Aalborg DFC mass flow controllers

Digital thermal mass flow controllers with RS-485 interface, from 10 smL/min to 100 sL/min N_2 full scale

The Aalborg DFC measures gas mass flow with a heated capillary sensor and holds the set point with a digital PID control loop and a proportional valve. It talks over RS-485 (RS-232 optional) and, in parallel, over analogue signals. It totalizes, raises flow alarms and stores calibrations for up to 10 gases.



100 sL/min	±1 % FS	±0.15 % FS	70 bar g	up to 10
Largest full scale in N_2; smallest 10 smL/min	Accuracy	Repeatability	Maximum gas pressure (1000 psig)	Stored gas calibrations

Performance

Accuracy [1]	±1 % FS at calibration temperature and pressure
Repeatability	±0.15 % FS
Response time	1–2 s to within ±2 % of the set point, for set points of 20–100 % FS
Temp. coefficient	0.05 % FS/°F or better
Press. coefficient	0.01 % FS/psi (0.07 bar) or better
Calibrated at	14.7 psia (101.4 kPa) and 70 °F (21.1 °C), unless ordered otherwise
Auto zero	Zero nulled whenever the set point is below 2 % FS Needs a control valve that closes fully at that set point Digital commands can disable or force auto zero, or store the current auto zero

Operating conditions

Max. pressure	1000 psig (70 bar)
Optimum inlet	25 psig (1.73 bar)
Max. differential	DFC 26, 36: 50 psig (3.4 bar) DFC 46: 40 psig (2.8 bar)
Gas, ambient	0–50 °C (32–122 °F) Extended to −10 to 50 °C (14–122 °F), dry gases only
Leak integrity	1 × 10⁻⁹ smL/s helium maximum, to the outside

Mechanical

Wetted materials	316 and 416 stainless steel, FKM O-rings Optional O-rings: NBR, EPR or FFKM Choosing them to suit your gas is your responsibility
Process connections	DFC 26, 36: 1/4" compression; options 6 mm or 3/8" compression, 1/4" VCR; DFC 26 also 1/8" DFC 46: 3/8" compression
Mounting position	Calibrated horizontal; keep within 15° of horizontal

Electrical and communication

Flow output	0–5 V DC, linear, load 2000 Ω minimum; 0–10 V DC, load 4000 Ω minimum 4–20 mA optional, loop resistance 0–500 Ω Noise: 20 mV peak-to-peak maximum
Set point input	0–5 V DC, 0–10 V DC or 4–20 mA
Digital interface	RS-485 standard, RS-232 optional; up to 256 controllers on one bus Digital and analogue modes work at the same time Digital access to the flow set point, actual flow, zero adjustments and linearisation table adjustments
Supply	±15 V DC, balanced; 13.5 W maximum Transducer input: +15 V DC, 450 mA maximum
Circuit protection	Reverse-polarity protection; resettable fuses on the power input
Connector	24-pin D-sub male (DFC 26); 25-pin D-sub male (DFC 36, 46)
Relay outputs	Two dry-contact outputs for flow alarms or a totaliser value

Compliance

CE marking	EN 55011 class 1, class B; EN 50082-1

Functions

Gas calibrations	Up to 10 gases, each at rated accuracy; conversion factors for 256 gases Standard: 10-point, NIST traceable; up to 9 more optional
Totaliser	Zero, start, stop, read; start at a preset flow, stop at a preset total
Alarms	High and low flow limits, by interface or relay
Valve override	Purge or close, by analogue or digital command
Auto tune	Sets PID gains for the gas; below 80 sL/min full scale only
Self-diagnostics	Self-diagnostic tests at every power-up
Engineering units	% FS, smL/min, smL/h, scfm, scfh, sL/min, sL/h, lb/h, lb/min and one user-defined unit; selected by digital interface
PC software	Free Aalborg software; blends up to 8 gases with 8 controllers on one bus Programmable flow, up to 10 steps, with ramps

Range codes, N_2 (21.11 °C, 1013.25 mbar)

Model	Range code	Full scale (N_2)
DFC 26	01	10 smL/min
DFC 26	02	20 smL/min
DFC 26	03	50 smL/min
DFC 26	04	100 smL/min
DFC 26	05	200 smL/min
DFC 26	06	500 smL/min
DFC 26	07	1 sL/min
DFC 26	08	2 sL/min
DFC 26	09	5 sL/min

Model	Range code	Full scale (N_2)
DFC 26	10	10 sL/min
DFC 36	11	15 sL/min
DFC 36	30	20 sL/min
DFC 36	31	30 sL/min
DFC 36	32	40 sL/min
DFC 36	33	50 sL/min
DFC 46	40	60 sL/min
DFC 46	41	80 sL/min
DFC 46	42	100 sL/min

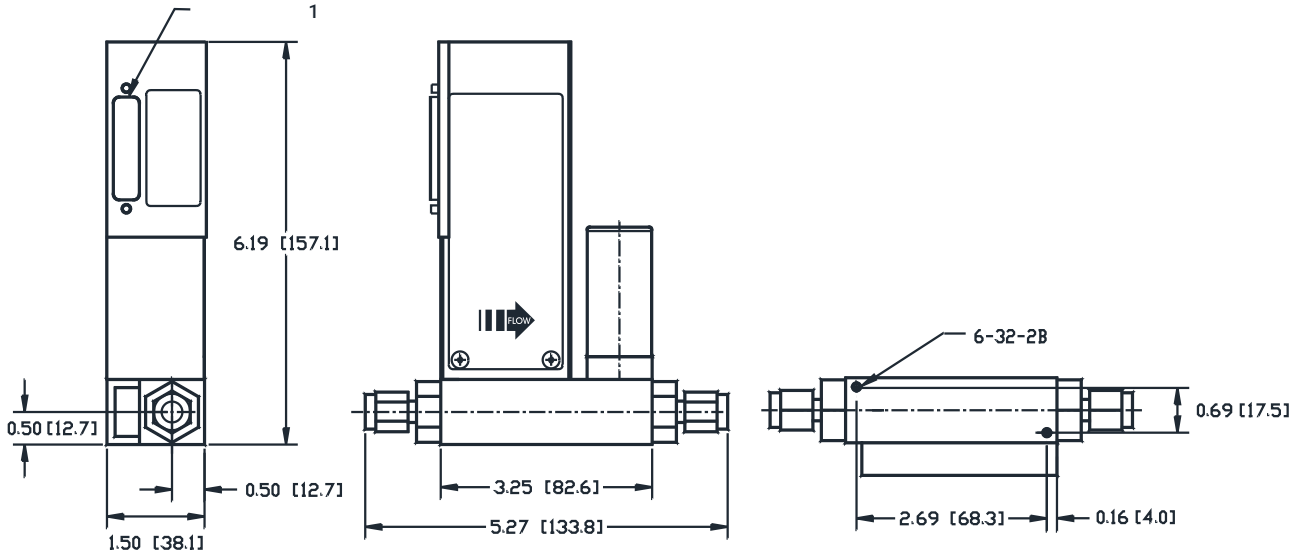
DFC 26 low flow, DFC 36 medium flow, DFC 46 high flow.

Maximum pressure drop at full scale (N_2)

Model	Full scale (N_2)	mm H_2O	psid	mbar
DFC 26	up to 10 sL/min	720	1.06	75
DFC 36	15 sL/min	2630	3.87	266
DFC 36	20 sL/min	1360	2.00	138
DFC 36	30 sL/min	2380	3.50	241

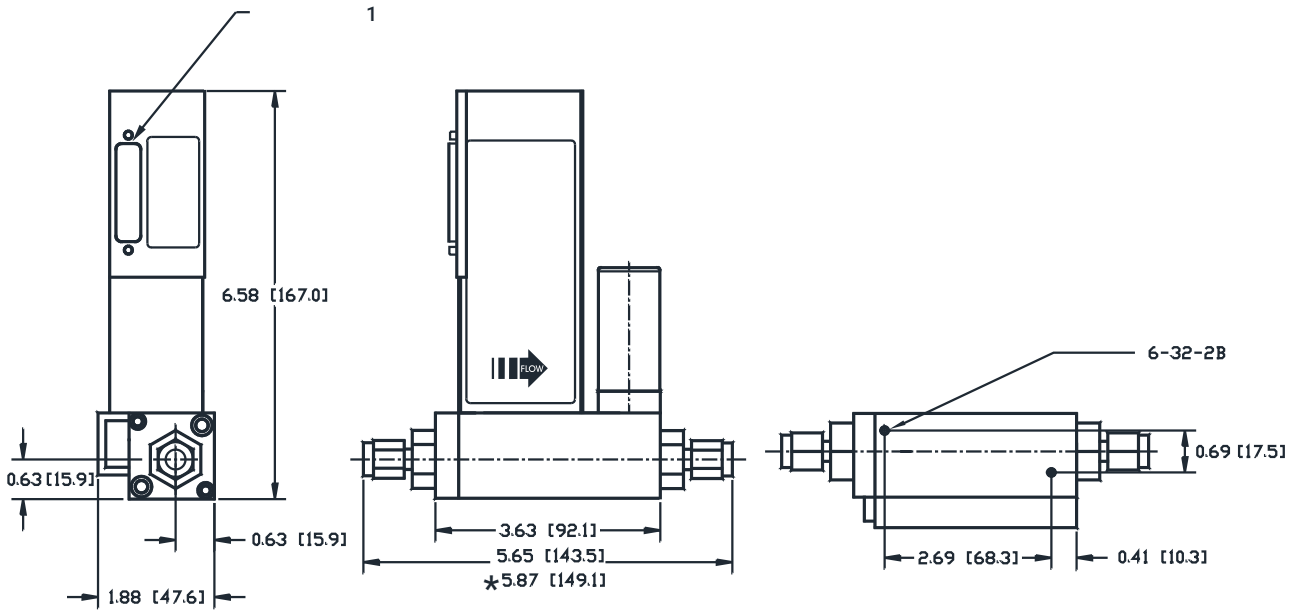
Model	Full scale (N_2)	mm H_2O	psid	mbar
DFC 36	40 sL/min	3740	5.50	379
DFC 36	50 sL/min	5440	8.00	551
DFC 46	60 sL/min	7480	11.00	758
DFC 46	100 sL/min	12850	18.89	1302

As published; the DFC 36 values do not rise steadily. No value is published for 80 sL/min (code 41).



1 24-pin D-connector, male

DFC 26: front, side and base views. Dimensions in inches [mm].



1 25-pin D-connector, male

DFC 36 and DFC 46: front, side and base views; * 5.87 [149.1] for the high-flow DFC 46. Inches [mm].

Dimensions in mm

Model	Height	End width	Body length	Overall length	Base width	Hole spacing	Hole to end
DFC 26	157.1	38.1	82.6	133.8	17.5	68.3	4.0
DFC 36	167.0	47.6	92.1	143.5	17.5	68.3	10.3
DFC 46	167.0	47.6	92.1	149.1	17.5	68.3	10.3

Overall length includes the fittings; DFC 46 value for high-flow models. Mounting holes 6-32-2B. Nominal dimensions; for certified drawings, ask Analyt-MTC.

Ordering code, for example DFC36S-VAN5-C5

Position	Code	Meaning
Model	26, 36, 46	Maximum flow 10, 50, 100 sL/min (N_2)
Material	S	Stainless steel
Seals	V, B, E, T	V FKM; B NBR; E EPR; T PTFE/FFKM
Fittings	A, B	A 1/4" compression (26, 36); B 1/8" compression (26)
Fittings	C, D	C 1/4" VCR (26, 36); D 3/8" compression (all)
Fittings	H	H 6 mm compression (26, 36)
Display	N, L	N no display; L LCD readout, special interface cable
Power	5	+15 V DC
Input/output signal	C, D	C 0–5/0–5 V DC; D 0–5 V DC/4–20 mA
Input/output signal	E, F	E 4–20/4–20 mA; F 4–20 mA/0–5 V DC
Input/output signal	H, I	H 0–5/0–10 V DC; I 0–10/0–5 V DC
Input/output signal	J, K	J 0–10/0–10 V DC; K 4–20 mA/0–10 V DC
Input/output signal	L	L 0–10 V DC/4–20 mA
Digital interface	2, 5	2 RS-232; 5 RS-485

Example DFC36S-VAN5-C5, 50 sL/min N_2, 20 psig: DFC 36, stainless steel, FKM seals, 1/4" compression, no display, +15 V DC, 0–5/0–5 V DC, RS-485. Specify flow range, gas and pressure.

Order codes, standard version DFC26S-VAN5-C5 (air)

Full scale (air)	Order code	Full scale (air)	Order code
10 smL/min	35381	500 smL/min	35386
20 smL/min	35382	1 sL/min	35387
50 smL/min	35383	2 sL/min	35388
100 smL/min	35384	5 sL/min	35389
200 smL/min	35385	10 sL/min	35390

Order codes, standard version DFC36S-VAN5-C5 / DFC46S-VDN5-C5 (air)

Full scale (air)	Order code	Full scale (air)	Order code
15 sL/min	35391	50 sL/min	35395
20 sL/min	35392	60 sL/min (DFC 46)	35396
30 sL/min	35393	80 sL/min (DFC 46)	35397
40 sL/min	35394	100 sL/min (DFC 46)	35398

Order from Analyt-MTC with the order codes. For any other version, contact Analyt-MTC.

Options and accessories

Additional 10-point calibrations, up to 9	
Cable, 25-pin D-connector, 6 ft legs to computer and power supply	CBL-DFC
Cable for LCD: analogue set point input only, or input and output	CBL-DFC-DPM-AI, -AIO
Cable, 25-pin D-connector to the 15-pin command module and computer	CBL-DFC-SDPROC
Power supply 230 V AC, ±15 V DC, serial or analogue, Europe	PS-DFC-230EU-5-S, -A
Power supply 110 V AC, serial or analogue interface, North America	PS-DFC-110NA-5-S, -A
Power supply 240 V AC, serial or analogue interface, United Kingdom	PS-DFC-240UK-5-S, -A
Power supply 240 V AC, serial or analogue interface, Australia	PS-DFC-240AU-5-S, -A
Digital panel meter with backlight	BCKUPDFC

Notes

1. FS = full scale. Full-scale flows are given for nitrogen; the standard versions are calibrated for air. sL/min and smL/min at 21.11 °C, 1013.25 mbar.
2. Power supplies with LCD jack, Europe: PS-DFC-230EU-5-S-D (serial), PS-DFC-230EU-5-A-D (analogue); other mains: add -D to the code.

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