Aalborg ZFM digital mass flow meter

Compact thermal gas mass flow meter, seven flow ranges from 0.0125 to 10 sL/min N_2, rescalable

The Aalborg ZFM is a compact thermal mass flow meter for clean gases. You choose gas and full-scale range on site with the free ZFM Configuration Utility, without removing the meter from the line. Analogue outputs and RS-232 or RS-485 are standard; a graphic display and Modbus are options.



±0.5 % rd	±0.15 % FS	10 sL/min	34.47 bar a	about 2 s
Accuracy (plus 0.2 % FS)	Repeatability	Largest full scale in N_2	Maximum gas pressure (500 psia)	Response within ±2 % of set point

Performance

Accuracy, with linearity [1]	±(0.5 % rd + 0.2 % FS) at the calibration temperature and pressure, based on the actual calibration
Repeatability	±0.15 % FS
Response time	Time constant 1000 ms; about 2 s to settle within ±2 % of the set flow, 0–100 % FS
Turndown ratio	Up to 133.3:1 at full accuracy
Temperature coefficient	0.05 % FS/°C or better
Pressure coefficient	0.01 % FS/psi (6.895 kPa) or better
Calibration conditions	101.4 kPa (14.7 psia) and 21.1 °C (70 °F), unless ordered or stated otherwise
Calibration certificate	N_2 as standard; for other gases, order an "as found" calibration
Mounting position	Up to 0.5 % FS extra deviation from the stated accuracy, after re-zeroing

Operating conditions

Medium	Clean gases only; never use with liquids
Maximum gas pressure	34.47 bar a (500 psia); higher pressure seriously damages the flow sensor
Pressure drop	About 0.8 psi at 10 sL/min (21.11 °C, 1013.25 mbar); provisional, still to be confirmed by the manufacturer
Temperature	Gas and ambient, 0–50 °C (32–122 °F)
Gas humidity	Up to 70 % relative
Leak integrity	1 × 10⁻⁹ smL/s helium maximum, to the outside

Mechanical

Wetted materials [2]	Aluminium models: anodised aluminium, brass, 316 stainless steel, FKM O-rings Stainless steel models: 316 stainless steel, FKM O-rings Optional O-rings: Buna-N, EPR or FFKM; seal code T: PTFE/FFKM
Process connections	ZFM 17: 1/4" compression as standard Options: 6 mm, 1/8" or 3/8" compression; 1/4" VCR 3/8" compression has no letter in the ordering code

Electrical and communication

Analogue output	0–5 V DC, linear, load 3000 Ω minimum; noise 10 mV peak-to-peak maximum 0–10 V DC, linear, load 5000 Ω minimum 4–20 mA, linear, loop resistance 500 Ω maximum Output type is selectable by the user
Digital interface	RS-232 or RS-485 test and configuration port Option: Modbus RTU network interface on an isolated RS-485 transceiver RS-485: up to 247 units on one line
Supply	14–26 V DC, noise 100 mV peak-to-peak maximum Consumption 100 mA maximum at 24 V DC
Circuit protection	Reverse-polarity protection; 300 mA resettable fuse on the power input

Compliance

EMC compliance	2004/108/EC as amended; CISPR 11 Emission IEC 61000-6-3; immunity IEC 61000-6-1
Environment	Installation level II, pollution degree II (IEC 664)

Functions

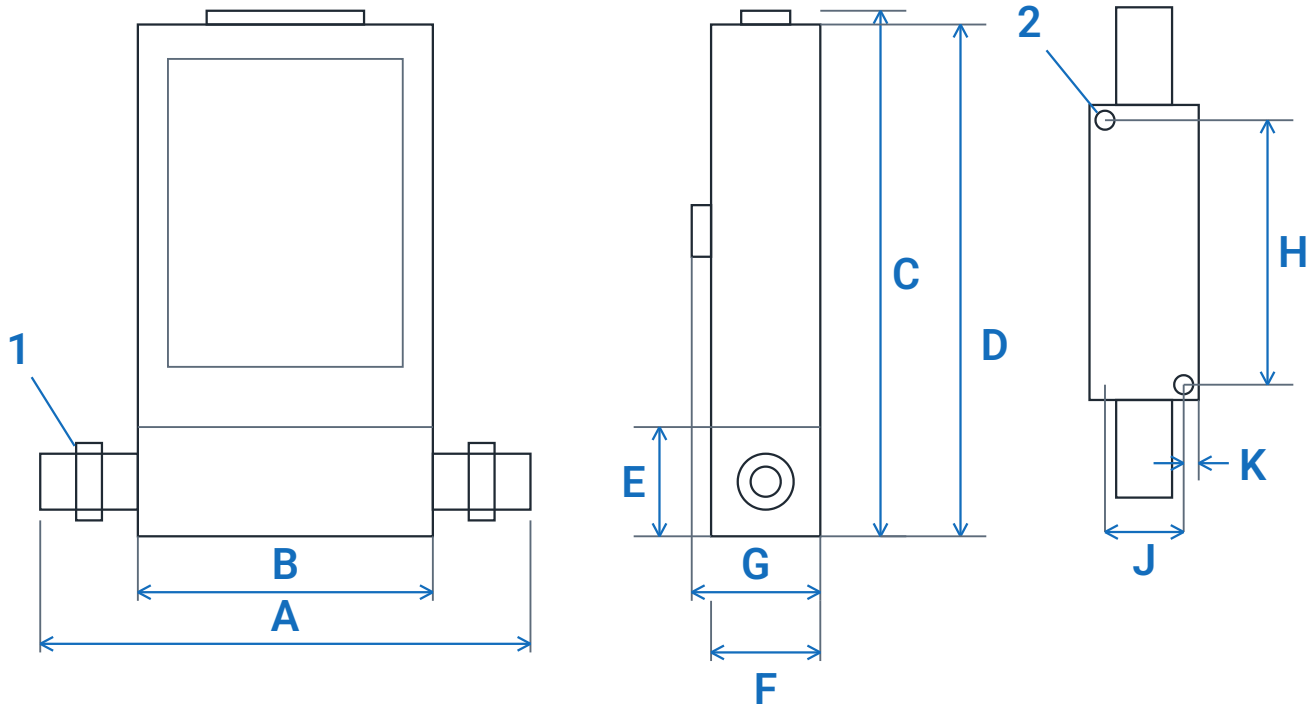
Gas selection	Multi-gas, multi-range rescaling up to 8 bar, currently for 6 gases Built-in K-factors for air, CO_2, O_2, argon and helium; conversion factors for up to 26 gases User calibration tables for up to 10 gases; up to 10 custom calibrations with certificate: ask Analyt-MTC
Rescaling on site	Gas and full-scale range set from a PC over RS-232 with the ZFM Configuration Utility, without removing the meter
Display	Optional 128 × 64 high-contrast yellow OLED graphic display, with Esc button and joystick
Totalisers	Two programmable totalisers for the total gas quantity
Alarms and relay	High and low flow alarm limits with a preset delay One programmable solid-state relay, with latch option Programmable pulse output through the solid-state relay
Engineering units	Up to 46 units, including user-defined units
Zero adjustment	Automatic sensor zero, from the digital interface or the local push button
Diagnostics	Self-diagnostics with a status LED or the OLED display
Software	Free ZFM Configuration Utility for configuration and calibration, over RS-232 or RS-485

ZFM 17 ranges (N_2, 21.11 °C, 1013.25 mbar)

Range code	Nominal full scale, sL/min	Reconfigurable full scale, sL/min
01	0.0125	0.003125–0.0125
03	0.05	0.0125–0.05
05	0.2	0.05–0.2
06	0.8	0.2–0.8
08	2.0	0.5–2.0
09	6.0	1.5–6.0
10	10.0	2.5–10.0

Seven standard configurations, from 3.125 smL/min to 10 sL/min full scale, with turndown up to 133.3:1.

ZFM 17



1 1/4" compression fitting

2 Mounting holes 6-32 UNC-2B, 0.180" deep

ZFM 17 with 1/4" compression fittings: front, side and base views (base turned 90°). G includes the side push button; K is the hole inset from both edges.

Dimensions in mm (B in inches)

Letter	Dimension	mm
A	Overall length with fittings	114.0
B	Body length	2.70 in
C	Overall height with connector	122.2
D	Body height	119.0
E	Base block height	25.4
F	Base block width	25.4
G	Overall width with push button	29.9
H	Hole spacing along the base	61.5
J	Hole spacing across the base	18.3
K	Hole inset from the edge	3.6

Ordering code, for example ZFM17S-VAL6-A2

Position	Codes	Example
Model	17 = 10 sL/min maximum flow in N_2	ZFM 17
Material	A aluminium; S stainless steel	S
Seals	V FKM; B Buna; E EPR; T PTFE/FFKM	V
Fittings	Compression: A 1/4", B 1/8", H 6 mm	A
Fittings	C 1/4" VCR	–
Display	N none; L display	L
Power	6 = universal supply	6
Output	A 0–5, M 0–10 V DC; B 4–20 mA	A
Interface	2 RS-232; 5 RS-485; 3 RS-232 with Modbus	2

The example ZFM17S-VAL6-A2 is stainless steel, FKM seals, 1/4" compression, display, 0–5 V DC, RS-232; 5 sL/min N_2, 20 psig.

Standard versions, ZFM 17 (21.11 °C, 1013.25 mbar)

Body	No display, RS-232	No display, RS-232 with Modbus	Display, RS-232	Display, RS-232 with Modbus
Aluminium	ZFM17A-N0	ZFM17A-NM	ZFM17A-L0	ZFM17A-LM
Stainless steel	ZFM17S-N0	ZFM17S-NM	ZFM17S-L0	ZFM17S-LM

Order from Analyt-MTC with the order codes. FKM seals, 1/4" compression, 0–5 V DC output. For any other version, contact Analyt-MTC.

Accessories

Power supply 230 V AC EU plug, 24 V DC, DC jack	PS-ZFM-230EU-4
Power supply 110 V AC US plug, 24 V DC, DC jack	PS-ZFM-110NA-4
Power supply 240 V AC UK/AU plug, 24 V DC, DC jack	
Adapter 9-pin D-sub to 2.1 mm DC jack, for own supply	ZFM-APW-BX
Shielded D-sub 9 M/F cable, 5 or 10 ft	CSM9MF-5, -10
Shielded D-sub 9 M/F cable, 15, 25 or 50 ft (4–20 mA)	CSM9MF-15, -25, -50
USB to RS-232 converter	35782
USB to RS-485 converter	USB-RS485
Modbus: RJ45/D-sub 9 F adapter, Y-adapter, coupler, 100 Ω terminator, splitter	
Modbus: Cat 5E RJ45 patch cables, 2, 10 or 25 ft	TRD815BL-2, -10, -25
Universal benchtop baseplate	35780
Rugged transport case	1200-000-110E

Notes

1. rd = of reading, FS = of full scale. Full-scale flows are given for nitrogen.
2. The customer chooses the model and its wetted materials to suit the gas; the manufacturer gives no guarantee of corrosion resistance.
3. Dimensions may change without notice; ask Analyt-MTC for certified dimensions.
4. Each meter ships with an electrical connection kit KIT-ZFM-2.5FT (2.5 ft M/F shielded cable, screw terminal with cover) and a 6 ft communication cable: CBL-A232, 3.5 mm plug to 9-pin D-sub F (RS-232), or CBL-A485, to stripped ends (RS-485).
5. Power supplies 240 V AC: PS-ZFM-240UK-4 (UK plug), PS-ZFM-240AU-4 (AU plug). Modbus parts: RJ45/D-sub 9 F adapter RBA098F, Y-adapter ECS803-1, coupler TDG1026-8C, 100 Ω terminator MOD27T, splitter JMOD4S-1.

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