

MCD Series

Bidirectional Mass Flow Control



alicat.com/mcd

Series Overview

Alicat Scientific MCD-Series digital mass flow controllers precisely and rapidly control the mass flow rate, volumetric flow rate and pressure of process gases in two flow directions via customized high-speed proportional control valves. The dual-valve design pairs a dedicated inlet valve with a dedicated exhaust valve, allowing a single MCD to control upstream and downstream flows, as well as positive pressure or backpressure in both open and closed systems.

At the heart of Alicat's MCD-Series mass flow controllers is a patented, internally compensated, laminar differential pressure measurement technology that yields linear results over a very wide flow range. This produces volumetric and mass flow data that is fully compensated for changes in pressure and temperature and corrected for the user's STP. All mass flow instruments come with NIST-traceable calibration and generous customer support, including free technical phone support, prompt recalibration service and a lifetime warranty.

Alicat MCD-Series mass flow controllers feature large integrated displays with user-accessible setpoint control and PID valve tuning without need for a computer. The MCD Series comes with 30 selectable gas calibrations and both analog and RS-232 digital communications. Extensive customizations are available, including Class 1, Div 2 CSA/ATEX ratings for use in hazardous environments. The series is also available with corrosion-resistant wetted materials (MCDS Series) or low pressure drop (MCDW Series).



Applications

MCD-Series bidirectional mass flow controllers are used in a variety of industries, from scientific research and gas analysis to leak testing and environmental monitoring. Dual valves, multi-variable measurement and control functionality, multiple gas calibrations and a 200:1 turndown ratio allow an MCD to be used as a universal control element, replacing several application-specific devices. Available 0.4% accuracy + 0.2% full-scale repeatability and <100 ms control response times ensure top performance of gas flow processes.

The MCD Series is available in full-scale mass flow rates from -0.5/+0.5 sccm to -3000/+3000 slpm.

Standard Specifications (Contact Alicat for available options.)

Performance	MCD Mass Flow Controller	MCRD Mass Flow Controller
Accuracy for Bidirectional Controllers at calibration conditions after tare	± (0.8% of reading + 0.2% of total span from positive full scale to negative full scale)	
Repeatability	± 0.2% Full Scale	
Zero Shift and Span Shift	0.02% Full Scale / °Celsius / Atm	
Operating Range / Turndown Ratio	-100% to 100% Full Scale / 200:1 Turndown	
Maximum Controllable Flow Rate	102.4% Full Scale	
Typical Response Time	100 ms (Adjustable)	
Warm-up Time	< 1 Second	

Operating Conditions	MCD Mass Flow Controller	MCRD Mass Flow Controller
Mass Reference Conditions (STP)	25°C & 14.696 psia (standard — others available on request)	
Operating Temperature	–10 to +50 °Celsius	
Humidity Range (Non–Condensing)	0 to 100%	
Maximum Pressure	145 psig	
Mounting Attitude Sensitivity	None	Mount with valve cylinder vertical & upright
Valve Type	Normally Closed	
Ingress Protection	IP40	
Wetted Materials	MCD: 303 & 302 Stainless Steel, Viton®, Silicone RTV (Rubber), Glass Reinforced Nylon, Aluminum, Brass, 430FR Stainless Steel, Silicon, Glass. MCRD: 303 & 302 Stainless Steel, Viton®, Silicone RTV (Rubber), Glass Reinforced Nylon, Aluminum, 416 Stainless Steel, Nickel, Silicon, Glass. If your application demands a different material, please contact Alicat.	

Communications / Power	MCD Mass Flow Controller	MCRD Mass Flow Controller
Monochrome LCD or Color TFT Display with integrated touchpad	Simultaneously displays Mass Flow, Volumetric Flow, Pressure and Temperature	
Digital Output Signal ¹ Options	RS-232 Serial / RS-485 Serial	
Analog Output Signal ² Options	0-5 Vdc / 1-5 Vdc / 0-10 Vdc / 4-20 mA	
Optional Secondary Analog Output Signal ²	0-5 Vdc / 1-5 Vdc / 0-10 Vdc / 4-20 mA	
Electrical Connection Options	8 Pin Mini-DIN / 9-pin D-sub (DB9) / 15-pin D-sub (DB15) / 6 pin locking	
Supply Voltage	12 to 30 Vdc (15-30 Vdc for 4-20 mA outputs)	24 to 30 Vdc
Supply Current	0.250 Amp	0.750 Amp
1. The Digital Output Signal communicates Mass Flow, Volumetric Flow, Pressure and Temperature 2. The Analog Output Signal and Optional Secondary Analog Output Signal communicate your choice of Mass Flow, Volumetric Flow, Pressure or Temperature		

Features	MCD & MCRD Mass Flow Controller
30 Gas Select™ 30 On-Board User Selectable Gas Calibrations	Programmed Gases: Acetylene, Air, Argon, Butane, Carbon Dioxide, Carbon Monoxide, Ethane, Ethylene (Ethene), Helium, Hydrogen, Iso-Butane, Krypton, Methane, Neon, Nitrogen, Nitrous Oxide, Oxygen, Propane, Sulfur Hexafluoride, Xenon, A-25, A-75, A1025, C-2, C-8, C-10, C-25, C-75, P-5, Star29 If your application calls for a gas not on this list, please let us know. We can also calibrate to a wide variety of complex gas mixtures involving up to eight gas constituents. Alicat's MCDS and MCRDS controllers are also compatible with these aggressive gases: Ammonia, Hydrogen Sulfide, Nitric Oxide, Nitrogen Trifluoride, Propylene, Nitrogen Dioxide to 0.5% in an inert carrier, Refrigerant gases (www.alicat.com/ms)

Range Specific Specifications

Full Scale Flow Mass Controller	Pressure Drop ¹ at FS Flow (psid) venting to atmosphere	Mechanical Dimensions	Process Connections ²
MCD 0.5 sccm to 50 sccm	1.0	Dimensions will vary with valve choice.	M-5 (10-32) Female Thread ³
MCD 100 sccm to 500 sccm	1.0		1/8" NPT Female
MCD 1 slpm	1.5		
MCD 2 slpm	3.0		
MCD 5 slpm	2.0		
MCD 10 slpm	5.5		
MCD 20 slpm	20.0		1/4" NPT Female
MCRD 50 slpm	2.0		
MCRD 100 slpm	3.2		
MCRD 250 slpm	2.4		1/2" NPT Female
MCRD 500 slpm	6.5		3/4" NPT Female (A 1-1/4" NPT Female process connection is available for 2000 slpm controllers.)
MCRD 1000 slpm	14.0		
MCRD 1500 slpm	17.0		1-1/4" NPT Female
MCRD 2000 slpm	28.6		
MCRD 3000 slpm	16.8		

1. Lower Pressure Drops Available, please see our **WHISPER-Series** mass flow controllers at www.alicat.com/whisper.

2. Compatible with Beswick®, Swagelok® tube, Parker®, face seal, push connect and compression adapter fittings. VCR and SAE connections upon request.

3. Shipped with M-5 (10-32) Male Buna-N O-ring face seal to 1/8" Female NPT fittings.