

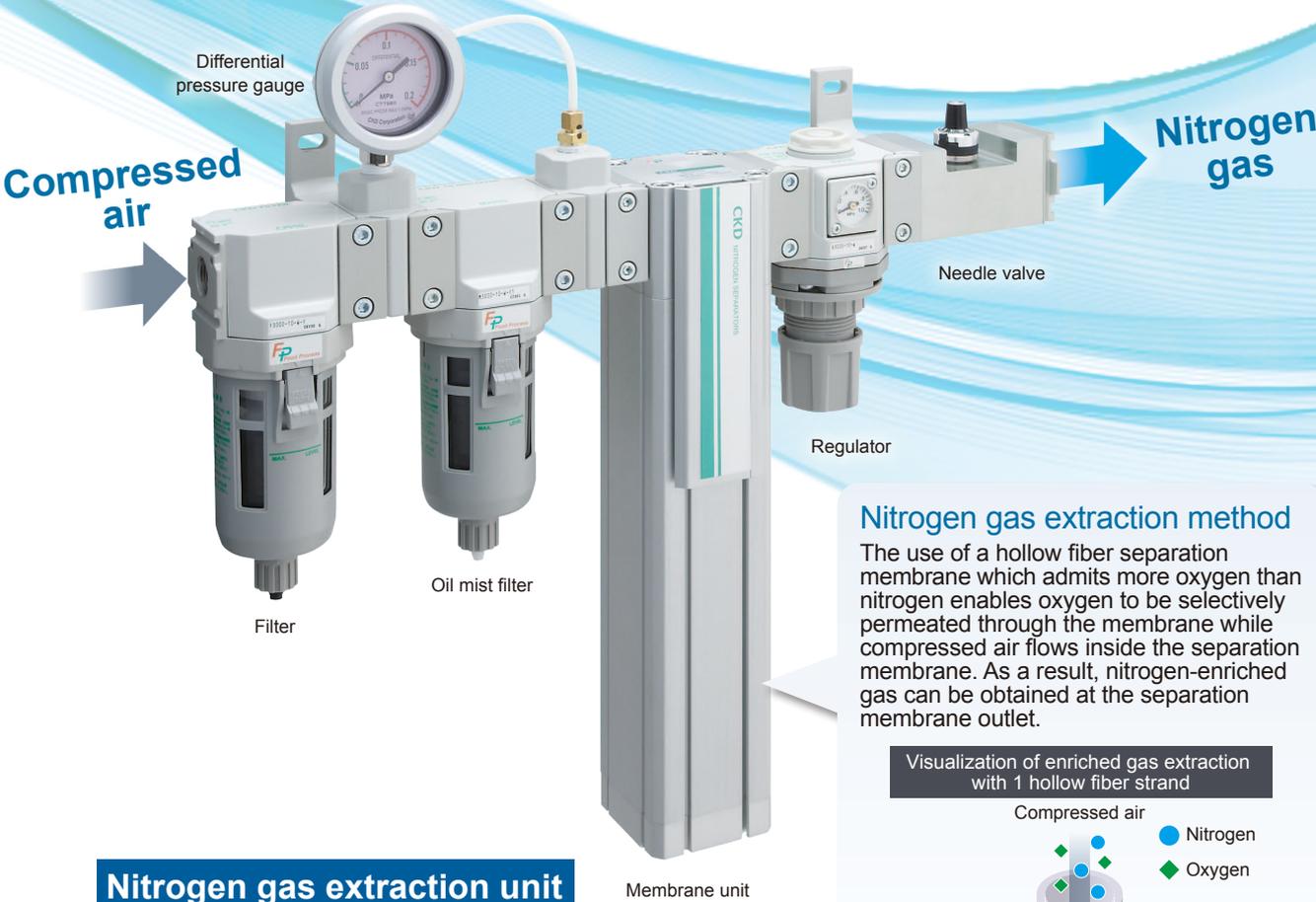
Nitrogen gas extraction unit NS Series



Nitrogen produced from air



Nitrogen gas can be extracted easily from compressed air.



Nitrogen gas extraction unit

NS Series

Nitrogen gas extraction method

The use of a hollow fiber separation membrane which admits more oxygen than nitrogen enables oxygen to be selectively permeated through the membrane while compressed air flows inside the separation membrane. As a result, nitrogen-enriched gas can be obtained at the separation membrane outlet.

Visualization of enriched gas extraction with 1 hollow fiber strand

Compressed air

- Nitrogen
- ◆ Oxygen

Oxygen-enriched gas

Oxygen-enriched gas

Nitrogen-enriched gas

NS Series configuration

System	Units	
	Single cylinder	Multiple cylinders
NSU	NS	

Install anywhere

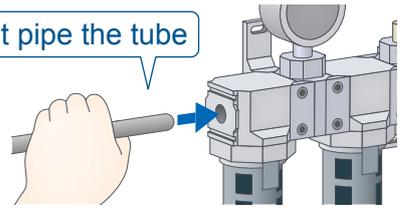
Saves processes, piping and space

- › With system components provided, design and piping are easy.
- › The ideal system can be selected according to the required flow rate.
- › Long piping work dedicated for nitrogen is unnecessary since it can be installed near equipment.

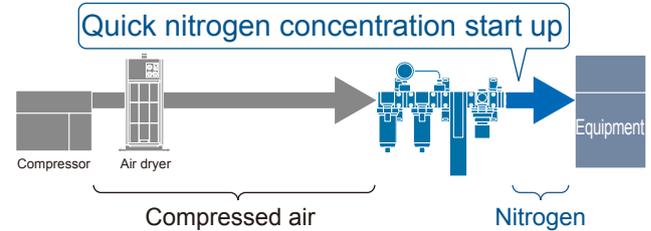
Power supply not required

- › Usable even in explosion-proof atmospheres, different voltage areas, etc.
- › No malfunctions due to electrical noise.
- › Quiet, with no heat generation as there is no drive unit.

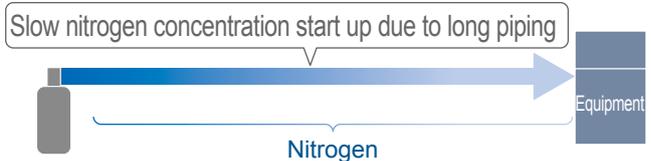
Just pipe the tube



For NS Series



For conventional



Low cost

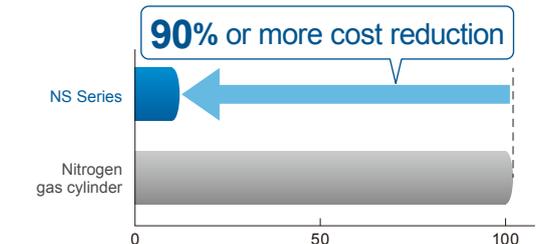
Running cost reduction

- › The only required maintenance cost is electricity for the air compressor.
- › No continuous running costs such as cylinder refilling costs.

Expense reduction

- › Troublesome management of gas remaining in cylinder, or replenishing are unnecessary.

Nitrogen gas cylinder and gas unit price comparison



* Comparison assuming that the nitrogen gas concentration is 99% and the gas unit price is 100.

Easy maintenance

Sustainable reliability

- › Since there are no movable parts, stable performance can be maintained.
- › Component replacement is possible without disassembling the piping.

High Pressure Gas Safety Act is not applicable

- › There is no need for notifications or assignment of certified personnel.



Compatible with FP Series for secure food manufacturing processes

Can be used safely in food manufacturing processes.

Uses
NSF H1
grease for food

Food Sanitation Act
Conforming Material
Fluid passage section
Resin/rubber



This logo represents CKD's stance to provide you with safe components for supporting your food manufacturing processes.

Usage examples

Packaging Gas-filled packaging (1)

MAP (gas-filled) packaging essential for long-life food products.

Fills with nitrogen-enriched gas to prevent the oxidative degradation of food.

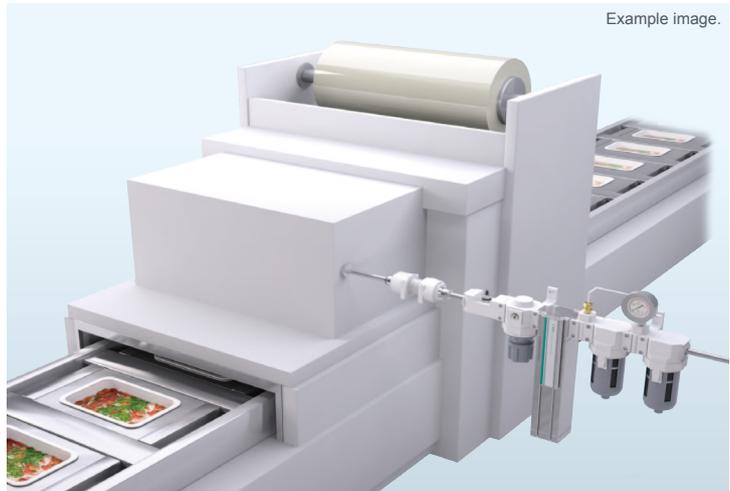
2-port solenoid valve for dry air



Antibacterial filter



Compact flow rate sensor



Packaging Gas-filled packaging (2)

For pillow packaging, the container is filled with nitrogen gas to prevent oxidative degradation, discoloration, or fading to preserve fragrance, and also to prevent the package from losing its shape.

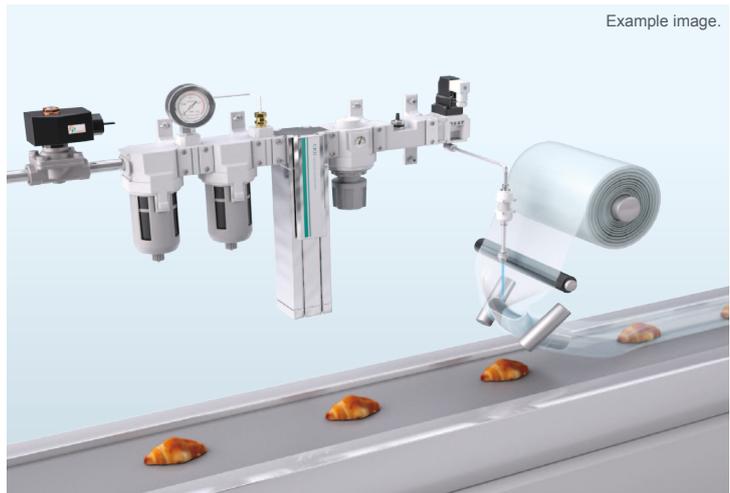
2-port solenoid valve for dry air



Antibacterial filter



Air nozzle point type



Food/chemicals Remaining oxygen removal

Removes oxygen gas dissolved in liquid by injecting nitrogen gas into the liquid.

Oil-free main line filter



Pneumatic flow rate sensor



2-port solenoid valve



Cultivation Low oxygen concentration management

Creates a low-oxygen environment preferred by cultivation samples by feeding nitrogen gas to the cultivation chamber.

Compact flow rate sensor



2, 3-port solenoid valve



Anti-bacterial/bacteria removing filter



Processing/assembly Explosion-proof atmospheres

Prevents explosive gas or corrosive gas from entering the container by filling it with nitrogen gas, purging air, and using positive internal pressure.

Refrigeration air dryer



Main line filter



Explosion-proof 2-port solenoid valve



Substrate Improved solder wettability

Improves lead-free solder wettability by blocking oxygen with nitrogen gas and preventing oxidation on the tip or surface of the soldering iron.

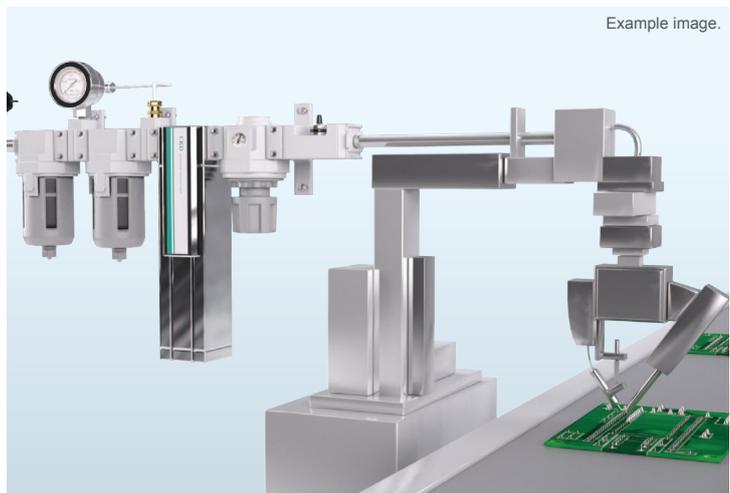
Drain separator



Cylinder valve



Compact flow rate sensor



Series variation

Nitrogen gas extraction unit NS Series

System

Model No.	Appearance	Flow rate (ℓ/min ANR) and nitrogen concentration (%)	
		10	20
NSU-3S		99.9 99.5 99 98 97 96 95	
NSU-3L		99.9 99.5 99 98	
NSU-4S		99.9 99.5	
NSU-4L		99.9	

Unit

Model No.	Appearance	Flow rate (ℓ/min ANR) and nitrogen concentration (%)	
		10	20
NS-3S1		99.9 99.5 99 98 97 96 95	
NS-3L1		99.9 99.5 99 98	
NS-4S1		99.9 99.5	
NS-4L1		99.9	

Model No.	No. of units	Appearance	Flow rate (ℓ/min ANR) and nitrogen concentration (%)			
			50	100	150	300
NS-4S2	2		99.9 99.5 99 98 97 96 95			
NS-4S3	3		99.9 99.5 99 98 97 96 95			
NS-4L2	2		99.9 99.5 99 98 97 96			
NS-4L3	3		99.9 99.5 99 98			
NS-4S6	6		99.9 99.5 99 98 97			
NS-4S8	8		99.9 99.5 99 98			
NS-4SA	10		99.9 99.5 99			
NS-4L6	6		99.9 99.5			
NS-4L8	8		99.9 99.5			

* The above value indicates the outlet nitrogen gas flow rate with inlet air pressure of 0.7 MPa and inlet air temperature of 25°C.

Flow rate (ℓ /min ANR) and nitrogen concentration (%)								Page
40	60	80	100	120	140	160	180	
								1
97	96	95						
99	98	97	96	95				
	99.5	99	98	97	96	95		

Flow rate (ℓ /min ANR) and nitrogen concentration (%)								Page
40	60	80	100	120	140	160	180	
								5
97	96	95						
99	98	97	96	95				
	99.5	99	98	97	96	95		

Flow rate (ℓ /min ANR) and nitrogen concentration (%)								Page
450	600	750	900	1050	1200	1350	1500	
								5
95								
97	96	95						
96	95							
97	96	95						
98	97	96	95					
99	98	97	96	95				
	99	98	97	96	95			

Supplement:

Precisely, the indicated nitrogen concentration of nitrogen gas obtained from the nitrogen gas extraction unit indicates the sum of the concentration of the components excluding oxygen (O₂). The raw air contains argon, carbon dioxide, water vapor, etc. as well as nitrogen and oxygen. Therefore, the product nitrogen gas contains about 1% argon (which, like nitrogen, has difficulty permeating the membrane). The concentration of about 10 to 50 ppm of carbon dioxide, which permeates the membrane easily, decreases down to vapor temperature -40°C at atmospheric dew point conversion.



Nitrogen gas extraction unit, system

NSU Series

Easily and stably supplying nitrogen gas.

- Nitrogen gas is obtained just by piping to a pneumatic source.
- All in one design with superior installation performance.

Specifications

Descriptions		NSU-3S	NSU-3L	NSU-4S	NSU-4L		
Range of working conditions	Working fluid	Compressed air					
	Inlet air pressure	MPa	0.4 to 1.0				
	Proof pressure	MPa	1.5				
	Inlet air temperature	°C	5 to 50				
	Relative humidity of inlet air	RH	50%				
	Ambient temperature	°C	5 to 50				
Rating	Inlet air pressure dew point	°C	10				
	Inlet air pressure	MPa	0.7				
	Inlet air temperature	°C	25				
	Ambient temperature	°C	25				
Rated flow rate	Outlet nitrogen gas flow rate ℓ /min(ANR)	Nitrogen concentration (%)	99.9	1.9	5.6	11.0	30.6
			99	5.0	15.5	28.2	66.9
			97	8.9	28.7	49.9	118.1
			95	14.0	39.8	65.3	169.2
	Inlet air flow rate ℓ /min(ANR)		99.9	21.2	62.3	122.3	340.0
			99	20.9	64.6	117.5	278.8
			97	24.1	77.6	134.9	319.2
			95	31.2	88.5	145.2	376.0
Air filter	Filtration	μm	5				
Oil mist filter	Oil removal	mg/m ³	0.01 or less (0.1 or less after oil saturation) * The measured value when primary oil concentration is 30 mg/m ³ at 21°C.				
Regulator	Set pressure range	MPa	0.05 to 0.85				
Standard accessories		Pressure gauge/differential pressure gauge/bracket					

* Refer to the outlet nitrogen gas flow rate and needle valve flow characteristics (page 4) in order to check if the conditions are within the working range. Contact CKD if the working range is exceeded.

Selection guide

As temperature and inlet air pressure affect outlet nitrogen gas flow rate, correction is required if they differ from the rated values listed in the specifications.

STEP 1 Confirm the use conditions and the rated values listed in the specifications.

Use conditions: Inlet air pressure, inlet air temperature, required nitrogen gas flow rate

STEP 2 Confirm the correction coefficient for outlet nitrogen gas flow rate affected by inlet air temperature.

(Table (1) at right)

STEP 3 Confirm the correction coefficient for outlet nitrogen gas flow rate affected by inlet air pressure.

(Table (2) at right)

STEP 4 Find the appropriate model based on the rated outlet nitrogen gas flow rate of each model.

Rated outlet nitrogen gas flow rate x (1) temperature gas flow rate correction coefficient x

(2) pressure gas flow rate correction coefficient = corrected outlet nitrogen gas flow rate

Select one with sufficient outlet nitrogen gas flow rate after correction with the above formula.

STEP 5 Confirm the correction coefficient for inlet air flow rate affected by inlet air temperature.

(Table (3) at right)

STEP 6 Confirm the correction coefficient for inlet air flow rate affected by inlet air pressure.

(Table (4) at right)

STEP 7 Find the inlet air flow rate from the rated outlet nitrogen gas flow rate of each model.

Inlet air flow rate of the model selected in STEP 4 x (3) temperature air flow rate correction coefficient x

(4) pressure air flow rate correction coefficient = corrected inlet air flow rate ℓ/min (ANR)

Based on the inlet air flow rate corrected as above, confirm whether the compressor capacity is sufficient.

(1) Temperature - Gas flow rate correction coefficient

Temperature (°C)	Outlet nitrogen gas concentration			
	99.9%	99%	97%	95%
10	0.73	0.84	0.84	0.81
25	1	1	1	1
40	0.95	1.08	1.06	1.11
50	0.9	1.09	1.11	1.15

(2) Pressure - Gas flow rate correction coefficient

Pressure (MPa)						
0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.4	0.65	0.75	1	1.07	1.2	1.3

(3) Temperature - Air flow rate correction coefficient

Temperature (°C)	Outlet nitrogen gas concentration			
	99.9%	99%	97%	95%
10	0.8	0.76	0.81	0.77
25	1	1	1	1
40	1.32	1.25	1.17	1.2
50	2.05	1.38	1.31	1.31

(4) Pressure - Air flow rate correction coefficient

Pressure (MPa)						
0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.61	0.79	0.91	1	1.07	1.2	1.3

Example of calculation

Conditions	Working conditions	Selecting conditions	Correction coefficient for outlet nitrogen gas flow rate	Correction coefficient for inlet air flow rate
Inlet air temperature	35 to 39°C	40°C	(1) 1.08	(3) 1.25
Inlet air pressure	0.5 to 0.55 MPa	0.5 MPa	(2) 0.65	(4) 0.79

Substitute the above conditions into the equation above to obtain the outlet nitrogen gas flow rate when using NSU-4L at a nitrogen concentration of 99%. It will be: 66.9 (rated outlet nitrogen gas flow rate) x 1.08 x 0.65 = 46.9 ℓ/min (ANR).

If the required nitrogen gas flow rate is less than or equal to this value, select that model.

In this case, the inlet air flow rate is calculated as: 278.8 x 1.25 x 0.79 = 275.3 ℓ/min (ANR).

How to order

NSU - 3 - S - N - FP1

Model No.

A Body size

B Membrane unit size

C Option

D Series

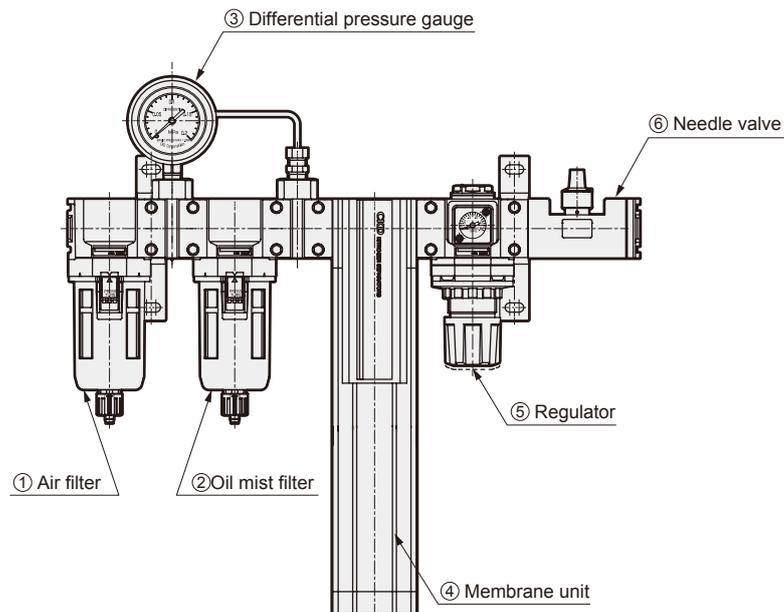
Code	Content
A Body size	
3	Body width 63
4	Body width 79
B Membrane unit size	
S	Short
L	Long
C Option	
N	No option
E	With exhaust port *2
D Series	
Blank	Standard
FP1	Series for food processing

⚠ Precautions for model No. selection

*1: Viewed from the front, standard products have an air inlet on the left port and an air outlet on the right port.

*2: Exhaust air (oxygen-enriched gas) from standard products is released into the atmosphere. Specify "E" to enable piping connection for exhaust air (oxygen-enriched gas). Size of exhaust port is Rc1/2.

Components



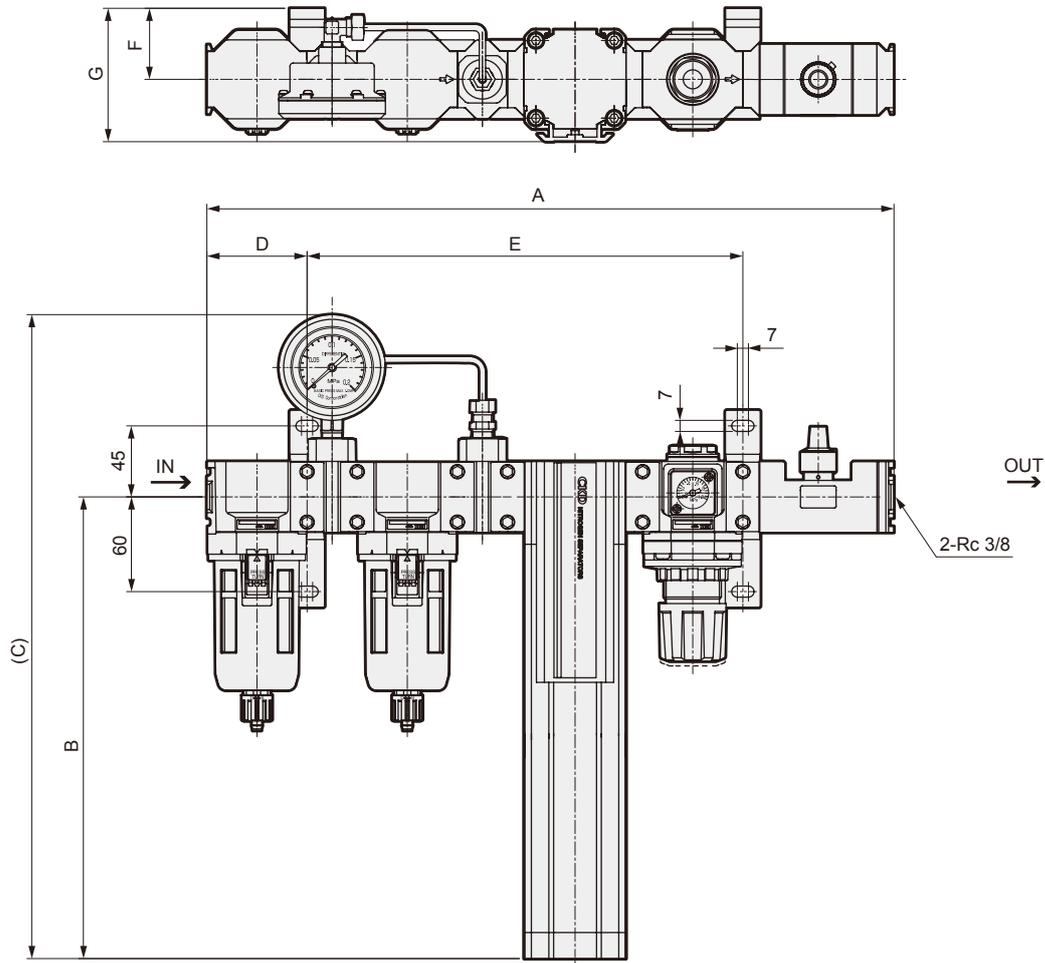
■ Standard

Unit model No.	NSU-3S-□	NSU-3L-□	NSU-4S-□	NSU-4L-□
① Air filter	F3000-10-W-F		F4000-10-W-F	
② Oil mist filter	M3000-10-W-F1		M4000-10-W-F1	
③ Differential pressure gauge	GA400-8-P02			
④ Membrane unit	NS-3S1-N	NS-3L1-N	NS-4S1-N	NS-4L1-N
⑤ Regulator	NS-QR3-FP1		NS-QR4-FP1	
⑥ Needle valve	NS-QDVL-020	NS-QDVL-080	NS-QDVL-160	NS-QDVL-240

■ FP1

Unit model No.	NSU-3S-□-FP1	NSU-3L-□-FP1	NSU-4S-□-FP1	NSU-4L-□-FP1
① Air filter	F3000-10-W-F-FP1		F4000-10-W-F-FP1	
② Oil mist filter	M3000-10-W-F1-FP1		M4000-10-W-F1-FP1	
③ Differential pressure gauge	GA400-8-P02			
④ Membrane unit	NS-3S1-N-FP2	NS-3L1-N-FP2	NS-4S1-N-FP2	NS-4L1-N-FP2
⑤ Regulator	NS-QR3-FP1		NS-QR4-FP1	
⑥ Needle valve	NS-QDVL-020	NS-QDVL-080	NS-QDVL-160	NS-QDVL-240

Dimensions

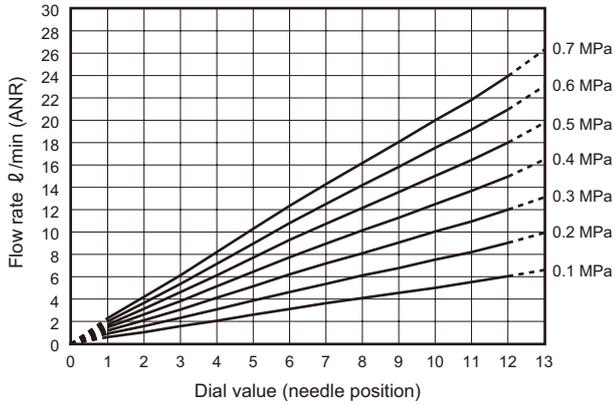


	A	B	C	D	E	F	G	Weight (kg)
NSU-3S	432	293	408	63	274	45	85	4.0
NSU-3L	432	543	658	63	274	45	85	4.9
NSU-4S	498	543	658	80	323	55	106	6.9
NSU-4L	498	1043	1158	80	323	55	106	9.7

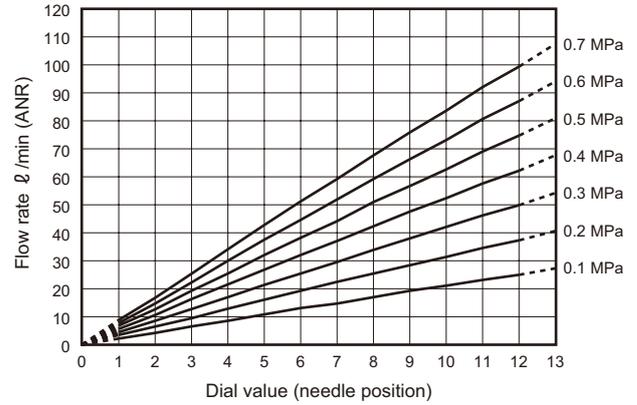
Flow characteristics

*The flow characteristics graph gives reference values and does not guarantee the values.

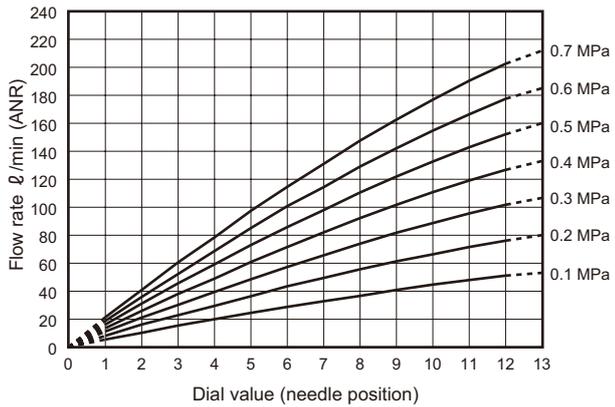
● NS-QDVL-020



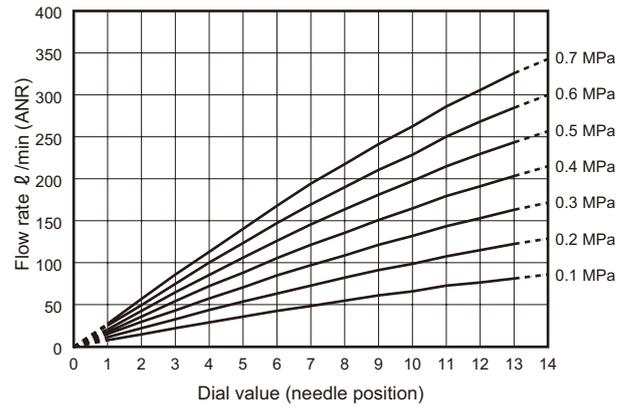
● NS-QDVL-080



● NS-QDVL-160



● NS-QDVL-240





Nitrogen gas extraction unit

NS Series

Modular design for easy system expansion with peripheral devices

■ Nitrogen gas is obtained just by supplying compressed air.

Specifications

■ Single cylinder

Descriptions		NS-3S1	NS-3L1	NS-4S1	NS-4L1		
Range of working conditions	Working fluid	Compressed air					
	Inlet air pressure MPa	0.4 to 1.0					
	Proof pressure MPa	1.5					
	Inlet air temperature °C	5 to 50					
	Relative humidity of inlet air RH	50% or less					
	Ambient temperature °C	5 to 50					
Rating	Inlet air purity grade	1:6:1 (according to JIS B 8392-1:2012)					
	Inlet air pressure MPa	0.7					
	Inlet air temperature °C	25					
	Ambient temperature °C	25					
Rated flow rate	Outlet nitrogen gas flow rate ℓ /min(ANR)	Nitrogen concentration (%)	99.9	1.9	5.6	11.0	30.6
			99	5.0	15.5	28.2	66.9
			97	8.9	28.7	49.9	118.1
			95	14.0	39.8	65.3	169.2
	Inlet air flow rate ℓ /min(ANR)	99.9	21.2	62.3	122.3	340.0	
		99	20.9	64.6	117.5	278.8	
		97	24.1	77.6	134.9	319.2	
		95	31.2	88.5	145.2	376.0	

■ Multiple cylinders

Descriptions		NS-4S2	NS-4S3	NS-4L2	NS-4L3	NS-4S6	NS-4S8	NS-4SA	NS-4L6	NS-4L8		
Range of working conditions	Working fluid	Compressed air										
	Inlet air pressure MPa	0.4 to 1.0										
	Proof pressure MPa	1.5										
	Inlet air temperature °C	5 to 50										
	Relative humidity of inlet air RH	50% or less										
	Ambient temperature °C	5 to 50										
Rating	Inlet air purity grade	1:6:1 (according to JIS B 8392-1:2012)										
	Inlet air pressure MPa	0.7										
	Inlet air temperature °C	25										
	Ambient temperature °C	25										
Rated flow rate	Outlet nitrogen gas flow rate ℓ /min(ANR)	Nitrogen concentration (%)	99.9	22.0	33.0	61.2	91.8	66.0	88.0	110.0	183.6	244.8
			99	56.4	84.6	133.8	200.7	169.2	225.6	282.0	401.4	535.2
			97	99.8	149.7	236.2	354.3	299.4	399.2	499.0	708.6	944.8
			95	130.6	195.9	338.4	507.6	391.8	522.4	653.0	1015.2	1353.6
	Inlet air flow rate ℓ /min(ANR)	99.9	244.6	366.9	680.0	1020.0	733.8	978.4	1223.0	2040.0	3400.0	
		99	235.0	352.5	557.6	836.4	705.0	940.0	1175.0	1672.8	2788.0	
		97	269.8	404.7	638.4	957.6	809.4	1079.2	1349.0	1915.2	3192.0	
		95	290.4	435.6	752.0	1128.0	871.2	1161.6	1452.0	2256.0	3760.0	

Note: The product will be floor-mounted for 6 units or more.

Selection guide

As temperature and inlet air pressure affect outlet nitrogen gas flow rate, correction is required if they differ from the rated values listed in the specifications.

STEP 1 Confirm the use conditions and the rated values listed in the specifications.

Use conditions: Inlet air pressure, inlet air temperature, required nitrogen gas flow rate

STEP 2 Confirm the correction coefficient for outlet nitrogen gas flow rate affected by inlet air temperature.

(1) Temperature - Gas flow rate correction coefficient

Temperature (°C)	Outlet nitrogen gas concentration			
	99.9%	99%	97%	95%
10	0.73	0.84	0.84	0.81
25	1	1	1	1
40	0.95	1.08	1.06	1.11
50	0.9	1.09	1.11	1.15

STEP 3 Confirm the correction coefficient for outlet nitrogen gas flow rate affected by inlet air pressure.

(2) Pressure - Gas flow rate correction coefficient

Pressure (MPa)						
0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.4	0.65	0.75	1	1.07	1.2	1.3

STEP 4 Find the appropriate model based on the rated outlet nitrogen gas flow rate of each model.

Rated outlet nitrogen gas flow rate x (1) temperature gas flow rate correction coefficient x (2) pressure gas flow rate correction coefficient = corrected outlet nitrogen gas flow rate

Select one with sufficient outlet nitrogen gas flow rate after correction with the above formula.

STEP 5 Confirm the correction coefficient for inlet air flow rate affected by inlet air temperature.

(3) Temperature - Air flow rate correction coefficient

Temperature (°C)	Outlet nitrogen gas concentration			
	99.9%	99%	97%	95%
10	0.8	0.76	0.81	0.77
25	1	1	1	1
40	1.32	1.25	1.17	1.2
50	2.05	1.38	1.31	1.31

STEP 6 Confirm the correction coefficient for inlet air flow rate affected by inlet air pressure.

(4) Pressure - Air flow rate correction coefficient

Pressure (MPa)						
0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.61	0.79	0.91	1	1.07	1.2	1.3

STEP 7 Find the inlet air flow rate from the rated outlet nitrogen gas flow rate of each model.

Inlet air flow rate of the model selected in STEP 4 x (3) temperature air flow rate correction coefficient x (4) pressure air flow rate correction coefficient = corrected inlet air flow rate ℓ/min (ANR)

Based on the inlet air flow rate corrected as above, confirm whether the compressor capacity is sufficient.

Example of calculation

Conditions	Working conditions	Selecting conditions	Correction coefficient for outlet nitrogen gas flow rate	Correction coefficient for inlet air flow rate
Inlet air temperature	35 to 39°C	40°C	(1) 1.08	(3) 1.25
Inlet air pressure	0.5 to 0.55 MPa	0.5 MPa	(2) 0.65	(4) 0.79

Substitute the above conditions into the equation above to obtain the outlet nitrogen gas flow rate when using NS-4L1 at a nitrogen concentration of 99%.

It will be: 66.9 (rated outlet nitrogen gas flow rate) x 1.08 x 0.65 = 46.9 ℓ/min (ANR).

If the required nitrogen gas flow rate is less than or equal to this value, select that model.

In this case, the inlet air flow rate is calculated as: 278.8 x 1.25 x 0.79 = 275.3 ℓ/min (ANR).

How to order

NS - 3 - S - 1 - B - FP2

Model No.

A Body size

B Membrane unit size

C No. of units

D Option

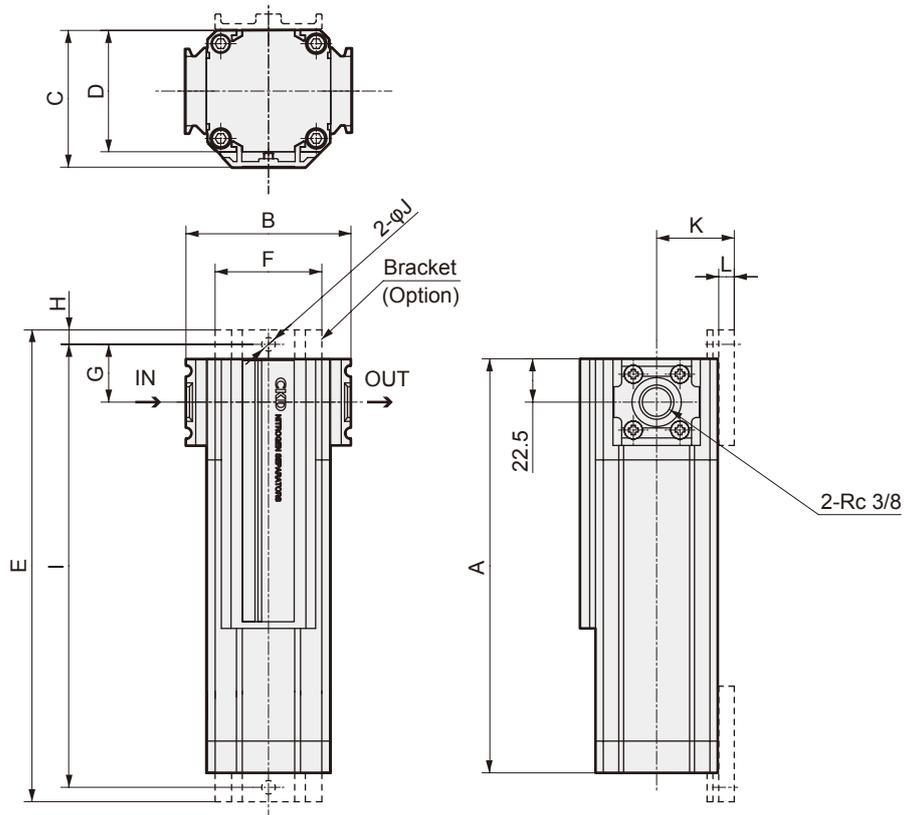
E Series

Code	Content
A Body size	
3	Body width 63
4	Body width 79
B Membrane unit size	
S	Short
L	Long
C No. of units *1	
1	1 pc.
2	2 (available with NS-4S, 4L)
3	3 (available with NS-4S, 4L)
6	6 (available with NS-4S, 4L)
8	8 (available with NS-4S, 4L)
A	10 (available with NS-4S)
D Option *2	
N	No option
B	Bracket
C	Bracket + reverse flow
D	Bracket + exhaust port
F	Bracket + reverse flow + exhaust port
X	Reverse flow
E	Exhaust port
H	Reverse flow + exhaust port
E Series	
Blank	Standard
FP2	Series for food processing

⚠ Precautions for model No. selection

- *1: The product will be floor-mounted without bracket for 6 units or more.
- *2: Viewed from the front, a standard product has an air inlet on the left port, while an air outlet on the right port. For "X", an air inlet is provided on the right port, with an air outlet provided on the left port.
- *3: Exhaust air (oxygen-enriched gas) from standard products is released into the atmosphere. Specify "E" to enable piping connection for exhaust air (oxygen-enriched gas). Size of exhaust port is Rc1/2.

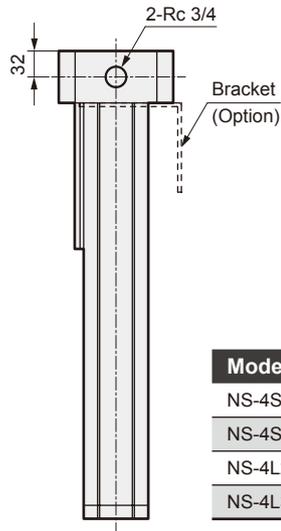
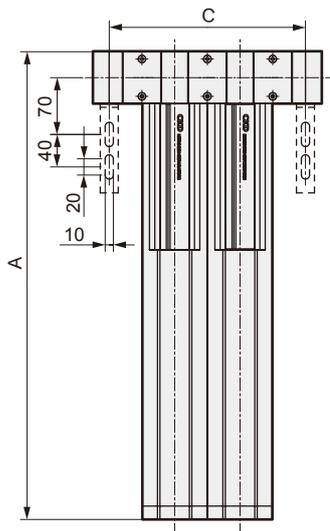
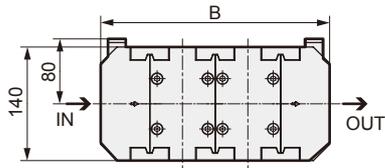
Dimensions



Model No.	A	B	C	D	Weight (kg)	Bracket relational dimensions							
						E	F	G	H	I	J	K	L
NS-3S1	315	85	71	63	1.8	345	55	30	7.5	330	7	40	8
NS-3L1	565	85	71	63	2.7	595	55	30	7.5	580	7	40	8
NS-4S1	565	100	90	79	4.0	605	70	32.5	10	585	9	50	10
NS-4L1	1065	100	90	79	6.8	1105	70	32.5	10	1085	9	50	10

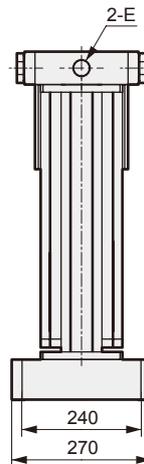
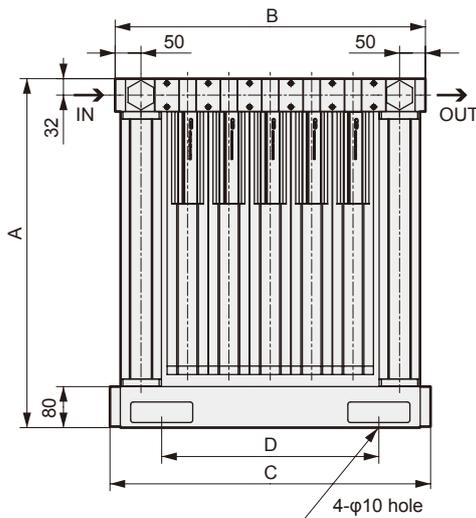
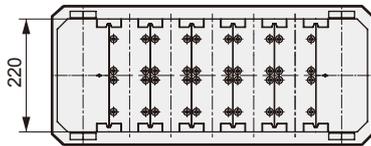
Dimensions

● 2 or 3 units



Model No.	A	B	C	Weight (kg)
NS-4S2	577	280	240	12
NS-4S3	577	360	320	17
NS-4L2	1077	280	240	18
NS-4L3	1077	360	320	25

● 6, 8 or 10 units



Model No.	A	B	C	D	E	Weight (kg)
NS-4S6	680	440	460	260	Rc1	41
NS-4S8	680	520	540	340	Rc1	50
NS-4SA	680	600	620	420	Rc1	59
NS-4L6	1180	440	460	260	Rc1	63
NS-4L8	1180	520	540	340	Rc1	78



Safety Precautions

Be sure to read this section before use.

When designing and manufacturing equipment using CKD products, the manufacturer is obligated to ensure that the safety of the mechanism, pneumatic control circuit and/or water control circuit and the system that runs the electrical controls are secured.

It is important to select, use, handle and maintain CKD products appropriately to ensure their safe usage.

Observe warnings and precautions to ensure device safety.

Check that device safety is ensured, and manufacture a safe device.

WARNING

1 This product is designed and manufactured as a general industrial machine part. It must be handled by an operator having sufficient knowledge and experience.

2 Use this product in accordance with specifications.

This product must be used within its stated specifications. In addition, never modify or additionally machine this product. This product is intended for use as a device or part for general-purpose industrial machinery. It is not intended for use outdoors (except for outdoor types) or for use under the following conditions or environments.

(Note that this product can be used when CKD is consulted prior to its usage and the customer consents to CKD product specifications. The customer should provide safety measures to avoid danger in the event of problems.)

① Use for applications requiring safety, including nuclear energy, railways, aircraft, marine vessels, vehicles, medical devices, devices or applications in contact with beverages or foodstuffs, amusement devices, emergency cutoff circuits, press machines, brake circuits, or safety devices or applications.

② Use for applications where life or assets could be significantly affected, and special safety measures are required.

3 Observe organization standards and regulations, etc., related to the safety of the device design and control, etc.

ISO4414, JIS B 8370 (General rules for pneumatic systems)

JFPS2008 (Principles for pneumatic cylinder selection and use)

Including the High Pressure Gas Safety Act, Industrial Safety and Health Act, other safety rules, organization standards and regulations, etc.

4 Do not handle, pipe, or remove devices before confirming safety.

① Inspect and service the machine and devices after confirming safety of all systems related to this product.

② Note that there may be hot or charged sections even after operation is stopped.

③ When inspecting or servicing the device, turn OFF the energy source (air supply or water supply), and turn OFF power to the facility. Discharge any compressed air from the system, and pay attention to possible water leakage and leakage of electricity.

④ When starting or restarting a machine or device that incorporates pneumatic components, make sure that the system safety, such as pop-out prevention measures, is secured.

5 Observe the warnings and cautions on the following pages to prevent accidents.

■ Precautions are ranked as “DANGER”, “WARNING”, and “CAUTION” in this section.

 **DANGER:** In the case where the product operation is mishandled and/or when the urgency of a dangerous situation is high, it may lead to fatalities or serious injuries.

 **WARNING:** A dangerous situation may occur if handling is mistaken, leading to fatal or serious injuries.

 **CAUTION:** A dangerous situation may occur if handling is mistaken, leading to minor injuries or property damage.

Note that some items indicated with “CAUTION” may lead to serious results depending on the conditions. All items contain important information and must be observed.

Limited warranty and disclaimer

1 Warranty period

This warranty is valid for one (1) year after delivery to the customer's designated site.

2 Scope of warranty

In case any defect clearly attributable to CKD is found during the warranty period, CKD shall, at its own discretion, repair the defect or replace the relevant product in whole or in part and at no cost, according to its own judgment.

Note that the following failures are excluded from the warranty scope:

(1) Failures due to use outside the conditions and environments set forth in the catalog or these specifications.

(2) Failures resulting from factors other than this product.

(3) Failures caused by improper use of the product.

(4) Failures resulting from modifications or repairs made without CKD consent.

(5) Failures caused by matters that could not be predicted with the technologies in practice when the product was delivered.

(6) Failures resulting from natural disasters or accidents for which CKD is not liable.

The warranty covers the actual delivered product, as a single unit, and does not cover any damages resulting from losses induced by malfunctions in the delivered product.

3 Compatibility check

The customer is responsible for confirming the compatibility of CKD products with the customer's systems, machines and equipment.



Pneumatic components (nitrogen gas extraction unit)

Safety Precautions

Be sure to read this section before use.

Refer to “Pneumatic, Vacuum and Auxiliary Components (No. CB-024SA)” for general precautions. Although the above general catalog states that products are not applicable for equipment or applications with direct contact with beverages/foodstuffs, the FP2 Series products can be used in such applications as long as they are within the range of the product specifications.

Product-specific cautions: Nitrogen gas extraction unit NS, NSU Series

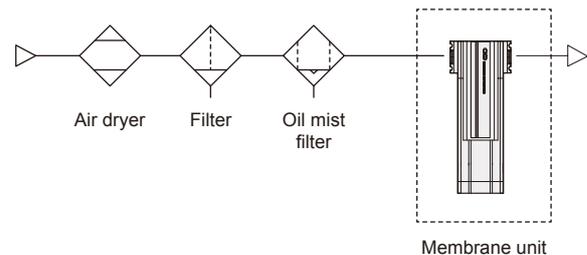
Design/selection

CAUTION

Working environment

- Avoid installing this product where it will be subject to direct sunlight or rain.
- As the bowl material is polycarbonate, avoid use with the following chemicals or in an atmosphere containing these chemicals. [NSU Series]
- Avoid use in environments where ozone is generated.
- Avoid using this product where vibration and impact are present.
- Avoid use in environments with moist air with a relative humidity of 50% or higher. (Performance will decrease sharply if the separation membrane gets wet with droplets (such as water).)
- Avoid air flow containing corrosive gas (strongly acidic gases such as hydrogen sulfide, sulfur dioxide, hydrogen chloride or fluorine) or strongly alkaline gas (amines, ammonia, caustic soda, etc.).
- The needle valve cannot be used as a stop valve that requires no leakage. Slight leakage is allowed for in this product's specifications.
- Dust cannot be completely kept out of the flow path. Install a final clean filter if dust could be a problem with the circuit. (Use antibacterial/sterilization filters for food processes.)

- “Compatible with Food Sanitation Act” indicates that the product material conforms to the Food Sanitation Act.
- Decide on product use after carefully confirming the conformity of the working atmosphere, working fluids, valve structure and component material of each device.
- Internal components may become worn due to the operation of the needle valve. If affected, take necessary measures such as installing a filter on the secondary side.
- Check the working circuit and working fluid. To prevent drop in membrane unit performance, install the dryer, air filter and oil mist filter on the primary side, and remove water or oil.

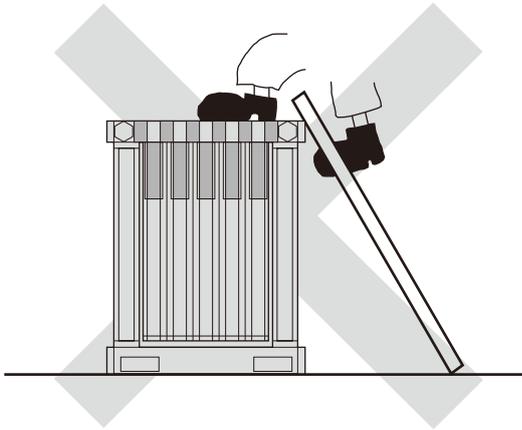


Types of chemicals	Categories of chemicals	Main products of chemicals	General applications	Polycarbonate
Inorganic compounds	Acids	Hydrochloric acid, sulfuric acid, fluorine, phosphoric acid, chromic acid, etc.	Acid washing of metals, acidic degreasing solutions, Coating treatment solution	×
	Alkalines	Caustic soda, caustic potash, calcium hydroxide, aqueous ammonia, sodium carbonate, etc.	Alkaline degreasing solution for metals	×
	Inorganic salts	Sodium sulfide, potassium nitrate, potassium bichromate, sodium sulfate, etc.		×
Organic compounds	Aromatic hydrocarbons	Benzene, toluene, xylene, ethyl benzene, styrene, etc.	Contained in paint thinner (Benzene, toluene, and xylene)	×
	Chlorinated aliphatic hydrocarbons	Methyl chloride, ethylene chloride, methylene chloride, acetylene chloride, chloroform, trichlene, perchlene, carbon tetrachloride	Organic solvent-based washing solution for metals (trichlene, perchlene, carbon tetrachloride, etc.)	×
	Chlorinated aromatic hydrocarbons	Chlorobenzene, dichlorobenzene, benzene hexachloride (B/H/C), etc.	Agricultural chemicals	×
	Petroleum components	Solvent, naphtha, gasoline		×
	Alcohols	Methyl alcohol, ethyl alcohol, cyclohexanol, benzyl alcohol	Used as antifreezing agent	×
	Phenol	Carbolic acid, cresol, naphthol, etc.	Disinfectant solution	×
	Ethers	Methyl ether, methyl ethyl ether, ethyl ether	Additive of brake oil	×
	Ketones	Acetone, methyl ethyl ketone, cyclohexanone, acetophenone, etc.		×
	Carboxylic acids	Formic acid, acetic acid, butyl acid, acrylic acid, oxalic acid, phthalic acid, etc.	Dyes/oxalic acid are used for aluminum treatment Phthalic acid is used as a paint base	×
	Phosphate esters	Dimethyl phthalate (DMP), diethyl phthalate (DEP), dibutyl phthalate (DBP), dioctyl phthalate (DOP)	Lubricant, synthetic coolant, rust preventing agent additives Used as plasticizer for synthetic resin	×
	Oxyacids	Glycol acid, lactic acid, malic acid, citric acid, tartaric acid		×
	Nitro compounds	Nitromethane, nitroethane, nitroethylene, nitrobenzene, etc.		×
	Amines	Methylamine, dimethylamine, ethylamine, aniline, acetanilide, etc.	Additive of brake oil	×
Nitriles	Acetonitrile, acrylonitrile, benzonitrile, acetoisonitrile, etc.	Raw material for nitrile rubber	×	

Mounting, installation and adjustment

⚠ CAUTION

- Do not step onto the body.



- When piping, remove cutting oil, rust preventing agents, contaminants, etc.
- Mount air filters or oil mist filters so that the drain outlet faces straight downward. Use a bore size $\phi 5.7$ to 6 tube for drain discharge piping, and keep the length within 5 m. Avoid vertical piping. [NSU Series]
- Be sure to install an oil removing filter (M type) immediately before the membrane unit to remove water drops and oil.
If oil adheres to the separation membrane, nitrogen concentration may decrease.
- Install the regulator on the outlet side of the membrane unit.
- When installing NS (2/3 units), fix the inlet and outlet pipes or fix the body with a bracket.
- When installing NS (6 units or more), place it on a solid and flat surface that does not vibrate and fix the base with anchor bolts.

Precautions for needle valves with adjusting dial

- To adjust the flow rate, turn the dial to the right to open or the left to close.
- After adjustment, lock the dial with the sliding lock lever.
- The flow rate control range is from "1" to "12" or "13" on the dial rotation display.
Do not set the flow rate outside this range. Turning the dial to the fully closed or fully open position forcibly may result in failure or abnormal flow characteristics.
- Even when the needle is fully closed, the dial display is not 0.
Calibration of the dial indicator flow rate is performed when the needle is not fully closed. Note that 0 is not necessarily indicated when the needle is fully closed. After "0", either "19" or no number at all is displayed.
- Do not remove the dial from the body.
If the dial is removed, readjustment and calibration of flow characteristics cannot be performed.

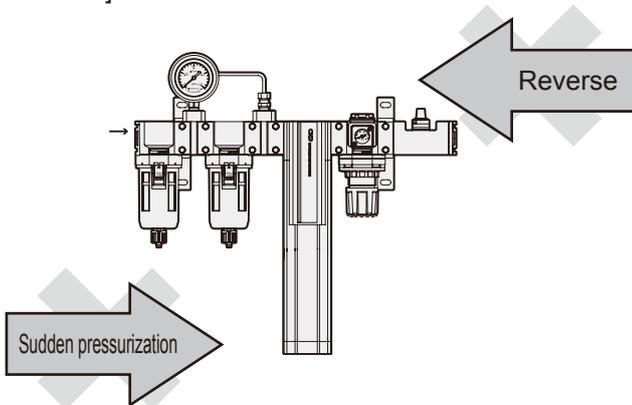
Use/maintenance

⚠ WARNING

- **As nitrogen gas involves the risk of oxygen deficiency, use the product according to the following instructions.**
 - Use in well ventilated locations.
 - Ventilate the work area when nitrogen gas is being used.
 - Periodically inspect nitrogen gas piping for leakage.
- **As oxygen-enriched gas is released from the exhaust unit of the membrane unit, note the following when installing the product.**
 - Install away from fire or flammable objects.
 - Ventilate the work area during operation of the equipment.
- **Do not use the product for any purpose directly related to human life.**

⚠ CAUTION

- Do not use reverse airflow.
Do not pressurize suddenly. The differential pressure gauge or mantle may be damaged. [NSU Series]



- The oil mist filter life is spent when the pressure drops to 0.07 MPa or after one year of use, whichever comes first. Replace the mantle with a new one at the end of its life (check the pressure drop with a differential pressure gauge). (Do not touch the urethane rubber foam layer when replacing the mantle)
[NSU Series]



0.07 MPa

- The service life of the membrane unit differs according to the working conditions. As a guideline, replace the membrane every 3 to 5 years.
- Confirm that pressure has been released before mounting or removing the bowl and bowl guard.
[NSU Series]
- Be aware that adequate time is necessary to obtain the required nitrogen concentration after compressed air is supplied.

MEMO

Related products

Equipment for food manufacturing processes FP Series

- A broad lineup ranging from air filters to actuators that can be used safely and securely in food manufacturing processes.
- The FP1 Series uses food-grade (NSF H1) lubricant to eliminate concerns over lubricant-based contamination.
- The FP2 Series uses resin/rubber materials compatible with the Food Sanitation Act in addition to FP1.

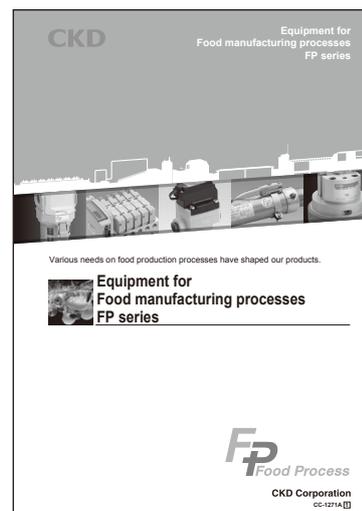
Antimicrobial/antibacterial filter

- Bactericidal activity value 3
- Bacterial retention performance: LRV8 or higher
- Resin materials/rubber materials used in the fluid passage section are compatible with the Food Sanitation Act
- Uses food-grade NSF H1 grease
- Exterior parts use antimicrobial materials
- Maintenance seal is provided as standard for easy maintenance period management.

Air blow nozzle BN* Series

- A wide range of variations
Diverse lineup to match applications or industries
- Energy saving
A special structure which brings in the surrounding air to enhance the pneumatic air source. Strong air jets even with minimal air consumption.
- Uniformity
A special structure which ejects air more uniformly at the desired area. The key to stable workpiece quality.
- Low noise
A low-noise, work-environment-friendly design suppressing turbulence. Flat and round types are available in accordance with applications.

Catalog No. CC-1271A



Catalog No. CC-1311A



Catalog No. CC-1347A



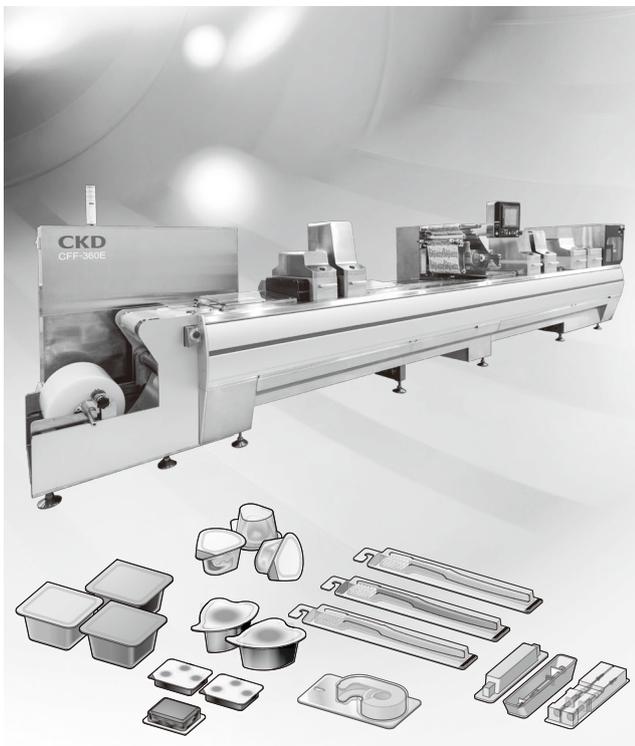
Super dryer SD/SU Series

- Freon-free dryer which does not cause environmental damage.
- No movable parts, so clean dry air can be supplied for long periods of time.
- Lighter, more compact, and easily built into installations.
- As it uses no electricity whatsoever, there is no noise or effects thereof.
- Ultra low dew point of max -60°C.
- Compatible with 75kW grade large flow rate compressors.

Catalog No. CC-024SA



Introduction of ECO Blister CFF-360E



For operation cost reduction

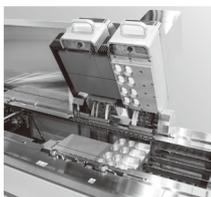
For labor reduction

For contamination countermeasures



Easy

Consistently precise punching and sealing positions thanks to automatic positioning calibration



Easy

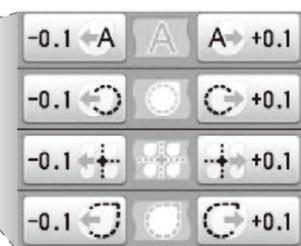
Mold thickness control (plug movement) is easily set digitally



Easy

Sealing pressure control is easily set digitally

Easy operation is a breeze



← Pattern matching

← Sealing position alignment

← Sewing position alignment

← Punching position alignment

Position alignment can be easily set with "+" and "-"

Inquiries about automatic machinery

Sales Administration Department
Tokyo Sales Dept. for Automatic Machinery

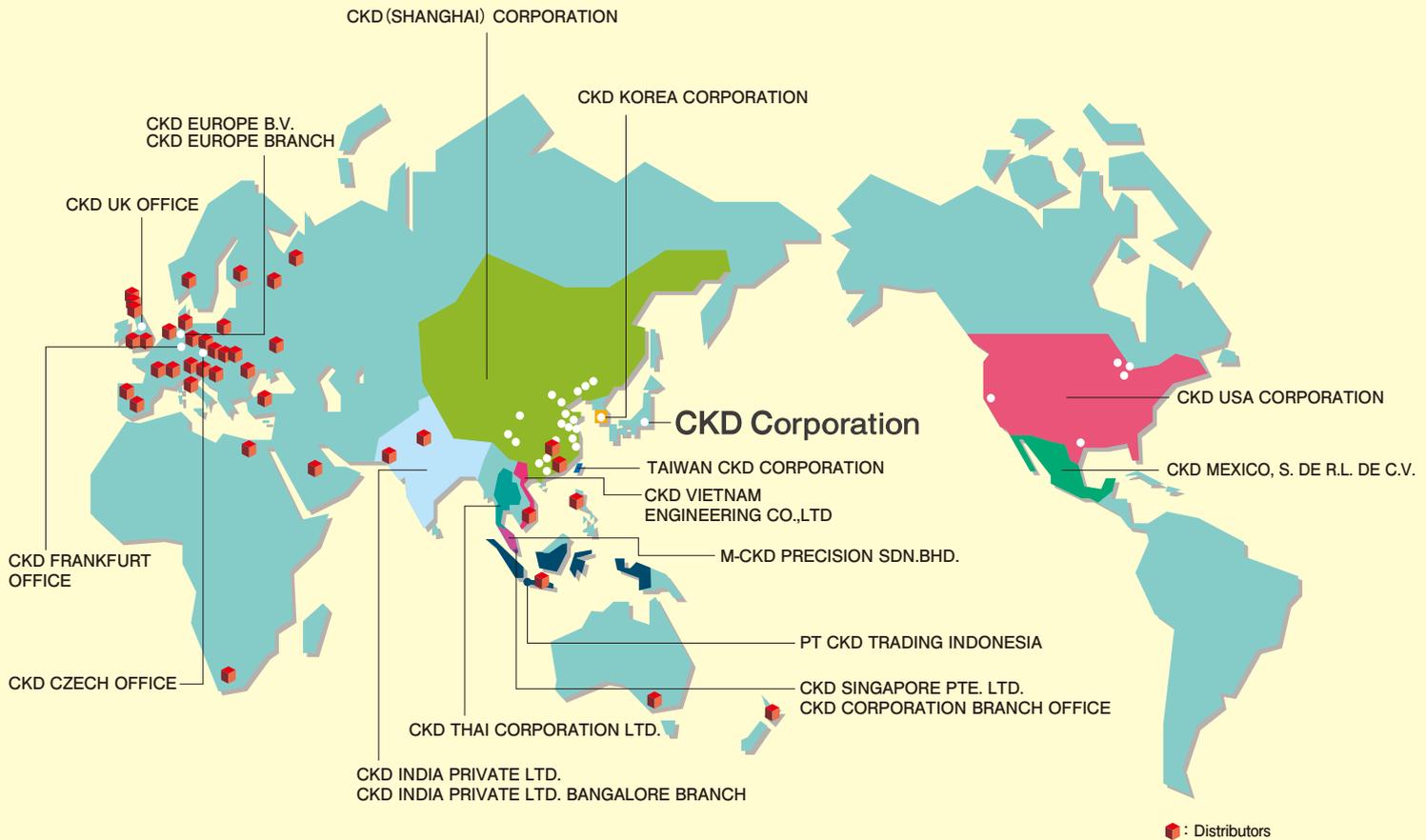
2-250, Uji, Komaki, Aichi
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- 台中營業所 (TAICHUNG OFFICE)
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