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mks

Flow Solutions

WWW.MKSINST.COM

ALTA™ Mass Flow Controllers

METAL-SEALED TYPE 1480A

The all-digital MKS ALTA Mass Flow Controller (MFC) includes 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' 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 MFC

US Patent No. 5,314,164, 5,461,913
Foreign Patents, Patents Pending

Reduces Overall Costs

- Reduces MFC inventory through multi-gas, multi-range capability
- DeviceNet configuration significantly reduces MFC cabling
- Open standard DeviceNet protocol provides accessibility to key MFC functions, including flow totalizer and selected trip points

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Where Technology Meets Production

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

To enable ease of integration into next generation or existing process tools, a variety of mechanical configurations exist, including surface mount and VCR®. 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.

Afraid of MFC downtime? Reliability has also been designed into the ALTA. Proven through rigorous stressed life (STRIFE) testing, the ALTA is indeed a production-worthy MFC.

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. For DeviceNet™ configurations, this is performed through the DeviceNet protocols. On analog I/O versions, these 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 accomodate your ever changing delivery schedules, the ALTA MFC meets your business requirements as well as your technical specifications. Designed with production requirements in mind, the ALTA MFC offers process reliability and gas selection flexibility for all your gas delivery applications.



Figure 1 —
ALTA User Interface Screen illustrating multi-gas and multi-flow capabilities

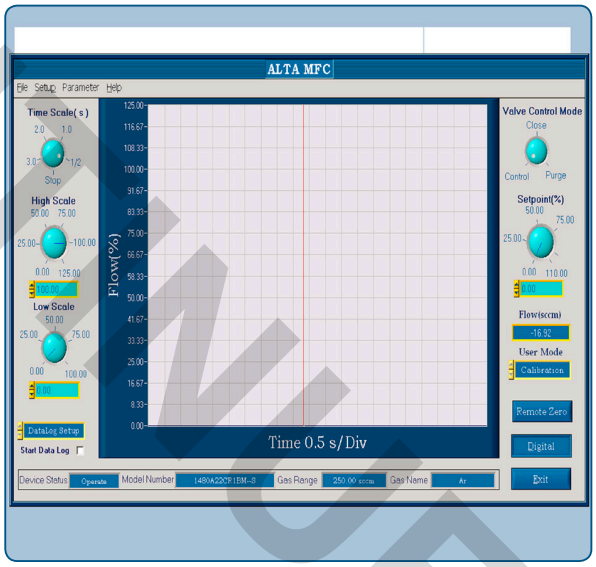


Figure 2 —
ALTA Data Acquisition and Control Mode

PROMOTED

Specifications

Electrical

Analog I/O

Input Voltage Required	
Max. current at start-up (first 5 sec)	± 15 VDC (± 5%) @ 350 mA
Typical current at steady state	± 15 VDC (± 5%) @ 250 mA 24 VDC (nominal) @ 300 mA (available on special basis)
Set Point Command Signal	0 to 5 VDC
Output Signal	0 to 5 VDC
Output Impedance	< 1 Ω
Connectors	9-pin or 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 Power	11 to 25 VDC per DeviceNet specification (@ <6 watts)
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)

Profibus®

Electromagnetic Compatibility	CE Compliant to EMC Directive 2004/108/EC

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Specifications

Performance

Full Scale Ranges *(N_2 equivalent)*	10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10000, 20000, 30000 sccm*
Maximum Inlet Pressure	150 psig
Normal Operating Pressure Differential *(with atmospheric pressure at the MFC outlet)*	
10 to 5000 sccm	10 to 40 psid
10000 to 30000 sccm	15 to 40 psid
Proof Pressure	1000 psig
Control Range	2% to 100% of F.S.
Accuracy *(Per SEMI E17-56)*	± 1% of Setpoint for 20 to 100% F.S
(calibration gas)	0.2% of F.S. for < 20% F.S
Repeatability	0.2% of Reading
Resolution	0.1% of F.S.
Temperature Coefficients	
Zero	< 0.05% of F.S./°C
Span	< 0.08% of Rdg./°C
Inlet Pressure Coefficient	< 0.02% of Rdg./psi
Typical Controller Settling Time *(per SEMI Guideline E17-91)*	≤ 1 sec typical above 10% F.S.
Warm-up Time *(to within 0.2% of F.S. of steady state performance)*	≤ 30 min
Normal Operating Temperature Range	10°C to 45°C
Storage Humidity	0 to 95% Relative Humidity, non-condensing
Storage Temperature	-20° to 65°C (-4° to 149° F)

Mechanical

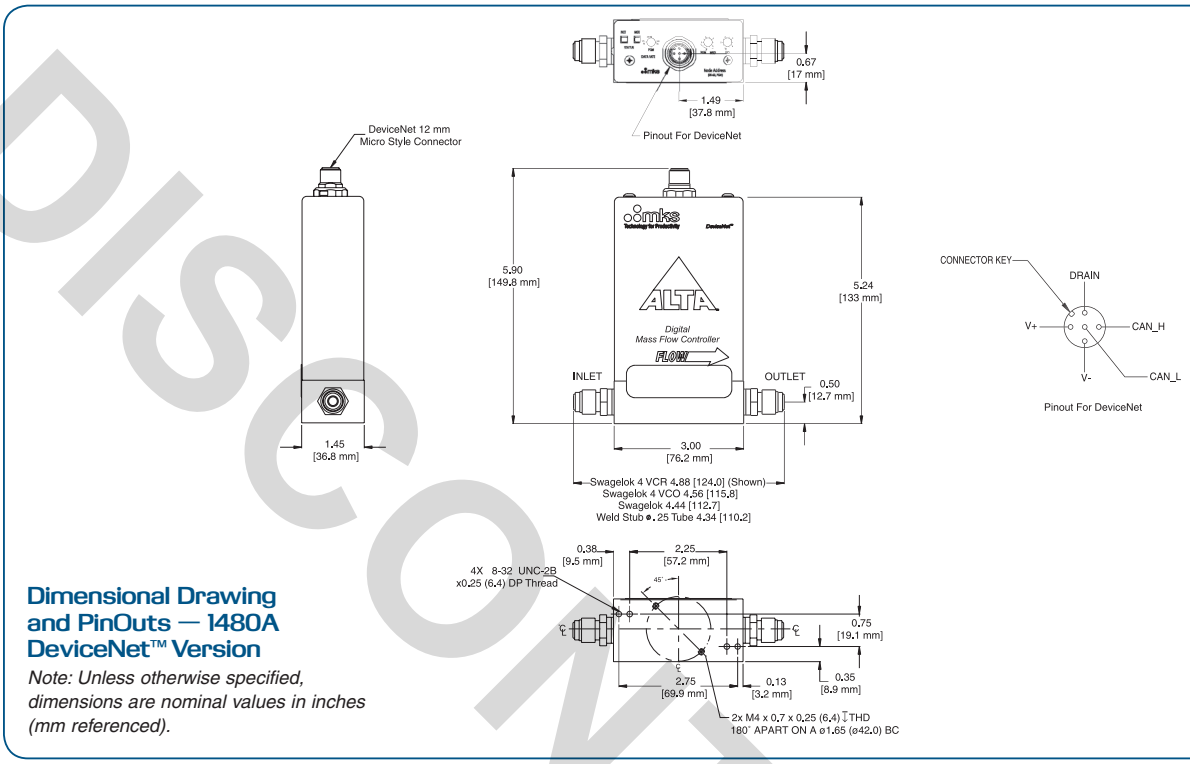
Fittings *(compatible with)*	Swagelok® 4 VCR®, 1-1/2" surface mount, 1/4" Swagelok
Leak Integrity	
External (scc/sec He)	< 1 x 10^{-10}
Through closed valve	< 1.0% of F.S. at 40 psig inlet to atmosphere (To assure no flow-through, a separate positive shut-off valve is required.)
Wetted Materials	
Standard	316L S.S. VAR (equivalent to 316 S.S. SCQ for semiconductor quality), 316 S.S., nickel, KM-45
Valve Seat	Kel-F® plug 50 sccm and below, Teflon® valve plug 100 sccm and above
Surface Finish	10µ inch average Ra (1480A)
Weight	less than 2 lbs (0.9kg)
Valve Type	Normally Closed Normally Open

**For Normally Open Valve, Full Scale ranges include all ≥ 100 sccm (N_2 equivalent)*

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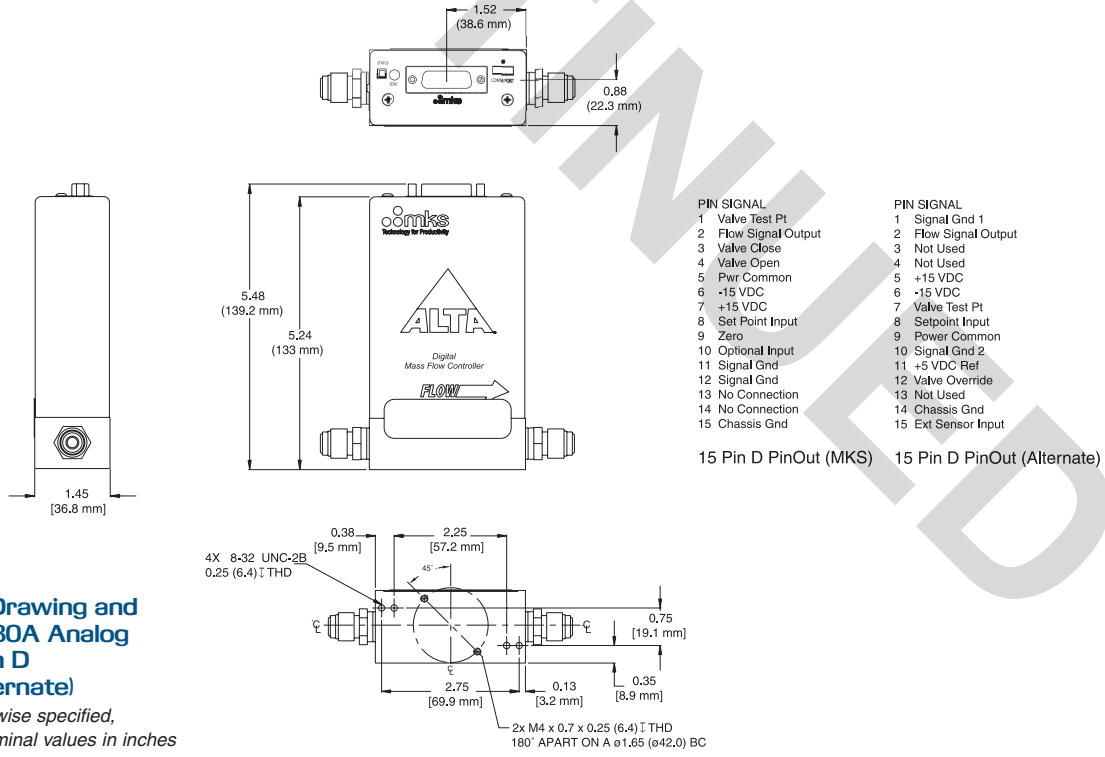
Dimensional Drawings & PinOuts

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Dimensional Drawing and PinOuts — 1480A DeviceNet™ Version

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



PIN	SIGNAL
1	Valve Test Pt
2	Flow Signal Output
3	Valve Close
4	Valve Open
5	Pwr Common
6	-15 VDC
7	+15 VDC
8	Set Point Input
9	Zero
10	Optional Input
11	Signal Gnd
12	Signal Gnd
13	No Connection
14	No Connection
15	Chassis Gnd

15 Pin D PinOut (MKS)

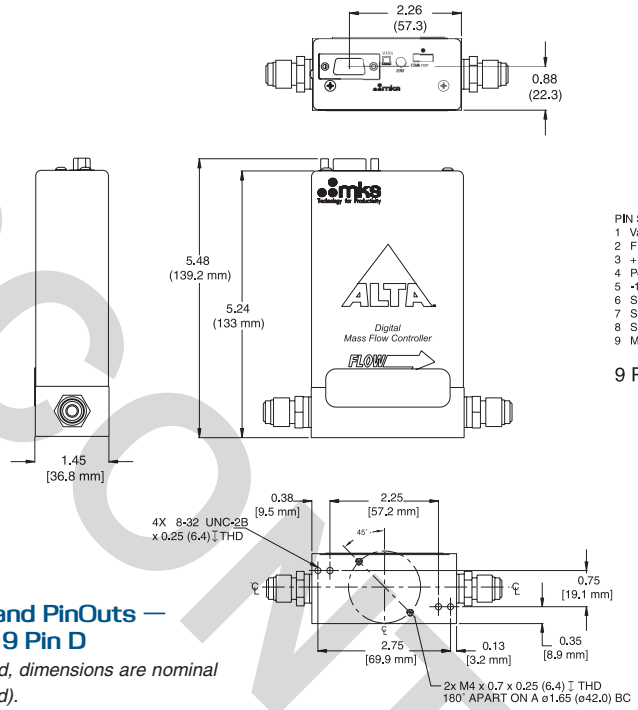
PIN	SIGNAL
1	Signal Gnd 1
2	Flow Signal Output
3	Not Used
4	Not Used
5	+15 VDC
6	-15 VDC
7	Valve Test Pt
8	Setpoint Input
9	Power Common
10	Signal Gnd 2
11	+5 VDC Ref
12	Valve Override
13	Not Used
14	Chassis Gnd
15	Ext Sensor Input

15 Pin D PinOut (Alternate)

Dimensional Drawing and PinOuts — 1480A Analog Version, 15 Pin D (MKS and Alternate)

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

Dimensional Drawings & Pinouts



PIN SIGNAL
1 Valve Open/Close
2 Flow Signal Output
3 +15 VDC
4 Power Common
5 -15 VDC
6 Set Point
7 Signal Common
8 Signal Common
9 MKS Test Point

9 Pin D PinOut

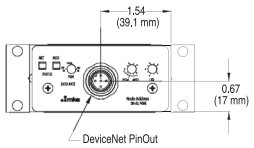
Dimensional Drawing and PinOuts — 1480A Analog Version, 9 Pin D

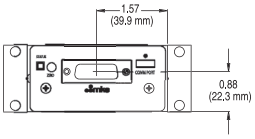
Note: Unless otherwise specified, dimensions are nominal values in inches (mm referenced).

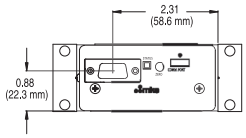
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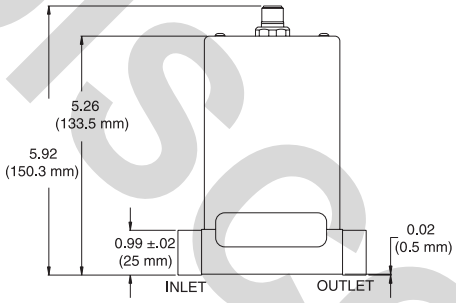
Dimensional Drawings & PinOuts

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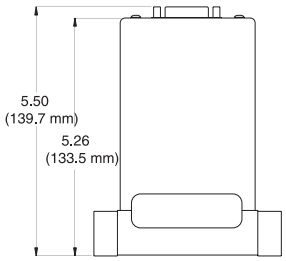




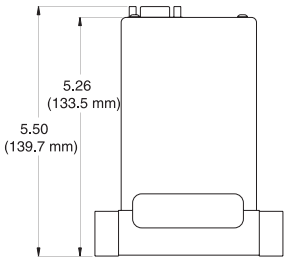




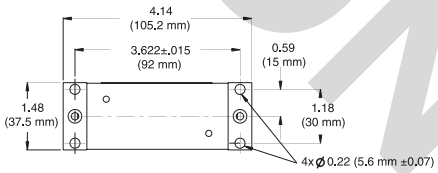
DOWNPORT VERSION
WITH DEVICENET CONNECTOR

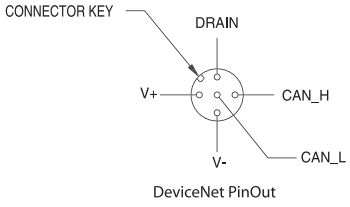


DOWNPORT VERSION
WITH 15 PIN "D" CONNECTOR



DOWNPORT VERSION
WITH 9 PIN "D" CONNECTOR





DeviceNet PinOut

PIN	SIGNAL
1	Valve Test Point
2	Flow Signal Output
3	Valve Close
4	Valve Open
5	Pwr Common
6	-15 VDC
7	+15 VDC
8	Set Point Input
9	Zero
10	Optional Input
11	Signal Gnd
12	Signal Gnd
13	No Connection
14	No Connection
15	Chassis Gnd

15 Pin D PinOut (MKS)

PIN	SIGNAL
1	Signal Gnd 1
2	Flow Signal Output
3	Not Used
4	Not Used
5	+15 VDC
6	-15 VDC
7	Valve Test Pt
8	Setpoint Input
9	Power Common
10	Signal Gnd 2
11	+5 VDC Ref
12	Valve Override
13	Not Used
14	Chassis Gnd
15	Ext Sensor Input

15 Pin D PinOut (Alternate)

PIN	SIGNAL
1	Valve Open/Close
2	Flow Signal Output
3	+15 VDC
4	Power Common
5	-15 VDC
6	Set Point
7	Signal Common
8	Signal Common
9	MKS Test Point

9 Pin D PinOut

Dimensional Drawing and PinOuts — 1480A DownMount Version

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

Ordering Information

SEMI Gas Codes

SEMI Gas Code	Name	Symbol	Maximum FS, sccm	Flow Rate Code
001	Helium	He	40,000	44C
004	Argon	Ar	40,000	44C
007	Hydrogen	H2	30,000	34C
008	Air	--	30,000	34C
013	Nitrogen	N2	30,000	34C
015	Oxygen	O2	30,000	34C
019	Chlorine	Cl2	20,000	24C
025	Carbon Dioxide	CO2	20,000	24C
028	Methane	CH4	20,000	24C
029	Ammonia	NH3	20,000	24C
039	Silane	SiH4	10,000	14C
042	Acetylene	C2H2	10,000	14C
110	Sulfur HexaFluoride	SF6	5000	53C

Ordering Code Example: 1480A00411CR16M12	**Code**	**Configuration**
Type 1480A ALTA Mass Controller (10µin)	1480A	1480A
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 SCCM (Maximum 30000 SCCM N_2 Equivalent)		
10 sccm	11C	11C
20 sccm	21C	
50 sccm	51C	
100 sccm	12C	
200 sccm	22C	
500 sccm	52C	
1000 sccm	13C	
2000 sccm	23C	
5000 sccm	53C	
10000 sccm	14C	
20000 sccm	24C	
30000 sccm	34C	
Fittings (compatible with)		
Swagelok 4 VCR Male	R	R
¼" Swagelok	S	
C-seal	C	
W-seal	H	
Valve		
Normally Closed	1	1
Normally Open - ≥100 sccm N_2	2	
Connector		
9-pin Type D	A	6
15-pin Type D	B	
Profibus® *(available with Normally Closed Valve only)*	4	
DeviceNet™	6	
Seal Materials		
Metal with Kel-F plug 50 sccm and below, Teflon valve plug 100 sccm and above	M	M
Firmware Version		
DeviceNet		12
Normally Closed	12	
Normally Open	13	
Profibus		
Normally Closed	14	
Unless otherwise specified, MKS will ship firmware revision current to date of order	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
- Profibus I/O version with parallel port PC use**		1001067-001
- Profibus I/O version with USB port PC use**		1001077-001
*Kits include PC converter assembly cable and RS-232 PC extension cable. **Customer must supply DNET/Profibus interface cards, hardware, and cables.		
Replacement Parallel Port Key		133897-G2
Replacement USB Port Key		133897-G1
Cabling for 1480A		
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 10 ft long (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

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