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Installation and Operation Manual
X-TMF-5800S-MFC-eng
PN 541-C-051-AAG
November, 2008

Brooks® Smart-Series Digital Mass Flow Meters and Controllers



Brooks Smart Family

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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.

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Dear Customer,

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

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

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

Yours sincerely,
Brooks Instrument

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Section 1 Introduction

1.1 Purpose

This instruction manual is intended to provide the user with all the information necessary to install, operate and maintain the Brooks Smart series Mass Flow meters 5860S, 5861S, 5863S and controllers 5850S, 5851S, 5853S.

1.2 How to use this Manual

It is recommended to read this manual before installing, operating or repairing these Mass Flow Instruments. This manual is organised into nine sections:

Section 1.	***Introduction***
Section 2.	***Installation***
Section 3.	***Operation***
Section 4.	***Maintenance***
Section 5.	***Specification***
Appendices	***A - E***

This instruction manual is intended to provide the user with all the information necessary to install, operate and maintain the Brooks Smart Mass Flow Meters and Controllers.
This series of microprocessor-based field instruments is designed to meet the rigorous demands of various industries/applications. The use of digital technology ensures that the Brooks Smart series provides maximum accuracy and signal integrity. In addition it allows easy interfacing to any peripheral equipment either through analogue or digital communication.
This manual covers Smart Mass Flow Meter models: 5860S, 5861S, 5863S and 5864S and Smart Mass Flow Controller models: 5850S, 5851S and 5853S.

Digital communication
The presence of a computer icon to the left of the text (as shown here) denotes that the accompanying text refers to digital communication.

Smart Control
Digital communication (either via RS-232 or RS-485) allows to connect our Brooks **model 0160 Smart Control.** This interface program can be used to operate and (re)configure Smart Mass Flow Products (calibration parameters are not accessible).

Smart DDE
If you require bi-directional links between your Windows-based applications software and Brooks Smart Mass Flow Products,our **model 0162 Smart DDE** (a powerful, user-friendly Dynamic Data Exchange software program) offers all the features you need.

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Smart Service
If you are equipped with primary standard Volumeter calibration equipment or (secondary standard) Brooks Smart Mass Flow Meters, you can use the **model 0163 Brooks Smart Service** program for (re)configuration, diagnostics, calibration and/or verification.The HART protocol-based commands are listed in a separate.

Communication manual
Document: Brooks part number: **541-C-053-AAA**.

1.3 Description

Models 5860S, 5861S, 5863S and 5864S Brooks Smart Mass Flow Meters are primarily used to provide accurate measurements of gas flows. The heart of these systems is the thermal mass flow sensor, which produces an electrical output signal as a function of flow rate.
In addition, models 5850S, 5851S and 5853S Brooks Smart Mass Flow Controllers control gas flows. The flow ranges per model are listed in Table 1-1.

Table 1-1: Flow ranges per model

Mass Flow Controller Model	Mass Flow Meter Model	Flow Ranges		
		min. f.s.	max. f.s.	Unit *
5850 S	5860 S	0.003	30	ln/min.
5851 S	5861 S	20	100	ln/min.
5853 S	5863 S	100	2500	ln/min.

*refers to 'normal' conditions, i.e. 0°C, 1013.25mbar.

The Brooks Smart Mass Flow Meter is a stand-alone instrument with microprocessor-based electronics on board. The MF-series Smart Mass Flow Controller has an integrally-mounted control-valve module with which stable gas flows can be achieved.

The *standard features* listed below apply to all models.
The supplied inlet adapter has a built-in, upstream *inlet filter* for flow straightening. Besides reducing the effects of changes in upstream piping, this also protects the measuring element from occasional debris in the flow stream. In addition, it eliminates the need for extra (expensive) nlet filtering.

- *Flow signal* adjustable via software:
  0-5 Vdc or 1-5 Vdc or
  0-20 mA or 4-20 mA.

Note: Digital output (communication) is simultaneously available with analogue output.

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- *Output damping* provides a constant scale reading under fluctuating flow rate conditions. Standard factory setting: 0.5 sec.

- *Output limiting* prevents possible damage to delicate acquisition devices by limiting the output to 0-5.25 Vdc on the voltage signal output and 0-21 mA on the current output.

An alarm (TTL open collector) signal output is available to the user. If the instrument's specifications are exceeded, either by process conditions or by the device itself, an alarm signal can be generated.

MASS FLOW CONTROLLER

Standard features include:

- Each Smart Mass Flow Controller is provided with an *adaptive valve-control algorithm* for the maintenance of stable flow control, even under varying process conditions (pressure/temperature).

- *Setpoint* source selectable: Setpoint signal source for the Mass Flow Controller can be selected from:
  - communication (RS232 / RS485) or
  - 0-5 Vdc or
  - 1-5 Vdc or
  - 0-20 mA or
  - 4-20 mA.

- *Fast Response Control* provides rapid gas settling times with minimal over/ undershoot. Standard factory setting: 1 sec. for 5850/51 and meter models, 3 sec. for 5853.

- *Valve Override (VOR, availabe at pin 12)* allows the user to fully open or close the control valve independently of the set-point.

- *Low flow cut-off* prevents the valve from opening whenever the Set point is less than 1% of full scale.

Digital communication features

Digital communication, via RS485 or RS232, provides access to all of the Smart TMF's functions, including:
Accurate mass flow measurement and Set point regulation (controller only), as a percentage of full scale and in selectable engineering units

- Flow totalizer
- Ambient temperature
- Operational settings
  - ⇒ Calibration (storage of up to 10 calibration curves)
  - ⇒ Controller settings (controller only)
    - PID settings

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- selectable soft start
- adaptive valve control

⇒ Adaptive filtering for signal flow component

- Alarms

⇒ Self-diagnostic

- EEPROM error
- database error
- analogue output error

⇒ Out-of-range indications

- for analogue set points higher than 100% (controller only)
- flow
- valve (controller only)
- analogue output

⇒ Environmental errors

- no gas flow detected
- power supply outside specification range
- ambient temperature outside specified range
- high and low flow alarms

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Section 2: Installation

2.1 General

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

NOTE: **Operating procedure:** do not operate this instrument outside the specification range listed in section 5.
Before bringing the unit into operation, make sure that all gas connections have been correctly tightened and that all the necessary electrical connections have been made.

2.2 Receipt of Equipment

When the equipment 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
Email: BrooksAm@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
Email:BrooksEu@BrooksInstrument.com

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

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

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2.3 Recommended Storage Practice

If equipment supplied by Brooks Instrument is to be placed in intermediate or long-term storage, it is recommended that it be:

a. Stored within the original shipping container.
b. Stored in a sheltered area, under the following conditions:
   1) Optimum ambient temperature 21°C (70 °F), maximum 32 °C (90 °F), minimum 7 °C (45 °F),.
   2) Optimum relative humidity 45% (maximum 60%/minimum 25%).
c. Subjected to a visual inspection upon removal from storage, to verify that the condition of the equipment is 'as received'. If the equipment has been in storage for more than ten months or if it has not been stored under the recommended conditions, all pressure containing seals should be replaced. In addition, the device should be subjected to a pneumatic pressure test in accordance with the applicable vessel codes.

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
Email: BrooksAm@BrooksInstrument.com
http://www.brooksinstrument.com

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

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

Any instrument returned to Brooks requires completion of Form RPR003-1, Brooks Instrument Decontamination Statement, as well as, a Material Safety Data Sheet (MSDS) for the fluid(s) used in the instrument. This is required before any Brooks Personnel can begin processing. Copies of the form can be obtained from any Brooks Instrument location listed above.

2.5 Gas Connections

All models are fitted with the following inlet and outlet connectors as standard: NPT(F), tube compression fittings, VCR, VCO, DIN or ANSI flanges. Prior to installation, make certain that all piping is clean and free of obstruction. Install the piping in a manner that permits easy access to the instrument, should it need to be removed for cleaning or test-bench troubleshooting.

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2.6 Mechanical Installation

(For dimensional drawings see Appendix B: Dimensional drawings*)*

NOTE: When installing the Mass Flow device, care should be taken to prevent foreign materials from entering the instrument's inlet or outlet. Do not remove the protective end-caps until the actual moment of installation.
When used with reactive gases (some of which may be toxic), contamination or corrosion may occur as a result of plumbing leaks or improper purging. Plumbing should be checked carefully for leaks and the Mass Flow device should be purged (for a significant time) with Nitrogen before and after use on reactive gasses.
Recommended installation procedures:

a. All models should be mounted in places that are relatively free from mechanical shocks and vibration.
b. Leave sufficient room for access to the electrical components.
c. Install in a manner that allows the instrument to be easily removed for cleaning.
d. The mounting position of the Smart Mass Flow Meter or Controller can be either horizontal or vertical, in case process pressures are smaller than 10 bar.
e. For higher process pressures, a horizontal installation is preferred, since these pressures may cause a thermal siphon effect of the output signal at zero flow conditions and degrading specifications.

NOTE: The control valve of the Smart Mass Flow Controller provides precision control and is *not* designed for positive shut off. If positive shut off is required, it is recommended that a separate shut-off valve be installed in-line, downstream from the Smart Mass Flow Controller.

NOTE: If the power supply to the Smart Mass Flow Controller is interrupted, a NORMALLY CLOSED valve will be fully closed, while a NORMALLY OPEN valve will be fully open. The NORMALLY OPEN control valve meets application specific requirements, since it allows nitrogen gas purging if the power supply is interrupted.

2.7 In-Line Filter

An in-line filter is installed, as standard, in the instrument's inlet to prevent any foreign material entering the flow sensor or control valve. *The filtering element should be periodically replaced or ultrasonically cleaned.*
Apply only clean gasses on Mass Flow Meter/Controllers.

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2.8 Electrical Interfacing

The installation of Smart TMF includes a 15-pin Sub-D connector. For details of correct installation, see Table 2-1

Table 2-1: Electrical interfacing. Smart TMF

Pin (TMF side)	Function	Controller	Meter
1.	Setpoint return (-)	*	n.a.
2.	0 (1)-5 Vdc Flow signal output	*	*
3.	(TTL) Open collector alarm output	*	*
4.	0 (4)-20 mA Flow signal output	*	*
5.	+15 Vdc to +28 Vdc Power supply	*	*
6.	-15 Vdc Power supply (if required)	*	*
7.	0 (4)-20 mA Setpoint input (+)	*	n.a.
8.	0 (1)-5 Vdc Setpoint input (+)	*	n.a.
9.	Power supply common	*	*
10.	Flow signal output common	*	*
11.	+5 Vdc ref. output	*	n.a.
12.	Valve override input	*	n.a.
13.	Not connected	*	*
14.	Optional RS232C-RxD or RS485-A-	*	*

Signal Output (pins 2, 4 and 10)
Pin 2 indicates the flow rate, represented by a 0-5 Vdc or 1-5 Vdc signal proportional to the mass flow. Pin 4 indicates the flow rate, represented by either a 0-20 mA or 4-20 mA signal current proportional to the mass flow. Both the current and voltage signals are returned via pin 10 on the D-connector.

Analogue Setpoint Input (pins 7/8 and 1; Controller models only) . The Smart Mass Flow Controller can be used either with a current or voltage Set point. To use the current Set point, connect the Set point signal to pin 7 and the Set point return signal to pin 1 on the terminal (jumper J1 must be in place refer to Figure 2-2). To use the voltage Set point, connect the Set point signal to pin 8 and the Set point return to pin 1 on the D-connector.

5 Vdc reference (pin 11; Controller models only)
A +5 Vdc ref. voltage is available on pin 11. This can be used to set the Setpoint with the aid of an externally located potentiometer (10 turn 2 KOhm suggested)..

NOTE: I/O configuration to be defined at time of ordering. Reconfiguration at customer side can be accomplished using digital communication.

Power Supply
Mass Flow Meter models (pin 5 and 9): The Mass Flow Meter's power supply is connected via pins 5 (+15 to +28 Vdc) and 9 (power supply common) on the D-connector.
Mass Flow Controller models (pin 5, 6 and 9): The Mass Flow Controller's power supply is connected via pin 5 (+15 to +28 Vdc) and 9 (power supply

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common) on the D-connector. If a -15 Vdc power supply is required, pin 6 must be connected and jumper [K2] on the p.c. board must be set the lower position (see Figure 2-2).

This is applicable for model 5851S and/or when a Normally Opened (N.O.) control valve is used.

NOTE: With regard to the power supply connections, the attached cable must be as short as possible to ensure that the minimum required voltage and current is available at the mass flow device.

Cable Shielding Earth
Cable requirements
Compliance with EMC directive 89/336/EEC, requires that the equipment be fitted with fully screened signal cables with at least 80% shielding.The cable shielding should be connected to the PG connector's metal shell, and have 360° shielding at both ends. The shielding should be connected to an earth terminal.
For translations of this instruction, see Appendix D: Translations of installation instructions

Alarm **(pin 3 of 9)**
A (TTL) Open Collector alarm output is available.
Type of used transistor is NPN.

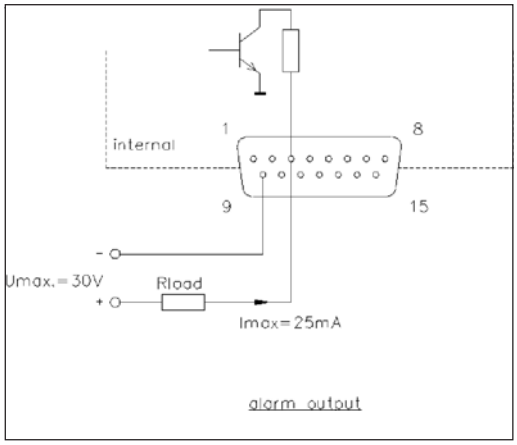


Figure 2-1: Open Collector

Valve override (pin 12; Controller models only)
To *open* or *close* the control valve independently of the Set point signal (e.g. for safety reasons), pin 12 is available to carry a valve override signal. Leave floating (i.e. not connected) to allow for normal control operation.

≥ 5 Vdc	Valve Open (for both NO and NC valves)
≤ 0 Vdc	Valve Closed (for both NO and NC valves)

NOTE: The valve override command on pin 12 takes precedence over the communication-mediated valve override command.

Digital communication (pins 14 and 15)

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pins 14 and 15 are available for connecting the device to the RxD/A$^-$ or TxD/A$^+$ lines for RS-232/RS-485 communications.

NOTE: Either RS-232 or RS-485 should be specified at the time of ordering. See section 2.7 for details of how to configure the p.c. board.

2.9 Digital Communication

NOTE: The printed circuit boards only need to be reconfigured if the hardware settings differ from those specified at the time of ordering.

Brooks Smart Mass Flow Meters and Controllers incorporate two printed circuit boards: one main board containing the processor and a piggyback board. The piggyback board enables the device to communicate with a PC via an RS-232 or RS-485 connection.The piggyback board is installed via the K5, K6 and K7 connectors on the main board (see Figure 2-2).

The p.c. board enclosure must be removed to gain access to the electronics. Disconnect the power to the device and any cables running to the D-connector. Remove the three screws at the base of the electronics enclosure, then lift off the enclosure. The electronics enclosure must be replaced before returning the unit to service.

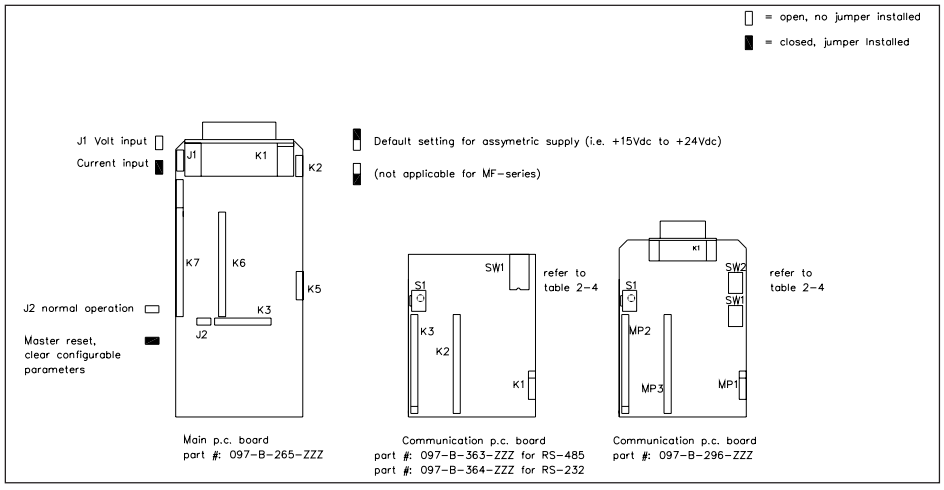


Figure 2-2: p.c. boards with the locations of jumper switches
Note: Switch number 1 is the switch at the bottom

The digital communication piggyback board is used for all communication-related hardware settings. For this purpose, the board is equipped with a dipswitch block (SW1) holding 4 switches. RS-232 Board (097-B-364-ZZZ) or RS-485 Board (097-B-363-ZZZ), and to select the baud rate. Table 2-2 summarises the possible settings.

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Table 2-2: Dipswitch settings

Physical layer selection	Baud rate selection	Dipswitch block SW1			
		Switch #1	Switch #2	Switch #3	Switch #4
RS-232		Off			
RS-485		On			
	1200		Off	Off	Off
	2400		On	Off	Off
	3600		Off	On	Off
	4800		On	On	Off
	7200		Off	Off	On
	9600		On	Off	On
	19200		Off	On	On
	38400		On	On	On

Since Brooks Smart Mass Flow devices are capable of communication immediately after start-up, you should set the correct baud rates prior to power up. Any changes to the baud rate settings or the physical layer selection made during operation will take effect immediately. The communication I/O drivers are directly connected to the D-connector on top of the device.

The RS-232 is essentially a point-to-point connection, i.e. one host-computer and one Smart Mass Flow device. Most IBM-compatible PCs are equipped with one or more RS-232 ports (COM ports) as standard. The RS 232 usage and definitians are very diverse. On the MF Smart Mass Flow devia the TxD signal is the output signal of the devia and the RxD the input signal.The communication terminals can be directly connected to a serial COM-port of any PC. The other part of the terminals can be connected to Brooks model 0152/0154 Microprocessor-based Read-out and Control Electronics. This model provides the power supply for Smart Mass Flow devices, as well as providing local read-out and displaying the analogue output signals. Figure 2-3 shows the interconnection diagram of the RS-232 configuration. The pin assignment on an IBM Compatible PC. This is standard for RS-232.

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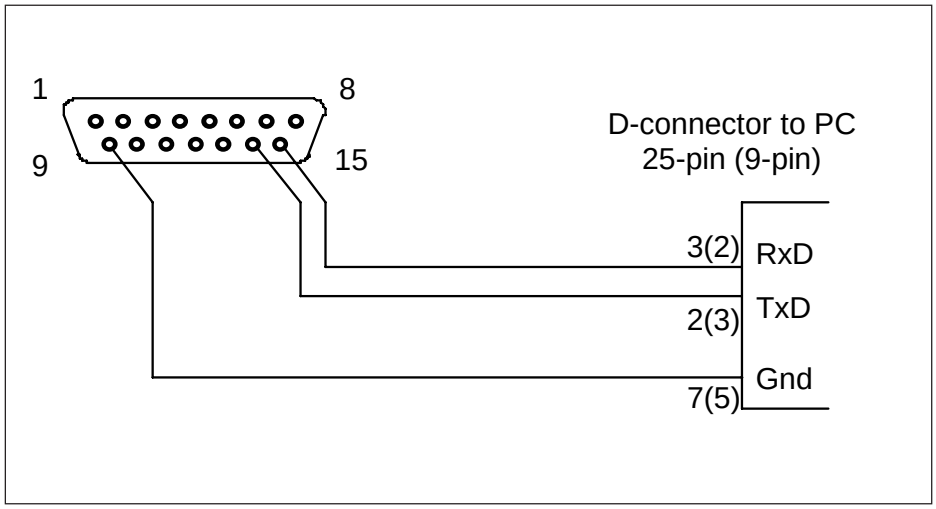


Figure 2-3: RS-232 interconnection of TMF and PC

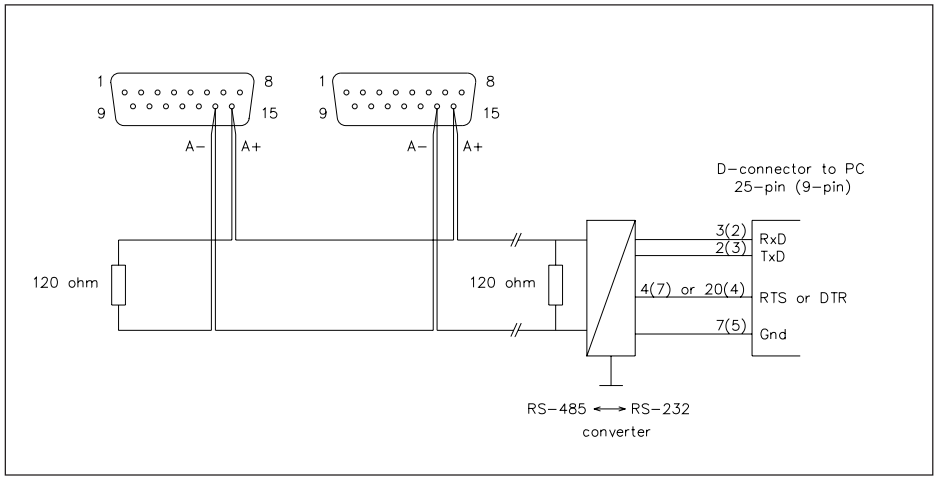


Figure 2-4: RS-485 multidrop interconnection TMFs and PC

The RS-485 is essentially a multidrop connection. It allows a maximum of 32 devices to be connected to a computer system. IBM-ompatible PCs are *not* equipped with RS-485 ports as standard. An RS-232 to RS-485 converter or RS-485 interface board is therefore required o connect an RS-485 to a standard PC. Figure 2-4 is an interconnection diagram showing two TMFs linked to an IBM-compatible PC, via RS-485 and RS-485 to RS-232 converter. The RS-485 bus, a daisy-chain network, meaning that the wires are connected at the units as in figure 2-4.

2.10 Interconnection

If no digital communication is required (i.e. analogue I/O only), the following cables are available for connection of the Smart Mass Flow Meter/Controller to the Brooks Microprocessor Control & Read-out Unit (see figure 2-5):

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Length: 3 m; part number 124-Z-236-AAA
Length: 6 m; part number 124-Z-237-AAA
Length: 12 m; part number 124-Z-610-AAA

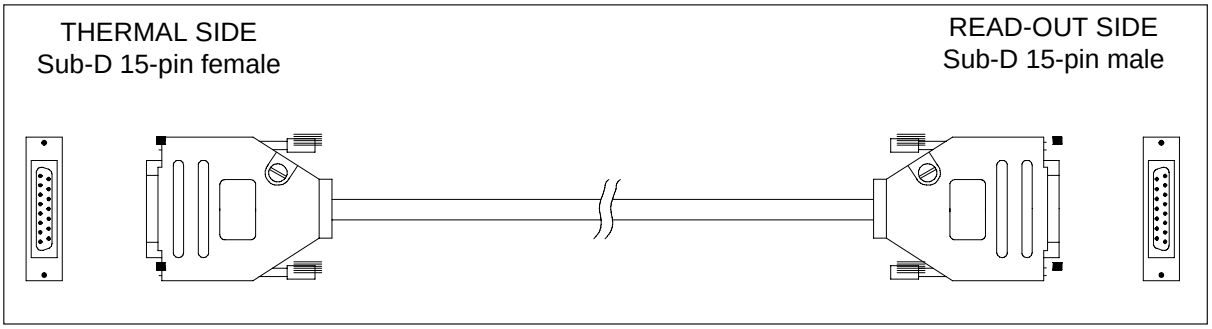


Figure 2-5: TMF/C to Read-out cable

If no digital communication is required, a split cable can be supplied to interconnect the Brooks Microprocessor Control & Read-out Unit, the Smart Mass Flow Meter/Controller and computer (see figure 2-5):

Length: 3 m; part number 124-Z-893-AAA
Length: 6 m; part number 124-Z-894-AAA
Length: 12 m; part number 124-Z-895-AAA

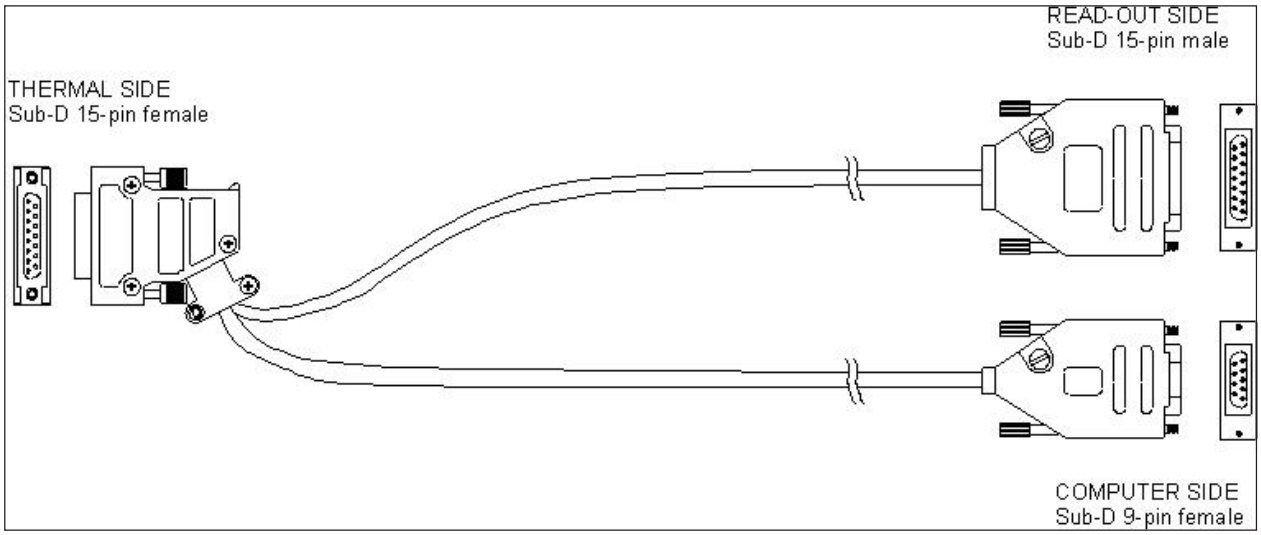


Figure 2-6: TMF/C Read-out and pc

NOTE: Special cables can be supplied multidrop (RS-485) installations are required.

For detailed information about the cable connections, see table 2-3.

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Table 2-3: Electrical interfacing. Smart TMF cable

Sub-D (15 c.) sub D (15p) female pin no.	Read-out side sub D (15p) male pin no.	Computer side		Colour	Function
		sub D (25p) female pin no.	sub D (9p) female pin no.		
1.	6			brown	Setpoint return (-)
2.	10			white	0 (1)-5 Vdc Flow signal output
3.	9			grey/pink	(TTL) Open collector alarm output
4.	2			red/blue	0 (4)-20 mA Flow signal output
5.	13			red	+15 Vcc to +28 Vdc Power supply
6.	14			blue	-15 Vdc Power supply (if required)
7.	3			violet	0 (4)-20 mA Setpiont input (+)
8.	5			grey	0 (1)-5 Vdc Setpiont input (+)
9.	12	7	5	black	Power supply common
10.	8			pink	Flow signal output common
11.	4			yellow	+5 Vdc ref. output
12.	7			green	valve override input
	11			shielding	Chassis
14.		2	3	green/white	Optional RS232C-RxD or RS485-A-
15.		3	2	blue/white	Optional RS232C-TxD or RS485-A+

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Section 3: Operation

3.1 Operating Procedure

1 Apply power to the Smart Mass Flow device and allow approximately 45 minutes for the instrument to reach a stable temperature.
2 Check the flow reading before turning on the pressurised gas supply. If the flow reading is >0.2% then the instrument should be re-zeroed (see section 3.2).
3 Turn on the gas supply.
4 Regulate flow to 0%. Monitor the instrument's output signal. If the output is not <0.2%, check for leaks.
5 Commence normal operation.

3.2 Zero Adjustment

Each Smart Mass Flow device is factory-adjusted to provide a 0 ±10 mVdc signal at zero flow. The adjustment is carried out in our calibration laboratory, an ambient the temperature of 20°C is maintained. After initial installation and warm-up in the gas system, the zero flow indication may differ from the factory setting. This is primarily caused by differences in temperature between our calibration laboratory and the final mounting position.
When checking the zero flow indication, always mount the device in its final location and allow a minimum of 45 minutes for it to reach a stable temperature.

In case Zero adjustment is required, this can be done via Smart Control (model 0160) or via the zero push button next to the diagnostics LED.
The zero adjustment should be carried out under process conditions and no flow.

3.3 Calibration Procedure

Calibration of the Smart Mass Flow device is not described in this manual. Calibration can only be achieved with use of the accurate Brooks Vol-U-Meter equipment and the digital communication.

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Section 4: Maintenance

4.1 General

No routine maintenance is required on the Smart Mass Flow Meters and Controllers other than occasional cleaning. The in-line filter should periodically be replaced or ultrasonically cleaned.

NOTE: If recalibration is required, but the necessary expertise or equipment is not available, the instrument should be returned to the factory.

4.2 Troubleshooting and System checks

The Smart Mass Flow Meters 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 incorrectly 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 Smart TMF.
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 Set point, verify that there is sufficient inlet pressure and pressure drop at the controller to provide the required flow.
4. Verify that all user-selectable jumpers and switches have been set to the appropriate positions. Refer to Figure 2-2 and table 2-2 .

NOTE: 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. The MF-series Smart Mass Flow device may also become corroded or contaminated upon exposure to air.

Bench Troubleshooting

1. Establish a proper connection between the Smart Mass Flow Meter or Controller and a +15 Vdc to +28 Vdc power supply (and, if necessary, to a -15 Vdc power supply) and connect an output signal read-out device (4½ digit voltmeter recommended) to pins 2 and 10 on the 15-pin Sub-D connector. Switch on the power and allow the instrument to warm-up for 45 minutes. In case of a Controller model, adjust the Set point to zero. Do not connect the device to a gas source yet. Observe the output signal and, if

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necessary, perform the zero adjustment procedure (section 3.2). 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 Set point to 100% flow and adjust the inlet and outlet pressures to the calibration conditions. Verify that the output signal reaches 5.00 volts and stabilises at that value. Vary the command voltage over the 1 to 100% range and verify that the output signal follows the Set point. If possible, connect a flow measurement device to monitor the actual flow behaviour and verify the accuracy of the mass flow instrument. If the mass flow 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 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%.

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Table 4-1: Troubleshooting

Trouble	Possible Cause	Check/Corrective Action
Output stays at zero (regardless of Set point) and there is flow through the meter/controller	Clogged Sensor	Clean sensor. Refer to cleaning procedures (Section 4.3).
	Defective electronic board	
Flow can not be achieved regardless of Set point. (applicable to MFC)	Clogged Control Valve	Clean the control valve (Section 4.3) or return the device to the factory
	Valve override input is grounded	Check the valve override input (pin 12)
	Defective electronic board	Contact Brooks Instrument.
Output signal stays at approx. 5.25 Vdc or 21 mA (regardless of Set point) and there is flow through the meter/controller	Valve leaks or is stuck open (applicable to MFC)	Clean and/or adjust control valve (Section 4.3).
	+15V 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 Set point at higher set points but will not go below 2%	Control valve leaks or is stuck open	Clean the control valve or return the device to the factory (Section 4.3)
Output signal follows Set point at lower set points, but does not reach full scale	Insufficient inlet pressure or pressure drop	Adjust pressures, inspect in-line filters and clean/replace as necessary
	Partially clogged sensor	Clean sensor, see cleaning procedures (Section 4.3)
	Partially clogged valve (applicable to MFC)	Clean the control valve (Section 4.3) or return the device to the factory, see cleaning procedures
	Valve out of adjustment (applicable to MFC)	Adjust valve, see calibration procedures (Section 4.4)
	Valve guide spring failure (applicable to MFC)	Controller oscillates (see below)
Instrument grossly out of calibration. Flow is higher than desired.	Partially clogged sensor	Clean sensor, see cleaning procedures (Section 4.3)
Instrument grossly out of calibration. Flow is lower than desired.	Partially clogged restrictor	Replace or clean restrictor.
Controller oscillates (applicable to MFC)	Pressure drop or inlet pressure deviates from calibrated values	Adjust pressures
	Oversized orifice	Check orifice size
	Valve out of adjustment	Adjust valve, see calibration procedures (Section 4.4.)
	Unstable inlet pressure	Check external pressure regulator
	Defective p.c. board	Contact Brooks Instrument

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4.3 Cleaning Procedures

When deposition makes it necessary to clean the Smart Mass Flow Controller or Mass Flow Meter, use the following procedures:

1. Remove the unit from the system.
2. Purge with dry nitrogen gas, which removes virtually all particulate matter from the device. Should contamination persist, subject all wetted [1] components to ultrasonic cleaning. Following this, purge the device thoroughly with dry nitrogen once again.
3. If the sensor is contaminated, remove the sensor and use a haemostat or tweezers to push a 0.007”-diameter piano wire through the flow-sensor tube to remove any contamination (end closest to the control valve). The sensor tube can then be flushed with a solvent that leaves no residue. This can be accomplished conveniently using a hypodermic needle filled with solvent.

NOTE: Do not soak the sensor assembly in a cleaning solution. If solvent seeps into the sensor assembly, it will probably damage the sensor, or at least significantly alter its operating characteristics.

4.4 Calibration Procedure

The calibration of Smart Mass Flow devices is not described in this manual. Such calibration requires the use of accurate and traceable calibration equipment such as Brooks Volumeter equipment, in addition to digital communications.
However, if the above equipment is available at your facility, then Brooks Instrument will supply you with copy of the calibration procedure document (no.:834-P-064) upon request.

4.5 Valve (Dis)Assembly Procedure

NOTE: If (dis)assembly is required, but the necessary expertise or equipment is not available, then the instrument should be returned to the factory.

However, if the requisite equipment is available at your facility, Brooks Instrument will supply you with copy of the dis (assembly) procedure document (no.: 834-L-030) upon request.
The model 5853S control valve assembly consists of an axially mounted main valve driven by the top-mounted pilot valve. The main valve should not be disassembled. If necessary, please return the Mass Flow Controller to the factory.

[1] Wetted components include the body, laminar-flow element, and all valve components including the orifice, process adapters and inlet filter.

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Section 5: Specification

PERFORMANCE SPECIFICATIONS

Flow Accuracy	± 0.7% of rate and ±0.2% F.S. (at calibration conditions) ± 0.5% of rate and ±0.1% F.S. (optional consult factory) ± 1.0% F.S. for flowrates above 1100 l_n/min (for 5863/5853)
Repeatability	± 0.25% of rate
Rangeability	50:1 (within specified accuracy)
Controllability	100:1 (i.e. total operating range)
Stability	Less than ± 0.5% of rate per year
Temperature - Sensitivity	Zero: Less than 0.075% F.S. per degree C For flowrates over 100 l/min gas and ambient temperature must be equal

PHYSICAL SPECIFICATIONS

Materials of Construction	Wetted parts stainless steel with Viton®, Buna-N®, PTFE/Kalrez® or EPDM seals
Mechanical connections	NPT(F), Tube compression, VCR / VCO Downport Option: Flanged DIN- or ANSI type available
Electrical connections	15-pin, D-type connector (goldplated contacts)

SPECIFICATIONS

Certification

- *CE certified*
- *EMC Directive (89/336/EEC)*
  EN 61326-1: 1997 + A1: 1998
- *Pressure Equipment Directive (97/23/EC)*
- *II 3 G EEx nA II T4,* per EN 60079-15:2003
- *KEMA 03ATEX1433 X*

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 equipement will be used".

Setpoint Input*	Voltage:	0 - 5 Vdc or 1 - 5 Vdc input impedance ≥ 2000 Ohm
	Current:	0 - 20 mA or 4-20 mA
	Communication:	250 Ohm impedance.
Analogue output*	Voltage:	0 - 5 Vdc or 1 - 5 Vdc ≥ 2000 Ohm
	Current:	0 - 20 mA or 4-20 mA max. loop resistance 375 Ohm

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Table 5-1: Flow ranges and pressure ratings

Brooks Smart Mass Flow Products						
Mass Flow Controller	Mass Flow Meter		Flow Ranges N2 Equivalent Ratings		Pressure	P.E.D. Module H Category
Model:	Model:	Min. f.s.	Max. f.s.	Unit [1]	Bar	
5850 S	5860 S	0.003	30	l_n/min.	100/300 bar	S.E.P.
5851 S	5861 S[2]	20	100	l_n/min.	100 bar	S.E.P.
5853 S[3]	5863 S	100	2500	l_n/min.	70 bar	1 for all 150 lbs flanges 2 for all other connections

1. referring to normal conditions, i.e. 0°C, 1013.25 mbar.
2. 300 bar version optional
3. max. Delta P for 5853 S is 20 bar

Digital Communication* RS-232- or RS-485*
Baud rate 1200, 2400, 3600, 4800, 7200, 9600, 19K2, 38K4*
PROFIBUS-DP up to 12 Mbit/sec. (self selecting)

Alarm (TTL) Open Collector Output signal earthed when activated. Max. 30 Vdc, 25 mA. Or via communication port, when used digitally.

5 Vdc. ref. 5 Vdc. reference voltage load impedance ≥ 2000 Ohm.

Security If self-diagnostics detects a failure, the alarm mode will be activated (Open Collector Output via the connector). Details of the cause of the failure are available through digital communication.To prevent "unauthorized" setting or reranging of span or zero, these functions are only accessible via the Brooks Smart Control, model 0160, or using Smart DDE, model 0162.

Power requirements +15Vdc to +28Vdc or +/-15Vdc. (use only 24 Vdc for NO valves and for use of 5851 S).

Power Consumption Mass Flow Meters
Models 5860 S, 5861 S, 5863 S and 5864 S:
for + 24 Vdc (± 10%) at 80 mA (120 mA for Profibus)
for + 15 Vdc (± 5%) at 90 mA

Power Consumption Mass Flow Controllers
Models 5850 S, 5851 S and 5853 S
for + 24 Vdc (± 10%) at 140 mA (180 mA for Profibus)
for + 15 Vdc (± 10%) at 185 mA

NOTE: With valve override function activated: the total power consumption specifications are:
for + 15 Vdc at 285 mA or
for + 24 Vdc at 370 mA

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Temperature	Both ambient and process gas: 0-70 °C.
Leak Integrity	Outboard: 1 x 10^{-9} mbar l/sec. Helium
Warm-up time	< 10 minutes; 1% F.S. accuracy. Performance within specifications: 45 minutes.
Damping	Damping from 0 to 10 seconds is possible for the flow output signal(s) * (default setting is 0.5 sec.).
Response (Meters)	Standard response of the flow output signal 1 sec. Response up to 0.2 sec. on request. Model 5864 3sec. (1 sec. on request)
Settling Time (Controllers)	Standard 1 sec. Settling time or up to 0.2 seconds is possible (to within 2% full scale of final value) for any command (Set point) step; virtually without any dead time, over- or undershoot. Model 5853S 3 sec. (1 sec. on request).

* To be specified at ordering

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KEMA

(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 03ATEX1433 X** Issue Number: **3**

(4) Equipment: **Smart Mass Flow Controller Model 5850S, 5851S, 5853S Series**
Smart Mass Flow Meters Model 5860S, 5861S, 5863S Series

(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. 2113693-7.

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

EN 60079-15 : 2003

(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:

Ex **II 3 G EEx nA II T4**

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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PRODUCTS RvAC 001

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

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Appendix A: Gas Conversion Tables

USE OF THE CONVERSION TABLES
If a Mass Flow Meter or Controller is operated on a gas other than the gas it was calibrated with, a scale shift will occur in the relationship between the output signal and the mass flow rate as a result of the difference in heat capacities between the two gases.
This scale shift can be calculated by using the ratio of the molar specific heat of the two gases, or the sensor conversion factor.

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

USE OF A MFC/M FOR A DIFFERENT GAS THAN IT IS CALIBRATED FOR:
For use with a different gas type, multiply the output reading by the ratio of the gas factor of the desired gas and the gas factor of the calibrated gas.

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

Example: The controller is calibrated for nitrogen: 1000mln/min full scale. The desired gas is carbon dioxide. Multiply the output reading by 0.740 to calculate the flow of carbon dioxide. When the output reading is 750 mln/min, the flow rate for carbon dioxide is 750 x 0.740 = 555 mln/min.

CALCULATE GAS FACTOR FOR MIX GASSES:
In order to calculate the conversion factor for a gas mixture the following formula should be used:

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

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

Example: The desired gas is 20% Helium (He) and 80% Chlorine (Cl2) by volume. The desired full-scale flow rate of the mixture is 20 ln/min.

Sensor conversion factor for the mixture is:

$$\text{Mixture Factor} = \frac{100}{\left(\frac{20}{1.386}\right) + \left(\frac{80}{0.876}\right)} = 0.946$$

N2 equivalent flow = 20/0.946 = 21.14 ln/min .

NOTE:
It is generally accepted that the mass flow rate derived from this equation is only accurate to ± 5%. The table below lists the conversion factors for various gases with respect to nitrogen. The conversion table is used to determine the flow rate for gases other than the pre-selected gas. The flow meter is factory set to a pre-selected gas, pressure and flow range.

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Gas Conversion Table

Gasname	Formula	Gasfactor	Orifice factor	Density (kg/m3)
Acetylene (Ethyne)	C2H2	0,615	0,97	1,173
Air	Mixture	0,998	1,018	1,293
Allene	C3H4	0,478	1,199	1,787
Ammonia	NH3	0,786	0,781	0,771
Argon	Ar	1,395	1,195	1,784
Arsine	AsH3	0,754	1,661	3,478
Boron Trichloride	BCL3	0,443	2,044	5,227
Boron Trifluoride	BF3	0,579	1,569	3,025
Bromine Pentafluoride	BrF5	0,287	2,502	7,806
Bromine Trifluoride	BrF3	0,439	2,214	6,108
Bromotrifluoroethylene	C2BrF3	0,326	2,397	7,165
Bromotrifluoromethane (f-13B1)	CBrF3	0,412	2,303	6,615
1,3-Butadiene	C4H6	0,354	1,413	2,491
Butane	C4H10	0,257	1,467	2,593
1-Butene	C4H8	0,294	1,435	2,503
CIS-2-Butene	C4H8	0,32	1,435	2,503
Trans-2-Butene	C4H8	0,291	1,435	2,503
Carbon Dioxide	CO2	0,74	1,255	1,977
Carbon Disulfide	CS2	0,638	1,65	3,393
Carbon Monoxide	CO	0,995	1	1,25
Carbon Tetrachloride	CCL4	0,344	2,345	6,86
Carbon Tetrafluoride (f-14)	CF4	0,44	1,77	3,926
Carbonyl Fluoride	COF2	0,567	1,555	2,045
Carbonyl Sulfide	COS	0,68	1,463	2,68
Chlorine	CL2	0,876	1,598	3,214
Chlorine Dioxide	CLO2	0,693	1,554	3,011
Chlorine Trifluoride	CLF3	0,433	1,812	4,125
Chlorodifluoromethane (f-22)	CHCLF2	0,505	1,77	3,906
Chloroform (Trichloromethane)	CHCL3	0,442	2,066	5,34
Chloropentafluoroethane (f-115)	C2CLF5	0,243	2,397	7,165
Chlorotrifluoroethylene	C2CLF3	0,337	2,044	5,208
Chlorotrifluoromethane (f-13)	CCLF3	0,43	1,985	4,912
2-Chlorobutane	C4H9CL	0,234	1,818	4,134
Cyanogen	(CN)2	0,498	1,366	2,322
Cyanogen Chloride	CLCN	0,618	1,48	2,73
Cyclobutane	C4H8	0,387	1,413	2,491
Cyclopropane	C3H6	0,505	1,224	1,877
Deuterium	D2	0,995	0,379	0,177
Diborane	B2H6	0,448	1	1,235
Diboromodifluoromethane (f-12B2)	CBr2F2	0,363	2,652	8,768
1,2-Dibromotetrafluoroethane (f-114B2)	C2Br2F4	0,215	2,905	10,53
Dichlorodifluoromethane (f-12)	CCL2F2	0,39	2,099	5,492
Dichlorofluoromethane (f-21)	CHCL2F	0,456	1,985	4,912
Dichlorosilane	SiH2CL2	0,442	1,897	4,506
Diedthylsilane	C4H12Si	0,183	1,775	3,94
2,2 Dichloro- 1,1,1- Trifloroethane	C2HCL2F3	0,259	2,336	6,829
1,2-Dichloroethane (Ethylene dichloride)	C2H4CL2	0,382	1,879	4,419
1,2-Dichlorotetrafluoroethane (f-114)	C2CL2F4	0,231	2,449	7,479
1,1-Difluoro-1-Chloroethane	C2H3CLF2	0,341	1,957	4,776
1,1-Difluoroethane	CH3CHF2	0,415	1,536	2,94
1,1-Difluoroethylene	CH2:CF2	0,458	1,512	2,86
Difluoromethane (f-32)	CF2H2	0,627	1,36	2,411

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Gas Conversion Table (continued)

Dimethylamine	(CH3)2NH	0,37	1,269	2,013
Dimethylether	(CH3)2O	0,392	1,281	2,055
2,2-Dimethylpropane	C(CH3)4	0,247	1,613	3,244
Disilane	Si2H6	0,332	1,493	2,779
Ethane	C2H6	0,49	1,038	1,357
Ethanol	C2H6O	0,394	1,282	2,057
Ethylacetylene	C4H6	0,365	1,384	2,388
Ethyl Chloride	C2H5CL	0,408	1,516	2,879
Ethylene	C2H4	0,619	1	1,261
Ethylene Oxide	C2H4O	0,589	1,254	1,965
Fluorine	F2	0,924	1,163	1,695
Fluoroform (f-23)	CHF3	0,529	1,584	3,127
Germane	GeH4	0,649	1,653	3,418
Germanium Tetrachloride	GeCL4	0,268	2,766	9,574
Halothane	C2HBrCLF3	0,257	2,654	8,814
Helium	He	1,386	0,378	0,178
Hexafluoroacetone	C3F6O	0,219	2,434	7,414
Hexafluorobenzine	C6F6	0,632	2,577	8,309
Hexafluoroethane (f-116)	C2F6	0,255	2,219	6,139
Hexafluoropropylene (HFP)	C3F6	0,249	2,312	6,663
Hexamethyldisilane (HMDS)	(CH2)6Si2	0,139	2,404	7,208
Hexane	C6H14	0,204	1,757	3,847
Hydrogen	H2	1,008	0,269	0,09
Hydrogen Bromide	HBr	0,987	1,695	3,645
Hydrogen Chloride	HCL	0,983	1,141	1,639
Hydrogen Cyanide	HCN	0,744	0,973	1,179
Hydrogen Fluoride	HF	0,998	0,845	0,893
Hydrogen Iodide	HI	0,953	2,144	5,789
Hydrogen Selenide	H2Se	0,837	1,695	3,613
Hydrogen Sulfide	H2S	0,85	1,108	1,539
Iodine Pentafluoride	IF5	0,283	2,819	9,907
Isobutane	C4H10	0,26	1,44	2,596
Isobutene	C4H8	0,289	1,435	2,503
Isopentane	C5H12	0,211	1,605	3,222
Krypton	Kr	1,382	1,729	3,708
Methane	CH4	0,763	0,763	0,717
Methylacetylene	C3H4	0,473	1,196	1,782
Methyl Bromide	CH3Br	0,646	1,834	4,236
3-Methyl-1-butene	C5H10	0,252	1,584	3,127
Methyl Chloride	CH3CL	0,687	1,347	2,308
Methyl Fluoride	CH3F	0,761	1,102	1,518
Methyl Mercaptan	CH4S	0,588	1,313	2,146
Methyl Silane	CH6Si	0,393	1,283	2,061
Methyl Trichlorosilane	CH3CL3Si	0,267	2,31	6,675
Methyl Vinyl Ether	C3H6O	0,377	1,435	2,567
Monoethyanolamine	C2H7NO	0,305	1,477	2,728
Monoethylamine (CH3CH2NH2)	C2H7	0,359	1,269	2,013
Monomethylamine	CH3NH2	0,565	1,067	1,42
Neon	Ne	1,398	0,847	0,902
Nickel Carbonyl	Ni(CO)4	0,212	2,371	7,008
Nitric Oxide	NO	0,995	1,03	1,339
Nitrogen	N2	1	1	1,251

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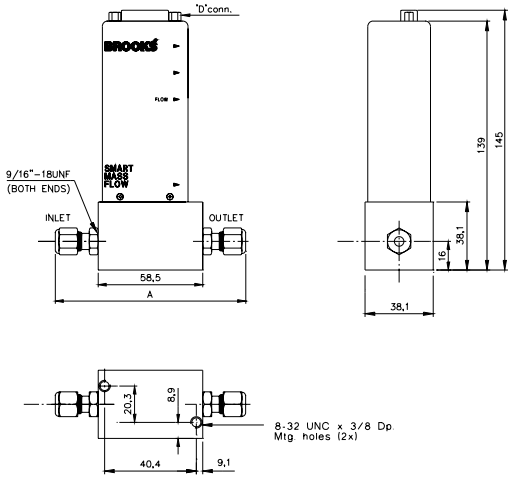
Gas Conversion Table (continued)

Nitrogen Dioxide	NO2	0,758	1,713	2,052
Nitrogen Trifluoride	NF3	0,501	1,598	3,168
Nitrogen Trioxide	N2O3	0,443	1,649	3,389
Nitrosyl Chloride	NOCL	0,644	1,529	2,913
Nitrous Oxide	N2O	0,752	1,259	1,964
Octofluorocyclobutane	C4F8	0,169	2,672	8,933
Oxygen	O2	0,988	1,067	1,429
Oxygen Difluoride	OF2	0,672	1,388	2,402
Ozone	O3	0,738	1,31	2,138
Perchloryl Fluoride	CLO3F	0,448	1,905	4,571
Perfluorobutane	C4F10	0,738	2,918	10,61
Perfluoro-2-Butene	C4F8	0,268	2,672	8,933
Perfluoromethyl-vinylether (PMVE)	PMVE	0,296	2,029	5,131
Perfluoropropane	C3F8	0,179	2,591	8,396
Pentane (n-Pentane)	C5H12	0,212	1,605	3,222
Pentafluoroethane	C2HF5	0,287	2,07	5,36
Phosgene	COCL2	0,504	1,881	4,418
Phosphine	PH3	0,783	1,1	1,517
Phosphorous Pentafluoride	PF5	0,346	2,109	5,62
Phosphorous Trifluoridide	PF3	0,495	1,77	3,906
Propane (same as CH3CH2CH3)	C3H8	0,343	1,274	2,008
Propylene (Propene)*	C3H6	0,401	1,234	1,875
Rhenium Hexafluoride	ReF6	0,23	3,279	13,41
Silane	SiH4	0,625	1,07	1,44
Silicon Tetrachloride	SiCL4	0,31	2,462	7,579
Silicon Tetrafluoride	SiF4	0,395	1,931	4,648
Sulfur Dioxide	SO2	0,728	1,529	2,858
Sulfur Hexafluoride	SF6	0,27	2,348	6,516
Sulfur Tetrafluoride	SF4	0,353	1,957	4,776
Sulfur Trioxide	SO3	0,535	1,691	3,575
Sulfuryl Fluoride	SO2F2	0,423	1,931	4,648
Tetrachloromethane	CCL4	0,344	2,345	6,858
Tetrafluoroethylene (TFE)	C2F4	0,361	1,905	4,526
Tetrafluorohydrazine	N2F4	0,367	1,926	4,624
Trichlorofluoromethane (f-11)	CCL3F	0,374	2,244	6,281
Trichlorosilane	SiHCL3	0,329	2,201	6,038
Trimethyloxyborane (TMB)	B(OCH3)3	0,3	1,929	4,638
1,1,2-Trichloro-1,1,2-Triflouroet (f-113)	C2CL3F3	0,231	2,52	7,92
Trimethylamine	(CH3)3N	0,316	1,467	2,639
Tungsten Hexafluoride	WF6	0,227	3,264	13,28
Uranium Hexafluoride	UF6	0,22	3,548	15,7
Vinyl Bromide	C2H3Br	0,524	1,985	4,772
Vinyl Chloride	C2H3CL	0,542	1,492	2,788
Vinyl Fluoride	C2H3F	0,576	1,281	2,046
Water Vapor	H2O	0,861	0,802	0,804
Xenon	Xe	1,383	2,18	5,851

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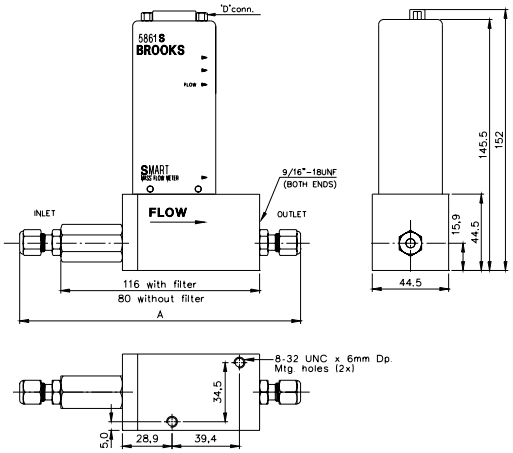
Appendix B: Dimensional drawings

Model 5860S



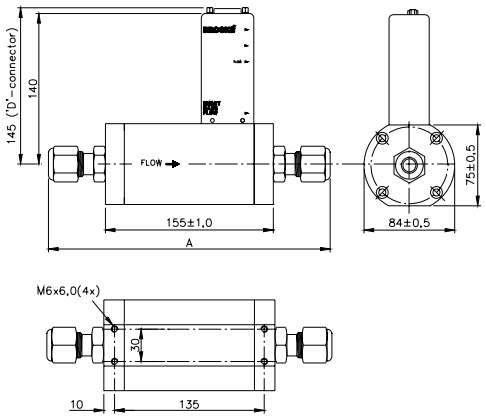
5860S CONNECTIONS	A (mm)	Inches
9/16-18 UNF (no adapters)	59	2,31
3/8" TUBE COMPR.	113	4,45
1/4" TUBE COMPR.	110	4,33
1/8" TUBE COMPR.	105	4,15
1/4" VCR	106	4,19
1/4" VCO	98	3,87
1/4" NPT	99	3,89
6mm TUBE COMPR.	110	4,33
10mm TUBE COMPR.	113	4,45
1/4" BSP	99	3,89

Model 5861S



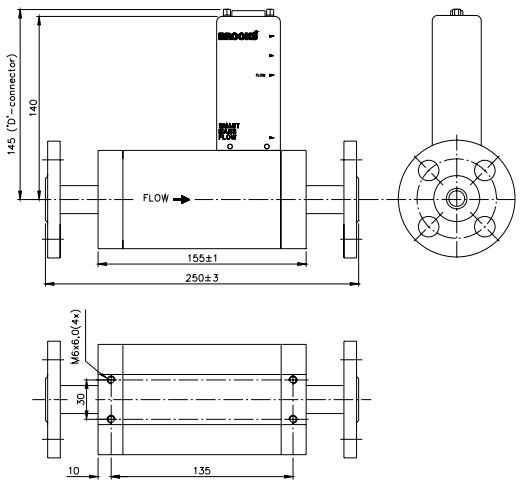
5861S CONNECTIONS	A (mm)		Inches	
Filters >>	excl.	incl.	excl.	incl.
9/16-18 UNF (no	80	116	3,15	4,57
1/4" TUBE COMPR.	131	167	5,17	6,59
3/8" TUBE COMPR.	134	170	5,29	6,71
1/4" VCR	128	164	5,03	6,45
1/2" VCO	131	167	5,15	6,57
1/4" VCO	120	156	4,71	6,13
1/4" NPT	120	156	4,73	6,15
6mm TUBE COMPR.	131	167	5,17	6,59
10mm TUBE COMPR.	134	170	5,29	6,71
1/4" BSP	120	156	4,73	6,15

Model 5863S



5863S CONNECTIONS	A (mm)	Inches
1/2" TUBE COMPR.	223	8,78
3/4" TUBE COMPR.	223	8,78
1" TUBE COMPR.	232	9,12
1/2" VCR	210	8,28
1/2" VCO	206	8,1
3/4" VCO	213	8,38
0.5", 1", 1.5" NPT OR		
1- 1/16"-12 (no adapters)	155	6,1
FLENS	255	10,04

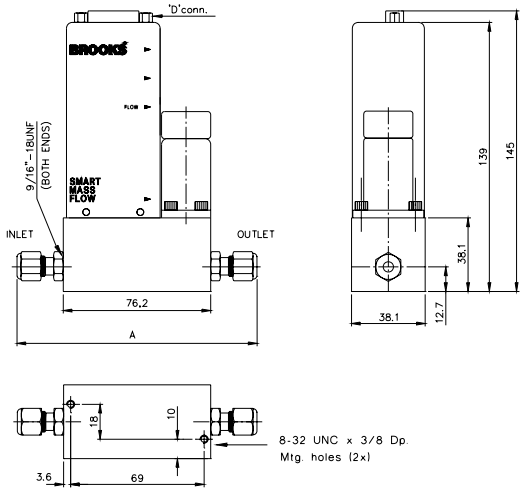
Model 5863S



CONNECTIONS	
DIN DN15 PN40	ANSI 1" 150 LBS
DIN DN25 PN40	ANSI 1" 300 LBS
DIN DN40 PN40	ANSI 1.5" 150 LBS
DIN DN50 PN40	ANSI 1.5" 300 LBS
ANSI 0.5" 150 LBS	ANSI 2" 150 LBS
ANSI 0.5" 300 LBS	ANSI 2" 300 LBS

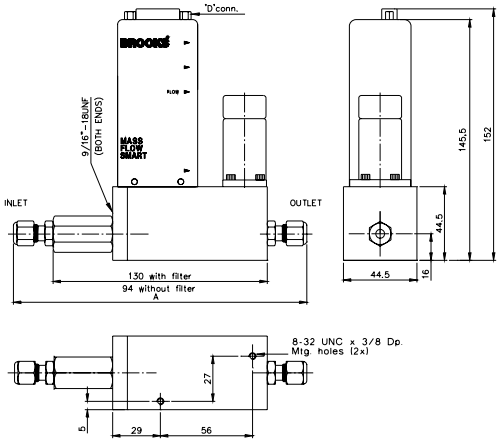
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Model 5850S



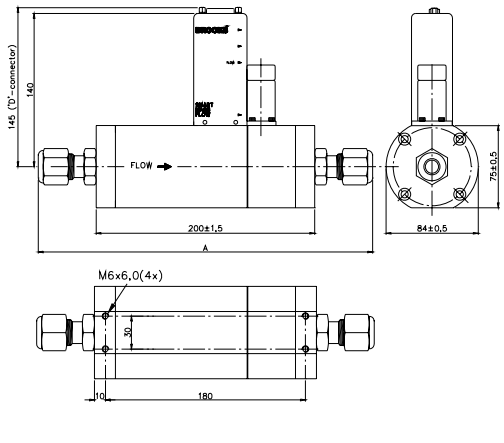
5850S CONNECTIONS	A (mm)	Inches
9/16-18 UNF (no adapters)	76	3
3/8" TUBE COMPR.	131	5,14
1/4" TUBE COMPR.	128	5,02
1/8" TUBE COMPR.	123	4,84
1/4" VCR	124	4,88
1/4" VCO	116	4,56
1/4" NPT	116	4,58
6mm TUBE COMPR.	128	5,02
10mm TUBE COMPR.	131	5,14
1/4" BSP	116	4,58

Model 5851S



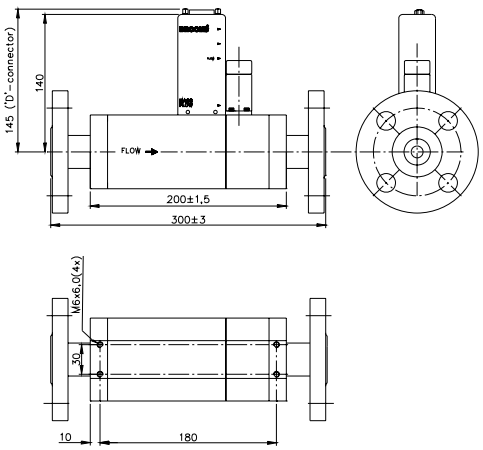
5851S CONNECTIONS	A (mm)		Inches	
Filters >>	excl.	incl.	excl.	incl.
9/16-18 UNF (no	94	130	3,68	5,1
1/4" TUBE COMPR.	145	181	5,7	7,12
3/8" TUBE COMPR.	148	184	5,82	7,24
1/4" VCR	141	177	5,56	6,98
1/2" VCO	144	180	5,68	7,1
1/4" VCO	133	169	5,24	6,66
1/4" NPT	134	170	5,26	6,68
6mm TUBE COMPR.	145	181	5,7	7,12
10mm TUBE COMPR.	148	184	5,82	7,24
1/4" BSP	134	170	5,26	6,68

Model 5853S



5853S CONNECTIONS	A (mm)	Inches
1/2" TUBE COMPR.	267	10,51
3/4" TUBE COMPR.	267	10,51
1" TUBE COMPR.	276	10,85
1/2" VCR	322	12,69
1/2" VCO	250	9,83
3/4" VCO	257	10,11
0.5", 1", 1.5" NPT		
OR 1- 1/16"-12 (no adapters)	199	7,83
FLENS	299	11,76

Model 5853S



CONNECTIONS	
DIN DN15 PN40	ANSI 1" 150 LBS
DIN DN25 PN40	ANSI 1" 300 LBS
DIN DN40 PN40	ANSI 1.5" 150 LBS
DIN DN50 PN40	ANSI 1.5" 300 LBS
ANSI 0.5" 150 LBS	ANSI 2" 150 LBS
ANSI 0.5" 300 LBS	ANSI 2" 300 LBS

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Appendix C: Translation of CE Marking electrical installation instructions

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-forskruninger skal enten være af metal eller metal skærmet.
Skærmen skal forbindes, i begge ender, til stikkets metalhus eller PG-forskruningen 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% dækning.
Skærmen bør være forbundet til jord.

Deutsch

Nach erfolgreichen Tests enstprechend den Vorschiften 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 %igenSchirmababdeckung 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-Steckverbindunger sind standardmäßige keine metallgeschirmten Verbindungen. Um die Anforderungen der CE-Zertifizierung zu erfüllen, sind Kabel mit einer 80 %igen Schirmababdeckung 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.

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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 Œ

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.

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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 τήν 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 Elettomagnetica (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 estemità.
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.

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Nederlands

Alle CE gemarkeerde elektrische en elektronische produkten 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 produkten.

Kwaliteit van de signaalkabel en kabelaansluitingen:
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.

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 requesitos 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 360º.
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.

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Suomi

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 80%:sti suojattu kaapeli.

“D” tai “Circular” tyyppisen liitimen tulisi olla varustettu metallisuojalla. Mikälì 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 80%: sesti suojattuja jotta ne olisivat CE sertifikaatin mukaisia.
Suoja on oltava maadoitettu.

Svensk

Brooks (elektriska / elektronik) utrustning, som är CE-märkt, har testats och godkänts enligt gällande regler för elektromagnetisk kompabilitet (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 80%.

“D” eller “runda” typer av anslutningskontakter ska vara skärmade. Kabelgenomföringar ska vara av metall alternativt med metalliserad skärmning.
Kabelns skärm ska, i bada ändar, 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 80% skarmade för att överensstämma med CE-certifieringen.
Skärmen ska avslutas med en jordförbindelse.

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Appendix D: Important Safety Instructions

ENGLISH

IMPORTANT SAFETY INSTRUCTIONS

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.

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 save operation of your process at risk. It furthermore may result in fire, electrical hazards or improper operation.

DANISH

VIGTIGE SIKKERHEDSINSTRUKTIONER

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.

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

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NEDERLANDS

BELANGRIJKE VEILIGHEIDSINSTRUCTIES

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

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 u zelf, vòòr het in gebruik nemen, dat het instrument volgens de geldende voorschriften is ingebouwd in de leiding en aangesloten op het (eventuele) spanningsnetwerk.
4. INGEBRUIK NEMEN: (a) Langzaam opvoeren van de stroom in het systeem. Open de kranen langzaam om een plotselinge golfbeweging van de vloeistofstroom te voorkomen. (b) Controleer het instrument op eventuele lekkage, met name de in- en uitlaat aansluitingen. Als er geen lekkage wordt ontdekt, kan het systeem op bedrijfsdruk worden gebracht.
5. WAARSCHUWING: Nalatig onderhoud van dit instrument kan ernstig persoonlijk letsel en/of beschadiging van de meet apparatuur tot gevolg hebben. Overtuig u zelf 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 weking van uw proces in gevaar kan komen. Zelfs kan het gebruik daarvan resulteren in brandgevaarlijke situaties, electriciteitsgevaar of onjuist functioneren.

SUOMI

TURVAOHJEET

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 vältyttäisiin paineiskuilta. (b) Tarkista mahdolliset vuodot mittarin prosessiliittimien kohdalta. Mikäli vuotoja ei ole, nosta prosessipaine käyttöpaineeseen.
5. VAROITUS: Mikäli tätä laitetta ei huolleta asianmukaisesti, saattaa korkea käyttöpaine 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 näköisoasat sekä käsittely voi vaikuttaa laitteen toimintaan sekä saattaa prosessin riskialttiiksi. Lisäksi tämä voisi aiheuttaa palo- tai sähköisen vaaran tai toimintaongelmia.

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DEUTSCH

WICHTIGE SICHERHEITSHINWEISE

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..

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.

FRANCAIS

INSTRUCTIONS IMPORTANTES DE SECURITE

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".

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 disfonctionnements.

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NORSK

VIKTIG SIKKERHETS INSTRUKS

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.

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 strømning 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.

ITALIANO

IMPORTANTI ISTRUZIONI PER LA SICUREZZA

Questa appendice contiene importanti istruzioni sia per la sicurezza che per l'uso corretto degli flussometri metallici della Brooks Instrument 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.

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 necessiti 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, posso 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..

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SWEDISH

VIKTIG SÄKERHETSINFORMATION

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

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 frånkopplat i samband med service.
6. Vänligen kontrollera att bara BROOKS originaldelar används i samband med service. Observera at 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.

ESPANIOL

IMPORTANTES INSTRUCCIONES DE SEGURIDAD

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.

INSTRUCCIONES DE SEGURIDAD

1. Lease con cuidado todas y cada una de las identificaciones del aparato (1) asi como las secciones del Manual de Inatalación y Operción antes de usar el rotámetro.
2. ATENCION! No operar nunca el instrumento por encima de las especificiones 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/ó 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. ATENCION! Llevar un mantenimiento adecuado con el fín de prevenir y evitar fallos debidos a altas presiones de operación. El no seguir estas instrucciones puede provocar daños y perjuicios en personas y/ó 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 incorecta.

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Appendix E: Modellist

BROOKS SMART MASS FLOW PRODUCTS SMART MASS FLOW METERS / CONTROLLERS	
BASE MODEL NUMBER	**DESCRIPTION**
5860S/BA	MASS FLOW METER; F.S. FLOWRANGES: 0.003 - 0.008 ln/min.
5860S/BC	MASS FLOW METER; F.S. FLOWRANGES: 0.008 - 30 ln/min.
5861S/BD	MASS FLOW METER; F.S. FLOWRANGES: 20 - 100 ln/min.
5863S/BE	MASS FLOW METER; F.S. FLOWRANGES: 100 - 200 ln/min.
5863S/BF	MASS FLOW METER; F.S. FLOWRANGES: 200 - 300 ln/min.
5863S/BG	MASS FLOW METER; F.S. FLOWRANGES: 300 - 400 ln/min.
5863S/BH	MASS FLOW METER; F.S. FLOWRANGES: 400 - 500 ln/min.
5863S/BJ	MASS FLOW METER; F.S. FLOWRANGES: 500 - 600 ln/min.
5863S/BK	MASS FLOW METER; F.S. FLOWRANGES: 600 - 700 ln/min.
5863S/BL	MASS FLOW METER; F.S. FLOWRANGES: 700 - 800 ln/min.
5863S/BM	MASS FLOW METER; F.S. FLOWRANGES: 800 - 900 ln/min.
5863S/BN	MASS FLOW METER; F.S. FLOWRANGES: 900 - 1000 ln/min.
5863S/B1	MASS FLOW METER; F.S. FLOWRANGES: 1001 - 1100 ln/min.
5863S/B2	MASS FLOW METER; F.S. FLOWRANGES: 1101 - 1300 ln/min.
5863S/B3	MASS FLOW METER; F.S. FLOWRANGES: 1301 - 1600 ln/min.
5863S/B4	MASS FLOW METER; F.S. FLOWRANGES: 1601 - 1900 ln/min.
5863S/B5	MASS FLOW METER; F.S. FLOWRANGES: 1 901 - 2200 ln/min.
5863S/B6	MASS FLOW METER; F.S. FLOWRANGES: 2201 - 2500 ln/min.
5850S/BA	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 0.003 - 0.008 ln/min.
5850S/BC	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 0.008 - 30 ln/min.
5851S/BD	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 20 - 100 ln/min.
5853S/BE	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 100 - 200 ln/min.
5853S/BF	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 200 - 300 ln/min.
5853S/BG	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 300 - 400 ln/min.
5853S/BH	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 400 - 500 ln/min.
5853S/BJ	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 500 - 600 ln/min.
5853S/BK	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 600 - 700 ln/min.
5853S/BL	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 700 - 800 ln/min.
5853S/BM	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 800 - 900 ln/min.
5853S/BN	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 900 - 1000 ln/min.
5853S/B1	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 1001 - 1100 ln/min.
5853S/B2	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 1101 - 1300 ln/min.
5853S/B3	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 1301 - 1600 ln/min.
5853S/B4	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 1601 - 1900 ln/min.
5853S/B5	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 1 901 - 2200 ln/min.
5853S/B6	MASS FLOW CONTROLLER; F.S. FLOWRANGES: 2201 - 2500 ln/min.

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		MECHANICAL CONNECTIONS		
1A		WITHOUT ADAPTORS (9/16"-18" UNF)		(ONLY FOR 5850/60/51/61/53/63)
1B		1/4"	TUBE COMPRESSION FITTINGS	(ONLY FOR 5850/60/51/61)
1C		1/8"	TUBE COMPRESSION FITTINGS	(ONLY FOR 5850/60/51/61)
1D		3/8"	TUBE COMPRESSION FITTINGS	(ONLY FOR 5851/61)
1E		1/4"	VCR	(ONLY FOR 5850/60/51/61)
1F		1/4"	VCO	(ONLY FOR 5850/60/51/61)
1G		1/4"	NPT	(ONLY FOR 5850/60/51/61)
1H		6mm	TUBE COMPRESSION FITTINGS	(ONLY FOR 5850/60/51/61)
1J		10mm	TUBE COMPRESSION FITTINGS	(ONLY FOR 5850/60/51/61)
1K		1/4"	BSP (F)	(ONLY FOR 5850/60/51/61)
1Y		½"	BSP (F)	(ONLY FOR 5853/63)
1Z		1"	BSP (F)	(ONLY FOR 5853/63)
2A		1 1/16" - 12	SAE/MS	(ONLY FOR 5853/63)
2B		½"	TUBE COMPRESSION FITTINGS	(ONLY FOR 5850/60/51/61/53/63)
2C		3/4"	TUBE COMPRESSION FITTINGS	(ONLY FOR 5853/63)
2D		1"	TUBE COMPRESSION FITTINGS	(ONLY FOR 5853/63)
2E		½"	NPT(F)	(ONLY FOR 5853/63)
2F		1"	NPT(F)	(ONLY FOR 5853/63)
2G		1½"	NPT(F) (SEE OPTION "E")	(ONLY FOR 5853/63/64)
2H		½"	VCO (200 ln/min. max.)	(ONLY FOR 5850/60/51/61/53/63)
2J		3/4"	VCO	(ONLY FOR 5853/63)
2K		½"	VCR (200 ln/min. max.)	(ONLY FOR 5850/60/51/61/53/63)
2L		DIN	DN15PN40	(ONLY FOR 5853/63)
2M		DIN	DN25PN40	(ONLY FOR 5853/63)
2N		DIN	DN40PN40	(ONLY FOR 5853/63)
2O		DIN	DN50PN40	(ONLY FOR 5853/63)
2P		ANSI ½"	150 LBS	(ONLY FOR 5853/63)
2R		ANSI ½"	300 LBS	(ONLY FOR 5853/63)
2S		ANSI 1"	150 LBS	(ONLY FOR 5853/63)
2T		ANSI 1"	300 LBS	(ONLY FOR 5853/63)
2U		ANSI 1½"	150 LBS	(ONLY FOR 5853/63)
2V		ANSI 1½"	300 LBS	(ONLY FOR 5853/63)
2W		ANSI 2"	150 LBS	(ONLY FOR 5853/63)
2X		ANSI 2"	300 LBS	(ONLY FOR 5853/63)
2Y		1"	VCO	(ONLY FOR 5853/63)
2Z		3/4"	VCR	(ONLY FOR 5853/63)
9Z		SPECIFY		
		O-RING/VALVE SEAT MATERIAL		
	A	VITON		
	B	BUNA (NOT FOR 5853 see Options 3, "I")		
	C	PTFE/KALREZ (KALREZ SENSOR O-RINGS & VALVE SEAT) (NOT FOR 5853/63)		
	D	KALREZ (NOT FOR 5853/63 see Options 3, "I")		
	E	PTFE O-RINGS / EPDM VALVE SEAT (Teflon Diaphragm for 5853)		
	M	KALREZ O-RINGS / METAL VALVE SEAT (NOT FOR 5853/63)		
	Z	SPECIFY		

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				VALVE TYPE
0				METER ONLY (NO VALVE)
1				NORMALLY CLOSED (5850/51 SERIES)
2				NORMALLY CLOSED (PRESS.DIFF. >2BAR. 5853 SERIES)
3				NORMALLY CLOSED (PRESS.DIFF. <2BAR. 5853 SERIES)
4				NORMALLY OPENED (5850 ONLY)
5				NORMALLY CLOSED, 5850 SERIES, 300 BAR
9				SPECIFY
				ELECTRICAL INPUT/OUTPUT
				INPUT **OUTPUT**
	A			0-5Vdc 0-5 Vdc & 0-20mA (INCL. RS 232, 9600 BDS)
	B			4-20mA 4-20 mA & 1-5Vdc (INCL. RS 232, 9600 BDS)
	C			0-20 mA 0-20mA & 0-5Vdc (INCL. RS 232, 9600 BDS)
	D			1-5Vdc 1-5 Vdc & 4-20mA (INCL. RS 232, 9600 BDS)
	E			DIG. COMM. DIG. COMM. + 0 - 5 Vdc
	F			DIG. COMM. DIG. COMM. + 4 - 20 mA
	G			DIG. COMM. DIG. COMM. + 0 - 20 mA
	H			DIG. COMM. DIG. COMM. + 1 - 5 Vdc
	I			DIG. COMM. DIGITAL COMMUNICATION (ONLY)
	Z			SPECIFY
				COMMUNICATION / BAUDRATE
	A	0		NONE (Communication will be possible via RS/232 and 9600 baud)
	B*			RS232
	C*			RS485
	D	0		PROFIBUS-DP (PNO CERTIFIED, 831-A-023 and 541-C-068-AAG)
	E	0		PROFIBUS-DP (not CERTIFIED, 831-A-021 and 541-C-062-AAG)
	F*			CARDEDGE CONNECTOR (ONLY 0-5 I/O & COMMUNICATION)
	G*			CARDEDGE CONNECTOR (ONLY 0-5 I/O & COMMUNICATION) RS-232
	H*			CARDEDGE CONNECTOR (ONLY 0-5 I/O & COMMUNICATION) RS-485
		*1		38400 Baud
		*2		19200
		*3		9600
		*4		7200
		*5		4800
		*6		3600
		*7		2400 * BOTH HAVE TO BE SPECIFIED
		*8		1200
				INTERCONNECTION CABLE
		A		NO CABLE
		B		MATING CONNECTOR ONLY
		C		3m ROUND CABLE
		D		6m ROUND CABLE
		E		3m ROUND CABLE INCLUDING COMMUNICATION CABLE
		F		6m ROUND CABLE INCLUDING COMMUNICATION CABLE
		Z		SPECIFY

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				ENHANCEMENTS
	A			STANDARD RESPONSE:< 1 SEC (5850/51) < 3 SEC (5853) [1].
	B			FAST RESPONSE (SPECIFY VALUES .... SEC.) [1]
	C			LINEAR RAMP (SPECIFY VALUES ....%/SEC.) [1]
	D			FLOW OUTPUT DAMPING (SPECIFY VALUES .... SEC.) [1]
				CALIBRATION
		0		UNCALIBRATED
		1		STANDARD CALIBRATION INCLUDED
		2		STORAGE OF MULTIPLE CAL. CURVES; ADD PER AVAILABLE CALIBRATION GAS
		9		SPECIFY
				POWER SUPPLY INPUT
			A	± 15 Vdc
			B	+ 24 Vdc = (Standard selection)
			C	+ 15 Vdc only
			Z	SPECIFY
				AREA CLASSIFICATION
			1	SAFE AREA
			2	CERTIFIED FOR USE IN ZONE 2
			9	SPECIFY
5850S/BC	**1H**	**A**	**1**	**A B3 C A 1 B 1 = TYPICAL MODEL NUMBER**

BROOKS SMART MASS FLOW PRODUCTS
SMART MASS FLOW METERS / CONTROLLERS

NOTES:

1.

ENHANCEMENTS

PLEASE FILL IN THE REQUESTED SPECIFICATIONS WHEN YOU HAVE DESCRIBED THE ENHANCEMENTS.

Standard response time of the flow output signal: Model 5850/51 and 5860/60, standard 1 sec. or on request better than 0.2 sec. Model 5853/63, standard 3 sec. or on request better than 1 sec. Model 5864, 3 sec.

Standard settling time for controllers: Model 5850/51, standard 1 sec. or on request better than 0.2 sec.

Model 5853, standard 3 sec. or on request better than 1 sec. (to within 2%full scale of final value)

2.

AREA SAFETY CLASSIFICATION

A "SPECIAL" CABLE CONNECTOR IS REQUIRED FOR ZONE 2 CERTIFICATION REQUIREMENTS.

THIS WILL BE SUPPLIED WHEN YOU HAVE SELECTED THE INTERCONNECTING CABLE. IF THE CUSTOMER MAKES HIS OWN CABLE SET; YOU ALWAYS HAVE TO SELECT POSITION B - "MATING CONNECTOR ONLY".

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3. **OPTIONS**
A) HIGH PRESSURE RATING 300 BAR FOR MODEL 5861S
B) FOR GASES WHICH CLOG AND CONTAMINATE THE MFC EASILY, AN ANTI-CLOG LAMINAR FLOW ELEMENT MUST BE ORDERED. FOR FLOW RANGES UP TO 3460 mln/min. N2, ADD:
C) 0 - 10 Vdc I/O CONFIGURATION (NO FURTHER I/O OPTIONS ARE POSSIBLE WITH THIS SELECTION)
D) 0 - 5 Vdc Input / 0 - 10 Vdc output (0550E replacement configuration)
E) DIN/ANSI (PN40/150 LBS PRESSURE RATING) FLANGED CONNECTION FOR THE 1,5" AND 2" 5864S
F) ENHANCED ACCURACY SPECIFICATIONS: 0.5% OF RATE PLUS 0.1% F.S. (Flow range 50 mln/min to 100 ln/min)
G) INTERCONNECTION CABLE, ADD PER METER:
H) INTERCONNECTION CABLE FOR RS-485 MULTI DROP CONFIGURATION, BASIS PRICE FOR THE FIRST DEVICE (3 METER CABLE LENGTH) ADD PER METER:
PRICE ADDER FOR AN ADDITIONAL DEVICE (1 MTR CABLE LENGTH):
I) O-RING / VALVE MATERIAL Selection B can only be delivered for a 5853 model in combination with a Teflon Diaphragm
Selection D can be delivered only in combination of a Teflon Diaphragm for Model 5853 price adder
Selection D for Model 5863 price adder

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Models 5800-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 SERVICE AND SUPPORT

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

Visit www.BrooksInstrument.com 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

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

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

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

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