Flow Solutions

WWW.MKSINST.COM

MC20A

ALTA™ HIGH FLOW THERMAL MASS FLOW CONTROLLERS

The all-digital ALTA Mass Flow Controllers (MFC) include technology improvements in functionality and performance to help users in semiconductor and high purity thin-film applications increase tool throughput and reduce overall system costs. To increase overall system throughput, the ALTA MFC features fast gas settling times to meet the productivity demands of next generation process tools. To facilitate better chamber matching, the ALTA features improved accuracy to 1% of set point.

Cost savings to users are seen through several innovative enhancements. To reduce the number of MFCs in inventory, users can recall specific MFC gas calibrations and flow ranges from up to 20 stored gas tables, configuring the ALTA MFC right off the shelf. The ALTA represents MKS's ongoing dedication to helping customers increase productivity while reducing system costs.

Features & Benefits

Increases Throughput and Performance

- Reduces process cycle times due to fast gas settling times
- Enables better chamber matching through increased MFC accuracy
- Increases tool uptime through reduction on "No Problem Found" MFC replacements
  - — DeviceNet™ versions include embedded diagnostics software that allows users to check MFC functionality without removing the unit

Reduces Overall Costs

- Reduces MFC inventory through multi-gas, multi-range capability
- Reduces gas panel size due to smallest footprint for high flow MFCs
- DeviceNet configuration significantly reduces MFC cabling
- Open standard DeviceNet protocol provides accessibility to key MFC functions, including flow totalizer and selected trip points

Where Technology Meets Production

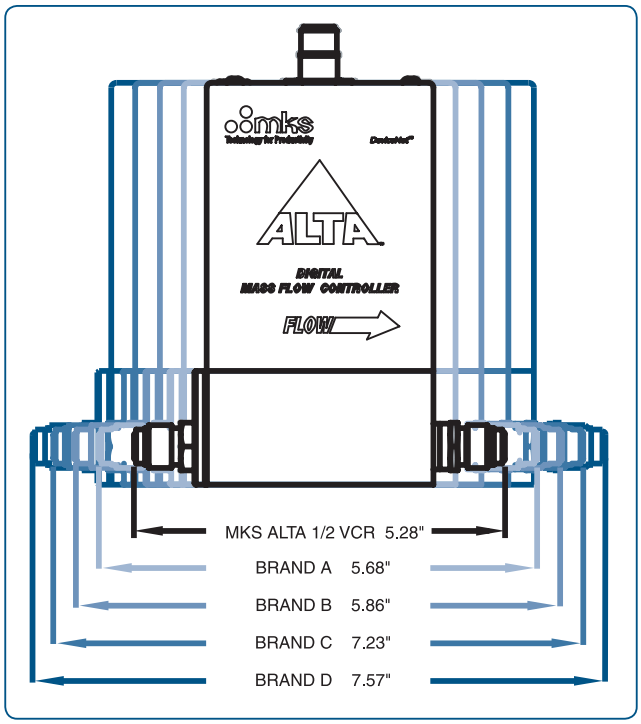
As a technology leader in MFCs, the ALTA represents what users want most – cost effective, easy to use technology and innovation that meets their production needs.

To enable ease of integration into next generation or existing process tools, a variety of mechanical connections are offered. Coupled with its compact size, the ALTA MFC provides an ideal way to migrate from existing analog MFCs, where reducing MFC inventory and improving process repeatability are important.

To ensure that customers can easily use the ALTA MFC, the ALTA gas tables can be configured electronically by the customer to meet specific application requirements. DeviceNet™ configurations are performed through the DeviceNet protocols. On analog I/O versions, gas tables are modified through a separate port using an MKS interface installed on a laptop computer.

Our award winning manufacturing facility is well versed in producing high quality MFCs to meet the demands of critical ultra-high purity applications. ALTA MFCs are manufactured in our Class 100 cleanroom in accordance with ISO 9001 procedures. With short lead times to meet your ever changing delivery schedules, the ALTA MFC meets business requirements as well as technical specifications.

Size, compatibility, cleanliness, and reliability make the ALTA MC20A an ideal choice for more demanding high flow control applications such as silicon epitaxy, RTP, diffusion/oxidation and MOCVD.



Smallest footprint high flow MFC

Specifications

PERFORMANCE

Full Scale Ranges *(N_2 equivalent)*	50, 100, 200 slm
Maximum Inlet Pressure	150 psig
Normal Operating Pressure Differential	
50 to 200 slm	20 to 50 psid* *(with atmospheric pressure at the MFC outlet)*
Proof Pressure	1000 psig
Control Range	2% to 100% of F.S.
Accuracy *(Per SEMI E56, calibration gas)*	
50, 100 slm	±1% of set point ≥ 25% F.S. ±0.25% F.S. < 25% F.S.
200 slm	±1.5% of set point ≥ 25% F.S. ±0.38% F.S. < 25% F.S.
Repeatability	±0.2% of F.S.
Flow Stability	±0.5% of set point
Temperature Coefficients	
Zero	<0.05% of F.S./°C
Span	<0.08% of Rdg./°C
Inlet Pressure Coefficient	0.02% Rdg./psi
Typical Controller Settling Time *(per SEMI E17-91)*	≤2 seconds
Warm-up Time	≤30 minutes (to within 0.2% of F.S> steady state performance)
Normal Operating Temperature	15° to 40°C
Storage Humidity	0 to 95% relative humidity, non-condensing
Storage Temperature	-20° to 80°C (-4° to 176° F)

Specifications (Cont'd)

MECHANICAL

Fittings	
50 slm	Swagelok® 4 VCR® male
50, 100, 200 slm	Swagelok® 8 VCR® male
Leak Integrity	
External (scc/sec He)	$<1 \times 10^{-10}$
Through Closed Valve	<1.0% of F.S. at 25 psig to vacuum. (To assure no flow-through, a separate positive shut-off valve is required.)
Wetted Materials	
Standard	316L S.S. VAR (equivalent to 316 S.S. SCQ for semiconductor quality), 316L S.S., Elgiloy®, Nickel
Valve Seat	Viton®, Buna-N, Kalrez®
Surface Finish	16µ inch average Ra
Weight	less than 2 lbs. (0.9 kg)

ELECTRICAL

Analog I/O	
Input Voltage Required	± 15 VDC
Max. steady state current	300 mA (9 Watts)
In-rush current at start-up	See user manual
Set Point Command Signal	0 to 5 VDC
Output Signal	0 to 5 VDC
Output Impedance	< 1 Ω
Connectors	15-pin Type "D"
Digital I/O (DeviceNet)	
Data Rate/Network Length	Data Rate (user selectable) 125 Kbps, 500 m (1,640 ft.) 250 Kbps, 250 m (820 ft.) 500 Kbps, 100m (328 ft.)
Level of Filtering	User software adjustable
Digital Functions	Select units: counts, slm, sccm, % of F.S. Remote Zero Set/read flow rate Up to 20 gas calibration tables with gas correction factors and up to 21 points per table Flow totalizer and run hours Valve soft start Monitor MFC status - valve drive level and trip points Reset factory defaults Report run time hours Change user tags and device address Device Identification Storage includes manufacturer information, model and serial number, original factory calibration, software and hardware revision numbers.
Data Rate Switch	4 positions: 125, 250, 500K, PGM (programmable over the network)
MAC ID Switches	2 switches, 10 positions; 0,0 to 6,3 are hardware ID numbers; 7,0 to 9,9 are software ID numbers (6,4 to 6,9 are unused and, if selected will default to hardware ID number 6,3)
Input Voltage Required	11 to 25 VDC (24 nominal) per DeviceNet specification
Max. steady state current	475 mA (11 Watts)
In-rush current at start-up	See user manual
Network Size	Up to 64 nodes
Network Topology	Linear (trunkline/dropline) power and signal on same network cable
Visual Communication Indicators	LED network status (green/red) LED module status (green/red)

* *Pressure differential requirement may change due to gas density and flow rate.*

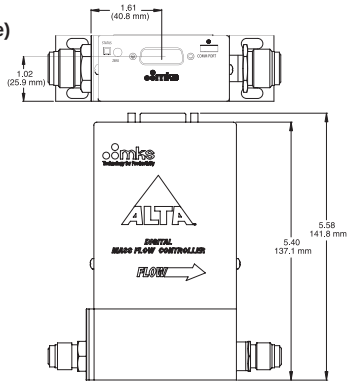
Ordering Information

SEMI Gas Codes

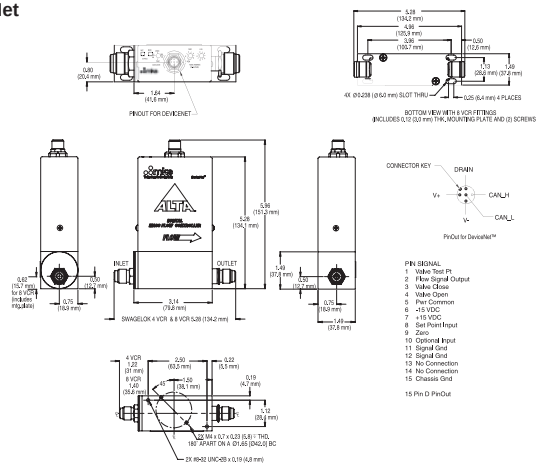
SEMI Gas Code	Name	Symbol	Maximum FS, slm	Flow Rate Code
001	Helium	He	200	22L
004	Argon	Ar	200	22L
007	Hydrogen	H_2	200	22L
008	Air	--	200	22L
013	Nitrogen	N_2	200	22L
015	Oxygen	O_2	200	22L
019	Chlorine	Cl_2	100	12L
025	Carbon Dioxide	CO_2	100	12L
028	Methane	CH_4	100	12L
029	Ammonia	NH_3	100	12L
039	Silane	SiH4	100	12L
042	Acetylene	C_2H_2	100	12L
110	Sulfur HexaFluoride	SF_6	50	51L

Ordering Code Example: MC20A00451LR26VXX	Code	Configuration
MC20A High Flow Thermal Mass-Flo Controller	MC20A	MC20A
Gas To Be Calibrated For: (SEMI Gas Code) *See table for additional options*		
Helium	001	004
Argon	004	
Hydrogen	007	
Nitrogen	013	
Oxygen	015	
Flow Rate To Be Calibrated For SLM (Maximum 200 SLM N_2 Equivalent)		
50 slm	51L	51L
100 slm	12L	
200 slm	22L	
Fittings (compatible with)		
Swagelok 4 VCR (50 slm)	R2	R2
Swagelok 8 VCR (50, 100, 200 slm)	M2	
Connector		
15 pin Type D (MKS)	B	6
15 pin Type D (Alternate)	E	
DeviceNet	6	
Valve Plug Material		
Viton®	V	V
Buna N	B	
Kalrez	K	
Firmware Version (DeviceNet only)		
Unless otherwise specified, MKS will ship firmware revision current to date of order	XX	XX
Optional Accessories		
ALTA Digital Software User Interface Kit (single license)		
Analog I/O version with parallel port PC use*		133730-G2
Analog I/O version with USB port PC use*		133730-G1
DeviceNet version with parallel port PC use**		133900-G2
DeviceNet version with USB port PC use**		133900-G1
Replacement Parallel Port Key		133897-G2
Replacement USB Port Key		133897-G1
*Kits include PC converter assembly cable and RS-232 PC extension cable.		
**Customer must supply DNET interface cards, hardware, and cables.		
Cabling for MC20A		
Cable for use with MKS 246/247 electronics to digital ALTA 15-pin D with analog I/O interface (where XX is desired length in feet)		CB1480-1-XX
RS232 PC extension cable 10ft. (included in kits 133730)		095-103377
RS232 converter assembly cable for use with Digital ALTA MFC with analog I/O interface and PC (included in kits 133730)		134566-G1

Analog Version
15 pin D (MKS & Alternate)



DeviceNet Version



Dimensional Drawing and PinOuts —

Note: Unless otherwise specified, dimensions are nominal values in inches (mm referenced).

MKS Instruments, Inc.
Global Headquarters

2 Tech Drive, Suite 201
Andover, MA 01810

Tel: 978.645.5500
Tel: 800.227.8766 (in U.S.A.)
Web: www.mksinst.com

MKS Instruments, Inc.
Flow Solutions

Six Shattuck Road
Andover, MA 01810

Tel: 978.975.2350

ALTA MC20 - 1/18