

## Gas Flowmeter Sizing

Variable area flowmeters suitable for liquid service have a capacity rating based on water at 70° Fahrenheit. Flowmeters suitable for gas service have a capacity rating based on air at STP (70°F, 14.7 PSIA) conditions. The correction factors listed below are used to calculate the flow capacity when using a liquid other than water or a gas other than air at STP conditions.

### GAS CORRECTION FORMULA

$$\text{Air Equivalent Flow Rate} = \text{Customer Gas Flow Rate} \times \text{Gas Correction Factor}$$

Step 1: Convert *Customer Gas Flow Rate* unit of measure to a standard unit of measure for air flow (SCFM or SCCM).

Step 2: Calculate *Gas Correction Factor* from given values.

Step 3: Calculate the product of the *Air Equivalent Flow Rate* from the *Customer Gas Flow Rate* and the *Gas Correction Factor*.

Step 4: Calculate the maximum or minimum flow rate for the customer's conditions.

**Step 1: Convert *Customer Gas Flow Rate* unit of measure to a standard unit of measure for air flow**

Customer Gas Flow Rate \_\_\_\_\_  
 Converted Gas Flow Rate \_\_\_\_\_ SCFM / SCCM

Gas Flow Rate Conversions			
From	To SCFM	From	To SCCM
SCFH	Divide by 60	SCFM	Multiply by 28,317
SCIM	Divide by 1,728	SCFH	Multiply by 472
SLPH	Divide by 28.317	SCIM	Multiply by 16.39
SM <sup>3</sup> /MIN	Multiply by 35.31	SLPM	Multiply by 1,000
SM <sup>3</sup> /HR	Multiply by 0.5885	SLPH	Multiply by 16.67
NM <sup>3</sup> /MIN	Multiply by 37.99	SM <sup>3</sup> /MIN	Multiply by 1,000,000
NM <sup>3</sup> /HR	Multiply by 0.6331	SM <sup>3</sup> /HR	Multiply by 16,667
SCCM	Divide by 28,317	NM <sup>3</sup> /MIN	Multiply by 1,075,785
KG/MIN	Multiply by (29.39 ÷ SpGr)	NM <sup>3</sup> /HR	Multiply by 17,929
KG/HR	Multiply by (0.49 ÷ SpGr)	KG/MIN	Multiply by (832,000 ÷ SpGr)
LBS/MIN	Multiply by (13.33 ÷ SpGr)	KG/HR	Multiply by (13,876 ÷ SpGr)
LBS/HR	Multiply by (0.2222 ÷ SpGr)	LBS/MIN	Multiply by (377,500 ÷ SpGr)
LBS/DAY	Multiply by (0.00926 ÷ SpGr)	LBS/HR	Multiply by (6,292 ÷ SpGr)
ACFM	Multiply by [((Operating PSIG+14.7)(530)) ÷ ((14.7)(Operating °F+460))]		

### Step 2: Calculate *Gas Correction Factor* from given values

This information is required to size for conditions other than air at STP:

- Operating Temperature: \_\_\_\_\_ °F
- Operating Back Pressure: \_\_\_\_\_ PSIG
- Specific Gravity of Gas: \_\_\_\_\_ @STP

Temperature Conversions		Gas Density Conversions	
From	To °Fahrenheit	From	To Specific Gravity
°Centigrade	(°C X 1.8) + 32	LBS/FT <sup>3</sup>	Divide by 0.075
°Kelvin	°K - 273.15	KG/M <sup>3</sup>	Divide by 1.2
°Rankine	((°R - 459.87) (1.8))+ 32	MolWt	Divide by 29.0
		g/cm <sup>3</sup>	Divide by 0.0012

Pressure Conversions			
From	To PSIG	From	To PSIG
foot Water	Divide by 2.308	Pa	(Pa÷101,300) X 14.7
Inch Water	Divide by 27.73	PSIA	Minus 14.7
mm Water	Divide by 704	ATM	(ATM X 14.7) - 14.7
inch Hg	Divide by 2.036	Torr	((Torr÷760) X14.7) - 14.7
mm Hg	Divide by 51.7	Bars	((Bars÷1.013) X14.7) - 14.7
kg/cm <sup>2</sup>	Multiply by 14.228	Millibar	((Millibars÷1013) X 14.7) -14.7
kPa	(kPa÷101.3) X 14.7		

Gas Correction Factor (GCF) formula:

$$\text{GCF} = \sqrt{\frac{[(\text{Gas Specific Gravity}) \times (\text{Operating Temperature} + 460)]}{[(36) \times (\text{Operating Backpressure} + 14.7)]}}$$

GCF = \_\_\_\_\_

### Step 3: Determine the Air Equivalent Flow Rate.

Air Equivalent Flow Rate = Customer Gas Flow Rate x Gas Correction Factor  
 Air Equivalent Flow Rate = \_\_\_\_\_

**Step 4: Calculate the maximum or minimum flow rate for the customer's conditions (Customer Gas Flow Rate Scale)**

Customer Gas Flow Rate Scale = Catalog Flow Rate ÷ Gas Correction Factor  
 Customer Gas Flow Rate Scale = \_\_\_\_\_