DS-TMF-DMFC-eng
April 2002
(Supersedes issue date May 2001)

BROOKS SMART (DMFC) MASS FLOW METERS AND CONTROLLERS

MODELS 5800 SERIES

Brooks Smart (DMFC) Mass Flow Meters and Mass Flow Controllers

Benefits:

- **Compact design, provides mass flow measurement and control of gases from 3 mln/min. full scale to more than 2500 ln/min.**
- **High accuracy, repeatability and immunity to temperature changes improve performance of your process.**
- **Provided with adaptive control algorithm to ensure fast response, robust and stable control of gas flow applications even under varying process conditions.**
- **Long term reliability, negligible zero drift ensures reliable measurement and control.**
- **Fully Customer programmable PID control, I/O's and alarms.**
- **Smart technology, available for elastomer-, metal sealed-, or ultra high purity (UHP) Mass Flow Meters/Controllers.**
- **Smart technology, available with PROFIBUS-DP communnication and Analogue I/O's.**
- **Smart technology, available with selectable Analogue I/O's and digital communication (HART based) via RS 232 or RS 485. With digital communications you can operate easily with most Windows based applications which support DDE.**
- **Easy and cost effective installation (fit-and forget) and high operating integrity through self-monitoring.**
- **Thousands of Brooks Smart Mass Flow Meters and Controllers have been installed and operate successfully in a variety of industries under various process conditions.**
- **Designed, developed, manufactured and supplied by the first ISO-9001 Quality Certified M&C company in the world: Brooks Instrument.**

INTRODUCTION

Brooks Instrument expands the capability and functionality of their successful Smart Mass Flow Products. Along with analogue and digital communication interfaces, these highly accurate instruments are also available with PROFIBUS-DP.

Thousands of these Brooks Smart Mass Flow Meters and Controllers have been installed and operate successfully even under severe conditions.

The superior design makes these Brooks Smart Mass Flow Products virtually insensitive (fit-and-forget) to process interference's. Its competitive price and its maintenance-free design, make the Brooks Smart Mass Flow Products economical where other measuring techniques have traditionally been used.

All Smart Flow Controllers are provided with adaptive control algorithm to ensure unrivalled performance and fast control even under varying process conditions. Unsurpassed control settling time, no dead time and other features are the enhanced specifications, which are listed in this document.

Our commitment to continuous improvement in terms of specification, safety standards and application flexibility, make these Smart Mass Flow products leaders throughout industry. Brooks Instrument excels in terms of performance, features, reliability, serviceability and overall perceived quality.

FIELD PROVEN PERFORMANCE AND RELIABILITY

- Accuracy: ± 0.7% of rate and ± 0.2% F.S. ± 1% F.S. for 5853/63 above 1100 l_n/min (at calibration conditions)
- Microprocessor-based, smart electronics.
- Robust adaptive control provides rapid response to varying process conditions, including temperature and pressure changes.
- Analogue I/O and digital communication; via RS-232 point-to-point transmission or RS-485 multi-point interconnection.
- PROFIBUS-DP
- Continuous self-diagnostics for maximum reliability.
- CE certified.
- Can be certified for use in Zone 2 environment according to NEN 3410 and NEN-EN 50014.
- More than 200.000 previous generation models installed & operational worldwide.

FLEXIBILITY

- Designed for easy installation
- Wide range power supply
- Selectable analogue setpoint input/flowrate output signals
- Totalizer function
- Configuration pin compatible with the Brooks "E" and "i" series
- Digital communication up to 38k4 Baud transmission speed selectable for RS 232 and RS 485. 12 Mbit/sec for Profibus
- Self diagnostics and alarm functions via hardware and/or software
- Up to ten (10) sets of different calibration curves programmable
- Wide flow & pressure range

The models are:

Brooks Smart Mass Flow Products				
Mass Flow Controller	Mass Flow Meter	Flow Ranges		
Model:	Model	Min. f.s.	Max. f.s.	Unit
5850S	5860S	0,003	30	ln/min
5851S	5861S	20	100	ln/min
5853S	5863S	100	2500	ln/min

PERFORMANCE

Digital communication, via RS485 or RS232, provides access to all of the Smart DMFC's functions, including:

• For detailed information about the Brooks Smart Mass Flow products, provided with PROFIBUS-DP communication, we refer to document: Profibus Instruction Manual: 541-C-068-AAG

• Accurate Mass Flow measurement and setpoint regulation (controller only), as a percentage and in selectable engineering units

• Flow totalizer

• Temperature

• Operational settings

- ➔ Calibration (storage of up to 10 cal. curves)
- ➔ PID control setting
  - ❍ fast response
  - ❍ 'traditional' soft start
  - ❍ linear ramp-up/down characteristic
  - ❍ adaptive valve control
- ➔ Adaptive filtering for signal flow component

• Alarms

- ➔ Self-diagnostic
  - ❍ EEPROM error
  - ❍ database error
  - ❍ analogue output error
- ➔ Out-of-range indications for
  - ❍ setpoint
  - ❍ flow
  - ❍ valve
  - ❍ analogue output
- ➔ Environmental errors
  - ❍ no gas flow detected
  - ❍ power supply outside spec. range
  - ❍ ambient temp. outside spec. range

HIGH PRESSURE APPLICATIONS

The Brooks models 5850S Smart Mass Flow Controllers, 5860S and 5861S Smart Mass Flow Meters can be used for up to 300 bar high pressure applications.
The full scale flow limits @ 300 bar operation pressure of the model 5850S Smart Mass Flow Controller are from 100 mln/min f.s. to 10 ln/min f.s. (Nitrogen gas equivalent).
These conditions are in combination with an allowable maximum pressure difference of 100 bar across the instrument. Other ranges and limits are available on request.

SERVICE ABILITY

The Brooks Smart Mass Flow Meters and Controllers perform continuous self diagnostic
routines that immediately identify any problem in the device, the process or the environment. The process variables gas flow, temperature and also environmental variables like sensor, control valve and power supply values are continuously monitored. An alarm situation in detail can be visualised on a screen (by means of digital communication). It is always available as an open collector output signal.

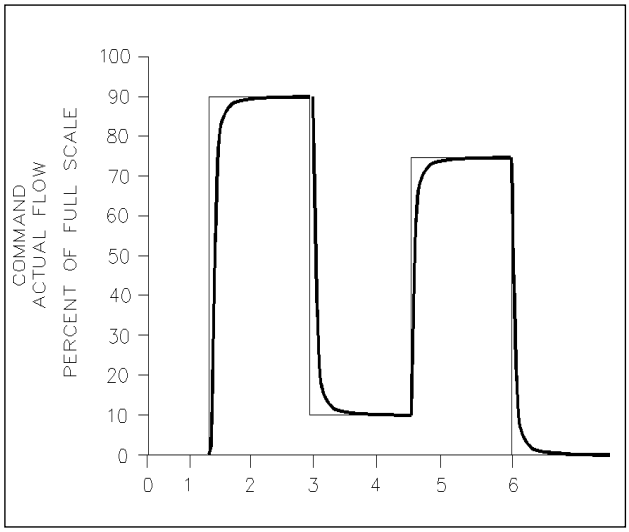


Figure 1: The Response Performance of the Brooks Smart Mass Flow Controllers

BROOKS SMART MASS FLOW CONTROLLERS FAST RESPONSE PERFORMANCE

The curves in Figure 1 depict the M.F.C. output signal and actual transitional flow to steady-state when gas flow enters into a process chamber, under a step response command condition.

Adaptive (optimized) PID control, including fast response to 0.2 sec. and linear ramp-up and/or ramp-down control characteristics.

SELECTABLE VALVE OVERRIDE

Gas handling safety practices must be given consideration in many processes. Since M.F.C.'s are an integral part of many gas systems, it was mandatory to include these practices in the Brooks Smart Mass Flow Controllers design standards.

Independent of command setpoint values the control valve can be fully opened or closed via the valve override feature by simply providing a voltage signal through the interconnection wiring or through digital communication (analogue input overrides digital). This is useful for shutdown or system purge requirements.

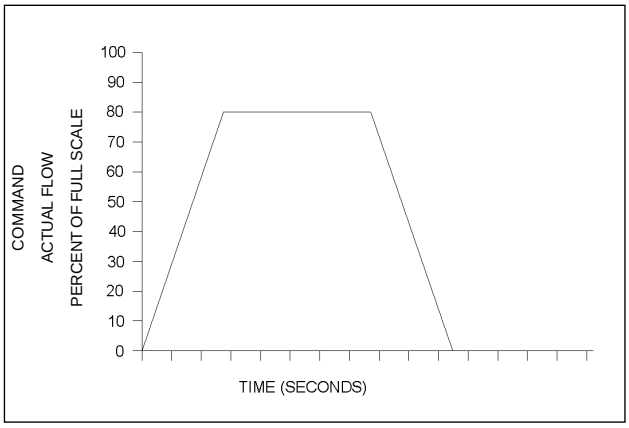


Figure 2: Linear ramp-up and/or ramp-down up from 200% second down to 0.5% per second setpoint change

SELECTABLE SOFT START

Processes requiring injection of gases can be adversely affected by excessive initial gas flow.

This abrupt injection of gas can result in process damage from explosion or initial pressure impact.

These problems are virtually eliminated with the soft start feature.

Traditional soft start or linear ramp up and/or ramp down (see figure 2) can be factory selected or are available via the User Interface.

Linear ramping is adjustable from 200% per second down to 0.5% per second setpoint change. To be specified at ordering or available via the User Interface.

AVAILABLE OPTIONS

- The Brooks Smart Mass Flow Meters and Controllers (DMFC) are always available with analogue I/O setting. The models 0152/0154 offer a power supply, read out, control independently or in blending mode and other features. (see figure 4)
  More details wanted? Ask for our Product Data Sheet 0152/0154.
- Standard also suitable for digital communication (either via RS-232 or RS-485) which allows you to also use our Smart Control, model 0160, for user interface function and (re)configuration purposes of the Smart Mass Flow Products. (see figure 4)
  More details wanted? Ask for our Product Data Sheet 0160.
- The Smart DDE, model 0162 is a powerful Dynamic Data Exchange software product from Brooks Instrument. It allows you to make bi-directional links between your Windows-based applications and the Brooks Smart Mass Flow Products. (see figure 3 and 5)
  More details wanted? Ask for our Product Data sheet 0162.

Any Windows based program can be used to link information via Smart DDE, Model 0162 bi-directionally to the Brooks Smart Mass Flow Products

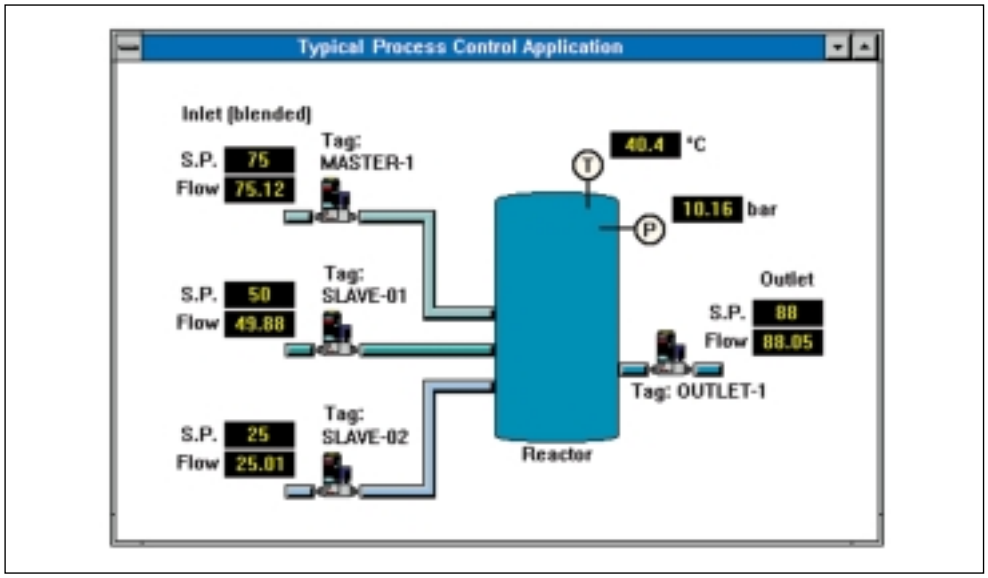


Figure 3

TYPICAL INSTALLATIONS FOR ANALOGUE AND RS-232 SET UP

Meters and Controllers multi-channel, analogue I/O's operated by model 0154. (figure 4).
The model 0154 microprocessor based electronics, provides power supply and analogue I/O to the DMFC's.
In addition, a number of other functions are standard available when using digital communication via RS-232 point-to-point (figure 4) transmission or RS-485 multi-point communication (figure 5).

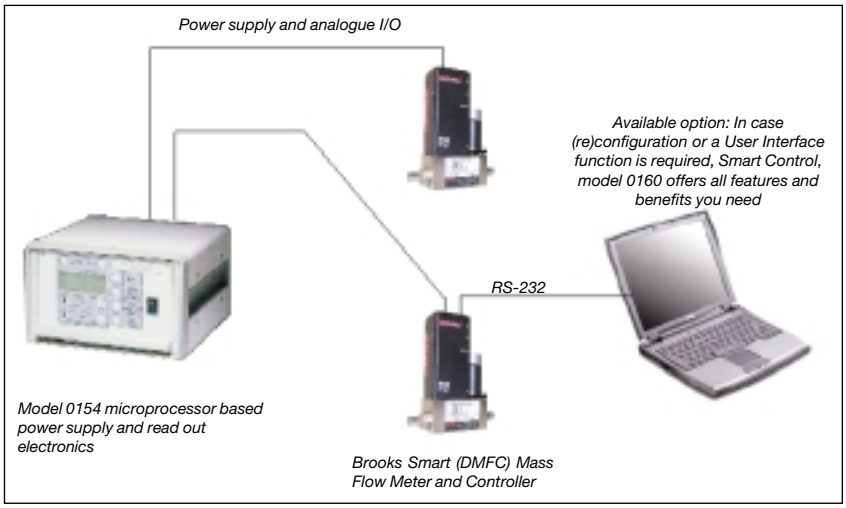


FIgure 4

TYPICAL INSTALLATIONS FOR RS-485 SETUP

Multi-channel, p.c. system operated configuration with virtually unlimited number of connected Brooks Smart (DMFC) Mass Flow Meters and Controllers.A (remote) power supply and multi-point interconnection can drive up to 32 devices per COM port. With help of our Smart DDE, COM 1... COM 9 are selectable.

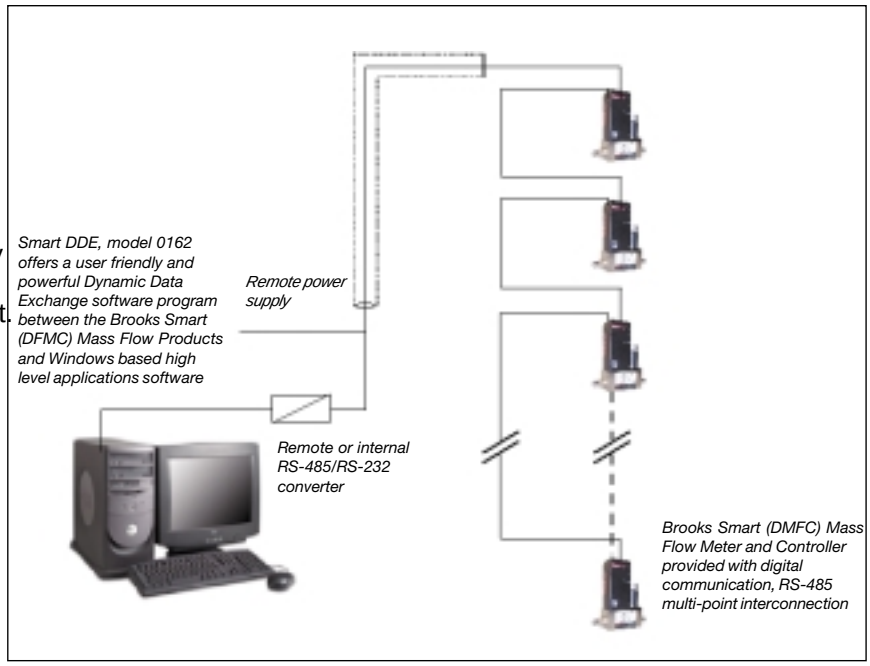


Figure 5

TYPICAL INSTALLATION FOR PROFIBUS-DP

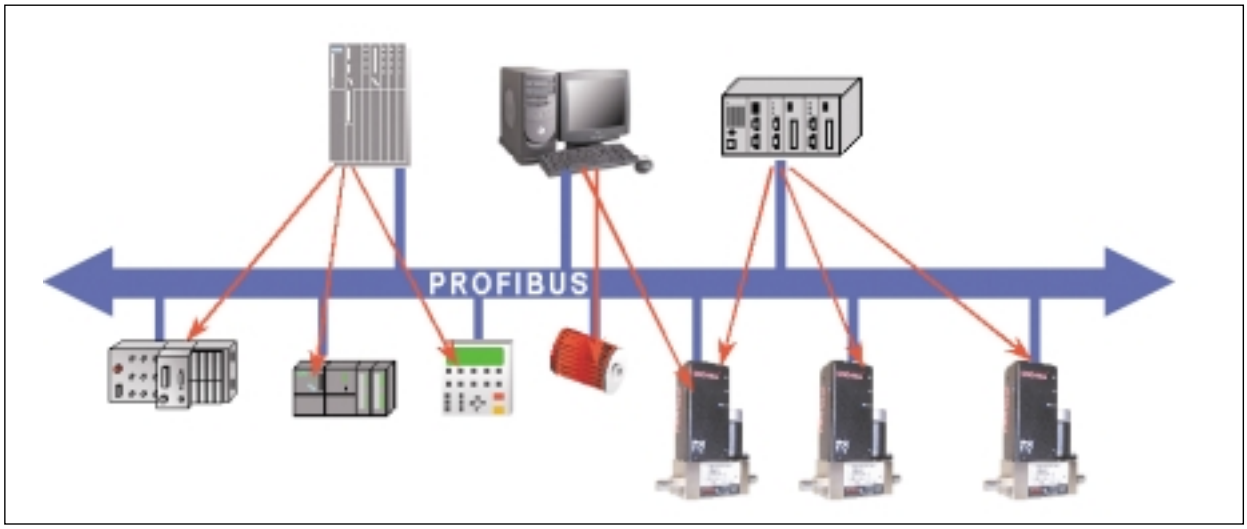


Figure 6

The Smart Mass Flow products of Brooks offer PROFIBUS-DP digital communication (high speed) capabilities AND analogue I/O signals are simultanuosly available. When using PROFIBUS-DP, you can connect other actuators and sensors to the same bus. I.e. saving cost (figure 6).

PERFORMANCE SPECIFICATIONS

Flow Accuracy	± 0.7% of rate and ± 0.2% f.s. ± 1% for 5853/63 above 1100 l_n/min (at calibration conditions)
*Optional **	± 0,5% of rate and ± 0.1% F.S. (max 100 l/min, at calibration conditions)
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 Effect	Less than 0.015% / ^{0}C of rate shift from original calibration over 0-70 ^{0}C

PHYSICAL SPECIFICATIONS

Materials of Construction or	Wetted parts stainless steel with Viton®, Buna-N®, PTFE/Kalrez® EPDM seals or elastomers
Mechanical Connections	NPT(F), Tube compression, VCR and VCO Option: Flanged DIN- or ANSI type available; (please refer to ordering information on page 10)
Electrical Connections	15-pins D-type connector (goldplated contacts) with 3 m or 6 m cable 9 pins D-type connector for PROFIBUS-DP

SPECIFICATIONS

Certification

- CE certified
- Can be certified for use in Zone 2 environment according to the NEN 3410 and NEN-EN 50014.
- EMC Directive (89/336/EEC) EN 61326-1: 1997 + A1: 1998
- Pressure Equipment Directive (97/23/EC)
  See Installation and Instruction manual for more details

Ranges and pressure ratings

Brooks Smart Mass Flow Products					
Mass Flow Controller	**Mass Flow Meter**	**Flow Ranges**			**Pressure Rating**
Model	**Model**	**Min. f.s.**	**Max. f.s.**	**Unit[2]**	
5850S	5860S	0,003	30	ln/min	100/300[4] bar
5851S	5861S[1]	20	100	ln/min	100/300 bar
5853S[3]	5863S	100	2500	ln/min	70 bar

[1] 300 bar meter version (5861) on request

[2] Referring to normal conditions

[3] Max. Delta P or 5853S is 20 bar [4] For controller on 300 bar flowrange is from 100 mln/min till 10 l/min

*Setpoint Input**

Voltage: 0 - 5 Vdc or 1 - 5 Vdc input impedance > 2000 Ohm minimum

or: 0 - 20 mA or 4 - 20 mA 250 Ohm impedance

Analogue Outputs *	Voltage: 0 - 5 Vdc or 1 - 5 Vdc 2000 Ohm and: 0 - 20 mA or 4 - 20 mA Max loop resistance 375 Ohm
Alarm	(TTL) Open Collector Output,signal grounded when activated. Max. 30 Vdc, 25 mA. Or via communication port, when used digitally
Digital	***HART: (Hart based programming codes for interface with PC)***
Communication *	RS-232 or RS-485 Baudrate 1200, 2400, 3600, 4800, 7200, 9600, 19k2, 38k4 (Default: RS-232, Baudrate 9600) ***PROFIBUS-DP:*** Up to 12 Mbit/sec (Self selecting)
Power Supply Mass Flow Meters * to	Models 5860S, 5861S and 5863S + 24 Vdc (± 10%) @ 80 mA + 15 Vdc (± 5%) @ 90 mA
Power Supply Mass Flow Controllers * to	Models 5850S, 5851S and 5853S + 24 Vdc (± 10%) @ 140 mA + 15 Vdc (± 10%) @ 185 mA
	Note: + and -15Vdc power supply is available on request. With valve override function actuated:the power supply specifications are: +15 Vdc @ 285 mA or +24 Vdc @ 370 mA
Temperature	Both amb. and process gas: 0-70 °C. Optional: 0-100 °C.
Leak Integrity	Outboard: 1 x 10^{-9} mbar l/sec. Helium Outboard: 1-10^{-11} mbar I/sec. Helium semi metal sealed and UHP
Security	If self-diagnostics detect a failure, the alarm mode will be activated (Open Collector Output via the connector). The cause of the failure is available if the digital communication is connected To prevent ”unauthorized” setting or reranging of span or zero, these functions are only accessible via the Brooks User Interface, model 0160, or using Smart DDE, model 0162.
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 analogue flowrate output signal(s) (default 0,5 seconds)
Response	Standard response of the flow output signal: model 5850/51 and 5860/61, standard 1 sec. or on request better than 0,2 sec. Model 5853/63 standard 3 sec. or on request better than 1 sec.
Settling Time *	Standard settling time for controllers. Model 5850/51, standard 1 sec. or on request better that 0,2 sec. Model 5853, standard 3 sec. or on request better than 1 sec. (to within 2% full scale of final value) for any command (setpoint) step; virtually without any dead time, over- or undershoot.

* Factory selectable: To be specified at ordering.

⚠Warning

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

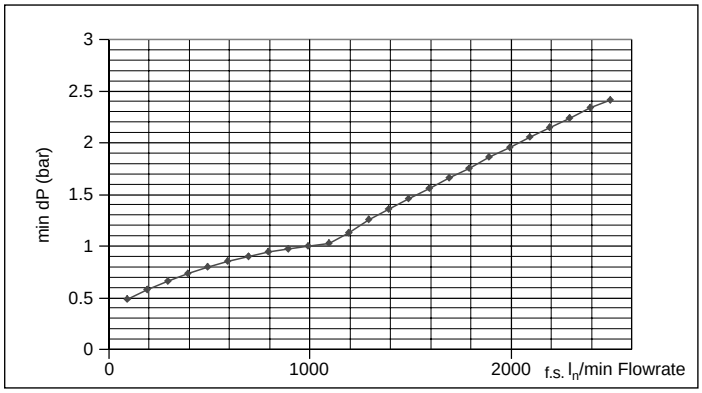
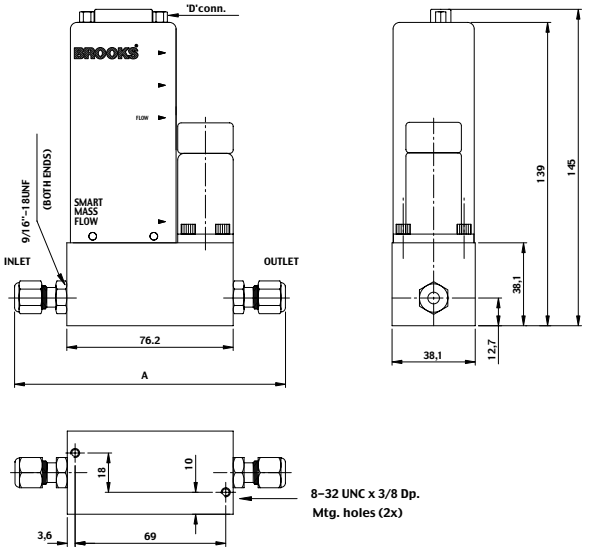


Figure 7: Min. Pressuredrop versus Flowrate for Model 5853 (1 bar = 14.5 psi)

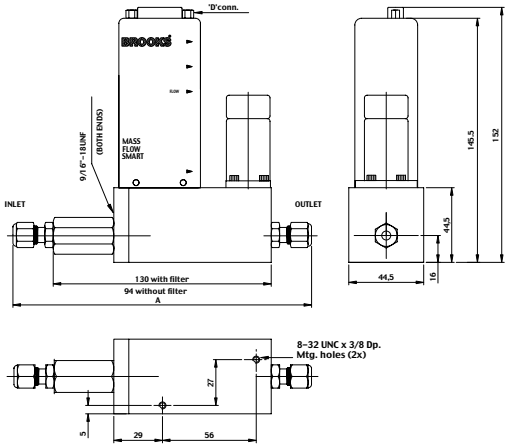
DIMENSIONAL DRAWINGS *Smart Mass Flow Controllers*

model 5850s



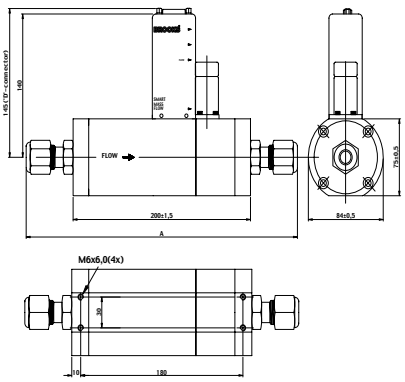
5850S CONNECTIONS	A(mm)	Inches
9/16-18 UNF	76,2	3,00
1/8" Tube compr.	123	4,84
1/4" Tube compr.	128	5,04
6 mm Tube compr.	128	5,04
1/4" VCR	124	4,88
1/4" VCO	116	4,57
1/4" NPT	116	4,57
1/4" BSP	116	4,57

model 5851s



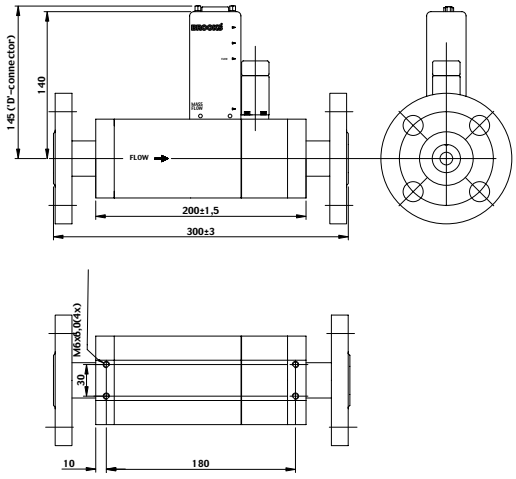
5851S CONNECTIONS	A (mm)		Inches	
Filters >>	excl.	incl.	excl.	incl.
9/16-18 UNF	93	130	3,70	5,12
1/4" Tube compr.	145	181	5,70	7,12
3/8" Tube compr.	148	184	5,83	7,24
1/2" Tube compr.	152	188	5,98	7,40
1/2" VCR	149	185	5,87	7,28
1/4" VCR	141	177	5,55	6,97
1/2" VCO	144	180	5,67	7,09
1/4" VCO	133	169	5,24	6,65
1/4" NPT	134	170	5,28	6,69
1/4" BSP	134	170	5,28	6,69
6mm Tube compr.	145	181	5,70	7,12
10mm Tube compr.	148	184	5,83	7,34

model 5853s



5853S CONNECTIONS	A(mm)	Inches
9/16-18 UNF	199	7,83
1 1/16-12 UN	199	7,83
1 5/16-12 UN	199	7,83
1/2" Tube compr.	267	10,51
3/4" Tube compr.	267	10,51
1" Tube compr.	276	10,87
1/2" VCR	254	10,00
3/4" VCR	280	11,02
1/2" VCO	250	9,84
3/4" VCO	257	10,11
1" VCO	260	10,23
1/2" NPT	199	7,83
1" NPT	199	7,83
1 1/2" NPT	199	7,83
1/2" BSP	199	7,83
1" BSP	199	7,83

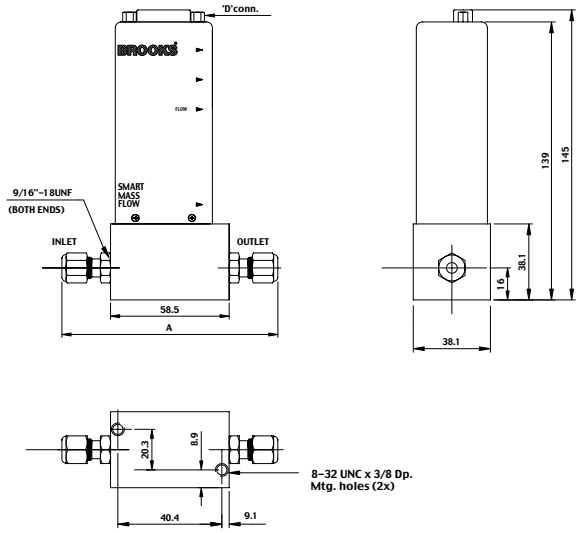
model 5853s



FLANGE	TYPE
1/2" ANSI	150 LBS RF
1/2" ANSI	300 LBS RF
DIN DN15	PN40 RF
1" ANSI	150 LBS RF
1" ANSI	300 LBS RF
DIN DN25	PN40 RF
1 1/2" ANSI	150 LBS RF
1 1/2" ANSI	300 LBS RF
DIN DN40	PN40 RF
2" ANSI	150 LBS RF
2" ANSI	300 LBS RF
DIN DN50	PN40 RF

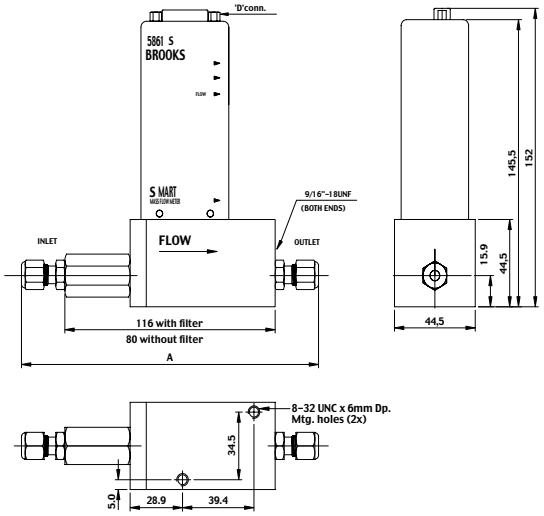
DIMENSIONAL DRAWINGS Smart Mass Flow Controllers

model 5860s



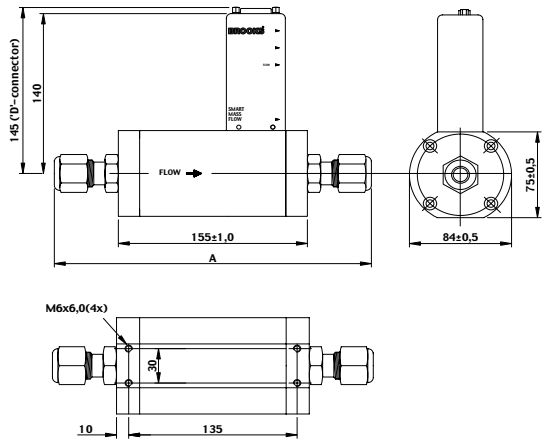
5860S CONNECTIONS	A(mm)	Inches
9/16-18 UNF (no adapters)	59	2,31
1/8" Tube compr.	105	4,13
1/4" Tube compr.	110	4,33
6 mm Tube compr.	110	4,33
1/4" VCR	106	4,17
1/4" VCO	98	3,86
1/4" NPT	99	3,90
1/4" BSP	99	3,90

model 5861s



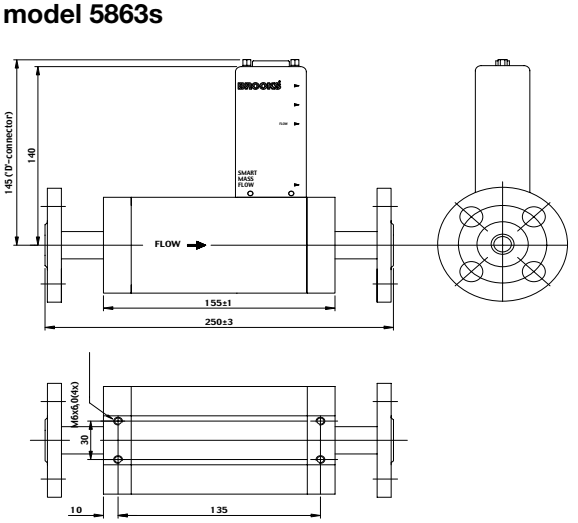
5861S CONNECTIONS	A (mm)		Inches	
Filters >>	excl.	incl.	excl.	incl.
9/16-18 UNF (no adapters)	80	116	3,15	4,57
1/4" Tube compr.	131	167	5,16	6,57
3/8" Tube compr.	134	170	5,28	6,69
1/2" Tube compr.	138	174	5,43	6,85
1/2" VCR	135	171	5,31	6,73
1/4" VCR	128	164	5,04	6,46
1/2" VCO	131	137	5,16	6,57
1/4" VCO	120	156	4,72	6,14
1/4" NPT	120	156	4,72	6,14
1/4" BSP	120	156	4,72	6,14
6mm Tube compr.	131	167	5,16	6,57
10mm Tube compr.	134	170	5,28	6,69

model 5863s



5863S CONNECTIONS	A(mm)	Inches
9/16-18 UNF	155	6,10
1 1/16-12 un	155	6,10
1 5/16-12 un	155	6,10
1/2" Tube compr.	223	8,78
3/4" Tube compr.	233	8,78
1" Tube compr.	232	9,13
1/2" VCR	210	8,27
3/4" VCR	236	9,29
1/2" VCO	206	8,11
3/4 VCO	213	8,39
1" VCO	216	8,50
1/2" NPT	155	6,10
1" NPT	155	6,10
1 1/2" NPT	155	6,10
1/2" BSP	155	6,10
1" BSP	155	6,10

model 5863s



FLANGE	TYPE
1/2" ANSI	150 LBS RF
1/2" ANSI	300 LBS RF
DIN DN15	PN40 RF
1" ANSI	150 LBS RF
1" ANSI	300 LBS RF
DIN DN25	PN40 RF
1 1/2" ANSI	150 LBS RF
1 1/2" ANSI	300 LBS RF
DIN DN40	PN40 RF
2" ANSI	150 LBS RF
2" ANSI	300 LBS RF
DIN DN50	PN40 RF

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.		
	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	1/2"	BSP (F)	(ONLY FOR 5853/63)
1Z	1"	BSP (F)	(ONLY FOR 5853/63)
2A	1 1/16" - 12SAE/MS		(ONLY FOR 5853/63)
2B	1/2"	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	1/2"	NPT(F)	(ONLY FOR 5853/63)
2F	1"	NPT(F)	(ONLY FOR 5853/63)
2G	1 1/2"	NPT(F) (SEE OPTION "E")	(ONLY FOR 5853/63/64)
2H	1/2"	VCO (200 ln/min. max.)	(ONLY FOR 5850/60/51/61/53/63)
2J	3/4"	VCO	(ONLY FOR 5853/63)
2K	1/2"	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 1/2	"150 LBS	(ONLY FOR 5853/63)
2R			ANSI 1/2"	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 1 1/2"	150 LBS	(ONLY FOR 5853/63)
2V			ANSI 1 1/2"	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)
C		PTFE/KALREZ (KALREZ FOR SENSOR O-RINGS AND VALVE SEAT)
D		KALREZ (NOT FOR 5853)
E		PTFE O-RINGS / EPDM VALVE SEAT
M		KALREZ O-RINGS / METAL VALVE SEAT
Z		SPECIFY

		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		ANALOG I/O AND RS 232 & 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
			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 **DEDUCT**
	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**

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".

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)

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 dedication to customer service and support extends to our direct sales force, who are well trained, experienced and equipped. These flow specialists 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 the mass flow products is certified by the Dutch Weights and Measures Authority (NMi) 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 mass flow 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 support our Helpdesk :