NITROGEN GENERATOR

PSA – N_2

Outline Drawing of the PSA Nitrogen Generator

Main Technical Parameters

Nitrogen flow	1~3000Nm^3/h
Nitrogen purity	97~99.9995%
Nitrogen pressure	0.05~1.0MPa
Dew point	−60℃~−45℃

Components Description

1 Compressed air cleaning assembly

Main parts:filters,refrigerated-dryer,oil remover.

Functions:remove inpurities such as water, oil and dust from compressed air, provide clean air source for oxygen and nitrogen separation assembly.

2 Air tank assembly

Main parts:air tank and accessorial valves.

Functions:buffer and reduce air pulsation, reduce system pressure fluctuation, ensure stable air passing through air cleaning assembly.

3 Oxygen and nitrogen separation assembly

Main parts: two adsorption towers, accessorial valves, carbon molecular sieve(CMS), cylinders and instruments.

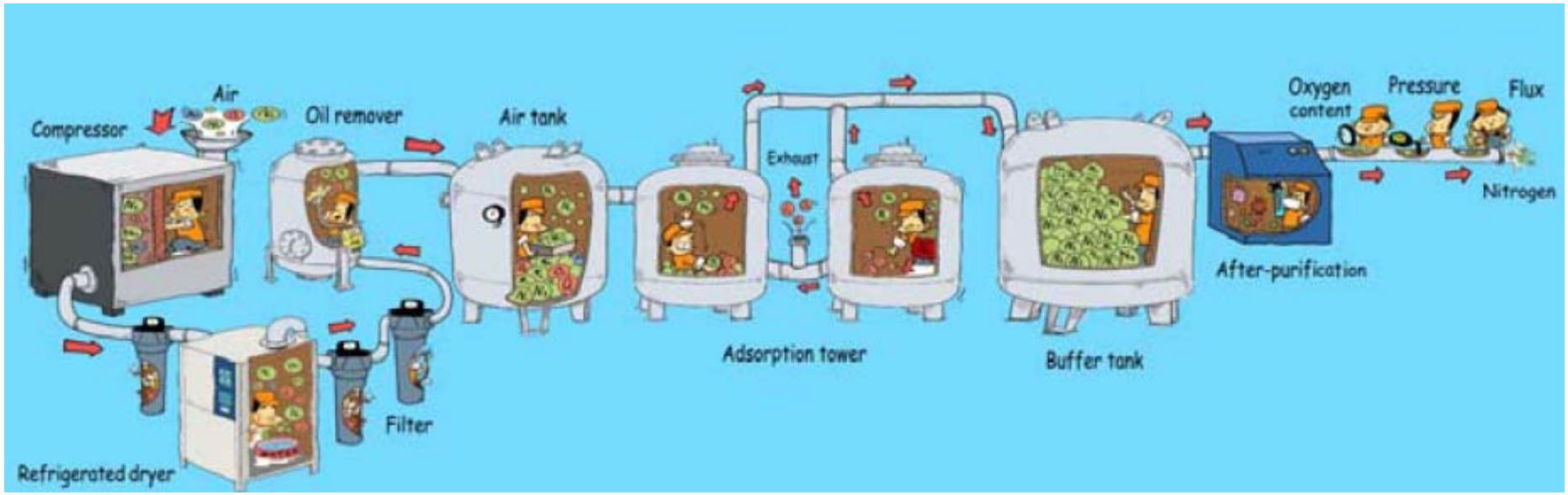
Functions:separate nitrogen from other components in the compressed air.

4 Nitrogen buffer tank assembly

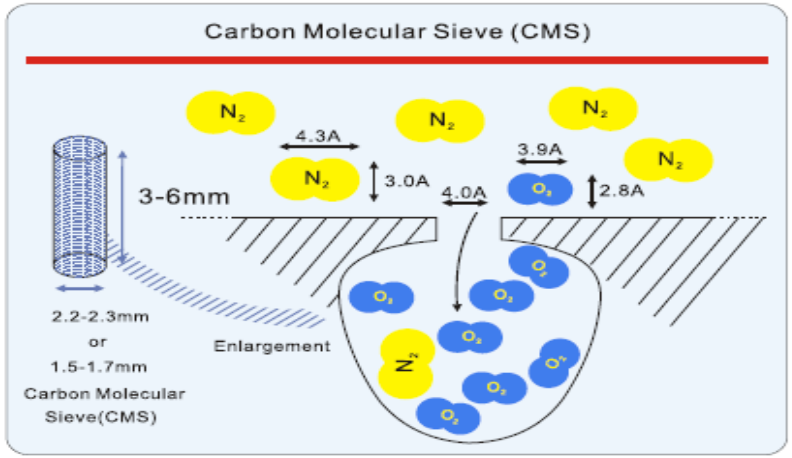
Main parts: buffer tank, flow meter, pressure regulating valves, etc.

Functions:balance the pressure and purity of produced nitrogen coming from oxygen and nitrogen separation assembly,ensure stable nitrogen supply.

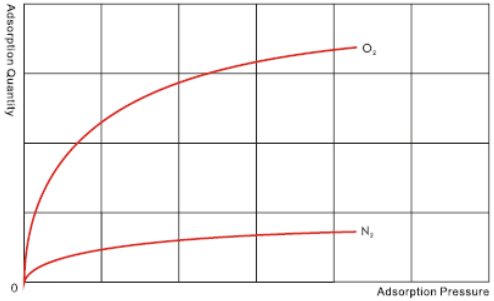
Flow Chart of PSA Nitrogen Generator



Principle of CMS Nitrogen Generation



Under adsorption balance condition，for any adsorbent，when adsorbs one sort of gas,the higher the air pressure is，the more quantity it can adsorb，vice versa.



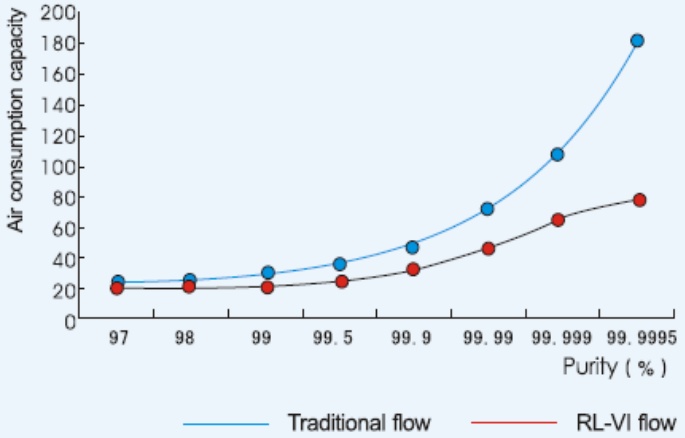
As shown on the diagram above，carbon molecular sieve has obvious adsorption differences to oxygen and nitrogen. There are many tiny holes inside the carbon molecular sieve. Under certain pressure，the tiny holes have different adsorption capacity to oxygen and nitrogen. When air pressure increases，carbon molecular sieve adsorbs oxygen and produces nitrogen，when air pressure drops to normal condition，carbon molecular sieve desorbs oxygen and regenerates itself. Two towers are generally provided，when one absorbs oxygen and produces nitrogen，the other desorbs oxygen and makes regeneration. This alternate process constantly produces nitrogen.

Excellent Energy-saving Features Reduce Air Usage Cost

The energy-saving CMS nitrogen generator adopts unequal pressure equalization process. This process changes the lower pressure qualizing position. Pressure equalizing air is gotten from the middle part of adsorption finished tower and enters the bottom part of desorption finished tower to equalize pressure. The inverted pyramid structure of nitrogen purity distribution ensures nitrogen with higher purity to be equalized from adsorption tower, which realize the original bedding purity ladder structures distribution.

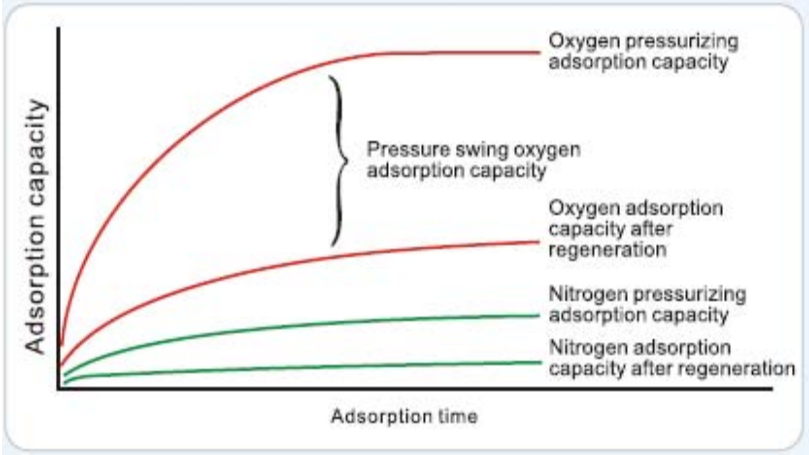
This process improves desorption tower nitrogen purity and reduces CMS oxygen pre-adsorption in the desorption tower and increases CMS utilization ratio. i.e. increases carbon molecular sieve nitrogen production rate. Compared with equal pressure equalization process, unequal pressure equalization process is more reasonable, scientific and mature. Direct effect is the increase of nitrogen recycle rate and nitrogen production volume, indirect benefit is energy-saving.With these designs mentioned above,RL-VI process not only improves nitrogen recycle rate and carbon molecular sieve utilization ratio, but also changes the history that no ppm clas high purity nitrogen can be produced by PSA technology.

The higher nitrogen purity，the more energy-saving



Nitrogen Generation Process：clean compressed air flows inter tower A，when passing through the carbon molecular sieve，oxygen，carbon dioxide，water and other contaminants are adsorbed，allowing nitrogen flows out as product gas CMS in tower A becomes saturated as time goes by. Then tower A stops adsorption and compressed air enters tower B to adsorb oxygen and produce nitrogen. Meanwhile，CMS in tower A begins regeneration，Two towers make alternate adsorption and regeneration to separate nitrogen from air and continuously produce nitrogen.

World famous molecular sieve ensures maximum energy-saving

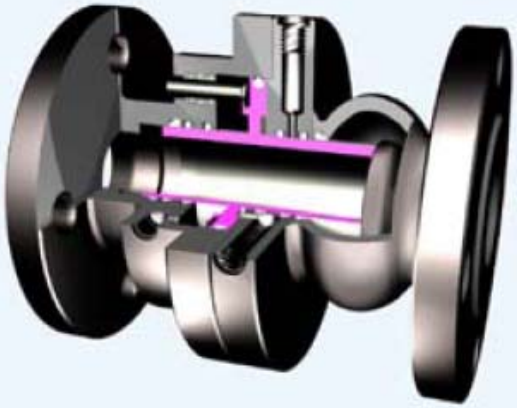


Advanced load adaptation technology further saves energy

The most reliable air cleaning process ensures adsorbing efficiency and lifetime of molecular sieve

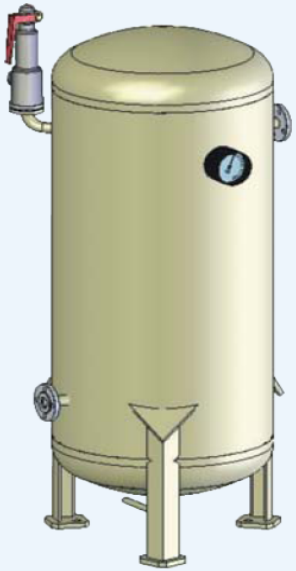
Carbon molecular seve(CMS) is the core in PSA nitrogen generator. Oil poisoning is one of the main reasons for carbon molecular sieve invalidation. The adsorption of water reduces CMS's oxygen adsorption capacity. Compressed air generated by oil lubricant air compressor contains oil and water, which must be removed before it enters oxygen/nitrogen separation assembly. Air cleaning assembly consists of pipeline filter, refrigerated dryer, precise filter, super precise filter, active carbon oil eliminator, automatic drain valve and ball valve.

National patent valve guarantees stable equipment operation



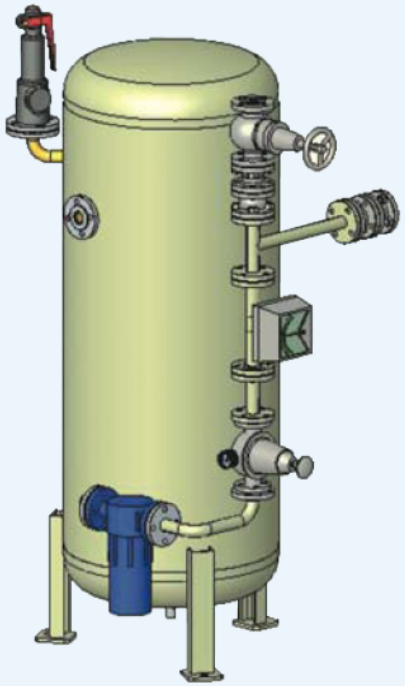
Actuator locates inside the valve body with excellent functions such as flexible open/close, swift reaction, obvious display with feedback indication, convenient installation and maintenance, good air tightness, zero leakage. Valve seat life time is three times of traditional ones.

Air tank ensures stable system air consumption



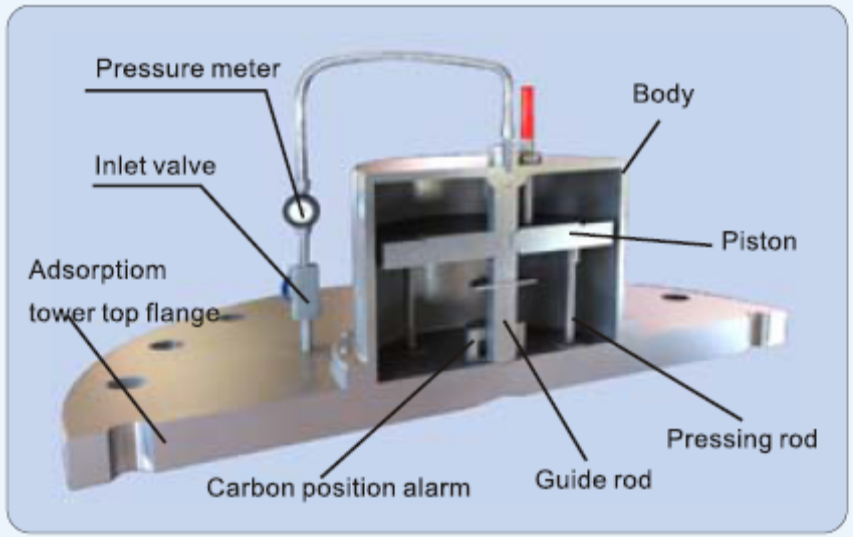
The function of air tank assembly is to ensure stable system air consumption, to prevent momentary fast air flow as oxygen and nitrogen separation system switches work. Failure to do so will greatly deteriorate air cleaning effort. This assembly improves the compressed air quality entering adsorption tower and prolongs carbon molecular sieve life time. This assembly contains air tank, safety valve, check valve, ball valve, pressure meter, etc.

Nitrogen buffer tank ensures stable system gas supply



Nitrogen buffer tank assembly consists of buffer tank，fiowmeter, dust filter，pressure adjusting valve，throttle valve，safety valve etc．Main function：stabilize the pressure，purity and flow of the produced nitrogen and automatically or manually discharge unqualified nitrogen through air vent valve．

National patent compaction technology ensures long life of CMS



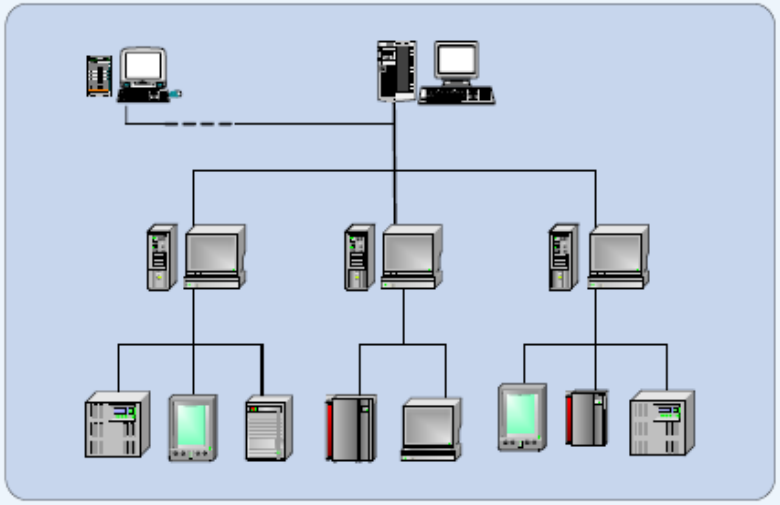
Stable compacting pressure，no alteration with travel length changes.

Direct travel length measurement.

With sinking alarm and automatic shutdown functions.

The needed air of cylinders comes directly from adsorption towers. Cylinders work synchronously with adsorption towers at any time.

Long-distance supervision and control



In control room，touching screen/industrial personal computer displays nitrogen flow and purity，pressure，fault information，etc. Equipment operating parameter modification and equipment start/shutdown control can be achieved online.

Professional technologies ensure reliable gas supply

Two pneumatic valves connect with each other in series to control air source with contrary open/close state，one open，the other close．PLC judges the qualification condition of nitrogen based on nitrogen purity signal and controls the electromagnetic valve to open or close．These two electromagnetic valves control pneumatic valve switches to automatically discharge unqualified nitrogen.

Perfect protective measures

Spare air source is suitable for areas where gas supply should not be stopped and areas with momentary high air consumption．In cases such as equipment fault，no gas supply due to power off,momentary unqualified nitrogen production，pneumatic valves automatically switch to spare nitrogen source and provide supplementary air supply．Spare nitrogen source includes nitrogen store tank，liquid nitrogen，etc．Unqualified nitrogen automatic discharge function is provided.

Friendly human-machine interface

Touching screen/industrial personal computer displays nitrogen flow, purity, equipment inlet/outlet pressure and fault information. Operating parameter can be modified online

Optional functions

≫ Spare nitrogen automatic switch function in equipment malfunction，power off condition

≫ Automatic start / shutdown function(Remote control available)

≫ Multiple store tanks automatic switch，shut down / re-start system function

≫ Different purity，different flow nitrogen production automatic switch in one machine

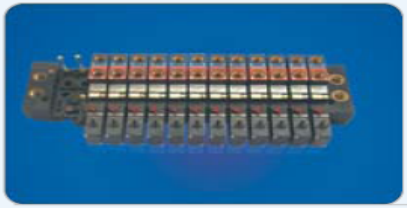
≫ End exhaust nitrogen recycle function

Famous components ensure reliable equipment quality

SMC

KROHNE

SIEMENS



bürkert
Fluid Control Systems

Danfoss

The above brands belong to their owners.

nitrogen generator,nitrogen purity: 97%

Flow(Nm^3/h)	Needed air(Nm^3/min)	Air cleaning part	Air tank	N_2 buffer tank
8	0.26	AC-1	CG-1	NT0.6
16	0.52	AC-1	CG-1	NT1.2
25	0.81	AC-1	CG-1	NT1.7
33	1.07	AC-2	CG-2	NT2.2
41	1.33	AC-2	CG-2	NT3.0
50	1.62	AC-2	CG-2	NT3.4
66	2.14	AC-3	CG-3	NT4.4
82	2.66	AC-3	CG-3	NT5.5
99	3.22	AC-4	CG-4	NT6.5
115	3.75	AC-6	CG-6	NT7.6
132	4.29	AC-6	CG-6	NT8.8
148	4.82	AC-6	CG-6	NT10.3
165	5.36	AC-6	CG-6	NT11.0
198	6.43	AC-8	CG-8	NT13.2
247	8.03	AC-10	CG-10	NT16.6
330	10.7	AC-12	CG-12	NT21.8
495	16.1	AC-20	CG-20	NT33.0
660	21.4	AC-25	CG-25	NT44.0
825	26.8	AC-30	CG-30	NT54.6
989	32.1	AC-40	CG-40	NT65.7
1154	37.5	AC-50	CG-50	NT80.1
1319	42.9	AC-50	CG-50	NT89.6
1484	48.2	AC-60	CG-60	NT106.8
1649	53.6	AC-60	CG-60	NT114.4
1814	58.9	AC-80	CG-80	NT130.5
1979	64.3	AC-80	CG-80	NT139.5
2144	69.6	AC-80	CG-80	NT148.6
2309	75.0	AC-100W/A	CG-100	NT157.6
2474	80.3	AC-100W/A	CG-100	NT166.7
2638	85.7	AC-100W/A	CG-100	NT180.3
2803	91.1	/	/	NT188.2
2968	96.4	/	/	NT198.9
3133	102	/	/	NT209.5
3298	107	/	/	NT220.1

nitrogen generator,nitrogen purity：98%

Flow(Nm³/h)	Needed air(Nm³/min)	Air cleaning part	Air tank	N_2 buffer tank
7	0.24	AC-1	CG-1	NT0.6
14	0.48	AC-1	CG-1	NT1.2
21	0.72	AC-1	CG-1	NT1.7
28	0.95	AC-2	CG-2	NT2.2
35	1.19	AC-2	CG-2	NT3.0
42	1.43	AC-2	CG-2	NT3.4
56	1.91	AC-3	CG-3	NT4.4
70	2.39	AC-3	CG-3	NT5.5
85	2.90	AC-4	CG-4	NT6.5
99	3.38	AC-4	CG-4	NT7.6
113	3.90	AC-6	CG-6	NT8.8
127	4.39	AC-6	CG-6	NT10.3
142	4.88	AC-6	CG-6	NT11.0
170	5.85	AC-8	CG-8	NT13.2
212	7.31	AC-10	CG-10	NT16.6
283	9.75	AC-12	CG-12	NT21.8
425	14.6	AC-20	CG-20	NT33.0
566	19.5	AC-25	CG-25	NT44.0
708	24.4	AC-30	CG-30	NT54.6
849	29.3	AC-40	CG-40	NT65.7
991	34.1	AC-40	CG-40	NT80.1
1132	39.0	AC-50	CG-50	NT89.6
1274	43.9	AC-50	CG-50	NT106.8
1415	48.8	AC-60	CG-60	NT114.4
1557	53.6	AC-60	CG-60	NT130.5
1698	58.5	AC-80	CG-80	NT139.5
1840	63.4	AC-80	CG-80	NT148.6
1981	68.3	AC-80	CG-80	NT157.6
2123	73.1	AC-100W/A	CG-100	NT166.7
2264	78.0	AC-100W/A	CG-100	NT180.3
2406	82.9	AC-100W/A	CG-100	NT188.2
2547	87.8	AC-100W/A	CG-100	NT198.9
2689	92.6	/	/	NT209.5
2830	97.5	/	/	NT220.1

nitrogen generator,nitrogen purity: 99%

Flow(Nm^3/h)	Needed air(Nm^3/min)	Air cleaning part	Air tank	N_2 buffer tank
6	0.22	AC-1	CG-1	NT0.6
12	0.44	AC-1	CG-1	NT1.2
18	0.67	AC-1	CG-1	NT1.7
24	0.89	AC-1	CG-1	NT2.2
30	1.12	AC-2	CG-2	NT3.0
35	1.30	AC-2	CG-2	NT3.4
47	1.75	AC-2	CG-2	NT4.4
59	2.20	AC-3	CG-3	NT5.5
70	2.60	AC-3	CG-3	NT6.5
82	3.05	AC-4	CG-4	NT7.6
95	3.53	AC-4	CG-4	NT8.8
106	4.02	AC-6	CG-6	NT10.3
118	4.47	AC-6	CG-6	NT11.0
141	5.37	AC-6	CG-6	NT13.2
177	6.71	AC-8	CG-8	NT16.6
235	8.94	AC-10	CG-10	NT21.8
353	13.4	AC-15	CG-15	NT33.0
471	17.9	AC-20	CG-20	NT44.0
589	22.4	AC-25	CG-25	NT54.6
706	26.8	AC-30	CG-30	NT65.7
824	31.3	AC-40	CG-40	NT80.1
942	35.8	AC-40	CG-40	NT89.6
1060	40.2	AC-50	CG-50	NT106.8
1177	44.7	AC-50	CG-50	NT114.4
1295	49.2	AC-60	CG-60	NT130.5
1413	53.7	AC-60	CG-60	NT139.5
1531	58.1	AC-80	CG-80	NT148.6
1648	62.6	AC-80	CG-80	NT157.6
1766	67.1	AC-80	CG-80	NT166.7
1884	71.5	AC-80	CG-80	NT180.3
2002	76.0	AC-100W/A	CG-100	NT188.2
2119	80.5	AC-100W/A	CG-100	NT198.9
2237	84.9	AC-100W/A	CG-100	NT209.5
2355	89.4	AC-100W/A	CG-100	NT220.1

nitrogen generator,nitrogen purity: 99.5%

Flow(Nm^3/h)	Needed air(Nm^3/min)	Air cleaning part	Air tank	N_2 buffer tank
5	0.21	AC-1	CG-1	NT0.6
10	0.42	AC-1	CG-1	NT1.2
15	0.63	AC-1	CG-1	NT1.7
20	0.84	AC-1	CG-1	NT2.2
25	1.05	AC-2	CG-2	NT3.0
30	1.26	AC-2	CG-2	NT3.4
40	1.68	AC-2	CG-2	NT4.4
50	2.1	AC-3	CG-3	NT5.5
60	2.52	AC-3	CG-3	NT6.5
70	2.94	AC-4	CG-4	NT7.6
80	3.36	AC-4	CG-4	NT8.8
90	3.78	AC-6	CG-6	NT10.3
100	4.2	AC-6	CG-6	NT11.0
120	5.04	AC-6	CG-6	NT13.2
150	6.3	AC-8	CG-8	NT16.6
200	8.4	AC-10	CG-10	NT21.8
300	12.6	AC-15	CG-15	NT33.0
400	16.8	AC-20	CG-20	NT44.0
500	21	AC-25	CG-25	NT54.6
600	25.2	AC-30	CG-30	NT65.7
700	29.4	AC-40	CG-40	NT80.1
800	33.6	AC-40	CG-40	NT89.6
900	37.8	AC-50	CG-50	NT106.8
1000	42	AC-50	CG-50	NT114.4
1100	46.2	AC-60	CG-60	NT130.5
1200	50.4	AC-60	CG-60	NT139.5
1300	54.6	AC-80	CG-80	NT148.6
1400	58.8	AC-80	CG-80	NT157.6
1500	63	AC-80	CG-80	NT166.7
1600	67.2	AC-80	CG-80	NT180.3
1700	71.4	AC-80	CG-80	NT188.2
1800	75.6	AC-100W/A	CG-100	NT198.9
1900	79.8	AC-100W/A	CG-100	NT209.5
2000	84	AC-100W/A	CG-100	NT220.1

nitrogen generator,nitrogen purity: 99.9%

Flow(Nm^3/h)	Needed air(Nm^3/min)	Air cleaning part	Air tank	N_2 buffer tank
3	0.15	AC-1	CG-1	NT0.6
7	0.36	AC-1	CG-1	NT1.2
10	0.51	AC-1	CG-1	NT1.7
13	0.67	AC-1	CG-1	NT2.2
17	0.89	AC-1	CG-1	NT3.0
20	1.02	AC-2	CG-2	NT3.4
27	1.38	AC-2	CG-2	NT4.4
34	1.79	AC-2	CG-2	NT5.5
40	2.05	AC-3	CG-3	NT6.5
48	2.46	AC-3	CG-3	NT7.6
55	2.81	AC-4	CG-4	NT8.8
61	3.12	AC-4	CG-4	NT10.3
68	3.48	AC-4	CG-4	NT11.0
82	4.20	AC-6	CG-6	NT13.2
102	5.37	AC-6	CG-6	NT16.6
136	7.16	AC-8	CG-8	NT21.8
204	10.7	AC-12	CG-12	NT33.0
272	14.3	AC-20	CG-20	NT44.0
340	17.9	AC-20	CG-20	NT54.6
408	21.5	AC-25	CG-25	NT65.7
475	25.1	AC-30	CG-30	NT80.1
543	28.6	AC-40	CG-40	NT89.6
611	32.2	AC-40	CG-40	NT106.8
679	35.8	AC-40	CG-40	NT114.4
747	39.4	AC-50	CG-50	NT130.5
815	42.9	AC-50	CG-50	NT139.5
883	46.5	AC-60	CG-60	NT148.6
951	50.1	AC-60	CG-60	NT157.6
1019	53.7	AC-60	CG-60	NT166.7
1087	57.3	AC-80	CG-80	NT180.3
1155	60.8	AC-80	CG-80	NT188.2
1223	64.4	AC-80	CG-80	NT198.9
1291	68.0	AC-80	CG-80	NT209.5
1358	71.6	AC-80	CG-80	NT220.1

nitrogen generator,nitrogen purity: 99.99%

Flow(Nm^3/h)	Needed air(Nm^3/min)	Air cleaning part	Air tank	N_2 buffer tank
2	0.14	AC-1	CG-1	NT0.6
5	0.35	AC-1	CG-1	NT1.2
7	0.49	AC-1	CG-1	NT1.7
9	0.64	AC-1	CG-1	NT2.2
11	0.78	AC-1	CG-1	NT3.0
13	0.92	AC-2	CG-2	NT3.4
18	1.27	AC-2	CG-2	NT4.4
22	1.55	AC-2	CG-2	NT5.5
27	1.91	AC-3	CG-3	NT6.5
32	2.26	AC-3	CG-3	NT7.6
36	2.54	AC-3	CG-3	NT8.8
40	2.82	AC-4	CG-4	NT10.3
45	3.18	AC-4	CG-4	NT11.0
55	3.88	AC-6	CG-6	NT13.2
68	4.80	AC-6	CG-6	NT16.6
90	6.35	AC-8	CG-8	NT21.8
136	9.88	AC-12	CG-12	NT33.0
181	13.2	AC-15	CG-15	NT44.0
226	16.5	AC-20	CG-20	NT54.6
272	19.8	AC-25	CG-25	NT65.7
317	23.1	AC-30	CG-30	NT80.1
362	26.4	AC-30	CG-30	NT89.6
408	29.6	AC-40	CG-40	NT106.8
453	32.9	AC-40	CG-40	NT114.4
498	36.2	AC-50	CG-50	NT130.5
543	39.5	AC-50	CG-50	NT139.5
589	42.8	AC-50	CG-50	NT148.6
634	46.1	AC-60	CG-60	NT157.6
679	49.4	AC-60	CG-60	NT166.7
725	52.7	AC-60	CG-60	NT180.3
770	56.0	AC-80	CG-80	NT188.2
815	59.3	AC-80	CG-80	NT198.9
860	62.6	AC-80	CG-80	NT209.5
906	65.9	AC-80	CG-80	NT220.1

nitrogen generator,nitrogen purity: 99.999%

Flow(Nm^3/h)	Needed air(Nm^3/min)	Air cleaning part	Air tank	N_2 buffer tank
1	0.11	AC-1	CG-1	NT0.6
3	0.32	AC-1	CG-1	NT1.2
4	0.43	AC-1	CG-1	NT1.7
5	0.54	AC-1	CG-1	NT2.2
6	0.65	AC-1	CG-1	NT3.0
8	0.86	AC-1	CG-1	NT3.4
10	1.08	AC-2	CG-2	NT4.4
12	1.29	AC-2	CG-2	NT5.5
15	1.62	AC-2	CG-2	NT6.5
18	1.94	AC-3	CG-3	NT7.6
20	2.15	AC-3	CG-3	NT8.8
22	2.37	AC-3	CG-3	NT10.3
25	2.69	AC-4	CG-4	NT11.0
30	3.23	AC-4	CG-4	NT13.2
38	4.09	AC-6	CG-6	NT16.6
50	5.39	AC-8	CG-8	NT21.8
76	8.19	AC-10	CG-10	NT33.0
101	11.2	AC-15	CG-15	NT44.0
126	14.0	AC-20	CG-20	NT54.6
152	16.8	AC-20	CG-20	NT65.7
177	19.7	AC-25	CG-25	NT80.1
202	22.5	AC-25	CG-25	NT89.6
228	25.3	AC-30	CG-30	NT106.8
253	28.1	AC-40	CG-40	NT114.4
278	30.9	AC-40	CG-40	NT130.5
303	33.7	AC-40	CG-40	NT139.5
329	36.5	AC-50	CG-50	NT148.6
354	39.3	AC-50	CG-50	NT157.6
379	42.1	AC-50	CG-50	NT166.7
405	44.9	AC-50	CG-50	NT180.3
430	47.7	AC-60	CG-60	NT188.2
455	50.5	AC-60	CG-60	NT198.9
480	53.3	AC-60	CG-60	NT209.5
506	56.1	AC-80	CG-80	NT220.1

nitrogen generator,nitrogen purity: 99.9995%

Flow(Nm^3/h)	Needed air(Nm^3/min)	Air cleaning part	Air tank	N_2 buffer tank
1	0.12	AC-1	CG-1	NT0.6
2	0.24	AC-1	CG-1	NT1.2
3	0.36	AC-1	CG-1	NT1.7
4	0.48	AC-1	CG-1	NT2.2
5	0.60	AC-1	CG-1	NT3.0
6	0.72	AC-1	CG-1	NT3.4
8	0.96	AC-1	CG-1	NT4.4
10	1.20	AC-2	CG-2	NT5.5
12	1.44	AC-2	CG-2	NT6.5
15	1.81	AC-2	CG-2	NT7.6
16	1.93	AC-3	CG-3	NT8.8
19	2.29	AC-3	CG-3	NT10.3
21	2.53	AC-3	CG-3	NT11.0
25	3.01	AC-4	CG-4	NT13.2
32	3.85	AC-6	CG-6	NT16.6
42	5.06	AC-6	CG-6	NT21.8
62	7.46	AC-10	CG-10	NT33.0
83	10.3	AC-12	CG-12	NT44.0
104	12.9	AC-15	CG-15	NT54.6
125	15.5	AC-20	CG-20	NT65.7
145	18.0	AC-20	CG-20	NT80.1
166	20.6	AC-25	CG-25	NT89.6
187	23.2	AC-30	CG-30	NT106.8
208	25.8	AC-30	CG-30	NT114.4
228	28.3	AC-40	CG-40	NT130.5
249	30.9	AC-40	CG-40	NT139.5
270	33.5	AC-40	CG-40	NT148.6
291	36.1	AC-50	CG-50	NT157.6
311	38.6	AC-50	CG-50	NT166.7
332	41.2	AC-50	CG-50	NT180.3
353	43.8	AC-50	CG-50	NT188.2
374	46.4	AC-60	CG-60	NT198.9
394	48.9	AC-60	CG-60	NT209.5
415	51.5	AC-60	CG-60	NT220.1