

# Datasheet D-6471/DR3

## Mass Flow Controllers for Low- $\Delta$ P Applications



D-6471/DR3 Mass Flow Controller for low- $\Delta$ P applications

### > Introduction

Bronkhorst® model D-6471/DR3 Mass Flow Controllers (MFCs) are suited for precise measurement of flow ranges between 300...3000 l<sub>n</sub>/min at operating pressures between 30 mbar and 5 bar. The MFC consists of a proven inline thermal (CTA) mass flow sensor, a precise control valve and a microprocessor based pc-board with signal and fieldbus conversion. As a function of a setpoint value, the flow controller swiftly adjusts the desired flow rate. The instrument is IP65 compliant and can optionally be equipped with a modern, multi-functional and multi-color display, with operator buttons on the instrument.

The digital MASS-STREAM™ series is characterized by a high degree of signal integrity and, as an option, up to 8 calibration curves of different gases and process conditions can be memorized in the instrument. In addition to the standard RS232 output the instruments also offer analog I/O. As an option, an on-board interface can be mounted to provide PROFINET, PROFIBUS DP, CANopen®, DeviceNet™, Modbus RTU, ASCII or TCP/IP, EtherCAT®, EtherNet/IP, POWERLINK or FLOW-BUS protocols.

### > Benefits

- Compact size, high flows (Kv-max. 3,0)
- Low power consumption (3,7 W)
  - Saves money on power supply
  - Lower costs of ownership
- Powering possible by fieldbus, no additional power lines for valve needed, simple cable layout
- Easy access to membrane for service and cleaning purposes
- Master/Slave available, e.g. for burner ratio control

### > Applications

The D-6471/DR3 MFC is intended for gas flow control applications with limited pre-pressure or when a low pressure drop is required:

- Burner gases
- Industrial furnace processes
- Low pressure gas distribution systems, e.g. for natural gas or municipal gas
- Biogas applications
- Fermenter processes
- Heat and surface treatment

### > Technical specifications

#### Measurement / control system

Flow capacity (based on N <sub>2</sub> )	: 300...3000 l <sub>n</sub> /min FS
Accuracy (at calibration conditions)	: $\pm 1,0\%$ Rd $\pm 0,5\%$ FS
Repeatability	: $< \pm 0,2\%$ FS
Turndown ratio	: up to 1:50
Fluids	: all gases, compatible with materials
Settling time (in control, typical)	: approx. 2 sec.
Control stability	: $< \pm 0,2\%$ FS typical
Operating temperature	: 0...50°C
Temperature sensitivity	: $< \pm 0,1\%$ Rd/°C (Air)
Leak integrity (outboard)	: $1 \times 10^{-6}$ mbar·l/s He
Maximum pressure	: 5 bar(g)
Pressure sensitivity	: $< \pm 0,3\%$ Rd/bar (Air)
Min. required $\Delta$ P for control	: $\geq 30$ mbar(d)
Max. allowed $\Delta$ P	: 2 bar(d)
Max. Kv-value	: 3,0
Attitude sensitivity max. error	: at 90° deviation from horizontal 0,2% at 1 bar typical N <sub>2</sub>
Warm-up time	: 30 min. for optimum accuracy, within 30 seconds for accuracy $< \pm 4\%$ FS

## Mechanical parts

### Material (wetted parts)

Sensor	: stainless steel SS316 (AISI 316L)
Instrument body	: aluminium EN AW-6082-T6
Membrane	: fiber (PET) reinforced FKM
Seals	: FKM / Viton®
Pressure rating	: 5 bar(g) for instrument body in aluminum
Process connections	: 1" BSPP (G1"; ISO 1179-1 cavities), straight inlet run >10" for optimal performance
Ingress protection (housing)	: IP65
Certification	: CE / RoHS

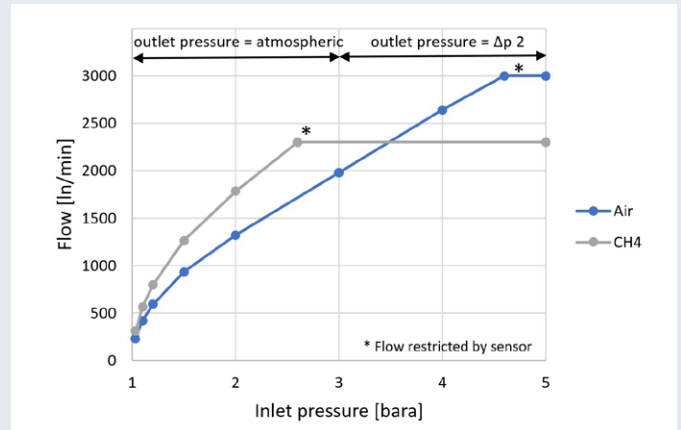
## Electrical connection

Analog/RS232	: 8 DIN (male)
PROFIBUS DP	: bus: 5-pin M12 (female) power: 8 DIN (male)
CANopen / DeviceNet™	: 5-pin M12-connector (male)
PROFINET / EtherNet/IP / POWERLINK	: bus: 2 x 5-pin M12-connector (male) power: 8 DIN (male)
FLOW-BUS / Modbus RTU / ASCII	: 5-pin M12-connector (male)

## Electrical properties

Power supply (single rail)	: +15...24 Vdc ±10%				
Power consumption	: Supply	at voltage	at current	Add. for fieldbus	Add. for display
	15 Vdc	102 mA	125 mA	< 80 mA	< 30 mA
	24 Vdc	66 mA	84 mA	< 50 mA	< 20 mA
Analog output (0...100%)	: 0...5 (10) Vdc, min. load impedance > 2 kΩ; 0 (4)...20 mA (sourcing), max. load impedance < 375 Ω				
Analog setpoint (0...100%)	: 0...5 (10) Vdc, min. load impedance > 100 kΩ; 0 (4)...20 mA, load impedance ~250 Ω				
Digital communication	: standard RS232; options: PROFINET, PROFIBUS DP, CANopen, DeviceNet™, Modbus RTU, ASCII or TCP/IP, EtherCAT®, EtherNet/IP, POWERLINK, FLOW-BUS				

## > Flow vs inlet pressure

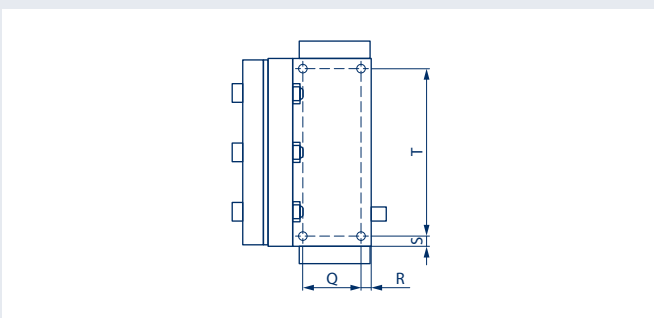
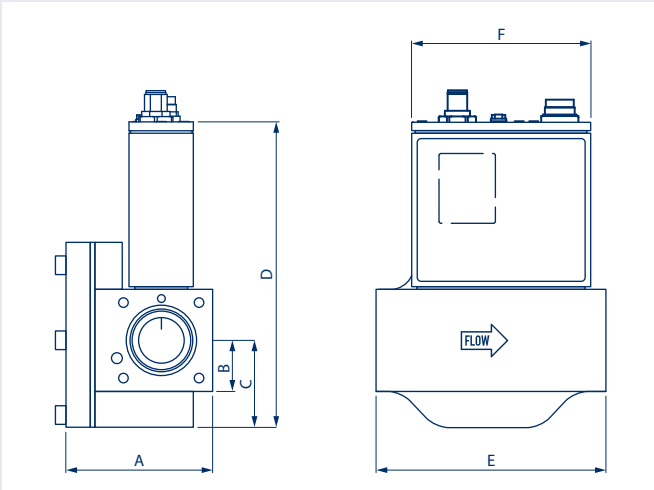


Technical specifications subject to change without notice.

## > Options and accessories

- Free software support for operation, monitoring, optimizing or to interface between digital instruments and windows software.
- Multi-functional display with operator buttons
- PiPS Plug-in Power Supply
- Flow Straightner, as alternative or addition for a minimum 10" long straight inlet run (please note: this causes additional pressure drop)

## > Dimensions (mm) and weight (kg)



Model	Dimensions in mm										
	A	B	C	D	E	F	Q	R	S	T	Weight (kg)
D-6471/DR3	81	25	54	166	130	95	35.5	4.5	6	98	2.0



D-6471/DR3 Mass Flow Controller - backside