

# DATASHEET D-6310-AND-D-6410

## MASS-STREAM D-6310 & D-6410 MFM

가스용 다이렉트 열식 질량 유량계, IP65



### Compact IP65 Mass Flow Meters for low flow rates of gases

Bronkhorst® model D-6310 and D-6410 Mass Flow Meters (MFMs) are suited for precise measurement of flow ranges between 10...200 ml<sub>n</sub>/min and 0,1...2 l<sub>n</sub>/min at operating pressures between vacuum and 10 bar (Aluminium) or 20 bar (Stainless Steel). The MFM consists of a proven inline thermal (CTA) mass flow sensor and a microprocessor based pc-board with signal and fieldbus conversion and a PID controller for optional mass flow control by means of a separately mounted control valve. The instrument is IP65 compliant and can optionally be equipped with a modern, multi-functional and multi-colour 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 CANopen®, DeviceNet™, EtherCAT®, PROFIBUS DP, PROFINET, Modbus RTU, ASCII or TCP/IP, EtherNet/IP, POWERLINK or FLOW-BUS protocols.

### 기술 정보

#### Measurement / control system

Flow range (intermediate ranges available)	min. 10...200 ml <sub>n</sub> /min max. 0,1...2 l <sub>n</sub> /min (based on N <sub>2</sub> )
정확도 (선형도) (실제 검교정 기반)	± 1,0 % RD plus ± 0.5% FS (at calibration conditions)
Repeatability	< 0,2 % FS
Turndown ratio	1:20
Type of gases	almost all gases, compatible with chosen materials
Response time (sensor)	approx. 0,3 sec.
Operating temperature	0 ... 50 °C
Storage / Transport conditions	-20 ... +80 °C, max. 95% RH (non-condensing)
Temperature sensitivity	D-63xx : ±0,2% Rd/°C (Air) D-64xx : ±0,1% Rd/°C (Air)
Pressure sensitivity	±0,3% Rd/bar typical (Air)
Leak integrity, outboard	tested < 2 x 10 <sup>-8</sup> mbar l/s He
Attitude sensitivity	at 90° deviation from horizontal max. error 0,2 % at 1 bar typical N <sub>2</sub>
Warm-up time	30 min. for optimum accuracy, within 30 seconds for accuracy ±4% FS

## Mechanical parts

Sensor	Stainless steel SS 316 (AISI 316L)
Instrument body	D-63xx : Aluminium AL 50ST/51ST (anodised) or stainless steel SS 316 / D-64xx : Aluminium EN AW-6082-T6 (non-anodised) or stainless steel SS 316
Sieves and rings	Stainless steel SS 316
Pressure rating (PN)	10 bar g for instrument body in aluminium, 20 bar g for instrument body in stainless steel SS 316
Process connections	G1/4" (D-63xx : RP-type cavity / D-64xx : ISO1179-1 cavity) / compression type or face seal (VCR/VCO) couplings
Seals	standard: FKM/Viton®; options: EPDM, FFKM/Kalrez®, FDA and USP Class VI approved compounds
Weight	Aluminium: 1,0 kg Stainless steel: 1,5 kg
Ingress protection	IP65

## Electrical properties

Power supply	+15 ... 24 Vdc ±10%			
Max. power consumption	Supply	Basic model	Add. for fieldbus	Add. for display
	15V	115 mA	80 mA	30 mA
	24V	85 mA	50 mA	20 mA
아날로그 출력	0...5 (10) Vdc or 0 (4)...20 mA (sourcing output)			
Digital communication	standard: RS232 options: CANopen®, DeviceNet™, EtherCAT®, PROFIBUS DP, PROFINET, Modbus RTU, ASCII or TCP/IP, EtherNet/IP, POWERLINK or FLOW-BUS			

## Electrical connection

아날로그/RS232	8 DIN (male);
PROFIBUS DP	bus: 5-pin M12 (female); power: 8 DIN (male)
CANopen® / DeviceNet™	5-pin M12 (male)
Modbus RTU / FLOW-BUS	5-pin M12 (male)
Modbus TCP / EtherNet/IP / POWERLINK	bus: 2 x 5-pin M12 (female) (in/out); power: 8 DIN (male);
EtherCAT®/ PROFINET	bus: 2 x 5-pin M12 (female) (in/out); power: 8 DIN (male)

## Control valve options

External actuator options to be connected to the controller

## Ex-proof specifications

## Approvals / certificates

## Recommended accessories



### PIPS SERIES

#### 전원 공급 액세서리

연구실용 / 산업용 제품  
메인 연결을 위한 교환  
가능한 플러그 (유럽, 영  
국, 미국, 호주, 국제 전  
기 표준)

## Related products



### MASS-STREAM D-6311 & D-6411 MFC

최소 유량 범위 0,01...  
0,2 l/min  
최대 유량 범위 0,1...2  
l/min  
압력 범위 최대 20 bar  
견고한 센서 및 하우징  
(IP65)  
일체형 TFT 디스플레이  
옵션



### MASS-STREAM D-6320 & D-6420 MFM

최저 유량 범위 0,05...1  
l/min  
최대 유량 범위 0,35...7  
l/min  
압력 범위 최대 20 bar  
견고한 센서 및 하우징  
(IP65)  
일체형 TFT 디스플레이  
옵션



Bronkhorst High-Tech designs and manufactures innovative instruments and subsystems for low-flow measurement and control for use in laboratories, machinery and industry. Driven by a strong sense of sustainability and with many years of experience, we offer an extensive range of (mass) flow meters and controllers for gases and liquids, based on thermal, Coriolis and ultrasonic measuring principles. Our global sales and service network provides local support in more than 40 countries. Discover Bronkhorst<sup>®</sup>!