

# Brooks® Model SLA7840 Remote Transducer Pressure/Flow Controller

*Model SLA7840D  
Digital I/O DeviceNet™*



*Model SLA7840A  
Analog I/O*

# Essential Instructions

## Read this page before proceeding!

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

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

## Pressure Equipment Directive (PED)

All pressure equipment with an internal pressure greater than 0.5 bar (g) and a size larger than 25mm or 1" (inch) falls under the Pressure Equipment Directive (PED). The Directive is applicable within the European Economic Area (EU plus Norway, Iceland and Liechtenstein). Pressure equipment can be traded freely within this area once the PED has been complied with.

- Section 1 of this manual contains important safety and operating instructions related to the PED directive.
- Meters described in this manual are in compliance with EN directive 97/23/EC module H *Conformity Assessment*.
- All Brooks Instrument Flowmeters fall under fluid group 1.
- Meters larger than 25mm or 1" (inch) are in compliance with category I, II, III of PED.
- Meters of 25mm or 1" (inch) or smaller are Sound Engineering Practice (SEP).

## ESD (Electrostatic Discharge)

### CAUTION

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

#### Handling Procedure:

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

#### Comments

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

## Installation and Operation Manual

X-PR-SLA7800-RT-eng  
Part Number: 541B048AAG  
August, 2009

Model SLA7840

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Dear Customer,

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

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

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

Yours sincerely,  
Brooks Instrument

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**Section 1 Introduction**

<u>Paragraph Number</u>	<u>Page Number</u>
1-1 Scope .....	1-1
1-2 Purpose .....	1-1
1-3 Description .....	1-1
1-4 Specifications .....	1-2

**Section 2 Installation**

2-1 General .....	2-1
2-2 Receipt of Equipment .....	2-1
2-3 Recommended Storage Practice .....	2-1
2-4 Return Shipment .....	2-2
2-5 Transit Precautions .....	2-2
2-6 Removal from Storage .....	2-2
2-7 Gas Connections .....	2-3
2-8 In-Line Filter .....	2-3
2-9 Installation .....	2-3
2-10 Electrical Interface (Analog I/O) .....	2-4
2-11 Operation Check Procedure (Analog I/O) .....	2-5
2-12 Electrical Interface (DeviceNet I/O) .....	2-6
2-13 Electrical Interface (Analog I/O) .....	2-6

**Section 3 Operation**

3-1 Overview .....	3-1
3-2 Theory of Operation for Flow measurement .....	3-1
3-3 Theory of Operation for Remote Transducer .....	3-2
3-4 Analog Mode of Operation .....	3-4
3-5 DeviceNet Mode of Operation .....	3-5
3-6 Calibration Data Sets .....	3-6

**Section 4 Maintenance & Troubleshooting**

4-1 Overview .....	4-1
4-2 Troubleshooting .....	4-1
4-3 Gas Conversion Factors .....	4-5
4-4 Orifice Sizing .....	4-6
4-5 Restrictor Sizing .....	4-6

**Section A CE Certification**

CE Certification of Mass Flow Equipment .....	A-1
---	-----

<b>Warranty, Local Sales/Service Contact Information</b> .....	Back Cover
--	------------

Model SLA7840

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**Figures**

<b>Figure Number</b>	<b>Page</b>
1-1 Model SLA7840A Analog I/O Controller with 1/4" VCR Connections .....	1-6
1-2 Model SLA7840D Digital I/O DeviceNet Controller with 1/4" VCR Connections .....	1-6
2-1 5-Pin Shielded Cable Hookup Diagram - Voltage I/O Versions .....	2-6
2-2 15-Pin D-Connector Shielded Cable Hookup Diagram - Voltage I/O Version .....	2-6
2-3 Common Electrical Hookups for 15-Pin D-Connector Voltage I/O Version .....	2-6
3-1 Flow sensor Operational Diagram .....	3-2
3-2 Model SLA7840 System Block Diagram .....	3-3
3-3 Typical Application for Downstream Controller .....	3-3
3-4 Typical Application for Upstream Controller .....	3-4
3-5 Externally Accessible Adjustment .....	3-6
4-1 Bench Troubleshooting Circuit .....	4-3

**Tables**

<b>Table Number</b>	<b>Page Number</b>
2-1 Recommended Filter Size .....	2-3
4-1 Sensor Troubleshooting .....	4-4
4-2 Orifice Capacities .....	4-6
4-3 Model SLA7840 Standard Restrictors .....	4-7

## 1-1 Scope

Thank you for purchasing a Brooks Instrument Model SLA7840 Remote Transducer (RT). This manual Part Number 541B048AHG is a complete installation and operation manual for your instrument.

## 1-2 Purpose

This manual is organized into the following sections:

Section 1	Introduction
Section 2	Installation
Section 3	Operation
Section 4	Maintenance & Troubleshooting
Section A	CE Certification
Back Cover	Warranty, Local Sales/Service Contact Information

It is recommended that this manual be read in its entirety before attempting to operate or repair the Brooks Model SLA7840.

## 1-3 Description

Brooks Instrument's Model SLA7840 is a 1-1/8" wide profile metal sealed instrument that controls pressure while measuring flow rate. The Model SLA7840 receives a remote pressure transducer signal, and using adjustable integral PID control electronics and a control valve, maintains a desired set pressure. In addition to the pressure function, the Model SLA7840 provides a 0-5 V signal that is linear with mass flow rate. The Model SLA7840 can also be configured as a mass flow controller for calibration or test purposes.

### Superior Valve Technology

The co-planar valve offers unmatched performance. Due to its simplified construction, the valve exhibits superior repeatability, stability, and response time. Instruments are less sensitive to pressure variations in the process because of the larger valve control range. The co-planar valve also offers lower leak-by rates compared to other metal sealed controllers. These advancements ensure a more stable process over time.

### Highly Adaptable Configurations

The 1-1/8" body offers a compact, space saving footprint. The SLA7840 is easily retrofitable to existing gas box designs that utilize the traditional 1-1/2" body platform. Likewise, the all-digital electronics is adaptable and allows the SLA7840 to serve as a direct replacement for existing analog products bringing with them greatly improved accuracy and reliability.

Model SLA7840

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**Broad Array of Communication Options**

Brooks offers the Model SLA7840 with a traditional 0-5 volt analog option. Brooks also offers control interface with DeviceNet™, a high-speed (up to 500k baud) digital communication network. Brooks' communication capabilities and device-profiles have been certified by the ODVA™ (Open DeviceNet Vendor's Association). Other network protocols are in development. Talk to your Brooks representative about your specific needs.

**Reduced Cost of Ownership**

The Model SLA7840 allows multi-gas and multi-range capabilities to reduce customer inventory. Storage and pre-programming of up to 10 gas calibrations easily permits users to switch between different gases and ranges on a single device. Also, the greater control range provided by the co-planar valve gives users the option to decrease the number of parts needed to control their entire process.

**1-4 Specifications**

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**⚠ WARNING**

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

**PERFORMANCE CHARACTERISTICS: Flow****Flow Ranges\*\***

Model SLA7840

Any range from 0-3 sccm to 0-30,000 sccm N<sub>2</sub>eq.**\*\*Standard 0° and 101kPa (760 Torr). Per SEMI Guideline E12-96.****Flow Accuracy**

±1.0% of rate, including linearity (20% to 100% full scale),

±0.2% of full scale (below 20% full scale.)

**Flow Repeatability**

±0.20% of rate



**Analog I/O Pin Connections for 15-pin D-Connector:**

PIN #	FUNCTION
1	SETPOINT/COMMAND COMMON
2	FLOW SIGNAL OUT
5	+15V DC POWER
8	SETPOINT/COMMAND IN
9	POWER SUPPLY COMMON
10	OUTPUT SIGNAL COMMON
11	+5V REFERENCE
12	VALVE OVERRIDE
13	MODE SELECT PIN
15	REMOTE SENSOR IN
3, 4, 6, 7, 14	NOT CONNECTED

**Flow Temperature Sensitivity**

Zero: Less than 0.035% F.S. per °C

Span: Less than 0.1% of rate per °C

**Flow Settling Time**

Less than 1 second to within ±2% full scale of final value for a 0-100% step per SEMI Guideline E17-91.

**PERFORMANCE CHARACTERISTICS:**

**Pressure Ranges**

Dependent upon remote transducer, maximum 500 psig.

**External Sensor Input**

Suitable for pressure sensors with maximum 0-10 Vdc output signals.

**Pressure Control Range**

20:1

**Pressure Settling Time**

Less than 1 second typical for a 20-100% setpoint step with maximum 2% overshoot. Actual pressure response highly dependent on system design.

**RATINGS:**

**Operating Pressure**

500 psig maximum

**Pressure Equipment Directive (PED) 97/23/EC:** Equipment falls under Sound Engineering Practice (SEP).

**Leak Integrity**

Inboard to Outboard:  $1 \times 10^{-10}$  atm scc/sec Helium max.

**Ambient Temperature Limits**

Operating: 0°C to 60°C (32°F to 140°F)

Non-Operating: -25°C to 100°C (-13°F to 212°F)

**Fluid Temperature Limits**

0°C to 65°C (32°F to 149°F)

Model SLA7840

**PHYSICAL:**

**⚠ CAUTION**

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

**Materials of Construction**

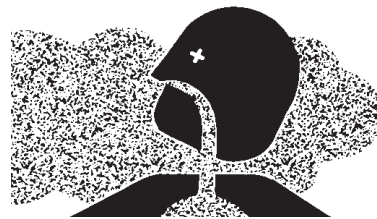
316L (VAR), 316L, and high-alloy ferritic stainless steel.

External/internal seals: Nickel

Valve seat: 316L stainless steel - standard

Internal Wetted Surface Finish: 32 Ra maximum

**⚠ WARNING**



**METER/CONTROLLER SEAL COMPATIBILITY**

Products in this manual may contain metal or elastomeric seals, gaskets, O-rings or valve seats. It is the "user's" responsibility to select materials that are compatible with their process and process conditions. Using materials that are not compatible with the process or process conditions could result in the Meter or Controller leaking process fluid outside the pressure boundary of the device, resulting in personnel injury or death.

It is recommended that the user check the Meter or Controller on a regular schedule to ensure that it is leak free as both metal and elastomeric seals, gaskets, O-rings and valve seats may change with age, exposure to process fluid, temperature, and /or pressure.

**Dimensions**

Refer to Figures 1-1 and 1-2

**Process Connections**

1/4" male VCR™ (standard)

**Electrical Characteristics:**

**Electrical Connections**

Analog I/O option: 15-pin D-Connector, male:

DeviceNet I/O option: 5-pin Micro-Connector, male

**Power Supply Voltage**

Analog I/O option: +15 Vdc, ±5% (traditional -15 Vdc pin is ignored)

DeviceNet I/O option: 11-25 Vdc

**Power Requirements:**

	Watts, typical	Watts, max.
Analog I/O option	3.6	4.0
DeviceNet I/O option	6.9	7.6

**Setpoint Input (Analog I/O option only)**

0-5 Vdc: Input will accept signals to 5.5 Vdc (110% F.S.).  
Input resistance: 360 Kohm min.

**Flow Output (Analog I/O option only)**

0-5 Vdc into 2 Kohm minimum load.  
Output will indicate process variable up to 5.5 Vdc (110% F.S.).

**Valve Override Signal (Analog I/O option only)**

Left floating/unconnected – instrument controls valve to command setpoint  
Connected to signal at or above 5.0 Volts (maximum 16 Vdc)  
– valve is forced open  
Connected to signal at or below 0.0 Volts (minimum -1 Vdc)  
– valve is forced closed

**5 Volt Reference Signal (Analog I/O option)**

For use with potentiometer command setpoint input  
±0.2%, into 1K ohm (minimum load)

**Mode Select Signal**

Select whether to control in external sensor mode (pressure) or flow mode.  
Open (disconnected) = unit operation in flow control mode  
Closed (grounded) = unit operation in pressure control mode

**External Sensor Input**

0-10 Vdc: Input will accept signals to 10.2 Vdc.  
Input resistance = 480 Kohm nominal.

Model SLA7840

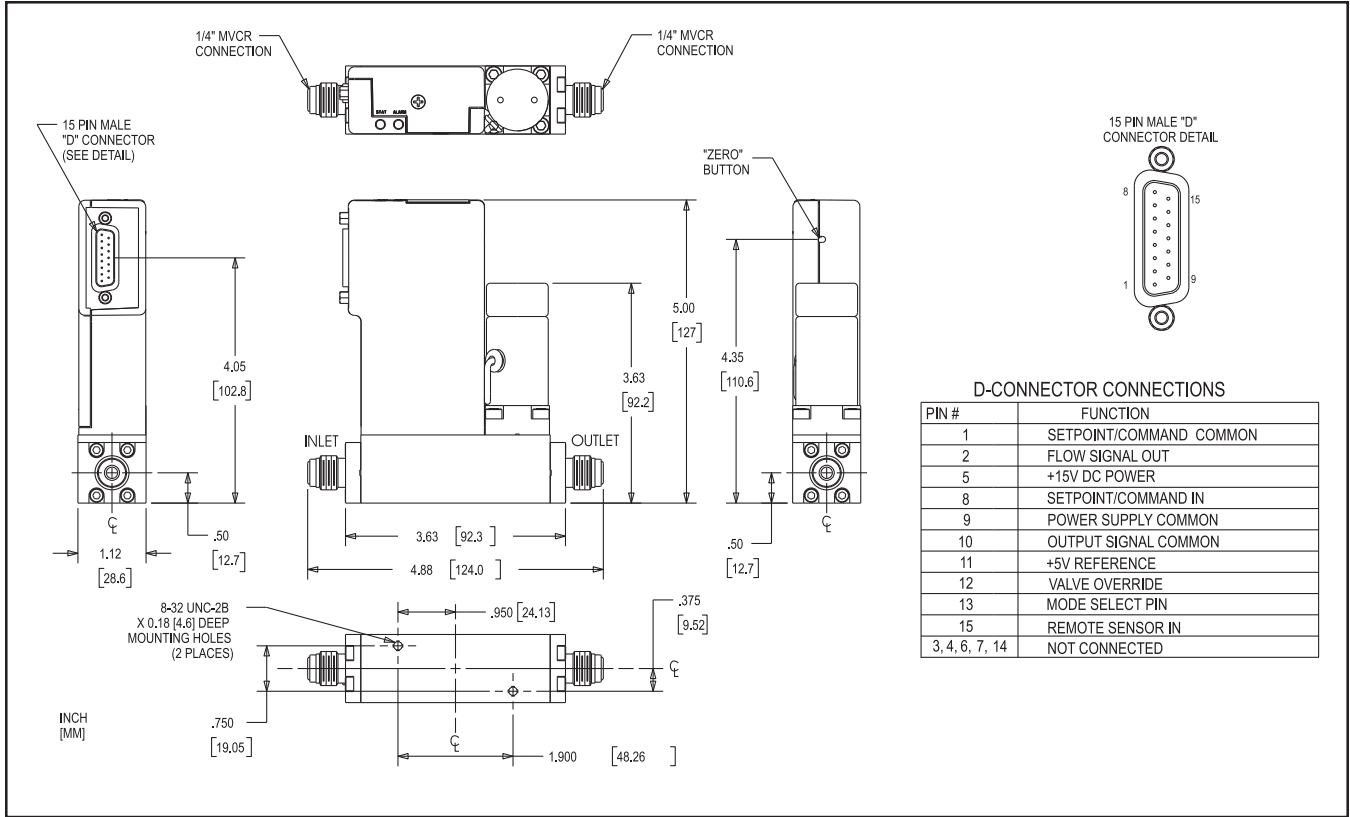


Figure 1-1 Model SLA7840A Analog I/O Controller with 1/4" VCR Connections

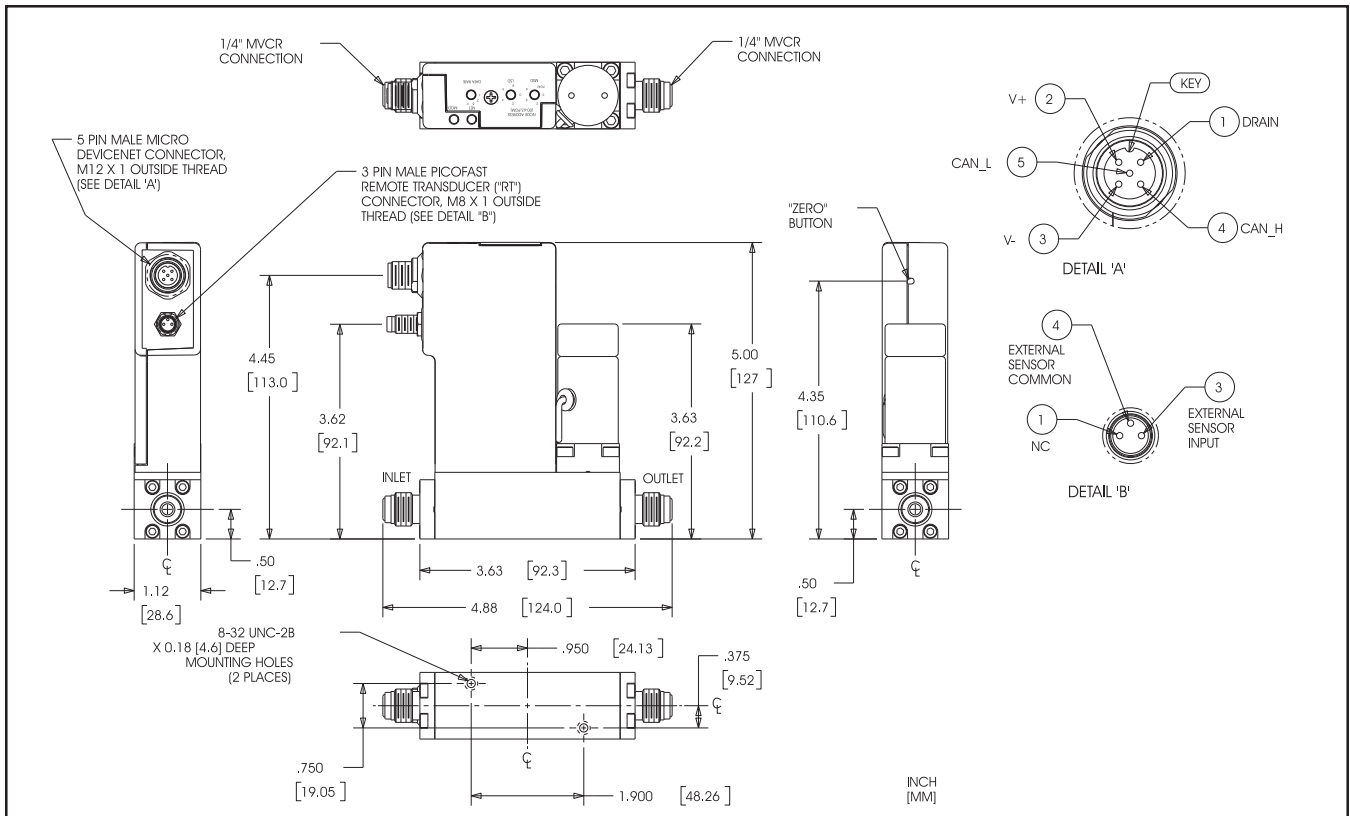


Figure 1-2 Model SLA7840D Digital I/O DeviceNet Controller with 1/4" VCR Connections

## 2-1 General

This section provides installation instructions for the Brooks Model SLA7840 Remote Transducer. Figures 1-1 and 1-2 show the Model SLA7840 dimensions, gas connections and electrical connection locations for an RT.

## 2-2 Receipt of Equipment

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

### Brooks Instrument

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

### Brooks Instrument

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

### Brooks Instrument

1-4-4 Kitasuna Koto-Ku  
Tokyo, 136-0073 Japan  
Tel +81 (0) 3 5633 7100  
Fax +81 (0) 3 5633 7101  
Email: BrooksAs@BrooksInstrument.com

Remove the envelope containing the packing list. Outside of your clean area, carefully remove the equipment from the packing case. Make sure spare parts are not discarded with the packing material. Inspect for damaged or missing parts.

This device has been assembled, calibrated and double-vacuum bagged in a Class 100 clean room. In your semi-clean area, remove the outer bag only. Pass your Model SLA7840 Ultra-Clean Metal Seal Remote Transducer Controller into your clean area. Remove the second clean room compatible bag only when the equipment is ready to be tested and/or installed in your clean system.

## 2-3 Recommended Storage Practice

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

- a. In the original vacuum bag and shipping container.
- b. In a sheltered area with the following conditions:
  1. Ambient temperature 21°C (70°F) nominal, 40°C (104°F) maximum and 7°C (45°F) minimum.
  2. Relative humidity 45% nominal, 60% maximum and 25% minimum.

## Model SLA7840

**2-4 Return Shipment**

Prior to returning any instrument to the factory, contact your nearest Brooks location for a Return Materials Authorization Number (RMA#). This can be obtained from one of the following locations:

**Brooks Instrument**

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

**Brooks Instrument**

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

**Brooks Instrument**

1-4-4 Kitasuna Koto-Ku  
Tokyo, 136-0073 Japan  
Tel +81 (0) 3 5633 7100  
Fax +81 (0) 3 5633 7101  
Email: BrooksAs@BrooksInstrument.com

Instrument must have been purged in accordance with the following:

**⚠ WARNING**

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

Completion of form RPR003-1, Brooks Instrument Decontamination Statement. A copy of this form can be downloaded from the Brooks website [www.brooksinstrument.com](http://www.brooksinstrument.com) or is available from any Brooks Instrument location listed above. This is required before any Brooks Personnel can begin processing. Copies of the form can be obtained from any Brooks Instrument location listed above. Provide a Material Safety Data Sheet (MSDS) for the fluid(s) used in the instrument.

**2-5 Transit Precautions**

To safeguard against damage during transit, transport the instrument to the installation site in the same container used for transportation from the factory if circumstances permit.

**2-6 Removal from Storage**

Upon removal from storage, a visual inspection should be conducted to verify the condition of the equipment is "as received." If the equipment has been in storage in conditions in excess of those recommended (See Section 2-3), the device should be subjected to a pneumatic pressure test in accordance with applicable vessel codes. To maintain the ultra-clean integrity, this service should be performed by the factory or one of the authorized service centers.

## 2-7 Gas Connections

Standard inlet and outlet connections supplied on the Model SLA7840 are 1/4"(M) VCR or Downport surface mount per Semi 2787. Prior to installation ensure all piping is clean and free from obstructions. Install piping in such a manner that permits easy access to the instrument if removal becomes necessary.

## 2-8 In-Line Filter

It is recommended that an in-line filter be installed upstream from the mass flow controller to prevent the possibility of any foreign material entering the flow sensor or control valve. The filtering element should be replaced periodically or ultrasonically cleaned.

Table 2-1 Recommended Filter Size

Maximum Flow Rate	Recommended Filter
100 sccm	1 micron
500 sccm	2 microns
1 to 5 slpm	7 microns
10 to 30 slpm	15 microns

## 2-9 Installation

### CAUTION

When installing the device, care should be taken that no foreign materials enter the inlet or outlet of the instrument. Do not remove the protective end caps until time of installation.

### CAUTION

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

Recommended installation procedures:

- The Model SLA7840 RT should be located in a clean, dry atmosphere relatively free from shock and vibration.
- Leave sufficient room for access to Self-zero function push-button.
- Install in such a manner that permits easy removal if the instrument requires servicing.

### CAUTION

When used with a reactive (sometimes toxic) gas, contamination or corrosion may occur as a result of plumbing leaks or improper purging. Plumbing should be checked carefully for leaks and the instrument purged with clean, dry N<sub>2</sub> before use.

- The Model SLA7840 RT can be installed in any position. However, mounting in orientations other than the original factory calibration (see calibration data sheet supplied with the instrument) can result in a  $\pm 0.2\%$  maximum full scale shift after rezeroing.

## Model SLA7840

**⚠ CAUTION**

Use caution when installing surface mount (downported) controllers. Most metal seals can not be reused after compression. Follow the seal manufacturers' recommendations for installation. Tighten the mounting screws in 10in-lb (1.1 n-m) increments such that the seal undergoes uniform compression. Final torque values depends on the screw and hardware material and lubrication.

e. When installing a controller with 1/4" (m) VCR end fittings and with full scale flow rates of 10 slpm or greater, be aware that sharp, abrupt angles in the system piping directly upstream of the device may cause a small shift in accuracy. If possible, have at least ten pipe diameters of straight tubing upstream of the controller.

**⚠ CAUTION**

Since the Model SL7840 control valve is designed as a control valve only, it may not provide positive shut-off. A separate shut-off valve may be installed downstream for that purpose. It should be noted that a small amount of gas may be trapped between the downstream side of the mass flow controller and the shut-off valve which will result in a surge upon actuation of the shut-off valve. This surge can be reduced in magnitude either by locating the controller and the shut-off valve closer together or by moving the shut-off valve upstream of the controller.

**2-10 Electrical Interface (Analog I/O)**

The Model SLA7840 RT is controlled using analog 0-5 Vdc signals. The minimum set of connections which must be made to the Model SLA7840 RT includes +15 Vdc, supply common, and a setpoint signal. The setpoint signal is supplied as a 0 to 5 Vdc analog signal. All signals are supplied via the 15-pin D-Connector. Refer to Figures 2-2, 2-3 and 2-4 for connections.

The Model SLA7840 RT electrical interface is designed to facilitate low-loss, quiet signal connections. Separate returns (commons) are supplied for the analog setpoint, analog flow signal, and the power supply. These commons are electrically connected together on the Model SLA7840 RT PC board.

**Voltage I/O Version**

- Signal Common
- Signal Output
- +15 Vdc Supply
- Setpoint Input
- Setpoint Common
- Supply Common



**⚠ NOTICE**

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

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

**2-11 Operation Check Procedure (Analog I/O)**

- a. Mount the RT in its final orientation.
- b. Apply power to the RT and allow approximately one hour for the instrument to warm up and stabilize its temperature.
- c. Do NOT supply gas to the RT. Ensure that the differential pressure across the RT is 0 psid. Ensure that the RT is set for flow mode.
- d. Check the RT zero output signal.
- e. The analog output signal should be equivalent to  $0.0 \pm 0.2\%$  FS ( $0.000 \pm 0.010$  Vdc). If the zero exceeds one of these limits, follow the re-zeroing procedure in Section 3-5.
- f. Turn on the gas supply. A positive flow signal may be present due to valve leak-thru. At 0% setpoint the flow signal output  $< 0.5\%$  FS  $0.025$  Vdc.
- g. If flow signal at 0% setpoint is  $> 0.5\%$ , then there is too much leak-through across the valve, and the RT would need a valve valve adjustment.
- h. Supply a setpoint voltage between 1 and 5 Vdc.
- i. Check the RT analog output signal. The output voltage signal should match the setpoint voltage ( $\pm 20$ mV) within 10 seconds after the setpoint is changed.
- j. If flow output signal does not match setpoint, and pressure settings are correct, this could indicate a problem in the RT. A secondary issue could be the gas type. When checking with a surrogate gas, ensure that there is enough pressure to the RT in order to flow the correct amount of the surrogate gas.

**Example:**

Checking an RT calibrated for 100 sccm SF<sub>6</sub> (sulfur hexafluoride). The sensor factor using N<sub>2</sub> (nitrogen) is 0.27, therefore the equivalent N<sub>2</sub> needed is  $100/0.27 = 370.4$  sccm. This may require a pressure increase

Model SLA7840

2-12 Electrical Interface (DeviceNet I/O)

Power and network signals are interfaced to the MFC through the standard 5-pin Micro-connector on the device. This connector is specified in the DeviceNet Specification, Vol. 1, Section 9-3.6.3 and is defined as a male, sealed, micro-style connector. The figure below illustrates the electrical connections to the device.

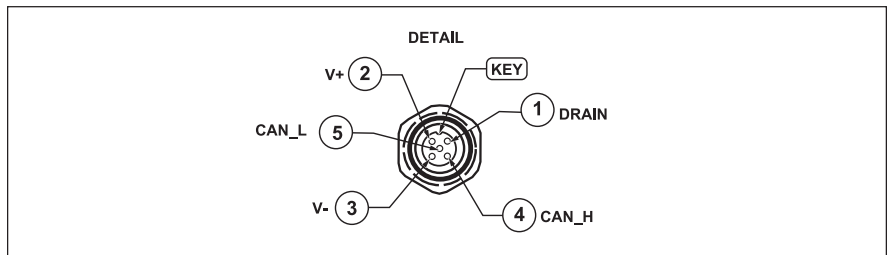


Figure 2-1 5-pin Shielded Cable Hookup Diagram - Voltage I/O Versions

2-13 Electrical Interface (Analog I/O and RS-485)

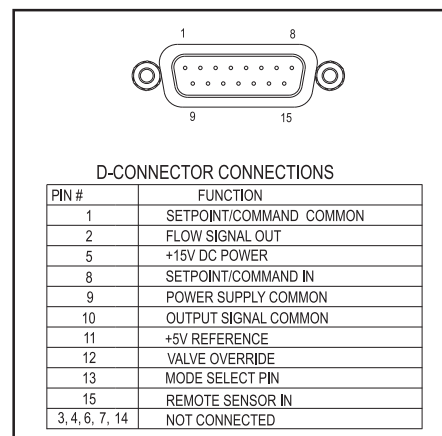


Figure 2-2 15-Pin D-Connector Shielded Cable Hookup Diagram - Voltage I/O Version

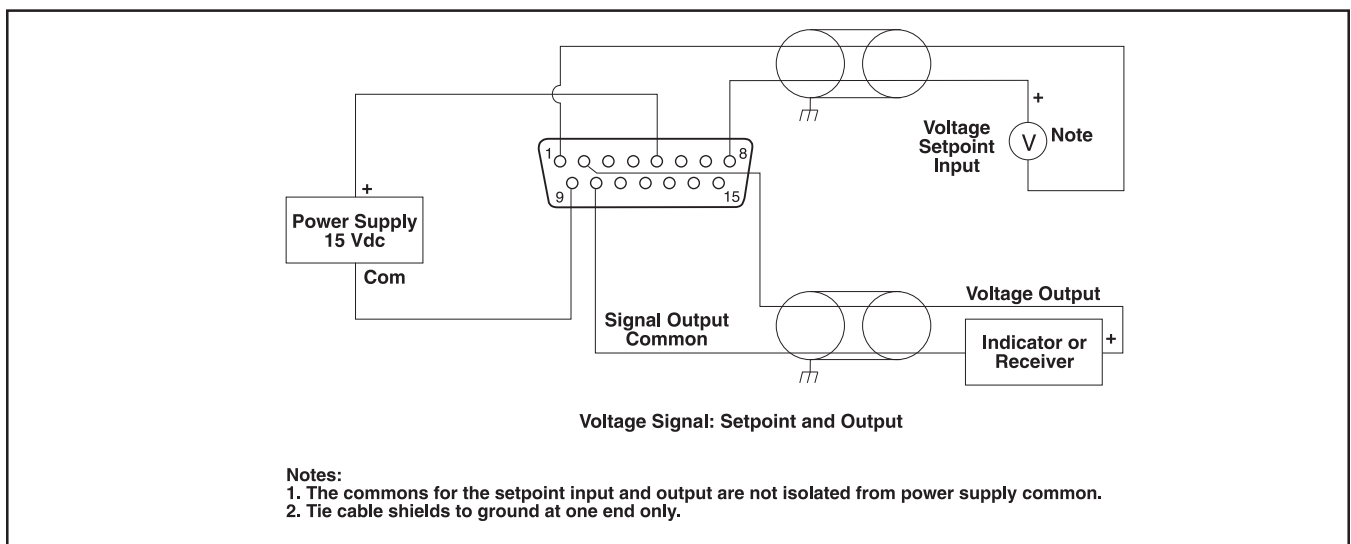


Figure 2-3 Common Electrical Hookups for 15-Pin D-Connector Voltage I/O Version

### 3-1 Overview

This section contains the following information:

- Theory of Operation
- Functional Description

### 3-2 Theory of Operation for Flow Measurement

The thermal mass flow measurement system consists of two components: the restrictor and the flow sensor. Figure 3-4 contains a diagram of the flow stream through the RT with an enlarged view of the flow sensor. Gas flow entering the RT is separated into two paths; one straight through the restrictor and the other through the flow sensor. This is represented in Figure 3-1 where the total flow A+B enters the RT and is separated into streams A and B. The streams are joined again at the far side of the restrictor.

The separation of the flow streams is caused by the restrictor. During flow conditions there will be a pressure differential across the restrictor which forces gas to flow in the sensor. The pressure difference caused by the restrictor varies linearly with total flow rate. The sensor has the same linear pressure difference versus flow relationship. The ratio of sensor flow to the flow through the restrictor remains constant over the range of the RT ( $A/B = \text{constant}$ ). The full scale flow rate of the RT is established by selecting a restrictor with the correct pressure differential for the desired flow.

The flow sensor is a very narrow, thin-walled stainless steel tube. Onto this tube are built upstream and downstream temperature sensing elements on either side of a heating element. Constant power is applied to the heater element, which is located at the midpoint of the sensor tube. During no-flow conditions, the amount of heat reaching each temperature sensor is equal, so temperatures T1 and T2 (Fig. 3-1) are equal. Gas flowing through the tube carries heat away from the upstream temperature sensor and toward the downstream sensor. The temperature difference,  $T_2 - T_1$ , is directly proportional to the gas mass flow. The equation is:

$$DT = A \times P \times C_p \times m$$

Where,

DT = Temperature difference  $T_2 - T_1$  ( $^{\circ}\text{K}$ )

A = Constant of proportionality ( $\text{S}^2 \cdot ^{\circ}\text{K}^2 / \text{kJ}^2$ )

P = Heater Power

$C_p$  = specific heat of the gas at constant pressure ( $\text{kJ/kg} \cdot ^{\circ}\text{K}$ )

m = Mass Flow ( $\text{kg/s}$ )

A bridge circuit and a differential amplifier interpret the temperature difference and generate an electrical signal directly proportional to the gas mass flow rate.

## Model SLA7840

## 3-3 Theory of Operation for Remote Transducer

A user supplied pressure sensor, with a full scale output signal of 5 or 10 Vdc, monitors the pressure in a vessel or a feed or exhaust line from the vessel. The control electronics in the Model SLA7840 compares the pressure signal to a setpoint and acts to regulate the flow through the integral solenoid control valve to stabilize the pressure at the setpoint. An integral mass flow sensor identical in design to the Brooks Model SLA7840 provides a 5 Vdc full scale signal proportional to the flow through the control valve. A system block diagram is shown in Figure 3-1.

The integration of mass flow sensor, control electronics and control valve into one unit results in a compact size. The mounting dimensions are comparable to a mass flow controller. Refer to Figure 3-2.

In the upstream pressure regulation mode shown in Figure 3-4, the pressure controller is placed at the outlet of the pressure vessel. The pressure in the process upstream of the controller will be constant independent of downstream variation. Pressure control takes place at the outlet side of the pressure vessel.

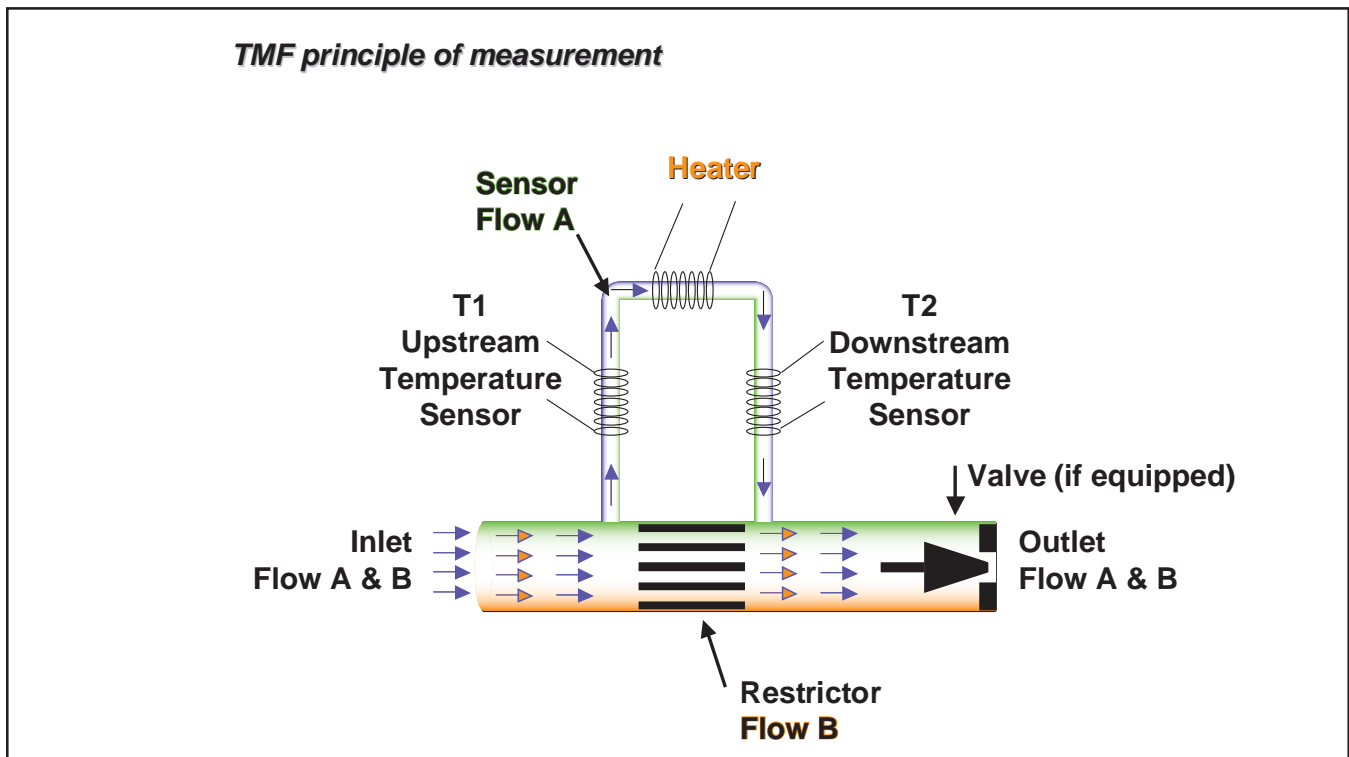


Figure 3-1 Flow Sensor Operational Diagram

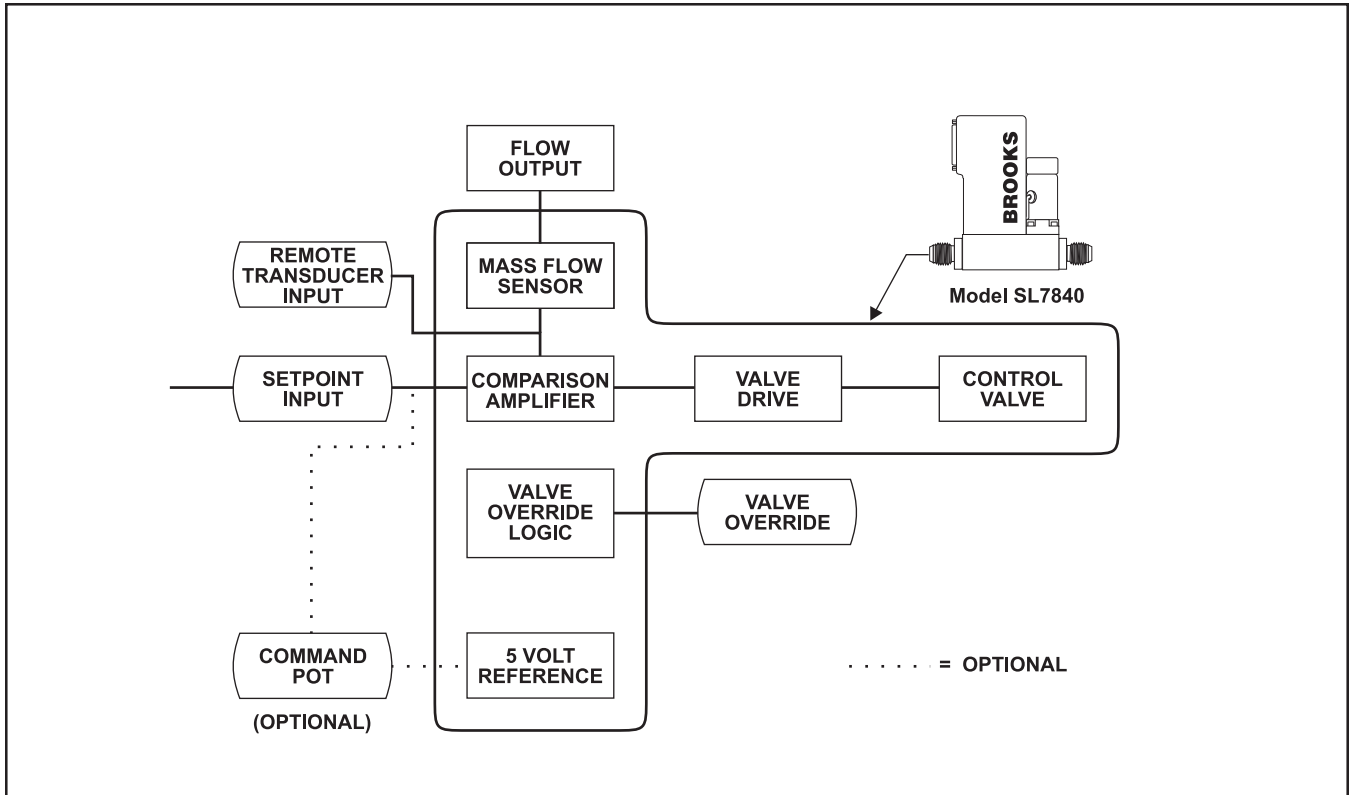


Figure 3-2 Model SLA7840 System Block Diagram

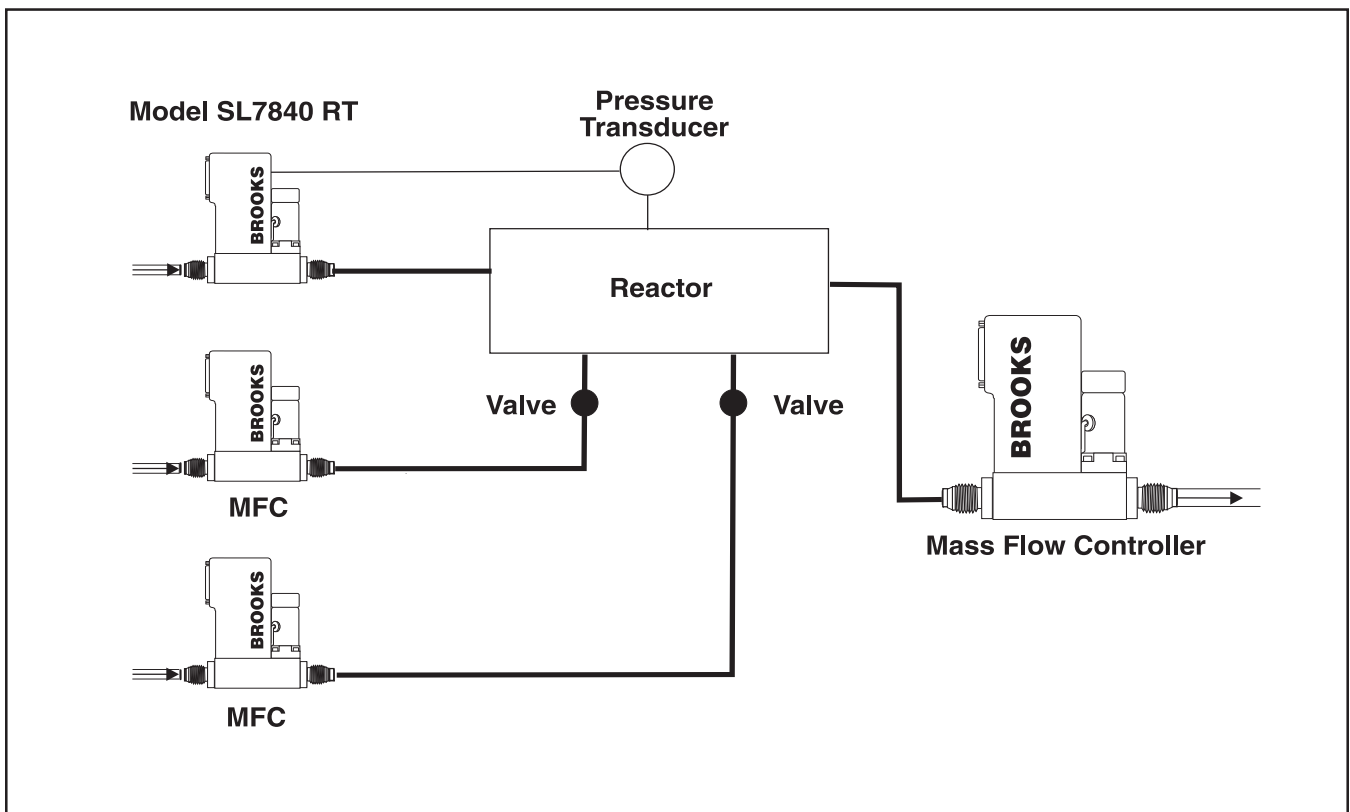


Figure 3-3 Model Typical Application of Downstream Controller

## Model SLA7840

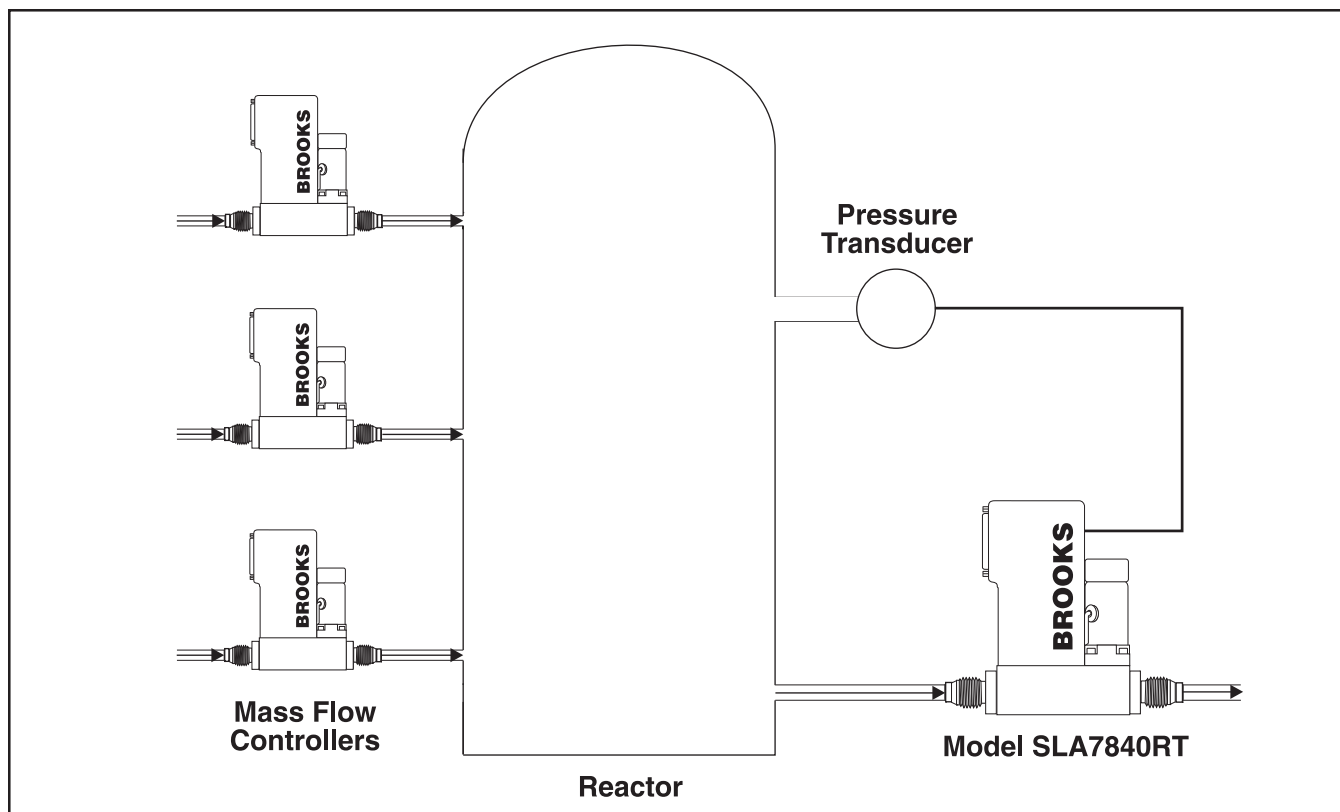


Figure 3-4 Typical Application of Upstream Controller

### 3-4 Analog Mode of Operation

#### A. Functional Description

The analog interface is consistent with other Brooks analog RTs. This includes a 0-5 volt setpoint input, 0-5 volt flow signal output and Valve Override input. Before operating the Model SLA7840, apply power and warm-up the instrument for approximately one hour. After warm-up, apply gas pressure then proceed by following the instructions in the following sections.

#### B. Analog Setpoint

This input allows the user to establish the RT setpoint. The usable range of this input is from 0 to 5.5 Vdc which corresponds to 0 to 110% of the RT full scale flow rate. Setpoints below 50 mV will be treated as 0 volt setpoints. For setpoints below 0 Vdc the RT behaves as if a 0 Vdc setpoint is present. Setpoints above 5.5 Vdc will cause a setpoint of at least 110% FS.

#### C. Analog Flow Signal

This output is used to indicate the flow signal. The range of this signal is from -0.5 to 5.5 Vdc, with the range of 0 to 5.5 Vdc corresponding to a calibrated flow signal of 0 to 110% of the full scale flow rate. A negative flow signal indicates reverse flow through the device, but is NOT calibrated. The analog flow signal is capable of resolving signals to 1.0 mV.

#### D. Valve Override

This input allows the valve to be forced to its most closed state or its most open state, regardless of setpoint. If this input is not electrically connected the MFC will operate according to the current values of the other MFC inputs. If this input is held at 0 Vdc, the valve will be forced to its most closed state. If this input is held to +15 Vdc the valve will be forced to its most open state.

#### E. Mode Select Pin

Pin 13 on the 15 pin 'D' connector allows for selection of RT operating mode. The Mode Select Pin is controlled similar to operating a switch. If the connection to the pin is 'OPEN', then the RT will operate in its flow control mode. If the connection to the pin is 'CLOSED' to Signal Common (Pin #10), then the RT will operate in its pressure control mode.

When the mode select pin changes state, the device performs any required processing to change the mode, then returns to normal operation. Typical time required to change modes is approximately 0.5 seconds.

NOTE: It is recommended to change operating modes during no-flow conditions.

#### F. Zeroing the RT (Self-zero)

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

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

Once zero differential pressure is established and verified, press the recessed, momentary push-button (Self-zero button) located on the side of the device (see Fig. 3-2) to start the Self-zero function.

The zero process requires approximately 200 msec. During this time, the device will set its output signal to 0.0 Vdc.

### 3-5 DeviceNet Mode of Operation

For information on DeviceNet capabilities for Brooks Model SLA7840 refer to the DeviceNet Supplemental Instruction Manual (X-DPT-DeviceNet-SLA7000-RT-eng).

## Model SLA7840

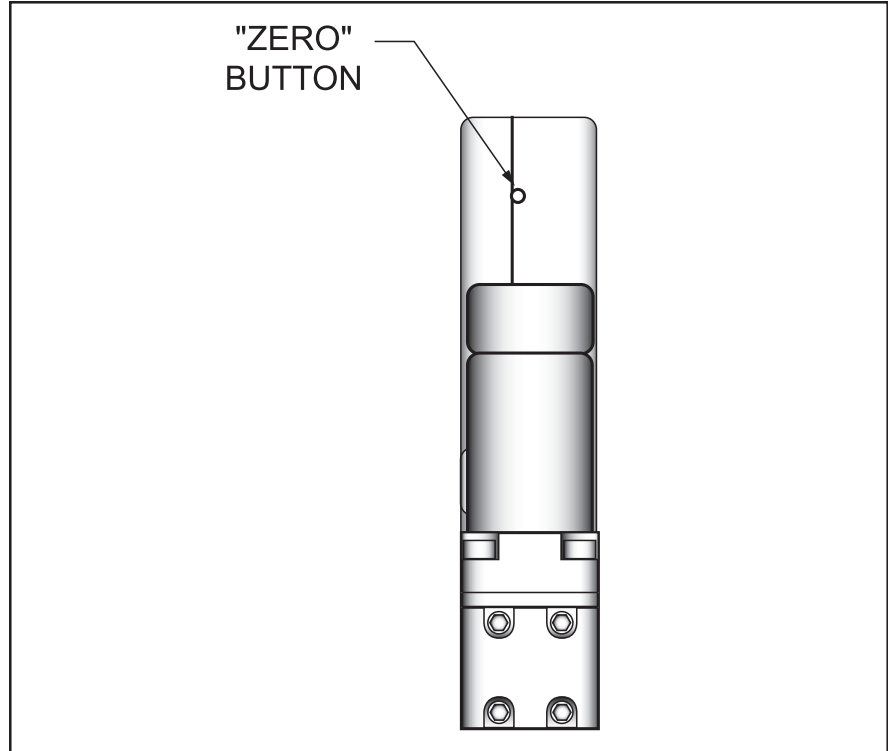


Figure 3-5 Externally Accessible Adjustment

### 3-6 Calibration Data Sets

The Model SLA7840 is capable of storing up to 10 sets of gas calibration data in either analog or DeviceNet modes of operation.

In the analog mode, the user must use the Brooks Service Tool™ to switch between the various active gas calibration data sets. For more information about the Brooks Service Tool, please contact your nearest Brooks sales Representative.

In the DeviceNet mode of operation, the user may use the DeviceNet protocol itself to switch between active gas calibration data sets. For detailed information about performing this and other DeviceNet operations, please reference the Brooks DeviceNet Supplemental Manual for Remote Transducer Pressure/Flow Controllers.



#### 4-1 Overview

No routine maintenance is required on the Model SLA7840. If an in-line filter is used, the filtering elements should be periodically replaced. This section provides the following information:

- Troubleshooting
- Application Information

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

#### 4-2 Troubleshooting

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

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

**⚠ CAUTION**

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

This section contains suggestions to help diagnose RT related problems in the gas distribution system and answers commonly asked questions. As reference, a Bench Flow Circuit can be set up similar to Figure 4-1.

**Flow Mode Issues**

**a. Problem: Flow/flow signal doesn't reach setpoint.**

Failure of the flow rate or flow signal to achieve the setpoint could be caused by a number of factors:

1. Insufficient pressure drop across the Model SLA7840 RT (low or no pressure). If there is not enough pressure differential across the RT, it is impossible for the RT's valve orifice to pass the full scale flow rate. To check for this condition, compare the actual inlet/outlet pressure drop with that specified on the order. Increase the pressure if necessary.
2. Clogged sensor tube. If the RT sensor tube is clogged, the flow signal will be very low or zero while the actual flow will be at the valve's maximum rate.
3. Clogged restrictor. If the RT restrictor becomes clogged, a much larger portion of the flow stream will pass through the sensor rather than going straight through the restrictor. The symptom of this condition is a substantially reduced actual flow with a flow signal that matches the setpoint.
4. If the Valve Override pin is active, the valve will be forced open or closed. Set this pin to its normal level before setting a setpoint.
5. If flow output signal does not match setpoint, and pressure settings are correct, this could indicate a problem in the RT. A secondary issue could be the gas type. When checking with a surrogate gas, ensure that there is enough pressure to the RT in order to flow the correct amount of the surrogate gas.

**b. Problem: Flow rate in excess of 100% at zero setpoint.**

1. Valve Override pin set to open.

**c. Problem: Flow/flow signal 'unstable'.**

Model SLA7840 RT performance is tuned during calibration at the conditions specified on the order. If the conditions in use (inlet and outlet pressure, temperature, attitude, gas or mixture type) are different or become different over time, the RT may not perform as it did when it left the factory. There are numerous solutions to this situation:

1. Restore the conditions to the values as they appear on the order.

2. 'Adaptive valve control' the RT. The RT contains a function which allows it to learn about its environment. Adaptive valve control helps to match the valve performance to the gas, pressure, and temperature of actual use. The RT must be returned to the factory or a trained field service technician can modify "Adaptive Valve Control" settings.

**d. Question: What is the purpose of the push-button on the side of the MFC?**

Answer: This push-button is used to start a Self-zero function, do NOT press it unless you are performing this function as described in Section 3-5.

**⚠ CAUTION**

The sensor of the Model SLA7840 is not removable. Do not attempt to disassemble or remove the sensor from the body. Removing the two hold-down screws may cause irreparable damage to the sensor tube and leakage of the process gas.

**⚠ CAUTION**

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

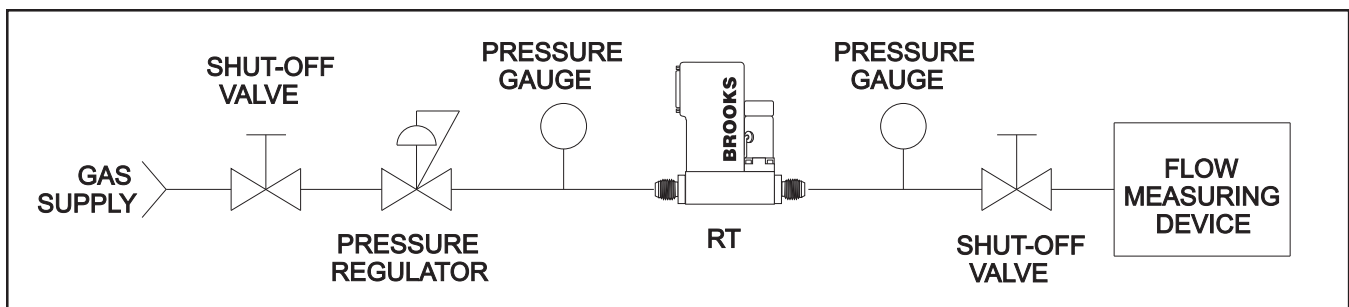
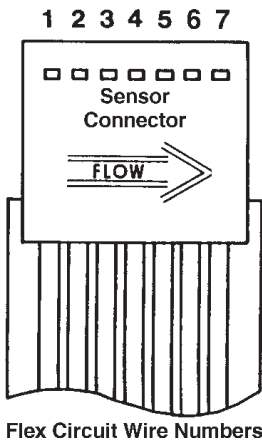


Figure 4-1 Bench Troubleshooting Circuit

*Table 4-1 Sensor Troubleshooting*

SENSOR SCHEMATIC			
<b>PIN NO.</b>	<b>FUNCTION</b>		
1	Heater		
2	Upstream Temperature Sensor (Su)		
3	Downstream Temperature Sensor (Sd)		
4	Sensor Common		
5	Heater Common		
6	Thermistor		
7	Thermistor		

---

**Remove the sensor connector from the PC Board for this procedure.**

OHMMETER CONNECTION	RESULT IF ELECTRICALLY FUNCTIONAL
Pin 1 or 4 to meter body	Open circuit on ohmmeter. If either heater (1) or sensor common (4) are shorted, an ohmmeter reading will be obtained.
Pin 4 to Pin 2	Nominal 1100 ohms reading, depending on temperature and ohmmeter current.
Pin 4 to Pin 3	
Pin 5 to Pin 1	Nominal 1000 ohm reading.
Pin 6 to Pin 7	Nominal 580 ohm reading.

### 4-3 Gas Conversion Factors

If a RT controller is operated on a gas other than the gas it was calibrated with, a scale shift will occur in the relation between the output signal and the mass flow rate. This is due to the difference in heat capacities between the two gases. This scale shift can be approximated by using the ratio of the molar specific heat of the two gases or by sensor conversion factor. Consult factory or nearest Brooks Instrument rep for a list of sensor conversion factors is given in Table 4-5. To change to a new gas, multiply the output reading by the ratio of the gas factor for the desired gas by the gas factor for the calibration gas used.

$$\text{Actual Gas Flow Rate} = \text{Output Reading} \times \frac{\text{Factor of the New Gas}}{\text{Factor of the Calibration Gas}}$$

Example:

The controller is calibrated for Nitrogen.

The desired gas is Carbon Dioxide (CO<sub>2</sub>)

The output reading is 75 sccm when Carbon Dioxide is flowing

Then  $75 \times 0.740 = 55.5$  sccm of (CO<sub>2</sub>)

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

$$\text{Sensor Conversion Factor Mixture} = \frac{100}{\frac{P_1}{\text{Sensor Conversion Factor}_1} + \frac{P_2}{\text{Sensor Conversion Factor}_2} + \frac{P_n}{\text{Sensor Conversion Factor}_n}}$$

Where,

P<sub>1</sub> = percentage (%) of gas 1 (by volume)

P<sub>2</sub> = percentage (%) of gas 2 (by volume)

P<sub>n</sub> = percentage (%) of gas n (by volume)

Example: The desired gas is 20% Helium (He) and 80% Chlorine (Cl) by volume. The desired full scale flow rate of the mixture is 20 slpm. Sensor conversion factor for the mixture is:

Since 2 gases are in the mix;

$$\text{Mixture Factor} = \frac{100}{\frac{20}{1.386} + \frac{80}{.876}} = .945$$

Nitrogen equivalent flow =  $20/.945 = 21.16$  slpm Nitrogen

It is generally accepted that the mass flow rate derived from this equation is only accurate to ±5%. The sensor conversion factors given in Table 4-3 are calculated based on a gas temperature of 21°C and a pressure of one atmosphere. The specific heat of most gases is not strongly pressure, and/or temperature, dependent. However, gas conditions that vary widely from these reference conditions may cause an additional error due to the change in specific heat caused by pressure and/or temperature.

4-4 Orifice Sizing

The flow controller's orifice is factory-sized to a preselected gas, operating pressure and flow range. Note that the orifice is marked with its size in thousandths of an inch. When changing the gas operating pressure (inlet or outlet), or flow range consult the factory for re-sizing information

Table 4-2 Orifice Capacities

Orifice Size (inches)	Minimum Flow Rate (sccm)	
	0°C	(21.1°C)
0.0013	5.3	(5.7)
0.002	12.5	(13.5)
0.003	39.2	(42.2)
0.004	82.5	(88.9)
0.0055	190	(205)
0.007	374	(403)
0.010	748	(806)
0.014	1364	(1469)
0.020	2673	(2879)
0.032	6490	(6991)
0.048	12980	(13980)
0.062	22000	(2879)
0.078	31900	(34400)

Inlet Pressure = 10 psig  
 Outlet Pressure = 10 inches of water (0.4 psig) or less  
 Note: Flow Rate based on Nitrogen

4-5 Restrictor Sizing

The restrictor assembly is a ranging device for the sensor portion of the controller. It creates a pressure drop which is linear with flow rate. This diverts a sample quantity of the process gas flow through the sensor. Each restrictor maintains a ratio of sensor flow to restrictor flow, however, the total flow through each restrictor is different. Different restrictors (active area) have different pressure drops and produce controllers with different full scale flow rates. For a discussion of the interaction of the various parts of the controller, you are urged to review Section 3-2, Theory of Operation.

If the restrictor assembly has been contaminated with foreign matter, the pressure drop versus flow characteristics will be altered and it must be cleaned or replaced. It may also be necessary to replace the restrictor assembly when the mass flow controller is to be calibrated to a new flow rate.

Restrictor assembly replacement should be performed only by trained personnel. Consult Factory / Service center.

**Restrictors**

The Model SLA7840 remote transducer controller uses two types of restrictor assemblies depending on full scale flowrate and expected service conditions.

1. Wire mesh for Nitrogen equivalent flow rates above 3.4 slpm. These restrictor assemblies are made from a cylinder of wire mesh and are easily cleaned if they become contaminated in service.
2. Anti-Clog Laminar Flow Element (A.C.L.F.E.) - This type of restrictor assembly is used for Nitrogen equivalent flow rates less than 3.4 slpm.

If a mixture of two or more gases is being used, the restrictor selection must be based on a Nitrogen equivalent flow rate of the mixture.

Example:

The desired gas is 20% Helium (He) and 80% Chlorine (Cl) by volume. The desired full scale flow rate of the mixture is 20 slpm. Sensor conversion factor for the mixture is:

$$\text{Mixture Factor} = \frac{20}{1.386} + \frac{80}{.876} = .945$$

Nitrogen equivalent flow = 20/.945 = 21.16 slpm Nitrogen. In this example a Size 4 Wire Mesh Assembly would be selected.

Table 4-3 Model SLA7840 Standard Restrictors

Size	Range SCCM Nitrogen Equivalent Flow		Part Number*	
	Low	High	ACLFE	Wire Mesh
D	8.038	11.38	S-110-Z-275-BMG	
G	22.05	31.23	S-110-Z-278-BMG	
J	43.23	61.21	S-110-Z-280-BMG	
M	118.6	167.9	S-110-Z-283-BMG	
P	232.5	329.3	S-110-Z-285-BMG	
Q	325.4	460.9	S-110-Z-286-BMG	
R	455.7	645.3	S-110-Z-287-BMG	
U	1250.	1771.	S-110-Z-290-BMG	
W	2451.	3471.	S-110-Z-292-BMG	
1	6724.	9523.		S-110-Z-317-BMG
3	13176.	30060.		S-110-Z-226-BMG

\*Materials: BMG = 316 Stainless Steel Electropolished

- NOTES:
- If two sizes are allowed because of overlap, select the larger size.
  - Restrictor size not required to enter order.

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**Dansk**

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

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

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

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

**Kvaliteten af signal kabler og stik:**

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

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

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

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

Skærmen bør være forbundet til jord.

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

Skærmen bør være forbundet til jord.

Forbindelse af stikket; venligst referer til vedlagte instruktions manual.

Med venlig hilsen,

---

**Deutsch**

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

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

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

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

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

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

Bei Verwendung eigener Verbindungskabel sollten Sie darauf achten, daß eine 100 %igen Schirmabdeckung des Kabels gewährleistet ist.

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

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

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

Die Abschirmung ist mit dem Erdpotential zu verbinden.

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

Die Abschirmung ist mit dem Erdpotential zu verbinden.

Die Belegung der Anschlußpins können Sie dem beigelegten Bedienungshandbuch entnehmen.

**Model SLA7840**

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**English**

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

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

The Brooks (electric/electronic) equipment bearing the CE mark has been successfully tested to the regulations of the Electro Magnetic Compatibility (EMC directive 89/336/EEC).

Special attention however is required when selecting the signal cable to be used with CE marked equipment.

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

Brooks supplies high quality cable(s) which meets the specifications for CE certification.

If you provide your own signal cable you should use a cable which is overall completely screened with a 100% shield.

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

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

The shield should be terminated to a earth ground.

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

The shield should be terminated to a earth ground.

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

---

**Español**

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

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

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

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

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

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

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

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

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

La pantalla deberá conectarse a tierra.

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

La pantalla deberá conectarse a tierra.

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

## Français

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

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

Messieurs,

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

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

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

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

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

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

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

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

Tous les blindages doivent être reliés à la terre.

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

Tous les blindages doivent être reliés à la terre.

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

## Greek

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

**α** : Προσθήκη στο Εγχειρίδιο Οδηγιών.  
**ηλεκτρονικά** : Πιστοποίηση CE των Οργάνων Μέτρησης Παροχής Μάζας.  
**προμηθία** : Ιανουάριος - 1996

Συρίες και Κύριοι,

Για 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).

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

### Ιδιότητα του καλωδίου σήματος των τυπιοθλιπτών και των συνδέσμων .

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

Εάν η επιλογή του καλωδίου σήματος γίνει από σας πρέπει να χρησιμοποιήσετε καλώδιο το οποίο να φέρει εξωτερικά πλήρες πλέγμα και να παρέχει θωράκιση 100%.

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

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

Η θωράκιση πρέπει να καταλήγει σε κάποιο ακροδέκτη γείωσης.

Οι σύνδεσμοι καρτών είναι μη-μεταλλικοί, τα καλώδια που χρησιμοποιούνται πρέπει να φέρουν πλέγμα θωράκισης 100% για να υπακούουν στην πιστοποίηση CE.

Η θωράκιση πρέπει να καταλήγει σε κάποιο ακροδέκτη γείωσης.

Κατά την διάταξη των ακροδεκτών: Παρακαλούμε αναφερθείτε στο εσωκλειστο εγχειρίδιο Οδηγιών.

Model SLA7840

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**Italiano**

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

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

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

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

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

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

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

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

Lo schermo deve essere collegato ad un terminale di terra.

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

Lo schermo deve essere collegato ad un terminale di terra.

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

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**Nederlands**

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

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

Dames en heren,

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

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

**Kwaliteit van de signaalkabel en 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 100%.
- "D" of "ronde" kabelconnectoren moeten afgeschermd zijn met een metalen connector kap. Indien kabelwartels worden toegepast, moeten metalen kabelwartels worden gebruikt die het mogelijk maken het kabelscherm in te klemmen. Het kabelscherm moet aan beide zijden over 360° met de metalen connectorkap, of wartel verbonden worden. Het scherm moet worden verbonden met aarde.
- "Card-edge" connectors zijn standaard niet-metallisch. De gebruikte kabels moeten volledig afgeschermd zijn met een bedekkingsgraad van 100% om te voldoen aan de CE certificering. Het scherm moet worden verbonden met aarde.

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

Hoogachtend,

**Norsk**

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

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

**Til den det angår**

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

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

**Utførelse av signalkabel og tilhørende plugger:**

- Brooks Instrument tilbyr levert med utstyret egnet kabel som møter de krav som stilles til CE-sertifisering.
  - Dersom kunden selv velger kabel, må kabel med fullstendig, 100% skjerming av lederene benyttes. "D" type og runde plugger og forbindelser må være utført med kappe i metall og kabelnipler må være utført i metall for jordat innfesting av skjermen. Skjermen i kabelen må tilknyttes metallet i pluggen eller nippelen i begge ender over 360°, tilkoblet elektrisk jord.
  - Kort-kantkontakter er normalt utført i kunststoff. De tilhørende flatkabler må være utført med fullstendig, 100% skjerming som kobles til elektrisk jord på riktig pinne i pluggen, for å møte CE sertifiseringskrav.
- For tilkobling av medleverte plugger, vennligst se håndboken som hører til utstyret.  
Vennlig hilsen

**Português**

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

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

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

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

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

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

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

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

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

A blindagem deve terminar com a ligação à massa.

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

A blindagem deve terminar com ligação à massa.

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

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Model SLA7840

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**Suomi**

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

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

Brooksin CE merkillä varustetut sähköiset laitteet ovat läpäissyt EMC testit (direktiivi 89/336/EEC).  
Erityistä huomiota on kuitenkin kiinnitettävä signaalikaapelin valintaan.

**Signaalikaapelin, kaapelin läpiviennin ja liittimen laatu**

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

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

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

Suojan tulisi olla maadoitettu.

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

Suoja on oltava maadoitettu.

Nastojen liittäminen; katso liitteenä oleva manuaali.

Ystävällisin terveisin,

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**Svensk**

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

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

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

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

**Kvalitet på signalkabel och anslutningskontakter:**

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

Om man använder en annan signalkabel ska kabeln i sin helhet vara skärmad till 100%. “D” eller “runda” typer av anslutningskontakter ska vara skärmade. Kabelgenomföringar ska vara av metall alternativt med metalliserad skärmning.

Kabelns skärm ska, i bada 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 100% skärmade för att överensstämja med CE-certifieringen.

Skärmen ska avslutas med en jordförbindelse.

För elektrisk anslutning till kontaktstiften hänvisas till medföljande instruktionsmanual.

**Installation and Operation Manual**

X-PR-SLA7800-RT-eng

Part Number: 541B048AAG

August, 2009

Model SLA7840

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Model SLA7840

**LIMITED WARRANTY**

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

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

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

**BROOKS SERVICE AND SUPPORT**

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

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

**START-UP SERVICE AND IN-SITU CALIBRATION**

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

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



**CUSTOMER SEMINARS AND TRAINING**

Brooks Instrument can provide customer seminars and dedicated training to engineers, end users and maintenance persons.

*Please contact your nearest sales representative for more details.*

**HELP DESK**

In case you need technical assistance:

- Americas  1 888 554 FLOW
- Europe  +31 (0) 318 549 290
- Asia  +81 (0) 3 5633 7100

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

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

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

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

