Membrane Nitrogen Generator

New

RoHS

Easily generate nitrogen enriched air with only a compressed air supply

Nitrogen concentration: 99.9 % or more

Outlet air flow rate: 20 l/min (ANR)

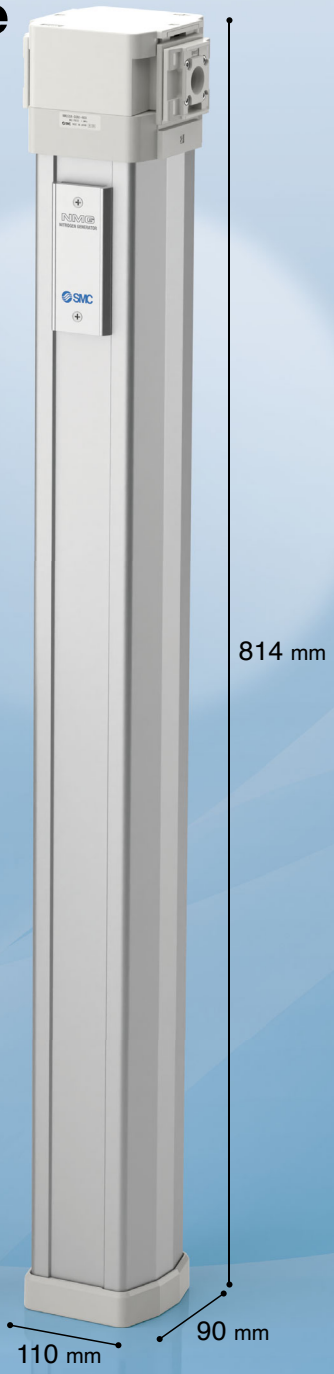
∗ Inlet air pressure 0.7 MPa, Inlet air temperature 25 °C

- Compact and easy to use at point of use
- No power supply required
- No need for gas cylinder replacement
- Outlet side compressed air purity class 2 (Humidity)

∗ Using NMG50A-08N1 with inlet side compressed air purity class ISO 8573-1:2010 [1:6:1]

Modular connection type p. 10

NMG50A-04N1



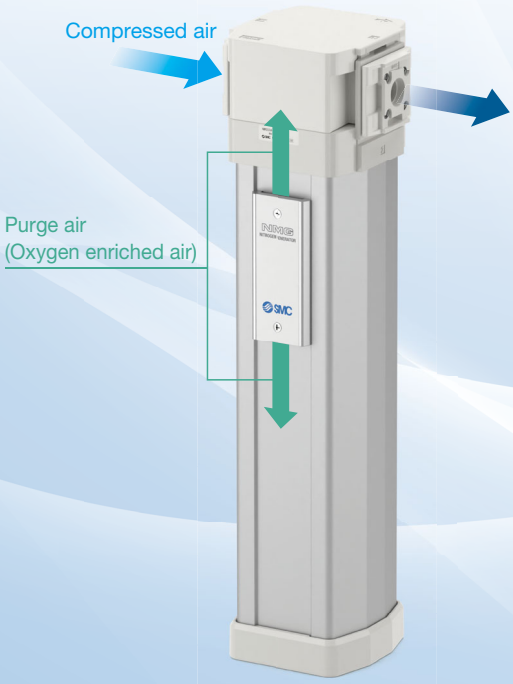
NMG50A-08N1

NMG Series

SMC

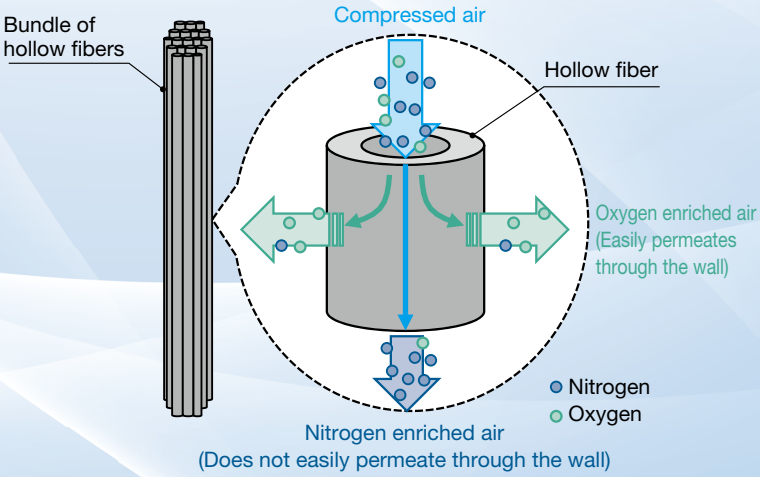
Principle of Operation

Product overview



Nitrogen enriched air production

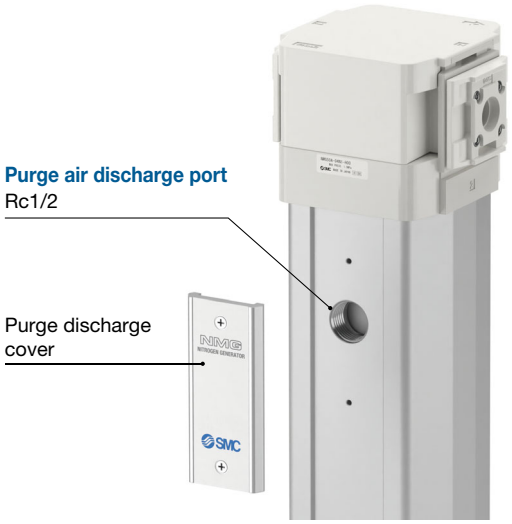
The membrane of the Membrane Nitrogen Generator is made of many hollow fibers which allow Oxygen to easily permeate through the fiber wall, but not Nitrogen.



Controlled discharge of purge air

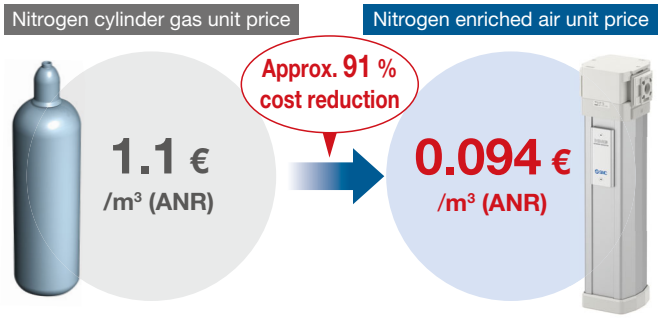
The purge discharge cover can be removed to allow for piping connections*1

*1 Refer to the operation manual before use.



Comparison with nitrogen cylinders

Gas unit price comparison



* When the nitrogen concentration is 99.9 % and the compressed air unit price is 0.013 €/m³

Reduced labour time

- No need for cylinder replacement or gas level checks
- No need to refill nitrogen cylinders

Comparison with the PSA (pressure swing adsorption) method

Comparing with the PSA method, which uses pressure fluctuations to separate and purify gas

- Space saving
- Not subject to pressure vessel regulations
- No regular maintenance required since chemical adsorbents are not used
- Compared to the PSA method, which requires solenoid valves and control devices, it can be used with just a supply of compressed air without the need for a power source.

Related Products

Compressed Air Preparation Filter (Modular Connection Type)*1

Compressed Air Purity Class ISO 8573

Line Filter	Mist Separator	Micro Mist Separator	Micro Mist Separator with Pre-filter	Activated Carbon Filter
AFF30-D	**AM30-D**	**AMD30-D**	**AMH30-D**	**AMK30-D**
				
1 µm Filtration efficiency 99 % Water droplet removal	0.1 µm Filtration efficiency 99 % Oil mist separation and removal	0.01 µm Filtration efficiency 99.9 % Oil mist separation and removal	0.01 µm Filtration efficiency 99.99 % Oil mist separation and removal	Oil concentration 0.003 mg/m³ Oil vapour and odor removal

Bacteria Removal Filter

HF2B-SFDA

Regulator (Modular Connection Type)*1

AR30-D

Membrane Air Dryer (Modular Connection Type)*1

IDG30-D

Digital Flow Switch

PF2M7

Throttle Valve with One-touch Fittings

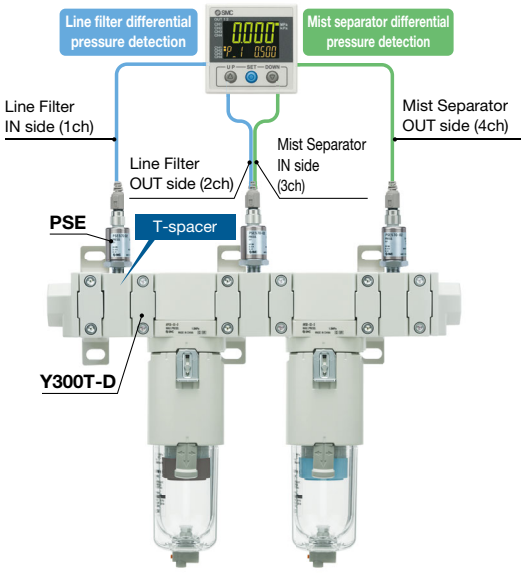
HF2B-ASG-□TV

*1 Modular connection is possible only for the NMG series with a body size of 30.

Multi-channel Digital Sensor Monitor

PSE200A

The differential pressure of 2 filters can be managed by a single unit.



AFF30-03-D **AM30-03-D**

Grease-free Nitrogen (N_2) Compatible Equipment

- To accommodate a wide variety of applications using nitrogen (N_2) gas
- Air preparation filters, Pressure control equipment, Pressure gauges, Fittings, Tubing, Restrictors, Pressure switches, Flow switches, 2/3-port solenoid valves for fluid control, Chemical liquid valves, High vacuum valves, Process gas equipment, Sintered metal elements

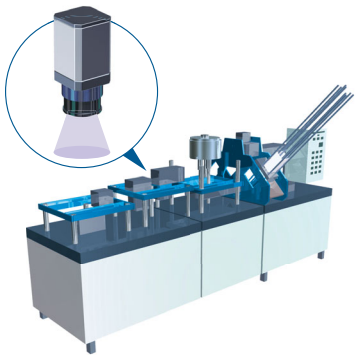
Equipment for the Food Manufacturing Industry

Lineup of equipment for various food production processes
By choosing our products, you can contribute to hygiene control, productivity improvement, and energy saving measures that are essential for the food production industry.

Application Examples

UV emitters/UV printer

UV steriliser/Oxygen inhibition suppression



Molding machine

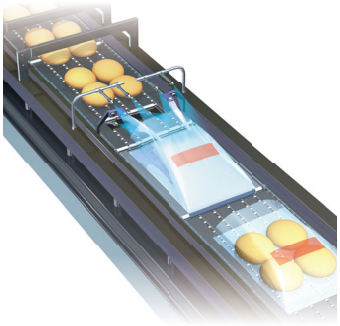
Hopper, oxidation prevention and suppression of black spots in injection area

Process chamber (Annealing, drying, etc.)

Exhaust line
Atmospheric pressure nitrogen replacement
(Reduction of residual oxygen concentration, etc.)

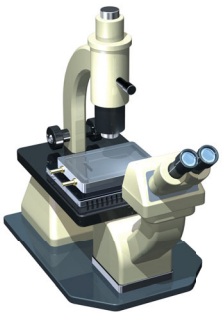
PTP packaging machine (Blister pack)

Suppression of black spots in the pack, reduction of residual oxygen concentration



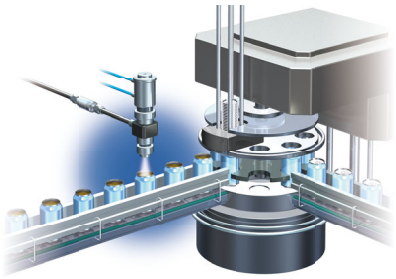
Nitrogen replacement for metallic mirrors

Suppress oxidation on metallic mirrors
Nitrogen replacement for the scanner head



Filling machine

UV laser, gas injection for filling (N_2, CO_2)



3D printer (Resin, light source)

Discoloration and black spot suppression in EG resin
Oxidation suppression for the laser transmission unit

Analytical equipment (Protein analysis device, etc.)

Laser for regenerative medicine (bioreactor), Reagent stage chamber

Automatic soldering machine

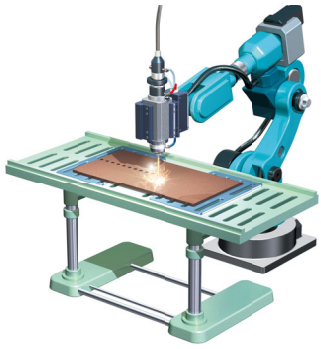
UV laser annealing defects and oxidation suppression

Control panel for explosion-proof applications

Nitrogen for explosion proof application

Fiber laser

Assist gas for laser cutting



CONTENTS

Membrane Nitrogen Generator
NMG Series

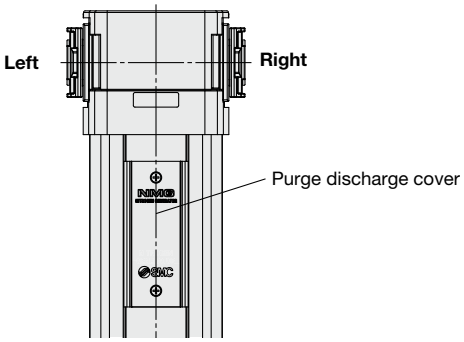
Membrane Nitrogen Generator
NMG Series

How to Order

NMG50A – 04 N1 – H00 – ❑

❶ ❷

		Symbol	Description
❶	Membrane module	04	400mm
		08	800mm
		+	
❷ Semi-standard	a Flow direction	–	Flow direction: Left to right
		R	Flow direction: Right to left



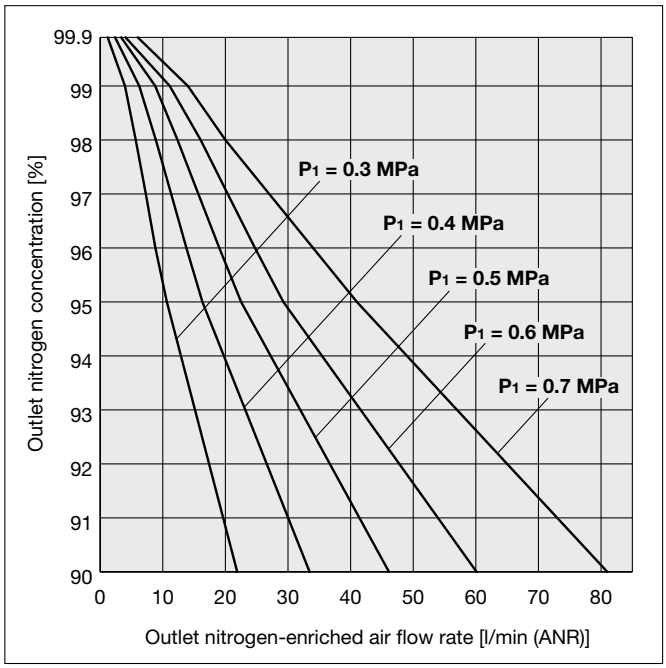
Specifications

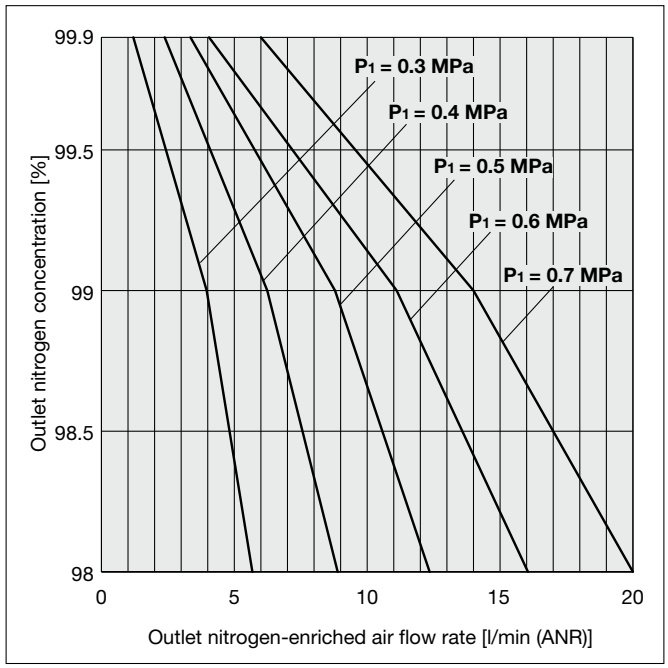
Model		NMG50A-04N1	NMG50A-08N1
Operating condition range	Fluid	Air	
	Inlet compressed air purity class*1	ISO 8573-1:2010 [1 : 6 : 1]	
	Ambient and fluid temperatures	-5 to 60 °C (No freezing or condensation)	
	Proof pressure	1.5 MPa	
	Max. operating pressure	1.0 MPa	
	Min. operating pressure	0.3 MPa	
Rated conditions	Inlet pressure	0.7 MPa	
	Inlet fluid temperature	25 °C	
	Ambient temperature	25 °C	
	Outlet nitrogen concentration*2	99.9 % or more	
	Outlet nitrogen-enriched air flow rate	6.0 l/min (ANR)	20 l/min (ANR)
	Outlet compressed air purity class*1	ISO 8573-1:2010 [1 : 3 : 1]	ISO 8573-1:2010 [1 : 2 : 1]
Weight [kg]		3.2 kg	6.4 kg

*1 The compressed air purity class is indicated based on ISO 8573-1:2010 Compressed air-Part 1: Contaminants and Purity classes.
*2 The nitrogen concentration refers to the concentration of the main components of air, other than oxygen.
The main components of compressed air are nitrogen, oxygen, carbon dioxide, argon, and water vapour.

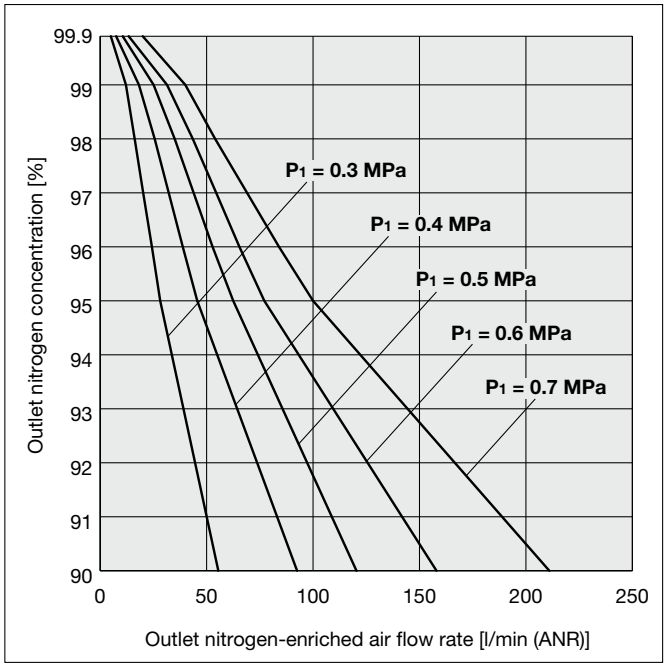
Performance Graph (Temperature 25 °C)

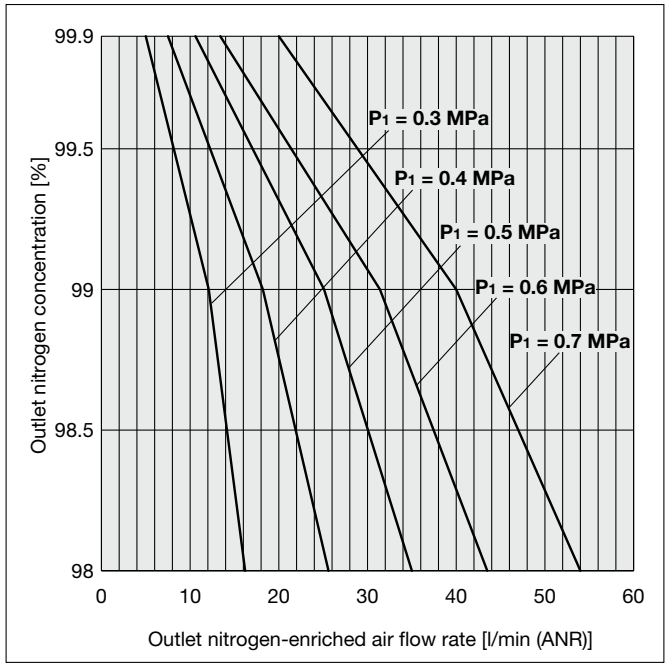
NMG50A-04N1





NMG50A-08N1





Characteristics Table (Inlet air conditions: Temperature 25 °C)

NMG50A-04N1

Outlet Nitrogen-enriched Air Flow Rate l/min (ANR)

Outlet nitrogen concentration [%]	Outlet nitrogen-enriched air flow rate (inlet pressure)				
	0.3 MPa	0.4 MPa	0.5 MPa	0.6 MPa	0.7 MPa
99.9	1.2	2.4	3.4	4.1	6.0
99	4.0	6.2	8.8	11.1	14.0
98	5.7	8.9	12.4	16.1	20.0
97	7.3	11.3	15.7	20.4	29.0
96	8.8	13.8	19.0	24.7	35.0
95	10.7	16.3	22.5	29.3	41.0
90	21.9	33.5	46.1	60.1	84.0

Inlet Air Flow Rate (Reference values) l/min (ANR)

Outlet nitrogen concentration [%]	Inlet flow rate (inlet pressure)				
	0.3 MPa	0.4 MPa	0.5 MPa	0.6 MPa	0.7 MPa
99.9	14	21	29	36	43
99	18	27	36	45	53
98	20	30	40	50	60
97	23	35	47	58	70
96	26	39	51	64	77
95	28	42	56	70	84
90	42	64	85	106	127

NMG50A-08N1

Outlet Nitrogen-enriched Air Flow Rate l/min (ANR)

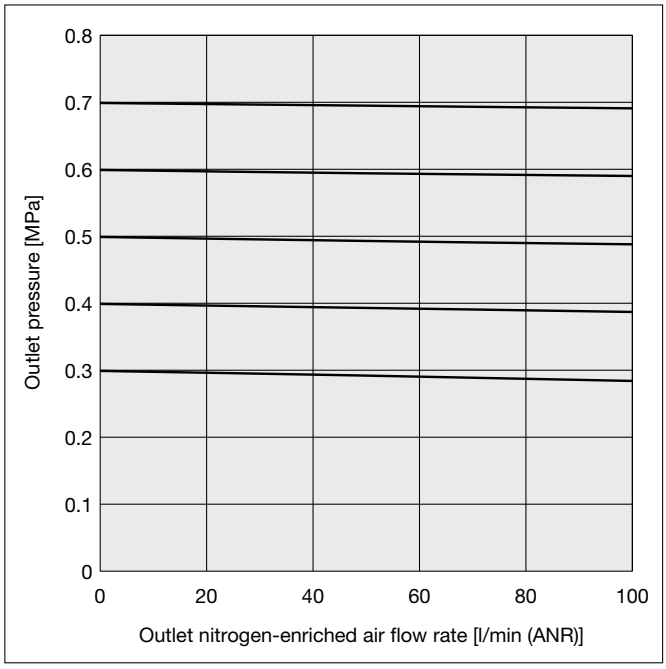
Outlet nitrogen concentration [%]	Outlet nitrogen-enriched air flow rate (inlet pressure)				
	0.3 MPa	0.4 MPa	0.5 MPa	0.6 MPa	0.7 MPa
99.9	5.0	7.5	10.6	13.4	20.0
99	12.1	18.2	25.1	31.4	40.0
98	16.2	25.6	35.0	43.5	54.0
97	20.2	32.2	43.9	54.5	69.0
96	24.3	38.8	52.8	65.4	84.0
95	28.2	45.6	62.5	77.1	100.0
90	55.5	92.5	120.4	158.0	211.0

Inlet Air Flow Rate (Reference values) l/min (ANR)

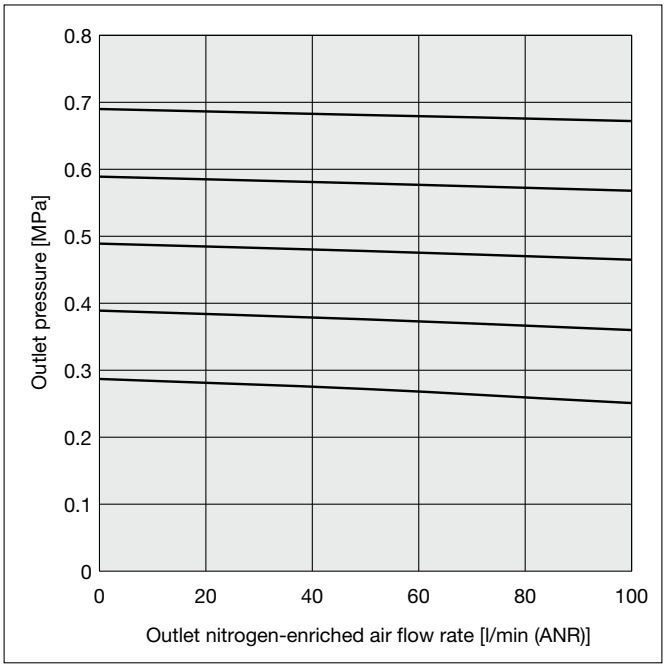
Outlet nitrogen concentration [%]	Inlet flow rate (inlet pressure)				
	0.3 MPa	0.4 MPa	0.5 MPa	0.6 MPa	0.7 MPa
99.9	48	71	95	119	143
99	57	85	113	142	170
98	63	94	125	156	188
97	68	103	137	171	205
96	74	111	148	185	222
95	80	120	160	200	240
90	117	176	234	293	351

Flow Rate Characteristics (Representative values)

NMG50A-04N1



NMG50A-08N1



Temperature Correction Method

The nitrogen enrichment performance of this product (outlet nitrogen concentration and outlet nitrogen-enriched air flow rate) varies depending on the inlet air temperature. When using it under different temperature conditions, refer to the corrected outlet nitrogen-enriched air flow rate (hereafter, corrected outlet air flow rate) obtained by following the procedure below.

Procedure

① Read the outlet nitrogen-enriched air flow rate Q under the operating conditions from the characteristic table (at 25 °C).
② Read the temperature correction factor from the temperature correction factor table, based on the inlet temperature and outlet nitrogen concentration.
③ Corrected outlet air flow rate Q' = (① Q) x (② correction factor)

Temperature Correction Factor Table

Inlet temperature [°C]	Outlet nitrogen concentration						
	99.9 %	99 %	98 %	97 %	96 %	95 %	90 %
15 °C	1.03	0.95	0.93	0.92	0.91	0.91	0.90
20 °C	1.01	0.95	0.95	0.95	0.94	0.94	0.94
25 °C	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30 °C	0.98	1.03	1.04	1.05	1.05	1.07	1.15
35 °C	0.94	1.06	1.07	1.09	1.10	1.11	1.21
40 °C	0.95	1.09	1.12	1.14	1.15	1.17	1.28

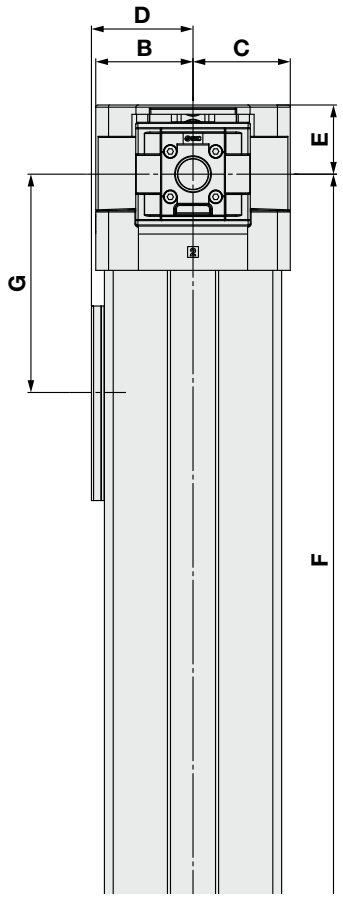
[Example of operating conditions]

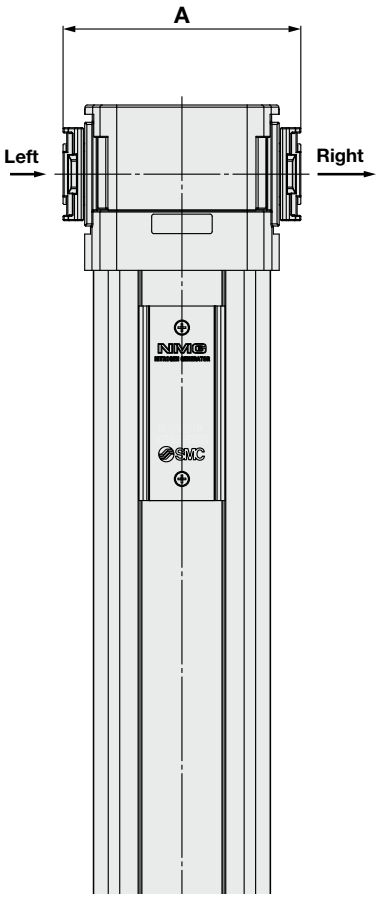
Model	NMG50A-04N1
Inlet air pressure P_1	0.7 MPa
Outlet nitrogen concentration	98 %
Outlet nitrogen-enriched air flow rate Q	20 l/min (ANR)
Inlet air temperature	20 °C

[Calculation example]

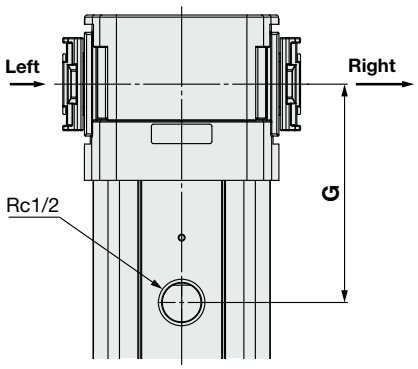
① Read the outlet nitrogen-enriched air flow rate Q under the operating conditions from the characteristic table (at 25 °C).
⇒ 20 l/min (ANR)
② Read the temperature correction factor from the temperature correction factor table, based on the inlet temperature and outlet nitrogen concentration.
⇒ 0.95
③ Corrected flow rate Q' = (① Q) x (② temperature correction factor)
⇒ Corrected outlet air flow rate Q' = 20 x 0.95 = **19 l/min (ANR)**

Dimensions





Purge air discharge port location



Model	A	B	C	D	E	F	G	Applicable AC size	Applicable spacer/ spacer with bracket
NMG50A-04N1	110	45	45	47	32	357	101	AC30-D	Y300-D/Y300T-2-D
NMG50A-08N1						782			

* Pipe threads are not provided on the face which connects with the other components. For use, a separate spacer with bracket (or spacer) is required. Refer to AC-D series attachments/piping adapters for selection.

NMG Series
Modular Connection Examples

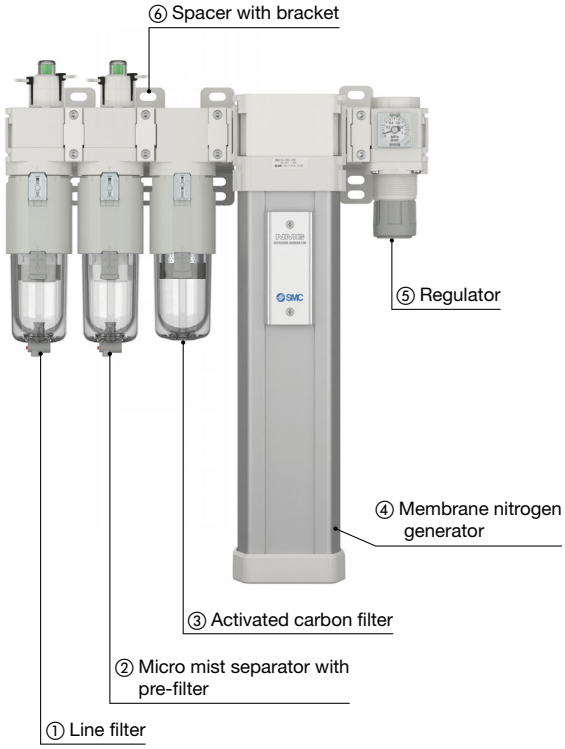
Assembly Examples

Products do not come assembled. They should be ordered separately and assembled by the customer. Use a spacer with a bracket when connecting modular units.

When using an [AFF + AMH + AMK]
Compressed air purity class compliant with ISO 8573-1:2010
Inlet air purity class ISO 8573-1:2010 [1:6:1]

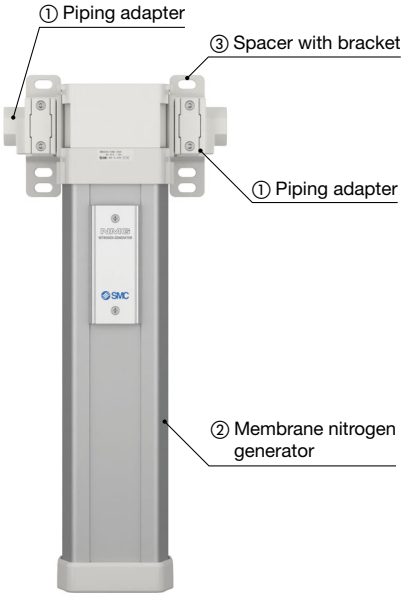
Assembly Example

① **Line filter AFF30-03-MM-D**	1 pc.
② **Micro mist separator with pre-filter AMH30-03-MM-D**	1 pc.
③ **Activated carbon filter AMK30-03-D**	1 pc.
④ **Membrane nitrogen generator NMG50A-04N1-H00**	1 pc.
⑤ **Regulator AR30-03E-D**	1 pc.
⑥ **Spacer with bracket Y300T-2-D**	4 pcs.



Assembly Example

① **Piping adapter E300-03-D**	2 pcs.
② **Membrane nitrogen generator NMG50A-04N1-H00**	1 pc.
③ **Spacer with bracket Y300T-2-D**	2 pcs.



Accessories Sold Separately

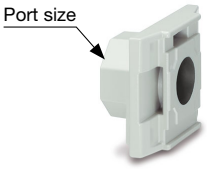
Piping Adapter, L-Shaped Piping Adapter, T-Shaped Piping Adapter

· Using on the inlet side or the outlet side makes it easier to perform maintenance, as the component can be installed/removed without removing the piping.

E300 ❶ – ❷ ❸ – D

		Symbol	Description	❶ Piping adapter type		
				– [Piping adapter]	**L** [L-shaped piping adapter]	**T** [T-shaped piping adapter]
❷	Pipe thread type	**–**	Rc	●	●	●
		N	NPT	●	●	●
		F	G	●	●	●
		+				
❸	Port size	**01**	1/8	–	●	●
		02	1/4	●	●	●
		03	3/8	●	●	●
		04	1/2	●	–	–

Piping adapter



L-shaped piping adapter

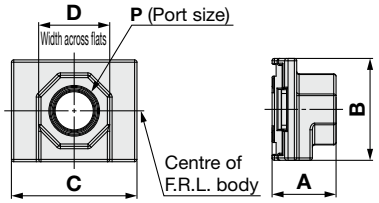
T-shaped piping adapter

Standard Specifications

Fluid	Air
Ambient and fluid temperatures	-5 to 60 °C (No freezing)
Proof pressure	1.5 MPa
Max. operating pressure	1.0 MPa

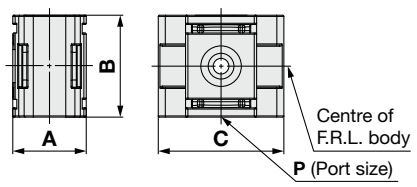
Dimensions

Piping adapter



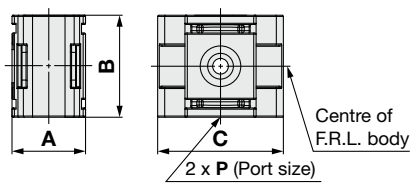
Model	P	A	B	C	D
E300-D	1/4, 3/8, 1/2	27	43	53	30

L-shaped piping adapter



Model	P	A	B	C
E300L-D	1/8, 1/4, 3/8	31	43	53

T-shaped piping adapter



Model	P	A	B	C
E300T-D	1/8, 1/4, 3/8	31	43	53

Caution on Mounting

Pipe threads are not provided on the face which connects with the other components. For use, a separate spacer (or spacer with bracket) is required.

Spacer / Spacer with Bracket

Spacer
Y300-D

Spacer with bracket
Y300T-2-D

Standard Specifications

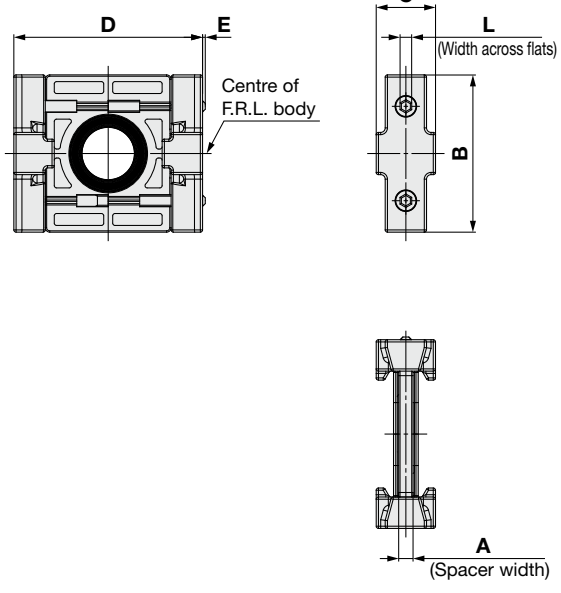
Fluid	Air
Ambient and fluid temperatures	-5 to 60 °C (No freezing)
Proof pressure	1.5 MPa
Max. operating pressure	1.0 MPa

Replacement Parts

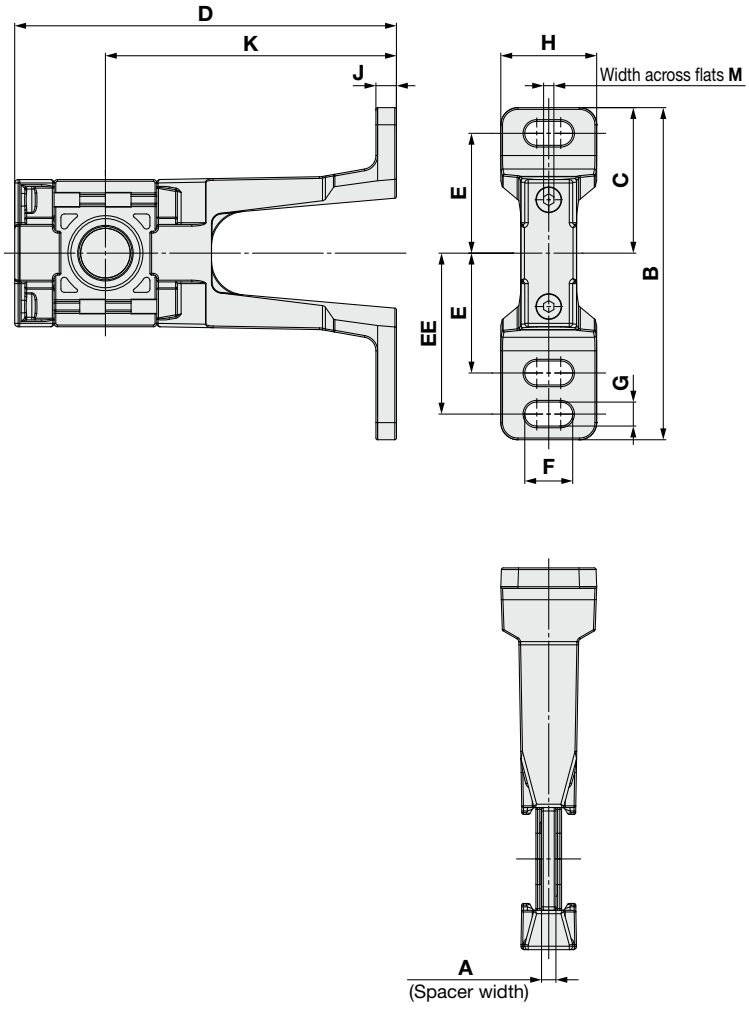
Description	Material	Part number
		Y300-D **Y300T-2-D**
Seal	HNBR	Y320P-050S

Dimensions

Spacer



Spacer with bracket



Model	A	B	C	D	E	L
Y300-D	4.2	43	16.2	53	–	3

Model	A	B	C	D	E	EE	F	G	H	J	K	M
Y300T-2-D	4.2	97	42.5	111.5	35	47	14	7	28	6	85	3

NMG Series
Specific Product Precautions

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For air preparation equipment precautions, refer to the "Handling Precautions for SMC Products" and the "Operation Manual" on the SMC website: https://www.smc.eu

Design / Selection

⚠Warning

1. **The outlet air is nitrogen-enriched air. Do not use it for breathing air as it may cause lack of oxygen and asphyxiation. Use in a well-ventilated area and ventilate while the product is in use.**
2. **The purge air is oxygen-enriched air. Use away from fire and combustible materials to avoid fire or explosion. Ventilate the room while the product is in use.**

⚠Caution

1. **"Nitrogen concentration" in this catalogue refers to the total concentration of all components other than oxygen in compressed air. Compressed air contains argon, carbon dioxide, and water vapour in addition to nitrogen and oxygen.**
2. **Supply sufficient inlet air flow rate. Air supply capacity must be greater than or equal to the required outlet air flow rate plus the purge air flow rate. Insufficient inlet air flow will not provide the required outlet air flow and performance.**
3. **It takes time to reach the required nitrogen concentration after compressed air is supplied. The time to reach the target concentration depends on conditions and nitrogen concentration, with higher nitrogen concentrations requiring more time. Especially, it may take more than 30 minutes (for reference) for the nitrogen concentration to reach 99.9 %.**

Mounting / Piping

⚠Warning

1. **Handle with care. This product is heavy, and dropping it may cause bodily injury or damage to the product. It is recommended that two or more people mount it.**
2. **For installation, please use the spacer with bracket (Y300T-2-D).**
   Connect our spacer with bracket (Y300T-2-D) to both inlet and outlet sides of the product and fix it to the wall. When fixing to the wall, fix the top and bottom 2 places, total 4 places on both sides. Fixing only one side may cause failure of the spacer with bracket. When piping steel pipes, use piping adapters (E300-(F, N)02 to (F, N)04-D).
3. **Connect the product ensuring the direction of "1" (IN) and "2" (OUT) for air direction and indicated arrow. Incorrect connections may cause malfunction.**

Air Supply / Operating Environment

⚠Caution

1. **Compressed air purity class [1:6:1] or better according to ISO 8573-1:2010 is recommended for the inlet side compressed air. Mount air preparation equipment (AFF, AMH, AMK) according to the air purity class of the compressed air on the inlet side. If the inlet air contains solid foreign matter or oil, performance will be reduced or the product will be damaged.**
2. **Remove water droplets from the inlet air. If water droplets flow into the product, the performance may lower, causing malfunction.**
3. **The pressure dew point of the supply air should be lower than the ambient temperature.**
   If the dew point is higher than the ambient temperature and flows into the product, it will be cooled inside and condensation will occur, leading to water droplet inflow. Especially, cold environments where the ambient temperature is below 10 °C, be careful of freezing and dew condensation.

⚠ Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of **"Caution," "Warning"** or **"Danger."** They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC) [1], and other safety regulations.

⚠ **Danger:**	**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
⚠ **Warning:**	**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
⚠ **Caution:**	**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

1) ISO 4414: Pneumatic fluid power – General rules and safety requirements for systems and their components.
ISO 4413: Hydraulic fluid power – General rules and safety requirements for systems and their components.
IEC 60204-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots.
etc.

⚠ Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.
Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.
The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/ equipment until safety is confirmed.
1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. SMC products cannot be used beyond their specifications.
They are not developed, designed, and manufactured to be used under the following conditions or environments.
Use under such conditions or environments is not allowed.
1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, combustion equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogues and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

⚠ Caution

SMC develops, designs, and manufactures products to be used for automatic control equipment, and provides them for peaceful use in manufacturing industries.
Use in non-manufacturing industries is not allowed.
Products SMC manufactures and sells cannot be used for the purpose of transactions or certification specified in the Measurement Act of each country.
The new Measurement Act prohibits use of any unit other than SI units in Japan.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first. [2] Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided. This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.

2) **Suction cups (Vacuum pads) are excluded from this 1 year warranty.**
A suction cup (vacuum pad) is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the suction cup (vacuum pad) or failure due to the deterioration of rubber material are not allowed by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

⚠ **Safety Instructions**	Be sure to read the "Handling Precautions for SMC Products" (M-E03-3) and "Operation Manual" before use.

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