

## Data Sheet

DS-TMF-4800-MFC-eng

April, 2008

# Brooks<sup>®</sup> 4800 Series

## 4850 Mass Flow Controller

## 4860 Mass Flow Meter

### GENERAL FEATURES:

- Wide FS flow range for measurement and control of common gases from 50 mln/min to 40 l/min
- Optional local operator interface (LOI) for control and configuration
- Accuracy options:  $\pm 1\%$  FS or  $\pm 3\%$  FS
- Compact size reduces space and eases installation
- Fast response time of  $< 300$  msec
- Storage of up to 9 selectable gas calibrations allows reduction in spares inventory
- Fully RoHS compliant

### DESCRIPTION

The Brooks 4800 line of mass flow meters and controllers is an excellent choice for measurement and control of many common gases including air,  $N_2$ ,  $O_2$ , Ar, He,  $H_2$ ,  $CO_2$ , CO,  $N_2O$ ,  $CH_4$ ,  $C_3H_6$ , and  $C_3H_8$ . It offers a broad flow range, fast response time, compact size, and many other benefits for a variety of applications.

### The 4800 Series MEMS-based sensor provides lightning fast response times.

The 4800 Series utilizes a Micro Electro Mechanical System (MEMS) based thermal sensor. Unlike traditional thermal sensors, MEMS sensors are fabricated from a silicon wafer.

Like traditional thermal sensors, the MEMS sensor measures a change in temperature to determine mass flow rate. Because the gas flows directly across the sensor, extremely fast response times can be achieved.

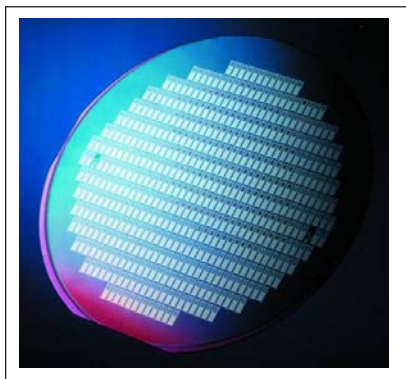


Figure 1 Silicon Wafer with MEMS Devices

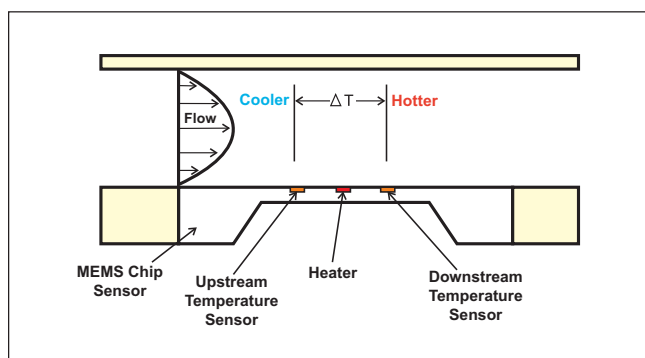


Figure 2 Gas Flow Across the MEMS Sensor

\* All performance characteristics are at calibration conditions.

## Brooks® 4800 Series

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**Fast settling times come standard with the 4850 controller.** The 4850 MFC version uses a proprietary PID algorithm to optimize the control valve response to ensure rapid settling times. The 4850 can be counted on to quickly match actual mass flow to any changes in setpoint.

**Good things come in small packages.** The MEMS sensor enables a dramatic reduction in size compared to traditional thermal mass flow sensors. In fact the compact size of the 4800 Series is significantly less in height and volume than that of typical thermal mass flow controllers.

**The 4800 Series is ideal for OEMs.** The broad flow range, fast response time, and compact size make for a perfect fit into any OEM system where gas flow needs to be measured or controlled. Additionally, the 4800 Series has a highly modular construction for quick assembly in order to meet short delivery dates.

**The local operator interface simplifies set-up and operation.** This option provides a convenient user interface to view, control and configure the Brooks 4800 Series thermal mass flow devices.

### SPECIFICATIONS

#### PERFORMANCE CHARACTERISTICS\*:

##### Flow Range

FS ranges from 50 mln/min – 40 lln/min  
(50 sccm – 40 slpm)  
(N<sub>2</sub> eq., at reference 0°C)

##### Control Range

2 – 100%

##### Accuracy Options

±3.0% of FS  
±1.0% of FS

##### Repeatability

±0.15% of FS

##### Response Time

Flow signal: <0.3 sec  
Flow control: Settling time <0.75 sec form 0 to 100%  
FS (typical <0.5 sec for all steps)

##### Temperature Coefficient

±0.1% FS/°C (N<sub>2</sub>)

#### RATINGS:

##### Gases

Air, N<sub>2</sub>, O<sub>2</sub>, Ar, He, H<sub>2</sub>, CO<sub>2</sub>, CO, N<sub>2</sub>O, CH<sub>4</sub>, C<sub>3</sub>H<sub>6</sub>, C<sub>3</sub>H<sub>8</sub>  
(other gases upon request)

##### Operating Limits

Pressure: 0 – 10 barg (0 - 150 psig)  
Temperature: 0 - 50°C  
Operating Humidity: 5 to 95% R.H. (ambient)

##### Pressure Differential Range (Controllers)

Minimum: 0.35 bar (5 psid)  
Maximum: 10 bar (150 psid)

##### Leak Integrity

Inboard to Outboard: 1x10<sup>-9</sup> atm scc/sec Helium max.

#### MECHANICAL CHARACTERISTICS:

##### Materials of Construction

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

##### Outline Dimensions

Refer to Figures 3 and 4

##### Process Connections

Inlet/Outlet threads: 9/16" – 18 UNF threads  
Refer to Figures 3 and 4  
for available process connections.

#### ELECTRICAL CHARACTERISTICS:

##### Electrical Connections

15-pin D-sub connector  
(pin-out schematic shown in Table 1)  
All pins shall be protected against ESD  
(Electro Static Discharge)

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

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## Power Supply Voltage\*\*

+15 Vdc  $\pm$  10% or

+24 Vdc  $\pm$  10%

Device only uses single sided power supply

Inrush current: <1 A

## Power Requirements

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

## Analog Input/Output

0 – 5 Vdc or 4 – 20 mA

## Digital Input/Output

RS-232

## Valve Override Signal

Valve controller: Input Open

Valve closed: <0.3 V; Valve open: >4.8 V

## Calibration Curve Selection

Select one of nine gases via the LOI or RS232.

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

## Local Operator Interface (LOI):

### Display

Effective display area: 28 mm wide, 11 mm high

Display contents: 8 x 2 dot matrix display

### Operating Limits

Temperature: 0-50°C

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

## ELECTRICAL CHARACTERISTICS:

### Electrical Connections

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

### Power Supply Voltage

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

### Materials of Construction

Enclosure: ABS plastic with CU-Ni plating.

### Outline Dimensions

Refer to Figure 5

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

PIN #	4800 Series	5850TR	S – SERIES (58xxS)
1	SETPOINT SIGNAL COMMON	ANALOG COMMON	SETPOINT SIGNAL COMMON
2	FLOW VOLTAGE OUTPUT	FLOW VOLTAGE OUTPUT	FLOW VOLTAGE OUTPUT
3	N.C.	N.C.	ALARM OUTPUT
4	FLOW CURRENT OUTPUT	FLOW CURRENT OUTPUT	FLOW CURRENT OUTPUT
5	POSITIVE SUPPLY VOLTAGE	POSITIVE SUPPLY VOLTAGE	POSITIVE SUPPLY VOLTAGE
6	N.C.	N.C.	NEGATIVE SUPPLY VOLTAGE
7	SETPOINT CURRENT INPUT	SETPOINT CURRENT INPUT	SETPOINT CURRENT INPUT
8	SETPOINT VOLTAGE INPUT	SETPOINT VOLTAGE INPUT	SETPOINT VOLTAGE INPUT
9	POWER SUPPLY COMMON	POWER SUPPLY COMMON	POWER SUPPLY COMMON
10	FLOW SIGNAL COMMON	FLOW SIGNAL COMMON	FLOW SIGNAL COMMON
11	N.C.	5V REFERENCE	5V REFERENCE
12	VALVE OVERRIDE INPUT	VALVE OVERRIDE INPUT	VALVE OVERRIDE INPUT
13	N.C.	N.C.	N.C.
14	RXD	N.C.	RXD / A-
15	TXD	N.C.	TXD / A+

# Brooks® 4800 Series

**CERTIFICATIONS:**

These certifications cover the 4800 Series mass flow devices as well as the local operator interface (LOI).

**EMC Directive 89/336/EEC:** Per EN 61326

**Hazardous Location Classification**

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

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

Enclosure: Type 1/IP40

Ambient Temperature:

0°C ≥ Tamb ≤ 50°C (32°F ≥ Tamb ≤ 122°F)

United States and Canada

Europe - ATEX Directive 94/9/EC

KEMA 06ATEX0251 per EN 60079-15: 2003



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



II 3 G EEx nA II T4



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

**Pressure Equipment Directive (97/23/EC):**  
Sound Engineering Practice.

Class 1, Zone 2, AEx nA II T4

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

Ex nA II T4

Per CSA - E79 - 15

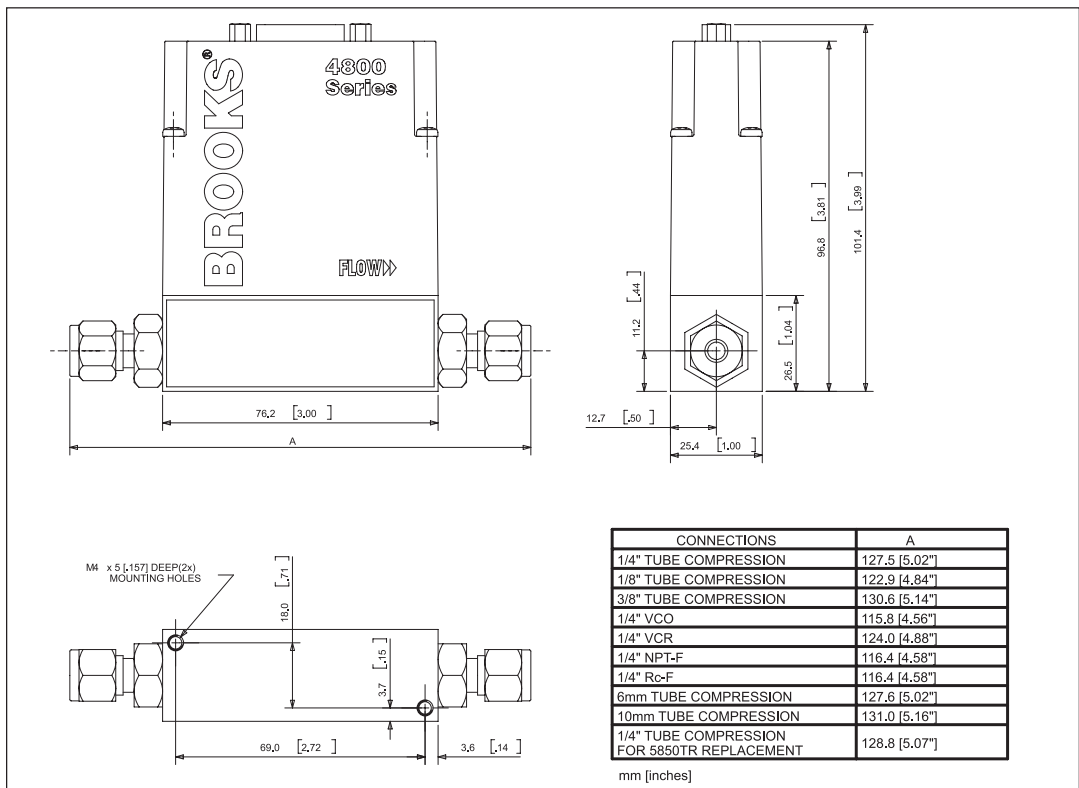


Figure 3 Dimensions for Model 4850/4860 with Standard Process Connections

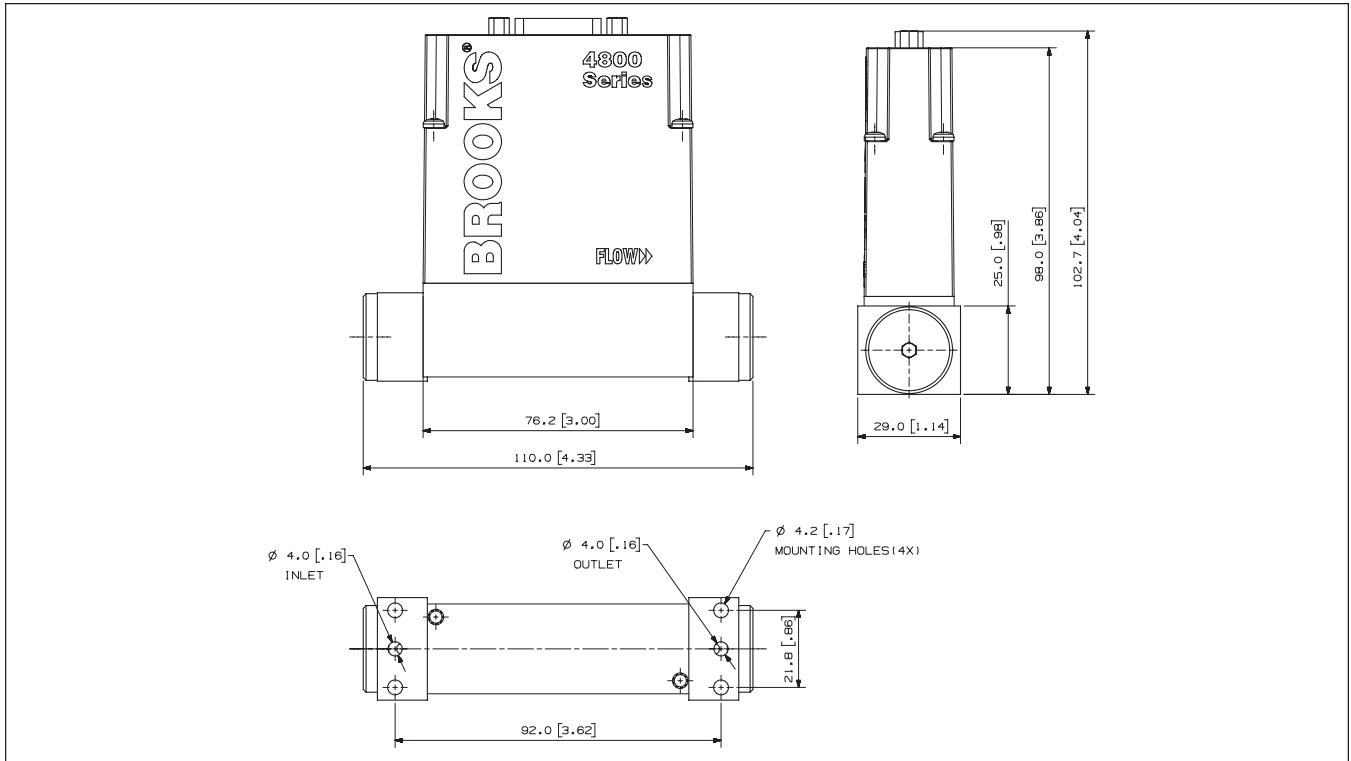


Figure 4 Dimensions for Model 4850/4860 with Downport Connections

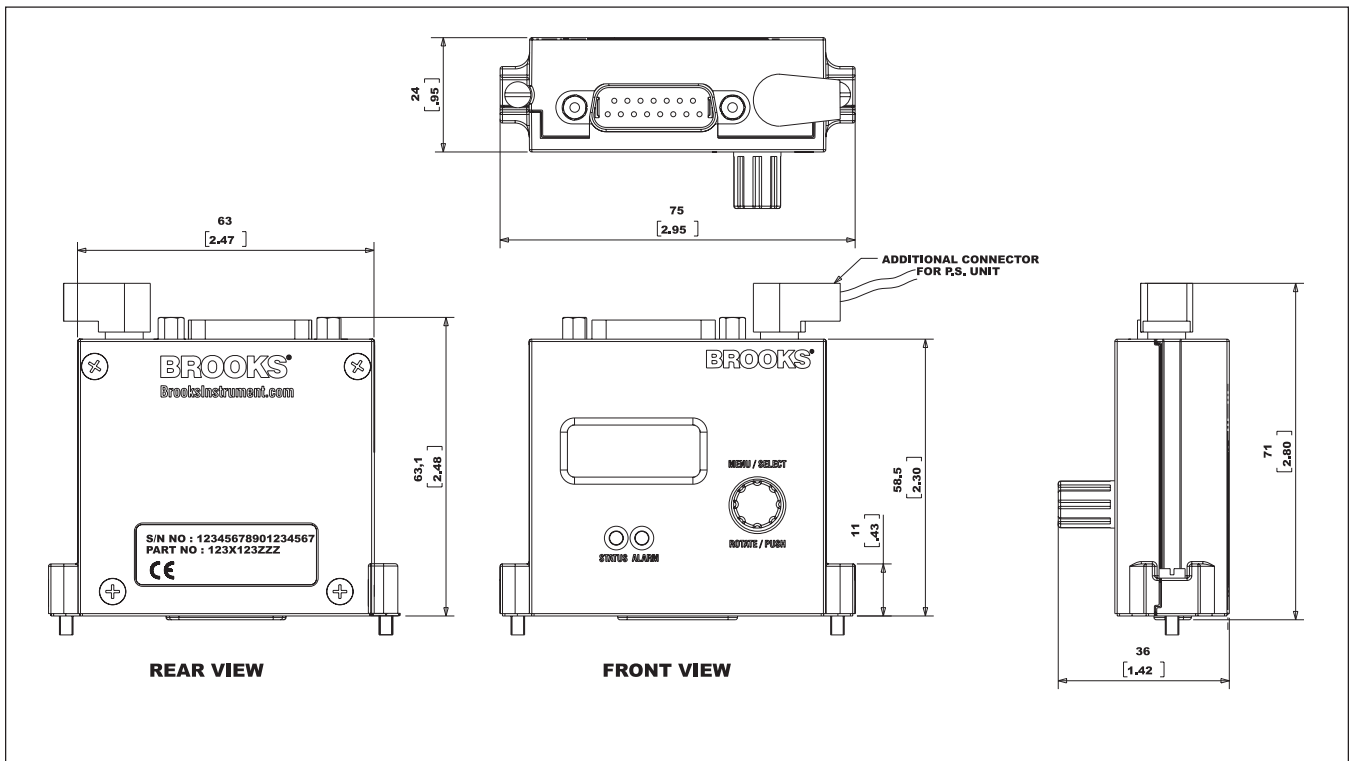


Figure 5 Dimensions for Model 4800 Series LOI

## Brooks® 4800 Series

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### LIMITED WARRANTY

Seller warrants that the Goods manufactured by Seller will be free from defects in materials or workmanship under normal use and service and that the Software will execute the programming instructions provided by Seller until the expiration of the earlier of twelve (12) months from the date of initial installation or eighteen (18) months from the date of shipment by Seller.

Products purchased by Seller from a third party for resale to Buyer ("Resale Products") shall carry only the warranty extended by the original manufacturer.

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

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

### BROOKS LOCAL AND WORLDWIDE SUPPORT

Brooks Instrument provides sales and service facilities around the world, ensuring quick delivery from local stock, timely repairs and local based sales and service facilities.

Our dedicated flow experts provide consultation and support, assuring successful applications of the Brooks flow measurement and control products.

Calibration facilities are available in local sales and service offices. The primary standard calibration equipment to calibrate our flow products is certified by our local Weights and Measures Authorities and traceable to the relevant international standards.

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

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

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

### CUSTOMER SEMINARS AND TRAINING

Brooks Instrument can provide customer seminars and dedicated training to engineers, end users and maintenance persons. Please contact your nearest sales representative for more details.

### HELP DESK

In case you need technical assistance:

Americas	☎ 1-888-554-FLOW	
Europe	☎ +(31) 318 549 290	Within Netherlands ☎ 0318 549 290
Asia	☎ +011-81-3-5633-7100	

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

### TRADEMARKS

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