Gas Reference Units for Flow and Volume

Fact Sheet



Parker nitrogen gas generator performance is standardised against reference conditions across the range of flows and purities.

7 bar(g) inlet pressure

Model	Nitrogen flow rate m³/hr vs Purity (Oxygen Content)													
	5ppm	10ppm	50ppm	100ppm	250ppm	500ppm	0.10%	0.40%	0.50%	1%	2%	3%	4%	5%
N2-20P	3.5	4.5	6.7	8.0	9.7	11.1	12.4	16.7	17.7	21.3	25.3	29.8	30.9	33.7
N2-25P	5.3	6.8	10.1	12.0	14.6	16.7	18.6	25.1	26.6	32.0	38.0	44.7	46.4	50.6
N2-35P	7.0	9.0	13.4	16.0	19.4	22.2	24.8	33.4	35.4	42.6	50.6	59.6	61.8	67.4
N2-45P	8.8	11.3	16.8	20.0	24.3	27.8	31.0	41.8	44.3	53.3	63.3	74.5	77.3	84.3
N2-55P	10.5	13.5	20.1	24.0	29.1	33.3	37.2	50.1	53.1	63.9	75.9	89.4	92.7	101.1
N2-60P	11.6	15.0	22.3	26.6	32.3	36.9	41.2	55.5	58.9	70.8	84.1	99.1	102.7	112.1
N2-65P	13.3	17.1	25.5	30.4	36.9	42.2	47.1	63.5	67.3	80.9	96.1	113.2	117.4	128.1
N2-75P	14.5	18.6	27.7	33.1	40.2	46.0	51.3	69.1	73.3	88.2	104.7	123.4	127.9	139.5
N2-80P	16.1	20.7	30.8	36.8	44.6	51.1	57.0	76.8	81.4	98.0	116.4	137.1	142.1	155.0
Air : N2 (20P-55P)	9.3	7.2	5.1	4.6	4.1	3.8	3.4	2.9	2.8	2.6	2.3	2.2	2.2	2.1
Air : N2 (60P-65P)	9.8	7.6	5.3	4.9	4.3	3.9	3.5	3.0	2.9	2.7	2.5	2.3	2.3	2.2
Air : N2 (75P-80P)	10.1	7.8	5.5	5.0	4.4	4.0	3.7	3.1	3.0	2.8	2.5	2.4	2.4	2.3
Outlet (bar(g))	6.0	6.0	6.0	6.0	6.0	6.0	5.8	5.8	5.7	5.7	5.6	5.5	5.4	5.4

The Parker reference conditions are that 1m³ of gas is at 20°C, 1013 milli bar absolute with 0% relative humidity.

Often nitrogen flow rates are specified against different reference standards and ensuring that the selection of a Parker nitrogen generator is accurate to meet the required flow rate is critical.

There are three common reference standards that occur frequently within nitrogen generator specification documents and requests.

Normal cubic metres, Nm³, referenced at 0°C, 1013mbarA

Standard cubic metres, Sm³, referenced at 15°C, 1013mbarA

Metres cubed, m³, referenced at 20°C, 1013mbarA

Providing the gas pressure is constant, at the different temperatures specified, the gas density will change and thus the volume.

Calculating the difference from Parker's specified flow rates within the sizing tables is relatively easy.

To convert one reference standard to another you need to calculate the ratio of absolute temperatures where absolute zero is 0 degrees Kelvin, (-273 °C) and thus zero degrees Celsius is 273 degrees Kelvin

Example 1

An RFQ specifies 20Nm³/h flow rate of nitrogen referenced to 0°C, 1013mbarA. What flow rate is required to be selected from the Parker nitrogen generator sizing tables?

20Nm³/h x (20 +273) / (0+273) = 21.465m³/h

Therefore, a generator with a flow rate of typically **21.5m³/h @ 20°C, 1013mbarA** would be the correct selection.

Sometimes, a reference standard of Actual m³, Am³, is specified, this can quite simply be anything, literally "at the temperature and pressure stated".
If there is a difference in pressure reference as well as temperature, then both the temperature and pressure ratios need to be converted.

Example 2

A consultant specifies a nitrogen flow rate of 50 Am³/h, (Actual metres cubed), @ 15°C but also at an actual pressure of 2 bar gauge. (so, 2 bar above atmospheric conditions, therefore 3 barA in total).

50Am³/h x (20°C + 273°C) / (15°C + 273°C) x

(1013mbarA + 2000mbarA /1013mbarA) = 151.3m³/h

Therefore, a Parker NITROSource PSA or (hollow fibre membrane modules, depending on purity), would need to be sized to flow **152m³/h @ 1013mbarA**

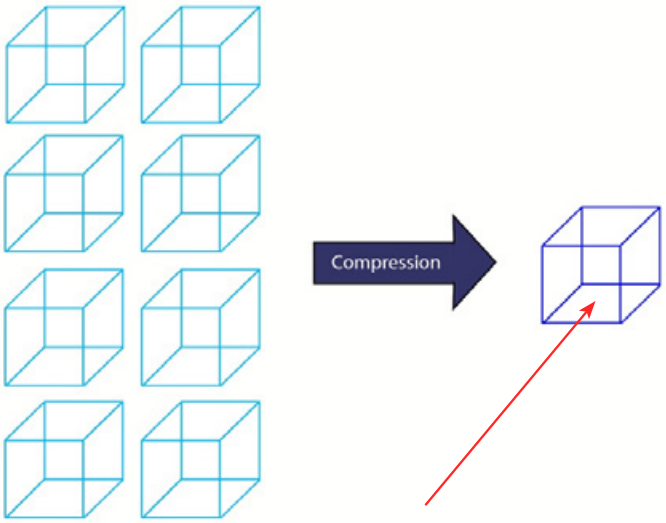
ENGINEERING YOUR SUCCESS.

Nitrogen Conversion Data 200°C, 1013mbarA		Weight		Gas		Liquid	
		Pounds (lbs)	Kilograms (kg)	Cubic Feet	Cubic Metre	Gallons US	Litres (L)
Weight	1 Pound	1	0.4536	13.803	0.3904	0.4181	0.5606
	1 Tonne	2205	1000	30,436	860.7	921.9	1236.1
	1 Kilogram	2.205	1	30.436	0.88607	0.9219	1.2361
Gas	1 Cubic Foot	0.0724	0.0329	1	0.0283	0.01074	0.04080
	1 Cubic Metre	2.568	1.165	35.324	1	0.3793	1.4409
Liquid	1 US Gallon	6.7441	3.0582	92.762	2.6267	1	3.785
	1 Litre	1.7818	0.808	24.508	0.694	0.264	1

What is meant by pressure and flow specifications?

When a Parker nitrogen gas generation system is specified, for example, 8m³/h @ 8 barg, this means that 8m³ of nitrogen gas at 20 °C and 1013 milli bar absolute (atmospheric pressure) reference standard, is compressed 8 times smaller, occupying a smaller volume but at a higher density.

It does not mean actual volume of 8m³ of gas at 8 barg = 64m³ at ambient conditions of 20°C, 1013mbarA.



Reference standard volume is compressed and thus occupies smaller volume at higher density

©2021 Parker Hannifin Corporation. All rights reserved.

EMEA Product Information Centre
Free phone: 00 800 27 27 5374
(from AT, BE, CH, CZ, DE, DK, EE, ES, FI, FR, IE, IL, IS, IT, LU, MT, NL, NO, PL, PT, RU, SE, SK, UK, ZA)

US Product Information Centre
Toll-free number: 1-800-27 27 537

www.parker.com