Technical Data for Alicat MCE and MCES Mass Flow Controllers

0 – 0.5 sccm Full Scale through 0 – 20 slpm Full Scale

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Alicat MCE mass flow controllers are built with a proportional valve positioned within the base of the unit. Please contact Alicat for MCE controller application information.
MCES controllers are for use with aggressive gases.

Standard Specifications (Contact Alicat for available options.)

Performance	MCE Mass Flow Controller	MCES Mass Flow Controller
Accuracy at calibration conditions after tare	± (0.8% of Reading + 0.2% of Full Scale)	
High Accuracy at calibration conditions after tare	± (0.4% of Reading + 0.2% of Full Scale) High Accuracy option not available for units ranged under 5 sccm or over 500 slpm.	
Repeatability	± 0.2% Full Scale	
Zero Shift and Span Shift	0.02% Full Scale / ºCelsius / Atm	
Operating Range / Turndown Ratio	0.5% to 100% Full Scale / 200:1 Turndown	1% to 100% Full Scale / 100:1 Turndown
Maximum Controllable Flow Rate	102.4% Full Scale	
Maximum Measurable Flow Rate	up to 128% Full Scale (Gas Dependent)	
Typical Response Time	100 ms (Adjustable)	
Warm-up Time	< 1 Second	

Operating Conditions	MCE Mass Flow Controller	MCES Mass Flow Controller
Mass Reference Conditions (STP)	25ºC & 14.696 psia (standard — others available on request)	
Operating Temperature	−10 to +60 ºCelsius	
Humidity Range (Non–Condensing)	0 to 100%	
Maximum Internal Pressure (Static)	145 psig	
Proof Pressure	175 psig	
Mounting Attitude Sensitivity	None	
Valve Type	Normally Closed	
Ingress Protection	IP40	
Wetted Materials	**MCE**: 303 & 302 Stainless Steel, Viton®, Heat Cured Silicone Rubber, Glass Reinforced Polyphenylene Sulfide, Heat Cured Epoxy, Aluminum, Gold, Brass, 430FR Stainless Steel, Silicon, Glass. **MCES**: 316LSS, 303SS, 430FRSS, FFKM (Kalrez) standard, Viton, EPDM, Buna, Neoprene as needed for some gases. If your application demands a different material, please contact Alicat.	

Communications / Power	MCE Mass Flow Controller	MCES Mass Flow Controller
Monochrome LCD or Color TFT Display with integrated touchpad	Simultaneously displays Mass Flow, Volumetric Flow, Pressure and Temperature	
Digital Input / Output Signal[1] Options	RS-232 Serial / RS-485 Serial / Modbus RTU / PROFIBUS / EtherNet/IP / DeviceNet / Modbus TCP/IP / EtherCAT	
Analog Input / 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 / 8-pin M12	
Supply Voltage	12 to 30 Vdc (15-30 Vdc for 4-20 mA outputs)	
Supply Current	0.300 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	MCE Mass Flow Controller	MCES Mass Flow Controller
Gas Select™ 5.0	**Gas Select™ 5.0** provides the **MCE** with **98** and **MCES** with **128 Preloaded Gas Calibrations: See the following page for a complete list.** 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.	
COMPOSER™	**COMPOSER™ is a feature of Gas Select™ 5.0 that allows users to defines up to 20 user gas compositions with up to 5 constituent gases per mix (*www.alicat.com/composer)*.**	

Range Specific Specifications

Full Scale Flow Mass Controller	Pressure Drop at FS Flow (psid) venting to atmosphere	Mechanical Dimensions[1]	Process Connections[2]
MCE 0.5 sccm to 50 sccm	1.0	4.6”H x 4.9”W x 1.5”D	1/4” VCR® Male
MCE 100 sccm to 500 sccm	1.0		
MCE 1 slpm	1.5		
MCE 2 slpm	3.0		
MCE 5 slpm	2.0		
MCE 10 slpm	5.5		
MCE 20 slpm	20.0		
MCES 0.5 sccm to 20 slpm	Equal to MCE	5.3”H x 4.9”W x 1.5”D	1/4” VCR® Male

1. See drawing for metric equivalents.
2. Compatible with Swagelok® tube, Parker®, face seal, push connect and compression adapter fittings. VCR and SAE connections upon request. Welded VCR® fittings (process connections) are recommended for MCE applications. Please contact Alicat.

Alicat Gas Select™ 5.0 Preloaded Gases

PURE NON-CORROSIVE GASES		
Gas Number	**Short Name**	**Long Name**
14	C2H2	Acetylene
0	Air	Air
1	Ar	Argon
16	i-C4H10	i-Butane
13	n-C4H10	n-Butane
4	CO2	Carbon Dioxide
3	CO	Carbon Monoxide
60	D2	Deuterium
5	C2H6	Ethane
15	C2H4	Ethylene (Ethene)
7	He	Helium
6	H2	Hydrogen
17	Kr	Krypton
2	CH4	Methane
10	Ne	Neon
8	N2	Nitrogen
9	N2O	Nitrous Oxide
11	O2	Oxygen
12	C3H8	Propane
19	SF6	Sulfur Hexafluoride
18	Xe	Xenon

BREATHING GASES		
Gas Number	**Short Name**	**Long Name**
164	EAN-32	32% O2 / 68% N2
165	EAN	36% O2 / 64% N2
166	EAN-40	40% O2 / 60% N2
167	HeOx-20	20% O2 / 80% He
168	HeOx-21	21% O2 / 79% He
169	HeOx-30	30% O2 / 70% He
170	HeOx-40	40% O2 / 60% He
171	HeOx-50	50% O2 / 50% He
172	HeOx-60	60% O2 / 40% He
173	HeOx-80	80% O2 / 20% He
174	HeOx-99	99% O2 / 1% He
175	EA-40	Enriched Air-40% O2
176	EA-60	Enriched Air-60% O2
177	EA-80	Enriched Air-80% O2
178	Metabol	Metabolic Exhalant (16% O2/ 78.04% N2 / 5% CO2 / 0.96% Ar)

CHROMATOGRAPHY GASES		
Gas Number	**Short Name**	**Long Name**
29	P-5	5% CH4 / 95% Ar
206	P-10	10% CH4 90% Ar

WELDING GASES		
Gas Number	**Short Name**	**Long Name**
23	C-2	2% CO2 / 98% Ar
22	C-8	8% CO2 / 92% Ar
21	C-10	10% CO2 / 90% Ar
140	C-15	15% CO2 / 85% Ar
141	C-20	20% CO2 / 80% Ar
20	C-25	25% CO2 / 75% Ar
142	C-50	50% CO2 / 50% Ar
24	C-75	75% CO2 / 25% Ar
25	He-25	25% He / 75% Ar
143	He-50	50% He / 50% Ar
26	He-75	75% He / 25% Ar
144	He-90	90% He / 10% Ar
27	A1025	90% He / 7.5% Ar / 2.5% CO2
28	Star29	Stargon CS 90% Ar / 8% CO2 / 2% O2

PURE CORROSIVES*		
Gas Number	**Short Name**	**Long Name**
32	NH3	Ammonia
80	1Butene	Butylene (1-Butene)
81	cButene	Cis-Butene (cis-2-butene)
82	iButene	Iso-Butene
83	tButene	Trans-Butene
84	COS	Carbonyl Sulfide
33	Cl2	Chlorine
85	CH3OCH3	Dimethylether
34	H2S	Hydrogen Sulfide (H2S)
31	NF3	NF3 (Nitrogen Trifluoride)
30	NO	NO (Nitric Oxide)
36	C3H6	Propylene (Propylene)
86	SiH4	Silane (SiH4)
35	SO2	Sulfur Dioxide

***Pure Corrosive gases are only available on S-Series instruments that are compatible with these gases.**
Gas numbers 33 and 35 are not available on controllers.

BIOREACTOR GASES		
Gas Number	**Short Name**	**Long Name**
145	Bio-5M	5% CH4 / 95% CO2
146	Bio-10M	10% CH4 / 90% CO2
147	Bio-15M	15% CH4 / 85% CO2
148	Bio-20M	20% CH4 / 80% CO2
149	Bio-25M	25% CH4 / 75% CO2
150	Bio-30M	30% CH4 / 70% CO2
151	Bio-35M	35% CH4 / 65% CO2
152	Bio-40M	40% CH4 / 60% CO2
153	Bio-45M	45% CH4 / 55% CO2
154	Bio-50M	50% CH4 / 50% CO2
155	Bio-55M	55% CH4 / 45% CO2
156	Bio-60M	60% CH4 /40% CO2
157	Bio-65M	65% CH4 /35% CO2
158	Bio-70M	70% CH4 / 30% CO2
159	Bio-75M	75% CH4 / 25% CO2
160	Bio-80M	80% CH4 / 20% CO2
161	Bio-85M	85% CH4 / 15% CO2
162	Bio-90M	90% CH4 / 10% CO2
163	Bio-95M	95% CH4 / 5% CO2

LASER GASES		
Gas Number	**Short Name**	**Long Name**
179	LG-4.5	4.5% CO2 / 13.5% N2 / 82% He
180	LG-6	6% CO2 / 14% N2 / 80% He
181	LG-7	7% CO2 / 14% N2 / 79% He
182	LG-9	9% CO2 / 15% N2 / 76% He
183	HeNe-9	9% Ne / 91% He
184	LG-9.4	9.4% CO2 / 19.25% N2 / 71.35% He

O2 CONCENTRATOR GASES		
Gas Number	**Short Name**	**Long Name**
197	OCG-89	89% O2 / 7% N2 / 4% Ar
198	OCG-93	93% O2 / 3% N2 / 4% Ar
199	OCG-95	95% O2 / 1% N2 / 4% Ar

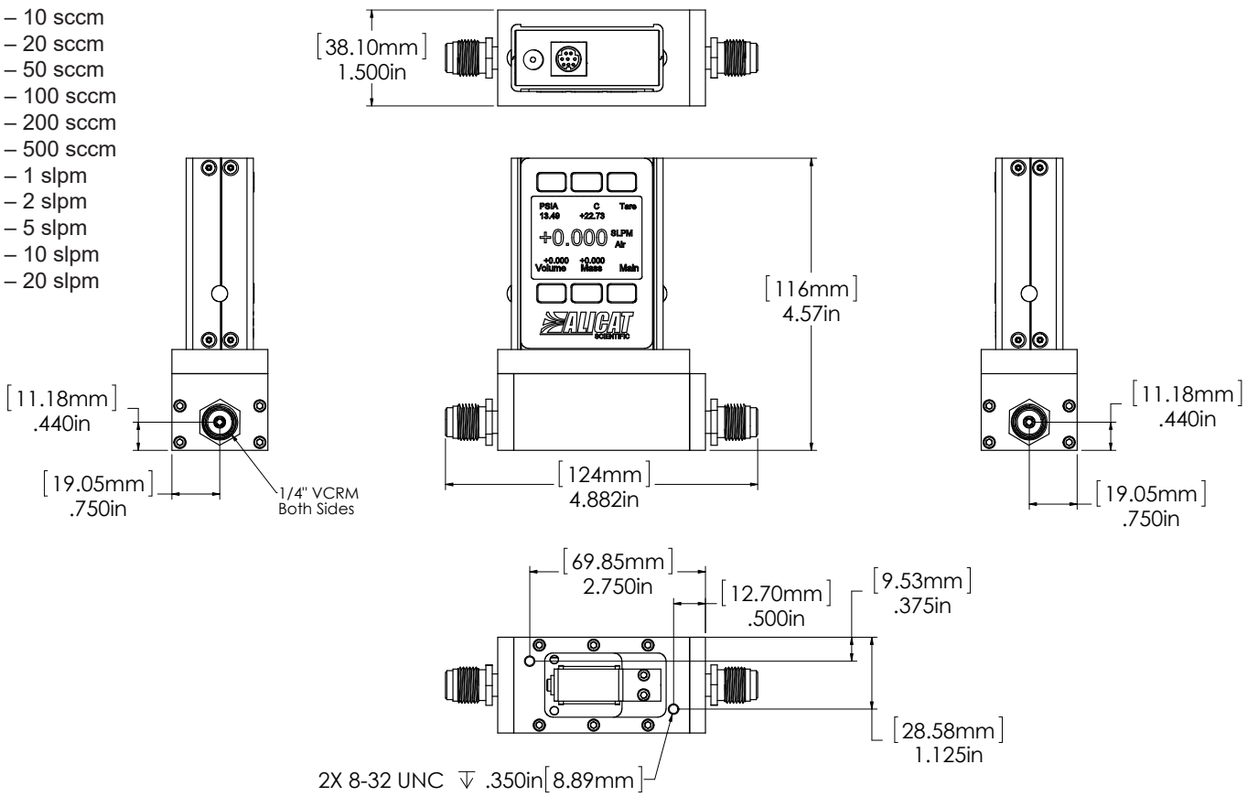
REFRIGERANTS*		
Gas Number	**Short Name**	**Long Name**
100	R-11	Trichlorofluoromethane
101	R-115	Chloropentafluoroethane
102	R-116	Hexafluoroethane
103	R-124	Chlorotetrafluoroethane
104	R-125	Pentafluoroethane
105	R-134A	Tetrafluoroethane
106	R-14	Tetrafluoromethane
107	R-142b	Chlorodifluoroethane
108	R-143a	Trifluoroethane
109	R-152a	Difluoroethane
110	R-22	Difluoromonochloromethane
111	R-23	Trifluoromethane
112	R-32	Difluoromethane
113	RC-318	Octafluorocyclobutane
114	R-404A	44% R-125 / 4% R-134A / 52% R-143A
115	R-407C	23% R-32 / 25% R-125 / 52% R-134A
116	R-410A	50% R-32 / 50% R-125
117	R-507A	50% R-125 / 50% R-143A

***Refrigerant gases are only available on S-Series instruments that are compatible with these gases.**

FUEL GASES		
Gas Number	**Short Name**	**Long Name**
185	Syn Gas-1	40% H2 + 29% CO + 20% CO2 + 11% CH4
186	Syn Gas-2	64% H2 + 28% CO + 1% CO2 + 7% CH4
187	Syn Gas-3	70% H2 + 4% CO + 25% CO2 + 1% CH4
188	Syn Gas-4	83% H2 + 14% CO + 3% CH4
189	Nat Gas-1	93% CH4 / 3% C2H6 / 1% C3H8 / 2% N2 / 1% CO2
190	Nat Gas-2	95% CH4 / 3% C2H6 / 1% N2 / 1% CO2
191	Nat Gas-3	95.2% CH4 / 2.5% C2H6 / 0.2% C3H8 / 0.1% C4H10 / 1.3% N2 / 0.7% CO2
192	Coal Gas	50% H2 / 35% CH4 / 10% CO / 5% C2H4
193	Endo	75% H2 + 25% N2
194	HHO	66.67% H2 / 33.33% O2
195	HD-5	LPG 96.1% C3H8 / 1.5% C2H6 / 0.4% C3H6 / 1.9% n-C4H10
196	HD-10	LPG 85% C3H8 / 10% C3H6 / 5% n-C4H10

STACK GASES		
Gas Number	**Short Name**	**Long Name**
200	FG-1	2.5% O2 / 10.8% CO2 / 85.7% N2 / 1% Ar
201	FG-2	2.9% O2 / 14% CO2 / 82.1% N2 / 1% Ar
202	FG-3	3.7% O2 / 15% CO2 / 80.3% N2 / 1% Ar
203	FG-4	7% O2 / 12% CO2 / 80% N2 / 1% Ar
204	FG-5	10% O2 / 9.5% CO2 / 79.5% N2 / 1% Ar
205	FG-6	13% O2 / 7% CO2 / 79% N2 / 1% Ar

MCE-Series
0 – 0.5 sccm
0 – 1 sccm
0 – 2 sccm
0 – 5 sccm
0 – 10 sccm
0 – 20 sccm
0 – 50 sccm
0 – 100 sccm
0 – 200 sccm
0 – 500 sccm
0 – 1 slpm
0 – 2 slpm
0 – 5 slpm
0 – 10 slpm
0 – 20 slpm



MCE approximate weight: 3.0 lb.

MCES-Series
0 – 0.5 sccm
0 – 1 sccm
0 – 2 sccm
0 – 5 sccm
0 – 10 sccm
0 – 20 sccm
0 – 50 sccm
0 – 100 sccm
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0 – 500 sccm
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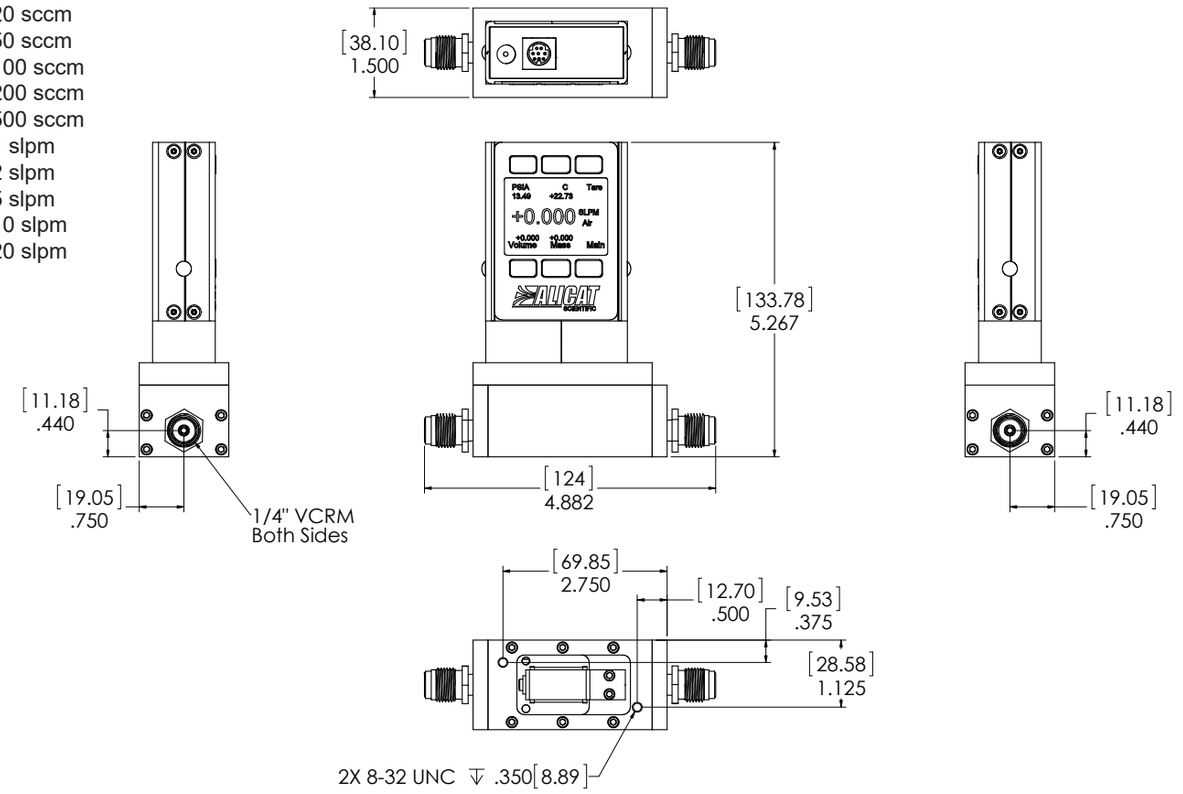
0 – 10 slpm
0 – 20 slpm



MCES approximate weight: 3.3 lb.