

# Mass Flow Controller & Meter

## Models 5853E/5863E

### Features & Benefits

- Easy maintenance
- Fast flow response to command changes
- Negligible flow overshoot/undershoot
- Removable sensor
- Insensitive to mounting attitude
- Wide flow range (up to 1000 slpm N<sub>2</sub>)
- End accessible zero and span potentiometers

### Model 5853E:

- Jumper selectable external valve control
- Electrically activated valve override
- Low command flow cutoff
- Normally closed valve
- Meriam® LFE restrictor
- Bellows sealed high stability valve
- Wide range of pressures and pressure drops

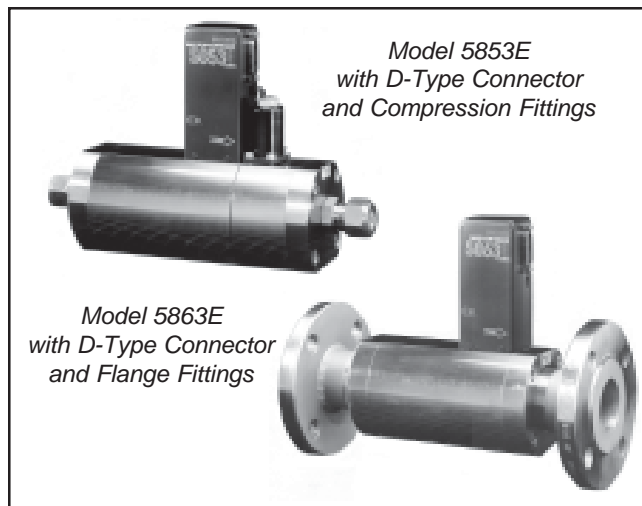
### Description

The Brooks® Models 5853E/5863E Mass Flow Controller and Meter accurately measure and control gas flow (5863E Meter only). The heart of the system is its removable, attitude-insensitive sensor which produces an electrical output signal linear with flow rate used for indicating, recording, and/or control purposes. It eliminates the need for continuous monitoring and readjustment of gas pressures to provide a stable gas flow.

### Principle of Operation

The operating principle of the Brooks mass flow controller and meter is thermodynamic. A wire wound heating element directs heat to the midpoint of the bypass sensor tube. A predetermined portion of the total flow is diverted through the bypass sensor tube. On the same tube, equidistant upstream and downstream of the heat input, are resistance temperature measuring elements.

With no flow, the heat reaching each temperature element is equal. With increasing flow, the flow stream carries heat away from the upstream element, T1, and an increasing amount towards the downstream element, T2. An increasing temperature difference develops between the two elements and this difference is proportional to the amount of gas flowing or the mass flow rate. A bridge circuit interprets the temperature difference and an amplifier provides a 0-5 Vdc output signal.



The control circuitry compares the command setpoint to the flow signal and positions the precision solenoid control valve (Model 5853E) to maintain the desired flow rate. When the command signal is below 2% of full scale, the control valve is positioned to fully closed. The control valve can be latched fully open or closed by activating the valve override circuit (Model 5853E).

### Specifications

Performance:

#### Flow Ranges

Any full scale flow from 0 - 100 slpm\* to 0 - 1,000 slpm (Nitrogen equivalent).

\*Standard pressure and temperature in accordance with SEMI (Semiconductor Equipment and Materials Institute) standard: 0°C and 101 kPa (760 Torr). The mass flow controller can be calibrated to other reference standard conditions. Specify at time of ordering.

#### Control / Usable Range

50 to 1

#### Accuracy

±1% full scale including linearity at calibrated conditions.

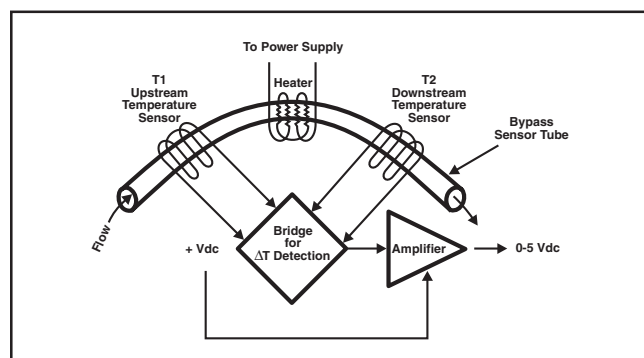


Figure 1 Principle of Operation

## Model 5853E & 5863E

### Specifications (continued)

#### Settling Time

Less than 3 seconds to within 2% full scale of final value for a 0-100% command change.

#### Repeatability

0.25% of rate

#### Sensitivity to Mounting Attitude

±0.5% full scale maximum deviation from specified accuracy after re-zeroing

#### Temperature Sensitivity

Zero: Less than ±0.075% F.S. per degree C  
Span: Less than ±1.0% F.S. shift from original calibration over 50°F to 122°F range (10°C to 50°C)

#### Pressure Sensitivity (Model 5853E)

±0.03% per psi up to 200 psig (N<sub>2</sub>)

#### Ratings:

##### Operating pressure

1500 psig (100 bar) maximum

##### Differential Pressure (Model 5853E)

Standard: High differential valve 30 to 290 psid  
Optional: Low differential valve 7.5 to 30 psid (<500 slpm)  
11.8 to 30 psid (>500 slpm)

##### Temperature Ambient/Gas

41°F to 149°F (5°C to 65°C)

##### Leak Integrity, Outboard

1 x 10<sup>-9</sup> atm cc/sec. Helium (excluding permeation)

#### Materials of Construction

Wetted Parts — 316 Stainless Steel with Viton® fluoroelastomers, Buna-N or PTFE/Kalrez®

#### Mechanical Connections

Type	Sizes Available	Standard or Optional
UNF	9/16"-18, 1-1/16"-12	Standard
NPT	1/2", 1", 1-1/2"	Standard
Compression	1/2", 3/4", 1"	Optional
VCO™	3/8", 1/2"	Optional
VCR™	3/8", 1/2"	Optional
150# ANSI Flange	1/2", 1", 1-1/2", 2"	Optional
300# ANSI Flange	1/2", 1", 1-1/2", 2"	Optional
DIN Flange	DN 15, 25, 40, 50	Optional

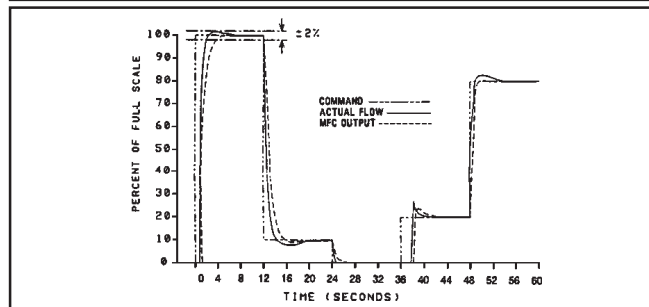


Figure 2 Typical Model 5853E Performance Curve

### Electrical Specifications

	5853E	5863E
+15 Vdc (±5%)	35 mAdc	35 mAdc
-15 Vdc (±5%)	180 mAdc	35 mAdc
Power	3.5 Watts	1.05 Watts
D-connector (DA-15P)	Standard	Standard
Card Edge Connector 30 microinch gold over low-stress Nickel	Standard	N/A
Output Signal into 2k ohm minimum	0-5V	0-5V
Command Input Voltage 200k ohm input resistance	0-5V	N/A

### Ordering Information

To order, specify: 5853E/5863E

- Model number
- Complete gas data
  - Type of gas to be metered
  - Operating temperature
  - Inlet pressure
  - Outlet pressure
  - Flow range
  - Process connections
- Additional application information:
  - Reference Temp.: 0°C(STD), 20°C, 70° F or other
  - Mounting Attitude: Describe mounting position
  - Soft Start  Yes  No

(It is often helpful to know the equipment the 5853E/5863E will be used in, and/or the type of flow controller it will be replacing)

- Additional accessories (if any):
  - Power supply
  - Secondary electronics
  - Command potentiometer
  - Cable assembly

Approximate shipping weight: 15 lb. (7 kg) w/ fittings  
29 lb (13 kg) w/ flanges

#### TRADEMARKS

Brooks ..... Brooks Instrument, LLC  
Kalrez ..... DuPont Dow Elastomers  
Meriam ..... Meriam Instrument Co.  
Teflon ..... E. I. DuPont de Nemours & Company  
VCO, VCR ..... Cajon Co.  
Viton ..... DuPont Performance Elastomers

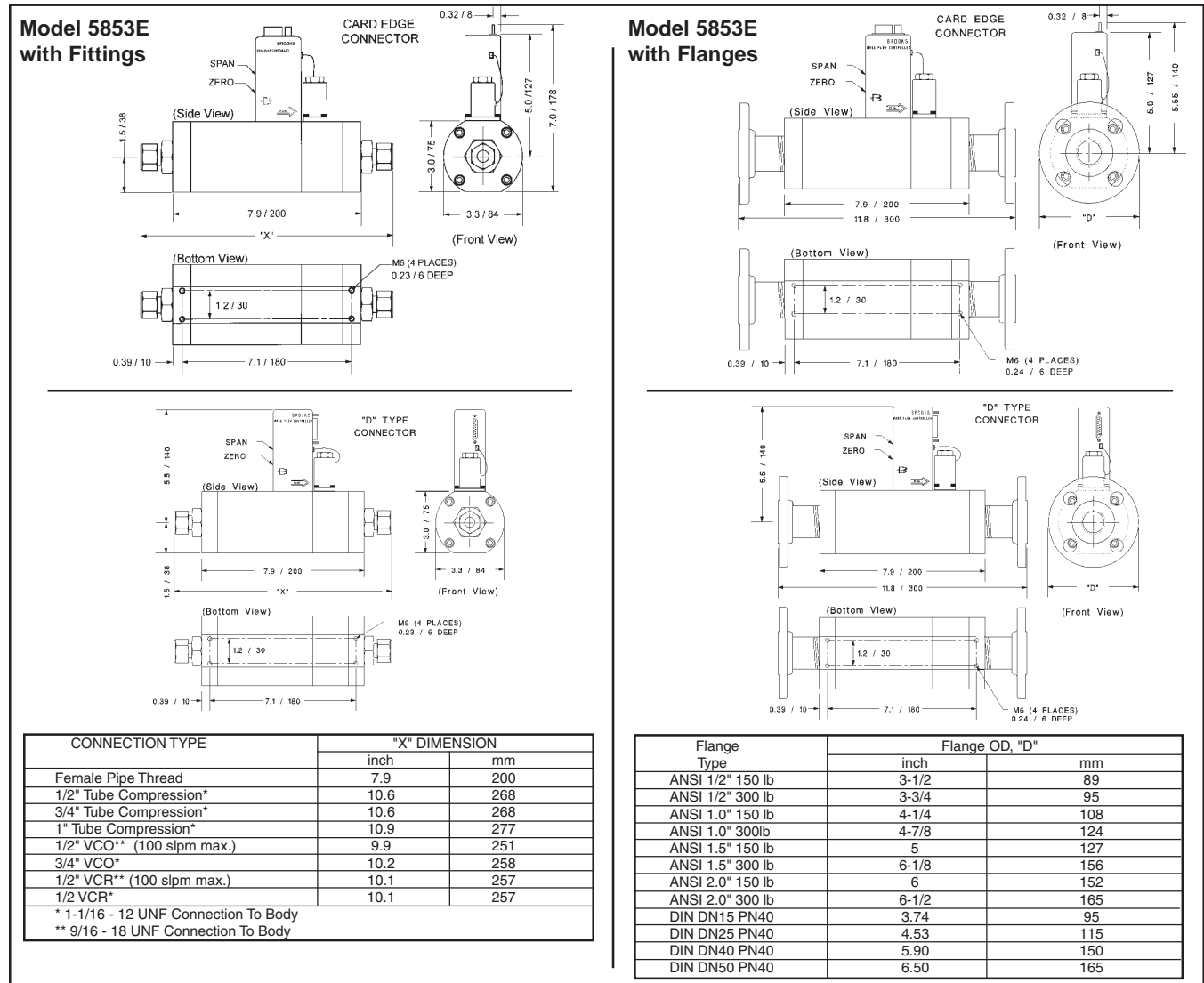


Figure 3 Model 5853E Dimensions

PCB No.	Pin No.	Function	Color Code <sup>(5)</sup>
1	1	Chassis Ground	Brown
A	2	Command Input (Cmd Post "S")	Red
2	3	0-5 V Signal Common	Orange
B	4	Command Common (Cmd Pot "CCW")	Yellow
3	5	0-5 V Signal Output	Green
C	6	Supply Voltage Common	Blue
4	7	+15 Vdc Supply	Violet
D	8	Valve Test Point/Purge	Gray
5	9	Remote Transducer Input**	White
E	10	Not Used	Black
6	11	Not Used	Brown
F	12	-15 Vdc Input	Red
7	13	Slot	Orange
H	14	Slot	Yellow
8	15	Not Used	Green
J	16	Not Used	Blue
9	17	Valve Override	Violet
K	18	Not Used	Gray
10	19	+5 V Reference Output (Cmd Pot "CW") or Valve Return*	White
L	20	Valve Off	Black

\*Jumper Selectable \*\*Factory Activated Option

Figure 4 Model 5853E Card Edge Hook-Up Diagram

PIN NO.	FUNCTION	COLOR CODE <sup>(6)</sup>
1	Cmd. Common (Command Pot "CCW")	Black
2	0-5 Volt Signal Output	White
3	Supply Common or Ext. Valve Return(See Note 3)*	Red
4	Valve Off	Green
5	+15 Vdc Supply	Orange
6	-15 Vdc Supply	Blue
7	Valve Test Point/Purge	Wht/Blk
8	Cmd. Input or Cmd. Pot "S"	Red/Blk
9	Supply Voltage Common (Note 4)	Grn/Blk
10	0-5 Volt Signal Common	Org/Blk
11	+5 Volt Reference Output (Command Pot "CW")	Blu/Blk
12	Valve Override	Blk/Wht
13	Not Used	Red/Wht
14	Chassis Ground	Grn/Wht
15	Remote Transducer Input**	Blu/Wht

\*Jumper Selectable \*\* Factory Activated Option

Notes:  
 1. Cable shield tied to chassis ground in meter connector. Make no connection on customer end.  
 2. All power leads must be connected to power supply.  
 3. To use pin 3 for external valve return, jumper J1 must be moved to the B-D position and pin 3 must be grounded at the customers system.  
 4. Pin 9 is normally used for external valve return and can be used for cables up to 10 feet in length.  
 5. Reference Brooks Cable Assy S124Z495AAA.  
 6. Reference Brooks Cable Assy S124Z575AAA.

Figure 5 Model 5853E D-Type Connector Hook-Up Diagram

# Model 5853E & 5863E

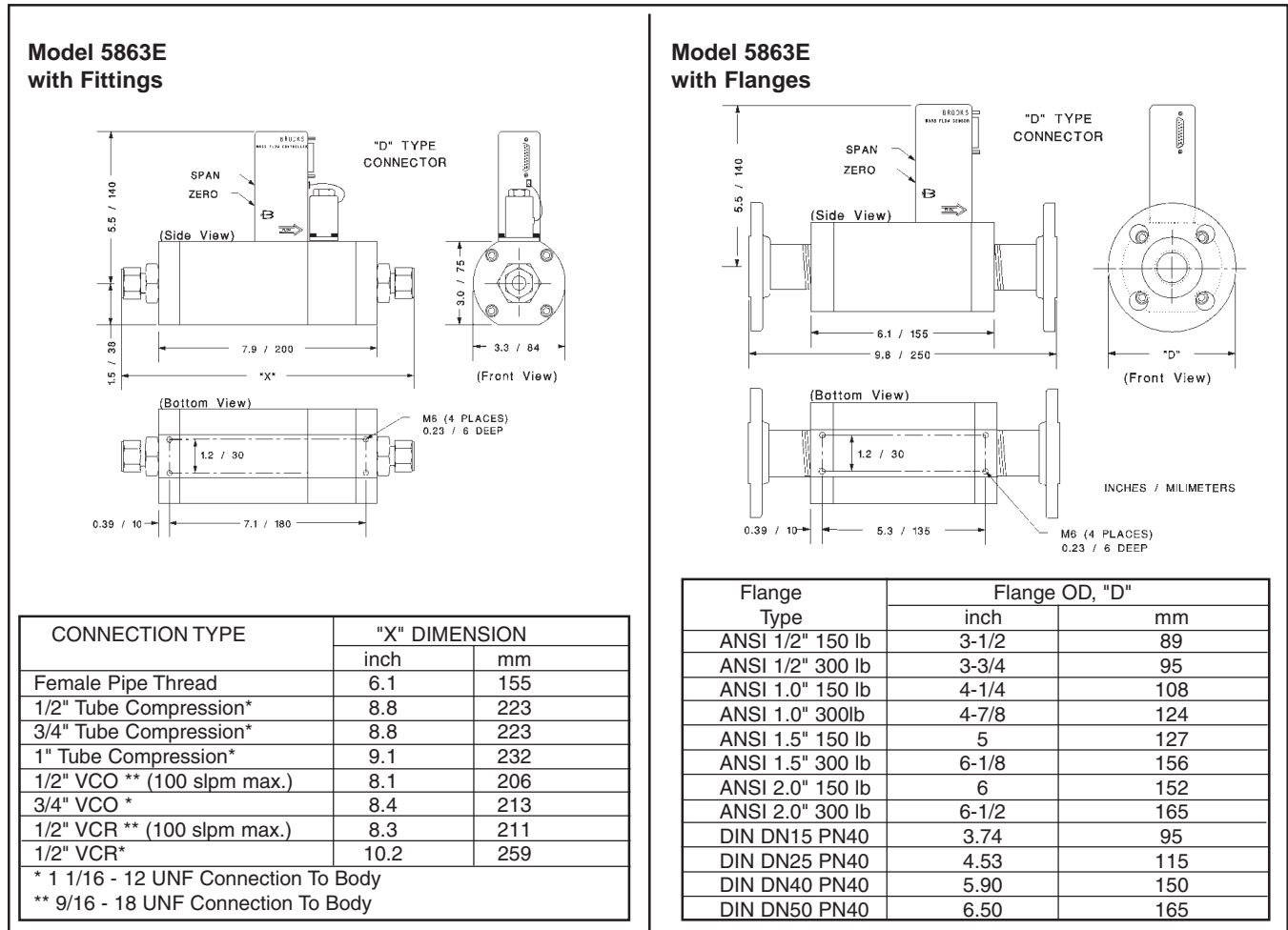


Figure 6 Model 5863E Dimensions

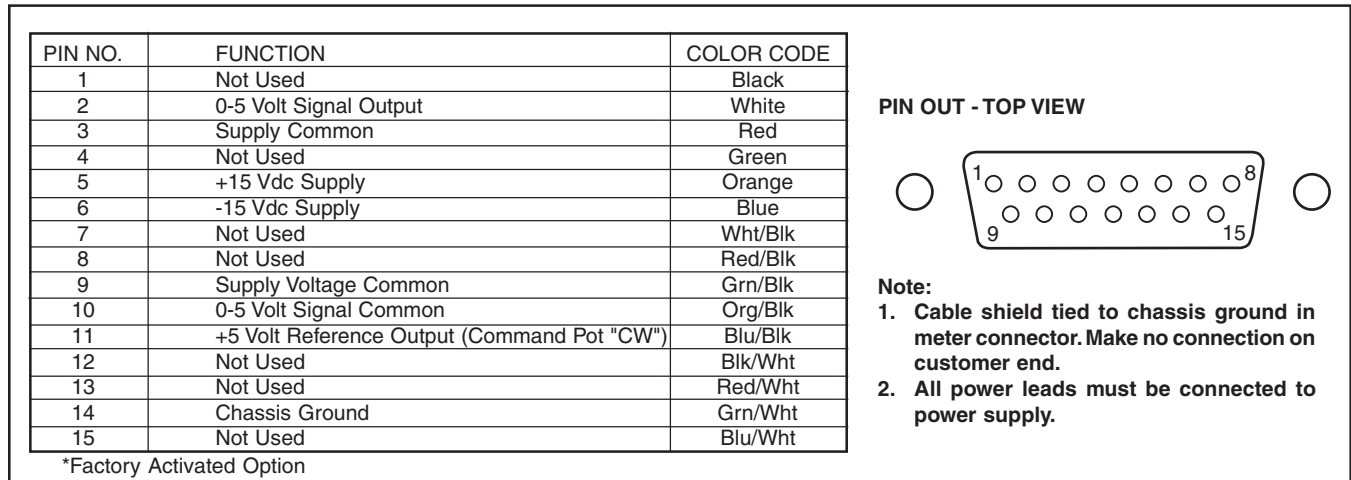


Figure 7 Model 5863E Pin Out

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Specifications Subject to Change Without Notice

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