

Brooks® 4800 Series

4850 Mass Flow Controller

4860 Mass Flow Meter



*Model 4850/4860
with Compression Fittings*



*Model 4850/4860 with
RS485 Module*



*Model 4850/4860 with
Profibus Module*



*Model 4850/4860 with
Local Operator Interface*

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 25mm 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.

- Section 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 fall under fluid group 1.
- Meters larger than 25mm or 1" (inch) are in compliance with category I, II, III of PED.
- Meters of 25mm or 1" (inch) or smaller are Sound Engineering Practice (SEP).

ESD (Electrostatic Discharge)

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 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 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, SMOS, 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.

Installation and Operation Manual

X -TMF-4800-MFC-eng

Part Number: 541B072AAG

June, 2009

Brooks® 4800 Series

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

Yours sincerely,

Brooks Instrument

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1-1 How to Use This Manual

This instruction manual is intended to provide the user with all the information necessary to install, operate and maintain the Brooks 4800 Series Products.

This manual is organized into the following sections:

Section 1.	Introduction
Section 2.	Installation
Section 3.	Operation
Section 4.	Maintenance and Troubleshooting
Section A.	Appendices
Back Cover	Warranty, Local Sales/Service Contact Information

1-2 Description

The Brooks 4800 Series Products are mass flow measurement devices designed for accurately measuring (MFMs) and rapidly controlling (MFCs) flows of gases. This instruction manual is intended to provide the user with all the information necessary to install, operate and maintain the Brooks Model 4850 mass flow controller(MFC) and 4860 mass flow meter (MFM).

1-3 Specifications for Meter/Controller

! WARNING

Do not operate this instrument in excess of the specifications listed in this manual. Failure to heed this warning can result in serious personal injury and/or damage to the equipment.

PERFORMANCE CHARACTERISTICS:*

Flow Range

FS ranges from 50 mln/min – 40 lln/min (50 sccm – 40 slpm)
(N₂ equivalent, at reference 0°C)

Control Range

2 – 100%

Accuracy Options

±3.0% of FS

±1.0% of FS

Repeatability

±0.15% of FS

Response Time

Flow signal: <0.3 sec

Flow control: Settling time <0.75 sec from 0 to 100% F.S. (typical <0.5 sec for all steps)

Temperature Coefficient

±0.1% FS/°C (N₂)

RATINGS:

Gases

Air, N₂, O₂, Ar, He, H₂, CO₂, CO, N₂O, CH₄, C₃H₆, C₃H₈
(for other non-corrosive gases and mixed gases, contact factory)

⚠ WARNING

Do not operate on gases other than those listed in this specification. Failure to heed this warning can result in serious personal injury and/or damage to the equipment.

Operating Limits

Pressure: 0 – 10 barg

Temperature: 0 - 50°C at 10 barg

Operating Humidity: 5 to 95% R.H. (ambient)

Pressure Differential Range (Controllers)

Minimum: 0.35 bar (5 psid)

Maximum: 10 bar (150 psid)

Leak Integrity

Inboard to Outboard: 1×10^{-9} atm scc/sec Helium max.

ELECTRICAL CHARACTERISTICS:**Electrical Connections**

Analog/RS-485: 15-pin D-sub connector

(pin-out schematic shown in Table 1-1)

Profibus Option: 9-pin female D-sub connector for signal and an M5 connector for power.

All pins shall be protected against ESD (Electro Static Discharge)

All input pins are protected from electrical stress, to at least withstand 28 Vdc (power supply)

Power Supply Voltage**

+15 Vdc \pm 10% or

+24 Vdc \pm 10%

Device only uses single sided power supply

Inrush current: <1 A

Power supply is protected from reverse polarity

Power Requirements

Device	15 Vdc		24 Vdc	
	Typical (mA)	Max. (mA)	Typical (mA)	Max (mA)
4860 (without valve)	30	60	30	60
4850 (with valve)	130	160	150	200

Analog Input/Output

Command/Setpoint Input

Voltage: 0-5 Vdc, minimum impedance 990 Ω

Current: 4-20 mA, maximum impedance 220 Ω

Flow Signal Output

Voltage: 0-5 Vdc, minimum load 2000 Ω

Current: 4-20 mA, maximum load 550 Ω

* All performance characteristics are at calibration conditions.

** For high flows or low differential pressures (using orifices 0.049" (1.25mm) or 0.079" (2.0mm)) only 24 Vdc power is available.

Digital Input/Output

RS-232 (standard)
 RS-485 (S-Protocol)
 Profibus (both DPVO and DPVI are supported)

Valve Override Signal

Valve controller: Input Open
 Valve closed: <0.3 V; Valve open: >4.8 V

Calibration Curve Selection

Select one of nine gases via the LOI or RS232. Optional software tool for ease of RS232 connection is available on the Brooks Instrument website. Contact your Brooks representative or the factory for details and cable options.

PHYSICAL:

⚠ CAUTION
It is the user's responsibility to select and approve all materials of construction. Careful attention to metallurgy, engineered materials and elastomeric materials is critical to safe operation.

Materials of Construction

Wetted parts: stainless steel, fluoroelastomers, silicon-based sensor

Outline Dimensions

Refer to Figures 1-1 through 1-5.

Process Connections

Inlet/Outlet threads: 9/16" – 18 UNF threads
 Refer to Figure 1-1 and 1-2 for available process connections.

Local Operator Interface (LOI)

For description and specifications refer to Section 1-4 of this manual. Refer to Brooks document X-SE-4800-LOI-eng for complete instructions.

Profibus and RS-485 (S-Protocol) Digital Interface Modules

For description and specifications refer to Sections 1-5 and 1-6 of this manual. Refer to Brooks Documents X-DPT-Profibus-4800-eng and/or X-DPT-S-Protocol-4800-eng for complete instructions.

Table 1-1 15-Pin D-Sub Connector Pin-out

PIN #	4800 Series	5850TR	S – SERIES (58xxS)
1	SETPOINT SIGNAL COMMON	ANALOG COMMON	SETPOINT SIGNAL COMMON
2	FLOW VOLTAGE OUTPUT	FLOW VOLTAGE OUTPUT	FLOW VOLTAGE OUTPUT
3	NOT USED	NOT USED	ALARM OUTPUT
4	FLOW CURRENT OUTPUT	FLOW CURRENT OUTPUT	FLOW CURRENT OUTPUT
5	POSITIVE SUPPLY VOLTAGE	POSITIVE SUPPLY VOLTAGE	POSITIVE SUPPLY VOLTAGE
6	NOT USED	NOT USED	NEGATIVE SUPPLY VOLTAGE
7	SETPOINT CURRENT INPUT	SETPOINT CURRENT INPUT	SETPOINT CURRENT INPUT
8	SETPOINT VOLTAGE INPUT	SETPOINT VOLTAGE INPUT	SETPOINT VOLTAGE INPUT
9	POWER SUPPLY COMMON	POWER SUPPLY COMMON	POWER SUPPLY COMMON
10	FLOW SIGNAL COMMON	FLOW SIGNAL COMMON	FLOW SIGNAL COMMON
11	NOT USED	5V REFERENCE	5V REFERENCE
12	VALVE OVERRIDE INPUT	VALVE OVERRIDE INPUT	VALVE OVERRIDE INPUT
13	NOT USED	NOT USED	NOT USED
14	RXD	NOT USED	RXD / A-
15	TXD	NOT USED	TXD / A+

5850TR and S-Series pin-outs shown for reference only.

Brooks® 4800 Series

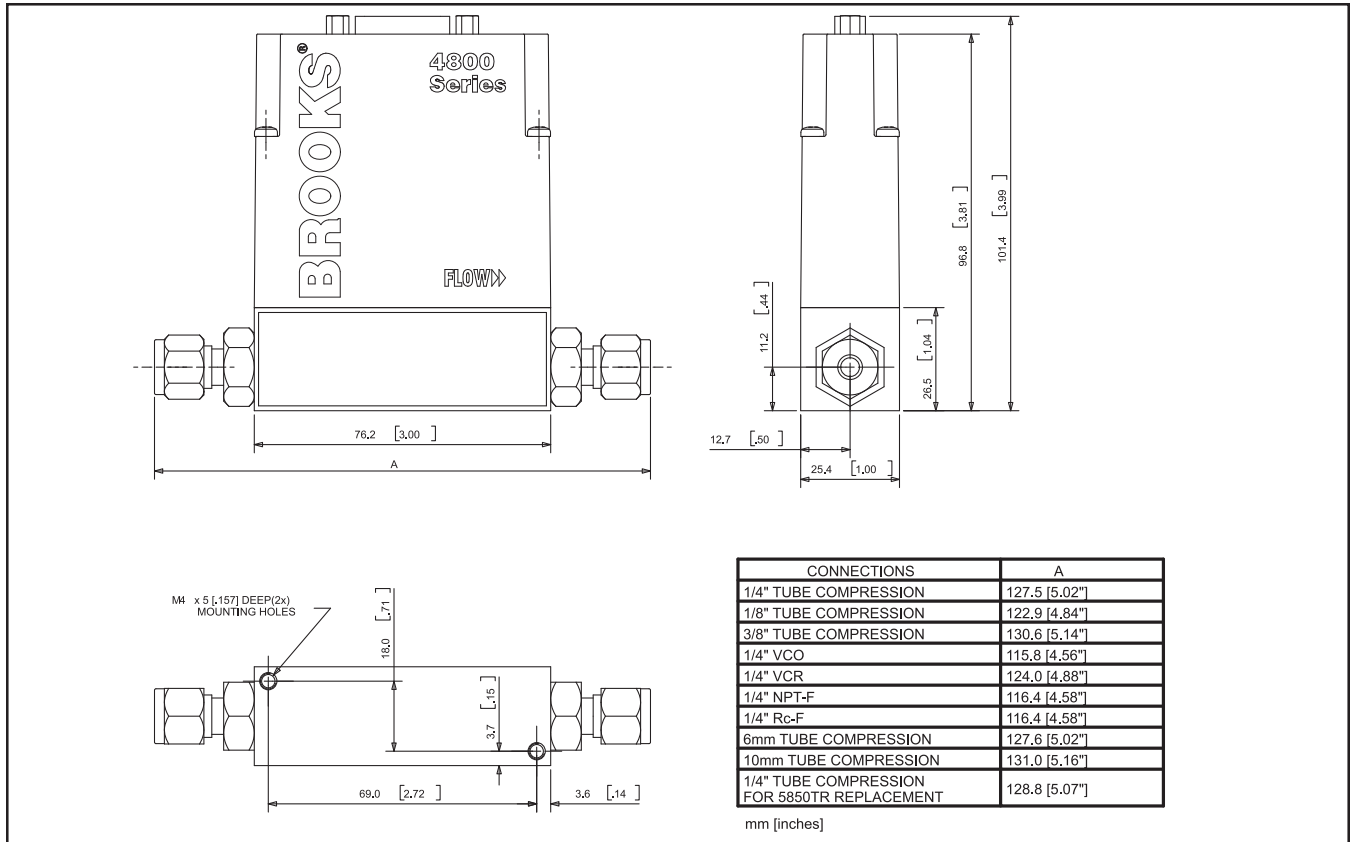


Figure 1-1 Dimensions for Model 4850/4860 with Standard Process Connections

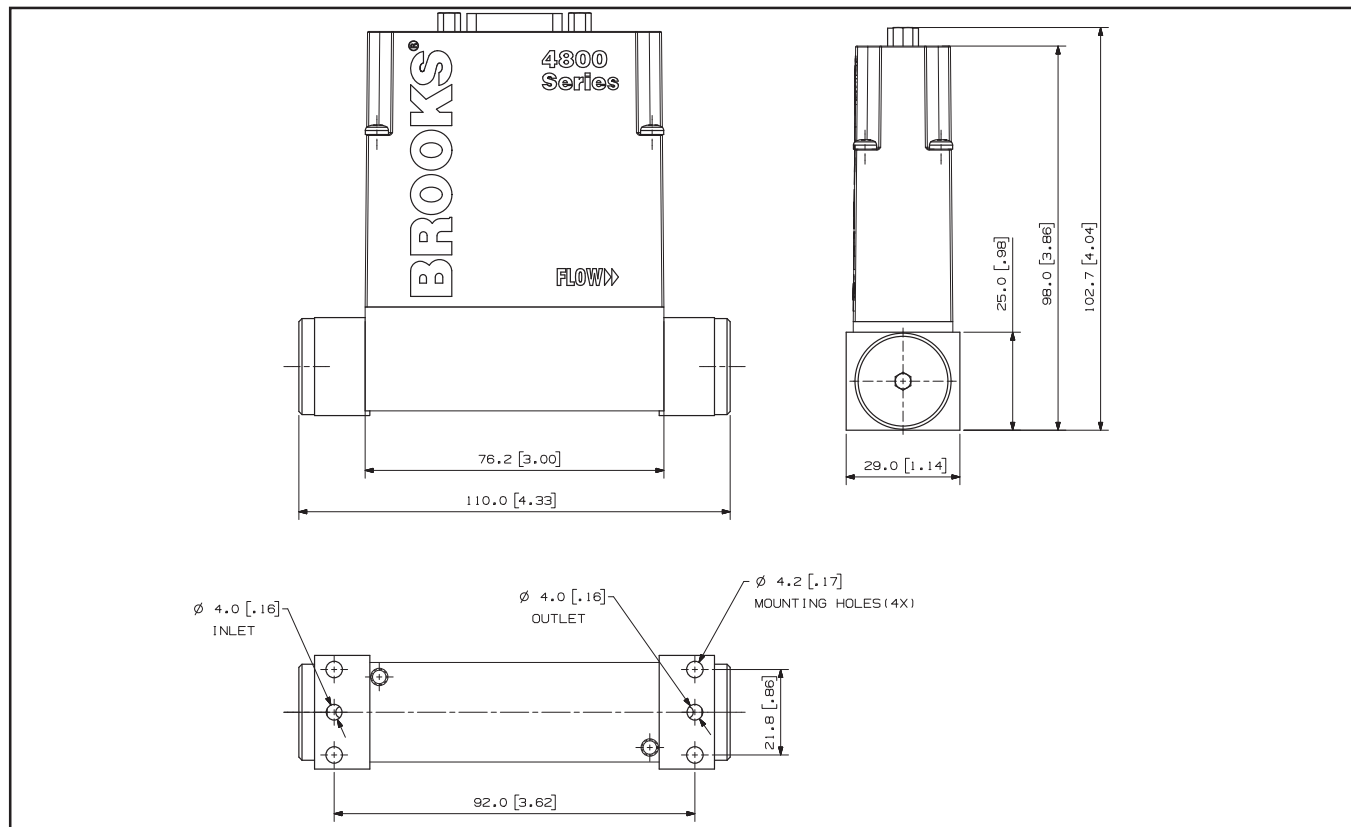


Figure 1-2 Dimensions for Model 4850/4860 with Downport Connections

Certifications:

These certifications cover the 4800 Series mass flow devices as well as the local operator interface (LOI), Profibus digital interface module and the RS-485 digital interface module.

EMC Directive 2004/108/EC:

Per EN 61326:2006

Hazardous Location Classification

The modules shall be installed in a suitable enclosure providing a degree of protection of at least IP54 according to EN 60529, taking into account the environmental conditions under which the equipment will be used.

Provisions shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 40 %.

Enclosure: Type 1/IP40

Ambient Temperature: $0^{\circ}\text{C} \geq \text{Tamb} \leq 50^{\circ}\text{C}$ ($32^{\circ}\text{F} \geq \text{Tamb} \leq 122^{\circ}\text{F}$)

United States and Canada



Non-Incendive,
Class 1, Division 2
Groups A, B, C & D; T4

Per UL 1604 and CSA-C22.2 no. 213-m87

Class 1, Zone 2, AEx nA II T4

Per ANSI/ISA 12.12.02 - 2003 and ANSI/UL 60079-15

Ex nA II T4

Per CSA - E79 - 15

Europe - ATEX Directive 94/9/EC

KEMA 06ATEX0251 per EN 60079-15: 2003



II 3 G EEx nA II T4



Pressure Equipment Directive (97/23/EC):

Sound Engineering practice.

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1-4 Specifications for Local Operator Interface (LOI)

For detailed instructions refer to the Brooks document X-SE-4800-LOI-eng.

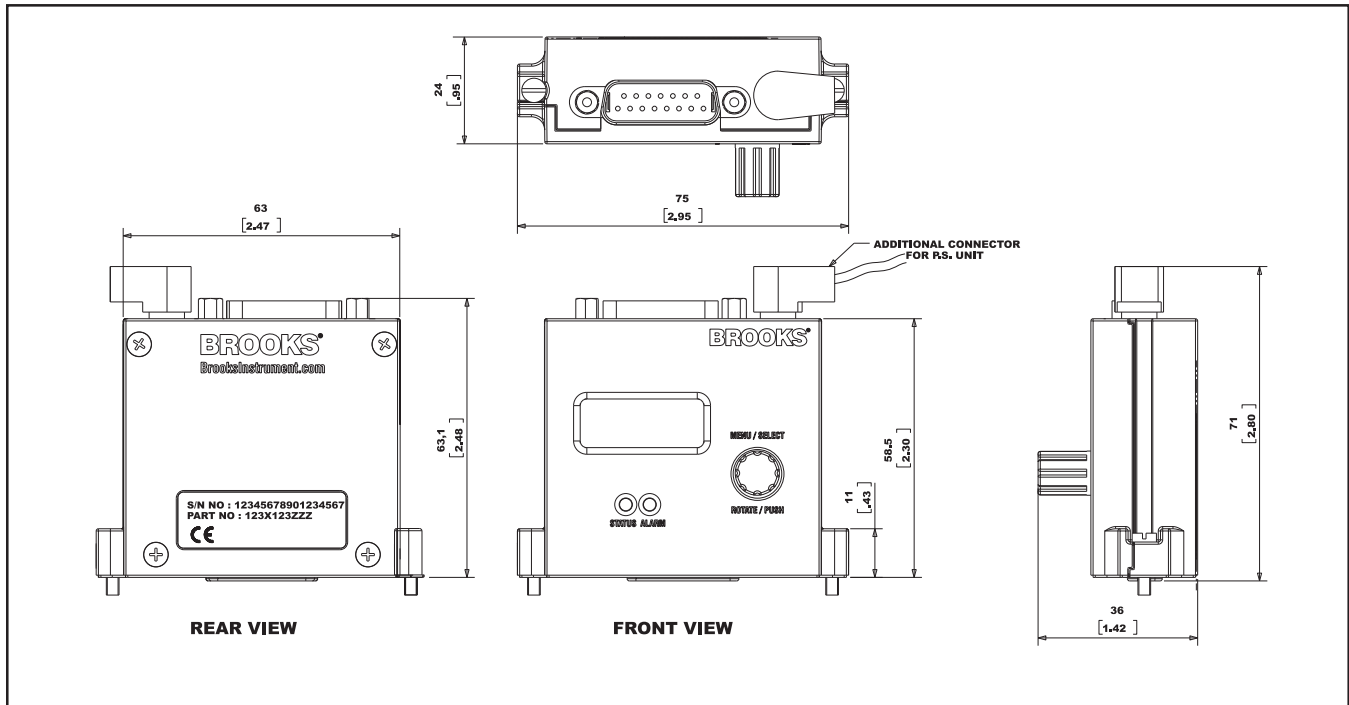


Figure 1-3 Dimensions for the 4800 Series Local Operator Interface (LOI)

Local Operator Interface (LOI):

Display

Effective display area: 28 mm wide, 11 mm high

Display contents: 8 x 2 dot matrix display

ELECTRICAL CHARACTERISTICS:

Electrical Connections

Two (2) 15-pin D-sub connectors, one for connection to the 4800 Series device and one for the remote connection

Power Supply Voltage

The LOI optionally includes a wall mount power adaptor with a 3.5-mm DC-plug. The adaptor works with input voltages of AC 90-240 V/47-63Hz. The adaptor supports European, U.K., Australia and U.S. wall plugs. Power can also be supplied by a remote connection via the D-connector.

Materials of Construction

Enclosure: ABS plastic with CU-Ni plating.

1-5 Specifications for Profibus Digital Interface Module

For detailed instructions refer to the Brooks document X-DPT-Profibus-4800-eng.

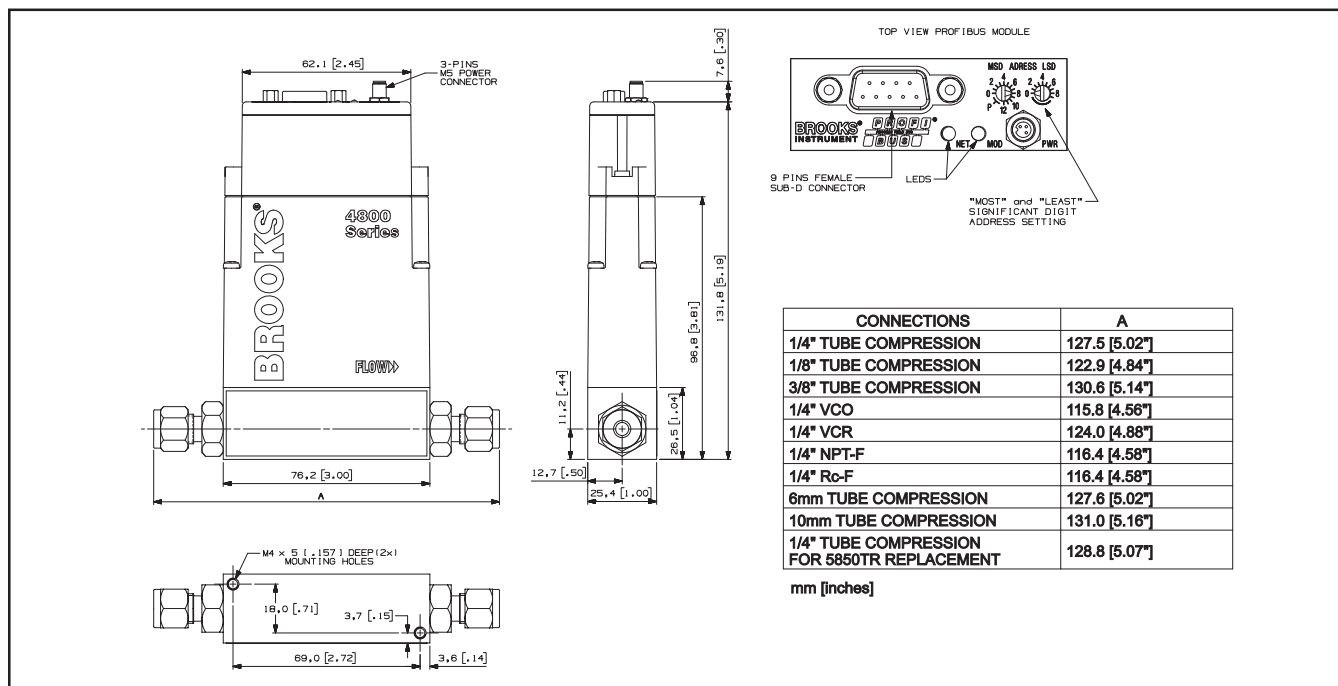


Figure 1-4 Dimensions for the 4800 Series with Profibus Digital Interface Module

Electrical Connections

- One(1) 15-Pin D-sub connector for connection to the 4800 Series device.
- One(1) 9-Pin D-sub connector for remote connection.
- One(1) 3-Pin M5 power connector.

Table 1-2 9-Pin D-Sub Connector Pin-Out

Pin	Signal
1	Shield
2	Not used
3	RXD / TXD - B - red wire
4	Not used
5	Common
6	+5 Vdc
7	Not used
8	RXD / TXD - A - green wire
9	Not used

Table 1-3 M5 Power Connector Pin-Out

Pin	Signal
1	+24 Vdc
2	Not used
3	Common
4	Not used

Materials of Construction

Enclosure: ABS plastic with CU-Ni plating.

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1-6 Specifications for RS-485 (SProtocol) Digital Interface Module

For detailed instructions refer to the Brooks document X-DPT-S-Protocol-4800-eng.

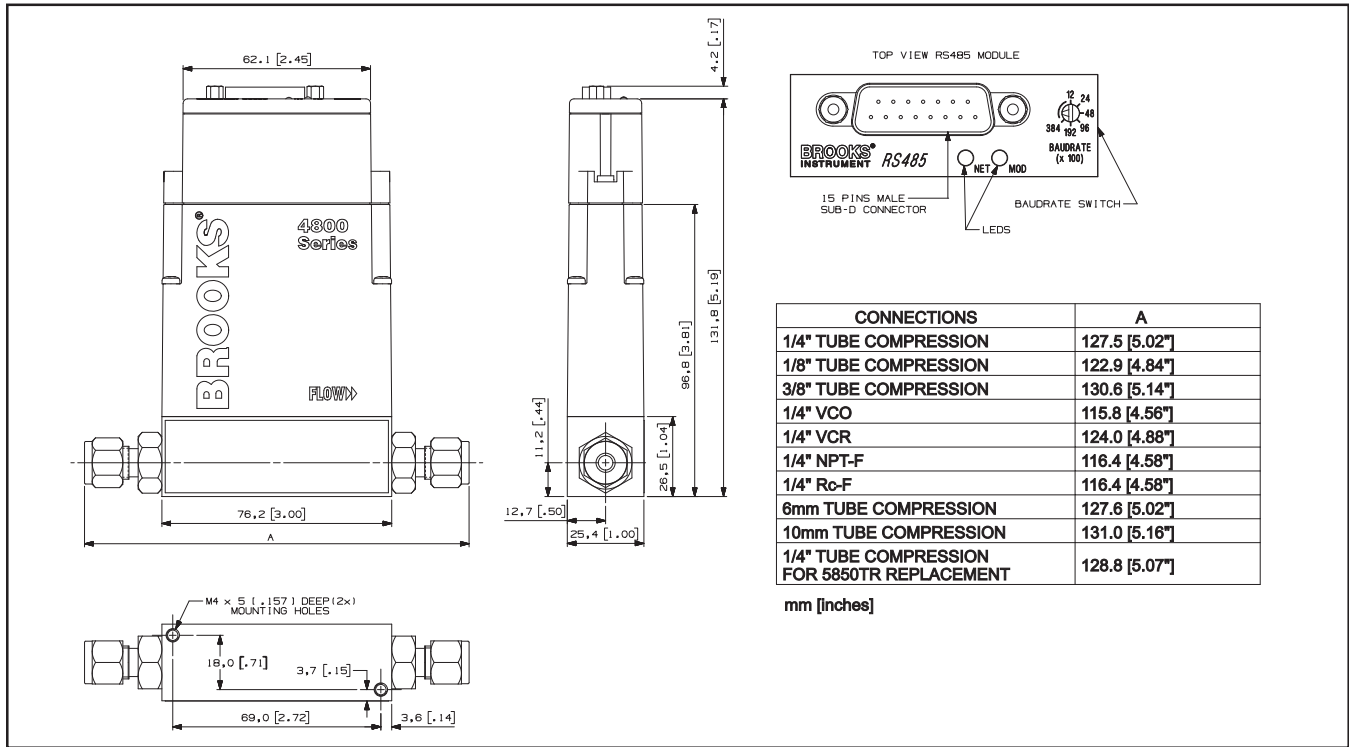


Figure 1-5 Dimensions for the 4800 Series with RS-485 (S-Protocol) Digital Interface Module

Electrical Connections

Two (2) 15-pin D-sub connectors, one for connection to the 4800 Series device and one for the remote connection

Table 1-4 15-Pin D-Sub Connector Pin-Out for RS-485 Module

PIN#	FUNCTION AT REMOTE CONNECTOR	FUNCTION AT CONNECTOR TO 4800
1	SETPOINT SIGNAL COMMON	SETPOINT SIGNAL COMMON
2	FLOW VOLTAGE OUTPUT	FLOW VOLTAGE OUTPUT
3	NOT USED	NOT USED
4	FLOW CURRENT OUTPUT	FLOW CURRENT OUTPUT
5	POSITIVE SUPPLY VOLTAGE	POSITIVE SUPPLY VOLTAGE
6	NOT USED	NOT USED
7	SETPOINT CURRENT INPUT	SETPOINT CURRENT INPUT
8	SETPOINT VOLTAGE INPUT	SETPOINT VOLTAGE INPUT
9	POWER SUPPLY COMMON	POWER SUPPLY COMMON
10	FLOW SIGNAL COMMON	FLOW SIGNAL COMMON
11	NOT USED	NOT USED
12	VALVE OVERRIDE INPUT	VALVE OVERRIDE INPUT
13	NOT USED	NOT USED
14	RXD /A-	RXD /A-
15	TXD /A+	N.C.

Materials of Construction

Enclosure: ABS plastic with CU-Ni plating.

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 (0) 318 549 300
Fax +31 (0) 318 549 309
E-mail: BrooksEu@BrooksInstrument.com

Brooks Instrument

1-4-4 Kitasuna Koto-Ku
Tokyo, 136-0073 Japan
Tel +81 (0) 3 5633 7100
Fax +81 (0) 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 conditions:

- a. Within the original shipping container.
- b. Stored in a sheltered area, preferably a warm, dry, heated warehouse.
- c. Ambient temperature 21°C (70°F) nominal, 32°C (90°F) maximum, 7°C (45°F) minimum.
- d. Relative humidity 45% nominal, 60% maximum, 25% minimum.

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2-4 Return Shipment

Prior to returning any instrument to the factory, contact your nearest Brooks location for a Return Materials Authorization Number (RMA#). This can be obtained from 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
www.BrooksInstrument.com

Brooks Instrument

Neonstraat 3
6718 WX Ede, Netherlands
P.O. Box 428
6710 BK Ede, Netherlands
Tel +31 (0) 318 549 300
Fax +31 (0) 318 549 309
E-mail: BrooksEu@BrooksInstrument.com

Brooks Instrument

1-4-4 Kitasuna Koto-Ku
Tokyo, 136-0073 Japan
Tel +81 (0) 3 5633 7100
Fax +81 (0) 3 5633 7101
Email: 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 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 Mechanical Connections

If mechanical connections were ordered from Brooks Instrument, an integrated filter of 40 microns is already installed in the upstream fitting. This is to prevent the possibility of any foreign material entering the flow sensor or control valve (for MFC).

If the 4800 Series product was ordered without fittings, there is no internal filter in the device. In this case, it is recommended that an in-line filter rated to at least 40 microns be installed upstream from the device.

⚠ CAUTION

When installing the Mass Flow Controller or Meter, 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.

Recommended installation procedures:

- a. The Brooks MFC or MFM should be located in a clean, dry atmosphere relatively free from shock and vibration.
- b. Install in such a manner that permits easy removal if the instrument requires servicing.

⚠ CAUTION

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 instrument purged with clean, dry N₂ before use.

- c. The Brooks MFC or MFM can be installed in any position. However, mounting in orientations other than the original factory calibration (see calibration data sheet supplied with the instrument) can result in a $\pm 0.2\%$ maximum full scale shift after re-zeroing.
- d. When installing a mass flow controller or meter with full scale flow rates of 10 l/min (10 slpm) or greater, be aware that sharp, abrupt angles in the system piping directly upstream of the controller may cause a small shift in accuracy. If possible, have at least ten pipe diameters of straight tubing upstream of the mass flow controller or meter. This is not required for meters with an integrated inlet filter.

⚠ CAUTION

Since the 4800 Series instrument control valve may not provide positive shut-off, a separate shut-off valve may be installed downstream 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 shut-off valve which will result in a surge upon acuation of the shut-off valve. This surge can be reduced in magnitude either by locating the controller and the shut-off valve close together or by moving the shut-off valve upstream of the controller.

2-8 Electrical Connections**⚠ CAUTION**

Plug in electrical connectors at the device prior to applying power.

⚠ NOTICE

The Brooks (electric/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 is required when selecting the signal cable to be used with CE marked equipment.

Brooks supplies high quality cables which meet the specifications for CE certification. If you provide your own signal cable you should use a cable which is completely screened with a 100% shield. D-Connectors should also be shielded using a metal shield. If applicable, metal cable glands must be used to provide cable screen clamping. The cable screen should be connected to the metal shell or gland and shielded at both ends over 360 degrees. The shield should be terminated to an earth ground. See Appendix A for CE Certification of Mass Flow Equipment.

The setpoint signal is supplied as a 0 to 5 Vdc or 4 to 20 mA analog signal. All signals are supplied via the 15-pin D-Connector. There is also an optional local operator interface (LOI). When the LOI is used the setpoint signal is provided by the LOI.

The Brooks electrical interface is designed to facilitate low-loss, quiet signal connections. Separate returns (commons) are supplied for the analog setpoint, analog flow signal, and the power supply. These commons are electrically connected together on the PC board.

Analog I/O Versions

- Signal Common
- Signal Output (Voltage or Current)
- Nominal +15 Vdc or +24 Vdc
- Setpoint Input (Voltage or Current)
- Setpoint Common
- Supply Common
- Chassis Ground (via unit body)

Refer to Table 1-1 for pin connections

Local Operator Interface (LOI) Versions

For description and specifications for the local operator interface refer to Section 1-4 in this manual and the Brooks document X-SE-4800-LOI-eng

2-9 Operation Check Procedure

CAUTION

Any sudden change in system pressure may cause mechanical damage to elastomer materials. Damage can occur when there is a rapid expansion of fluid that has permeated elastomer materials. The user must take the necessary precautions to avoid such conditions.

- Mount the MFC/MFM in its final orientation.
- Apply power to the MFC/MFM and allow approximately 15 minutes for the instrument to completely warm up and stabilize its temperature.
- Do NOT supply gas to the MFC/MFM. Ensure that the differential pressure across the MFC/MFM is zero.
- Apply a setpoint (MFC only) of:
 - 0.000 Vdc \pm 10 mV (0 - 5 Vdc setpoint)
 - 4.000 mA \pm 32 μ A (4 - 20 mA setpoint)
- If the zero exceeds one of these limits, follow the re-zeroing procedure in Section 3. The analog output signal should be:
 - 0.000 Vdc \pm 10 mV (0 - 5 Vdc output)
 - 4.000 mA \pm 32 μ A (4 - 20 mA output)
- Turn on the gas supply. A positive flow signal may be present due to slight valve leak-thru (MFC only).
- Supply a setpoint signal between:
 - 0 to 5 Vdc (0 - 5 Vdc setpoint)
 - 4 to 20 mA (4 - 20 mA setpoint)

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- h. Check the analog output signal. The output signal should match the setpoint signal in accordance with the accuracy specifications provided in Section 1 of this document.
- i. If flow output signal does not match the setpoint, and pressure settings are correct, this could indicate a problem in the MFC. A secondary issue could be the gas type. When checking with a surrogate gas, ensure that there is enough pressure to the MFC in order to flow the correct amount of the surrogate gas.

3-1 Operating Procedure

After the MFC/MFM has been properly installed in the process, it is ready for operation. When initiating flow, slowly open the valve to avoid a flow surge. Bypass is a help in bringing the flow on smoothly. Avoid starting a pump to supply the flowmeter without the use of a valve upstream of the flowmeter.

⚠ WARNING

Before operating the flowmeter, ensure all fluid connections have been properly tightened and, where applicable, all electrical connections have been properly terminated.

3-2 Theory of Operation

As with traditional Thermal Mass Flow devices, the 4800 Series flow measurement system consists of two components: the flow restrictor and the sensor. The purpose of the 4800 Series flow restrictor is to create backpressure and force flow through the thermal sensor. Figure 3-1 is a cross sectional cut-away view depicting gas flow around the thermal sensor.

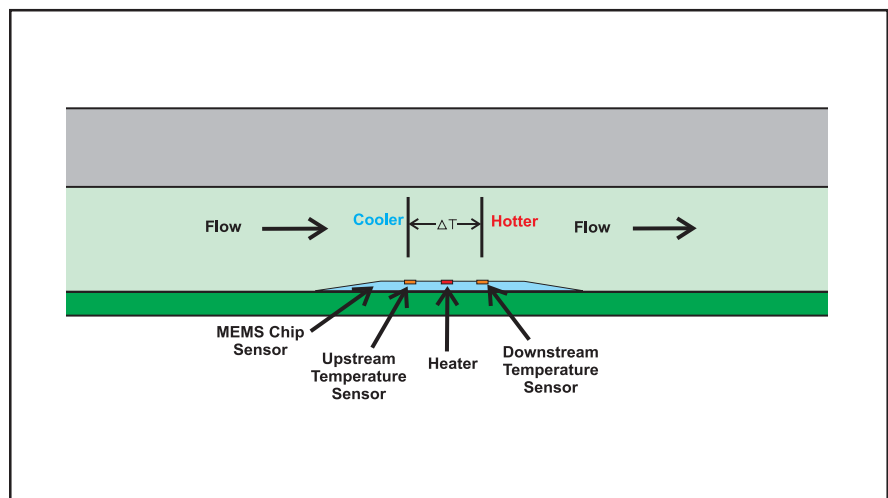


Figure 3-1 Gas Flow Across the MEMS Sensor

The 4800 Series sensor is a Micro Electro Mechanical Systems (MEMS) based thermal sensor. As shown in Figure 3-1, the gas flows directly across the MEMS sensor, resulting in extremely fast response times. As with traditional thermal mass flow sensors, upstream and downstream temperature sensors are centered around a heating element. As gas flows across the upstream temperature sensor towards the heater and the downstream temperature sensor, it cools the upstream temperature sensor and heats the downstream temperature sensor. This causes the

Brooks® 4800 Series

temperature difference measured by the two temperature sensors to increase with increasing flow. The temperature difference is then converted into a flow signal based on the factory calibration.

There is one major difference between a traditional thermal mass flow sensor and the MEMS based sensor. A traditional thermal mass flow sensor makes use of a Cp transfer function. However, as depicted in Figure 3-1, only a portion of the flow field is heated by the MEMS sensor. Therefore, a Cp transfer function cannot be used in the MEMS sensor to adjust the flow rate for a gas other than what the device was calibrated on when it left the factory.

3-3 Features

Note: All Brooks Series mass flow meters are configured at the factory according to customer order and do not require adjustment. Not all features are available on all instruments.

The Brooks 4800 Series device is a full-featured digital MFC. The device performs much like a traditional analog MFC, but with improved step response and valve control. The analog interface matches that of Brooks' popular analog MFCs so it can be retrofitted into tools using analog MFCs.

3-4 Analog I/O Mode of Operation

The following paragraphs describe the basic features of the Brooks 4800 Series instruments.

Functional Description

The analog interface may include any of the following I/O options as specified by the user:

- 0 - 5 Vdc setpoint, 0 - 5 Vdc flow output
- 4 - 20 mA setpoint, 4 - 20 mA flow output

Also included is the Valve Override input pin. All analog signals available are on the 15 pin D-Connector. (See Fig. 1-1 for connections.)

Before operating the MFC/MFM, apply power and warm-up the instrument for approximately 15 minutes. After warm-up, apply gas pressure then proceed by following the instructions in the following sections.

Setpoint Signal Input (MFC Only)

This input allows the user to establish the MFC setpoint. Several input types are available as follows:

Setpoint Signal Type	Full Scale	Zero Signal
0 to 5 Vdc	5 Vdc	0 V
4 to 20 mA	20 mA	4 mA

Flow Signal Output

This output is used to indicate the flow signal. Several flow signal types are available:

Flow Signal Type	Full Scale	Zero Signal	Maximum Signal
0 to 5 Vdc	5 Vdc	0 V	5.5 Vdc = 110%
4 to 20 mA	20 mA	4 mA	21.6 mA = 110%

Valve Override (MFC Only)

Connector Pin 12 on the 15-pin D-Connector allows the valve to be forced to its most closed state or its most open state, regardless of setpoint. If this input is not electrically connected, the MFC will operate according to the current values of the other MFC inputs. If this input is held at 0 Vdc (<0.3 V), the valve will be forced to its most closed state. If this input is held at +5 Vdc (>4.8 V), the valve will be forced to its open state.

The valve override function can also be accessed via RS232. An optional software tool for ease of RS232 connection is available on the Brooks Instrument website. See Section 3, PC-based Support Tools for instructions on how to access this software.

Zeroing the MFC (Self-Zero)

It may be desirable to re-zero the flow sensor if it is operated at its temperature extremes or if it is positioned in an attitude other than that specified on the customer order.

Note: Before zeroing the instrument, zero pressure differential MUST be established across the device. If there is pressure across the instrument during the zero process, any detected flow through the sensor will be misinterpreted as the zero flow reading. This will result in calibration inaccuracy during normal operation.

The re-zero function can be accessed via RS232. An optional software tool for ease of RS232 connection is available on the Brooks Instrument website. See Section 3, PC-based Support Tools for instructions on how to access this software.

Brooks® 4800 Series

3-5 PC-Based Support Tools

A basic PC-based service tool for re-zeroing, gas selection, valve override and monitoring of the 4800 Series instruments is available on the Brooks Instrument website. To access this software, type in the following link into a web browser: www.BrooksInstrument.com/4800software.html. Then follow the instructions on the screen. Contact your Brooks representative or the factory for cable options.

3-6 Local Operator Interface (LOI)

For description and specifications for the 4800 Series local operator interface (LOI) refer to Section 1-4 in this manual and the Brooks document X-SE-4800-LOI-eng.

3-7 RS-485 (S-Protocol) and Profibus Digital Interface Modules


For description and specifications refer to Sections 1-5 and 1-6 in this manual. Refer to the Brooks documents X-DPT-Profibus-4800-eng and/or X-DPT-S-Protocol-4800-eng for complete instructions.

4-1 Overview

No routine maintenance is required on the 4800 Series devices. However, if an in-line filter is used, the filtering elements should be periodically replaced.

This section provides the following information:

- Troubleshooting
- Frequently asked questions
- System checks

	<p>⚠ WARNING</p> <p>METER/CONTROLLER SEAL COMPATIBILITY</p>
<p>Products in this manual may contain metal or elastomeric seals, gaskets, O-rings or valve seats. It is the "user's" responsibility to select materials that are compatible with their process and process conditions. Using materials that are not compatible with the process or process conditions could result in the Meter or Controller leaking process fluid outside the pressure boundary of the device, resulting in personnel injury or death.</p> <p>It is recommended that the user check the Meter or Controller on a regular schedule to ensure that it is leak free as both metal and elastomeric seals, gaskets, O-rings and valve seats may change with age, exposure to process fluid, temperature, and /or pressure.</p>	

<p>⚠ WARNING</p> <p>If it becomes necessary to remove the instrument from the system, power to the device must be disconnected.</p>
--

<p>⚠ WARNING</p> <p>If it becomes necessary to remove the flowmeter from the system after exposure to toxic, pyrophoric, flammable or corrosive gas, purge the flowmeter thoroughly 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 flowmeter upon exposure to air, may also occur.</p>

<p>⚠ CAUTION</p> <p>It is important that this device only be serviced by properly trained and qualified personnel.</p>

Brooks® 4800 Series

⚠ 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.

4-2 Troubleshooting

This section contains suggestions to help diagnose simple MFC/MFM related problems in the gas distribution system and answers commonly asked questions.

4-2-1 Troubleshooting Table

Table 4-1 Troubleshooting

Trouble	Possible Cause	Check/Corrective Action
Output stays at zero (regardless of Setpoint) and there is flow through the meter/controller	Incorrect calibration coefficients Defective electronic board Defective restrictor seal	Contact Brooks Instrument
Output signal stays at approx. 5.5 Vdc or 22 mA (regardless of Setpoint) and there is flow through the meter/controller	Valve leaks or is stuck open (applicable to MFC)	Contact Brooks Instrument
	Maximum voltage applied to the valve override input (applicable to MFC)	Check the valve override terminal (pin 12)
	Defective electronic board	Contact Brooks Instrument
Output signal follows Setpoint at higher Setpoints but will not go below 2%	Control valve leaks or is stuck open	Contact Brooks Instrument
Output signal follows Setpoint at lower Setpoints, but does not reach full scale OR Flow cannot be achieved regardless of Setpoint (applicable to MFC)	Insufficient inlet pressure or pressure drop	Adjust pressures, inspect in-line filters and clean/replace as necessary
	Clogged inlet filter	Replace inlet fitting
	Partially clogged valve (applicable to MFC)	Contact Brooks Instrument
	Valve out of adjustment (applicable to MFC)	Contact Brooks Instrument
	Valve guide spring failure (applicable to MFC)	Contact Brooks Instrument
	Defective electronic board	Contact Brooks Instrument
Instrument grossly out of calibration. Flow is lower than desired.	Partially clogged restrictor	Contact Brooks Instrument
Controller oscillates (applicable to MFC)	Pressure drop or inlet pressure deviates from calibrated values	Adjust pressures to original specifications
	PID out of adjustment	Adjust PID settings or contact Brooks Instrument
	Valve out of adjustment	Contact Brooks Instrument
	Unstable inlet pressure	Check external pressure regulator
	Defective electronic board	Contact Brooks Instrument

4-2-2 Frequently Asked Questions

Q: Where is the zero button?

A: There is no zero button on the 4800 Series devices. The re-zeroing function is handled via a PC-based software tool. Refer to "Zeroing the MFC (Self-Zero)" in Section 3-4 for instructions on how to obtain the software.

Q: Doesn't the use of CO₂ necessitate the use of Buna O-rings?

A: Not in this case. A material compatibility analysis performed in cooperation with the Advanced Design Center in Columbus, Ohio, U.S.A., concluded that there are no significant issues with the use of Viton® fluoroelastomers with CO₂ under 10 bar (150 psig). Most other Brooks mass flow controllers are capable of operating at much higher pressures. This is why Brooks typically specifies Buna for CO₂.

Q: Does the 4800 device have a low flow setpoint cut off?

A: Yes. The low flow setpoint cut off prevents the valve from opening whenever there is a setpoint below 1% FS. During this time the valve drive will be zero to achieve complete valve closure.

Q: Does the 4800 device have a low flow signal cutoff?

A: Yes. When the internal flow signal is less than 1% FS, the device will report a flow output signal of zero.

4-2-3 System Checks

The Brooks 4800 Series Flowmeters and Controllers are generally used as a component in gas handling systems, which can be complex in nature. It can therefore be very difficult to isolate a malfunction in the system. An inaccurately diagnosed malfunction can cause many hours of unnecessary downtime. If possible, perform the following system checks before removing a suspect Mass Flow Meter or Controller for bench troubleshooting or return to the factory (especially if the system is new):

1. Verify a low resistance common connection and that the correct power supply voltage and signals are present of the connector of the device.
2. Verify that the process gas connections have been made correctly, and that they have been tested for leaks.

3. If the Mass Flow Controller appears to be functioning but cannot achieve Setpoint, verify that there is sufficient inlet pressure and pressure drop at the controller to provide the required flow.

⚠ WARNING

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

Bench Troubleshooting

1. Establish a proper connection between the Brooks 4800 Series Mass Flow Meter or Controller (using Figure 4-1 as a reference). Switch on the power and allow the instrument to warm-up for 15 minutes. In case of a Controller model, adjust the Setpoint to zero. Do not connect the device to a gas source yet. Observe the output signal and, if necessary, perform the zero adjustment procedure (see Section 3 for information about the zeroing function). If the output signal does not zero properly, please contact Brooks Instrument.
2. Connect the instrument to a source of the same gas used for its original calibration. Regulate the Setpoint to 100% flow and adjust the inlet and outlet pressures to calibration conditions. Verify that the output signal reaches its full scale value and stabilizes at that value. Vary the command voltage over the 1 to 100% range and verify that the output signal follows the Setpoint. If possible, connect a flow measurement device to monitor the actual flow behavior and verify the accuracy of the mass flow instrument. If the mass instrument performs as described above, then it is functioning correctly and the problem may lie elsewhere.

Table 4-1 lists possible malfunctions which may be encountered during bench troubleshooting.

For Controller Models Only: Apply +5 Vdc to the +15 Vdc valve override pin (pin 12) and verify that the output exceeds 100%. Connect the valve override pin to earth and verify that the output signal falls below 2%.

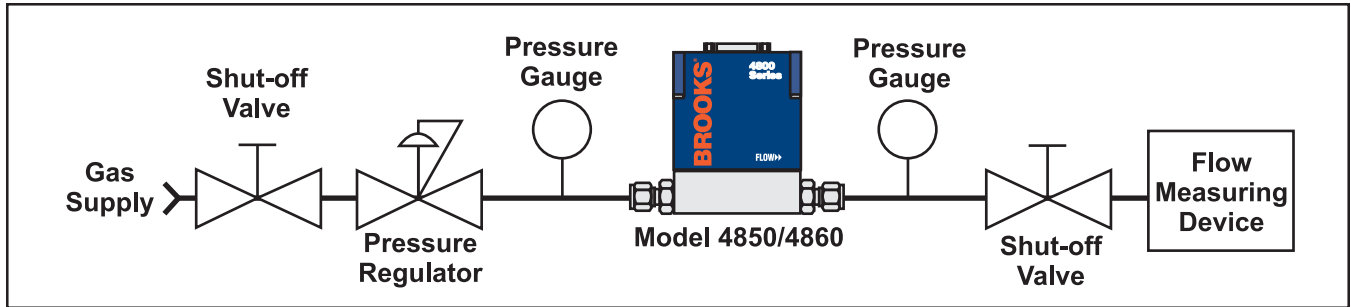


Figure 4-1 Bench Troubleshooting Circuit

4-2-4 Calibration Procedure

The calibration of Brooks 4800 Series Mass Flow devices is not described in this manual. Such calibration requires accurate and traceable calibration equipment. To re-calibrate a device contact the Brooks factory.

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Dansk

Brooks Instrument
407 West Vine St.
Hatfield, PA 19440
U.S.A.

Emne : **Tillæg til instruktions manual.**
Reference : **CE mærkning af Masse Flow udstyr**
Dato : **Januar-1996.**

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-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 100% dækning.

Skærmen bør være forbundet til jord.

Forbindelse af stikket; venligst referer til vedlagte instruktions manual.

Med venlig hilsen,

Deutsch

Brooks Instrument
407 West Vine St.
Hatfield, PA 19440
U.S.A.

Subject : **Nachtrag zur Bedienungsanleitung.**
Referenz : **CE Zertifizierung für Massedurchflußgeräte**
Datum : **Januar-1996.**

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.

Die Belegung der Anschlußpins können Sie dem beigelegten Bedienungshandbuch entnehmen.

Brooks® 4800 Series

English

Brooks Instrument
407 West Vine St.
Hatfield, PA 19440
U.S.A.

Subject : **Addendum to the Instruction Manual.**
Reference : **CE certification of Mass Flow Equipment**
Date : **January-1996.**

The Brooks (electric/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, cable glands and connectors:

Brooks 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 a 100% shield.

“D” or “Circular” type connectors used should be shielded with a metal shield. If applicable, metal cable glands must be used providing cable screen clamping.

The cable screen should be connected to the metal shell or gland and shielded at both ends over 360 Degrees.

The shield should be terminated to a earth ground.

Card Edge Connectors are standard non-metallic. The cables used must be screened with 100% shield to comply with CE certification.

The shield should be terminated to a earth ground.

For pin configuration : Please refer to the enclosed Instruction Manual.

Español

Brooks Instrument
407 West Vine St.
Hatfield, PA 19440
U.S.A.

Asunto : **Addendum al Manual de Instrucciones.**
Referencia : **Certificación CE de los Equipos de Caudal Másico**
Fecha : **Enero-1996.**

Los equipos de Brooks (eléctricos/electrónicos) en relación con la marca CE han pasado satisfactoriamente las pruebas referentes a las regulaciones de Compatibilidad Electro magnética (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 deberán 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 deberán ser protegidos con un apantallamiento del 100% para cumplir con la certificación CE.

La pantalla deberá conectarse a tierra.

Para ver la configuración de los pines: Por favor, consultar Manual de Instrucciones adjunto.

Français

Brooks Instrument
407 West Vine St.
Hatfield, PA 19440
U.S.A.

Sujet : Annexe au Manuel d'Instructions.
Référence : Certification CE des Débitmètres Massiques à Effet Thermique.
Date : Janvier 1996.

Messieurs,

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.

Se référer au manuel d'instruction pour le raccordement des contacts.

Greek

Brooks Instrument
407 West Vine St.
Hatfield, PA 19440
U.S.A.

Θέμα : Προσθήκη στο Εγχειρίδιο Οδηγιών.
Σχετικά : Πιστοποίηση CE των Οργάνων Μέτρησης Παροχής Μάζας.
Ημερομηνία : Ιανουάριος - 1996

Κυρίες και Κύριοι,

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).

Οποσδήποτε 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 100%.

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

Το πλέγμα του καλωδίου πρέπει να συνδέεται στο μεταλλικό περιβλήμα ή στον στυπιοθλιπτή 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 100% για να υπακούουν στην πιστοποίηση CE.

Η θωράκιση πρέπει να καταλήγει σε κάποιο ακροδέκτη γείωσης.

Για την διάταξη των ακροδεκτών: Παρακαλούμε αναφερθείτε στο εσώκλειστο Εγχειρίδιο Οδηγιών.

Brooks® 4800 Series

Italiano

Brooks Instrument
407 West Vine St.
Hatfield, PA 19440
U.S.A.

Oggetto : **Addendum al manuale di istruzioni.**
Riferimento : **Certificazione CE dei misuratori termici di portata in massa**
Data : **Gennaio 1996.**

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.

Per il corretto cablaggio dei terminali occorre fare riferimento agli schemi del manuale di istruzioni dello strumento.

Nederlands

Brooks Instrument
407 West Vine St.
Hatfield, PA 19440
U.S.A.

Onderwerp : **Addendum voor Instructie Handboek**
Referentie: **CE certificering voor Mass Flow Meters & Controllers**
Datum : **Januari 1996**

Dames en heren,

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.

Voor pin-configuraties a.u.b. verwijzen wij naar het bijgesloten instructie handboek.

Hoogachtend,

Norsk

Brooks Instrument
407 West Vine St.
Hatfield, PA 19440
U.S.A.

Vedrørende : Vedlegg til håndbok
Referanse : CE sertifisering av utstyr for massestrømsmåling og regulering
Dato : Januar 1996

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 jordat innfesting av skjermen. Skjermen i kablen 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.
- For tilkobling av medleverte plugger, vennligst se håndboken som hører til utstyret.
Vennlig hilsen

Português

Brooks Instrument
407 West Vine St.
Hatfield, PA 19440
U.S.A.

Assunto : Adenda ao Manual de Instruções
Referência : Certificação CE do Equipamento de Fluxo de Massa
Data : Janeiro de 1996.

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.

Relativamente à configuração da cavilha, queiram consultar o Manual de Instruções.

Brooks® 4800 Series

Suomi

Brooks Instrument
407 West Vine St.
Hatfield, PA 19440
U.S.A.

Asia : Lisäys Käyttöohjeisiin
Viite : Massamäärämittareiden CE sertifiointi
Päivämäärä : Tammikuu 1996

Brooksin CE merkillä varustetut sähköiset laitteet ovat läpäissyt EMC testit (direktiivi 89/336/EEC).

Erityistä huomiota on kuitenkin kiinnitettävä signaalikaapelin valintaan.

Signaalikaapelin, kaapelin läpiviennin ja liittimen laatu

Brooks toimittaa korkealaatuisia kaapeleita, jotka täyttävät CE sertifikaatin vaatimukset. Hankkiessaan signaalikaapelin itse, olisi hankittava 100%:sti suojattu kaapeli.

“D” tai “Circular” tyyppisen liittimen tulisi olla varustettu metallisuojaalla. Mikäli mahdollista, tulisi käyttää metallisia kaapeliliittimiä kiinnitettäessä suojaa.

Kaapelin suoja tulisi olla liitetty metallisuojaan tai liittimeen molemmissa päissä 360°:n matkalta.

Suojan tulisi olla maadoitettu.

“Card Edge Connector”it ovat standarditoimituksina ei-metallisia. Kaapeleiden täytyy olla 100%:sesti suojattuja jotta ne olisivat CE sertifikaatin mukaisia.

Suoja on oltava maadoitettu.

Nastojen liittäminen; katso liitteenä oleva manuaali.

Ystävällisin terveisin,

Svensk

Brooks Instrument
407 West Vine St.
Hatfield, PA 19440
U.S.A.

Subject : Addendum to the Instruction Manual
Reference : CE certification of Mass Flow Equipment
Date : January 1996

Brooks (elektriska / elektronik) utrustning, som är CE-märkt, har testats och godkänts enligt gällande regler för elektromagnetisk kompatibilitet (EMC direktiv 89/336/EEC).

Speciell hänsyn måste emellertid tas vid val av signalkabel som ska användas tillsammans med CE-märkt utrustning.

Kvalitet på signalkabel och anslutningskontakter:

Brooks levererar som standard, kablar av hög kvalitet som motsvarar de krav som ställs för CE-godkännande.

Om man använder en annan signalkabel ska kabeln i sin helhet vara skärmad till 100%.

“D” eller “runda” typer av anslutningskontakter ska vara skärmade. Kabelgenomföringar ska vara av metall alternativt med metalliserad skärmning.

Kabelns skärm ska, i bada ändrar, vara ansluten till kontakternas metallkåpor eller genomföringar med 360 graders skärmning.

Skärmen ska avslutas med en jordförbindelse.

Kortkontakter är som standard ej metalliserade, kablar som används måste vara 100% skarmade för att överensstämma med CE-certifieringen.

Skärmen ska avslutas med en jordförbindelse.

För elektrisk anslutning till kontaktstiften hänvisas till medföljande instruktionsmanual.

Installation and Operation Manual

X-TMF-4800-MFC-eng

Part Number: 541B072AAG

June, 2009

Brooks® 4800 Series

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Brooks® Series 4800

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 and is certified by our local Weights and Measures Authorities and traceable to the relevant International Standards.

Visit 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 (0) 318 549 290
Asia +81 (0) 3 5633 7100

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

TRADEMARKS

- Brooks Brooks Instrument, LLC
Profibus PROFIBUS International
VCO Cajon Co.
VCR Cajon Co.



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
www.BrooksInstrument.com

Brooks Instrument
Neonstraat 3
6718 WX Ede, Netherlands
T +31 (0) 318 549 300
F +31 (0) 318 549 309
E-Mail BrooksEu@BrooksInstrument.com

Brooks Instrument
1-4-4 Kitasuna Koto-Ku
Tokyo, 136-0073 Japan
T +81 (0) 3 5633 7100
F +81 (0) 3 5633 7101
E-Mail BrooksAs@BrooksInstrument.com

