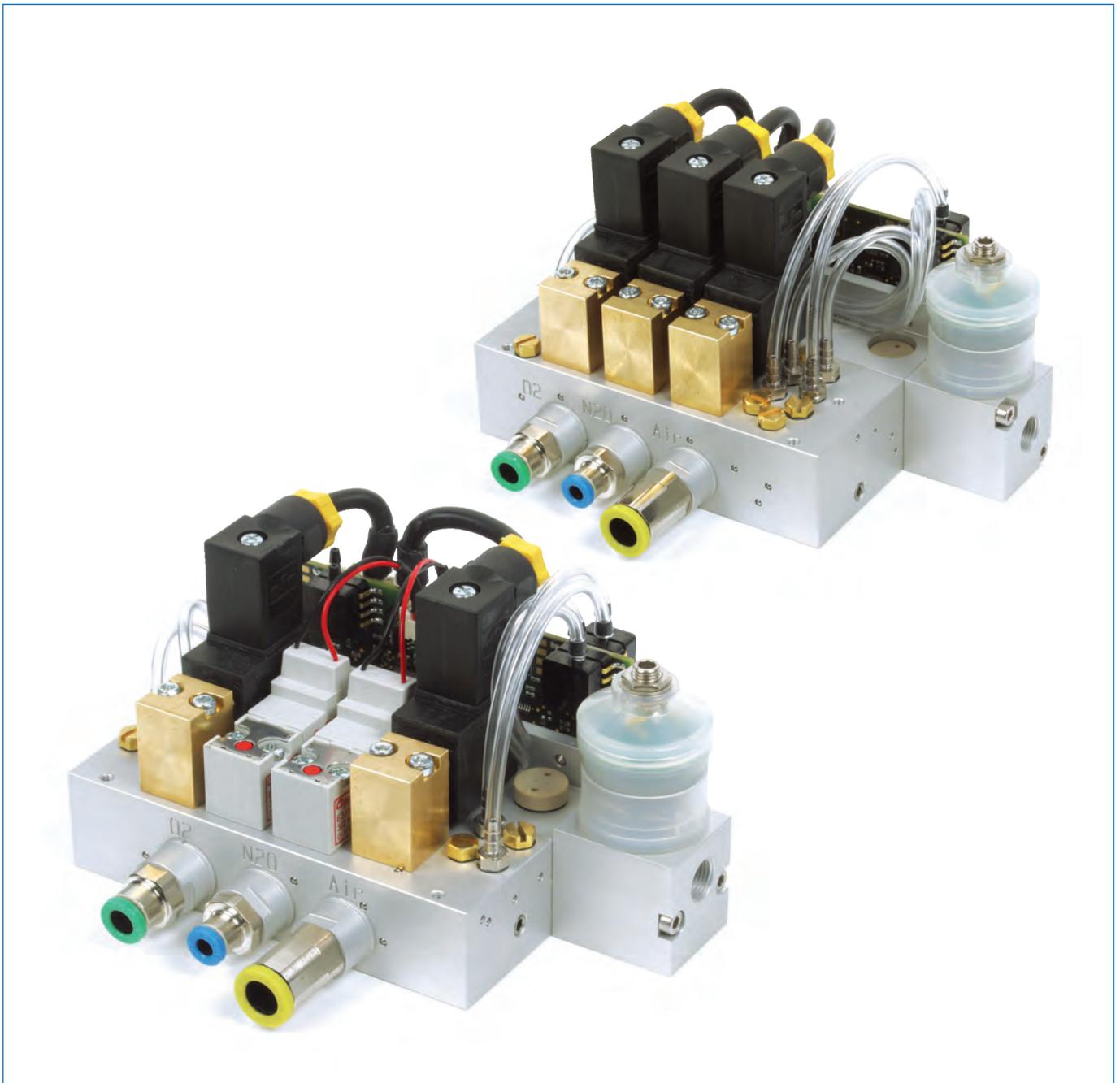


Electronic Freshgas Dosing Module



2 Gases (Front) and 3 Gases (Back) Electronic Freshgas Dosing Module

The Air Controls Fresh Gas Delivery System (FGDS) is an OEM module which provides flow rate control and mixing of medical gases used in anesthesia equipment. Two models of the device are available.

Both models have input connections for three gases - Oxygen (O₂), Nitrous Oxide (N₂O), and Air. The three gas model provides simultaneous control and mixing of up to three gases. The two gas model permits two of the three gases to be selected, controlled, and mixed simultaneously. Flowrate of each gas is measured by sensing the differential pressure across an orifice. Gas temperature is monitored in the output channel.

A 32 bit micro-controller processes this information to determine an accurate flowrate for each gas. The individual flowrates are compared to their respective setpoint values to determine any deviations, which are then corrected by a PID controller which is implemented in firmware. The outputs produced by the PID algorithms are used to drive the high precision proportional valves which control the flowrate of the respective gases.

The micro-controller monitors the flowrates to guard against hypoxic mixture ratios. An O₂ sensor is also used to measure O₂ concentration in the outlet channel. Oxygen levels below 25% are reported to the host system via the communications interface, and a dedicated alarm signal is available to the host system as well. High ambient temperature warning and alarm conditions, micro-controller watchdog faults, and under-voltage conditions are also reported to the host system via dedicated signal lines.

Specifications

1. Gas Inputs

Oxygen (O ₂)	95.0 to 99.9%
Nitrous Oxide (N ₂ O)	99.5 to 99.9%
Air	20.8 to 21.0%
Input pressure range	2.8 to 6.0 bar
Flowrate	> 30 LPM

2. Gas Outputs

Three gas model
O ₂ only
Air only
O ₂ + Air
O ₂ + N ₂ O
O ₂ + Air + N ₂ O
Two gas model
O ₂ only
Air only
O ₂ + Air
O ₂ + N ₂ O

3. Environmental

Temperature range	10° C to 45° C
Relative humidity:	95% max. non-condensing

4. Power Requirements

Input voltage:	+ 12 VDC +/-5%
Input current:	1.2A typ, 1.4A max

5. General Specifications¹

Measurement accuracy:	+/- 5% of reading or 20 ml/min ^{2,3}
Flow control range:	0.15 ml/min to 15 ml/min ²
Settable increment:	10 ml/min
Control method:	Proportional, Integral, Derivative ⁴
Valve Drive:	PWM, 1000Hz
Response time:	< 0.5 seconds ⁵

6. Communications Interfaces

RS-232

Baud Rate:	19.2K bps
Number of bits:	8
Stop bits:	1
Parity:	None
Flow control:	None, optional RTS/CTS

USB

Power:	Self-powered
Speed:	Full
Number of endpoints:	2
Endpoint types:	1 interrupt, 1 bulk

7. Alarms

High Temperature warning	45° C
High Temperature alarm	50° C
Low O ₂ alarm	O ₂ < 25%
Under-voltage alarm ⁵	12V -6%

(Preliminary Specifications subject to change)

¹ Values at 25° C unless stated otherwise

² Applies to all gas types O₂, N₂O, Air

³ Whichever is greater

⁴ Firmware implementation

⁵ Step from 10% rated flow to 90% rated flow



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