Data Sheet
DS-TMF-5850E-MFC-eng-eu
April, 2008

Models 5850E/5863E

Brooks® E-series MFC/MFM

DESIGN FEATURES
- Accurate measurement and control
- Wide flow- & pressure range
- Fast response to command changes
- Corrosion resistant normally closed-, or normally opened control valve
- Subminiature D-connector electrical interface for RFI immunity
- CE certified

OPTIONS:
- Ultra clean technology, all metal sealed. Please ask for PDS: 5964 or 5850EM
- Fast response or soft start
- Normally opened-, or closed control valve
- Mechanically and electrically interchangeable with other mass flow controllers
- (Optionally) certified for use in zone 2 environment according to NEN 3410, NEN-EN 50014, DIN 57165 and VDE 0165

DESCRIPTION
The Brooks models 5850E-5863E mass flow meters and mass flow controllers accurately measures and controls gas flows.
The heart of the system is a very stable flow sensor which produces an electric output signal linear with flow rate used for indicating and/or recording.
The Brooks mass flow controllers accurately measure and control gasflows fast to command changes, virtually without overshoot. These mass flow controllers provide an exclusive PID control loop, which has been balanced to match unique sensor/ valve characteristics.
The computer designed control valves allow stable operation over a wide variety of flow and pressure conditions.
The actual flow dynamics are controlled, resulting in a much smoother transition to steady-state flow in the shortest period of time.

Mass Flow Controller Model 5850E

Mass Flow Controller Model 5851E

Mass Flow Sensor Model 5863E

SPECIFICATIONS

Certification: CE certified

PERFORMANCE

Accuracy: ± 1% full scale including linearity measured at calibrated conditions

Repeatability: ± 0,25% of rate

Rangeability: 50 to 1

Flow ranges: Any full scale range from 3 mln/min to 1000 ln/min. (Nitrogen equivalent.)

Mounting attitude: ± 0,5% full scale max. deviation from sensitivity specified accuracy after rezeroing

Temperature sensitivity:
Zero : less than ± 0,075% full scale/°C
Span : less than ± 1,0% full scale shift from original calibration over 10-50 °C range

RATINGS

Max. operating pressure:
- 100 bar
- Model 5860E 300 bar
- Model 5850E, 5861E optional 300 bar

Differential pressure:
- Models 5850E and 5851E typical 1 bar
- Model 5853 0,5 bar to 20 bar
- Models 5860E, 5861E and 5863, 50 mbar at max full scale

Temperature: Ambient/gas 0-65°C

Leak integrity: Outboard: 1 x 10-9 mbar.l/s Helium

Electrical Specifications
MASS FLOW CONTROLLERS

MODELS	POWER SUPPLY REQUIREMENvTS	SETPOINT INPUT	OUTPUT SIGNALS
5850E and 5853E	+15 Vdc, 35 mA and –15 Vdc, 180 mA	0-5 Vdc 2000 Ohm input resist.	0-5 Vdc min load 2000 Ohm
5851E and 5850E 300 bar	+15 Vdc, 350 mA and –15 Vdc, 350 mA	0-5 Vdc 2000 Ohm input resist.	0-5 Vdc min load 2000 Ohm

MASS FLOW METERS

MODEL	POWER SUPPLY	OUTPUT SIGNALS
5860E, 5861E and 5863E	+15 Vdc @ 25mA and –15 Vdc @ 15mA	0-5 Vdc into 2000 Ohm (or greater) load 0-5 Vdc into 2000 Ohm (or greater) load

NOTE: Tolerance to the above requirements: ± 5%

Materials of construction: Wetted parts stainless steel with Viton® , Buna-N® or PTFE/Kalrez®

Mechanical connections:
- ¼", ½", 1", 1½" NPT(F)
- ¼", ½" - ¾" or 1" Tube compression
- ¼", ½", ¾" VCO or ½" VCR

Option: Flanged DIN- or ANSI type available; please refer to ordering information

Electrical:
- 15-pins D-type connector (goldplated connections contacts) with 3 m, 6 m or 12 m cable

MASS FLOW CONTROLLER FAST RESPONSE PERFORMANCE

The curves in figure 1 displays 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.

LOW COMMAND VALVE INHIBIT

A variety of process control systems do not always provide a true "zero" command value.
This results in the mass flow controller trying to match its output signal to its commanded value, which opens the M.F.C. and permits undesired gas flow.

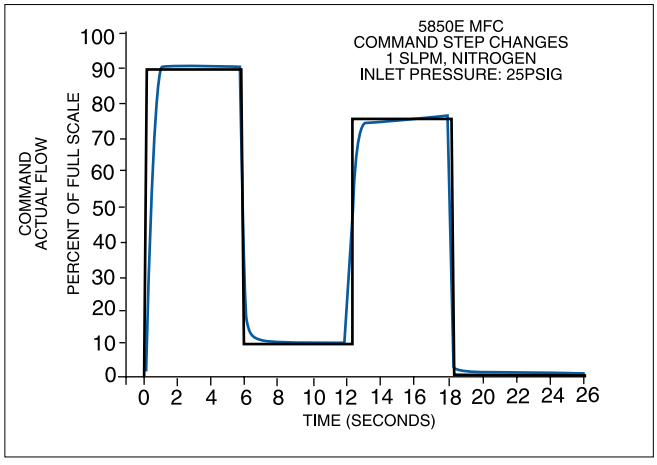


Figure 1: Response performance

The Brooks mass flow controller eliminates this undesired flow condition through its unique LOW COMMAND VALVE INHIBIT, which provides superior process stability.
With Low Command Valve Inhibit the valve is automatically driven to the full closed position when the command value is less than 1% of full scale.

INTERNAL COMMAND RESET
The Brooks mass flow controller provides the exclusive feature of INTERNAL COMMAND RESET. It eliminates overshoot and undershoot oscillations and reaches commanded steady-state flow control very rapidly.
The result is a decreased gas settling time and vastly improved set point control (see figure 2).

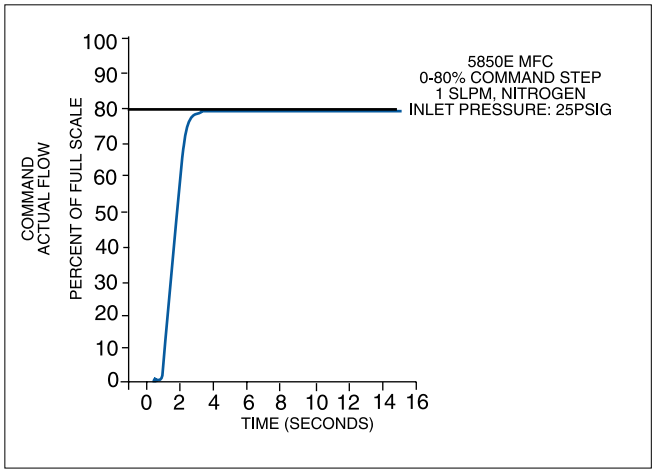


Figure 2: The M.F.C valve closed to normal operation

SELECTABLE SOFT START
Processes requiring injection of gases can be adversely affected by exessive initial gas flow.
This overshoot can result in process damage from explosion or initial pressure impact.
These problems are virtually eliminated with the SOFT START feature (see figure 3)

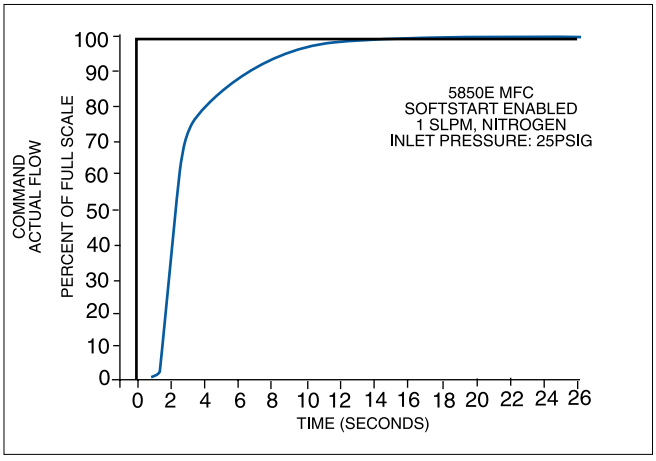


Figure 3: Soft-start enabled

SELECTABLE VALVE OVERRIDE
Gas handling safety practices must be given consideration in many processes.

Since M.F.C.'s are an integral part of the gas system, it was mandatory to take these practices into our 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. This is useful for shutdown or system purge requirements.

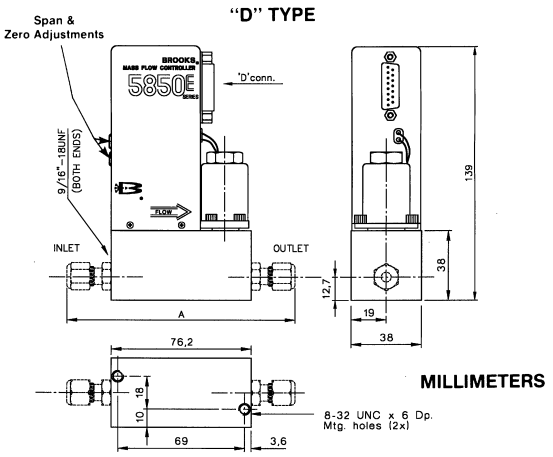
Accessories
- For Microprocessor based Read Out and Control electronics, please refer to the PDS 0152/0154.
- Standard signal cables are available. Please refer to the ordering information at page 6/7.

Reference to figures: 1, 2 and 3

- The black curve represents an (external) command setpoint change
- The blue curve represents the flowrate output signal of the mass flow sensor/controller

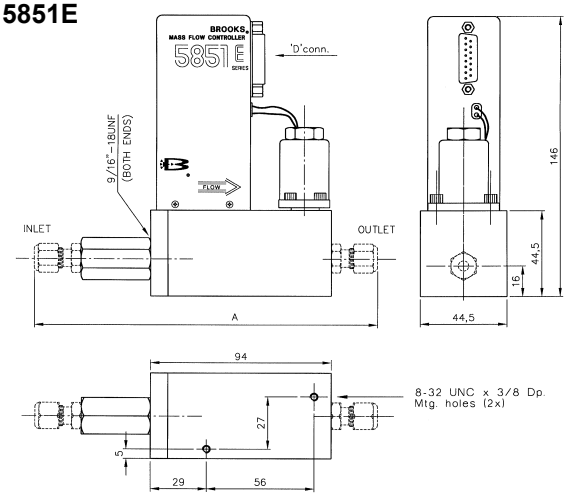
DIMENSIONS

MODEL 5850E



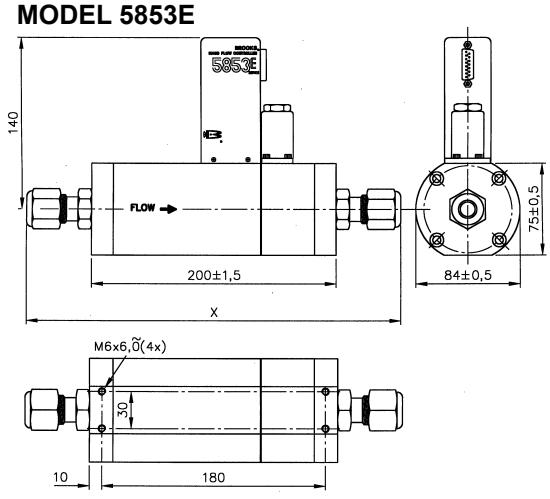
CONNECTIONS	A
9/16"-18 UNF	76
1/4" TUBE COMPR.	128
1/8" TUBE COMPR.	123
1/4" VCR	124
1/4" VCO	116
1/4" NPT	116
6mm TUBE COMPR.	128

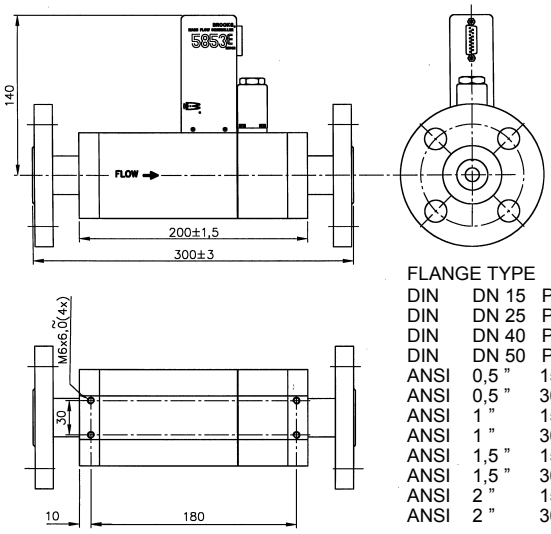
MODEL 5851E



CONNECTIONS	A	A with filter
9/16"-18 UNF	94	130
1/4" TUBE COMPR.	145	181
3/8" TUBE COMPR.	148	184
1/4" VCR	141	177
1/4" VCO	133	169
1/4" NPT	134	170
6mm TUBE COMPR.	145	181
10mm TUBE COMPR.	148	184

MODEL 5853E





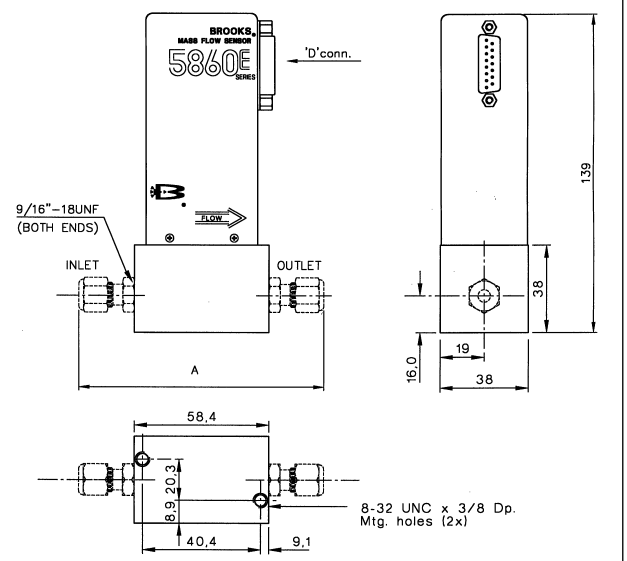
FLANGE TYPE

DIN	DN 15	PN40
DIN	DN 25	PN40
DIN	DN 40	PN40
DIN	DN 50	PN40
ANSI	0,5 "	150 LBS
ANSI	0,5 "	300 LBS
ANSI	1 "	150 LBS
ANSI	1 "	300 LBS
ANSI	1,5 "	150 LBS
ANSI	1,5 "	300 LBS
ANSI	2 "	150 LBS
ANSI	2 "	300 LBS

CONNECTIONS	Build-in Dimensions: (mm) 'X' model 5853	CONNECTIONS	Build-in Dimensions: (mm) 'X' model 5853
1/2" TB. COMPR.	267	3/4" VCO	257
3/4" TB. COMPR.	267	1/2" VCR	322
1" TB. COMPR.	276	0,5", 1", 1,5" NPT or 1 1/16"-12	199
1/2" VCO	250		

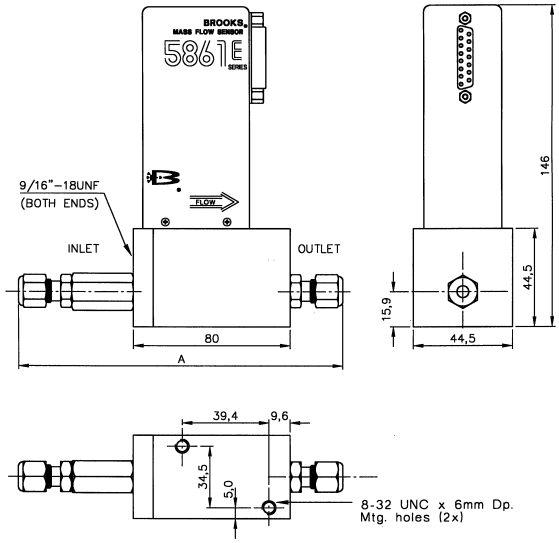
DIMENSIONS

MODEL 5860E



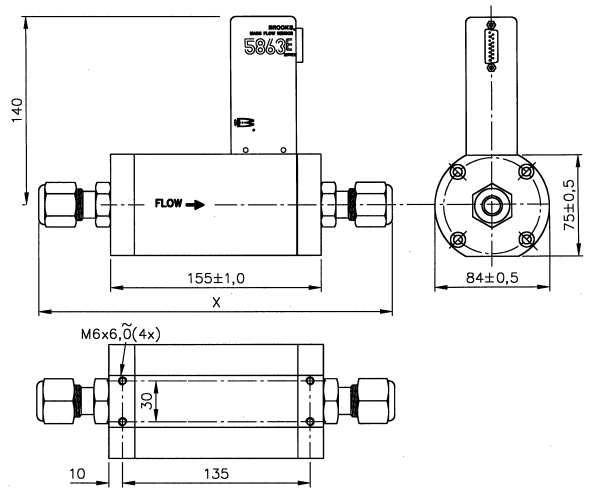
CONNECTIONS	A	CONNECTIONS	A
9/16"-18 UNF	59	1/4" VCO	98
1/4" TUBE COMPR.	110	1/4" NPT	99
1/8" TUBE COMPR.	105	6mm TUBE COMPR.	110
1/4" VCR	106		

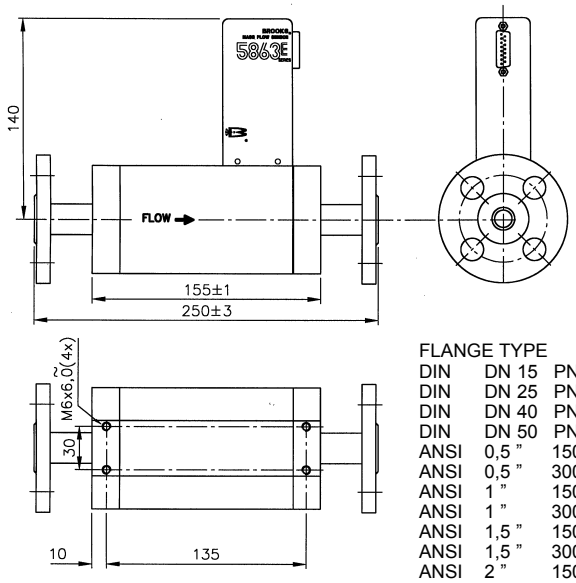
MODEL 5861E



CONNECTIONS	"A" dim in mm	"A" dim in mm
9/16"-18 UNF	80	116
1/4" TUBE COMPR.	131	167
3/8" TUBE COMPR.	134	170
1/4" VCR	128	164
1/4" VCO	120	156

MODEL 5863E





FLANGE TYPE

DIN	DN 15	PN40
DIN	DN 25	PN40
DIN	DN 40	PN40
DIN	DN 50	PN40
ANSI	0,5 "	150 LBS
ANSI	0,5 "	300 LBS
ANSI	1 "	150 LBS
ANSI	1 "	300 LBS
ANSI	1,5 "	150 LBS
ANSI	1,5 "	300 LBS
ANSI	2 "	150 LBS
ANSI	2 "	300 LBS

CONNECTIONS	Build-in Dimensions: (mm) 'X' model 5863	CONNECTIONS	Build-in Dimensions: (mm) 'X' model 5863
1/2" TB. COMPR..	223	3/4" VCO	213
3/4" TB. COMPR.	223	1/2" VCR	210
1" TB. COMPR.	232	0,5", 1", 1,5" NPT or 1 1/16"-12	155
1/2" VCO	206		

THERMAL MASS "E" SERIES 5850/5851						
BASE MODEL NUMBER						**DESCRIPTION**
5850E/B1						MASS FLOW CONTROLLER, MAX. 100 BAR FULL SCALE RANGES FROM 10mln/min* UPTO 30 ln/min N2
5851E/B1						MASS FLOW CONTROLLER, MAX 100 BAR FULL SCALE RANGES FROM 10mln/min UPTO 100ln/min N2
						O-RING/VALVE SEAT MATERIAL
A						VITON
B						BUNA
C						TEFLON/KALREZ (KALREZ ONLY FOR SENSOR 0-RINGS AND VALVE SEAT)
D						KALREZ
Z						SPECIFY
						VALVE TYPE
	1					NORMALLY CLOSED
	2					NORMALLY OPENED (ONLY 5850E)
						ELECTRICAL CONNECTIONS
		A				CARD EDGE
		B				15-PINS SUB "D" CONNECTOR
		J				ZONE II CERTIFIED
		Z				SPECIFY
						MECHANICAL CONNECTIONS
			1			WITHOUT ADAPTERS (9/16"-18" UNF)
			2			1/4" TUBE COMPRESSION FITTINGS
			3			1/8" TUBE COMPRESSION FITTINGS (ONLY FOR 5850E)
						3/8" TUBE COMPRESSION FITTINGS (ONLY FOR 5851E)
			4			1/4" VCR
			5			1/4" VC0
			6			1/4" NPT
			7			6 mm TUBE COMPRESSION FITTINGS
			8			10 mm TUBE COMPRESSION FITTINGS (ONLY FOR 5850/51E)
			9			SPECIFY
						INTERCONNECTION CABLE
				0		NO CABLE
				A		MOUNTING C.E. BRACKET
				B		MATING CONNECTOR ONLY
				C		1,5m. FLAT CABLE WITH C.E. CONNECTOR AT ONE SIDE
				D		3m. ROUND CABLE WITH MATING "D" CONNECTOR
				E		6m. ROUND CABLE WITH MATING "D" CONNECTOR
				F		12m. ROUND CABLE WITH MATING "D" CONNECTOR
				Z		SPECIFY
5850E/B1 A 1 B 3 E =						**TYPICAL MODEL NUMBER**

ACCESSOIRES & OPTIONS
* FOR FLOWRANGES > 3 mln/min. 10 mln/min. N2, ADD:
- FOR GASES WICH CLOG AND CONTAMINATE THE MFC EASILY, AN ANTI-CLOG LAMINAR FLOW ELEMENT MUST BE ORDERED, FOR FLOWRANGES UPTO 3460 mln/min N2 ADD.:
- HEATING PAD
- INTERCONNECTION CABLE; ADD PER METER

THERMAL MASS "E" SERIES 5853						
BASE MODEL NUMBER						**DESCRIPTION**
5853E/-						MASS FLOW CONTROLLER, MAX 100 BAR
						MAX. F.S. FLOW RANGE
1						100 ln/min.
2						UP TO 200 ln/min.
3						UP TO 300 ln/min.
4						UP TO 400 ln/min.
5						UP TO 500 ln/min.
6						UP TO 600 ln/min.
7						UP TO 700 ln/min.
8						UP TO 800 ln/min.
9						UP TO 900 ln/min.
0						UP TO 1000 ln/min.
						O-RING MATERIAL
	A					VITON
	B					PTFE/BUNA
	C					PTFE/KALREZ
						CONTROL VALVE TYPE
		1				NORMALLY CLOSED MIN. DIFF. 2 BAR, MAX. DIFF. 20 BAR
		2				NORMALLY CLOSED MIN. DIFF. 0,5 BAR, MAX. DIFF. 2 BAR
						ELECTRICAL CONNECTIONS
						0-5Vdc 0-5Vdc CE-CONN. E-SERIES
			A			0-5Vdc 0-5Vdc "D"-CONN. E-SERIES
			B			**MECHANICAL CONNECTIONS**
				1A		9/16" - 18UNF. (100 ln/min max.)
				1B		1 1/16" - 12SAE/MS
				1C		9/16" TO $^1/_2$" TUBE COMPRESSION FITTINGS
				1D		1 1/16" TO $^1/_2$" TUBE COMPRESSION FITTINGS
				1E		3/4" TUBE COMPRESSION FITTINGS
				1F		1" TUBE COMPRESSION FITTINGS
				1G		$^1/_2$" NPT (F)
				1H		1" NPT (F)
				1J		1$^1/_2$" NPT (F)
				1K		$^1/_2$" VCO (100 ln/min max.)
				1L		3/4" VCO
				1M		$^1/_2$" VCR (100 ln/min max.)
				1N		$^1/_2$" BSP (F)
				1O		1" BSP (F)
				2A		DIN DN 15 PN40
				2B		DIN DN 25 PN40
				2C		DIN DN 40 PN40
				2D		DIN DN 50 PN40
				3A		ANSI $^1/_2$" 150 LBS
				3B		ANSI $^1/_2$" 300 LBS
				3C		ANSI 1" 150 LBS
				3D		ANSI 1" 300 LBS
				3E		ANSI 1$^1/_2$" 150 LBS
				3F		ANSI 1$^1/_2$" 300 LBS
				3G		ANSI 2" 150 LBS
				3H		ANSI 2" 300 LBS
				9Z		SPECIFY
						INTERCONNECTION CABLE
					O0	WITHOUT MATING CONNECTOR
					A0	C.E. BRACKET
					B0	WITH MATING CONNECTOR
					C0	C.E. CONNECTOR WITH 1.5m. FLAT CABLE
					D0	3M. SIGNAL CABLE WITH 15-PINS SUB "D" CONNECTOR
					E0	6M. SIGNAL CABLE WITH 15-PINS SUB "D" CONNECTOR
					F0	12M. SIGNAL CABLE WITH 15-PINS SUB "D" CONNECTOR
					Z0	SPECIFY
5853E/- 5 A1 B 1F D0 =						**TYPICAL MODEL NUMBER**

ACCESSOIRES & OPTIONS
* CERTIFIED FOR USE IN ZONE 2, HAZARDOUS AREA
** STANDARD CABLE; ADD PER METER

THERMAL MASS "E" SERIES 5860/5861				
BASE MODEL NUMBER				**DESCRIPTION**
5860E/-1				MASS FLOW METER (VOLTAGE), F.S. RANGES FROM 10 mln/min* UPTO 30 ln/min (N2 EQUIVALENT) MAXIMUM OPERATING PRESSURE 300 BAR
5861E/-1				MASS FLOW METER (VOLTAGE), F.S. RANGES FROM 20 ln./min UPTO 100 ln/min (N2 EQUIVALENT) MAXIMUM OPERATING PRESSURE 100 BAR*
				O-RING MATERIAL
A				VITON
B				BUNA
C				TEFLON (KALREZ O-RINGS FOR THE SENSOR ASSEMBLY)
D				KALREZ
Z				SPECIFY
				ELECTRICAL CONNECTIONS
	A			CARD EDGE 0-5Vdc
	B			15-PINS SUB "D" 0-5Vdc
	J			ZONE 2 CERTIFIED
	Z			SPECIFY
				MECHANICAL CONNECTIONS
		1		WITHOUT ADAPTERS (9/16-18 UNF)
		2		1/4" TUBE COMPRESSION FITTINGS
		3		1/8" TUBE COMPRESSION FITTINGS ONLY FOR 5860
				3/8" TUBE COMPRESSION FITTINGS ONLY FOR 5861
		4		1/4" VCR
		5		1/4" VC0
		6		1/4" NPT
		7		6 mm TUBE COMPRESSION FITTINGS
		8		10 mm TUBE COMPRESSION FITTINGS (ONLY FOR 5860/61E)
		9		SPECIFY
				INTERCONNECTION CABLE
			0	NO CABLE
			A	C.E. Bracket
			B	MATING CONNECTOR ONLY
			D	3m. ROUND CABLE WITH MATING "D" CONNECTOR
			E	6m. ROUND CABLE WITH MATING "D" CONNECTOR
			F	12m. ROUND CABLE WITH MATING "D" CONNECTOR
			Z	SPECIFY
5860E/-1 A B 7 D =				**TYPICAL MODEL NUMBER**

ACCESSOIRIES & OPTIONS
* FOR FLOWRANGES > 3 mln/min. 10 mln/min. N2, ADD:
- FOR LOW-LINE PRESSURES AND FOR GASES WICH CLOG AND CONTAMINATE THE MFM EASILY, AN ANTI-CLOG LAMINAR FLOW ELEMENT MUST BE ORDERED. FOR FLOWRANGES UPTO 3460 mln/min N2 ADD
- HIGH PRESSURE RATING: 300 BAR FOR MODEL 5861
- STANDARD CABLE: ADD PER METER
- HEATING PAD

THERMAL MASS "E" SERIES **5863E**						
BASE MODEL NUMBER					**DESCRIPTION**	
5863E/-					MASS FLOW SENSOR, MAX 100 BAR	
					MAX. F.S. FLOW RANGE	
1					100 ln/min.	
2					UP TO 200 ln/min.	
3					UP TO 300 ln/min.	
4					UP TO 400 ln/min.	
5					UP TO 500 ln/min.	
6					UP TO 600 ln/min.	
7					UP TO 700 ln/min.	
8					UP TO 800 ln/min.	
9					UP TO 900 ln/min.	
0					UP TO 1000 ln/min.	
					O-RING MATERIAL	
	A0				VITON	
	B0				PTFE/BUNA	
	C0				PTFE/KALREZ	
					ELECTRICAL OUTPUT	
		A			0-5Vdc CE-conn	
		B			0-5Vdc "D"-conn	
					MECHANICAL CONNECTIONS	
			1A		9/16" - 18UNF. (100 ln/min max.)	
			1B		1 1/16" - 12SAE/MS	
			1C		9/16" TO $^1/_2$"	TUBE COMPRESSION FITTINGS
			1D		1 1/16" TO $^1/_2$"	TUBE COMPRESSION FITTINGS
			1E		3/4"	TUBE COMPRESSION FITTINGS
			1F		1"	TUBE COMPRESSION FITTINGS
			1G		$^1/_2$"	NPT (F)
			1H		1"	NPT (F)
			1J		$1^1/_2$"	NPT (F)
			1K		$^1/_2$"	VCO (100 ln/min max.)
			1L		3/4"	VCO
			1M		$^1/_2$"	VCR (100 ln/min max.)
			1N		$^1/_2$"	BSP (F)
			1O		1"	BSP (F)
			2A		DIN	DN 15 PN40
			2B		DIN	DN 25 PN40
			2C		DIN	DN 40 PN40
			2D		DIN	DN 50 PN40
			3A		ANSI $^1/_2$"	150 LBS
			3B		ANSI $^1/_2$"	300 LBS
			3C		ANSI 1"	150 LBS
			3D		ANSI 1"	300 LBS
			3E		ANSI $1^1/_2$"	150 LBS
			3F		ANSI $1^1/_2$"	300 LBS
			3G		ANSI 2"	150 LBS
			3H		ANSI 2"	300 LBS
			9Z		SPECIFY	
					INTERCONNECTION CABLE	
				0	WITHOUT MATING CONNECTOR	
				A	C.E. BRACKET	
				B	WITH MATING CONNECTOR	
				C	C.E. CONNECTOR WITH 1.5m. FLAT CABLE	
				D	3M. SIGNAL CABLE WITH 15-PINS SUB "D" CONNECTOR	
				E	6M. SIGNAL CABLE WITH 15-PINS SUB "D" CONNECTOR	
				F	12M. SIGNAL CABLE WITH 15-PINS SUB "D" CONNECTOR	
				Z	SPECIFY	
5853E/- 5 A1 B 1F D0 =					**TYPICAL MODEL NUMBER**	

ACCESSOIRES & OPTIONS
* STANDARD CABLE; ADD PER METER
* CERTIFIED FOR USE IN ZONE 2, HAZARDOUS AREA

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Models 5850E/5863E

BROOKS LOCAL AND WORLDWIDE SUPPORT

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

START-UP SERVICE AND IN-SITU CALIBRATION

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

CUSTOMER SEMINARS AND TRAINING

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

HELP DESK

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.

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