

## Installation and Operation Manual

X-TMF-FM-MFC-eng

PN 541-C-007-AAG

April, 2008

# Brooks® Flomega, Liquid MFC's/MFM's Model 5881/5891 and 5882/5892



 **WARNING !**

This publication must be read in its entirety before performing any operation. Failure to understand and follow these instructions could result in serious personal injury and/or damage to the equipment. Should this equipment require repair or adjustment, contact the nearest Brooks Sales & Repair Office. It is important that servicing is performed by trained and qualified personnel only. If this equipment is not properly serviced, serious personal injury and/or damage to the equipment could result.

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

 **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 must be removed.
2. Personnel must be grounded, via a wrist wrap or other safe, suitable means, before any printed circuit card or other internal device is installed, removed or adjusted.
3. Printed circuit board must be transported on a conductive bag or other conductive container. Boards must not be removed from protective enclosure until the immediate time of installation. Removed boards must be placed immediately in a protective container for transport, storage or factory.

**Comments:**

This instrument is not unique in its content of ESD (electrostatic discharge) sensitive components. Most modern electronics designs contain microprocessor technology including SMD-components. 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.

# 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 than 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.

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**1-1 Purpose**

The Brooks models 5881/5882 Flow Controllers are a mass flow measurement devices designed for accurately measuring and controlling flows of liquids. This instruction manual is intended to provide the user with all the information necessary to install, operate and maintain the Brooks 5881/5882 Mass Flow Controllers and 5891/5892 Flow Meters. This manual is organized into six chapters:

1. Introduction
2. Installation
3. Operation
4. Maintenance
5. Replacement parts
6. Modelist

It is recommended that this manual be read in its entirety before attempting to operate or repair.

**1-2 Description**

The Brooks models 5881/5882 consist of three basic units: a flow sensor, a control valve and an integral electronic control system. Designed to operate at +15 Vdc or +24 Vdc, the models 5881/5882 monitor and maintain a stable mass flow relatively independent of pressure and temperature variations.

Standard features include:

- a. Thru-flow (patented) design of the sensor
- b. In-line type control valve
- c. Soft start
- d. Valve override
- e. Low command valve inhibit
- f. Flow output limiting
- g. Temperature of heater output
- h. Field adjustable orifice

**1-3 Performance Specifications**

Accuracy incl. linearity	$\pm 0.5\%$ full scale measured at calibration conditions
Process temperature effects	$\pm 0.03\%$ F.S./ $^{\circ}\text{C}$
Ambient temperature effects	$\pm 0.1\%$ F.S./ $^{\circ}\text{C}$

**Repeatability**

Applicable flowrange		
Models	from 100% to 50% of max. f.s.	less than 50% of max. f.s.
5881/91	$\pm 0.2\%$ of rate	$\pm 0.2\%$ f.s.*
5882/92	$\pm 0.2\%$ of rate	$\pm 0.4\%$ of rate

\* The measured repeatability is (technically) limited by the current calibration method using an highly accurate balance (weighscale)

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Specification

Flowranges

Brooks FLOMEGA™				
Models	Min. full scale Flowrate*	Max. full scale Flowrate*	Units	PED Module Category
5881/91	15**	100	gr/hour	S.E.P.
5882/92	200	1000	gr/hour	S.E.P.


\* To be specified at ordering (factory selectable) (water equivalent flowranges)

\*\* Down to 15 gr/hour minimum full scale is possible  
 @ ± 1% f.s. accuracy and ± 0,4% f.s. repeatability  
 Flowranges from > 30 gr/h are within specified accuracy

**Rangeability** 50:1  
**Viscosity limits** Up to 200 cP (limited by max. diff. pressure)  
**Ambient temperature range** 0 - 65°C  
**Process temperature range** 0 to 100°C (Model 5882/92: max. 90°C)  
**Pressure limits** 100/400 bar versions  
**Max pressure difference** • Model 5881: 20 bar • Model 5882: 40 bar  
**Pressure drop sensor** • Model 5891: 10 mbar @ 100 gram/hour water  
 • Model 5892: 150 mbar @ 1000 gram/hour water  
**Setpoint input/Flow signal output** 0 (4) -20 mA\*, or 0-5Vdc\*  
**Power supply** + 15Vdc or 24Vdc\* ± 10% max. current 660 mA  
**Warm-up time** Performance within specifications: 60 minutes  
 (Within ± 1.5% F.S. accuracy: 15 minutes)  
**Response time** (to within 2% of final value for a 2-100% command change, at a constant operating pressure)  
 • Models: 5881/91: 5 seconds • Models: 5882/92: 7 seconds  
**Mounting insensitivity** Not affected by mounting position\*  
**Certification** • ATEX Zone I, II 2 GD KEMA 03 ATEX2036  
 CE 0344 EEx d IIB T6...T4 T100°C (IP 66)  
  

<u>Temperature Class</u>	<u>Process Temperature</u>
T6	≤ 75°C
T5	75 - 85°C
T4	85 - 100°C

Per: EN 50014:1997 +A1 + A2  
 EN 50018:2000 + A2  
 EN 50281-1-1:1998 + A1

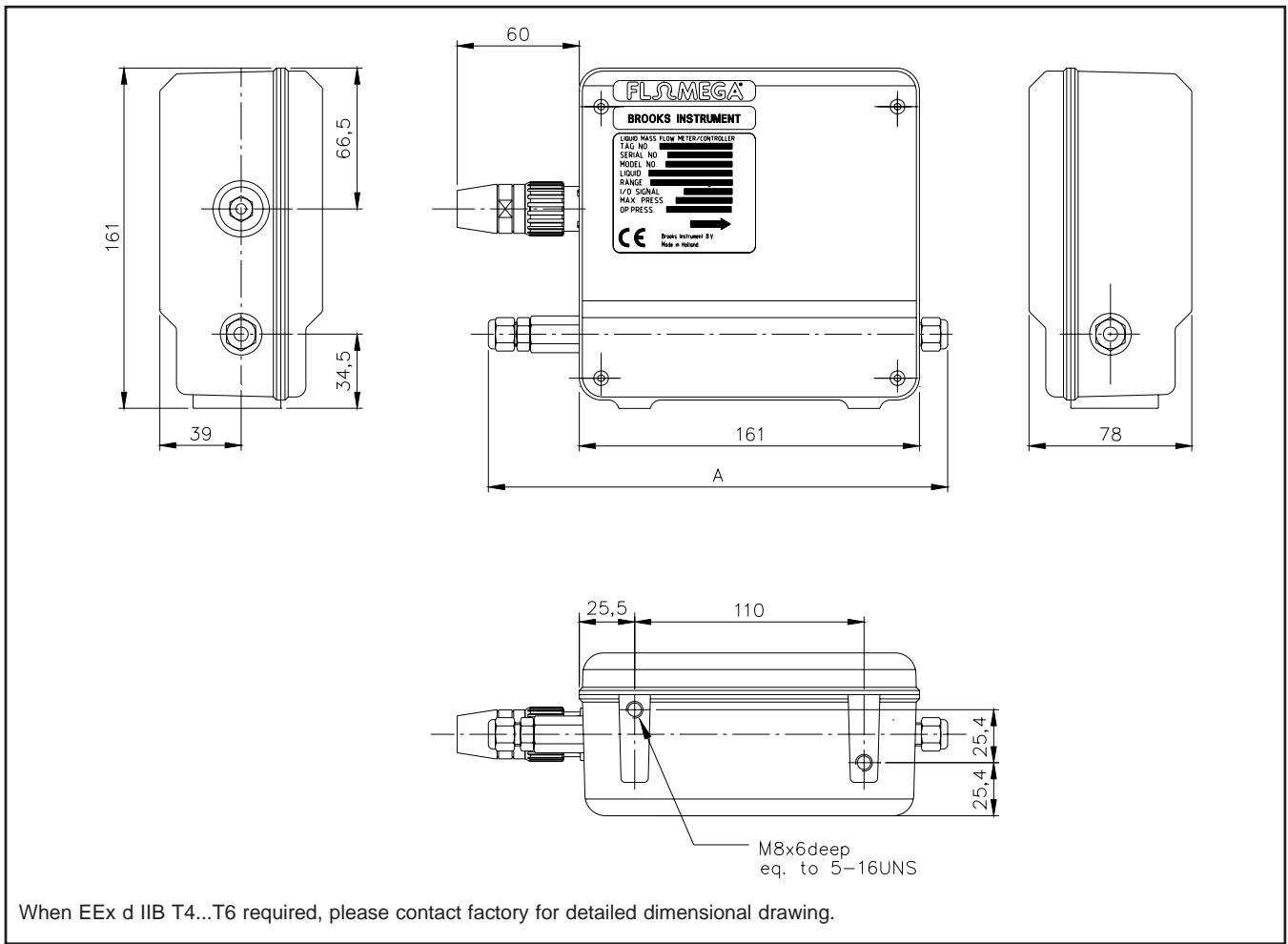
 • ATEX Zone 2, II 3 GD KEMA 99 ATEX3626  
 EEx nA II T4 T75°C (IP65) Per: EN 60079-15:2003  
 EN 50281-1-7:1998+A1

\* To be specified at ordering

Physical specifications

**Mechanical connections** • Standard: 1/16" or 1/8" tube connections  
 • Optional: 1/4" tube compression, 1/4" NPT (F), or 1/4" B.VCO fittings  
 Material: stainless steel Mess size: 40 micron  
**Inlet filter** • All wetted materials: stainless steel. For seals: Viton, PTFE, EPDM, Buna or Kalrez  
**Materials of construction** • All stainless steel construction (including welded adapters) for SANITARY sensor  
**Housing materials** Cast aluminium  
**Electrical connections** 12-pole circular connector  
**Weight** less than 3.5 kg





Connections	A	A with filter
5/16" - 24 UNF	143,5 mm	175 mm
1/16" Tube Compression	176,5 mm	208 mm
1/8" Tube Compression	188 mm	220 mm
1/4" Tube Compression	188 mm	220 mm
1/4" NPT(F)	208 mm	240 mm

Figure 1-1 Dimensions

## Flomega, Liquid MFC's/MFM's

**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  
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**Brooks Instrument**

Neonstraat 3  
6718 WX Ede, Netherlands  
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Tel 31-318-549-300  
Fax 31-318-549-309  
E-mail: BrooksEu@EmersonProcess.com

**Brooks Instrument**

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Tokyo, 136-0073 Japan  
Tel 011-81-3-5633-7100  
Fax 011-81-3-5633-7101  
Email: BrooksAs@EmersonProcess.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@EmersonProcess.com](mailto:BrooksAm@EmersonProcess.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@EmersonProcess.com](mailto:BrooksEu@EmersonProcess.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@EmersonProcess.com](mailto:BrooksAs@EmersonProcess.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.

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## Flomega, Liquid MFC's/MFM's

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### 2-7 In-line Filter

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An in-line type 40 micron filter has been installed upstream from the flow sensor to prevent the possibility of any foreign material entering the flow sensor or control valve.

### 2-8 Connections

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Standard, the Flomega models are supplied with adapters. Inlet and outlet thread size is 5/16"-24 UNF. Optional adapters can be supplied.

5/16"-24 to 1/16" tube compression fittings

5/16"-24 to 1/8" tube compression fittings

5/16"-24 to 1/4" tube compression fittings

5/16"-24 to 1/4" NPT (F)

Prior to installation, make certain all piping is clean and free of obstructions. Install the piping in such a manner that permits easy removal if the instrument is to be removed for cleaning or test bench troubleshooting.

### 2-9 Precision 5V Reference

---

The 5881/5882 is equipped with a precision 5V reference. The reference voltage is available at terminal 11 (ref. to fig. 2-1) for use in conjunction with potentiometer to provide a 0-5 Vdc command.

### 2.10 Command Input

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The command input hook-up is as follows: a. Connect the external command voltage to terminal 8, (command input) and to terminal 1 (command input return). Refer to figure 2-1.

### 2-11 Valve Override

---

The valve override function allows full opening and closing of the valve independent of the command setting. The valve override function can be accessed from terminal 12. Refer to figure 2-1.

The valve override for the mass flow controller is as follows:

- To open the valve apply a voltage between +5 Vdc and +15 Vdc to the valve override terminal. (V.O.R.+)
- To close the valve apply 0 Vdc, or "common" to the valve override terminal. (V.O.R.-)

**Note:** For normal operation terminal 12 must be left open (floating).

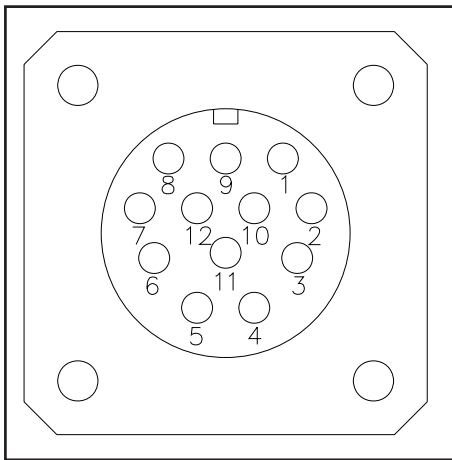


Figure 2-1  
Standard and EEx nA execution

Pin Function	
1	Command Common
2	Signal output voltage
3	Valve Common
4	Current output
5	+15 Vdc to +24 Vdc supply
6	
7	Valve voltage tp.
8	Command
9	Supply common
10	Signal common
11	Ref. output
12	Valve override

Figure 2-2

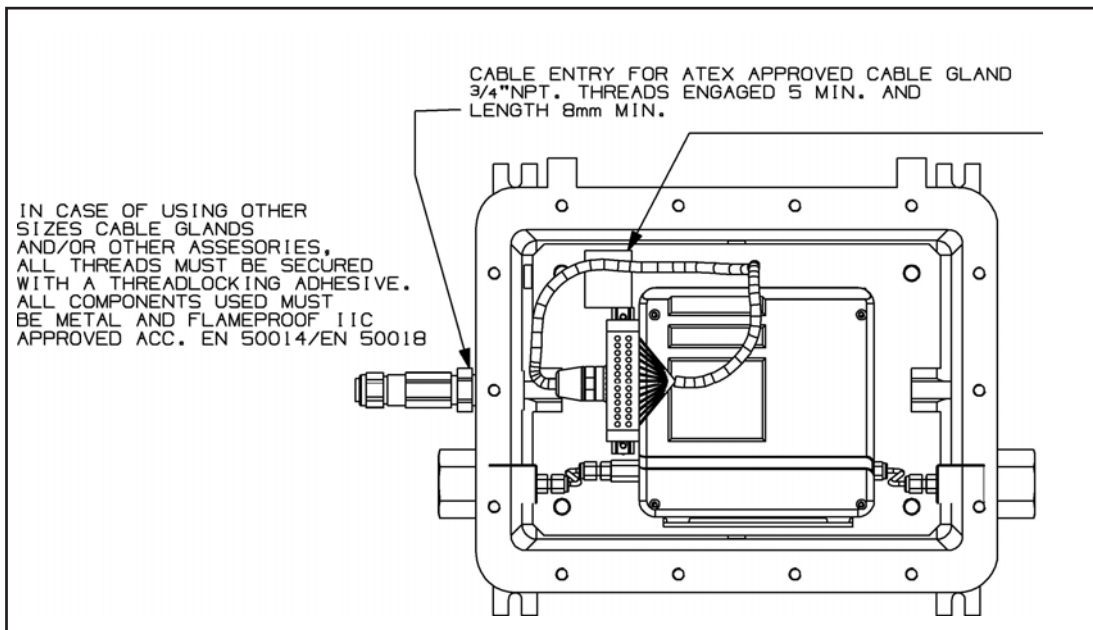


Figure 2-3, EEx d. execution

Figure 2-4

Pin	Wire color	Function
1	Brown	Command common
2	White	Signal output voltage
3	Grey/Pink	Valve common
4	Red/Blue	Current output
5	Red	+15Vdc to +24Vdc supply
6	Yel/Wht	Temperature heater *
7	Violet	Valve voltage tp.
8	Grey	Command
9	Black	Supply common
10	Pink	Signal common
11	Yellow	Ref. output
12	Green	Valve override
13	n.C.	

\* 5881/91: no function  
5882/92: temp. heater

## Flomega, Liquid MFC's/MFM's

**2-12 Installation**

The Brooks (electrical/electronic) equipment bearing the CE mark has been successfully tested to the regulations of the Electro Magnetic Compatibility (EMC directive 89/336/EEC). Special attention however is required when selecting the signal cable to be used with CE marked equipment.

**Quality of the signal cable and cable connectors:**

- Brooks standard supplies high quality cable(s) which meets the specifications for CE certification.
- If you provide your own signal cable you should use a cable which is overall completely screened with at least 100% shield.

Cable connectors used should be made from metal and cable glands should either be metal or metal shielded.

The cable screen should be connected to the metal connector or gland and shielded at both ends over 360 degrees. For pin configuration, please refer to fig. 2-1 and 2-2 or 2-3 and 2-4.

The cable entry device for the Ex Proof execution, shall be in type of explosion protection flameproof enclosure "d", suitable for the conditions of use and correctly installed. The minimum ingress protection requirement of IP 6X according to EN 60529 must be satisfied.

Cables suitable for a temperature of at least 90°C shall be used.

**⚠ CAUTION**

When installing the controller, care should be taken that no foreign materials enter the inlet or outlet of the instrument.

Recommended installation procedures:

- a. The flow controller or sensor should be inspected for cleanliness or any visible external damage after it is removed from its shipping container.
- b. The FLOMEGA should be located in an atmosphere with vibration levels lower than SAMA PMC 31.1 condition 3.
- c. Leave sufficient room for access to the electrical components.
- d. Install in such a manner that it permits easy removal if the instrument requires cleaning.

**⚠ CAUTION**

The models 5881/5892 can be installed in any position. However, mounting orientations other than original factory calibration position (mounting holes down) may require re-zeroing to regain the specified accuracy.

- e. Accurate upstream pressure regulation is required to ensure proper valve control operation. Piping should be sized to avoid excessive pressure drops. It is recommended to install the controller in a vertical-upwards position. This installation position will release the entrained gas in the valve compartment more easily. A constant higher back pressure than atmospheric pressure is also beneficial for the stability of the control valve performance.

**Note:**

The control valve in the 5881/5882 provides precision control. If positive shut-off is required, it is recommended a separate shut-off valve be installed in-line.

- f. The controller body is machined to accept 5/16"-24, threaded inlet and outlet fittings. Make sure that the proper o-ring size (902) and material is used when securing the fittings.

**2-13 Start-up Guidelines**

**⚠ CAUTION:**

When used with a reactive (sometimes toxic) liquid, contamination or corrosion may occur as a result of plumbing leaks or improper purging. Plumbing should be checked carefully for leaks and purged with nitrogen before use. (Refer to step a.)

- a. After the flow controller has been installed in the flow system and the connecting cable attached (refer to fig 2-1), apply power, set the command to 100%, and purge the controller with liquid to a minimum of 15 minutes or give V.O.R. + for some minutes. This is most important if the process liquid contains elements which will react with air components to form corrosive or precipitative mixtures. It will also preserve the accuracy and life of the controller. This purge should also be performed when a controller is being removed from an active, corrosive, or toxic process liquid line.
- b. Set the command to zero and block the flow downstream of the controller. Wait at least 35 minutes to allow the flow controller to reach operating temperature. Check the output signal from the controller (pin 2) with a voltmeter. If necessary, adjust the "zero" potentiometer (accessible through cover) to set the output signal to 0 mV +/-10 mV.

**Note:**

An absolute zero shift may occur during normal controller operation if the ambient temperature is substantially different than the temperature when the adjustment was performed.

The "zero" output signal can be adjusted. Please don't remove the cover. If possible the "zero" pot should be adjusted while the controller is in its normal working environment.

3-1 Theory of Operation

(refer to figures 3-1 and 3-2)

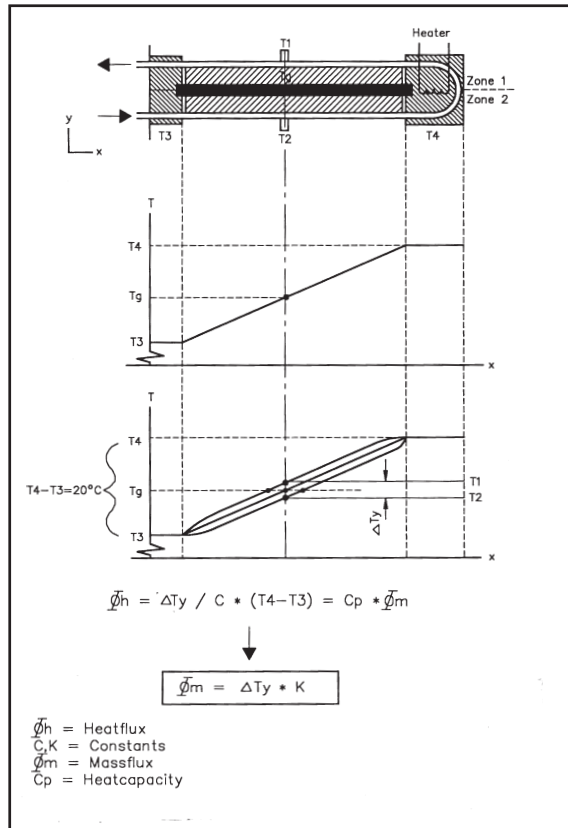


Figure 3-1 Measurement Principle 5891

**FLOMEGA**

A new thermal measurement principle is used in our Flomega. The patented thru-flow sensor is especially designed for liquids and is different from the traditional Brooks 5850 series "thermal" mass flow meters for gases.

The by-pass or shunt technique used for gases cannot be applied for liquids; viscosity variations, air bubbles, convection and attitude sensitivity deteriorates the performances dramatically. Therefore, Brooks Instrument developed Flomega. This thru-flow meter is unique in its patented design, performance and reliability.

In the new sensor, the heat transfer to and from the liquid is perpendicular to the pipe axis contrary to classic way of heat transfer along the pipe wall. This technique enables a high heat current to and from the liquid, which is essential for a thru-flow sensor. Using thermal feedback reduces power consumption to a minimum.

Figure 3-1 shows the lay-out of the sensor. The temperature difference between heater and bottom of the sensor is regulated to a constant of 10 or 20 °C. To ensure a constant heat-gradient (linearity) along the tube, a high conductive strip (guideline) is added. A fixed conductance from the pipes to the guideline is realized with a so-called interface material. The temperature T1 - T2 reflects the heat current to and from the liquid. As can be seen, T1 - T2 is proportional to the liquid flow thru the sensor and the heat-gradient at T1, T2.



As with relative high flows more heat-current is involved, the thermal "lag" of the fluidum increases. Also the decreasing operation of the guideline reduces the outstanding performance of the device.

For flows up to 1000 g/h, the design has been changed to overcome above mentioned problems. The guideline is left out to reduce the thermal lag effects. Since the heat-gradient now varies with flow, two extra sensors (T5 and T6) are added to measure the heat-gradient at T1, T2 (see figure 3-2). With this technique, flows up to 1000 g/h can be measured with high accuracy. This new technique is used in models 5882/5892.

The FLOMEGA model 5881/82 liquid mass flow controller consists of the same unique sensor design. In addition, an in-line control valve and control electronics are included. This control valve differs from the traditional Brooks series 5850 mass flow controllers for gases. In the latter, expansion of the flow in the control valve compartment may lead to outgassing of the fluid and influences the controllability of the mass flow controller easily. A manual degassing of the valve would be required. Therefore, Brooks Instrument developed an in-line control valve especially designed for accurately controlling the liquid flowrates. Dead volumes in the flow path have been eliminated as much as possible to ensure troublefree operation. For easy maintenance, the valve orifice is field adjustable.

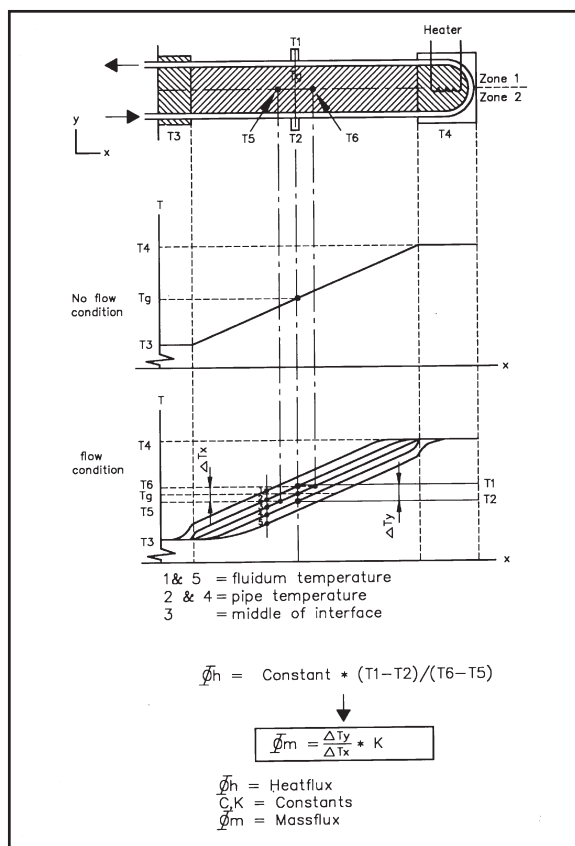


Figure 3-2 Measurement Principle

**Electronics (see figure 3-3)**

There are two control sections in the electronics, one for creating a temperature difference between top and bottom of the sensor (upper part of block diagram) and one for controlling the valve. The signal generated by the temperature elements T1 and T2 are amplified in such a way that 100% of the customer's flowrate equals 100% full scale output. This amplification has a three switch selectable coarse adjustment and one potentiometer for fine tuning. Using the temperature difference of T5 and T6 (5882/92) the output is corrected by the heat-gradient. For rapid response output this amplified signal is applied to a "D" action. A comparison amplifier compares the output signal with the customer adjusted setpoint value and will drive the valve to the desired value via a P.I.D. action. For specific fluidum which requires a one time linearisation, a network is created that linearises the sensor's output signal. A voltage to current converter is added to provide a 0-20 mA or 4-20 mA output.

## Flomega, Liquid MFC's/MFM's

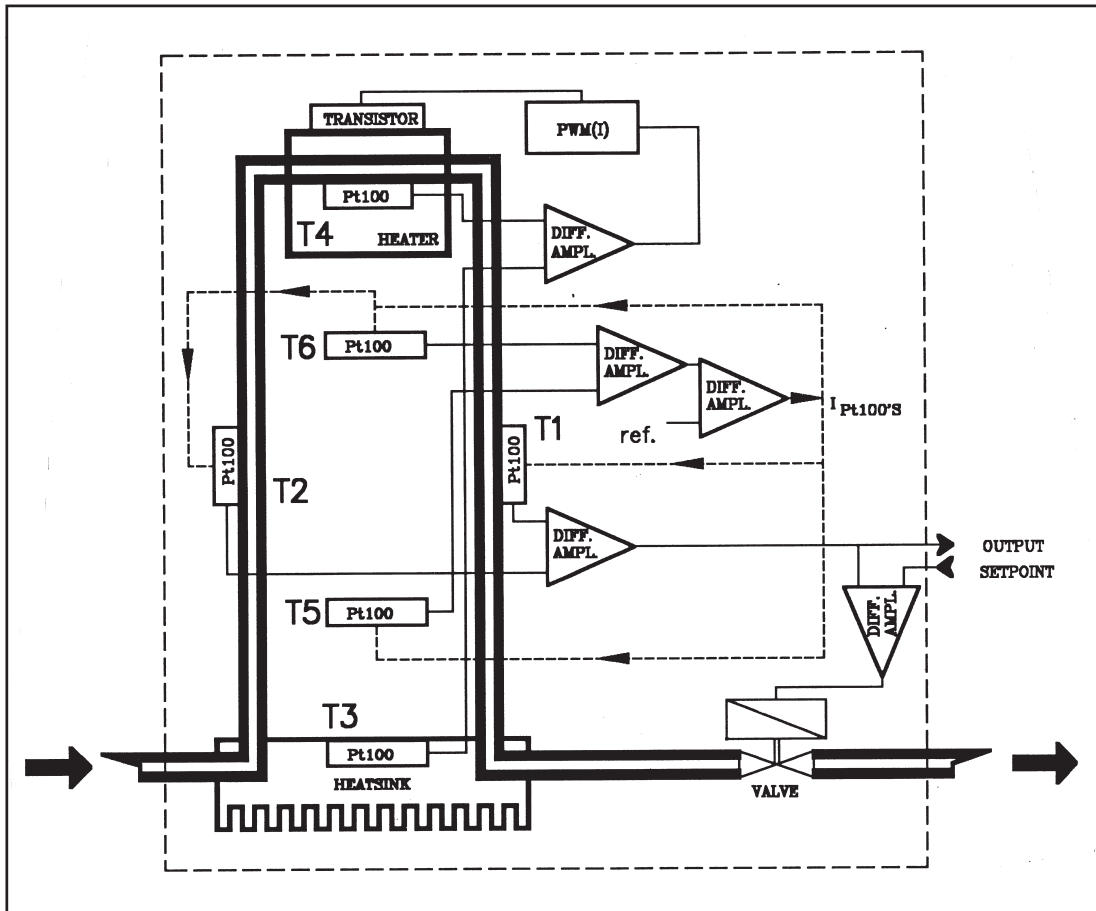


Figure 3-3 Principle Mass Flow Controller

**MODEL 5881/91****ELECTRONIC FEATURES (see figure 3-4)**

The Flomega model 5881 liquid mass flow controller and model 5891 liquid mass flow meter has a number of features which are customer selectable (by jumper setting) or adjustable (by potentiometer). These are:

**a. Voltage or current setpoint**

This is jumper selectable. For 0-5 Vdc setpoint insert jumpers J9, J10 and J11 to position "0". For 0-20 mA setpoint insert jumper J9 to position "X" and jumpers J10 and J11 to position "0". For 4-20 mA setpoint insert jumper J9, J10 and J11 to position "X".

**b. 0-20 mA or 4-20 mA output**

This is jumper selectable. For 0-20 mA output insert the jumpers J6 and J7 to position "X" and jumper J8 to position "0". For 4-20 mA output insert jumpers J6 and J7 to position "0" and jumper J8 to position "X". 0-5 Vdc output is always available. Voltage output: 6, 7, 8 "0".

**c. Proportional gain**

By adjusting potentiometer P4, the proportional gain can be changed. This will enable you to optimize your response.

**d. Valve Over Ride**

When applying +5 Vdc to +15 Vdc on pin number 12 of the connector, the valve is commanded to the fully open position independent of the setpoint. When applying -15 Vdc to 0 Vdc on pin number 12 of the connector, the valve is commanded to the closed position independent of the setpoint.

**Note:**

Excessive high flowrates, around  $\geq 200\%$  full scale setting, may produce a decreasing output signal. The output signal is limited up to 6.8 Vdc and 24 mA.

**MODEL 5882/92 (see figure 3-5)****ELECTRONIC FEATURES**

The Flomega model 5882 liquid mass flow controller and model 5892 liquid mass flow meter has a number of features which are customer selectable (by jumper setting) or adjustable (by potentiometer). These are:

**a. Voltage or current setpoint**

This is jumper selectable. For 0-5 Vdc setpoint insert jumper J5 to position 2-3 and jumper J7 to position 2-4. For 0-20 mA setpoint insert jumper J5 to position 2-3 and jumper J7 to position 2-3. For 4-20 mA setpoint insert jumper J5 to position 1 1-2 1-2 and jumper J7 to position 1-2.

**b. 0-20 mA or 4-20 mA output**

This is jumper selectable. For 0-20 mA output insert the jumpers J6 and J7 to position "X" and jumper J8 to position "0". For 4-20 mA output insert jumpers J6 and J7 to position "0" and jumper J8 to position "X". 0-5 Vdc output is always available.

**c. Soft start**

To enable soft start feature insert jumper J6 to position 2-3

**d. Artificial zero**

To enable this feature insert jumper J14 to position 1-2. When flow signal is less than 1%, output is command to zero, i.e. 0 V and 0 mA or 4 mA.

**e. Output damping**

The output can be dampened out by adjusting potentiometer P8. It can be adjusted between a RC-time of 0.1 sec. to 10 sec.

**f. Proportional gain**

By adjusting potentiometer P4, the proportional gain can be changed. This will enable you to optimize your response.

**g. Valve Over Ride**

When applying -15 Vdc to 0 Vdc on pin number 12 of the connector, the valve is commanded to the closed position independent of the setpoint. When applying +5 Vdc to +15 Vdc on the same pin, the valve is commanded to the fully open position independent of the setpoint.

**Note:**

Excessive high flowrates, around  $\geq 200\%$  full scale setting, may produce a decreasing output signal. The output signal is limited up to 6.8 Vdc and 24 mA.

**h. Temperature heater output**

On pin no. 6 of the connector, the output voltage can be monitored which reflects the temperature of the heat source. This can be used for monitoring or alarm purposes in case liquids are used which are limited regarding the warm-up temperature.

**Note:**

The electronics are executed with a temperature limiter for the heater. When this temperature is reached, the heating circuitry is switched off.

Flomega, Liquid MFC's/MFM's

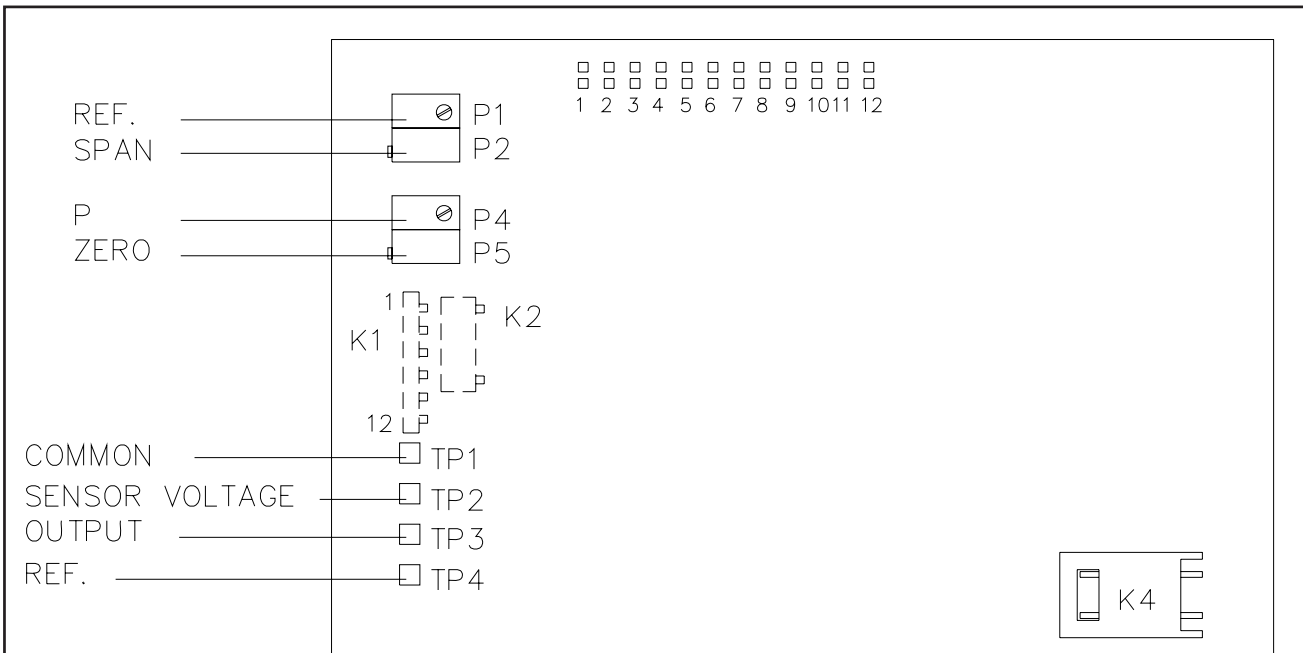


Figure 3-4 Jumper Settings for Flomega

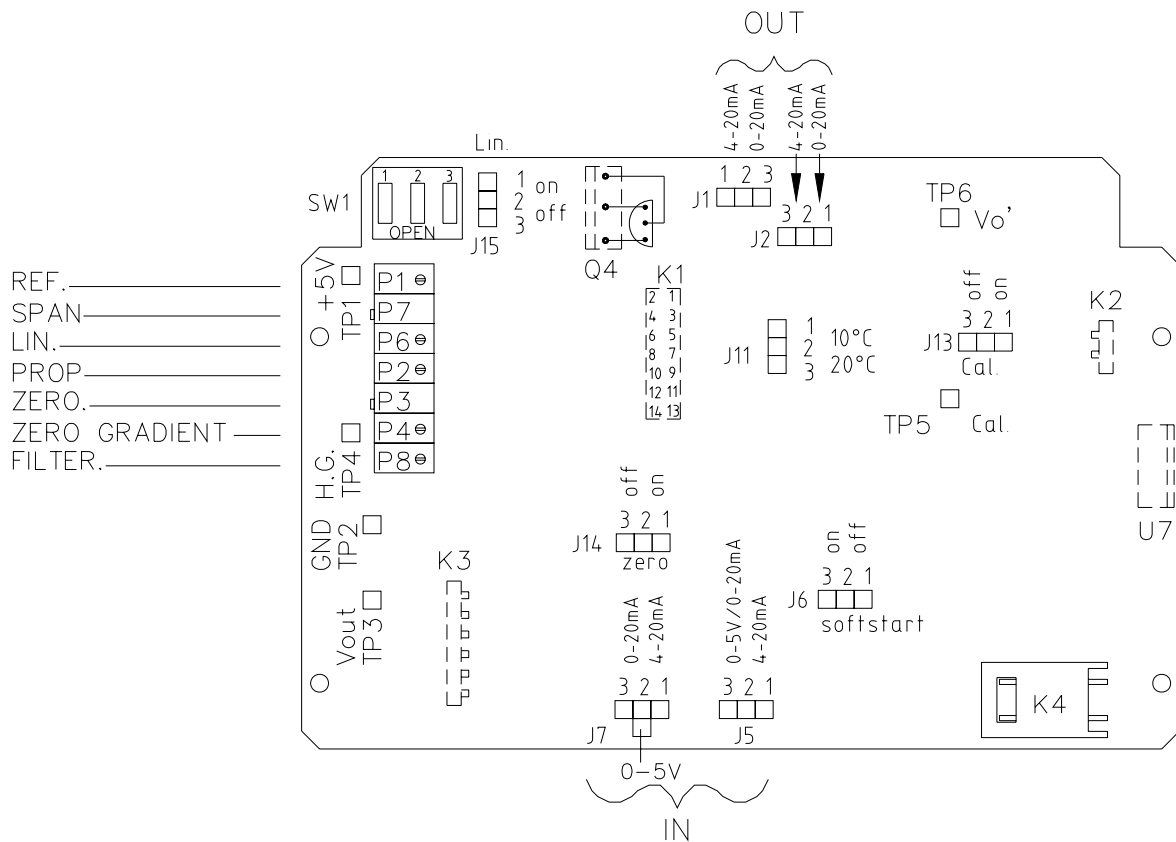


Figure 3-5 Jumper Settings for Flomega

**3-2 Calibration Procedure****Note:**

Calibration of the Flomega models requires the use of the digital voltmeter (DVM), and an accurate calibration standard. It is recommended that calibration be performed only by trained and qualified service personnel.

- a. Install the Flomega in the flow calibration system. Apply power, open downstream shut-off valve, apply line pressure, and set command voltage to 100%, or apply V.O.R.+ for some minutes. Allow flow controller to purge with the calibration liquid for approximately 15 minutes.
- b. Set command voltage to 0% and close downstream shut-off valve. Allow the controller to warm up for an additional 20 minutes.
- c. Reference (REF) adjustment: Connect DVM Positive lead to pin REF and negative lead to the Common. Adjust REF (P1) for  $5 \text{ Vdc} \pm 1 \text{ mV}$ .
- d. Zero adjustment: Connect DVM positive lead to OUTPUT. Adjust zero for  $0 \text{ mV} \pm 10 \text{ mV}$ .
- e. Command 100% flow. Wait 5 minutes.
- f. With command at 100%, use the calibration standard to measure the mass flow rate. Adjust span until the measured flow rate is within 0.5% of the desired flow rate.
- g. Set command to 0% and close the downstream shut-off valve. Wait approximately 10 minutes for the output signal to stabilize. Adjust zero for  $0 \text{ mV} \pm 10 \text{ mV}$ . Open downstream shut-off valve.
- h. Command 50% flow. Wait 5 minutes and measure the flow rate with the calibration standard.

**3-3 Response Adjustment**

- a. Make a step-in command to the controller from 2 to 100% of full scale flow and record the output signal.
- b. If the output signal shows more than 10% overshoot or oscillate; adjust proportional gain. If the signal does not show overshoot, but is not within 2% of final value after the response specification; adjust proportional gain the other way around.
- c. Repeat steps **a.** and **b.** until the response output signal meets the specification.

**3-4 Rangeability**

The 5881/5882 is designed to control mass flows from 2 to 100% of the specified full scale flowrate. This at an inlet pressure up to 100 or 400 bar (see pressure rating of your Flomega) and a maximal differential pressure of 40 bar (5881: 20 bar).

Operation at other inlet or differential pressures is possible as long as certain guidelines are observed. If a controller is operated with a process liquid other than its calibration liquid, a scale shift can occur in the relationship between the output signal and the mass flowrate.

## Flomega, Liquid MFC's/MFM's

**4-1 General**

No routine maintenance is required to be performed on the models 5881/5892 other than occasional cleaning. It is recommended a non-residual solvent be used for cleaning the flow sensor and control valve. If an in-line filter is used, the filtering element should periodically be replaced or ultrasonically cleaned.

**4-2 Disassembly and Assembly****⚠ WARNING:**

It is important that this instrument be serviced only by properly trained and qualified personnel. Proper purging techniques should be followed before removing the flow controller from a system.

**a. Electronic disassembly**

1. Remove the four screws from the top of the cover and remove cover.

**⚠ CAUTION!**

Gasket for assuring IP65 protection should be handled carefully.

2. Remove the four screws which hold the pc-board assembly and gently pull the board from the base.
3. Disconnect the valve, output cable and sensor cable connector, from pc-board.
4. To reassemble, follow the above steps in reverse order.

**b. Internal disassembly**

1. Remove the insulation from the sensor assembly.
2. Remove the inlet and outlet connections.
3. Unscrew the 3 screws which hold the whole ssembly, two are located at the outlet body and one just above the inlet body.
4. Gently pull the whole assembly from the base.

**⚠ CAUTION!**

By this operation the IP65 seal will be broken and has to be restored after assembly.

5. To reassemble, follow the above steps in reverse order. To assure IP65 protection a layer of silicone must be laid inside and between the inlet/outlet holes of housing and body. Be sure a good thermal contact is obtained between copper heatsink and housing.

**c. Valve disassembly**

1. Unscrew the four high tensile allen head key screws.
2. Gently pull the outlet body from the valve assembly, take care of the o-ring.
3. Remove o-ring from valve stem, before removing the coil assembly and adapter plate and pull gently the valve stem out of the body, take care of the o-ring.
4. To reassemble, follow above steps in reverse order. Apply 3.5 Nm force to the screws (1) in a digital pattern.

**d. Orifice disassembly**

1. Use a screwdriver to remove the orifice through the process connection from the outlet body.
2. Take care of the o-ring.
3. Apply Nitrogen gas flow at 2 bar inlet pressure.
4. Screw the orifice in the outlet body and adjust till 0% output signal has been reached again.
5. Check if value opens at 5-7 Vdc. if not, adjust orifice (final turn: clock wise).

**4-3 Trouble Shooting Guidelines**

<b>⚠ WARNING:</b>
Service and troubleshooting should be performed only by personnel who have been trained in safe repair procedures who have thoroughly read this manual.

**General**

Before applying power, remove cover of the housing and check jumper setting (see calibration sheet), and make sure that the valve connector has been fixed correctly (Controller only.) After applying power, wait at least 35 minutes to allow the unit to warm up.

**TROUBLE SHOOTING**

SYMPTOM	POSSIBLE CAUSE	REMEDY
<b>No signal</b>	1a) No power 1b) Electronic failure	Check power / wiring Return to factory
<b>Controller indicates zero flow, regardless of command</b>	2a) Liquid source is empty or blocked 2b) Supply pressure too high or differential pressure too high 2c) VOR input is -15 to 0 Vdc at VOR input 2d) Valve clogged (valve voltage will increase to max.) 2e) Valve seat not compatible with liquid (valve voltage max.) 2f) Electronic failure	Check in-line filters, liquid supply. Shut-off valve etc. Lower supply pressure Determine undesirable voltage Remove, clean and adjust orifice. See 6a. Choose correct valve seat material (consult factory) Return to factory
<b>Output controller much lower than setpoint</b>	3a) Pressure diff. too low/ in-line filter contaminated, sensor/valve clogged	Increase pressure diff., clean filter/sensor/valve (6a)

Flomega, Liquid MFC's/MFM's

SYMPTOM	POSSIBLE CAUSE	REMEDY
<b>Output signal remains at maximum</b>	4a) VOR input at +5V to +15V  4b) Flow too high because of leakage of the valve (valve voltage min)	Determine cause of this undesirable input  Clean orifice or valve. Adjust orifice according to 6a
<b>Oscillation</b>	5a) Unstable upstream/downstream pressure control  5b) Differential pressure too high  5c) Gas is valve compartment  5d) Very low viscosity and/or high density of liquid (compared with water)  5e) Outgassing of liquid	Check pressure regulator  Power pressure or change prop. gain  Purge system: VOR+ (2 minutes) or 100% setpoint (15 minutes)  Change prop. gain. Decrease gain  Max. temp. of liquid close to boiling point. Choose proper liquid delivery system. Vertical position is recommended. Apply higher back pressure, proper pressurising gas
<b>Low flow at zero setpoint</b>	6a) Valve leakage	Adjust orifice (turn C.W.), valve should open at 5V-7Vdc (1 bar diff. pressure)
<b>Output is fluctuating</b>	7a) Pulsation because of pump	Apply damping (potmeter P8)
<b>Output is stable but flow is too high</b>	8a) VOR+ has been used too long	Shut valve and wait 20 minutes



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 April, 2008

**Section 5 Spare Parts**

Flomega, Liquid MFC's/MFM's

**5-1 General**

Refer to figure 5-1 and table 5-1 to order replacement parts.

Ref. No.	Quant. Req.	Description	Part No.
1	1	Washer	964-E-019-ACK
2	1	Coil Assembly	185-Z-131-ZZZ
3	4	Screws	760-Z-052-ACA
4	1	Shassis Connector	207-G-008-ZJK
5*	1	Valve O-ring Buna-N Viton Teflon	375-B-016-SUA 375-B-016-QTA 375-B-016-QMA
6	1	Stem Assembly	839-Z-040-AAA
7	1	Plunger Assembly	622-Z-119-AAA
8	1	Lower Guide Spring	820-Z-076-BBA
9*	1	Valve Seat Viton Buna-N Kalrez	715-Z-245-AAA 715-Z-246-AAA 715-Z-162-AAA
10	1	Orifice	577-Z-151-BMT
11*	1	Orifice O-ring Buna-N Viton Kalrez	375-B-006-SUA 375-B-006-QTA 375-B-006-TTA
13	1	PC Board Assembly for model 5881/91	097-B-251-ZZZ
13	1	PC Board Assembly for model 5882/92	097-B-219-ZZZ
14	1	Cable Connector	207-F-014-ZJK
15*	1	O-ring Buna-N Viton Kalrez	375-B-003-SUA 375-B-003-QTA 375-B-003-TTA
17*	1	O-ring Buna-N Viton Teflon	375-B-010-SUA 375-B-010-QTA 375-B-010-QMA
18	1	Cover	442-B-088-EAD
19*	1	Gasket	375-E-109-TDA
23	2	O-ring Viton Buna-N Teflon	375-B-902-QTA 375-B-902-SUA 375-B-902-QMA

Table 5-1

\* Recommended Spare Parts

Flomega, Liquid MFC's/MFM's

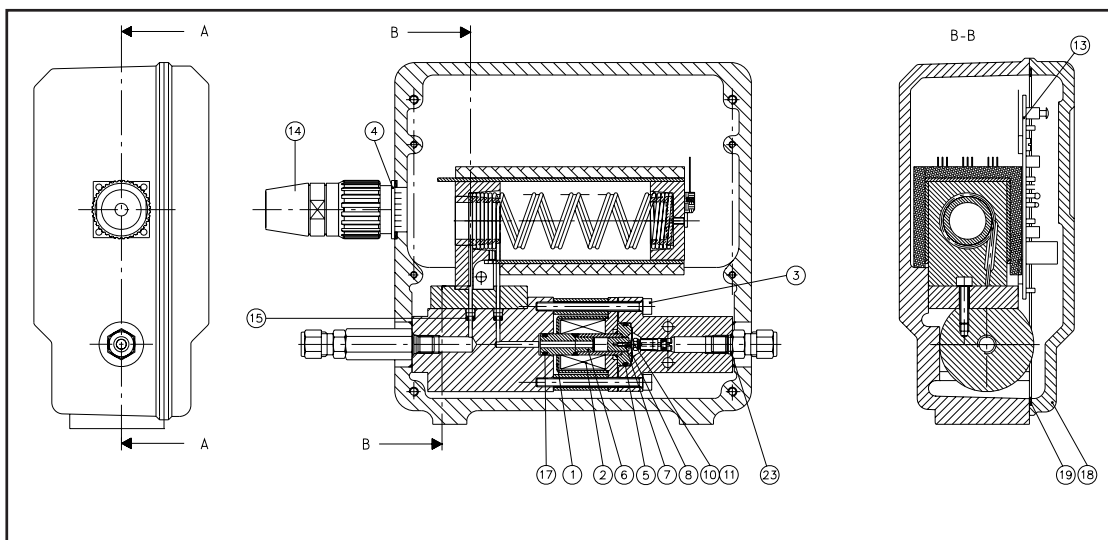


Figure 5-1 Flomega spare parts

**5-2 Service Tools**

- Slotted head screwdriver
- Tweezer
- Allen head key wrench
- Syringe with silicon
- Torque wrench (3.5 N.m.)

# Installation and Operation Manual

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# Section 6 Modelist

## Flomega, Liquid MFC's/MFM's

<b>FLOMEGA</b>	
<b>5881/91 - 5882/92</b>	
<b>BASE MODEL NUMBER</b>	<b>DESCRIPTION</b>
5881/D	MASS FLOW CONTROLLER (MAX. 100 GRAMS/HOUR WATER EQUIVALENT)
5891/D	MASS FLOW METER (MAX. 100 GRAMS/HOUR)
5882/D	MASS FLOW CONTROLLER (MAX. 1000 GRAMS/HOUR WATER EQUIVALENT)
5892/D	MASS FLOW METER (MAX. 1000 GRAMS/HOUR)
<b>MATERIALS OF CONSTRUCTION</b>	
1A	ST.ST./VITON
1B	ST.ST./BUNA
1C	ST.ST./PTFE (STAKED KALREZ VALVE SEAT AND SENSOR O-RINGS) P>14 BAR
1D	ST.ST./PTFE (MOULDED KALREZ VALVE SEAT AND SENSOR O-RINGS) P<14 BAR
1E	ST.ST./KALREZ (MOULDED KALREZ VALVE SEAT) P<14 BAR
1F	ST.ST./KALREZ (STAKED KALREZ VALVE SEAT) P>14 BAR
9Z	SPECIFY
<b>RATINGS</b>	
1	100 BAR
2	14 BAR
3	400 BAR
9	SPECIFY
<b>INPUT/OUTPUT SIGNALS</b>	
A	4-20 mA
B	0-20 mA
C	0-5 Vdc
Z	SPECIFY
<b>MECHANICAL CONNECTIONS</b>	
1	5/16" - 24 UNF THREADS
2	1/16" - TUBE COMPRESSION FITTINGS (ONLY 5881/5891) (MAX. 100 BAR)
3	1/8" - TUBE COMPRESSION FITTINGS (MAX. 400 BAR)
4	1/4" - TUBE COMPRESSION FITTINGS (MAX. 400 BAR)
5	1/4" - NPT(F) (MAX. 400 BAR)
6	1/4" - VCO FITTINGS FOR SANITARY SENSOR ONLY (MAX. 400 BAR)
7	1/4" VCR (MAX. 100 BAR)
9	SPECIFY
<b>INTERCONNECTION CABLE</b>	
0	NONE
A	WEATHERPROOF MATING CONNECTOR
B	3 m. INTERCONNECTION CABLE **
C	6 m. INTERCONNECTION CABLE ** ** THIS CABLE IS PROVIDED WITH A MATING 15-PINS D-TYPE CONNECTOR FOR CONNECTION WITH THE READ-OUT ELECTRONICS, 19" RACK 0152/0154 MODELS.
Z	SPECIFY
<b>OPTIONS</b>	
0	NONE (=WITH "BROOKS" LABELS)
4	SANITARY SENSOR PROVIDED WITH 1/4" VCO FITTINGS * * SEE NOTES
<b>EX-PROOF</b>	
0	NONE
D	ATEX ZONE I (EEx d IIB T4 ... T6)
F	ATEX ZONE II (EEx nA II T4)
<b>POWER SUPPLY INPUT</b>	
0	+15 Vdc
1	+24 Vdc
<b>5891/D1A 1A 3A 00 1 = TYPICAL MODEL NUMBER</b>	
<b>ACCESSORIES &amp; OPTIONS:</b>	
* INTERCONNECTION CABLE, ADD PER METER	

**Notes:**

1. FLOMEGA SANITARY SENSOR WITHSTANDS STERILIZATION CONDITIONS I.E. MAX. 130°C, MAX. 30 MINUTES WITHOUT POWER SUPPLY CONNECTED TO THE FLOMEGA.

2. FOR READ OUT AND CONTROL ELECTRONICS, PLEASE REFER TO THE MODELS 0152/0154.

## Flomega, Liquid MFC's/MFM's

**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 80% dækning.

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

Skærmen skal forbindes, i begge ender, til stikkets metalhus eller PG-forskrningen 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 80% ækning.

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 80 %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 80 %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 80% 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 80% shielding to comply with CE certification.

The shielding should be connected to an earth terminal.

### 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 80%.

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 80% 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 80 %.

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 80% pour satisfaire à la réglementation CE.

Tous les blindages doivent être reliés à la terre.

## Flomega, Liquid MFC's/MFM's

## 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 80%.

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 80% per soddisfare la certificazione CE.

Lo schermo deve essere collegato ad un terminale di terra.

### 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 80%.

"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 80% 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, 80% 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, 80% skjerming som kobles til elektrisk jord på riktig pinne i pluggen, for å møte CE sertifiseringskrav.

### Flomega, Liquid MFC's/MFM's

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#### 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 80%.

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 80% 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.

DUTCH

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## BELANGRIJKE VEILIGHEIDSINSTRUCTIES!

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Deze appendix bevat belangrijke veiligheidsinstructies voor het gebruik van de Thermal 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 gebruiks-handleiding.
2. **WAARSCHUWING:** Gebruik dit instrument niet buiten de in de gebruiks-handleiding 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 uzelf, vòòr het in gebruik nemen, dat het instrument volgens de geldende voorschriften is ingebouwd in de leiding en aangesloten op het (eventuele) spanningsnetwerk.
4. **IN GEBRUIK 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, electriciteitsgevaar of onjuist functioneren.

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.

### 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 välttäisiin paineiskuulta. (b) Tarkista mahdolliset vuodot mittarin prosessiliittimien 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.

## Flomega, Liquid MFC's/MFM's

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**

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 operasjonstrykk.
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 prosesstrykket 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.

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**

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 utilizzare 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) PRES-SURE 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.

## Flomega, Liquid MFC's/MFM's

(1) **TYPE EXAMINATION CERTIFICATE**(2) **Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC**

- (3) Type Examination Certificate Number: **KEMA 99ATEX3626** Issue Number: 3
- (4) Equipment: **Mass Flow Controller Flomega Model 588.J.....A...**  
**Mass Flow Meter Flomega Model 589.J.....A...**
- (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. 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 no. 2113693-15.
- (9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
- EN 60079-15 : 2003**                      **EN 50281-1-1 : 1998 + 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 Type Examination Certificate relates only to the design, examination and tests of the specified equipment and not to the manufacturing process and supply of this equipment.
- (12) The marking of the equipment shall include the following:



**II 3 G EEx nA II T4 and**  
**II 3 D IP65 T75 °C**

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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Experience you can trust.



(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 03ATEX2036 Issue Number: 2

(4) Equipment: Mass Flow Controller Flomega Types 5881/D.....D., 5882/D.....D., 5891/D.....D., 5892/D.....D.

(5) Manufacturer: ~~Emerson Process Management~~, Brooks Instrument BV

(6) Address: Neonstraat 3, 6718 WX Ede, The Netherlands

(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 2095482-16

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

EN 50014 : 1997 + A1 + A2

EN 50018 : 2000 + A1

EN 50281-1-1 : 1998 + 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 EEx d IIB T6 ... T4  
II 2 D T 100 °C

This certificate is issued on dd 11 October 2006 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.

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Certification Manager

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Flomega, Liquid MFC's/MFM's

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 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 dedicated flow experts 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 our flow products is certified by our local Weights and Measures Authorities 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 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.

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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:

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Due to Brooks Instrument's commitment to continuous improvement of our products, all specifications are subject to change without notice.

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Kalrez DuPont Dow Elastomers
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