

Multi-Parameter flow meters provide accurate data on three different fluid parameters:

- **flow**
- **pressure**
- **temperature**

The flow rate can be displayed in volumetric flow or mass flow engineering units for standard or actual (temperature, pressure) conditions. Flow meters can be programmed locally by the four button keypad and LCD or remotely via RS-232/RS-485 interface.

DFM flow meters support various functions including: flow totalizer, flow, temperature, pressure alarms, automatic zero adjustment, 2 relay outputs, 0-5 Vdc / 0-10 Vdc / 4-20 mA analog outputs for flow, pressure and temperature.

DFM's are offered either as Digital Mass Flow Meters, Model Numbers: DFM26, 36, & 46 or as a Digital Multi-Parameter Meters, Model Numbers, DFM27, 37 & 47. Model Numbers are displayed in Table 28

THERE ARE 3 VOLTAGE (POWER) OPTIONS:

±15Vdc, 12Vdc, & 24Vdc.

Interface

All features of the flow meter can be accessed via the local four button keypad and LCD. The digital interface operates via RS485 (optional RS-232 is available) and provides access to applicable internal data including: flow, temperature, pressure reading, auto zero, totalizer and alarms settings, gas table, conversion factors and engineering units selection, dynamic response compensation and linearization table adjustment. The analog interface provides 0 to 5Vdc or 0 to 10Vdc or 4 to 20 mA outputs for flow, pressure and temperature (jumper selectable).

Auto Zero

The DFM supports automatic sensor zero offset adjustment which can be activated locally via the keypad or remotely via digital interface. The auto zero feature requires absolutely no flow through the meter during auto zero process. Provisions are made to either start, read, or save the current auto zero value via digital commands.



Totalizer

The total volume of the gas is calculated by integrating the actual gas flow rate with respect to time. Both keypad menu and digital interface commands are provided to:

- Set the totalizer to ZERO.
- Start the totalizer at a preset flow.
- Assign action at a preset total volume.
- start/stop totalizing the flow.
- Read totalizer.

Totalizer conditions become true, when the totalizer reading and the "Stop at Total" volumes are equal.

Flow Alarm

High and Low gas flow ALARM limits can be preprogrammed via keypad or remotely via digital interface. ALARM conditions become true when the current flow reading is equal or higher/lower than corresponding values of high and low alarm levels. Alarm action can be assigned with preset delay interval (0-3600 seconds) to activate the contact closer (separate for High and Low alarm).

Pressure Alarm

High and Low gas pressure ALARM limits can be preprogrammed via the keypad or remotely via digital interface. Pressure alarm conditions become true when the current pressure reading is equal or higher than corresponding values of high pressure alarm settings or equal or lower than corresponding values of low pressure alarm settings. Alarm action can be assigned to activate the contact closer (separate for High and Low pressure alarm).

Temperature Alarm

High and Low gas temperature ALARM limits can be preprogrammed via the keypad or remotely via digital interface. Temperature alarm conditions become true when the current temperature reading is equal or higher than corresponding values of high temperature alarm settings or equal or lower than corresponding values of low temperature alarm settings. Alarm action can be assigned to activate the contact closer (separate for High and Low temperature alarm).

TABLE 33 - SPECIFICATIONS

ACCURACY:	±1% of FS at calibration temperature and pressure.
CALIBRATIONS:	Performed at standard conditions [14.7 psia (101.4 kPa) and 70 °F (21.1°C)] unless otherwise stated.
PRESSURE RANGE (MEASUREMENT):	5 to 100 psia (0.34 to 6.8 bars).
PRESSURE ACCURACY:	±1% of FS.
TEMPERATURE RANGE (MEASUREMENT):	32 °F to 122 °F (0 °C to 50 °C).
TEMPERATURE ACCURACY:	±1 °C.
REPEATABILITY:	±0.25% of full scale.
RESPONSE TIME:	0.6 to 1.0 second to within ±2% of set flow over 20% to 100% of full scale.
TEMPERATURE COEFFICIENT:	0.15% / °C or better.
PRESSURE COEFFICIENT:	0.01% of full scale/ 1 psi (0.07 bar) or better.
OPTIMUM GAS PRESSURE:	25 psig (1.73 bars).
MAXIMUM GAS PRESSURE:	DFM 26/36/46: 1000 psig (68 barg, 6895 kPag). DFM 27/37/47: 100 psia (6.8 barabs, 689 kPaabs).
MAXIMUM BURST PRESSURE:	DFM 26/36/46: 1000 psig (68 barg, 6895 kPag). DFM 27/37/47: 200 psig (13.6 barg, 1379 kPag).
MAXIMUM PRESSURE DROP:	See table 35.
GAS and AMBIENT TEMP:	32 °F to 122 °F (0 °C to 50 °C). 14 °F to 122 °F (-10 °C to 50 °C) - Dry gases only.
OUTPUT SIGNALS:	Linear 0-5 Vdc (3000 ohms min load impedance); 0-10Vdc (6000 ohms min impedance); 4-20 mA optional (500 ohms max loop resistance). Maximum noise 20mV peak to peak.
INPUT POWER:	May be configured for three different options: ±15Vdc (±200 mA maximum); +12Vdc (300 mA maximum); +24Vdc (250 mA maximum); Circuit boards have built-in polarity reversal protection. Resettable fuses provide power input protection.
**MATERIALS IN FLUID CONTACT:	316 stainless steel, Viton® O-rings. Optional O-rings: Buna®, EPR and Kalrez®.
CONNECTIONS:	Model DFM26/27: Standard 1/4" compression fittings. Optional: 6mm compression fittings, 3/8" or 1/8" compression fittings and 1/4" VCR® fittings. Model DFM36/37: Standard 1/4" compression fittings. Optional: 6mm compression fittings, 3/8" compression fittings and 1/4" VCR® fittings. Model DFM46/47: Standard 3/8" compression fittings.
DISPLAY:	128 x 64 graphic LCD with backlight (up to 8 lines of text).
CALIBRATION OPTIONS:	Standard one 10 points NIST traceable calibration. Optional up to 9 additional calibrations may be ordered for an additional charge.
CE COMPLIANCE:	EN 55011 class 1, class B; EN50082-1.
ENVIRONMENTAL (PER IEC 664):	Installation Level II; Pollution Degree II.

**The selection of materials of construction, is the responsibility of the customer. The company accepts no liability.

Engineering Units

The measured gas flow and associated totalizer data are scaled directly in engineering units via the front panel keypad or digital interface.

THE FOLLOWING UNITS OF MEASURE ARE SUPPORTED:

%F.S., L/min, L/h, mL/min, mL/h, scuft/h, scuft/min, lb/h, lb/min, one user defined engineering unit.

Multi-Gas Calibration

The DFM is capable of storing primary calibration data for up to 10 gases. This feature allows the same DFM to be calibrated for multiple gases while maintaining the rated accuracy on each.

Conversion Factors

Conversion factors for up to 32 gases are stored in the DFM. In addition provision is made for a user defined conversion factor. Conversion factors may be applied to any of the ten gas calibrations via keypad or digital interface commands.

Contact Closure

Two sets of dry contact relay outputs are provided to actuate user supplied equipment. These are programmable via the local keypad or digital interface such that the relays can be made to switch when a specified event occurs (e.g. when a low or high flow, pressure or temperature alarm limit is exceeded or when the totalizer reaches a specified value).

Leak Integrity

1 x 10⁻⁹ smL/sec of Helium maximum to the outside environment.

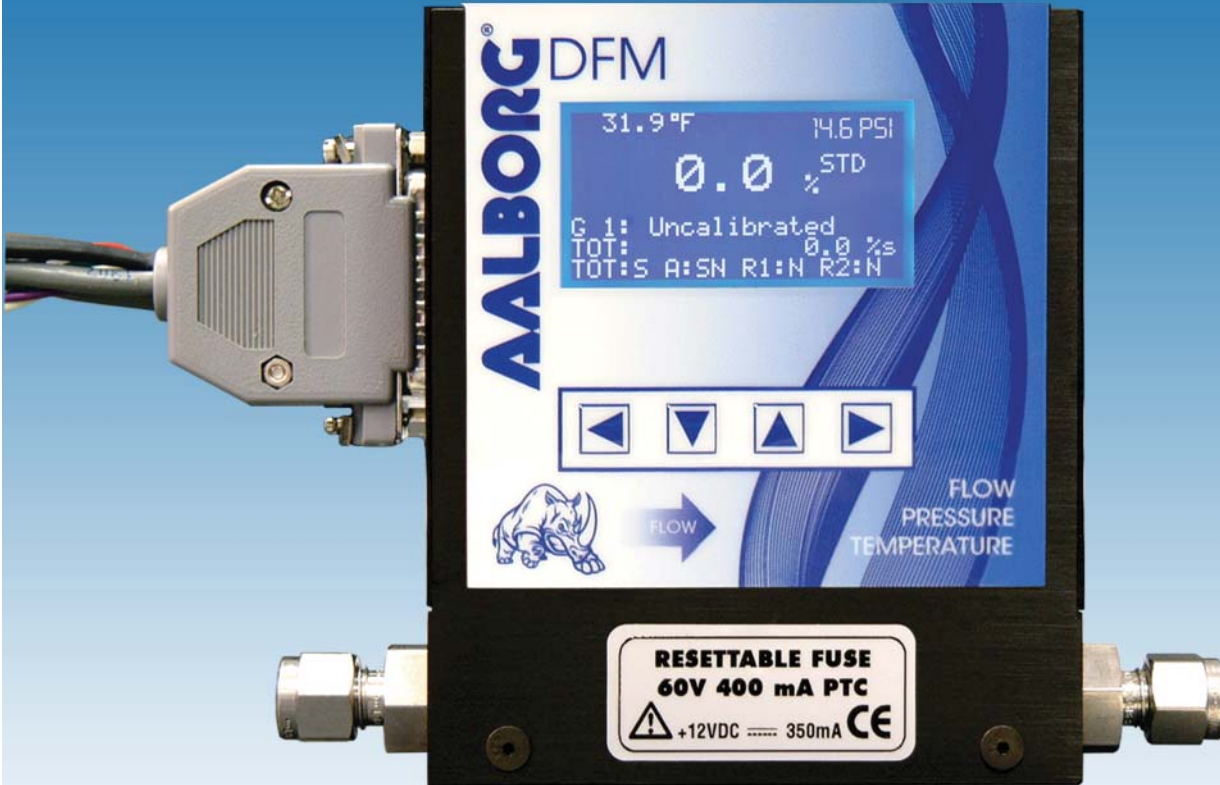
TABLE 34 - FLOW RANGES FOR DFM

DFM 26 / 27 LOW FLOW MASS METERS	
CODE	mL/min [N ₂]
01	0 to 10
02	0 to 20
03	0 to 50
04	0 to 100
05	0 to 200
06	0 to 500
CODE	L/min [N ₂]
07	0 to 1
08	0 to 2
09	0 to 5
10	0 to 10
DFM 36 / 37 MEDIUM FLOW MASS FLOW METERS	
CODE	L/min [N ₂]
11	0 to 15
30	0 to 20
31	0 to 30
32	0 to 40
33	0 to 50
DFM 46 / 47 HIGH FLOW MASS FLOW METERS	
CODE	L/min [N ₂]
40	0 to 60
41	0 to 80
42	0 to 100

TABLE 35 - PRESSURE DROP FOR DFM

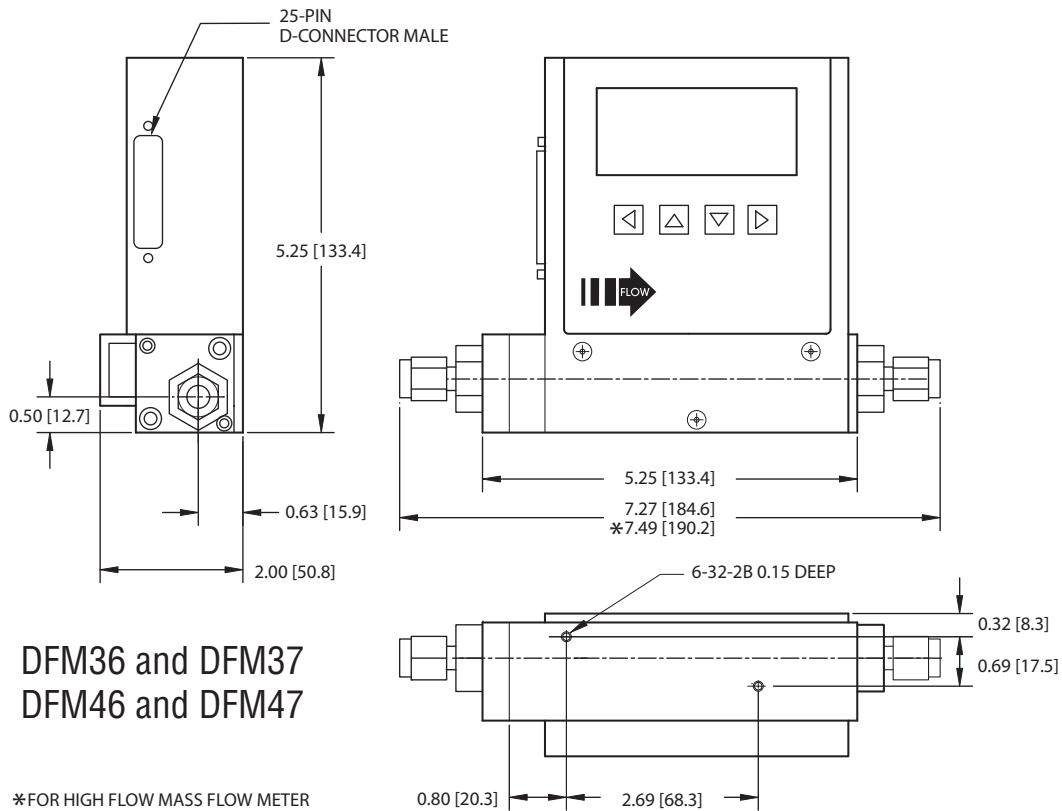
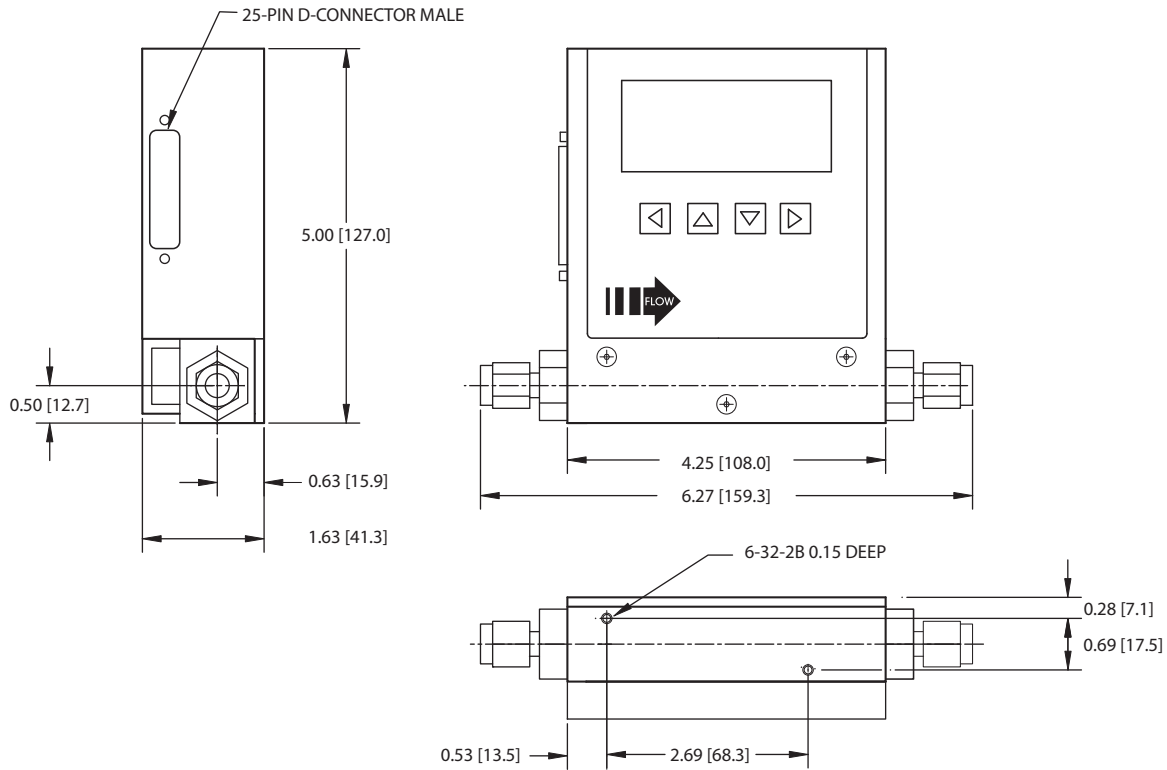
MODEL	FLOW RATE [liters/min]	MAXIMUM PRESSURE DROP FOR DFM		
		mm H ₂ O]	[psid]	[kPa]
DFM 26 /27	up to 10	25	0.04	0.276
DFM 36 /37	20	300	0.44	3.03
	30	800	1.18	8.14
	40	1480	2.18	15.03
	50	2200	3.23	22.3
DFM 46 /47	60	3100	4.56	31.4
	100	5500	8.08	55.7

Multi-Parameter Mass Flow Meter with Digital Signal Processing



Design Features

- Multi-Drop Capability of up to 255 units (for RS-485 option).
- Stores calibration data for up to 10 different gases.
- Supports 10 different engineering units including user defined.
- Programmable 12 digits Totalizer indicates total gas volume.
- Flow Alarm limits for high and low gas flow with relay output.
- Pressure Alarm limits for high and low gas pressure with relay output.
- Temperature Alarm limits for high & low gas temperature with relay output.
- Four button keypad and large 128x64 graphical LCD with back light.
- Digital (RS-232 or RS-485) and Analog outputs operate simultaneously.
- Internal Conversion factors for up to 32 gases.
- Automatic Zero Adjustment.
- Self-Diagnostic Tests.



DFM36 and DFM37
DFM46 and DFM47

*FOR HIGH FLOW MASS FLOW METER

DFM	MODEL										
MAX. FLOW (N ₂)											
26	10 L/min										
36	50 L/min										
46	100 L/min										
27	10 L/min										
37	50 L/min										
47	100 L/min										
MATERIAL											
S	Stainless Steel										
SEALS											
V	Viton®										
B	Buna®										
E	EPR										
T	PTFE / Kalrez®										
FITTINGS											
A	1/4" Compression	MODEL									
B	1/8" Compression	DFM 26 & 27									
C	1/4" VCR®	DFM 26, 27, 3, 37									
D	3/8" Compression	DFM 26, 27, 36, 37, 46, 47									
H	6mm Compression	DFM 26, 27, 36, 37									
DISPLAY											
L	LCD readout										
POWER											
2	12 Vdc										
4	24 Vdc										
5	+15 Vdc										
OUTPUT SIGNAL											
A	0-5 Vdc										
B	4-20 mA										
C	0-10 Vdc										
TEMP & PRESSURE OUTPUT SIGNAL (A only 26, 36, 46)		**DIGITAL INTERFACE									
CODE	TEMP OUT	PRESSURE OUT	2	RS232							
A	n.a.	n.a.	5	RS485							
B	0-5Vdc	0-5Vdc	**RS485 is standard. No cost optional RS232 is selected by changing the last digit of part number from 5 to 2.								
C	0-5Vdc	4-20mA									
D	0-5Vdc	0-10Vdc									
E	4-20mA	0-5Vdc									
F	4-20mA	4-20mA									
G	4-20mA	0-10Vdc									
H	0-10Vdc	0-5Vdc									
I	0-10Vdc	4-20mA									
J	0-10Vdc	0-10Vdc									
*n.a. = not applicable.											
DFM	36	S	-	V	A	L	5	-	A	A	5

EXAMPLE: DFM36S-VAL5-AA5 50 L/min [N₂] 20 psig
SPECIFY: Flow Range, Gas and Pressure.

DFM36 stainless steel, Viton® seals, 1/4" compression fittings, LCD readout display, ±15 Vdc power, 0-5Vdc output signal, RS485 digital interface.