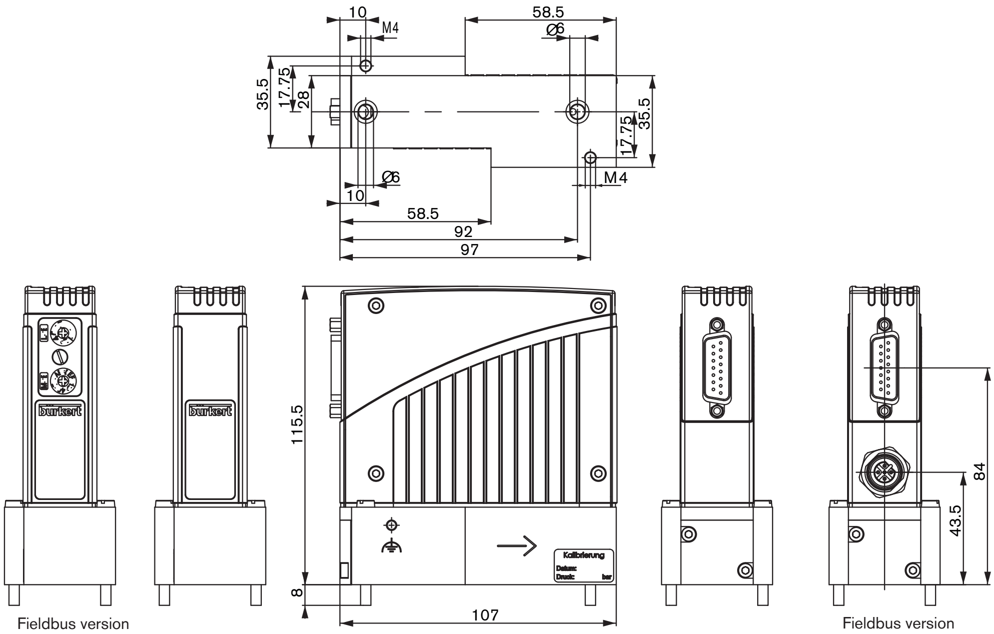
Standard version



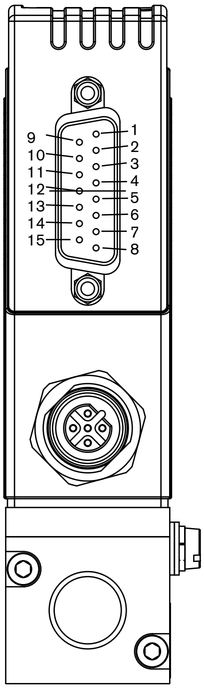


Size A
G 1/4
NPT 1/4

Sub-base version



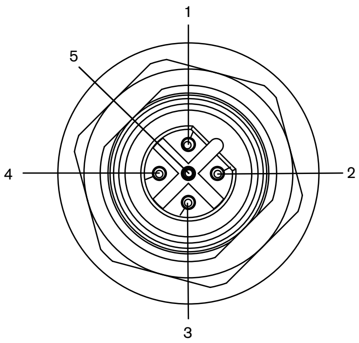
Pin Assignment



Sub-D plug 15-pin

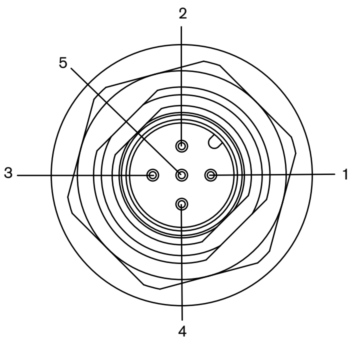
Pin	Connection
1	Relay output - NC contact
2	Relay output - NO contact
3	Relay output - C contact
4	GND 24 -V-supply and binary inputs
5	24 V supply +
6	8 V output (For factory use only!)
7	Setpoint input GND
8	Setpoint input +
9	Process value output GND
10	Process value output +
11	DGND (for RS232)
12	Binary input 1
13	Binary input 2
14	RS232 RxD (without driver)
15	RS232 TxD (without driver)

Only with fieldbus



PROFIBUS DP – socket B-encoded M12 (DPV1 max. 12 Mbaud)

Pin	Connection
1	VDD
2	RxD / TxD - N (A-line)
3	DGND
4	RxD / TxD - P (B-line)
5	not used



DeviceNet, CANopen – plug M12

Pin	Belegung
1	Shield
2	not used
3	DGND
4	CAN_H
5	CAN_L

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Note
You can fill out the fields directly in the PDF file before printing out the form.

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_{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)

Inlet pressure at Q_{nenn} p_1= barg ■

Outlet pressure at Q_{nenn} p_2= barg ■

Max. inlet pressure p_{1max} barg ■

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

MFC/MFM- port connection
- ☐ without screw-in fitting
  - ☐ 1/4" thread G-thread (DIN ISO 228/1)
  - ☐ 1/4" thread NPT-thread (ANSI B1.2)
- ☐ with screw-in fitting
- ☐ sub-base version

Ambient temperature °C

Material data

Sealing material ☐ FKM ☐ EPDM ☐ FFKM

Electrical data

Output/Input signal

Standard signal

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

with Fieldbus
- ☐ 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.buerkert.com**

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

Subject to alteration

0904/2_EU-en_00891883

DTS 1000095464 EN Version: B Status: RL (released I freigegeben I validé) printed: 04.05.2009