

## Installation and Operation Manual

X-TMF-5816Ex-MFC-eng

PN 541-C-008-AAG

December, 2008

# Brooks® TMF-Zone 1

Models 5816-Ex/5864-Ex



Model 5816

## Essential Instructions

**Read this page before proceeding!**

Brooks Instrument designs, manufactures and tests its products to meet many national and international standards. Because these instruments are sophisticated technical products, you must properly install, use and maintain them to ensure they continue to operate within their normal specifications. The following instructions must be adhered to and integrated into your safety program when installing, using and maintaining Brooks Products.

- Read all instructions prior to installing, operating and servicing the product. If this instruction manual is not the correct manual, please see back cover for local sales office contact information. Save this instruction manual for future reference.
- If you do not understand any of the instructions, contact your Brooks Instrument representative for clarification.
- Follow all warnings, cautions and instructions marked on and supplied with the product.
- Inform and educate your personnel in the proper installation, operation and maintenance of the product.
- Install your equipment as specified in the installation instructions of the appropriate instruction manual and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.
- To ensure proper performance, use qualified personnel to install, operate, update, program and maintain the product.
- When replacement parts are required, ensure that qualified people use replacement parts specified by Brooks Instrument. Unauthorized parts and procedures can affect the product's performance and place the safe operation of your process at risk. Look-alike substitutions may result in fire, electrical hazards or improper operation.
- Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.

### Pressure Equipment Directive (PED)

All pressure equipment with an internal pressure greater than 0,5 bar (g) and a size larger than 25 mm or 1" (inch) falls under the Pressure Equipment Directive (PED). The Directive is applicable within the European Economic Area (EU plus Norway, Iceland and Liechtenstein).

Pressure equipment can be traded freely within this area once the PED has been complied with.

\*\* Appendix 1 of this manual contains important safety and operating instructions related to the PED directive

\*\* Meters described in this manual are in compliance with EN directive 97/23/EC module H Conformity Assessment.

\*\* All Brooks Instrument flowmeters falls under Fluid-group I

\*\* Meters larger then 25mm or 1" (inch) are in compliance with category I, II or III of the PED.

\*\* Meters of 25mm or 1" (inch) or smaller are Sound Engineering Practice (SEP).

## CAUTION

**This instrument contains electronic components that are susceptible to damage by static electricity. Proper handling: procedures must be observed during the removal, installation or other handling of internal circuit boards or devices.**

### Handling procedure

1. Power to unit must be removed.
2. Personnel must be grounded, via a wrist strap or other safe, suitable means before any printed circuit card or other internal device is installed, removed or adjusted.
3. Printed circuit cards must be transported in a conductive bag or other conductive container. Boards must not be removed from protective enclosure until immediately before installation. Removed boards must immediately be placed in protective container for transport, storage or return to factory.

### Comments

This instrument is not unique in its content of ESD (electrostatic discharge) sensitive components. Most modern electronic designs contain components that utilize metal oxide technology (NMOS, CMOS, etc.). Experience has proven that even small amounts of static electricity can damage or destroy these devices. Damaged components, even though they appear to function properly, exhibit early failure.

**TMF-Zone 1**

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Dear Customer,

We appreciate this opportunity to service your flow measurement and control requirements with a Brooks Instrument device. Every day, flow customers all over the world turn to Brooks Instrument for solutions to their gas and liquid low-flow applications. Brooks provides an array of flow measurement and control products for various industries from biopharmaceuticals, oil and gas, fuel cell research and chemicals, to medical devices, analytical instrumentation, semiconductor manufacturing, and more.

The Brooks product you have just received is of the highest quality available, offering superior performance, reliability and value to the user. It is designed with the ever changing process conditions, accuracy requirements and hostile process environments in mind to provide you with a lifetime of dependable service.

We recommend that you read this manual in its entirety. Should you require any additional information concerning Brooks products and services, please contact your local Brooks Sales and Service Office listed on the back cover of this manual or visit [www.BrooksInstrument.com](http://www.BrooksInstrument.com)

Yours sincerely,  
Brooks Instrument

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1.1 Purpose

This instruction manual is intended to provide the user with all the information necessary to install, operate and maintain the Brooks Ex-proof mass flowmeter and controller.

1.2 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 whengas 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 is converted into 4-20 mA via the remotely installed conditioning electronics unit. The [Ex] mass flow meter and control valve are separated from the conditioning electronics, which is 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

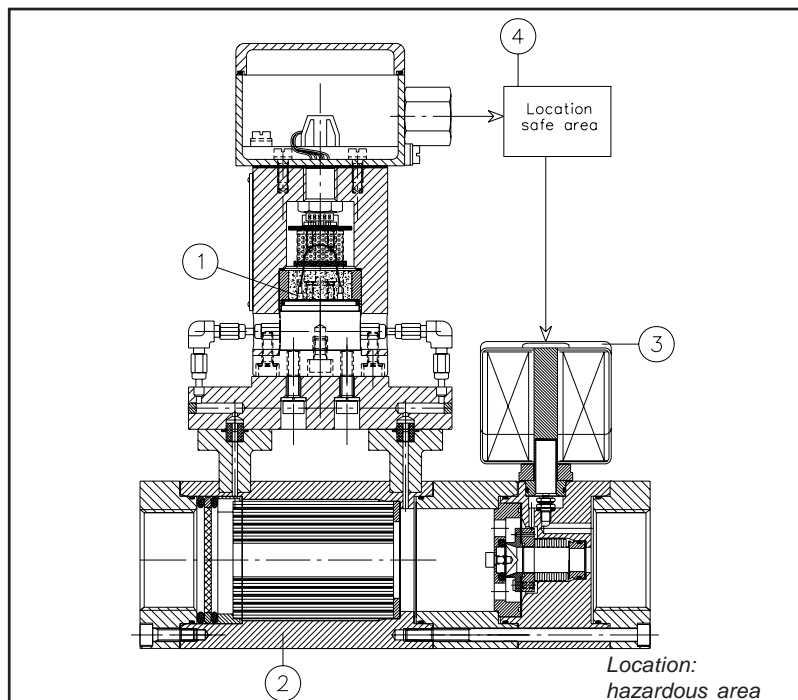


Figure 1-1  
Schematic construction of the Brooks [Ex] mass flow meter and controller

**Control module**

The Brooks [Ex] mass flow controllers accurately measure and control gasflows, 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.

**1.3 Performance Specifications**

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**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 Effect**

Less than 0.1 % per °C over 0 to 65°C temp.range

**Mounting position Effect**

Negligible

(Refer to the Operating Manual X-TMF-5816Ex for installation guide lines).

**1.4 Physical Specifications**

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**Materials of construction**

Wetted parts 316L stainless steel with Viton®, Buna-N®, PTFE/Kalrez®, or EPDM seals or elastomers.

**Mechanical connections**

NPT(F), Tube compression, VCR, VCO and Flanged DIN- or ANSI type available.

**Electrical connections**

M20 x 1.5 cable gland.



**1.5 Specifications**

**Certifications**

Flame proof/Explosion proof Sensor

Power supply 24 Vdc, 100 mA, 2,4 VA  
 Ambient temp. 0°C to 65°C  
 ATEX: KEMA 02ATEX2151



II 2 G  
 Ex de IIC T6

Per EN 50014:1997 + A1, A2  
 EN 50018:2000 + A1  
 EN 60079-0:2006  
 EN 60079-7:2003

IP65  
 CE 0427/0344

Explosion proof Control Valve  
 Type 4632

Power supply 24 Vdc  
 Ambient temp. -40°C to 50°C  
 ATEX: PTB 02ATEX2085 X



II 2 GD T 80 C  
 EEx md II C T4...T6  
 Ex me II T4...T6  
 IP66  
 CE 0102

Table 1-1  
 Flow ranges - Brooks (Ex) Mass Flow Products

Mass Flow Controller	Mass Flow Meter	Flow Ranges					
		Model:	Model:	Min. f.s.	Max. f.s.	Unit	Pressure rating
5816-38-Ex	5816-Ex			0.010	5	ln/min	300 bar
5816N/36-Ex	5816N-Ex			5	100	ln/min	100 bar
5853-Ex	5863-Ex			100	2500	ln/min	70 bar
	5864-Ex			18	2160	m³n/h	Depending on flow ranges and selected process connections See pressure table figure 1-2

**Ratings**

*Max. operating pressure:*  
 Model: 5816, 5816/38 Ex 5816P1  
 Ex and 5816P2 Ex: 300 bar  
 Other models 70 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

**Temperature**

Ambient and process gas: 0-65°C

**Leak Integrity**

Outboard: 1 x 10<sup>-9</sup> 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 separated from the conditioning electronics. The latter has to be installed in a safe (control room) area.

**Housing dimensions:**

19" Cassette, 3 HE and 10 TE

**Frontpanel:**

- H 128.4 W x 50.4 x 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 output
- Control Valve output
- Analog I/O via 15 pin D-connector

The above mentioned conditioning electronics provides power to the [Ex] mass flow meter, reads the flow output signal and drives the control valve to its required setpoint level. In addition a 4-20 mA flow output signal can be provided, when only one [Ex] mass flow meter has been connected. The complete system has been CE certified.

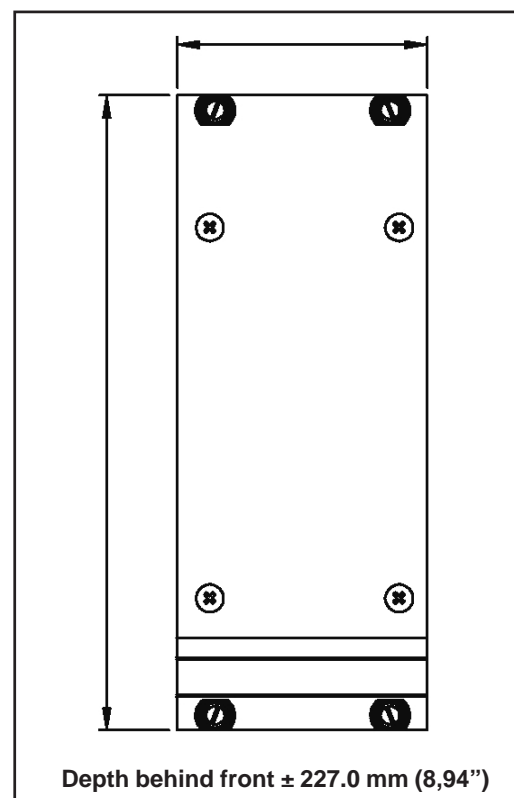


Figure 1-2 Dimensional drawing for 19" module

*Table 1-2 Pressure Matrix 5864Ex Series  
Flange pressure rating versus line size and connection type*

Size	Flange	Applicable Gasket types	MAWP @ 20C [bar]	MAWP @ 70C [bar]	P.E.D. Module H Category	
1½"	<Threaded>	N/A	80	75	2	
	150#	Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	2	
	300#	Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	2	
	PN40	Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	2	
2"	<Threaded>	N/A	65	60	2	
	150#	Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	2	
	300#	Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	2	
	PN40	Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	2	
3"	150#	Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	2	
	300#	Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	2	
	600#	Up to spiral wound	84	77	2	
	PN40	Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	2	
	PN64	Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	2	
	PN100	Up to spiral wound	84	77	2	
	4"	150#	Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	2
		300#	Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	2
600#		Up to spiral wound	78	71	2	
PN16		Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	2	
PN40		Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	2	
PN64		Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	2	
6"	150#	Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	2	
	300#	Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	3	
	600#	Up to spiral wound	60	55	3	
	PN16	Up to elastomeric	Acc. Std flange ratings	Acc. Std flange ratings	2	
	PN40	Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	3	
	PN64	Up to spiral wound	60	55	3	
8"	150#	Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	3	
	300#	Up to spiral wound	Acc. Std flange ratings	Acc. Std flange ratings	3	
	PN10	Up to elastomeric	Acc. Std flange ratings	Acc. Std flange ratings	2	
	PN16	Up to elastomeric	Acc. Std flange ratings	Acc. Std flange ratings	2	
	PN25	Up to elastomeric	Acc. Std flange ratings	Acc. Std flange ratings	3	
	PN64	Up to spiral wound	48	45	3	

2-1 General

This section contains the procedures for the receipt and installation of the instrument. See Section 1 for dimensional and connection requirements. Do not attempt to start the system until the instrument has been permanently installed. It is important that the start-up procedures be followed in the exact sequence presented.

2-2 Receipt of Equipment

When the instrument is received, the outside packing case should be checked for damage incurred during shipment. If the packing case is damaged, the local carrier should be notified at once regarding his liability. A report should be submitted to your nearest Product Service Department.

**Brooks Instrument**

407 W. Vine Street  
P.O. Box 903  
Hatfield, PA 19440 USA  
Toll Free (888) 554-FLOW (3569)  
Tel (215) 362-3700  
Fax (215) 362-3745  
E-mail: BrooksAm@BrooksInstrument.com  
www.BrooksInstrument.com

**Brooks Instrument**

Neonstraat 3  
6718 WX Ede, Netherlands  
P.O. Box 428  
6710 BK Ede, Netherlands  
Tel 31-318-549-300  
Fax 31-318-549-309  
E-mail: BrooksEu@BrooksInstrument.com

**Brooks Instrument**

1-4-4 Kitasuna Koto-Ku  
Tokyo, 136-0073 Japan  
Tel 011-81-3-5633-7100  
Fax 011-81-3-5633-7101  
Email:BrooksAs@BrooksInstrument.com

Remove the envelope containing the packing list. Carefully remove the instrument from the packing case. Make sure spare parts are not discarded with the packing materials. Inspect for damaged or missing parts.

2-3 Recommended Storage Practice

If intermediate or long-term storage of equipment is required, it is recommended that the equipment be stored in accordance with the following:

- a. Within the original shipping container.
- b. Stored in a sheltered area, preferably a warm, dry, heated warehouse.
- c. Ambient temperature of 70° F (21° C) nominal, 109° F (43° C) maximum, 45° F (7° C) minimum.
- d. Relative humidity 45% nominal, 60% maximum, 25% minimum.

Upon removal from storage a visual inspection should be conducted to verify the condition of equipment is "as received".

**2-4 Return Shipment**

Prior to returning any instrument to the factory visit the Brooks website [www.BrooksInstrument.com](http://www.BrooksInstrument.com) for a Return Materials Authorization Number (RMA#), or contact one of the following locations:

**Brooks Instrument**

407 W. Vine Street  
P.O. Box 903  
Hatfield, PA 19440 USA  
Toll Free (888) 554-FLOW (3569)  
Tel (215) 362-3700  
Fax (215) 362-3745  
E-mail: [BrooksAm@BrooksInstrument.com](mailto:BrooksAm@BrooksInstrument.com)  
[www.BrooksInstrument.com](http://www.BrooksInstrument.com)

**Brooks Instrument**

Neonstraat 3  
6718 WX Ede, Netherlands  
P.O. Box 428  
6710 BK Ede, Netherlands  
Tel 31-318-549-300  
Fax 31-318-549-309  
E-mail: [BrooksEu@BrooksInstrument.com](mailto:BrooksEu@BrooksInstrument.com)

**Brooks Instrument**

1-4-4 Kitasuna Koto-Ku  
Tokyo, 136-0073 Japan  
Tel 011-81-3-5633-7100  
Fax 011-81-3-5633-7101  
Email: [BrooksAs@BrooksInstrument.com](mailto:BrooksAs@BrooksInstrument.com)

Instrument must have been purged in accordance with the following:

**⚠ WARNING**

**Before returning the device purge thoroughly with a dry inert gas such as Nitrogen before disconnecting gas connections. Failure to correctly purge the instrument could result in fire, explosion or death. Corrosion or contamination may occur upon exposure to air.**

All flow instruments returned to Brooks requires completion of Form RPR003-1, Brooks Instrument Decontamination Statement, along with a Material Safety Data Sheet (MSDS) for the fluid(s) used in the instrument. Failure to provide this information will delay processing by Brooks personnel. Copies of these forms can be downloaded from the Brooks website [www.BrooksInstrument.com](http://www.BrooksInstrument.com) or are available from any Brooks Instrument location listed above.

**2-5 Transit Precautions**

To safeguard the instrument against transportation damage, it is recommended to keep the instrument in its factory container until ready for installation.

**2-6 Removal from Storage**

Upon removal of the instrument from storage, a visual inspection should be conducted to verify its "as-received" condition. If the instrument has been subject to storage conditions in excess of those recommended (See Section 2-3), it should be subjected to a pneumatic pressure test in accordance with applicable vessel codes.

2.7 Gas Connections

Standard inlet and outlet connections supplied on all Models are NPT(F), Tube compression fittings, VCR, VCO, DIN or ANSI Flanges. Prior to installation, make certain all piping is clean and free of obstruction. Install the piping in such a manner that permits easy access to the instrument if it needs to be removed for cleaning or test bench troubleshooting.

2.8 Installation

Refer to figure 2-3 to 2-12, dimensional drawings.

**⚠ CAUTION**

When installing the mass flow meter or controller, care should be taken that no foreign materials enter the inlet or outlet of the instrument. Do not remove the protective end caps until time of installation. When used with a reactive (sometimes toxic) gas, contamination or corrosion may occur as a result of plumbing leaks or improper purging. Plumbing should be checked carefully for leaks and the mass flow meter/controller purged with dry Nitrogen before use.

Recommended installation procedures:

- a. All models should be located relatively free from shock and vibration
- b. Leave sufficient room for access to the electrical components.
- c. Install in such a manner that permits easy removal if the instrument requires cleaning.
- d. The Brooks mass flow controller and mass flow meter can be installed in any position.

**Note:**

The (normally closed type) control valve of the mass flow controller provides precision control and is not designed for positive shut off. If positive shut off is required, it is recommended that a separate shut-off valve be installed in-line.

**⚠ CAUTION**

Since the control valve is not a positive shut-off, a separate solenoid valve may have been installed down stream for that purpose. It should be noted that a small amount of gas may be trapped between the downstream side of the mass flow controller and the solenoid valve resulting in a surge upon actuation of the controller. This surge can be reduced in magnitude by locating the controller and solenoid valve close together or by moving the solenoid valve upstream of the controller.

## 2.9 In-Line Filter

---

An in-line filter standard has been installed in the inlet of the meter or controller to prevent the possibility of any foreign material entering the flowsensor or control valve. The filter element should be periodically replaced or ultrasonically cleaned.

## 2.10 Electrical Connections

---

A standard M20 x 1,5 acc. to ISO is supplied with the meter. The cable entry device shall be certified in type of explosion protection increased safety "e", suitable for the conditions of use and correctly installed.

## 2.9 Cable Specifications

---

Use separate cables for the mass flow sensor and the control valve, according to following specifications:

### Shielding

For shielding it is necessary to use cable connectors either made of metal or metal shielded. Use a cable which is overall completely screened with at least 80 % grade of coverage. The cable screen should be connected to the metal connector or gland and shielded at both ends (i.e. mass flow meter or controller and remote electronics) over 360 degrees.

### Cable requirements

Sensor cable: resistance max. 2,5 Ohm, outside cable diameter max. 7 mm, length max. 30 m.

Valve cable: resistance max. 95 Ohms, outside cable diameter max. 7 mm, length max. 30 m.

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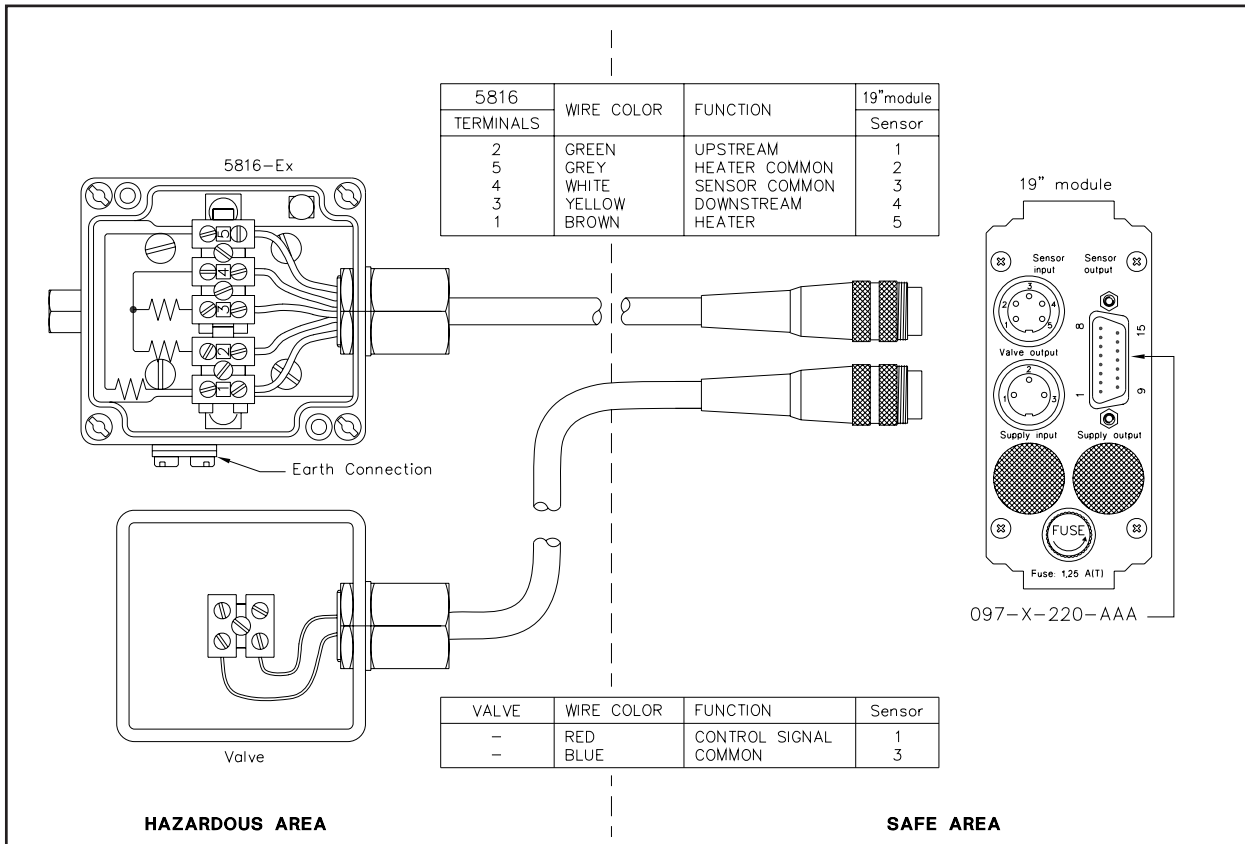


Figure 2-1 Wiring connections model 5816 Ex-proof mass flowmeter and control valve

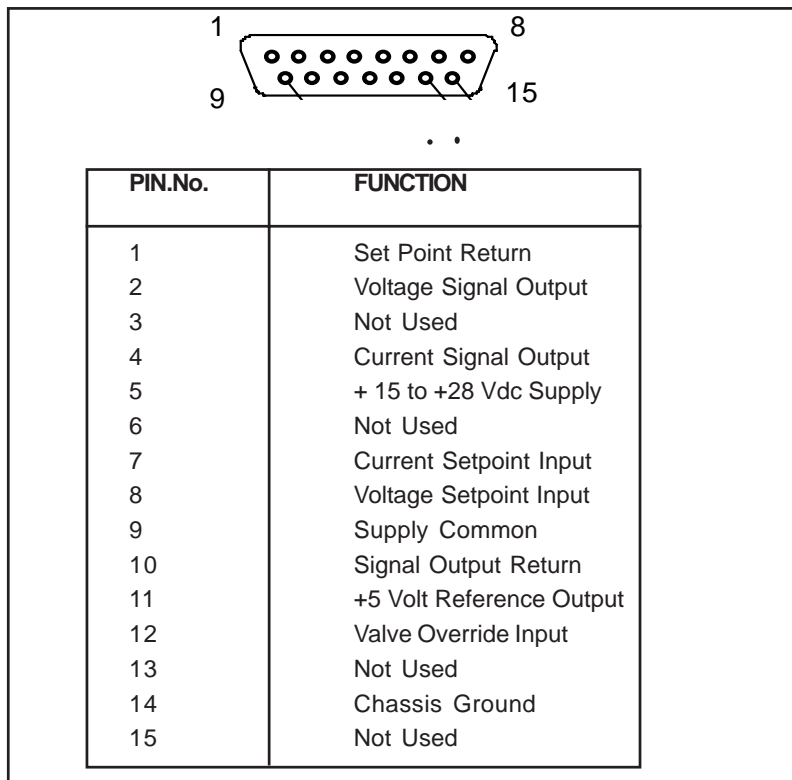


Figure 2-2 Wiring Connection 15 pin "D" Connector



**Dimensional Drawings [EX] Mass Flow Controllers**

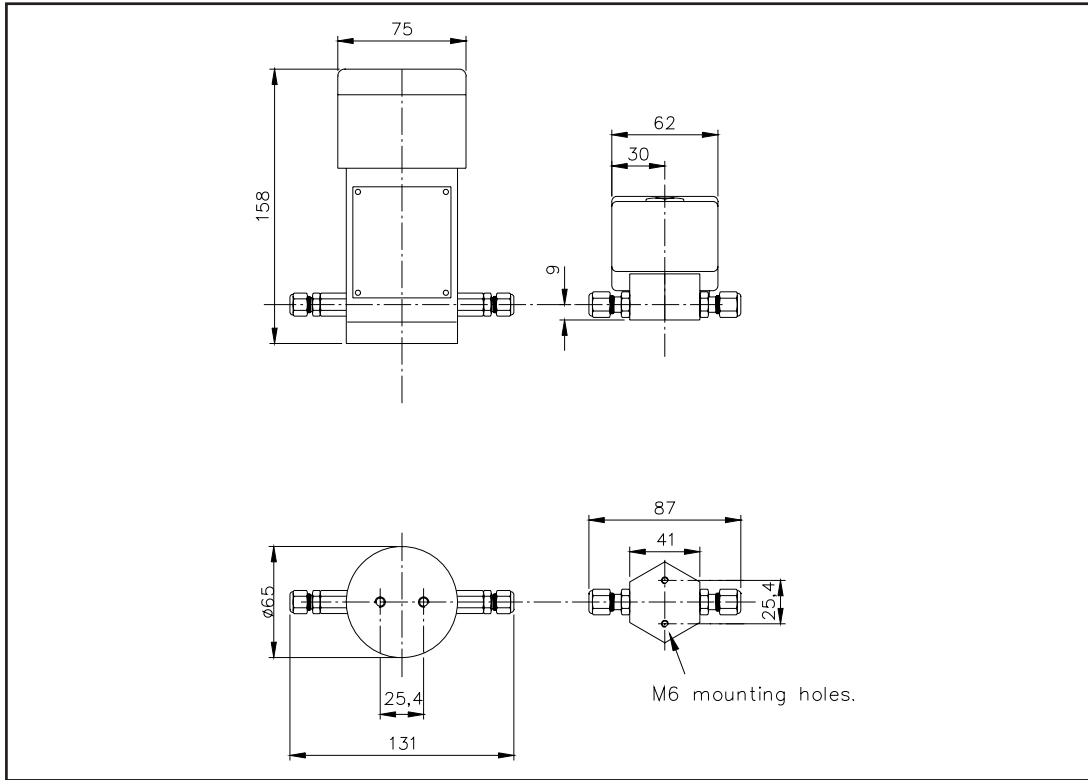


Figure 2-3 Model: 5816/38 Ex

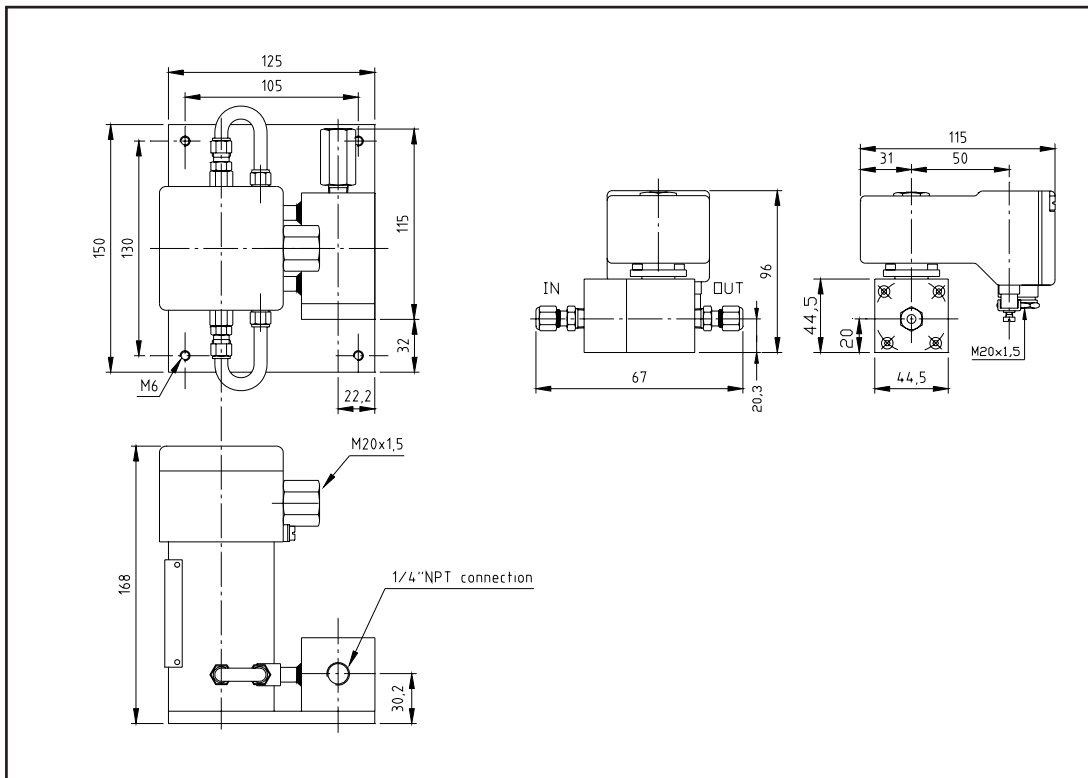


Figure 2-4 Model: 5816N/36 Ex

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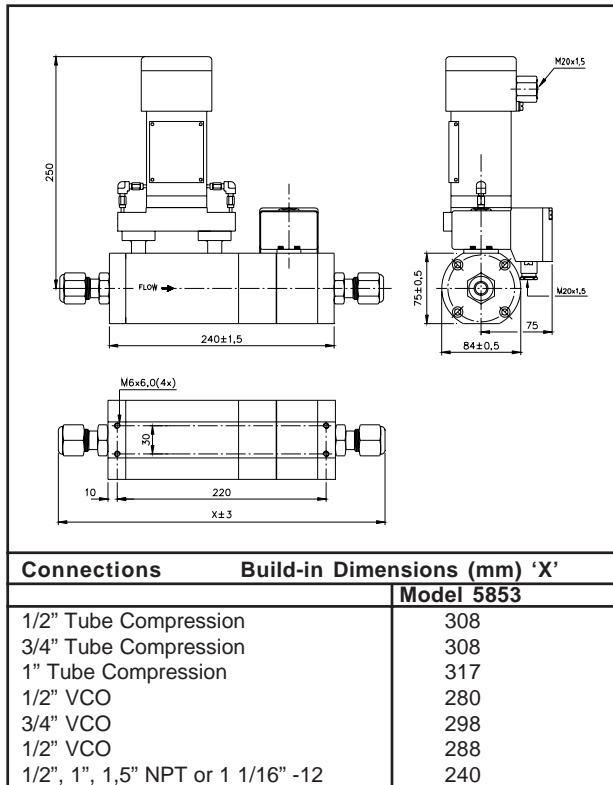


Figure 2-5 Model: 5853 Ex

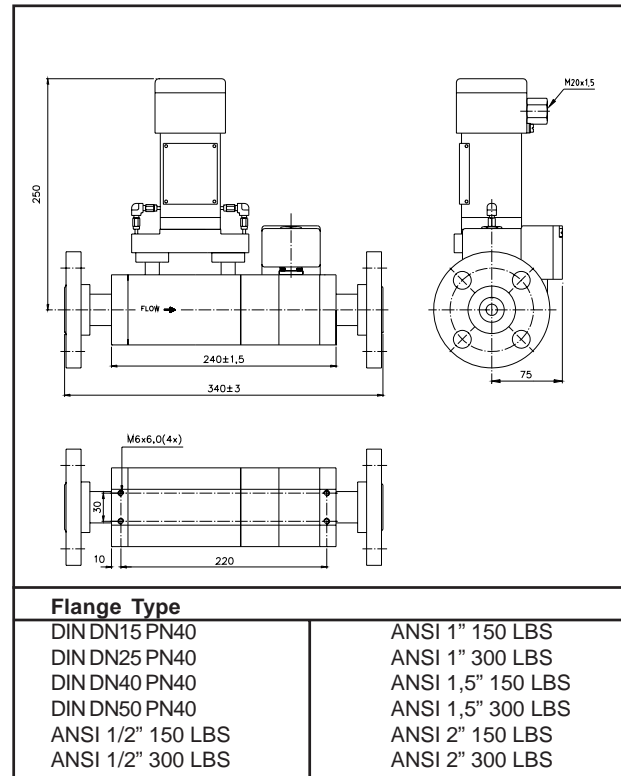


Figure 2-7 Model: 5816 Ex

Dimensional Drawings [EX] Mass Flow Meters

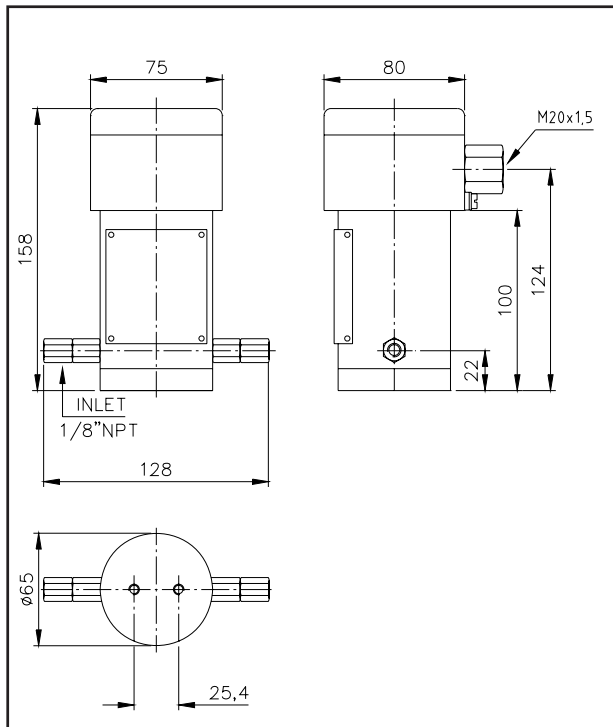


Figure 2-6 Model: 5853 Ex (flanged)

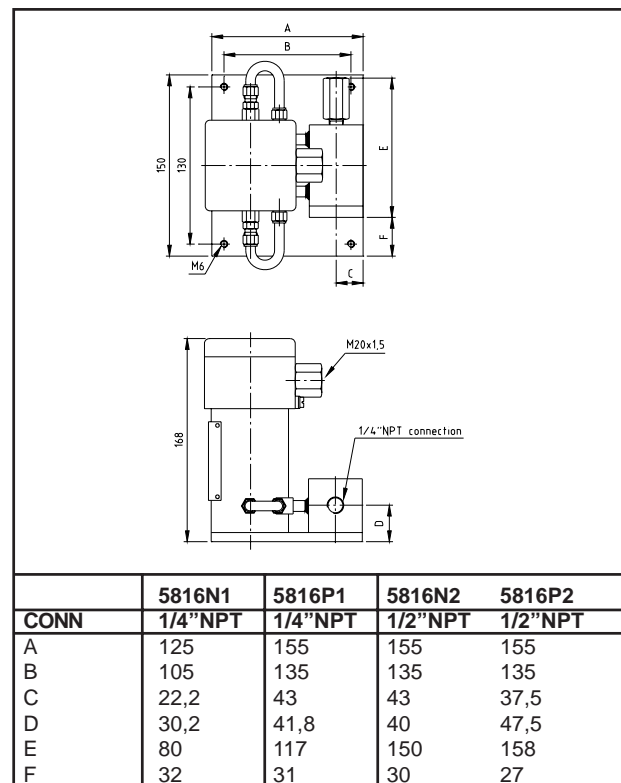


Figure 2-8 Model: 5816N Ex

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X-TMF-5816Ex-MFC-eng

PN 541-C-008-AAG

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# Section 2 Installation

## TMF-Zone 1

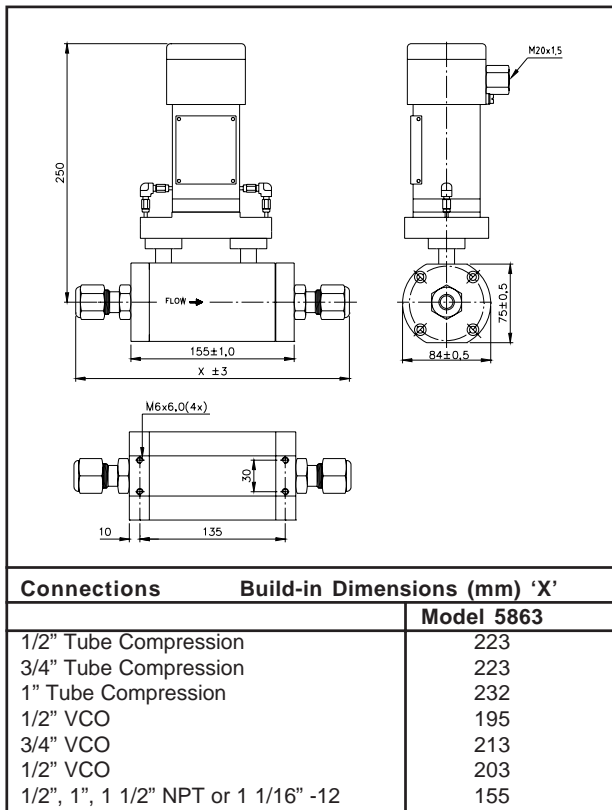


Figure 2-9 Model: 5863 Ex

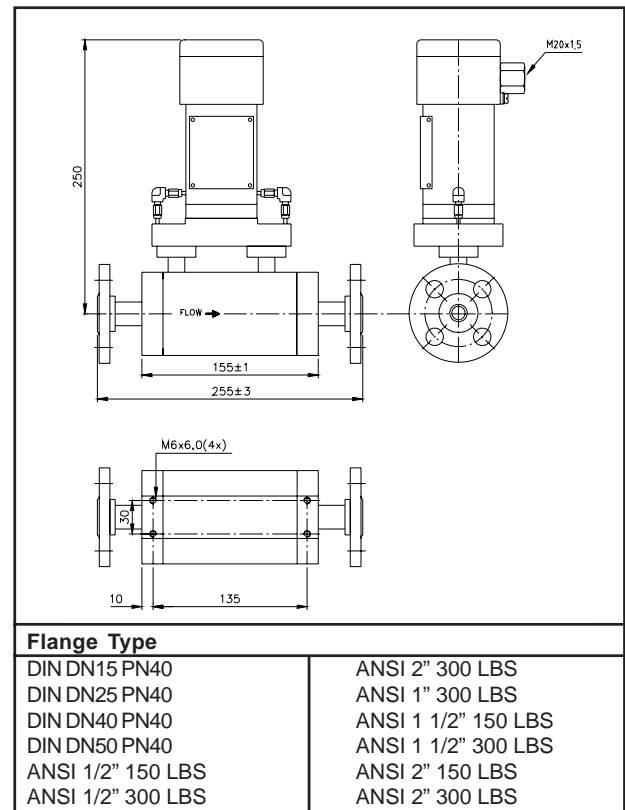


Figure 2-10 Model: 5863 Ex (flanged)

### Dimensional Drawings [EX] Mass Flow Meters

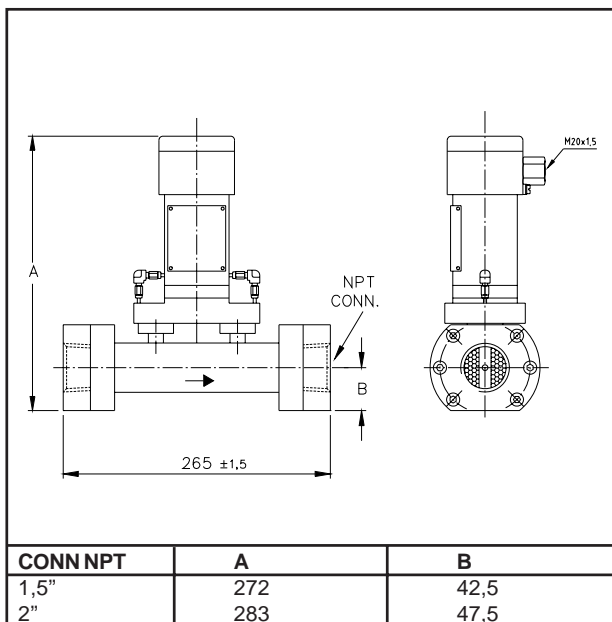


Figure 2-11 Model: 5864Ex

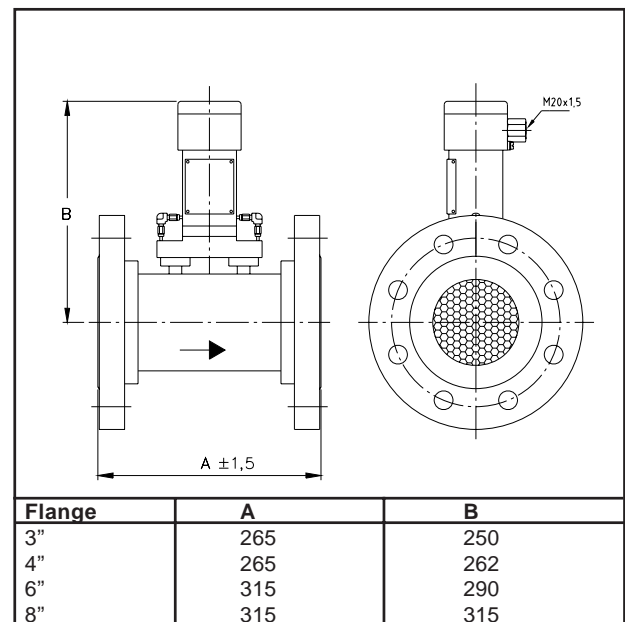


Figure 2-12 Model: 5864 Ex (flanged)

### 3.1 Operating Procedure

#### CAUTION

**Do not operate this instrument in excess of specifications listed in section 1-2. Before placing the unit into operation, make sure all gas connections are tight and all electrical connections have been completed.**

To place the instrument into operation, proceed as follows:

- a) Connect the line cord to power source; e.g. remote electronic series
- b) Allow the instrument to warm up for approximately 45 minutes
- c) Slowly introduce gas flow into the system
- d) Set the appropriate controls to bring the instrument to the desired operating level

### 3.2 Zero Adjustment

Each Brooks mass flow meter or controller is factory adjusted to provide a  $0 \pm 10$  mVdc signal at zero flow. The adjustment is made in our calibration laboratory which is temperature controlled to 20°C. After initial installation and warm up in the gas system, the zero flow indication may be other than the factory setting. This is primarily caused by changes in temperature between our calibration laboratory and the final installation. To check zero, always mount the controller in its final configuration and allow a minimum of 20 minutes for the temperature of the controller and its environment to stabilize. Using a suitable voltmeter, check the mass flow meter or controller output signal. If it differs from the factory setting, adjust the "Zero" potentiometer which is located in the remotely installed amplifier p.c. board.

### 3.3 Use of the Conversion Tables

If a mass flow meter or controller is operated on a gas other than the gas it was calibrated with, a scale shift will occur in the relationship between the output signal and the mass flow rate. This is due to the difference in heat capacities between the two gases. This scale shift can be approximated by using the ratio of the molar specific heat of the two gases, or sensor conversion factor.

**The gas conversion table is available at Brooks Instrument under document no.: J-836-D-508**

To change to a new gas, multiply the output reading by the ratio of the gas factor for the desired gas to the gas factor for the calibration gas.

$$\text{Actual gas Flow rate} = \frac{\text{Output Reading} \times \text{factor of the new gas}}{\text{factor of the calibrated gas}}$$

Example:

The controller is calibrated for Nitrogen.

The desired gas is Carbon Dioxide.

The output reading is 750 mln/min when using Carbon Dioxide

Then  $750 \times 0,74 = 555 \text{ mln/min CO}_2$

In order to calculate the conversion factor for a gas mixture the following formula should be used:

$$\text{Sensor conversion factor} = \frac{100}{\left(\frac{P1}{\text{sensor conversion factor 1}}\right) + \left(\frac{P2}{\text{sensor conversion factor 2}}\right) + \left(\frac{Pn}{\text{sensor conversion factor n}}\right)}$$

Where  
 P1 = percentage (%) of gas 1 (by volume)  
 P2 = percentage (%) of gas 2 (by volume)  
 Pn = percentage (%) of gas n (by volume)

Example:

The desired gas is 20% Helium (He) and 80% Chlorine (Cl<sub>2</sub>) by volume. The desired full scale flow rate of the mixture is 20 ln/min.

Sensor conversion factor for the mixture is:

$$\text{Mixture factor} = \frac{100}{\left(\frac{20}{1,386}\right) + \left(\frac{80}{0,876}\right)} = 0,95$$

Nitrogen equivalent =  $20/0,95 = 21,05 \text{ ln/min}$

It is generally accepted that the mass flow rate derived from this equation is only accurate to  $\pm 5\%$ . The specific heat of most gases is not strongly pressure and temperature dependent, however, gas conditions that vary widely from these reference conditions may cause an additional error due to the change in specific heat due to temperature and/or pressure.

The conversion table is used to determine the flow rate for gases other than the preselected gas. The flowmeter is factory set to a preselected gas, pressure and flow range. To change to a new gas, multiply the output reading by the factor, in case the flowmeter is calibrated on Nitrogen.

4.1 General service information

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 **WARNING**

**If this equipment is not properly serviced, serious personal injury and/or damage to the equipment can result from potentially high operating pressures. Process line pressure should be removed prior to servicing.**

The Model 5816-Ex/5864-Ex requires no routine maintenance other than an occasional cleaning. In case you want to perform your own routine maintenance, please ask for the Brooks cleanliness procedures part number: J-834-P-061-GFE. It informs you in great detail.

**5.1 Trouble Shooting**

**⚠ CAUTION**

**It is important that this flowmeter be serviced only by properly trained and qualified personnel.**

**A. System Checks**

Normally the 5816-Ex/5864-Ex is a component in gas handling systems which can be quite complex. This can make the task of isolating a malfunction in the system a difficult one. An incorrectly diagnosed malfunction can cause many hours of unnecessary downtime. If possible, make the following system checks before removing a suspected defective mass flowmeter for bench troubleshooting or return, especially if the system is new.

1. Insure that the process gas connections have been correctly installed and leak checked.

**⚠ WARNING**

**If it becomes necessary to remove the flowmeter from the system after exposure to toxic, pyrophoric, flammable, or corrosive gas, purge the flowmeter with a dry inert gas such as Nitrogen, before disconnecting the gas connections. Failure to correctly purge the flowmeter could result in fire, explosion, or death. Corrosion or contamination of the mass flowmeter upon exposure to air may also occur.**

**B. Bench Troubleshooting**

1. Properly connect the mass flowsystem to a power supply. Connect an output signal read-out device (4 1/2 digit voltmeter recommended) to the systems output.
2. Apply power and allow the flowmeter to warm up for 45 minutes. Do not connect to a gas source now. Observe the output signal and, if necessary perform the zero calibration procedure. Test the sensor if the output signal will not zero after calibration.
3. Connect the flowmeter to its calibration gas. Increase flow until 100% output (5.00 Vdc) is indicated. Vary the flow rate over the 2 to 100% range and verify that output signal follows the flowrate (verify by primary standard).
4. Connect a flow measurement device in series with the flowmeter to observe the flow behaviour and verify the accuracy of the mass flowmeter. If the mass flowmeter functions as described above, it is functioning properly and the problem may lie elsewhere.
5. Table 5-1 lists possible malfunctions which may be encountered during bench troubleshooting.

## TMF-Zone 1

Table 5-1 Model 5816/5864 Ex Mass Flowmeter Bench Troubleshooting

TROUBLE	POSSIBLE	CAUSE CHECK OR REMEDY
No output	No power-in	Check for power supply on the 4250 series read-out system. Check line fuse.
	Faulty meter	Check for output on pins X and M of the amplifier board.
	Obstruction in sensor solvent.	Flush sensor both directions with non-residuous.  Air dry thoroughly.
	Clogged Filter	Ultrasonically clean
	Bad connection between flowmeter and modular thermal board	Check connections.
Indicator will not zero	Shift in indicator zero adjustment Gas leak	Check pins X and M for zero. Adjust indicator zero. Check downstream gas connections.
	Gas leak	Check all gas connections.
Out of calibration	Dirty sensor	Flush with non-residuous solvent. Air dry thoroughly.
	Change in composition of metered gas. Shift in electronics	Return mass flow meter to factory. Unit must be calibrated on type of gas metered. <b>DO NOT ATTEMPT TO CALIBRATE UNIT, SERVICE OR DISASSEMBLE SENSOR:</b> Return to factory.



**Dansk**

Brooks Instrument har gennemført CE mærkning af elektronisk udstyr med succes, i henhold til regulativet om elektrisk støj (EMC direktivet 89/336/EEC).

Der skal dog gøres opmærksom på benyttelsen af signalkabler i forbindelse med CE mærkede udstyr.

**Kvaliteten af signal kabler og stik:**

Brooks lever kabler af høj kvalitet, der imødekommer specifikationerne til CE mærkning.

Hvis der anvendes andre kabel typer skal der benyttes et skærmet kabel med hel skærm med 100% dækning.

Forbindelses stikket type "D" eller "cirkulære", skal være skærmet med metalhus og eventuelle PG-forskrutninger skal enten være af metal eller metal skærmet.

Skærmen skal forbindes, i begge ender, til stikkets metalhus eller PG-forskrutningen og have forbindelse over 360 grader.

Skærmen bør være forbundet til jord.

"Card Edge" stik er standard ikke af metal, der skal derfor ligeledes benyttes et skærmet kabel med hel skærm med 100% dækning.

Skærmen bør være forbundet til jord.

**Deutsch**

Nach erfolgreichen Tests entsprechend den Vorschriften der Elektromagnetischen Verträglichkeit (EMC Richtlinie 89/336/EEC) erhalten die Brooks-Geräte (elektrische/elektronische Komponenten) das CE-Zeichen.

Bei der Auswahl der Verbindungskabel für CE-zertifizierte Geräte sind spezielle Anforderungen zu beachten.

**Qualität der Verbindungskabel, Anschlußstecker und der Kabeldurchführungen**

Die hochwertigen Qualitätskabel von Brooks entsprechen der Spezifikation der CE-Zertifizierung.

Bei Verwendung eigener Verbindungskabel sollten Sie darauf achten, daß eine

100 %igen Schirmabdeckung des Kabels gewährleistet ist.

„D“ oder „Rund“ -Verbindungsstecker sollten eine Abschirmung aus Metall besitzen.

Wenn möglich, sollten Kabeldurchführungen mit Anschlußmöglichkeiten für die Kabelabschirmung verwendet werden.

Die Abschirmung des Kabels ist auf beiden Seiten des Steckers oder der Kabeldurchführungen über den vollen Umfang von 360 ° anzuschließen.

Die Abschirmung ist mit dem Erdpotential zu verbinden.

Platinen-Steckverbindungen sind standardmäßige keine metallgeschirmten Verbindungen. Um die Anforderungen der CE-Zertifizierung zu erfüllen, sind Kabel mit einer 100 %igen Schirmabdeckung zu verwenden.

Die Abschirmung ist mit dem Erdpotential zu verbinden.

**English**

All Brooks (electrical/electronic) equipment bearing the CE mark has been successfully tested in accordance with the Electromagnetic Compatibility regulations (EMC directive 89/336/EEC).

However, special care is required when selecting signal cables to be used with equipment bearing the CE mark.

**Quality of signal cables, cable glands and connectors:**

Brooks supplies high quality cabling that meets the specifications for CE certification.

However, if you wish to use your own signal cable, you should select one that is fully screened with at least 100% shielding.

Any 'D' or 'Circular' type connectors used should be screened with a metal shield. If applicable, metal cable glands must be used to clamp the cable shielding. The cable shielding should be connected to the metal shell or gland, and have 360° shielding at both ends.

The shielding should be connected to an earth terminal.

Card Edge Connectors are non-metallic, as standard. The cables used must be screened with 100% shielding to comply with CE certification. The shielding should be connected to an earth terminal.

## TMF-Zone 1

**Español**

Los equipos de Brooks (eléctricos/electrónicos) en relación con la marca CE han pasado satisfactoriamente las pruebas referentes a las regulaciones de Compatibilidad Electro magnetica (EMC directiva 89/336/EEC).

Sin embargo se requiere una atención especial en el momento de seleccionar el cable de señal cuando se va a utilizar un equipo con marca CE

**Calidad del cable de señal, prensaestopas y conectores:**

Brooks suministra cable(s) de alta calidad, que cumple las especificaciones de la certificación CE .

Si usted adquiere su propio cable de señal, debería usar un cable que esté completamente protegido en su conjunto con un apantallamiento del 100%.

Cuando utilice conectores del tipo «D» ó «Circular» deberían estar protegidos con una pantalla metálica. Cuando sea posible, se deberan utilizar prensaestopas metálicos provistos de abrazadera para la pantalla del cable.

La pantalla del cable deberá ser conectada al casquillo metálico ó prensa y protegida en ambos extremos completamente en los 360 Grados. La pantalla deberá conectarse a tierra.

Los conectores estandar de tipo tarjeta (Card Edge) no son metálicos, los cables utilizados deberan ser protegidos con un apantallamiento del 100% para cumplir con la certificación CE.

La pantalla deberá conectarse a tierra.

**Français**

Les équipements Brooks (électriques/électroniques) portant le label CE ont été testés avec succès selon les règles de la Compatibilité Electromagnétique (directive CEM 89/336/EEC).

Cependant, la plus grande attention doit être apportée en ce qui concerne la sélection du câble utilisé pour véhiculer le signal d'un appareil portant le label CE.

**Qualité du câble, des presse-étoupes et des connecteurs:**

Brooks fournit des câbles de haute qualité répondant aux spécifications de la certification CE.

Si vous approvisionnez vous-même ce câble, vous devez utiliser un câble blindé à 100 %.

Les connecteurs « D » ou de type « circulaire » doivent être reliés à la terre.

Si des presse-étoupes sont nécessaires, ceux ci doivent être métalliques avec mise à la terre.

Le blindage doit être raccordé aux connecteurs métalliques ou aux presse-étoupes sur le pourtour complet du câble, et à chacune de ses extrémités.

Tous les blindages doivent être reliés à la terre.

Les connecteurs de type « card edge » sont non métalliques. Les câbles utilisés doivent être blindés à 100% pour satisfaire à la réglementation CE.

Tous les blindages doivent être reliés à la terre.

**Greek**

Τα όργανα (ηλεκτρικά/ηλεκτρονικά) της Brooks τα οποία φέρουν το σήμα CE έχουν επιτυχώς ελεγχθεί σύμφωνα με τους κανονισμούς της Ηλεκτρο-Μαγνητικής Συμβατότητας (EMC ντιρεκτίβα 89/336/EEC).

Οπωσδήποτε χρειάζεται ειδική προσοχή κατά την επιλογή του καλωδίου μεταφοράς του σήματος το οποίο (καλώδιο) πρόκειται να χρησιμοποιηθεί με όργανα που φέρουν το σήμα CE.

**Ποιότητα του καλωδίου σήματος των στυπιοθλιπτών και των συνδέσμων.**

Η Brooks κατά κανόνα προμηθεύει υψηλής ποιότητας καλώδια τα οποία πληρούν τις προδιαγραφές για πιστοποίηση CE.

Εάν η επιλογή του καλωδίου σήματος γίνει από σας πρέπει να χρησιμοποιήσετε καλώδιο το οποίο να φέρει εξωτερικά πλήρες πλέγμα και να παρέχει θωράκιση 80% .

Οι σύνδεσμοι τύπου "D" ή "Κυκλικοί" των καλωδίων, πρέπει να θωρακίζονται με μεταλλική θωράκιση. Εάν είναι εφαρμόσιμο, πρέπει να χρησιμοποιούνται μεταλλικοί στυπιοθλίπτες καλωδίων που να διαθέτουν ακροδέκτη σύνδεσης του πλέγματος του καλωδίου.

Το πλέγμα του καλωδίου πρέπει να συνδέεται στο μεταλλικό περίβλημα ή στον στυπιοθλίπτη και να θωρακίζεται και στα δύο άκρα κατά 360 μοίρες.

Η θωράκιση πρέπει να καταλήγει σε κάποιο ακροδέκτη γείωσης.

Οι σύνδεσμοι καρτών είναι μη-μεταλλικοί, τα καλώδια που χρησιμοποιούνται πρέπει να φέρουν πλέγμα θωράκισης 80% για να υπακούουν στην πιστοποίηση CE.

Η θωράκιση πρέπει να καταλήγει σε κάποιο ακροδέκτη γείωσης.

**Italiano**

Questa strumentazione (elettrica ed elettronica) prodotta da Brooks Instrument, soggetta a marcatura CE, ha superato con successo le prove richieste dalla direttiva per la Compatibilità Elettromagnetica (Direttiva EMC 89/336/EEC).

E' richiesta comunque una speciale attenzione nella scelta dei cavi di segnale da usarsi con la strumentazione soggetta a marchio CE.

**Qualità dei cavi di segnale e dei relativi connettori:**

Brooks fornisce cavi di elevata qualità che soddisfano le specifiche richieste dalla certificazione CE. Se l'utente intende usare propri cavi, questi devono possedere una schermatura del 100%.

I connettori sia di tipo "D" che circolari devono possedere un guscio metallico. Se esiste un passacavo esso deve essere metallico e fornito di fissaggio per lo schermo del cavo.

Lo schermo del cavo deve essere collegato al guscio metallico in modo da schermarlo a 360° e questo vale per entrambe le estremità. Lo schermo deve essere collegato ad un terminale di terra.

I connettori "Card Edge" sono normalmente non metallici. Il cavo impiegato deve comunque avere una schermatura del 100% per soddisfare la certificazione CE.

Lo schermo deve essere collegato ad un terminale di terra.

## TMF-Zone 1

**Nederlands**

Alle CE gemarkeerde elektrische en elektronische producten van Brooks Instrument zijn met succes getest en voldoen aan de wetgeving voor Electro Magnetische Compatibiliteit (EMC wetgeving volgens 89/336/EEC).

Speciale aandacht is echter vereist wanneer de signaalkabel gekozen wordt voor gebruik met CE gemarkeerde producten.

Kwaliteit van de signaalkabel en kabelansluitingen:

Brooks levert standaard kabels met een hoge kwaliteit, welke voldoen aan de specificaties voor CE certificering.

Indien men voorziet in een eigen signaalkabel, moet er gebruik gemaakt worden van een kabel die volledig is afgeschermd met een bedekkingsgraad van 100%.

"D" of "ronde" kabelconnectoren moeten afgeschermd zijn met een metalen connector kap. Indien kabelwartels worden toegepast, moeten metalen kabelwartels worden gebruikt die het mogelijk maken het kabelscherm in te klemmen

Het kabelscherm moet aan beide zijden over 360° met de metalen connectorkap, of wartel verbonden worden.

Het scherm moet worden verbonden met aarde.

"Card-edge" connectors zijn standaard niet-metallisch. De gebruikte kabels moeten volledig afgeschermd zijn met een bedekkingsgraad van 100% om te voldoen aan de CE certificering.

Het scherm moet worden verbonden met aarde.

**Norsk**

Til den det angår

Brooks Instrument elektrisk og elektronisk utstyr påført CE-merket har gjennomgått og bestått prøver som beskrevet i EMC forskrift om elektromagnetisk immunitet, direktiv 89/336/EEC.

For å opprettholde denne klassifisering er det av stor viktighet at riktig kabel velges for tilkobling av det måletekniske utstyret.

Utførelse av signalkabel og tilhørende plugger:

Brooks Instrument tilbyr levert med utstyret egnet kabel som møter de krav som stilles til CE-sertifisering.

Dersom kunden selv velger kabel, må kabel med fullstendig, 100% skjerming av lederene benyttes.

"D" type og runde plugger og forbindelser må være utført med kappe i metall og kabelnipler må være utført i metall for jordet innfesting av skjermen. Skjermen i kabelen må tilknyttes metallet i pluggen eller nippelen i begge ender over 360°, tilkoblet elektrisk jord.

Kort-kantkontakter er normalt utført i kunststoff. De tilhørende flatkabler må være utført med fullstendig, 100% skjerming som kobles til elektrisk jord på riktig pinne i pluggen, for å møte CE sertifiseringskrav.

**Português**

O equipamento (eléctrico/electrónico) Brooks com a marca CE foi testado com êxito nos termos do regulamento da Compatibilidade Electromagnética (directiva CEM 89/336/EEC).

Todavia, ao seleccionar-se o cabo de sinal a utilizar com equipamento contendo a marca CE, será necessário ter uma atenção especial.

**Qualidade do cabo de sinal, buchas de cabo e conectores:**

A Brooks fornece cabo(s) de qualidade superior que cumprem os requisitos da certificação CE.

Se fornecerem o vosso próprio cabo de sinal, devem utilizar um cabo que, na sua totalidade, seja isolado com uma blindagem de 100%.

Os conectores tipo "D" ou "Circulares" devem ser blindados com uma blindagem metálica. Se tal for necessário, deve utilizar-se buchas metálicas de cabo para o isolamento do aperto do cabo.

O isolamento do cabo deve ser ligado à blindagem ou bucha metálica em ambas as extremidades em 360°.

A blindagem deve terminar com a ligação à massa.

Os conectores "Card Edge" não são, em geral, metálicos e os cabos utilizados devem ter um isolamento com blindagem a 100% nos termos da Certificação CE..

A blindagem deve terminar com ligação à massa.

ENGLISH

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## IMPORTANT SAFETY INSTRUCTIONS

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This appendix contains important safety and operating instructions for use with the Thermal Mass Flow Meter / Controller Series. The instrument complies to the (PED) PRESSURE EQUIPMENT CE DIRECTIVE 97/23/EC. Consult local authorities as to national and/or local safety codes and any additional installation requirements.

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### SAFETY INSTRUCTIONS

1. Please read all instructions and cautionary markings on (1) the flowmeter and (2) all appropriate sections of the Instruction and Operating Manual before using this product.
2. **WARNING:** Do not operate this instrument in excess of the specifications, listed in the Instruction and Operating Manual. Failure to heed this warning can result in serious personal injury and/or damage to the equipment.
3. Please make sure that the instrument is properly connected to electrical and pressure sources.
4. **OPERATION:** (a) Slowly initiate flow into the system. Open process valves slowly to avoid flow surges. (b) Check for leaks around the meter inlet and outlet connections. If no leaks are present, bring the system up to operating pressure.
5. **WARNING:** If this equipment is not properly serviced, serious personal injury and/or damage to the equipment can result from potentially high operating pressures. Please make sure that the process line pressure is removed prior to service.
6. Please make sure that original parts of Brooks are used when the device requires servicing. Note however that look-alike substitutions and procedures can affect the product's performance and place the safe operation of your process at risk. It furthermore may result in fire, electrical hazards or improper operation.

DANISH

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## VIGTIGE SIKKERHEDSINSTRUKTIONER

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Denne instruktion indeholder vigtige oplysninger om sikkerhed og anvendelse af Brooks Thermal Mass Flow Meter / Controller Series. Instrumentet opfylder (PED) trykudstyrs CE direktivet 97/23/EC. Kontakt de lokale myndigheder for oplysning om nationale og/eller lokale sikkerhedskrav og yderligere krav i forbindelse med installationen.

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### SIKKERHEDSINSTRUKTIONER

1. Læs alle instruktioner samt faremarkeringer på (1) flowmeteret og (2) i alle relevante sektioner af instruktions- og brugervejledningen før instrumentet tages i brug.
2. **ADVARSEL:** Anvend ikke dette instrument udover de specifikationer, som er angivet i instruktions- og brugervejledningen. Manglende opmærksomhed på denne advarsel kan resultere i alvorlige personskader og/eller skader på udstyret.
3. Vær sikker på at instrumentet er korrekt tilsluttet elektrisk og mekanisk.
4. **ANVENDELSE:** (a) Luk langsomt flow ind i systemet. For at undgå trykstød åbnes afspærringsventilen langsomt. (b) Kontroller ind- og udgangstilslutningerne for lækager. Hvis ingen lækager findes, kan systemet bringes op på normalt procestryk.
5. **ADVARSEL:** Hvis vedligehold af instrumentet ikke sker som anbefalet, er der - i tilfælde af høje tryk - risiko for alvorlige skader på såvel personer som på instrumentet. Sørg derfor for at instrumentet er trykløst, før det afmonteres for service.
6. Vær opmærksom på kun at anvende originale Brooks reservedele, når instrumentet skal vedligeholdes. Bemærk at anvendelse af uoriginale reservedele kan forringe instrumentets specifikationer og dermed øge risikoen for skader. Desuden kan anvendelse af uoriginale reservedele medføre risiko for brand, elektrisk stød eller forringet virkemåde.

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*DUTCH*

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## BELANGRIJKE VEILIGHEIDSINSTRUCTIES!

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Deze appendix bevat belangrijke veiligheidsinstructies voor het gebruik van de Thernal Mass Flow Meter/ Controller Series. Deze instrumenten voldoen aan de (PED) Pressure Equipment CE Directive 97/23/EC (wet op het vervaardigen en distribueren van drukvaten binnen de Europese lidstaten). De lokale autoriteiten kunnen u op de hoogte stellen van de daar geldende additionele en/of lokale eisen voor installatie en gebruik.

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### VEILIGHEIDS INSTRUCTIES

1. Lees voor het in gebruiknemen alle instructies en waarschuwingen op de flowmeter en in de gebruikshandleiding.
2. **WAARSCHUWING:** Gebruik dit instrument niet buiten de in de gebruikshandleiding vastgelegde MAXIMALE GEBRUIKS DRUKKEN. Het niet in acht nemen van deze waarschuwingen kunnen leiden tot persoonlijke verwondingen en/of beschadiging van de meetapparatuur.
3. Overtuig u zelf, vòòr het in gebruik nemen, dat het instrument volgens de geldende voorschriften is ingebouwd in de leiding en aangesloten op het (eventuele) spanningsnetwerk.
4. **INGEBRUIK NEMEN:** (a) Langzaam opvoeren van de stroom in het systeem. Open de kranen langzaam om een plotselinge golfbeweging van de vloeistofstroom te voorkomen. (b) Controleer het instrument op eventuele lekkage, met name de in- en uitlaat aansluitingen. Als er geen lekkage wordt ontdekt, kan het systeem op bedrijfsdruk worden gebracht.
5. **WAARSCHUWING:** Nalatig onderhoud van dit instrument kan ernstig persoonlijk letsel en/of beschadiging van de meetapparatuur tot gevolg hebben. Overtuig uzelf ervan dat de procesdruk is afgevoerd alvorens onderhoud aan het instrument te plegen.
6. Overtuig u ervan dat er uitsluitend originele Brooks Instrument onderdelen worden gebruikt voor onderhoud en service aan het instrument. U wordt erop gewezen dat het gebruik van universele onderdelen en voorschriften om daar mee om te gaan, nadelige gevolgen kunnen hebben voor het gebruik van het instrument, en daardoor de juiste werking van uw proces in gevaar kan komen. Zelfs kan het gebruik daarvan resulteren in brandgevaarlijke situaties, elektriciteitsgevaar of onjuist functioneren.

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*SUOMI*

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## TURVAOHJEET

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Tämä liite sisältää tärkeitä turva- ja käyttöohjeita Brooks:Thermal Mass Flow Meter / Controller Series Instrumentit kuuluvat CE-direktiiviin (PED) PRESSURE EQUIPMENT CE DIRECTIVE 97/23/EC.  
Kysy lisää paikallisilta viranomaisilta koskien kansainvälisiä ja/tai paikallisia turvakoodeja sekä muita asennusvaatimuksia.

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### TURVAOHJEET

1. Kaikki ohjeet ja (1) virtausmittariin kiinnitetyt varoittavat merkinnät sekä (2) manuaalin soveltuvat kohdat on luettava ennen laitteen käyttöönottoa.
2. **VAROITUS:** Älä käytä tätä instrumenttia yli manuaalissa mainittujen maksimiarvojen. Mikäli tätä varoitusta ei noudateta, voi seurauksena olla vakava henkilövahinko ja/tai laitteen vaurioituminen.
3. Varmista, että mittalaite on oikein asennettu sekä prosessiputkistoon että sähköisesti.
4. **KÄYTTÖ:** (a) Päästä paineet hitaasti järjestelmään. Avaa putkistossa olevat venttiilit hitaasti, jotta välttyttäisiin paineiskuulta. (b) Tarkista mahdolliset vuodot mittarin prosessi liittimien kohdalta. Mikäli vuotoja ei ole, nosta prosessipaine käyttöpaineseen.
5. **VAROITUS:** Mikäli tätä laitetta ei huolleta asianmukaisesti, saattaa korkea käyttöpainne aiheuttaa vakavia henkilövahinkoja ja/tai laitteen rikkoutumisen. On varmistettava, että putkistopaine on poistettu huollon ajaksi.
6. Tulee varmistaa, että käyetään Brooks:in alkuperäisiä varaosia kun laite vaatii huoltoa. Huomaa että korvaavat näköisoosat sekä käsittely voi vaikuttaa laitteen toimintaan sekä saattaa prosessin riskialttiiksi. Lisäksi tämä voisi aiheuttaa palo- tai sähköisen vaaran tai toimintaongelmia.

GERMAN

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## WICHTIGE SICHERHEITSHINWEISE

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Dieser Anhang enthält wichtige Hinweise für einen sicheren Betrieb des Ganzmetall-Schwebekörperdurchflussmessers der Baureihe Thermal Mass Flow Meter / Controller Series von Brooks Instrument. Das Gerät entspricht den gültigen PED-Richtlinien (PRESSURE EQUIPMENT CE DIRECTIVE 97/23/EC). Konsultieren Sie lokale Zulassungsbehörden für nationale und/oder regionale Sicherheitsbestimmungen bzw. weitergehende Installationsvorschriften..

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### SICHERHEITSHINWEISE

1. Bitte lesen Sie alle gekennzeichneten Sicherheitshinweise/ Warnungen auf (1.) dem Gerät und (2.) alle entsprechenden Kapitel in der dazugehörigen Installations- und Bedienungsanleitung vor dem Betrieb des Gerätes.
2. **WARNUNG:** Betreiben Sie das Gerät nicht außerhalb der Spezifikationen. In der Installations- und Bedienungsanleitung finden Sie den baugrößenspezifischen MAXIMALEN BETRIEBSDRUCK in der entsprechenden Tabelle. Bei Nichtbeachtung dieses Hinweises kann das Gerät beschädigt und/ oder zerstört werden und dies kann zu ernsthaften Verletzungen und/ oder zum Tod von Personen führen.
3. Bitte stellen Sie sicher, dass das Gerät einwandfrei mit elektrischen und druckbeaufschlagten Leitungen verbunden ist.
4. **BETRIEB:** (a) Lassen Sie das Gerät zu Beginn langsam durchströmen. Öffnen Sie Ventile langsam, damit Druckstöße verhindert werden. (b) Prüfen Sie den Aufbau am Ein- und Ausgang des Gerätes auf Leckagen. Wenn Sie kein Leck feststellen können, erhöhen Sie langsam den Systemdruck bis der gewünschte Prozessdruck erreicht ist.
5. **WARNUNG:** Bei unsachgemäßer Wartung des Gerätes geht von diesem aufgrund potentiell hoher Betriebsdrücke ein hohes Sicherheitsrisiko für Personen und Material aus. Bitte vergewissern Sie sich vor Wartungsarbeiten, dass die Leitungen drucklos sind.
6. Verwenden Sie ausschließlich Original-Ersatzteile von Brooks Instrument für die Wartung und Reparatur von Geräten. Verwendung von Fremdfabrikaten oder Nachbildungen kann die Leistung des Gerätes einschränken und die Betriebssicherheit aufheben. Fehlfunktionen und gefährliche Betriebszustände können weitere Folgen sein.

FRENCH

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## INSTRUCTIONS IMPORTANTES DE SECURITE

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Cet appendice contient des instructions importantes de sécurité pour l'utilisation du Thermal Mass Flow Meter / Controller Series. Cet instrument est conforme aux nouvelles directives PED "PRESSURE EQUIPMENT CE DIRECTIVE 97/23/EC".

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### INSTRUCTIONS

1. Veuillez bien lire toutes les instructions, remarques et avertissements (1) sur l'appareil et (2) dans le manuel d'installation, d'utilisation et d'entretien.
2. **AVERTISSEMENTS:** Ne pas utiliser cet instrument en dehors des caractéristiques de fonctionnement spécifiées dans le manuel d'instructions. Dans le cas contraire, le personnel risque de se blesser grièvement et/ou d'endommager le matériel.
3. S'assurer que l'appareil est bien relié électriquement et soumis à une pression de travail.
4. **OPERATION:** (a) Lorsque l'installation du débitmètre dans la canalisation est achevée. La mise en débit du débitmètre doit être exécutée progressivement en ouvrant doucement le vanne de régulation afin d'éviter tout sur débit (b) Vérifier que les raccordements d'entrée et sortie soient parfaitement étanches (sans fuite), puis mettre sous pression de travail.
5. **AVERTISSEMENT:** Lors d'interventions d'entretien, bien s'assurer que la pression dans la canalisation est proche de zéro. Dans le cas contraire, le personnel risque de se blesser grièvement et/ou d'endommager le matériel.
6. Bien s'assurer que les pièces d'origine Brooks sont utilisées pour des interventions d'entretien. Des pièces de substitution pourraient affecter les performances de l'appareil et engendrer de graves dysfonctionnements.

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*NORSK*

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## VIKTIG SIKKERHETS INSTRUKS

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Dette tillegget inneholder viktige sikkerhets og drifts instruksjoner for bruk av Brooks metall rør mengde måler Thermal Mass Flow Meter / Controller Series. Instrumentet tilfredstiller (PED) PRESSURE EQUIPMENT CE DIRECTIVE 97/23/EC. Kontakt lokale myndigheter for nasjonale eller lokale sikkerhetskoder og andre installasjonskrav.

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### SIKKERHETS INSTRUKS

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1. Les alle instruksjoner og sikkerhetsanmerkninger for (1) mengde måleren (Flow meteret) og (2) alle aktuelle seksjoner av instruksjons manualen før bruk av produktet.
2. **ADVARSEL:** Bruk ikke dette instrumentet utover de spesifikasjonene som er gitt i instruksjons boken. Dersom advarslene ikke følges kan det resultere i alvorlig personskader og/eller ødeleggelse av utstyret.
3. Kontroller at instrumentet er skikkelig koblet både elektrisk og mekanisk.
4. **DRIFT:** (a) Start forsiktig. Ventilen åpnes langsomt for å unngå strømming sjokk. (b) Kontroller at det ikke er lekkasjer rundt målerens inn- og utløpstilkoblinger. Dersom det ikke er synlige lekkasjer kan ventilen åpnes til fullt rasjonstrykk.
5. **ADVARSEL:** Dersom utstyret ikke blir riktig vedlikeholdt kan det føre til alvorlige personskader og/eller skade på instrumentet på grunn av potensielle høye trykk. Påse at prosessstrykket er avlastet før utstyret demonteres.
6. Bruk alltid Brooks original deler ved service. Merk at selv om erstatningene ser like ut kan de påvirke produktets virkemåte og gjøre prosessen usikker. Det kan videre føre til brann, elektrisk risiko eller feil virkemåte.

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*ITALIAN*

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## IMPORTANTI ISTRUZIONI PER LA SICUREZZA

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Questa appendice contiene importanti istruzioni sia per la sicurezza che per l'uso corretto degli flussometri metallici della Brooks Instrument B.V. della Thermal Mass Flow Meter / Controller Series. Questi strumenti seguono la normativa (PED) Direttiva CE 97/23/EC per gli strumenti in pressione. Consultare le autorità locali per i codici di sicurezza nazionali/internazionali e per ulteriori norme di installazione.

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### ISTRUZIONI DI SICUREZZA

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1. Prima di utilizzare il prodotto leggere attentamente tutte le istruzioni ed i marchi di sicurezza applicati sui flussimetri (1) e Appendici relative delle istruzioni e del manuale operativo (2).
2. **ATTENZIONE:** Non utilizzate questo strumento oltre i limiti massimi delle specifiche elencate sia nelle istruzioni per l'uso che nel manuale operativo. La mancata osservanza di tali istruzioni potrebbe causare il rischio di lesioni personali e/o al danneggiamento dello strumento stesso.
3. Controllare che lo strumento sia correttamente collegato alle fonti di pressione che a quelle elettriche.
4. **ISTRUZIONI OPERATIVE:** (a) Lentamente procedere ad aprire il flusso allo strumento. Aprire lentamente le valvole di processo dello strumento per evitare picchi di pressione. (b) Controllare l'assenza di perdite sia sui raccordi di entrata che in quelli di uscita dello strumento. Se non si riscontra alcuna perdita, portare lo strumento alla pressione di esercizio.
5. **ATTENZIONE:** Se allo strumento non viene fatta regolarmente una corretta manutenzione, alle alte pressioni potrebbero verificarsi lesioni personali e/o danni allo strumento. Assicurarsi che la pressione di processo sia stata tolta laddove si necessita effettuare una manutenzione.
6. Assicurarsi che siano utilizzate solo parti originali nella manutenzione degli strumenti. Si fa notare che la sostituzione con parti compatibili e la manutenzione effettuata non seguendo le procedure del fornitore, possono provocare alterazioni nelle prestazioni dello strumento ed alterare lo stato di sicurezza delle Vs. linee di processo. Ancor più potrebbe provocare rischi di incendio, rischi elettrici o far risultare errati i processi in corso.



## SWEDISH

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## VIKTIG SÄKERHETSINFORMATION

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Denna bilaga innehåller viktig information om säkerhet och handhavande vid installation och användande av Brooks Flödesmätare i Thermal Mass Flow Meter / Controller Series. Instrumentet är i överensstämmande med (PED) PRESSURE EQUIPMENT CE DIRECTIVE 97/23/EC. Kontakta de lokala myndigheterna angående eventuella nationella föreskrifter och ytterligare föreskrifter angående krav på riktig installation.

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### SÄKERHETS INSTRUKTION

1. Läs alla instruktioner och varningsföreskrifter på (1) flödesmätaren och (2) alla aktuella avsnitt i Instruktion - och handhavande manualen innan produkten tas i drift.
2. **VARNING!** Använd inte detta instrument utanför de angivna specifikationerna, som anges i Instruktion - och handhavande manualen. Att ej beakta denna varning kan resultera i alvarlig personskada och/eller skada på utrustningen.
3. Vänligen kontrollera att instrumentet är rätt inkopplat elektriskt och mekaniskt med avseende på elektrisk spänning och aktuellt tryck.
4. **Vid igångsättning:** (a) Släpp långsamt på aktuellt flöde i systemet. Öppna processventiler långsamt för att undvika för höga flöden. (b) Kontrollera om det finns några läckage runt flödesmätarens anslutningar. Om det inte finns något läckage, öka försiktigt till aktuellt arbetstryck.
5. **Varning:** Om denna utrustning inte servas enligt instruktionsboken kan alvarlig personskada inträffa. Utrustningen kan skadas av för högt tryck. Vänligen kontrollera att processtrycket på mätaren är fränkopplat i samband med service.
6. Vänligen kontrollera att bara BROOKS originaldelar används i samband med service. Observera att delar med motsvarande utseende, men ej originaldelar, kan påverka flödesmätarens funktion och prestanda samt påverkar säkerheten i processen. Det kan även resultera i eldsvåda, elektrisk fara eller felaktig funktion.

## SPANISH

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## IMPORTANTES INSTRUCCIONES DE SEGURIDAD

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Este apéndice contiene importantes instrucciones de operación y seguridad para el uso de los rotámetros de tubo de vidrio BROOKS de la Thermal Mass Flow Meter / Controller. El instrumento es conforme a la directiva 97/23/CE sobre Equipos a Presión de la Comunidad Europea (PED). Consulte con sus autoridades locales por si existieran normas ó directivas adicionales sobre el uso y/o instalación de dicho tipo de instrumentos.

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### INSTRUCCIONES DE SEGURIDAD

1. Lease con cuidado todas y cada una de las identificaciones del aparato (1) así como las secciones del Manual de Instalación y Operación antes de usar el rotámetro.
2. **ATENCIÓN!** No operar nunca el instrumento por encima de las especificaciones de Máxima Presión de operación reseñadas en el Manual de Instalación y Operación. El no seguir estas instrucciones puede provocar daños y perjuicios en personas y/o equipos.
3. Asegurarse de que el instrumento ha sido conectado e instalado correctamente a la fuente de presión y/o eléctrica.
4. **OPERACION:** (a) Empezar abriendo el caudal cuidadosamente. Abra lentamente las válvulas para evitar puntas de caudal. (b) Comprobar si existen fugas en el caudalímetro y sus conexiones. Si no se encuentran fugas continuar abriendo hasta conseguir las condiciones normales de servicio.
5. **ATENCIÓN!** Llevar un mantenimiento adecuado con el fin de prevenir y evitar fallos debidos a altas presiones de operación. El no seguir estas instrucciones puede provocar daños y perjuicios en personas y/o equipos. Despresurizar la línea antes de desmontar el rotámetro.
6. Utilice solo piezas originales BROOKS para el mantenimiento de su rotámetro. El uso de piezas de otros suministradores con apariencia similar puede afectar las prestaciones y la seguridad del equipo. Cualquier cambio indebido puede resultar en una explosión ó operación incorrecta.



## (1) EC-TYPE EXAMINATION CERTIFICATE

### (2) Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC

(3) EC-Type Examination Certificate Number: **KEMA 02ATEX2151** Issue Number: **3**

(4) Equipment: **Thermal Mass Flow Meter Type 5816**

(5) Manufacturer: **Brooks Instrument LLC**

(6) Address: **407 West Vine Street, Hatfield, PA 19440, USA**

(7) This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) KEMA Quality B.V., notified body number 0344 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the directive.

The examination and test results are recorded in confidential test report number 2113693-6.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

**EN 60079-0 : 2006    EN 60079-7 : 2003    EN 50014 : 1997 + A1, A2    EN 50018 : 2000 + A1**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment according to the Directive 94/9/EC. Further requirements of the directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:



**II 2 G Ex de IIC T6**

This certificate is issued on March 21, 2008 and, as far as applicable, shall be revised before the date of cessation of presumption of conformity of (one of) the standards mentioned above as communicated in the Official Journal of the European Union.

KEMA Quality B.V.

C.G. van Es  
Certification Manager



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KEMA Quality B.V. Utrechtseweg 310, 6812 AR Arnhem P.O. Box 5185, 6802 ED Arnhem The Netherlands  
T +31 26 3 56 20 00 F +31 26 3 52 58 00 customer@kema.com www.kema.com Registered Arnhem 09085396

Experience you can trust.

**Physikalisch-Technische Bundesanstalt**  
Braunschweig und Berlin



(1) **EC-TYPE-EXAMINATION CERTIFICATE**  
(Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - Directive 94/9/EC

(3) EC-type-examination Certificate Number:

**PTB 02 ATEX 2085 X**



(4) Equipment: Actuation electro-magnets for solenoid valves, type 46..

(5) Manufacturer: IMI Norgren-Heion Fluidtronic GmbH & Co. KG

(6) Address: Stuttgarter Straße 120; 70736 Fellbach; Germany

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB Ex 01-20256 and 02-10167.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:  
EN 50014:1997 + A1 + A2    EN 50018:2000    EN 50019:2000  
EN 50028:1987    EN 50281-1-1:1998

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

II 2 G EEx md IIC T4 or EEx md IIC T5 or EEx md IIC T6 and EEx me II T4 or  
Ex me II T5 or EEx me II T6 and II 2 D IP 66 T 130 °C

Zertifizierungsstelle Explosionschutz  
By order

Dr.-Ing. U. Johannsmeyer  
Regierungsdirektor



Braunschweig, September 30, 2002

sheet 1/15

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig

**LIMITED WARRANTY**

Seller warrants that the Goods manufactured by Seller will be free from defects in materials or workmanship under normal use and service and that the Software will execute the programming instructions provided by Seller until the expiration of the earlier of twelve (12) months from the date of initial installation or eighteen (18) months from the date of shipment by Seller. Products purchased by Seller from a third party for resale to Buyer ("Resale Products") shall carry only the warranty extended by the original manufacturer.

All replacements or repairs necessitated by inadequate preventive maintenance, or by normal wear and usage, or by fault of Buyer, or by unsuitable power sources or by attack or deterioration under unsuitable environmental conditions, or by abuse, accident, alteration, misuse, improper installation, modification, repair, storage or handling, or any other cause not the fault of Seller are not covered by this limited warranty, and shall be at Buyer's expense.

Goods repaired and parts replaced during the warranty period shall be in warranty for the remainder of the original warranty period or ninety (90) days, whichever is longer. This limited warranty is the only warranty made by Seller and can be amended only in a writing signed by an authorized representative of Seller.

**BROOKS SERVICE AND SUPPORT**

Brooks is committed to assuring all of our customers receive the ideal flow solution for their application, along with outstanding service and support to back it up. We operate first class repair facilities located around the world to provide rapid response and support. Each location utilizes primary standard calibration equipment to ensure accuracy and reliability for repairs and recalibration. The primary standard calibration equipment to calibrate our flow products is certified by our local Weights and Measures Authorities and traceable to the relevant International Standards.

Visit [www.BrooksInstrument.com](http://www.BrooksInstrument.com) to locate the service location nearest to you.

**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 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:

- Americas ☎ 1-888-554-FLOW
- Europe ☎ +(31) 318 549 290 Within Netherlands ☎ 0318 549 290
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Due to Brooks Instrument's commitment to continuous improvement of our products, all specifications are subject to change without notice.

**TRADEMARKS**

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**Brooks Instrument**  
 407 West Vine Street  
 P.O. Box 903  
 Hatfield, PA 19440-0903 USA  
 T (215) 362-3700  
 F (215) 362-3745  
 E-Mail [BrooksAm@BrooksInstrument.com](mailto:BrooksAm@BrooksInstrument.com)  
[www.BrooksInstrument.com](http://www.BrooksInstrument.com)

**Brooks Instrument**  
 Neonstraat 3  
 6718 WX Ede, Netherlands  
 T 31-318-549-300  
 F 31-318-549-309  
 E-Mail [BrooksEu@BrooksInstrument.com](mailto:BrooksEu@BrooksInstrument.com)

**Brooks Instrument**  
 1-4-4 Kitasuna Koto-Ku  
 Tokyo, 136-0073 Japan  
 T 011-81-3-5633-7100  
 F 011-81-3-5633-7101  
 E-Mail [BrooksAs@BrooksInstrument.com](mailto:BrooksAs@BrooksInstrument.com)

