

High Flow Industrial Mass Flow Controller & Meter

Models 5853i / 5863i

Features and Benefits

- Easy maintenance
- Negligible flow overshoot/undershoot
- Removable sensor
- Insensitive to mounting attitude
- Wide flow range (up to 1000 slpm N₂)
- End accessible zero and span potentiometers
- Dual analog signal outputs 0-5 Vdc and 4-20 mA or 0-20 mA
- Wide power supply tolerance, 15-28 Vdc
- Subminiature D-connector electrical interface for RFI immunity
- Meriam® LFE restrictor

Model 5853i:

- Jumper selectable external valve control
- Electrically activated valve override
- Low command flow cutoff
- Normally closed valve
- User configurable set point input 0-5 Vdc or 4-20 mA
- Bellows sealed high stability valve
- Wide range of pressures and pressure drops

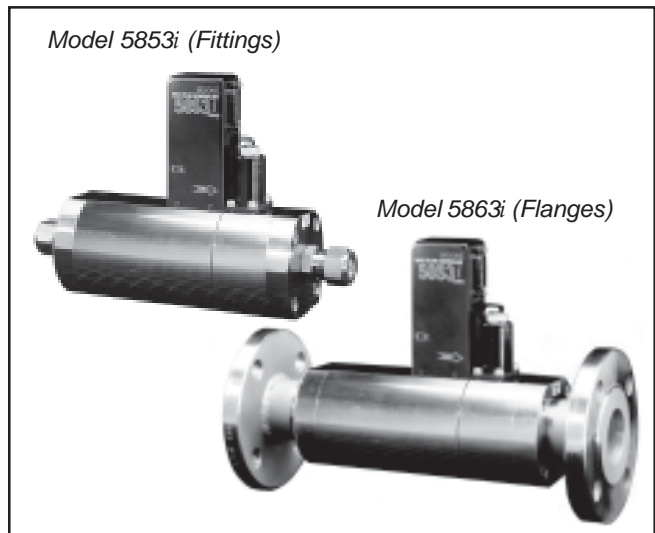
Description

The Brooks® Models 5853i and 5863i industrial mass controller and meter accurately measure and control high gas flow. 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, flows 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, 4-20 mA or 0-20 mA linear output signal.



The control circuitry compares the command setpoint to the flow signal and positions the precision solenoid control valve. 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.

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.

Settling Time

Less than 3 seconds to within 2% of full scale final valve for 0-100% flow step.

Repeatability

0.25% of rate

Sensitivity to Mounting Attitude

±0.5% full scale maximum deviation from specified accuracy after re-zeroing under 200 psig. Specify mounting attitude at time of order to insure optimum performance.

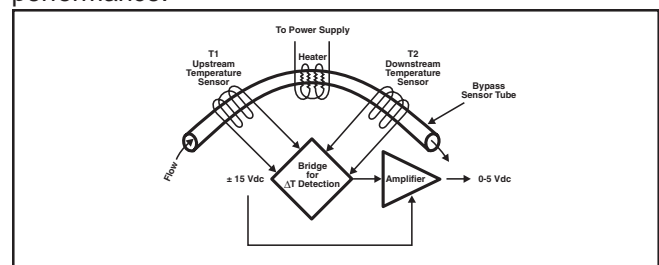


Figure 1 Principle of Operation

Models 5853i & 5863i

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 5853i)

±0.03% per psi up to 200 psig (N₂)

Ratings:

Operating Pressure

1500 psig (100 bar) maximum

Differential Pressure (Model 5853i)

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 10⁻⁹ atm cc/sec. He (excluding permeation)

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

Materials of Construction:

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

Electrical Specifications

Set Point (Command) Signal Requirements (Model 5853i)
 0 to 5 Vdc (200 k ohms input resistance) or 4-20 mA (75 ohms input resistance)

Output Signals

0 to 5 Vdc into 2000 ohms (or greater) load. Maximum ripple 3 mV. 0/4-20 mA, max. loop resistance is power supply dependent, 500 ohms maximum loop resistance, see Figure 5.

Power Requirements

+15 to +28 Vdc

240 mA @ +15 Vdc, 370 mA @ 28 Vdc (Model 5863i - 90mA max.)

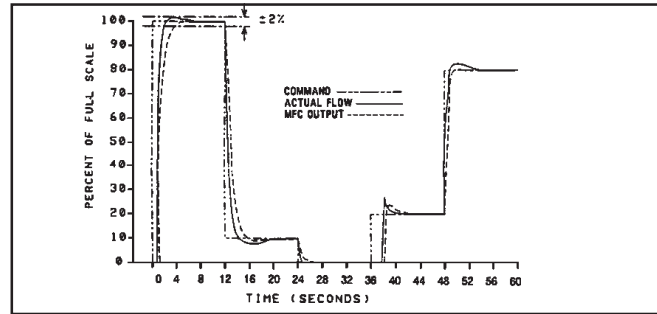


Figure 2 Typical Performance Curve

Electrical Connections

D-type connector (DA-15P)

ORDERING INFORMATION

To order, specify: 5853i/5863i:

1. Model number
 2. 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, 0°F or other
 Mounting Attitude: Describe mounting position
 Soft Start: Disabled (STD), Enabled

Input/Output	Input	Output
Configuration:	0-5V, or 4-20mA	0-20mA, or 4-20mA

(0-5V always avail.)
 3. Additional accessories (if any):
 Power supply
 Secondary electronics
 Command potentiometer
 Cable assembly
- Approximate shipping weight: 15 lb. (7 kg) w/ fitting
 29 lb (13 kg) w/flanges

TRADEMARKS

Brooks Brooks Instrument, LLC
 Kalrez DuPont Dow Elastomers
 Meriam Meriam Instrument Co.
 VCO, VCR Cajon Co.
 Viton DuPont Performance Elastomers

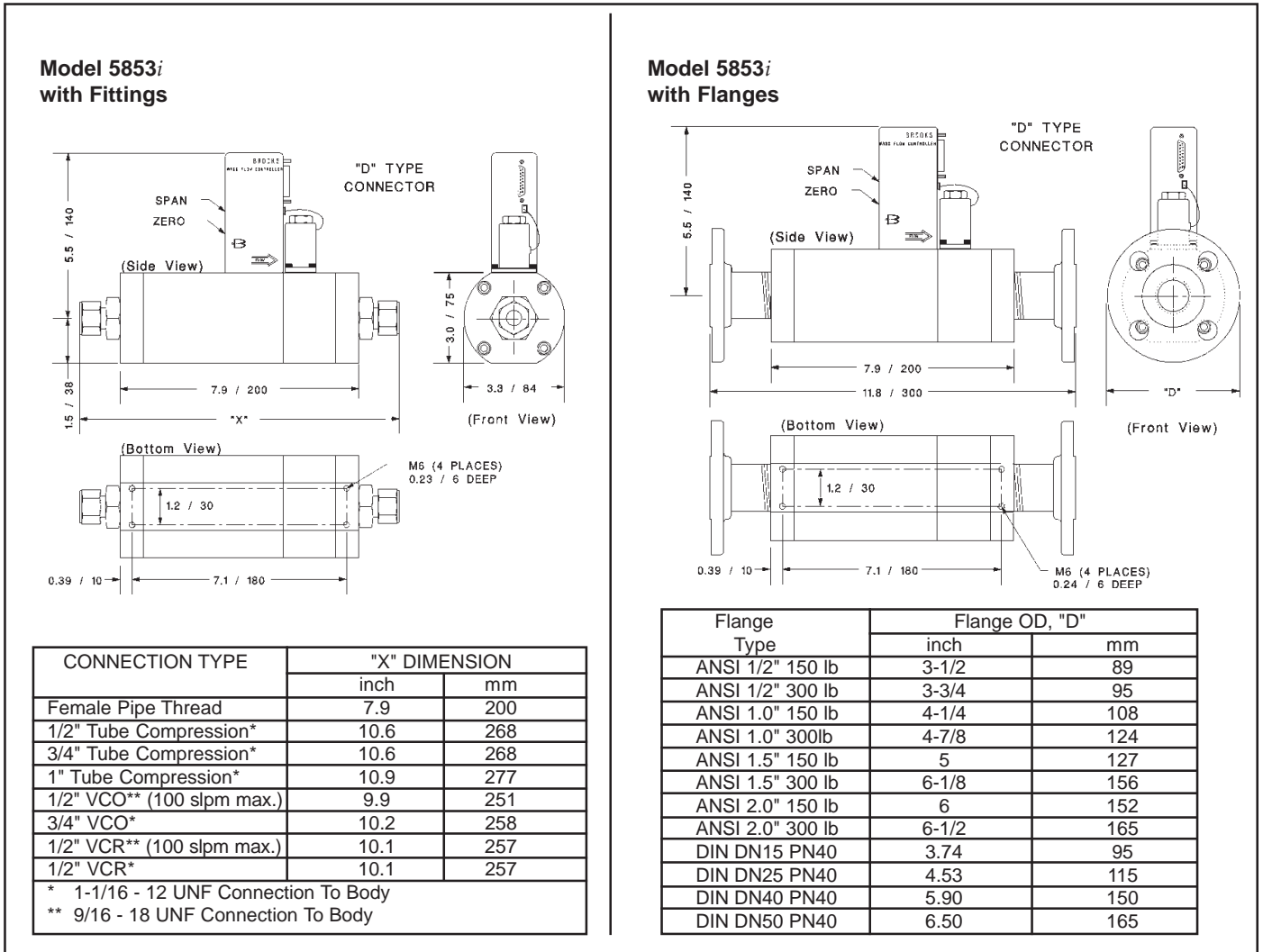


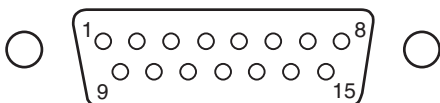
Figure 3 Model 5853i Dimensions

PIN NO.	FUNCTION	COLOR CODE
1*	Setpoint Return or N/C	Black
2	0-5 Volt Signal Output	White
3	Not Used	Red
4	Current Signal Output	Green
5	+15 to +28 Vdc Supply	Orange
6	Not Used	Blue
7*	Current Setpoint Input or N/C	Wht/Blk
8*	Voltage Setpoint Input or N/C	Red/Blk
9	Supply Voltage Common	Grn/Blk
10	Signal Output Common	Org/Blk
11	+5 Volt Reference Output (Command Pot "CW")	Blu/Blk
12*	Input Valve Override or N/C	Blk/Wht
13	Not Used	Red/Wht
14	Chassis Ground (See Note 1)	Grn/Wht
15	Not Used	Blu/Wht

* These connections are used for Model 5853i make no connections for Model 5863i.

Figure 4 Models 5853i/5863i Hookup Diagram

PIN OUT - TOP VIEW



Note:

- Cable shield tied to chassis ground in meter connector. Make no connection on customer end.

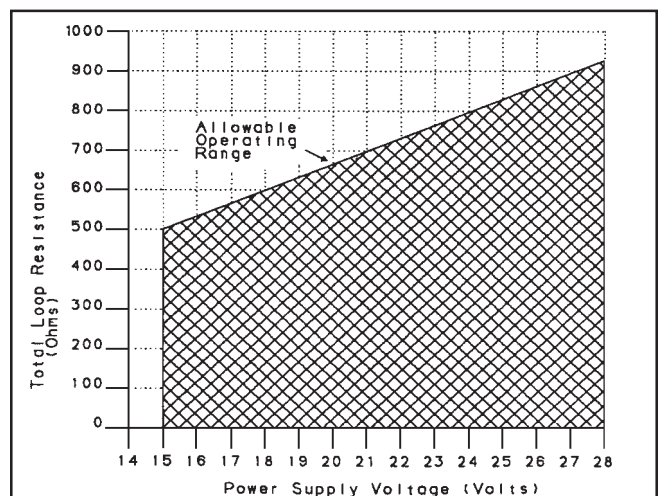


Figure 5 Maximum Allowable Loop Resistance

Models 5853i & 5863i

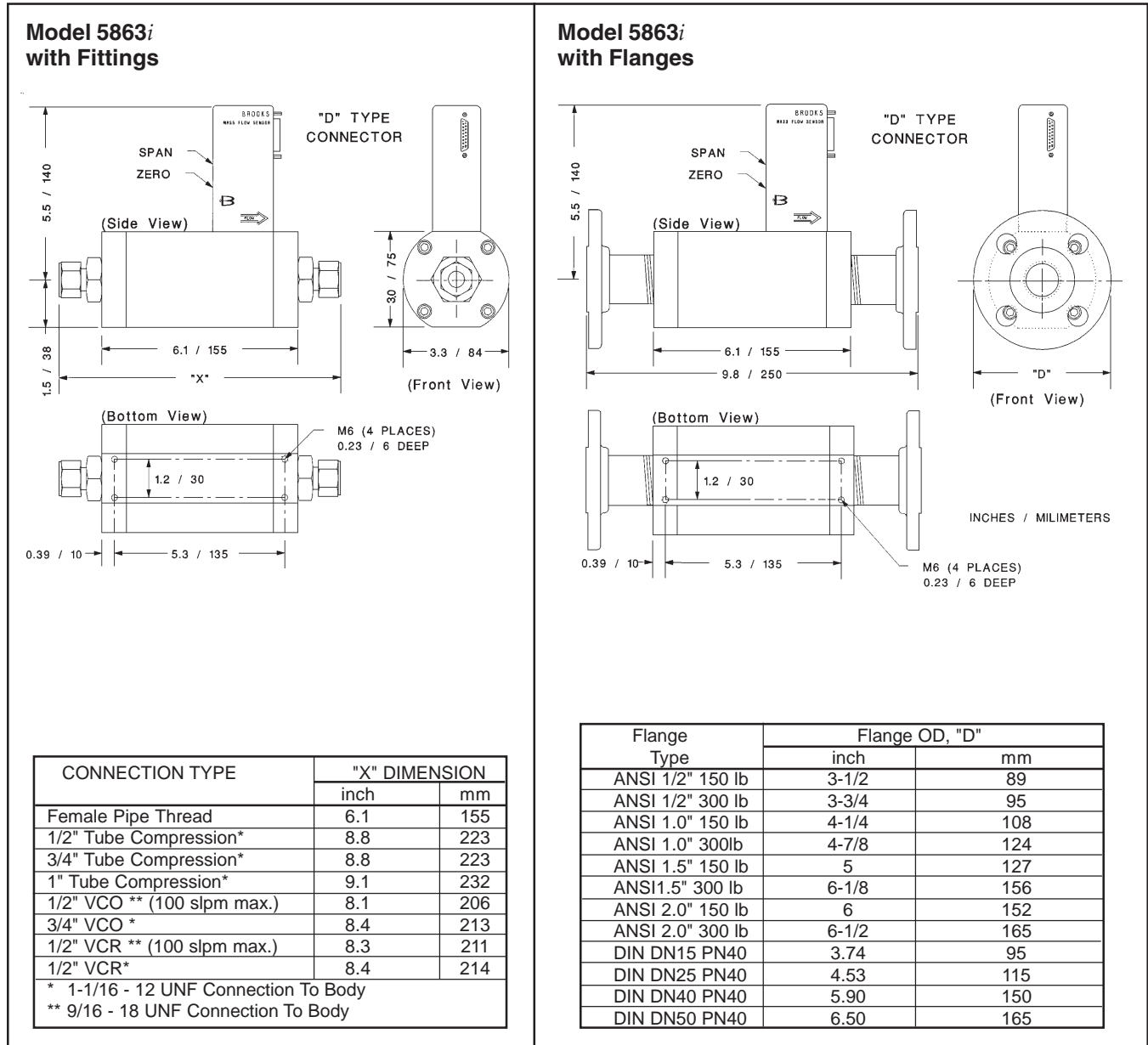


Figure 6 5863i Dimensions



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