



# ALIAMASS

Thermal Mass Flow Controllers  
AMFC Series


## GENERAL

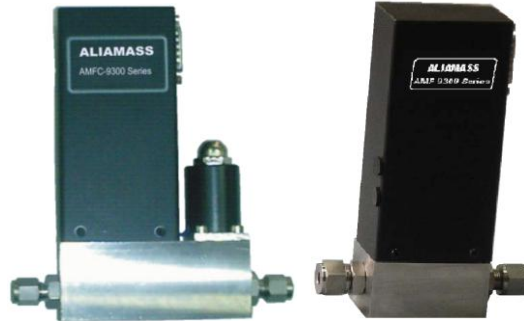
The SMC Mass Flow Meter (AMF) and Controllers (AMFC) are a combination of our proven thermal mass flow technology and intelligent flow controller which provides user friendly control functions to ensure excellent performance and fast control, even under varying process conditions. Superior control settling time, no dead time and other functions are the enhanced features that ensure stable and continuous gas flow.

## FEATURES

- ❑ Direct mass flow measurement of any gas or mixture
- ❑ Single and multi-valve group configurations provide full control over range of 0.01 SCFH to 7 SCFM (5 sccm to 200 slpm)
- ❑ Tracking of gas flow rate over a turndown ratio of at least 20:1
- ❑ Options: controller with or without display
- ❑ Flow display : 4 digital characters  
Total display : 6 digital characters
- ❑ Equivalent effective nitrogen or actual gas calibration
- ❑ Low cost, superior value

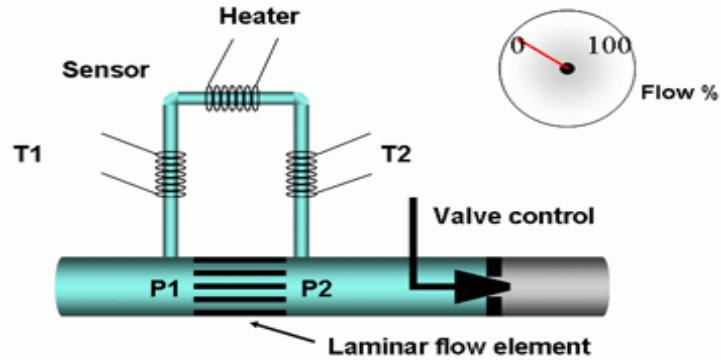
## SPECIFICATION

- Process Connections:  
Options : Ø3,Ø6,Ø8 compression fitting
- Process temperature : 40 - 115 °F (5 - 45 °C)
- Electronics temperature: 32 - 122 °F (0 - 50 °C)
- Operating pressure : 145 psi (10MPa)
- Mass Flow rate : See model selection guide section
- Flow units : SLPM or SCCM
- Accuracy (and linearity) :  $\pm 1\%$  of Reading + (0.5% FS)
- Repeatability :  $\pm 0.5\%$  of Full Scale
- Turn down ratio : Over 20:1
- Command Signal response : One second  
Options : normal :  $\approx 10s$   
fast response :  $< 1.5s$   
soft start :  $< 30s$
- Linear input(command) :  $0 \sim 5V_{DC}$  or  $4 \sim 20mA$   
Linear output(measure):  $0 \sim 5V_{DC}$  to  $1000 \Omega$  or greater;  
or  $4 \sim 20mA$  to  $\leq 250 \Omega$   
3mV (RMS) maximum ripple
- Power requirement:  
without Display :  $+15V_{DC} / 0.6A, -15V_{DC} / 0.3A$   
with Display :  $220V_{AC} / 20W$
- Display Reading : Flow, total flow
- Display function : Command / measuring signal
- Controller Function : turn off / operating
- Ex-protection :  GB3836.2-2000  
eqv IEC60079-1:1990
- Cable (remote version) : 985' (300 meters)
- Wetted materials : 316 SSS
- Weights  
AMFC 9312 : 3.5 lbs (1,715 grams)  
AMFC 9322 : 3.8 lbs (1,720 grams)  
2-Valves Group : 7.0 lbs (3,170 grams)

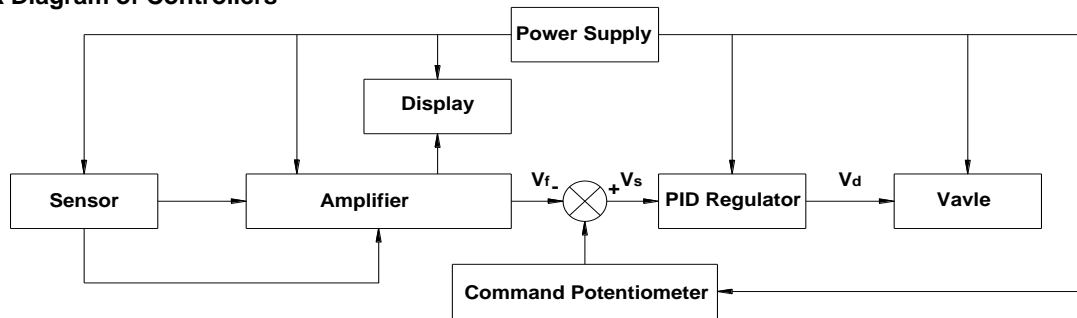


The SMC AMFC-93 Series features a heater coil; both upstream and downstream of the temperature sensor coils are turned around the outside of the bypass sensor tube. The heater coil uniformly heats the gas flow stream through the bypass sensor tube. As a result, both the upstream and downstream sensor coils are heated equally at zero flow and the resistances of coils are equal. As the gas in the tube begins differential is created between the two coils . This temperature differential creates an inequality between the two coils' resistance . The difference in resistance is directly proportional to the mass flow rate. A NPN transistor is placed in close proximity to the sensor coils for use as an ambient temperature compensation signal. The controllers consist of three basic units : a flow sensor, a linear control valve and an integral electronic control system.

• Principle of sensor operation



• Block Diagram of Controllers

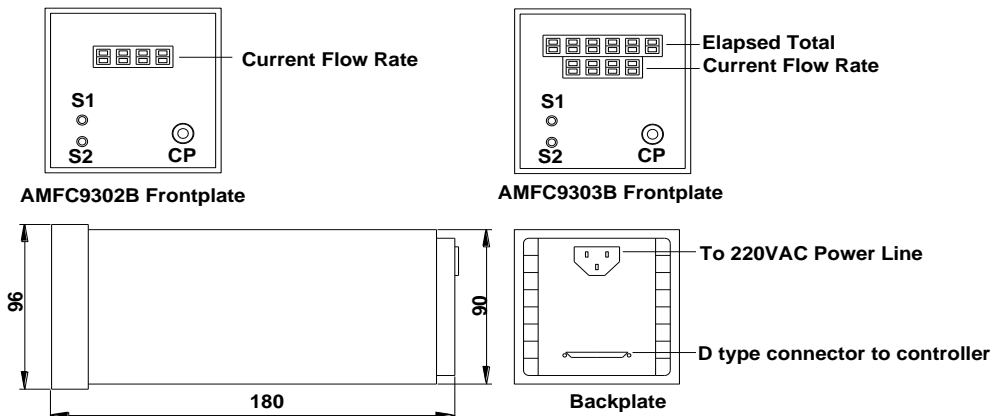


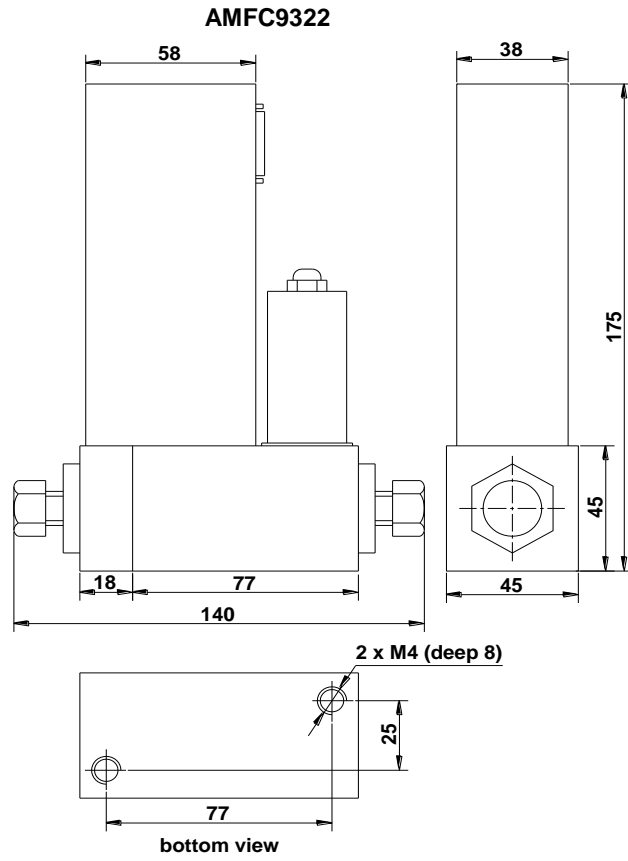
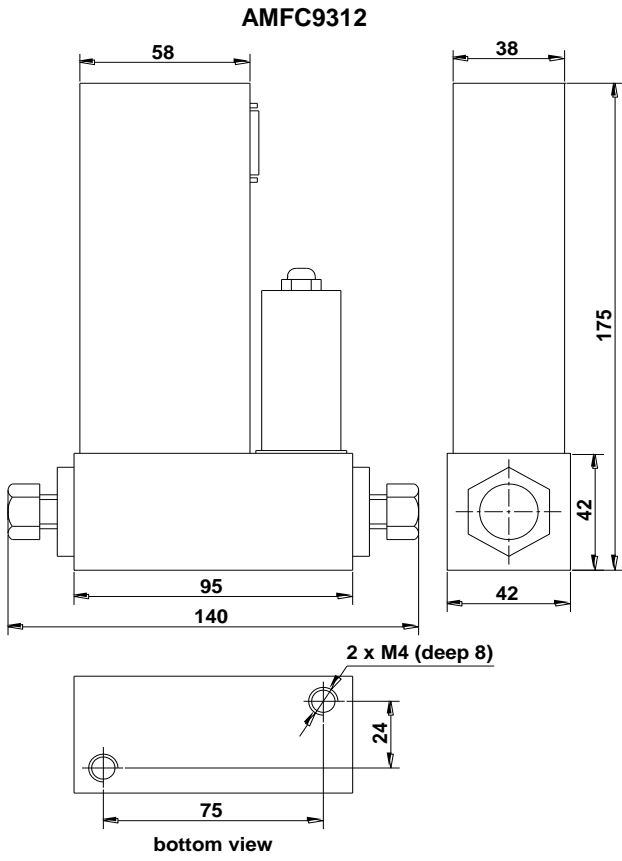
• Models and Full Scales of controllers

Model	AMFC-9322		
Full Scale (in SLPM)	Min	Max	Min
	0.005	100	>50

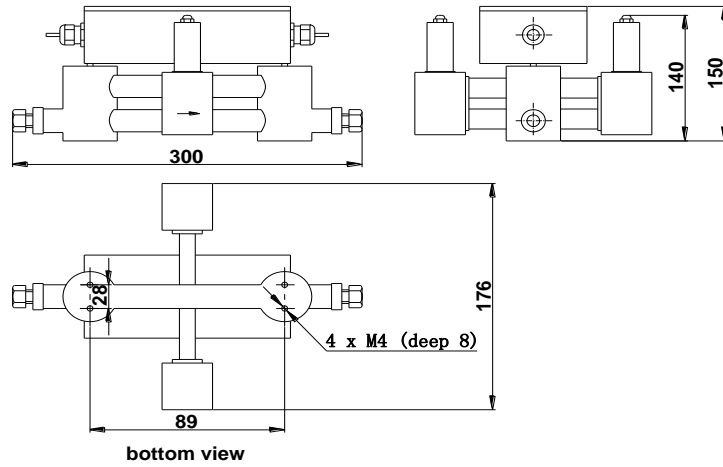
SLPM : l/min @ standard atmosphero conditions.

• Frontplate of Displays

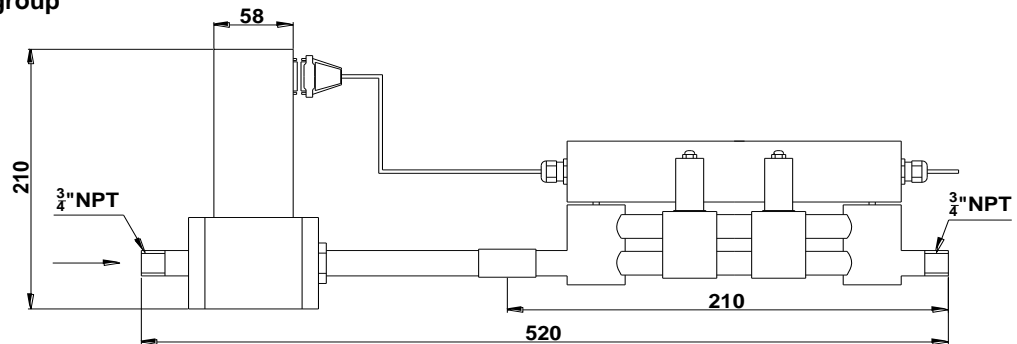




**AMFC9332 two valve group**



**AMFC9332 four valve group**



Please contact your local SMC application engineer

**\*\*You also need to provide the following information:**

<b>Gas Composition</b>	We calibrate our mass flowmeters to NIST standards with the actual gas or a mixture that reflects the end user's process. The gas or mixture name should be listed as a percent of the total, summing to 100%.
<b>Full Scale Flow</b>	Please indicate your maximum and minimum flow rates; units must be SLPM.
<b>Line Size</b>	Please specify your pipe size as well connection type (threaded, compression fitting)
<b>Gas Pressure and Temperature</b>	We will calibrate under conditions as close to your process environment as possible
<b>Electronics Temperature</b>	Temperature of the ambient environment surrounding the flowmeter's electronics.
<b>Power Requirements</b>	Please specify your power requirements such as 15 V <sub>DC</sub> or 220 V <sub>AC</sub>
<b>Configuration</b>	We have various configurations such as Ex proof, Non-Ex proof, remote, integral. See below:

➤ **Model Selection Guide**

<b>SMC Mass Flow Controller (AMFC) 9300 Series</b>										
Example : AMFC-9312-Ø6-NX-02B-AC220-**										
AMFC-93	**	**	**	**	**	**	Gas type, Flow rate,P,T,Pipe size		Description	
	12							0.005-5 SLPM		Flow rate (Full scale )
	22							5-100 SLPM		
	32							100-400 SLPM		
Connections System	(Metric)	Ø3	M 8 X 1 to Process line			M 14 X 1.5 to controllerbody		Flowline size (outside diameter)		
		Ø6	M 12 X 1.25 to Process line							
		Ø8	M 14 X 1.5 to Process line							
Non Hazardous		NX						Environment		
Explosion Proof		EX								
Display Rate				02B		Indication				
Display Rate & Total				03B						
220 V <sub>AC</sub> (with display)					AC220		Power Supply			
± 15 V <sub>DC</sub> (without display)					DC					
Standard of P.R.C							**		Process connections	
Process Gas (Please indicate, gas type, flow rate, line size, pressure and temperature)									Process information	

<b>SMC Mass Flowmeter 9300 Series</b>										
Example : AMF-9312-Ø6-NX-02B-AC220-**										
AMF-93	**	**	**	**	**	**	Gas type, Flow rate,P,T,Pipe size		Description	
	11							0.005-5 SLPM		Flow rate (Full scale )
	21							5-100 SLPM		
	31							100-400 SLPM		
Connections System	(Metric)	Ø3	M 8 X 1 to Process line			M 14 X 1.5 to Flowmeterbody		Flowline size (outside diameter)		
		Ø6	M 12 X 1.25 to Process line							
		Ø8	M 14 X 1.5 to Process line							
Non Hazardous		NX						Environment		
Explosion Proof		EX								
Display Rate				02B		Indication				
Display Rate & Total				03B						
220 V <sub>AC</sub> (with display)					AC 220		Power Supply			
± 15 V <sub>DC</sub> (without display)					DC					
Standard of P.R.C							**		Process connections	
Process Gas (Please indicate, gas type, flow rate, line size, pressure and temperature)									Process information	