Data Sheet
DS-TMF-5816ex-eng
May, 2003

Brooks Mass Flow Meters and Mass Flow Controllers Certified for use in Zone 1 hazardous area

CUSTOMER BENEFITS

- **Assured process accuracy and repeatability**
- **Long-term reliability**
- **Reduced maintenance**
- **CE certified**
- **Improved safety; certified for use in zone 1 hazardous area according to ATEX**
- **Designed, developed, manufactured and supplied by the first ISO-9001 Quality Certified M&C company in the world: Brooks Instrument.**

Model 5816

Model 5853 Ex

Model 5864 Ex

CONTINUOUSLY IMPROVING QUALITY

The commitment of Brooks Instrument to continuous improve: specifications, safety standards and application flexibility, make these Brooks [Ex] mass flow products leaders throughout industry in terms of performance, features, reliability, serviceability, and overall perceived quality.

The primary standard calibration equipment used at Brooks Instrument is certified by the Dutch Weights and Measures Authorities (NMi): and traceable to the relevant international standards.

Various calibration gases are available at Brooks Instrument to simulate difficult process applications. Calibration pressures from atmospheric to 100 bar are also possible. To ensure safety: all models are pressure tested as standard to 1.5 times the maximum working pressure using Nitrogen gas and to ensure leak integrity, leak tested to 1×10^{-9} mbar l/sec. Helium.

INTRODUCTION

The Brooks [Ex] Thermal Mass Flow (TMF) products are designed for use in petrochemical, pharmaceutical and food industry. The rugged weatherproof construction and certification for installation in Zone 1 hazardous areas, make these products suitable for difficult-to-handle gasflow applications. Mass flow measurement for gases between 10 ml_n/min. full scale to 2160 m^3_n/h and mass flow control between 10 ml_n/min. to 1000 l_n/min. can be accomplished by various models which utilise one common set of electronics.

DESCRIPTION

Meter Body/Sensor

The Brooks [Ex] mass flow products incorporates a high accurate thermal mass flow Sensor (1. in figure 1). A small amount of energy is constantly applied to the process gas. Temperature sensors located upstream and downstream accurately detect the temperature difference which occurs when gas flows.

Based on the specific heat of the process gas the temperature difference is directly proportional to mass flow. The voltage signal, generated as a result of temperature difference, versus mass flow, represents the output signal. This signal can be converted into 4-20 mA with help of the remote installed conditioning electronics unit. The [Ex] mass flow meter and control valve are separated from the conditioning electronics, this can be closely installed in the control room.

Figure 1 represents a simplified block diagram of a Brooks [Ex] mass flow controller.

1. Represents the [Ex] mass flow sensor module (including temperature compensation circuitry)
2. Represents the meter body
3. Represents the control valve (for MFC only)
4. Represents the conditioning electronics

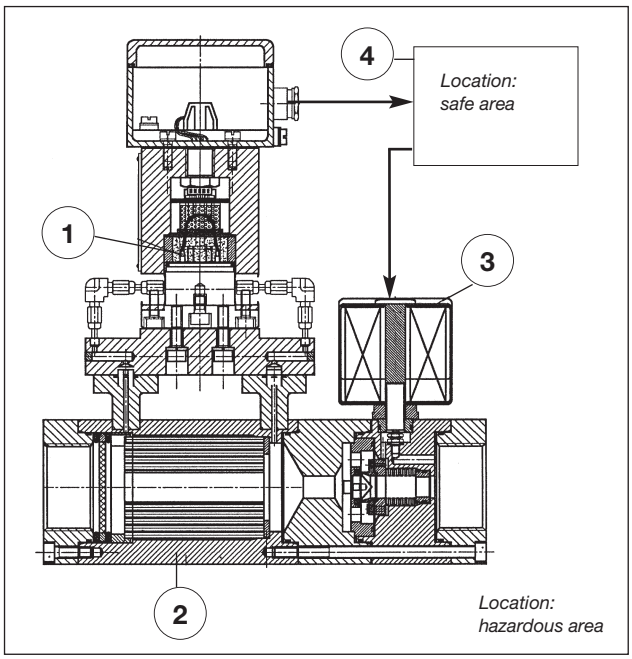


Figure 1
Blockdiagram of the Brooks [Ex] mass flow meter and controller

Control module

The Brooks [Ex] mass flow controllers accurately measure and control gas flows, responding fast to command changes virtually without over- or undershoot.

The control valve receives its drive signal from the controller board and immediately responds to any deviation between the flow output signal and the setpoint value.

The control valve is a normally closed type, certified for use in hazardous areas.

PERFORMANCE SPECIFICATIONS

Flow accuracy	± 1.0 % full scale including linearity at calibration conditions
Repeatability	± 0.25 % of rate
Rangeability	50 : 1
Stability	Less than 0.5 % per year
Temperature	Less than 0.1 % per ºC over
Effect	0 to 65 ºC temp.range
Mounting position Effect	Negligible*

* Refer to the operating manual X-TMF-5816Ex-eng for installation guide lines.

PHYSICAL SPECIFICATIONS

Materials of construction	Wetted parts 316L stainless steel with Viton®, Buna-N®, PTFE/Kalrez®, or EPDM seals or elastomers.
Mechanical connections type available.	NPT(F), Tube compression, VCR, VCO and Flanged DIN- or ANSI
Electrical connections	M20 x 1,5

SPECIFICATIONS

Certifications • CE certified

Flame proof/ Explosion proof Sensor	Explosion proof Control Valve
Power supply 24 Vdc, 100 mA, 2,4 VA	Power supply 24 Vdc
Ambient temp. 0°C to 65°C	Ambient temp. -40°C to 80°C
ATEX: KEMA 02ATEX2151	ATEX: KEMA 98ATEX4452X
II 2 G	II 2 G T 80 C
EEx de IIC T6	EEx me II T4...T5
IP65	IP66
CE 0409/0344	

Protection grade Weather proof : IP-65 certified

Flow ranges

Brooks [Ex] mass flow products

Mass Flow Controller	Mass Flow Meter	Flow Ranges		
Model:	**Model:**	**Min. f.s.**	**Max. f.s.**	**Unit**
5816/38-Ex	5816-Ex	0.010	5	l_n/min.
5816N/36-Ex	5816N-Ex	5	100	l_n/min.
5853-Ex	5863-Ex	100	1000	l_n/min.
	5864-Ex	18	2160	m^3_n/h

Ratings	Max. operating pressure: Model: 5816, 5816/38 Ex 5816P1 Ex and 5816P2 Ex: 300 bar Other models 100 bar, or up to flange rating specifications. (Other pressure ratings on request)
Differential pressure	Model 5853-Ex: 0.5 bar to 20 bar All sensor models: 50 mbar at max. full scale flow (This is for information and is not a rating)
Temperature	Ambient and process gas: 0-65 ºC
Leak Integrity	Outboard: 1 x 10^{-9} mbar. l/sec. Helium
Warm up time	Performance within specifications: 45 minutes

System configuration can only be achieved by means of the remotely installed conditioning electronics.

The [Ex] mass flow meter and control valve are seperated from the conditioning electronics.

The latter has to be installed in a safe (control room) area.

Housing dimensions	19” (3 HE, 10TE) H 128.4 x W 50.4 x D 227.0 mm H 5.05” x W 1.98” x D 8.94
Backpanel	• Power supply 24 Vdc via 15 pin D-connector • Mass flow meter input • Control valve output • Analog I/O via 15 pin D-connector

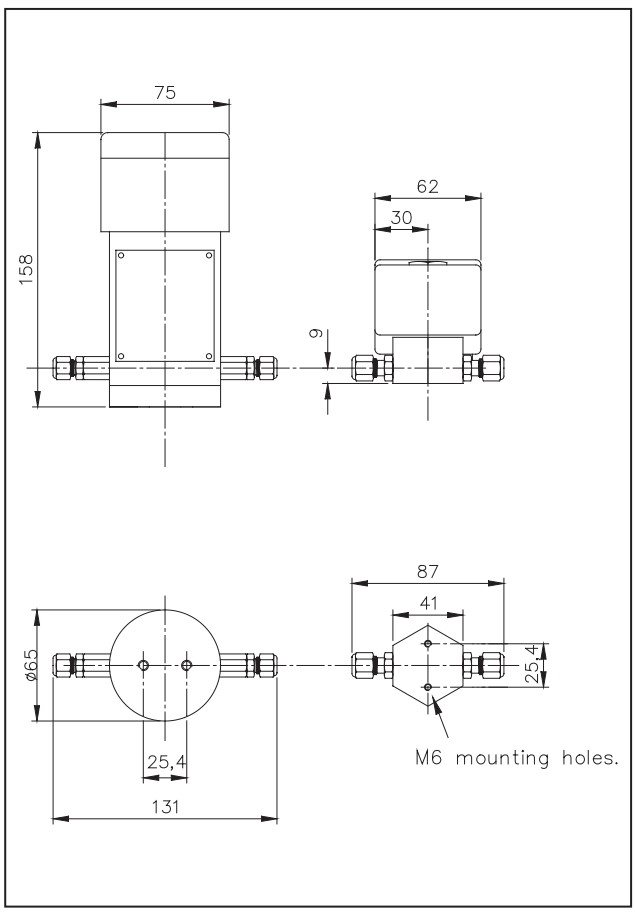
The above mentioned conditioning electronics provides power to the [Ex] mass flow meter and drives the control valve to its required setpoint level.

The complete system has been CE certified, and will have a Flow output available.

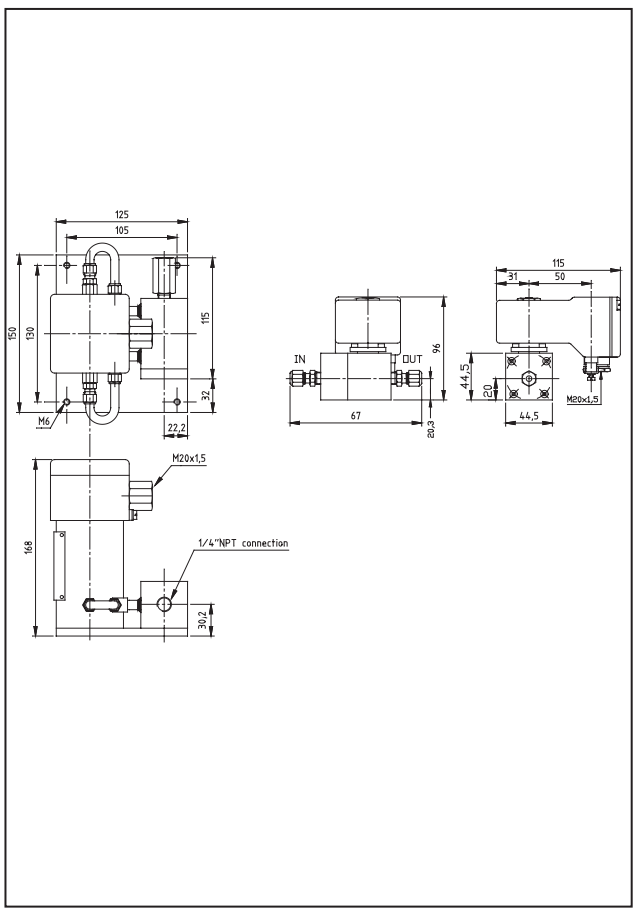
In combination with a control valve the conditioning Electronics requires a setpoint signal that drives the control valve to the requested setpoint level. The I/O signals can be selected for 0-5V or 4-20 mA.

DIMENSIONAL DRAWINGS [Ex] mass flow controllers:

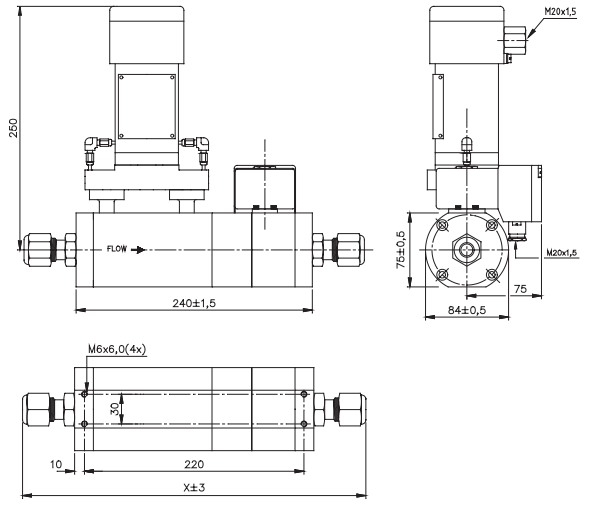
Model: 5816/38 Ex



Model: 5816N/36 Ex

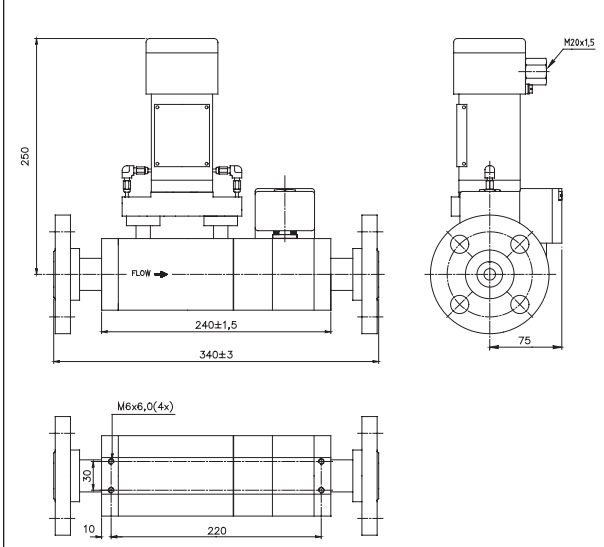


Model: 5853 Ex



Connections	Build-in Dimensions (mm) "X"
	Model 5853
½" Tube Compression	308
¾" Tube Compression	308
1" Tube Compression	317
½" VCO	280
¾" VCO	298
½" VCR	288
0,5", 1", 1,5" NPT or 1 1/16"-12	240

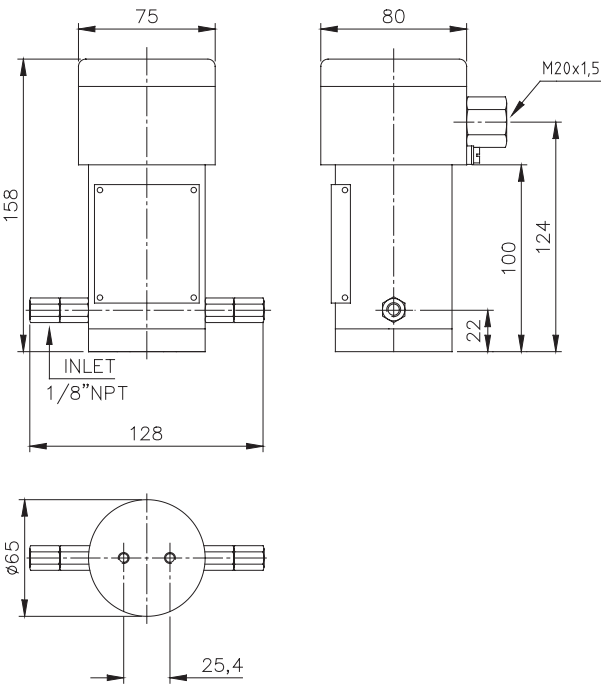
Model: 5853 Ex (flanged)



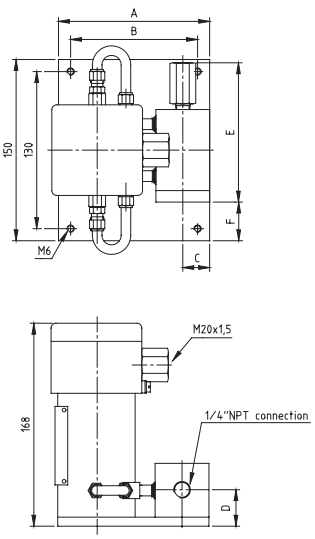
Flange Type	
DIN DN15 PN 40	ANSI 1" 150LBS
DIN DN25 PN 40	ANSI 1" 300LBS
DIN DN40 PN 40	ANSI 1,5" 150LBS
DIN DN50 PN 40	ANSI 1,5" 300LBS
ANSI 0,5" 150LBS	ANSI 2" 150LBS
ANSI 0,5" 300LBS	ANSI 2" 300LBS

DIMENSIONAL DRAWINGS [Ex] Mass Flow Meters

Model: 5816 Ex

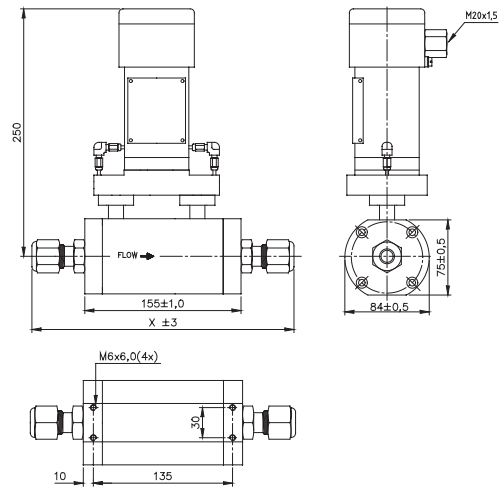


Model: 5816N Ex



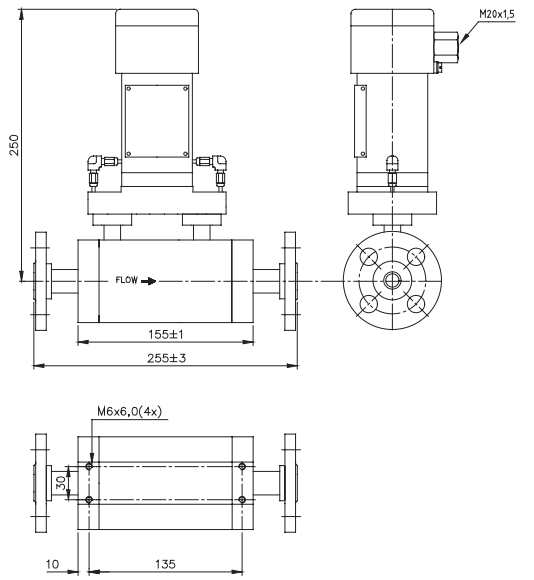
	5816N1	5816P1	5816P2
CONN.	**1/4" NPT**	**1/4" NPT**	**1/2" NPT**
A	125	155	155
B	105	135	135
C	22,2	43	37,5
D	30,2	41,8	47,5
E	119	126	176
F	32	31	27

Model: 5863 Ex



Connections	Build-in Dimensions (mm) "X"
	Model 5863
½" Tube Compression	223
¾" Tube Compression	223
1" Tube Compression	232
½" VCO	195
¾" VCO	213
½" VCR	203
0,5", 1", 1,5" NPT or 1 1/16"-12	155

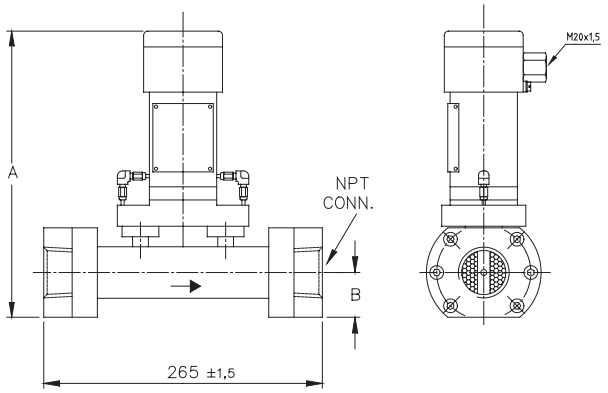
Model: 5863 Ex (flanged)



FLANGE TYPE	
DIN DN15 PN 40	ANSI 1" 150LBS
DIN DN25 PN 40	ANSI 1" 300LBS
DIN DN40 PN 40	ANSI 1,5" 150LBS
DIN DN50 PN 40	ANSI 1,5" 300LBS
ANSI 0,5" 150LBS	ANSI 2" 150LBS
ANSI 0,5" 300LBS	ANSI 2" 300LBS

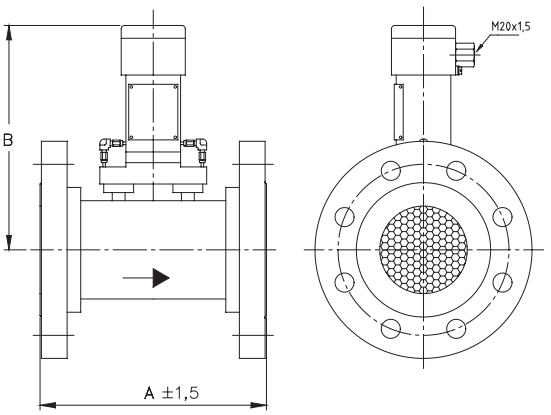
DIMENSIONAL DRAWINGS [Ex] Mass Flow Meters

Model: 5864 Ex



CONN. NPT	A	B
1,5"	272	42,5
2"	283	47,5

Model: 5864 Ex (Flanged)



CONN. NPT	A	B
3"	265	250
4"	265	262
6"	315	290
8"	315	315

ORDER SPECIFICATION INFORMATION

Please use this specification form when ordering Brooks Flow products.

Process data			**Instrument data**	
Fluid name	:.....		Model number	:.....
Flow rate	:.....	Units:.....	Construction materials	:.....
Upstream pressure	:.....	Units:.....	Mech. connections	:.....
Downstream pressure	:.....	Units:.....		
Temperature	:.....	Units:.....		

BROOKS LOCAL AND WORLDWIDE SUPPORT

Brooks Instrument provides sales and service facilities around the world, ensuring quick delivery from local stock, timely repairs, and local based sales and service facilities.

Our dedication to customer service and support extends to our direct sales force, who are well trained, experienced and equipped. These flow specialists provide consultation and support, assuring successful applications of the Brooks flow measurement and control products.

Calibration facilities are available in local sales and service offices. The primary standard calibration equipment to calibrate the mass flow products is certified by the Dutch Weights and Measures Authority (NMi) and traceable to the relevant international standards.

START-UP SERVICE AND IN-SITU CALIBRATION

Brooks Instrument can provide start-up service prior to operation when required.

For some process applications, where ISO-9001 Quality Certification is important, it is mandatory to verify and/or (re)calibrate the mass flow products periodically. In many cases this service can be provided under in-situ conditions, and the results will be traceable to the relevant international quality standards.

CUSTOMER SEMINARS AND TRAINING

Brooks Instrument can provide customer seminars and dedicated training to engineers, end users and maintenance persons. Please contact your nearest sales representative for more details.

HELP DESK

In case you need technical assistance :

SERV' INSTRUMENTATION
Mesure et Contrôle vos fluides
ZI Broteau Nord
69540 Irigny
TEL 33 (0)4 78 51 47 50
FAX 33 (0)4 78 51 59 96
http://www.servinstrumentation.fr

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