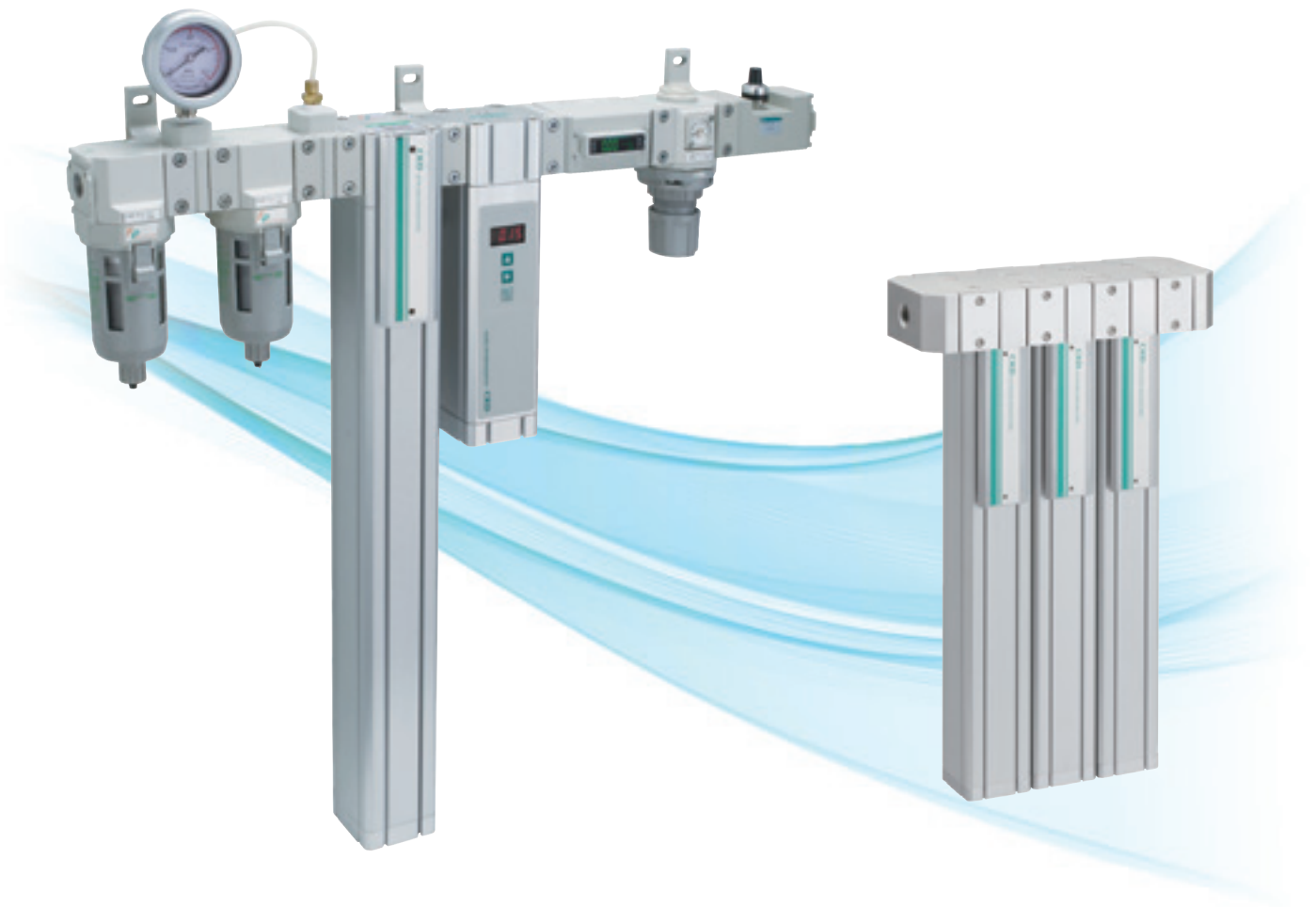


Nitrogen Gas Extraction Unit NS Series



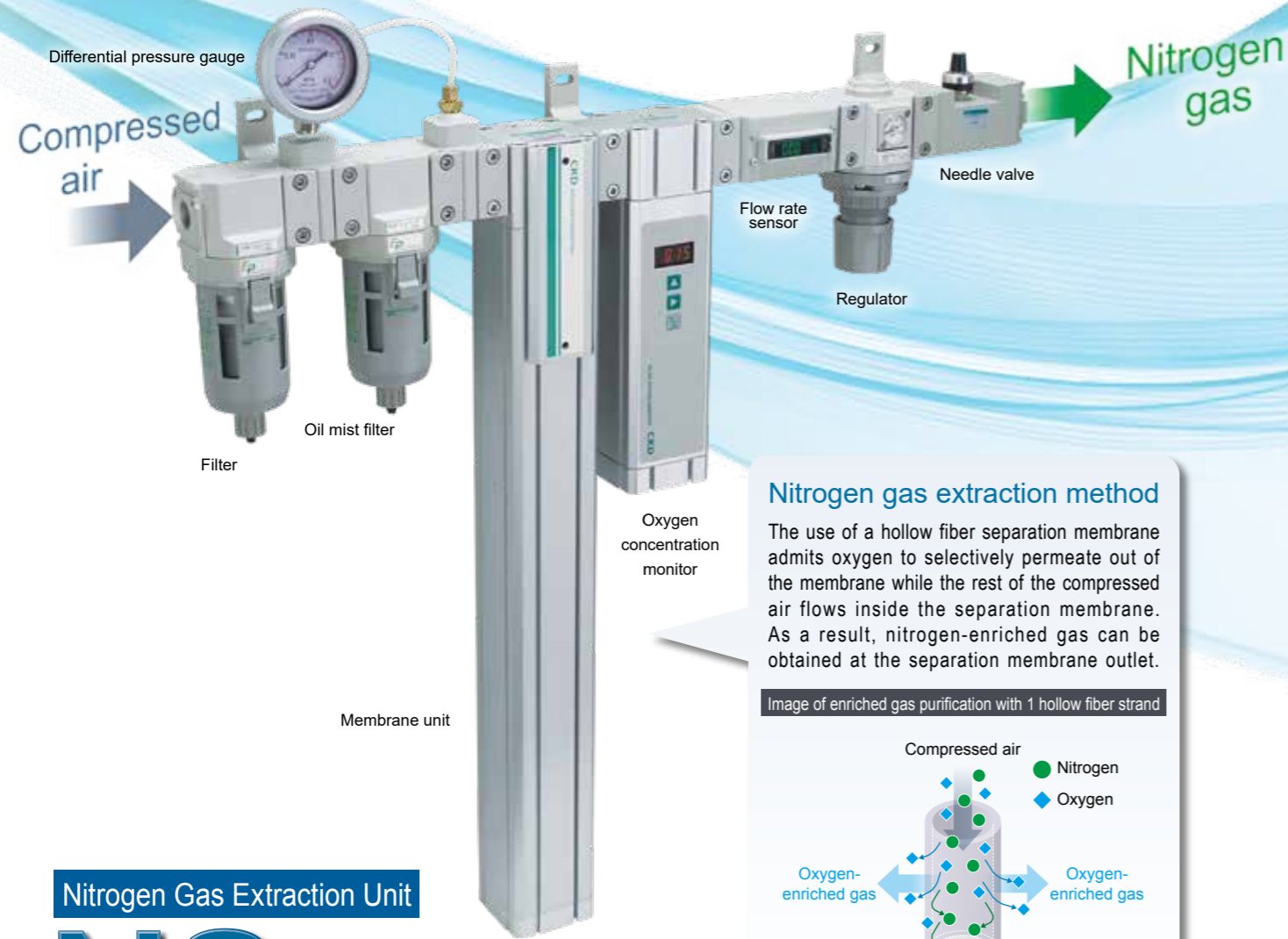
Nitrogen extracted from air



New

Horizontal mounting added.

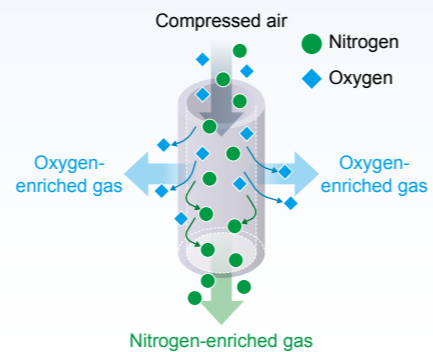
Nitrogen gas extracted easily from compressed air.



Nitrogen gas extraction method

The use of a hollow fiber separation membrane admits oxygen to selectively permeate out of the membrane while the rest of the compressed air flows inside the separation membrane. As a result, nitrogen-enriched gas can be obtained at the separation membrane outlet.

Image of enriched gas purification with 1 hollow fiber strand



Nitrogen Gas Extraction Unit

NS Series

Compatible with FP Series for secure food manufacturing processes

Safe and secure for food manufacturing processes.

NSF H1
grease for foodstuffs is used

Material compatible with the Food Sanitation Act
Fluid passage section Resin /rubber

FP
Food Process™

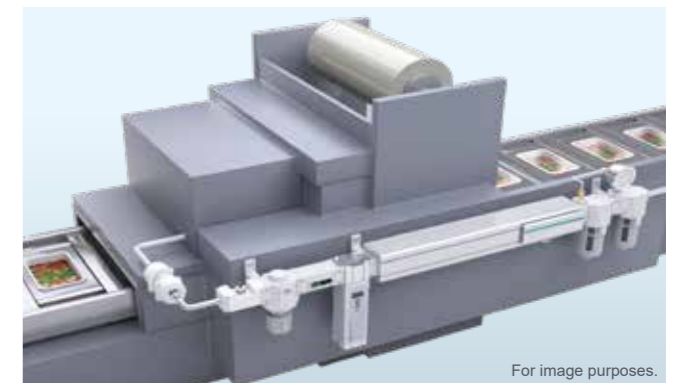
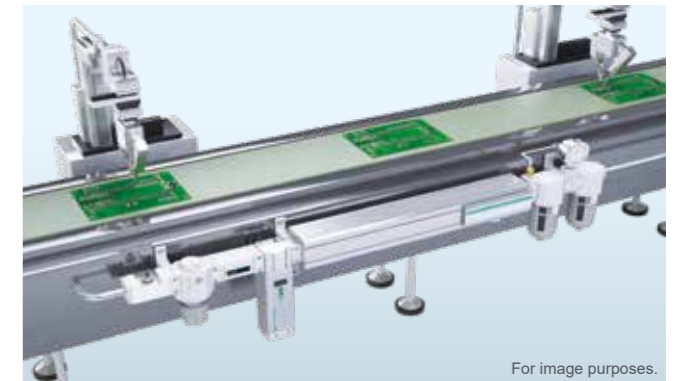
This logo represents our commitment to support food manufacturing processes with safe CKD products.

A new recommendation for nitrogen supply

Flexible design *New*

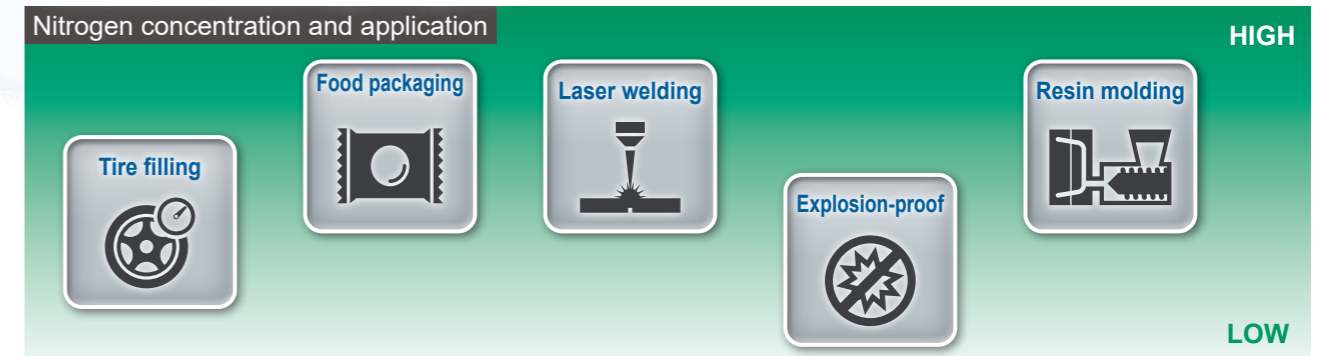
New horizontal mounting available

- ▶ Installation in dead spaces
- ▶ Built-in installation into equipment..



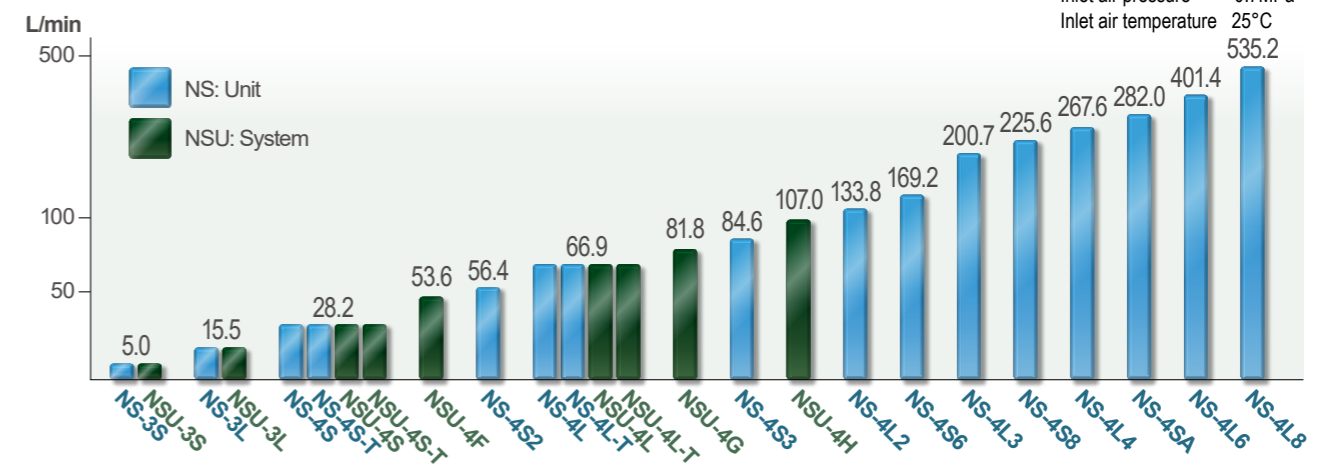
Degrees of freedom in concentration *New*

- ▶ Nitrogen is now available from 90% concentration.
- ▶ Nitrogen supply to low-nitrogen concentration environments such as explosion-proof.



Degrees of freedom in selection *New*

- ▶ The optimum model can be selected from the lineup of 25 models and 17 flow rates.

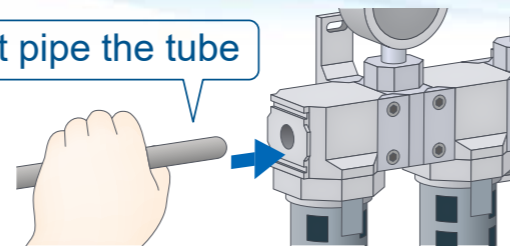


Install anywhere

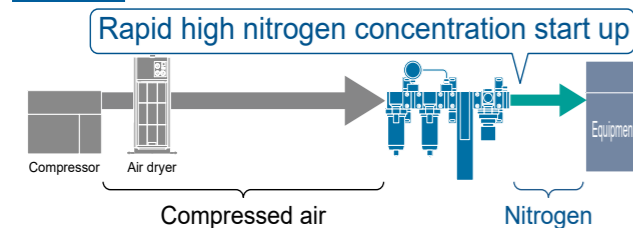
Reduces processes, piping, and space

- ▶ Nitrogen-enriched gas can be obtained simply by supplying compressed air.
- ▶ Design and piping are done easily by providing system components.
- ▶ Its small size and light weight allows it to be installed near the device. No need for long piping work dedicated to nitrogen.

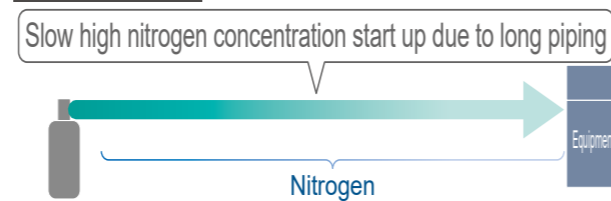
Just pipe the tube



NS Series

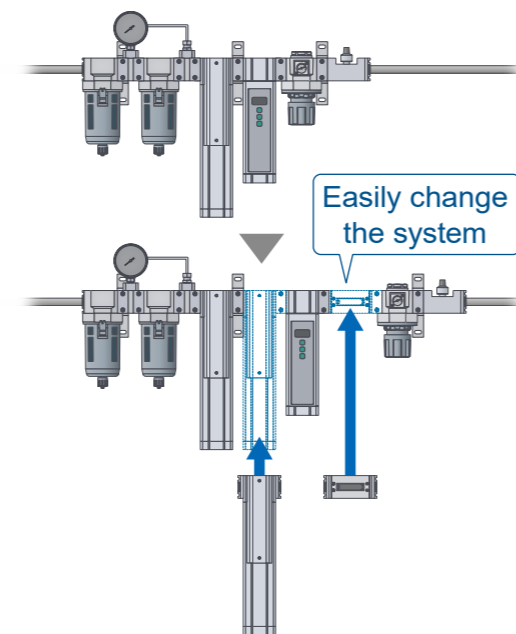


Conventional method



Freely select

- ▶ The ideal system can be selected according to the required flow rate and concentration.
- ▶ Modular connection enables easy system changes such as expansion of stations after installation.



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 system.
- *A power supply is required when the oxygen concentration monitor or flow rate sensor (option) is selected.

NS Series configuration

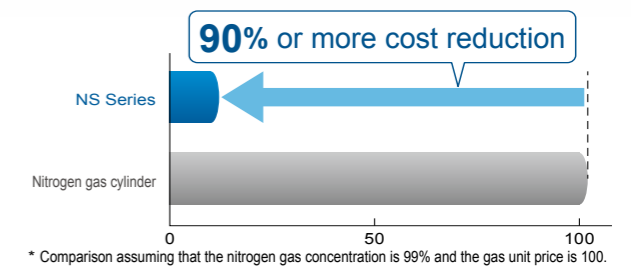
System		
1-station		2-station
NSU		
Horizontal mounting	Vertical mounting	

Low cost and reduced processes

Running cost reduction

- ▶ Running cost is only the cost of electricity for the air compressor.
 - ▶ There are no ongoing costs such as cylinder replenishment costs.
- *A power supply is required when the oxygen concentration monitor or flow rate sensor (option) is selected.

Nitrogen gas cylinder and gas unit price comparison



Reduced administrative processes

- ▶ Nitrogen volume control is no longer required.
- ▶ Oxygen concentration monitor and flow rate sensor can be installed inline, enabling continuous control.

Control of oxygen concentration (by nitrogen concentration)

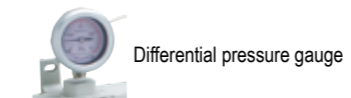


oxygen concentration monitor

Nitrogen flow rate management



Management of supplied compressed air quality



Differential pressure gauge

*Modular connection enables easy connection of required components. Contact the CKD for details.

Easy maintenance

Sustained reliability

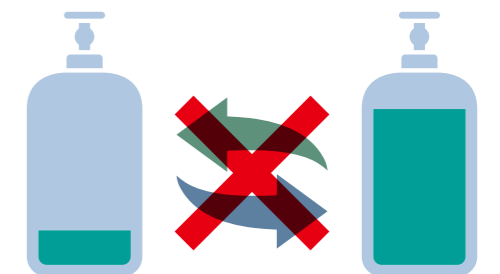
- ▶ Since there are no movable parts, stable performance can be maintained.
- ▶ Parts replacement is possible without disassembling the piping.

Not subject to the High Pressure Gas Safety Act

- ▶ There is no need for notifications or assignment of qualified personnel.

Replacement not required

- ▶ Troublesome tank management of remaining gases or replacement work is not required.



Unit		
Single cylinder		Double acting
NS		
Horizontal mounting	Vertical mounting	

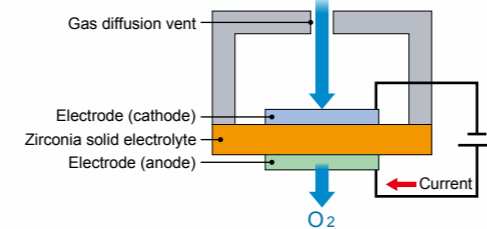
Oxygen concentration under pressurization can be known.



Limit current method

The PNA Series uses the limit current method. When voltage is applied to the zirconia element, an ion current flows with oxygen ions as carriers. When the oxygen concentration changes, the current characteristics change proportionally, enabling detection of the oxygen concentration. Durability and a long service life can be expected from this method.

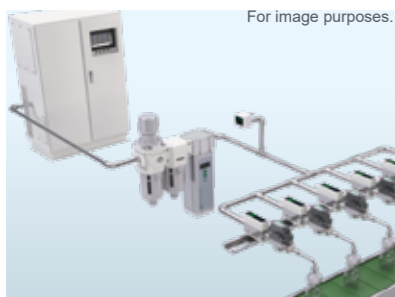
Measurement principle



Inline Oxygen Monitor PNA Series

Application examples

Terminal concentration check



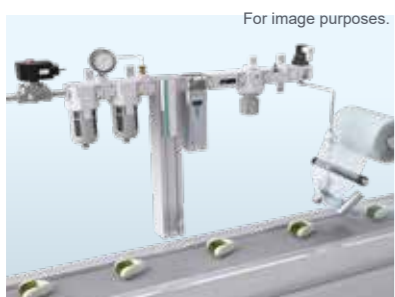
- For image purposes.
- Concentration check at start of operations
 - Normal concentration check
 - Understanding maintenance timing

Gas concentration check in explosion-proof areas



- For image purposes.
- Concentration check at start of operations
 - Normal concentration check
 - Alarm for dangerous concentrations

Nitrogen filling concentration check



- For image purposes.
- Concentration check during nitrogen filling
 - Concentration setting

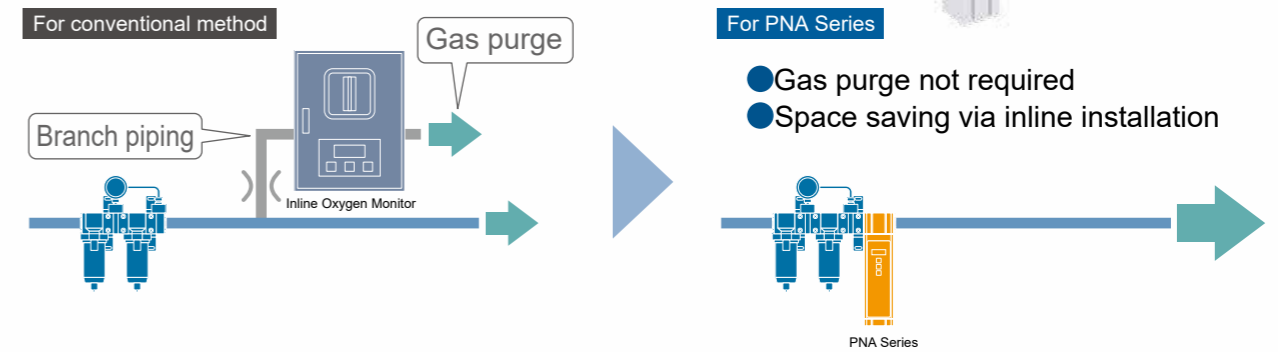
Checking gas for remaining oxygen removal



- For image purposes.
- Oxygen concentration check during purging of gas
 - Status monitoring

Saves energy, piping, and space

- Pressure resistant structure for inline use
- Modular structure saves space
- Conventional gas purging is no longer necessary



Easy to use

Oxygen/inert gas concentration display is switchable

- ▶ With 100-oxygen concentration, the inert gas concentration is clear at a glance.

Upper/lower limit Switches output setting, and analog output are available

- ▶ Alarms can be set for concentration changes, and status monitoring is possible.

With self-diagnostic function

- ▶ Keeps you posted about abnormalities in the detector element.

Degree of protection IP65 or equivalent

- ▶ Wet or dry, it still functions.

Pressure resistant structure

- ▶ Usable at pressures from atmospheric pressure through 1.0 MPa.



Oxygen concentration display



Inert gas concentration display

Compatible with FP Series for secure food manufacturing processes

Safe and secure for food manufacturing processes.

Material compatible with the Food Sanitation Act
Fluid passage section Resin /rubber



This logo represents our commitment to support food manufacturing processes with safe CKD products.

CKD after-sales service

Calibration certificates (with traceability series variation diagram) can be issued.

The sensor of the oxygen concentration monitor may deteriorate depending on the working conditions. Therefore, regular inspection and adjustment is required to maintain stable performance. For even longer consistent performance, we recommend the yearly inspection and adjustment service (with calibration certificate).

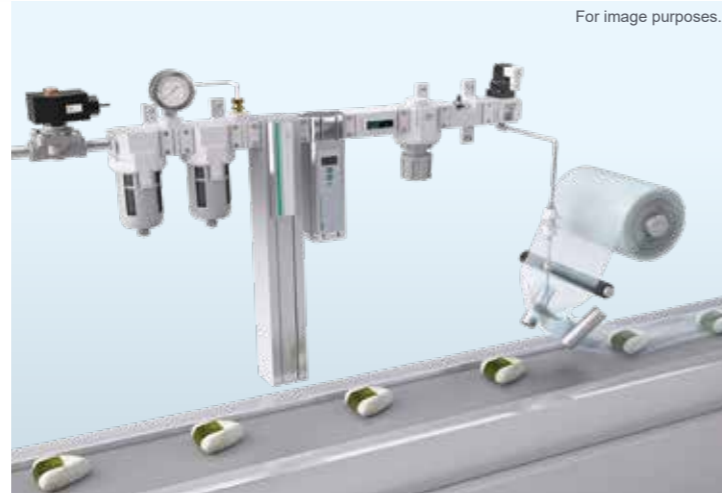


Feel free to contact CKD for details on inspection, calibration, and repair.

Case Study

Packaging Gas-filled packaging

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



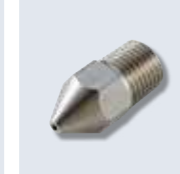
2-port solenoid valve for dry air



Bacteria removing filter

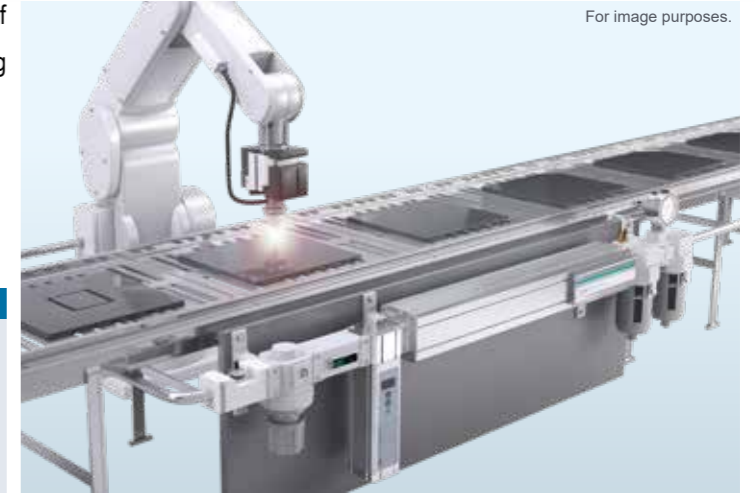


Air nozzle point type



Production Laser welding

Shield with nitrogen gas to prevent degradation of welding strength due to oxidation at molten parts during laser welding.



Drain separator



High polymer membrane air dryer



Direct acting 2-port valve

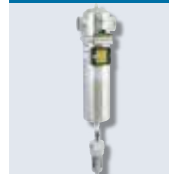


Food/chemicals Remaining oxygen removal

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



Oil-free main line filter



Compressed air flow rate sensor



2-port solenoid valve



Machining/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

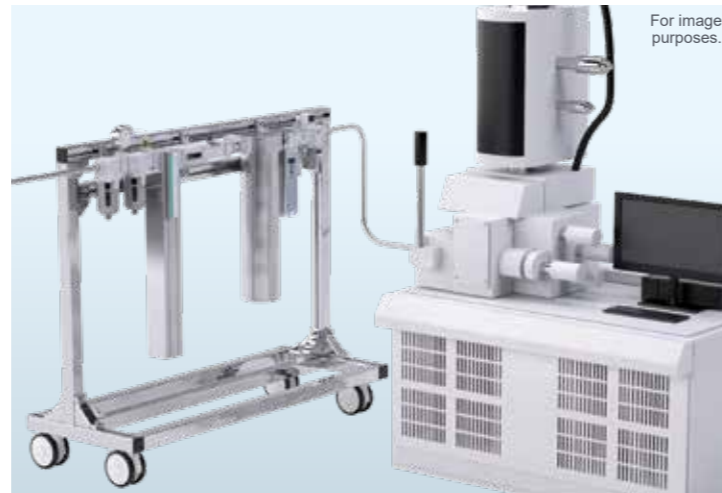


2-port solenoid valve



Inspection Electron microscope

Nitrogen is used as a gas for vent, actuator and damper.



Modular 2-port solenoid valve



High-performance oil mist filter

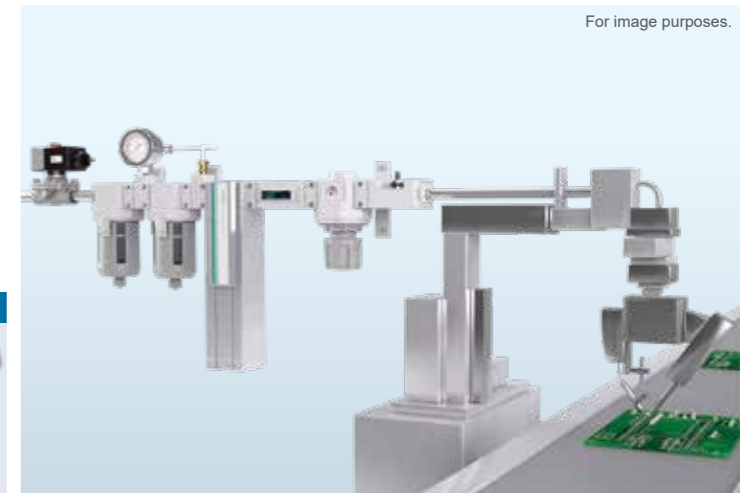


Digital pressure sensor



Base 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

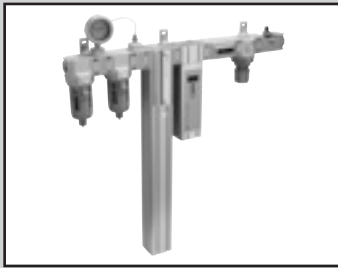


Cylinder valve



Electric actuators





Nitrogen Gas Extraction Unit System type

NSF H1

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

Item		NSU-3S	NSU-3L	NSU-4S	NSU-4F	NSU-4L	NSU-4G	NSU-4H		
Range of working conditions	Working fluid	Compressed air								
	Inlet air pressure MPa	0.4 to 1.0 (*1)								
	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								
	Inlet air pressure dew point °C	10								
Rating	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) (*2)	Nitrogen concentration (%) or higher	99.9	1.9	5.6	11.0	20.9	30.6	31.9	49.0
			99	5.0	15.5	28.2	53.6	66.9	81.8	107.0
			97	8.9	28.7	49.9	94.8	118.1	159.7	189.0
			95	14.0	39.8	65.3	124.1	169.2	222.0	270.7
			90	27.0	78.1	137.3	260.9	313.5 (*4)	- (*5)	
	Inlet air flow rate L/min(ANR)	Nitrogen concentration (%) or higher	99.9	17.3	50.9	100.0	190.0	278.2	290.0	445.5
			99	20.9	64.6	117.5	223.3	278.8	340.8	445.8
			97	24.1	77.6	134.9	256.2	319.2	431.6	510.8
			95	31.2	88.5	145.2	275.8	376.0	493.3	601.6
			90	60.0	173.6	305.1	579.7	696.7 (*4)	- (*5)	
Air filter	Filtration rating μm	5								
Oil mist filter	Oil removal mg/m ³	0.01Less than or equal to (0.1 or less after oil saturation) * Primary oil measurement concentration 30mg/m ³ and 21°C.								
Regulator	Set pressure range MPa	0.05 to 0.85								
Oxygen monitor		Refer to page 15 for the specifications.								
Flow rate sensor		Refer to page 17 for the specifications.								
Needle valve	Flow characteristics	Refer to page 4.								
Standard accessories		Pressure gauge/differential pressure gauge/bracket								

*1: The inlet air pressure when NS-QFS-E is assembled is 0.4 to 0.75MPa.

*2: When the membrane unit size "H" is selected and the inlet temperature is set to 50°C, the outlet flow rate with nitrogen gas concentration of 99.9% must be 39 L/min or less. Contact CKD when working beyond the specified range.

*3: Refer to the outlet nitrogen gas flow rate and the needle valve flow characteristics to confirm that the value is within the working range. Contact CKD when working outside the specified range.

*4: When the "L" sized membrane unit is selected and the outlet nitrogen gas with a concentration of 90% is used, the inlet air temperature should be 40 °C or less. Please contact CKD if you intend to use the product above 40 °C.

*5: When the "G" and "H" membrane sized units are selected, please contact us if you want to use the outlet nitrogen gas with a concentration of 90%.

Selection guide

The temperature and inlet air pressure affect the outlet nitrogen gas flow and should be corrected if they differ from the ratings in the specification section.

STEP 1 Confirm working conditions

Outlet nitrogen gas flow rate [L/min (ANR)]

Outlet nitrogen gas pressure [MPa]

Inlet air pressure [MPa]

Inlet air temperature [°C]

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

(1) Temperature - Gas flow rate compensation coefficient

Temp° (°C)	Outlet nitrogen gas concentration				
	99.9%	99%	97%	95%	90%
5	0.64	0.79	0.79	0.75	0.78
10	0.73	0.84	0.84	0.81	0.84
25	1	1	1	1	1
35	0.97	1.05	1.04	1.07	1.07
40	0.95	1.08	1.06	1.11	1.11
50	0.9	1.09	1.11	1.15	1.2

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

(2) Pressure - Gas flow rate compensation 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 body size and membrane unit size based on the rated outlet nitrogen gas flow rate of each model.

Rated outlet nitrogen gas flow rate × (1) Temperature gas flow rate correction coefficient × (2) Pressure gas flow rate correction coefficient = corrected refined nitrogen gas flow rate. Select the body size and membrane unit size whose refined nitrogen gas flow rate after correction with the above formula is sufficient for the required gas flow rate

STEP 5 Select the required needle valve according to the outlet nitrogen gas flow rate.

Based on the outlet nitrogen gas flow and outlet nitrogen gas pressure confirmed in STEP1, select the needle valve from the needle valve flow characteristics (page 4)

STEP 6 Select the model from STEP4 and STEP5.

STEP 7 Confirm the compensation coefficient for inlet air flow rate affected by inlet air temperature.

(3) Temperature - Air flow rate compensation coefficient

Temp (°C)	Outlet nitrogen gas concentration				
	99.9%	99%	97%	95%	90%
5	0.73	0.68	0.75	0.69	0.76
10	0.8	0.76	0.81	0.77	0.82
25	1	1	1	1	1
35	1.21	1.17	1.11	1.13	1.11
40	1.32	1.25	1.17	1.2	1.16
50	2.05	1.38	1.31	1.31	1.3

STEP 8 Confirm the compensation coefficient for inlet air flow rate affected by inlet air pressure.

(4) Pressure - Air flow rate compensation 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 9 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 STEP5 × (3) temperature air flow rate correction coefficient × (4) pressure air flow rate correction coefficient = corrected inlet air flow rate. 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	Compensation coefficient for outlet nitrogen gas flow rate	Compensation coefficient for inlet air flow rate
Outlet nitrogen flow rate	50 [L/min(ANR)]	50 [L/min(ANR)]	-	-
Outlet nitrogen concentration	99 [%]	99 [%]	-	-
Outlet nitrogen pressure	0.2 [MPa]	0.2 [MPa]	-	-
Inlet air temperature	35 [°C]	40 [°C]	(1) 1.08	(3) 1.25
Inlet air pressure	0.6 to 0.7 [MPa]	0.6 [MPa]	(2) 0.75	(4) 0.91

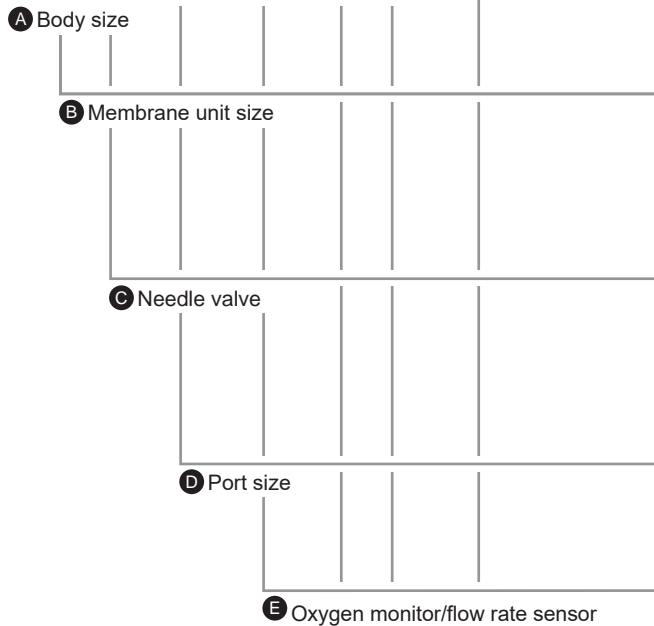
Calculate the following and select according to the above conditions.

From the formula 50 (outlet nitrogen gas flow rate) ÷ 1.08 ÷ 0.75 = 61.7[L/min(ANR)], the specification field shows that NSU-4L has sufficient flow rate and is the proper size.

For needle size, select NS-QDVL-160 at 0.2 [MPa], which can be adjusted at 50 [L/min (ANR)]. This enables the selection of "NSU-4LC10AAK-N". In this case, the inlet air flow rate is 278.8 × 1.25 × 0.91 = 317.1L/min (ANR).

How to order

NSU - **4** **S** **A** **10A** **NN** - **N** **T** - **FP1**



*The oxygen sensor does not include connector cables. Order the following connector cable discrete model No.

Connector cable discrete model No.

- DC cable
- AC adapter single unit

PNA-1D	PNA-A
Cable length	AC adapter + conversion plug set
1D 1000 mm	PNA-AG
3D 3000 mm	
5D 5000 mm	

Refer to page 16 for dimensions.

⚠ Precautions for model No. selection

- *1: Only the body size "4" is available for the membrane unit sizes "F", "G" and "H".
- *2: Refer to the table below for combinations of **C** needle valve. Select a flow rate sensor with a suitable range for the needle valve.

	Needle valve size NS-QDVL-***				
	20	80	160	240	400
NSU-3S	A	B			
NSU-3L	A	B	C		
NSU-4S/4F	A	B	C	D	
NSU-4L/4G/4H	A	B	C	D	E

- *3: When selecting G3/8, the regulator pressure gauge units will be shown as bar.
- *4: When selecting NPT3/8, the regulator pressure gauge units will be shown as psi.
- *5: Switch output for the flow rate sensor is NPN. Specify the option "P" to obtain PNP output.
- *6: Exhaust air (oxygen-enriched gas) from standard products is released into the atmosphere. For "E", piping connection for exhaust (oxygen-rich gas) is possible. Size of exhaust port is Rc1/2.
- *7: Viewed from the front, standard products have an air inlet on the left port and a nitrogen gas outlet on the right port.

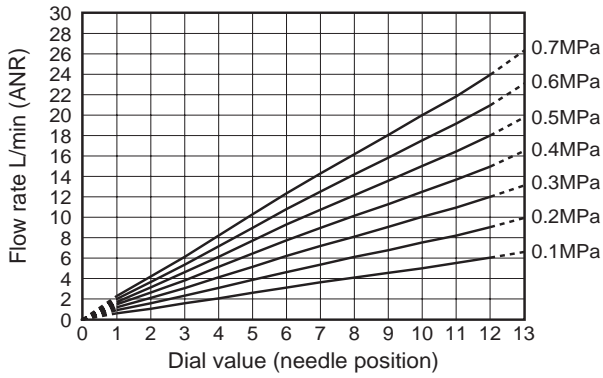
Code	Description
A Body size	
3	Body width 63
4	Body width 79
B Membrane unit size (*1)	
S	Short
F	Short + Short
L	Long
G	Long + Short
H	Long + Long
C Needle valve (*2)	
A	Max. flow rate 20 L/min
B	Max. flow rate 80L/min
C	Max. flow rate 160 L/min
D	Max. flow rate 240 L/min
E	Max. flow rate 400 L/min
D Port size	
10A	Rc3/8
10B	G3/8 (*3)
10C	NPT3/8 (*4)
E Oxygen monitor/flow rate sensor (*5)	
NN	No
AK	With oxygen monitor
AM	With oxygen monitor, traceability cert with series variation diag and company cert
BA	With flow rate sensor (20 L/min specification)
BB	With flow rate sensor (50 L/min specification)
BC	With flow rate sensor (100 L/min specification)
BD	With flow rate sensor (200 L/min specification)
BE	With flow rate sensor (500 L/min specification)
CA	With oxygen monitor and flow rate sensor (20 L/min specification)
CB	With oxygen monitor and flow rate sensor (50 L/min specification)
CC	With oxygen monitor and flow rate sensor (100 L/min specification)
CD	With oxygen monitor and flow rate sensor (200 L/min specification)
CE	With oxygen monitor and flow rate sensor (500 L/min specification)
CF	With oxygen monitor (with traceability) and flow rate sensor (20 L/min specification)
CG	With oxygen monitor (with traceability) and flow rate sensor (50 L/min specification)
CH	With oxygen monitor (with traceability) and flow rate sensor (100 L/min specification)
CJ	With oxygen monitor (with traceability) and flow rate sensor (200 L/min specification)
CK	With oxygen monitor (with traceability) and flow rate sensor (500 L/min specification)
F Option	
N	No option
E	With exhaust port (*6)
K	Flow rate sensor With unit switching function (overseas models only)
P	Flow rate sensor Switch output: PNP output
X	Reverse flow (*7)
G Mounting direction	
Blank	Vertical mounting
T	Horizontal mounting (available with NSU-4S, 4L)
H Series	
Blank	Standard
FP1	Series for food processing

* Contact CKD for other combinations.

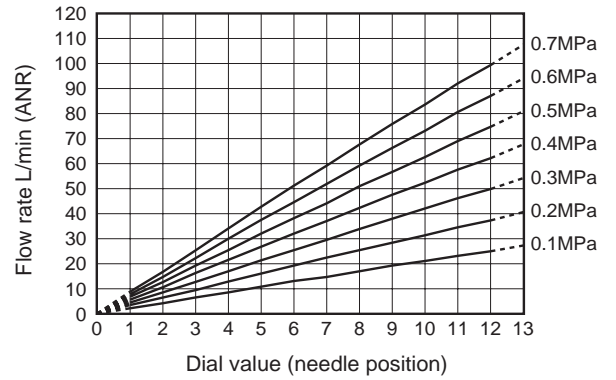
Needle valve flow characteristics

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

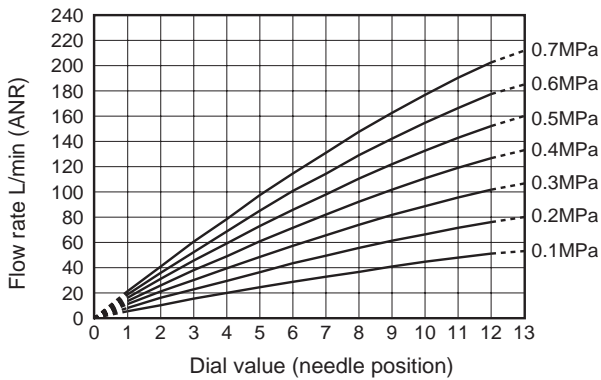
● NS-QDVL-020



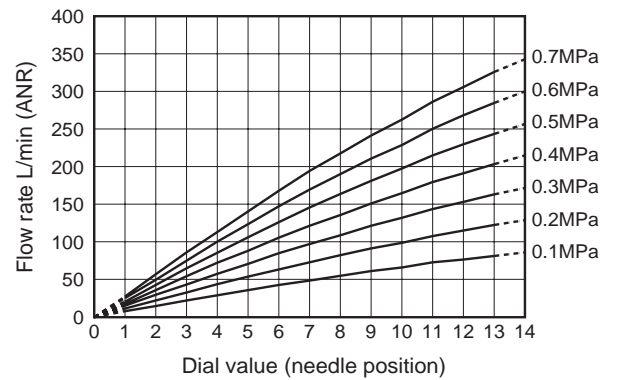
● NS-QDVL-080



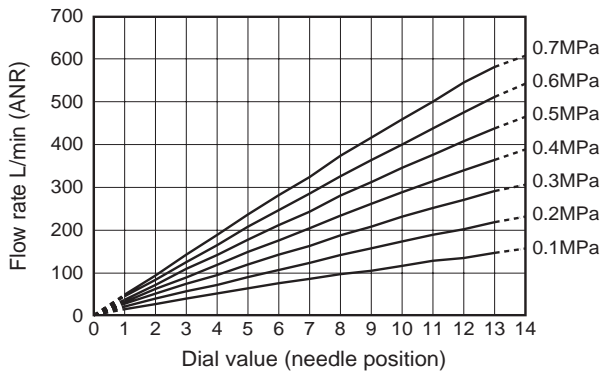
● NS-QDVL-160



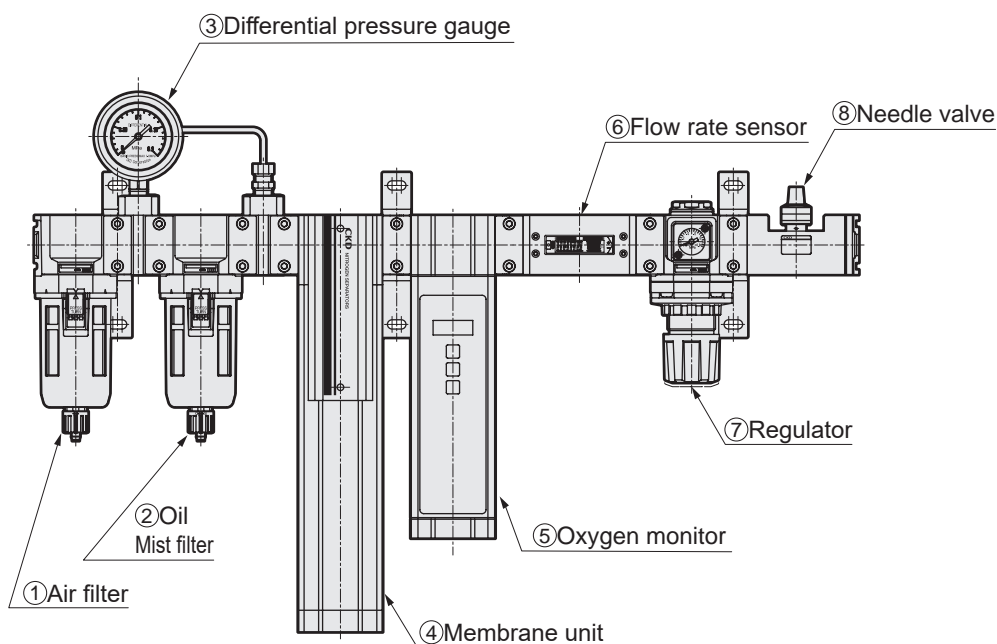
● NS-QDVL-240



● NS-QDVL-400



System components (vertical mount)



Standard (with port size Rc3/8)

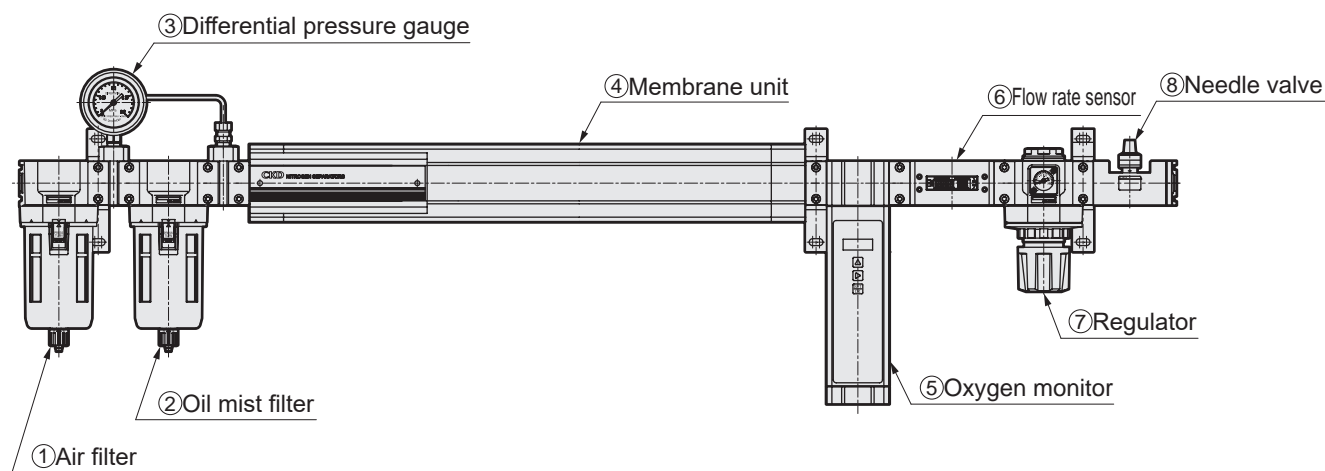
Unit model No.	NSU-3S□	NSU-3L□	NSU-4S□	NSU-4F□	NSU-4L□	NSU-4G□	NSU-4H□
(1) Air filter	F3000-10-W-F		F4000-10-W-F				
(2) Oil mist filter	M3000-10-W-F1		M4000-10-W-F1				
(3) Differential pressure gauge	GA400-8-P02						
(4) Membrane unit	NS-3S110A-□	NS-3L110A-□	NS-4S110A-□	NS-4S110A-□ NS-4S110A-□	NS-4L110A-□	NS-4L110A-□ NS-4S110A-□	NS-4L110A-□ NS-4L110A-□
(5) Oxygen monitor	PNA-10A-□-FP2						
(6) Flow rate sensor	NS-QFS-□						
(7) Regulator	NS-QR3-FP1			NS-QR4-FP1			
(8) Needle valve	NS-QDVL-020 NS-QDVL-080	NS-QDVL-020 NS-QDVL-080 NS-QDVL-160	NS-QDVL-020 NS-QDVL-080 NS-QDVL-160 NS-QDVL-240	NS-QDVL-020 NS-QDVL-080 NS-QDVL-160 NS-QDVL-240 NS-QDVL-400			

FP1 (with port size Rc3/8)

Unit model No.	NSU-3S□-FP1	NSU-3L□-FP1	NSU-4S□-FP1	NSU-4F□-FP1	NSU-4L□-FP1	NSU-4G□-FP1	NSU-4H□-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-3S110A-□-FP2	NS-3L110A-□-FP2	NS-4S110A-□-FP2	NS-4S110A-□-FP2 NS-4S110A-□-FP2	NS-4L110A-□-FP2	NS-4L110A-□-FP2 NS-4S110A-□-FP2	NS-4L110A-□-FP2 NS-4L110A-□-FP2
(5) Oxygen monitor	PNA-10A-□-FP2						
(6) Flow rate sensor	NS-QFS-□						
(7) Regulator	NS-QR3-FP1			NS-QR4-FP1			
(8) Needle valve	NS-QDVL-020 NS-QDVL-080	NS-QDVL-020 NS-QDVL-080 NS-QDVL-160	NS-QDVL-020 NS-QDVL-080 NS-QDVL-160 NS-QDVL-240	NS-QDVL-020 NS-QDVL-080 NS-QDVL-160 NS-QDVL-240 NS-QDVL-400			

*Contact CKD regarding port size G3/8 and NPT3/8.

System components (horizontal mounting)



■ Standard (with port size Rc3/8)

Unit model No.	NSU-4S□-□T	NSU-4L□-□T
(1) Air filter	F4000-10-W-F	
(2) Oil mist filter	M4000-10-W-F1	
(3) Differential pressure gauge	GA400-8-P02	
(4) Membrane unit	NS-4S110A-□T	NS-4L110A-□T
(5) Oxygen monitor	PNA-10A-□-FP2	
(6) Flow rate sensor	NS-QFS-□	
(7) Regulator	NS-QR4-FP1	
(8) Needle valve	NS-QDVL-020	NS-QDVL-020
	NS-QDVL-080	NS-QDVL-080
	NS-QDVL-160	NS-QDVL-160
	NS-QDVL-240	NS-QDVL-240
		NS-QDVL-400

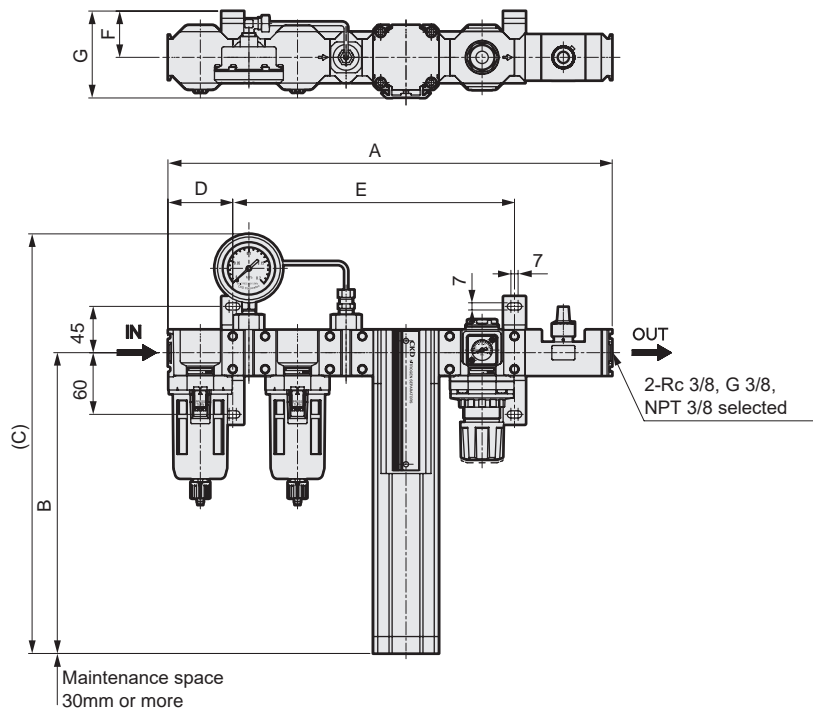
■ FP1 (with port size Rc3/8)

Unit model No.	NSU-4S□-□T-FP1	NSU-4L□-□T-FP1
(1) Air filter	F4000-10-W-F-FP1	
(2) Oil mist filter	M4000-10-W-F1-FP1	
(3) Differential pressure gauge	GA400-8-P02	
(4) Membrane unit	NS-4S110A-□T-FP2	NS-4L110A-□T-FP2
(5) Oxygen monitor	PNA-10A-□-FP2	
(6) Flow rate sensor	NS-QFS-□	
(7) Regulator	NS-QR4-FP1	
(8) Needle valve	NS-QDVL-020	NS-QDVL-020
	NS-QDVL-080	NS-QDVL-080
	NS-QDVL-160	NS-QDVL-160
	NS-QDVL-240	NS-QDVL-240
		NS-QDVL-400

*Contact CKD regarding port size G3/8 and NPT3/8.

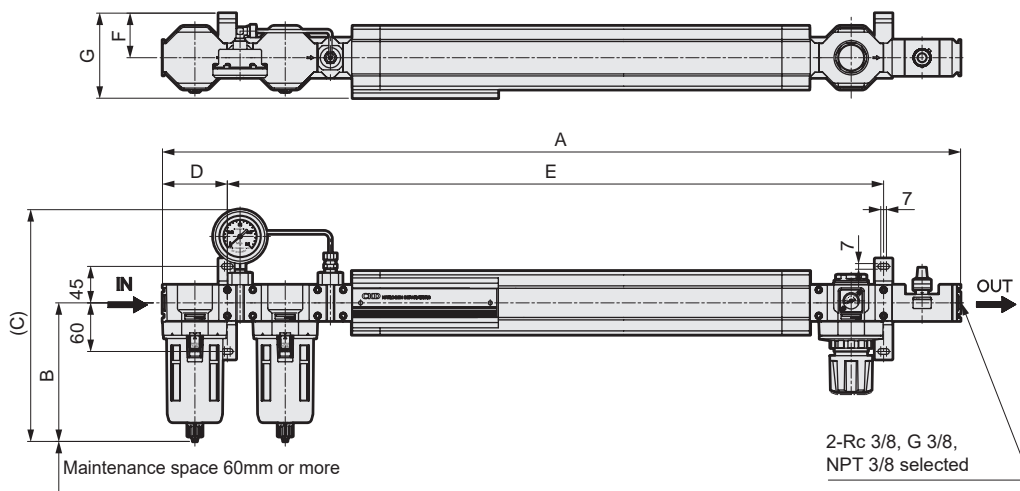
Dimensions (1-station type)

- Without oxygen monitor/without flow rate sensor (NSU-^{3S}_{4L}*10*NN)



Model No.	A	B	C	D	E	F	G	Weight (kg)
NSU-3S*10*NN	432	293	408	63	274	45	85	4.0
NSU-3L*10*NN	432	543	658	63	274	45	85	4.9
NSU-4S*10*NN	498	543	658	80	323	55	106	6.9
NSU-4L*10*NN	498	1043	1158	80	323	55	106	9.7

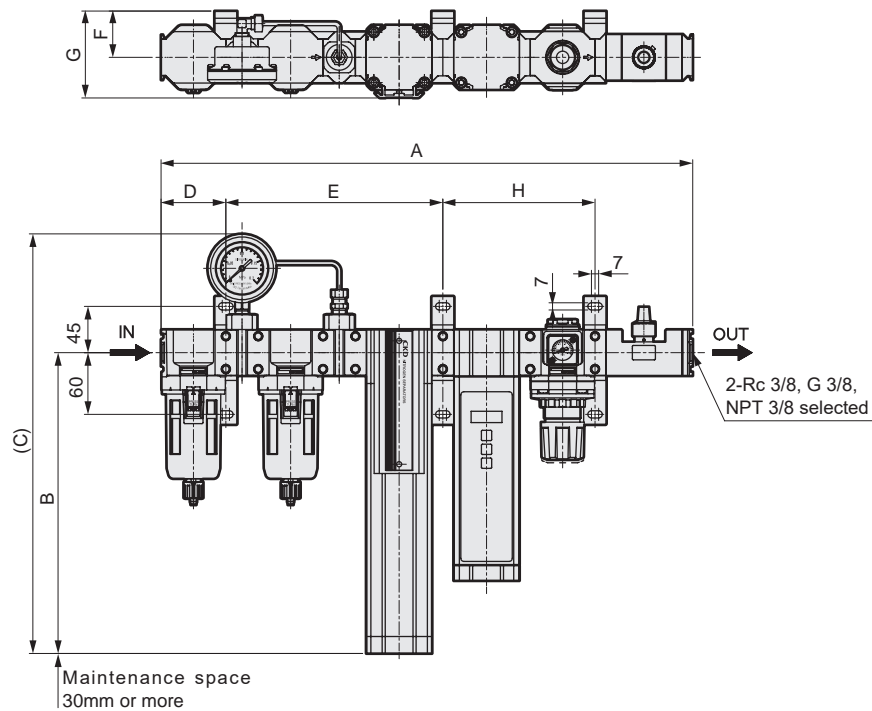
- Without oxygen monitor/without flow sensor (NSU-4^S_L*10*NN-*T)



Model No.	A	B	C	D	E	F	G	Weight (kg)
NSU-4S*10*NN-*T	985	171	286	80	810	55	106	7.1
NSU-4L*10*NN-*T	1485	171	286	80	1310	55	106	9.9

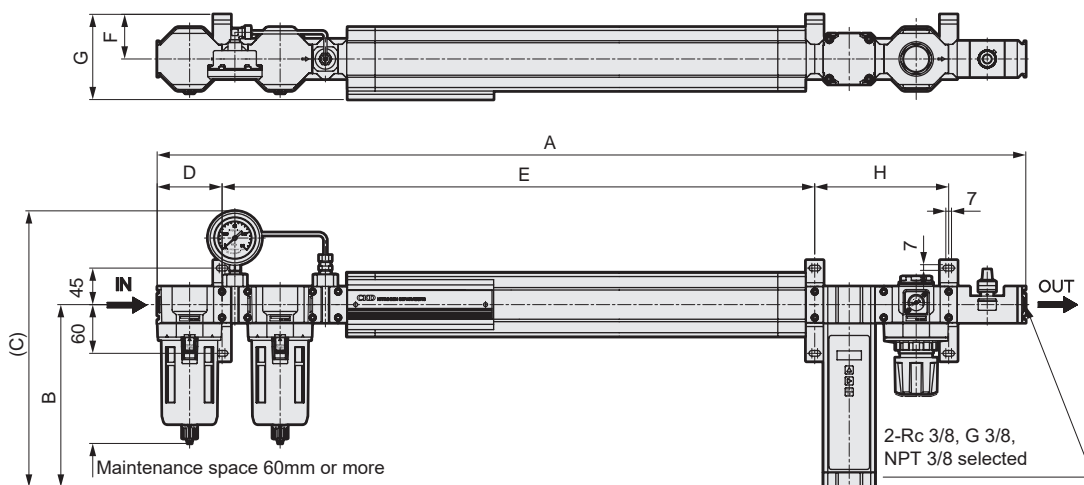
Dimensions

- With oxygen monitor/without flow rate sensor (NSU-^{3S}_{4L}*10*A*)



Model No.	A	B	C	D	E	F	G	H	Weight (kg)
NSU-3S*10*A*	517	293	408	63	211	45	85	148	5.6
NSU-3L*10*A*	517	543	658	63	211	45	85	148	6.5
NSU-4S*10*A*	583	543	658	80	243	55	106	165	8.5
NSU-4L*10*A*	583	1043	1158	80	243	55	106	165	11.3

- With oxygen monitor/without flow sensor (NSU-4^S_L*10*A*-*T)

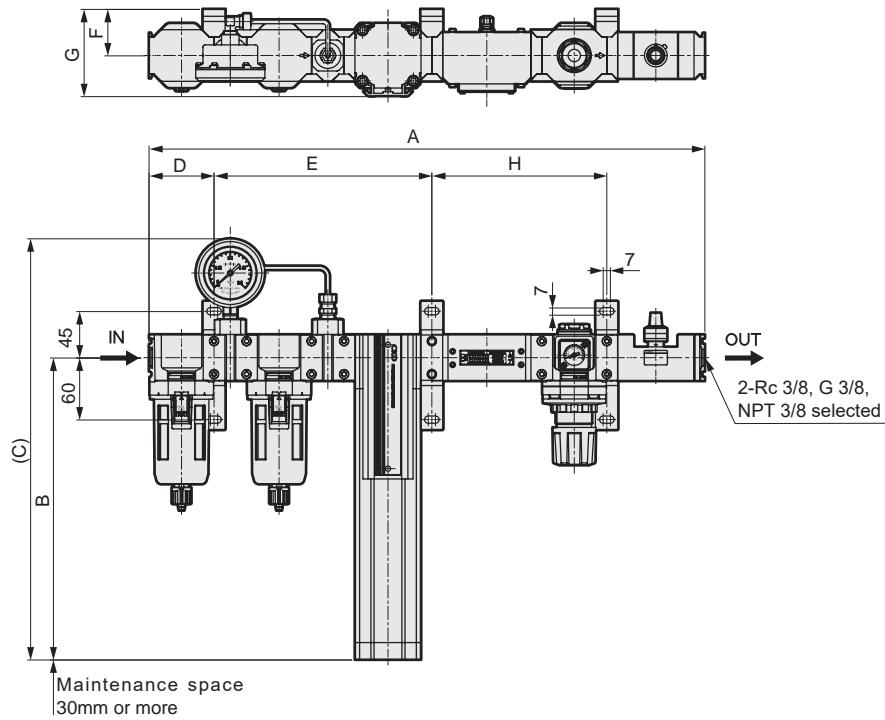


* You need at least 60mm of wiring space under the oxygen meter.

Model No.	A	B	C	D	E	F	G	H	Weight (kg)
NSU-4S*10*A*-*T	1070	225	340	80	730	55	106	165	8.7
NSU-4L*10*A*-*T	1570	225	340	80	1230	55	106	165	11.5

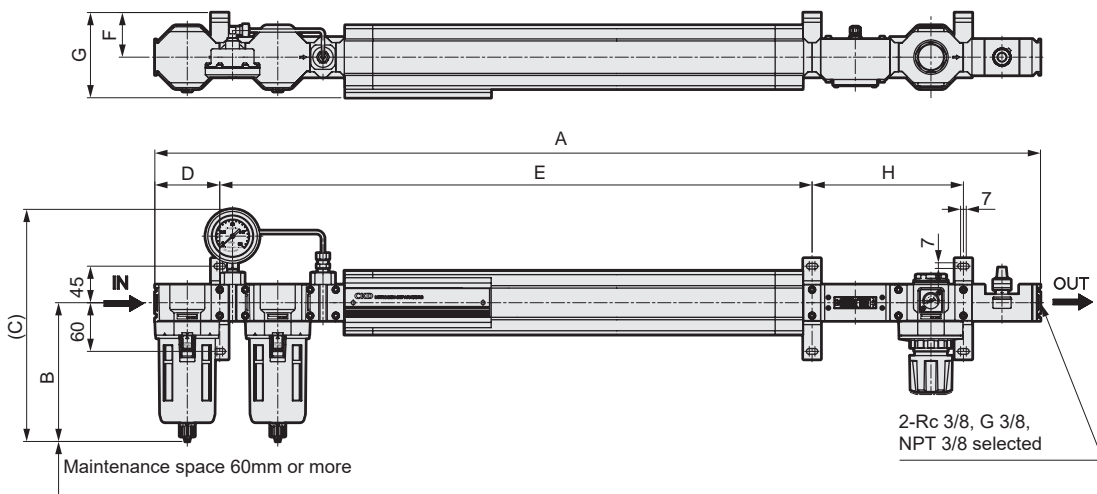
Dimensions (1 station)

- Without oxygen monitor/with flow rate sensor (NSU-^{3S}_{4L}*10*B*)



Model No.	A	B	C	D	E	F	G	H	Weight (kg)
NSU-3S*10*B*	538.5	293	408	63	211	45	85	169.5	4.8
NSU-3L*10*B*	538.5	543	658	63	211	45	85	169.5	5.7
NSU-4S*10*B*	604.5	543	658	80	243	55	106	186.5	7.7
NSU-4L*10*B*	604.5	1043	1158	80	243	55	106	186.5	10.5

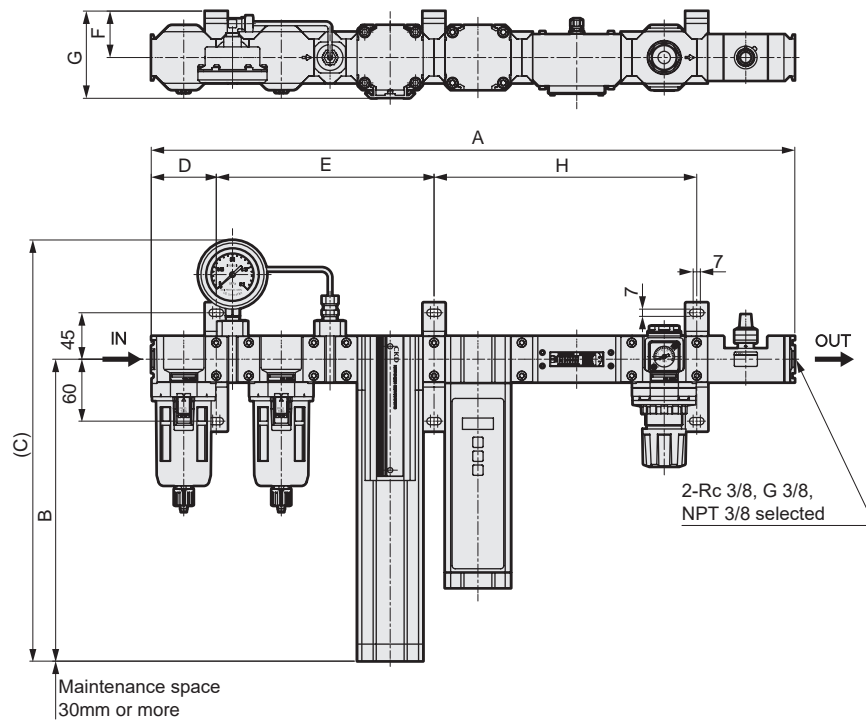
- Without oxygen monitor/with flow rate sensor (NSU-4^S_L*10*B*-*T)



Model No.	A	B	C	D	E	F	G	H	Weight (kg)
NSU-4S*10*B*-*T	1091.5	171	286	80	730	55	106	186.5	7.9
NSU-4L*10*B*-*T	1591.5	171	286	80	1230	55	106	186.5	10.7

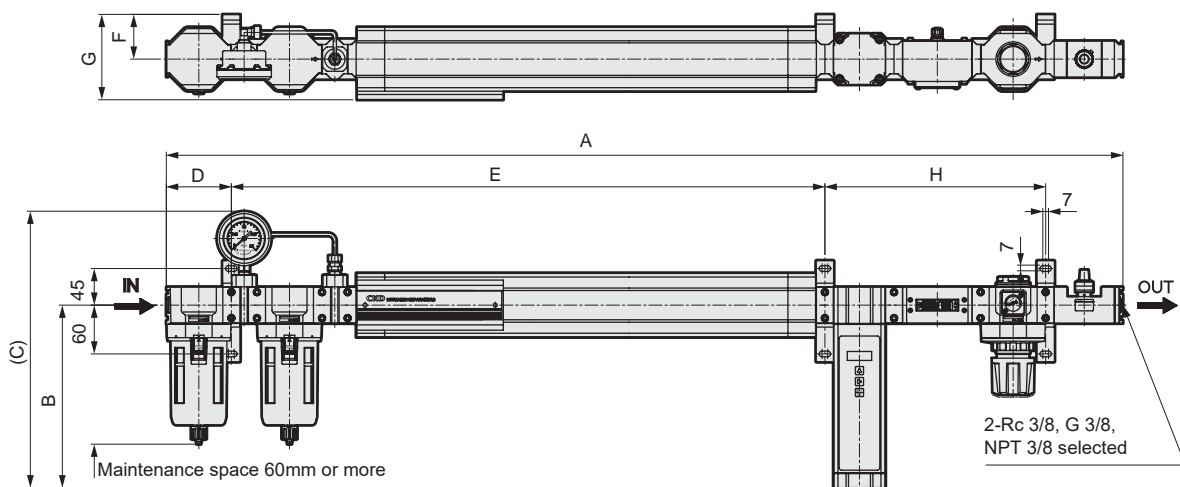
Dimensions (1 station)

- With oxygen monitor/with flow rate sensor (NSU-3S_{4L}*10*C*)



Model No.	A	B	C	D	E	F	G	H	Weight (kg)
NSU-3S*10*C*	623.5	293	408	63	211	45	85	254.5	6.4
NSU-3L*10*C*	623.5	543	658	63	211	45	85	254.5	7.3
NSU-4S*10*C*	689.5	543	658	80	243	55	106	271.5	9.3
NSU-4L*10*C*	689.5	1043	1158	80	243	55	106	271.5	12.1

- With oxygen monitor/with flow rate sensor (NSU-4_L^S*10*C*-*T)

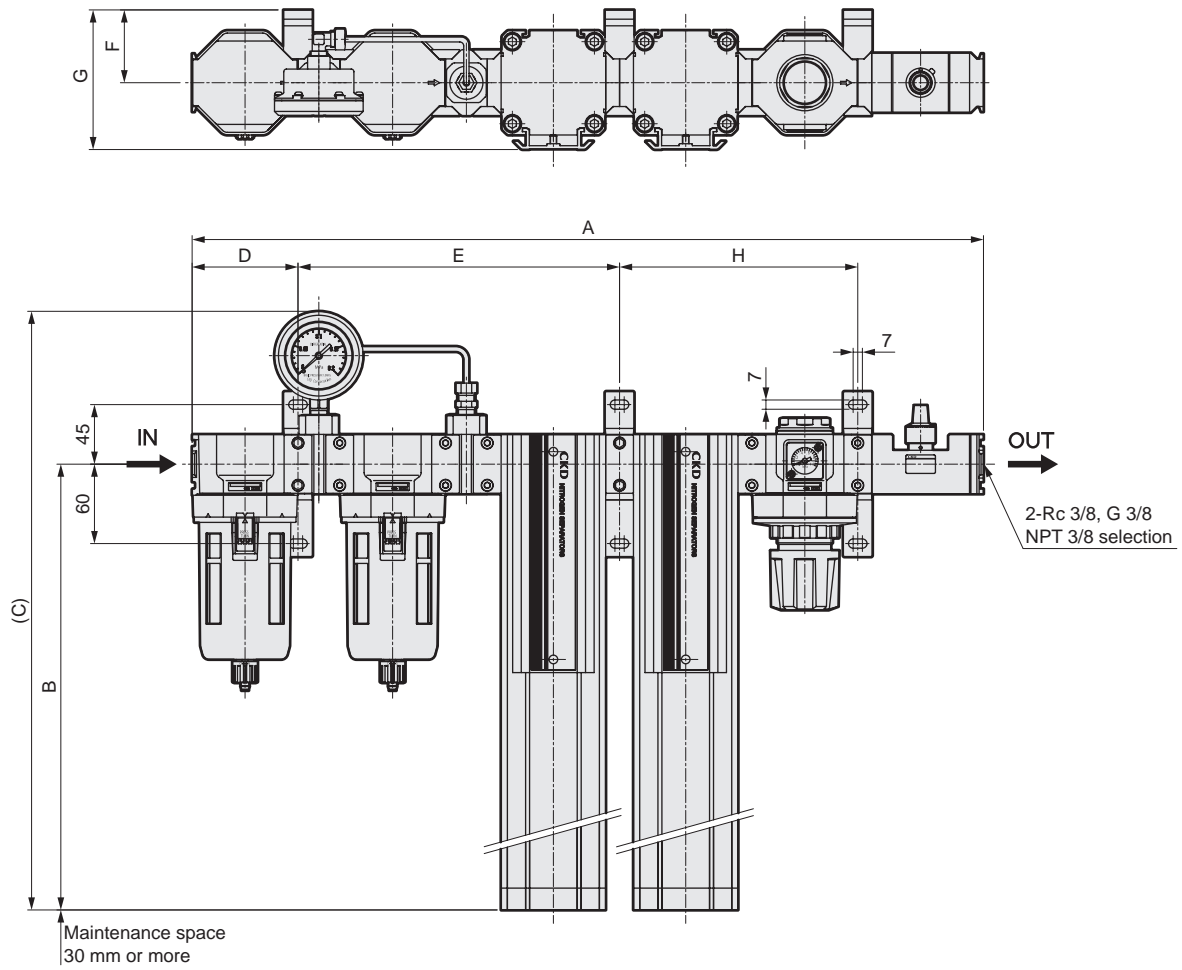


* You need at least 60mm of wiring space under the oxygen meter.

Model No.	A	B	C	D	E	F	G	H	Weight (kg)
NSU-4S*10*C*-*T	1176.5	225	340	80	730	55	106	271.5	9.5
NSU-4L*10*C*-*T	1676.5	225	340	80	1230	55	106	271.5	12.3

Dimensions (2-station type)

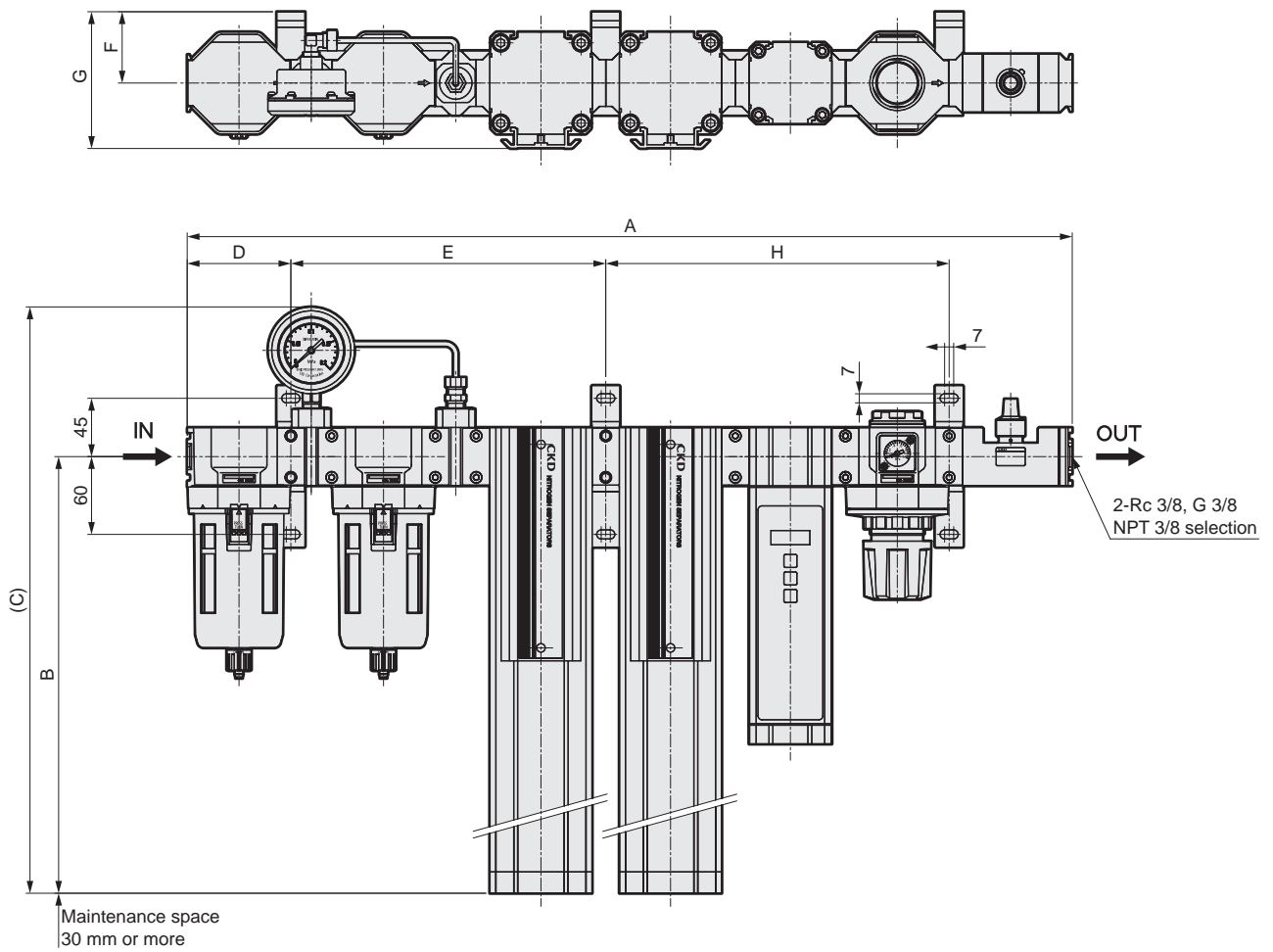
- No oxygen monitor or flow rate sensor (NSU-4^F_G*10*NN)



Model No.	A	B	C	D	E	F	G	H	Weight (kg)
NSU-4F*10*NN	598	543	658	80	243	55	106	180	10.9
NSU-4G*10*NN	598	1043	1158	80	243	55	106	180	13.7
NSU-4H*10*NN	598	1043	1158	80	243	55	106	180	16.5

Dimensions (2-station type)

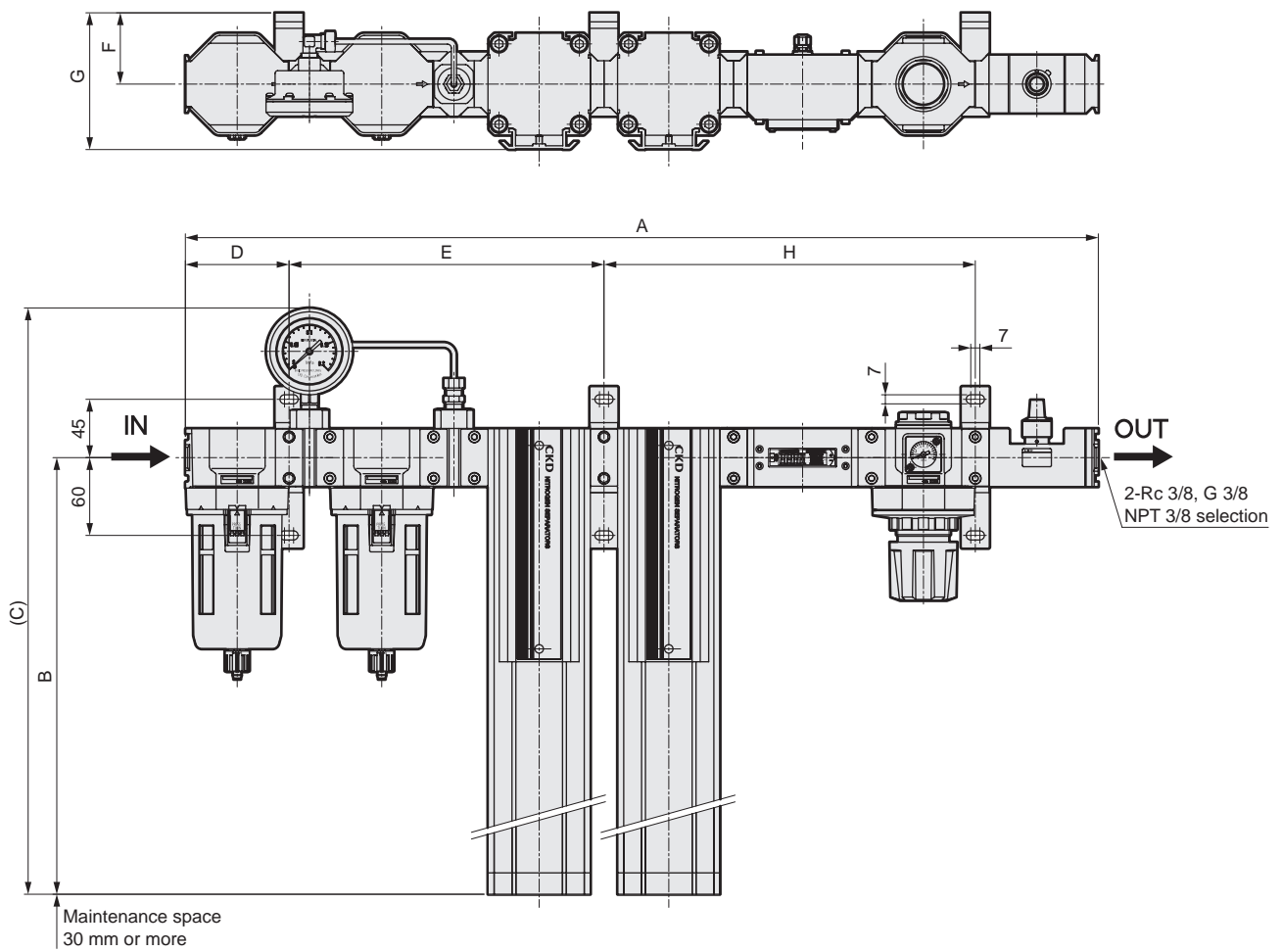
- With oxygen monitor, no flow rate sensor (NSU-4^F_G*10*A*)



Model No.	A	B	C	D	E	F	G	H	Weight (kg)
NSU-4F*10*A*	683	543	658	80	243	55	106	265	12.5
NSU-4G*10*A*	683	1043	1158	80	243	55	106	265	15.3
NSU-4H*10*A*	683	1043	1158	80	243	55	106	265	18.1

Dimensions (2-station type)

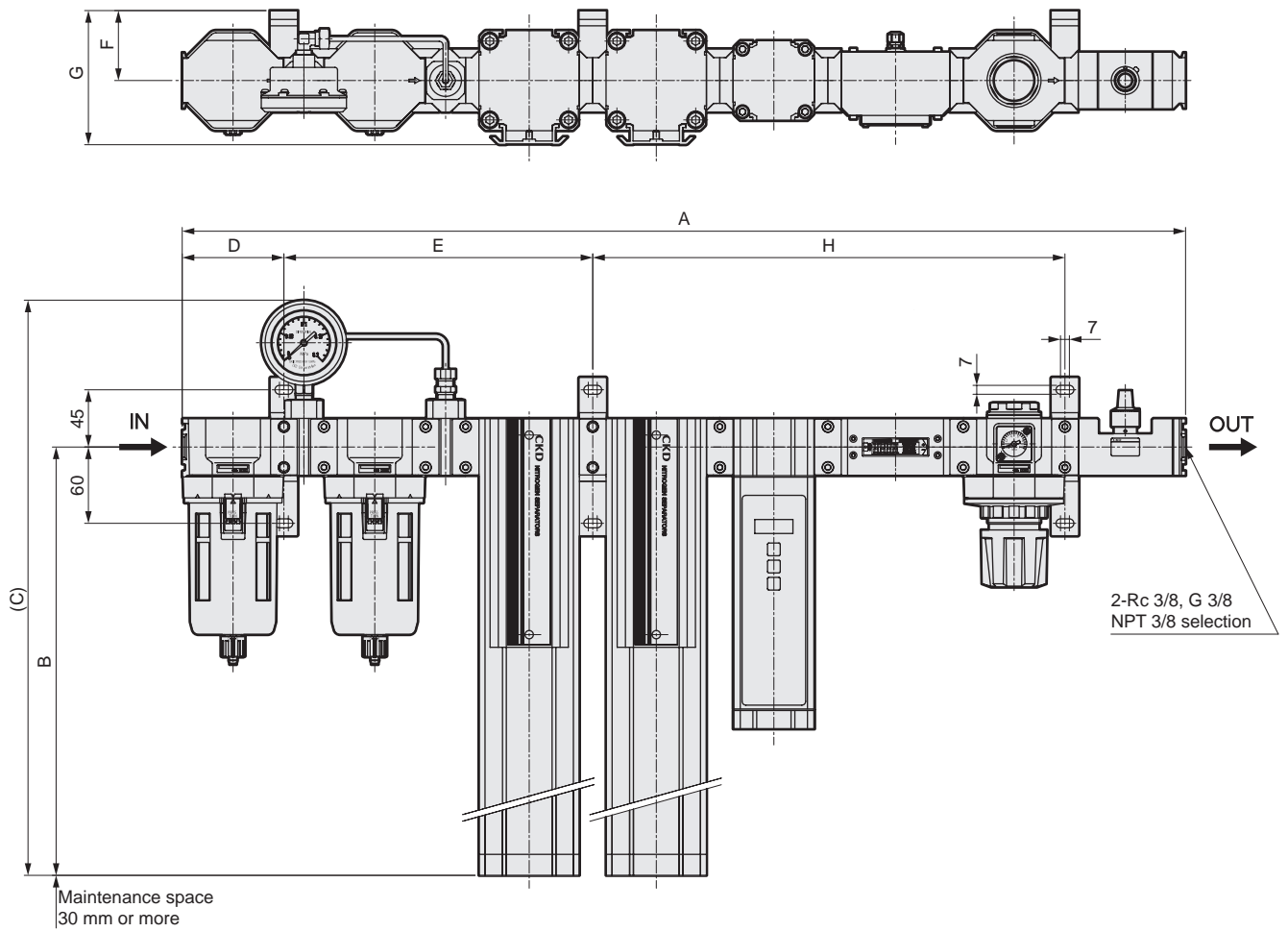
- No oxygen monitor, with flow rate sensor (NSU-4^F_H*10*B*)



Model No.	A	B	C	D	E	F	G	H	Weight (kg)
NSU-4F*10*B*	704.5	543	658	80	243	55	106	286.5	11.7
NSU-4G*10*B*	704.5	1043	1158	80	243	55	106	286.5	14.5
NSU-4H*10*B*	704.5	1043	1158	80	243	55	106	286.5	17.3

Dimensions (2-station type)

- With oxygen monitor and flow rate sensor (NSU-4^F_G*10*C*)



Model No.	A	B	C	D	E	F	G	H	Weight (kg)
NSU-4F*10*C*	789.5	543	658	80	243	55	106	371.5	13.3
NSU-4G*10*C*	789.5	1043	1158	80	243	55	106	371.5	16.1
NSU-4H*10*C*	789.5	1043	1158	80	243	55	106	371.5	18.9



Inline oxygen monitor

PNA Series

Purging not required due to the inline pressure resistant structure
A modular structure that can be connected to the Nitrogen Gas Extraction Unit NS Series and F.R unit



Specifications

Item	Description
Measuring method	Zirconia solid electrolyte method
Sampling method	Natural diffusion
Display	Can be switched between oxygen concentration display and nitrogen concentration display (100 - oxygen concentration)
Working fluid	Nitrogen-rich compressed air
Working pressure MPa	0 to 1.0
Proof pressure MPa	1.5
Ambient temperature, humidity	0 to 50°C, 80% RH or less (no condensation)
Fluid temperature	0 to 50°C (no condensation)
Storage ambient temperature, humidity	-10 to 60°C, 80% RH or less (no condensation)
Max. flow rate L/min (ANR)	500 (*1)
Measured range % O ₂	0.00 to 25.00
Accuracy (*2)	±0.05% O ₂ ±1digit (For 0.00 to 1.00% O ₂) ±0.10% O ₂ ±1digit (For 1.01 to 2.50% O ₂) ±0.5% O ₂ ±1digit (For 2.51 to 10.00% O ₂) ±1.0% O ₂ ±1digit (For 10.01 to 25.00% O ₂)
Response time	90% response within 20 seconds (*3)
Analog output	4 to 20 mA current output (for 0.00 to 25.00% O ₂)
Load resistance of analog output	0 to 400 Ω
Analog output accuracy	0.064 mA/0.1% O ₂
Switch output	Set value and detection element abnormality: 1 (relay output)
Switch output capacity	24 VDC, 1 A
Power supply voltage	24 VDC ± 15% (when AC adapter is used: 100 to 240 VAC)
Power consumption	10 W or less
Degree of protection	IP65 or equivalent
EMC Directive	EN61326-1
Weight kg	1.6
Warmup time	About 5 minutes after turning on the power supply (*4)

*1 For values exceeding 500 L/min (ANR), consult with CKD.

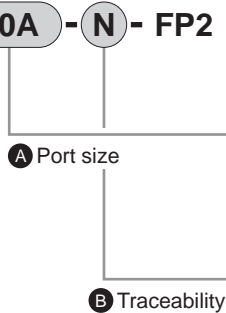
*2 Value in dry gas composed of oxygen and nitrogen.

*3 Response times are values under a flow rate of 5 L/min (ANR) or higher.

*4 Analog output and switch output are not output during warm up.

How to order main body

PNA-10A-N-FP2



* Connector cable is not included.
Refer to page 16 for details.

Code	Description
A Port size	
10A	Rc3/8
10B	G3/8
10C	NPT3/8
B Traceability	
N	No
M	Traceability certification with series variation diagram and company certification

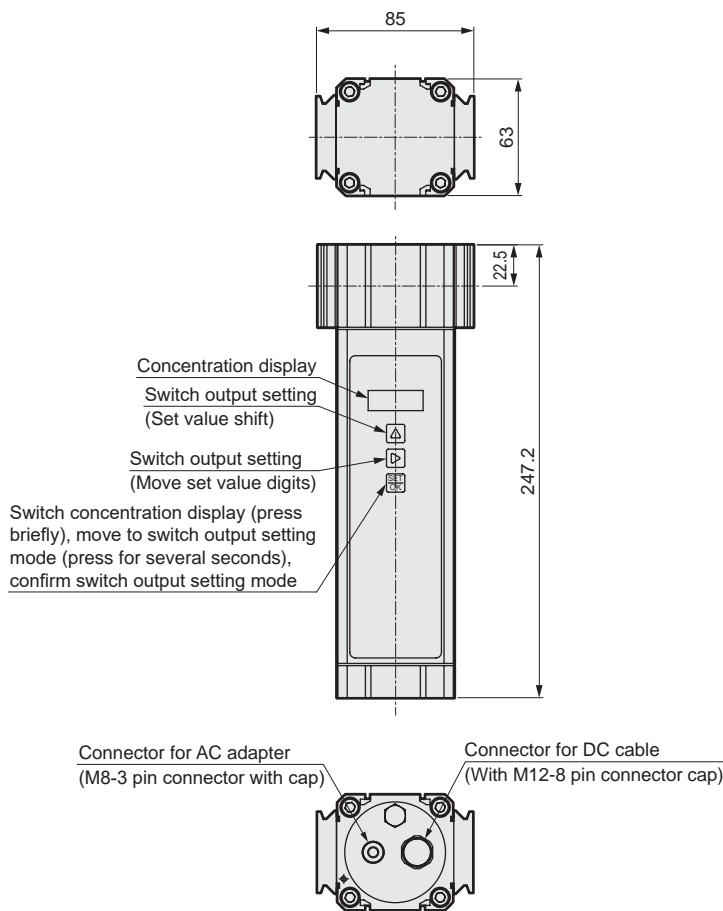
[Example of model No.]

PNA-10A-M-FP2

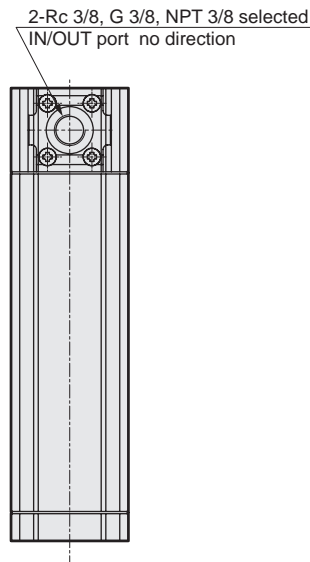
A Port size: Rc3/8

B Traceability: Traceability certification with series variation diagram and company certification

Dimensions



Cannot be disassembled



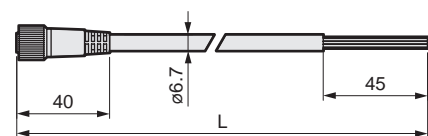
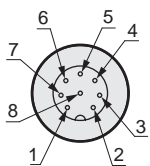
How to order connector cable and dimensions

*Connector cable is sold separately from the body.

● DC cable

Use when driving with a DC power supply and when using analog output or switch output.

Model No.	Dimension L	No.	Cable color	Description
PNA-1D	1000	1	White	Power supply +
PNA-3D	3000	2	Brown	Power supply -
PNA-5D	5000	3	Green	Analog output +
		4	Yellow	Analog output -
		5	Gray	Contact output
		6	Pink	(relay output)
		7	Blue	-
		8	-	-



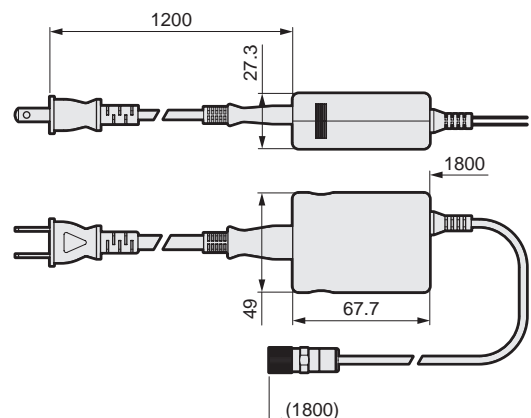
● AC adapter

Use when driving with an AC power supply.

Model No.	Description
PNA-A	AC adapter single unit A
PNA-AG	AC adapter + conversion plug set *Global power supply conversion plugs B, C, O and BF included.

• Plug shape

B type	C type	O type	BF type





Flow rate sensor for nitrogen gas extraction unit

NS-QFS Series

A modular structure that can be connected to the Nitrogen Extraction Unit NS Series

● Flow rate range: 20 L/min to 500 L/min

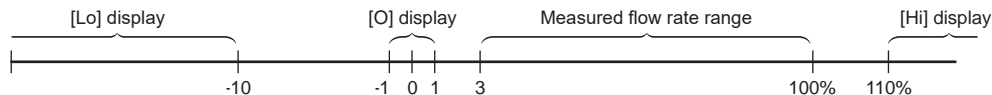


NS-QFS specification

Item	NS-QFS-A	NS-QFS-B	NS-QFS-C	NS-QFS-D	NS-QFS-E
Flow direction	Uni-direction				
Measurement flow rate range *1 (L/min)	0.6 to 20	1.5 to 50	3 to 100	6 to 200	15 to 500
Display	4 digit + +4 digit 2 color LCD				
Flow rate display range *2 (L/min)	-1.9 to 21.9	-4.9 to 54.9	-9.9 to 109.9	-19 to 219	-49 to 549
Integration display *3	Display range L	0.0 to ± 999999.9 L			0 to ± 9999999 L
	Pulse output rate L	0.2	0.5	1	2
Working conditions	Applicable fluids	Nitrogen gas			
	Temperature range °C	5 to 50 (no condensation)			
	Pressure range MPa	0 to 1.0			0 to 0.75
	Proof pressure MPa	1.5			
Operating ambient temperature/humidity	5 to 50 °C, 90% RH or less				
Storage temperature °C	-10 to 60				
Accuracy *4 (Fluid: in dry air)	Accuracy *5	Within ±3% F.S. (Secondary side released to atmosphere) (The scope of warranty is in accordance with the "measurement flow rate range.")			
	Repeatability *6	Within ±1% F.S. (Secondary side released to atmosphere)			
	Temperature characteristics	Within ±0.2% F.S./°C (15 to 35 °C, base temperature 25 °C)			
	Pressure characteristics	Within ±5% F.S. (0.35 MPa reference)			
Response time *7	50 msec or less (setting response time OFF)				
Switch output [B]	N	NPN open collector 1 point output (50 mA or less, voltage drop 2.4 V or less)			
	P	PNP open collector 1 point output (50 mA or less, voltage drop 2.4 V or less)			
Analog output	4 to 20 mA current output (connecting load impedance 0 to 300 Ω)				
Power supply voltage	24 VDC (21.6 to 26.4 V) ripple rate 1% or less				
Current consumption *8	45 mA or less				
Lead wire	ø3.7, AWG26 or equivalent x 5-conductor, insulator O.D. ø1.0, length 2.5 m				
Functions	(1) setting copy function, (2) flow rate integration, (3) peak hold, etc.				
Degree of protection	IP40 or equivalent (IEC standard)				
Protection circuit *9	Power reverse connection protection, switch output reverse connection protection, switch output load short-circuit protection				
EMC Directive	EN55011, EN61000-6-2, EN61000-4-2/3/4/6/8				
Weight kg	0.8				

*1: The value converted to volumetric flow rate at standard condition (20 °C 1 barometric pressure (101 kPa) relative humidity 65%).

*2: Display at each flow rate is as follows.



*3: The accumulated flow is a calculated (reference) value. When using the integrated save function, take care to prevent the number of saves from exceeding the access count limit of the storage device (1 million times). (Changes to various settings also are counted in the access count.)

Number of saves = Usage time / 5 minutes < 1 million times

When instantaneous flow rate is below 1% it is not counted as integrating flow.

*4: Compressed air is used for adjusting and inspecting this product.

*5: Accuracy is based on a CKD standard flow rate meter. It does not indicate absolute accuracy. Repeatability, temperature characteristics, and pressure characteristics are not included for an accuracy of ± 3% F.S.

*6: Repeatability calculated during a short time. Change over time is not included.

*7: The actual response time changes depending on the piping conditions. As a guideline, the response time can be set within the range of 50 msec to 1.5 sec.

*8: Current for when no load is applied. Please note that the current consumption changes depending on the load connection status.

*9: This product's protection function is effective only for specific misconnections and load short-circuits. It does not provide protection for all misconnections.

How to order

NS-QFS - **A** **N** **1**

A Flow rate range (full scale flow rate)

B Switch output

C Unit specifications

Code	Description
A Flow rate range (full scale flow rate)	
A	Flow rate range 20 L/min
B	Flow rate range 50 L/min
C	Flow rate range 100 L/min
D	Flow rate range 200 L/min
E	Flow rate range 500 L/min
B Switch output	
N	NPN transistor open collector output 1 point
P	PNP transistor open collector output 1 point
C Unit specifications	
1	SI units only
2	With unit switching function (overseas models only) *1

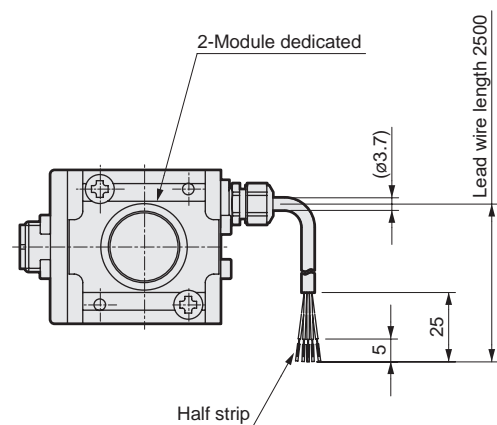
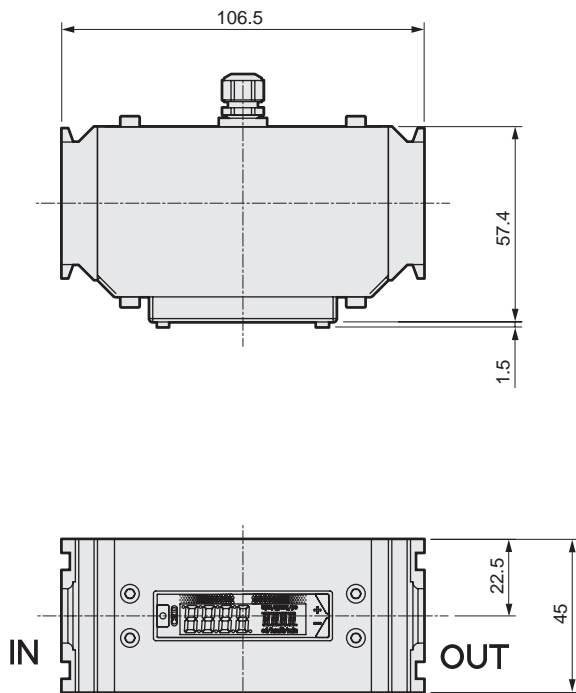
⚠ Precautions for model No. selection

*1: Models with the unit switching function are not sold in Japan.

*2: When using the NSU series reverse flow option, invert the display. Refer to page 22 for display inversion settings.

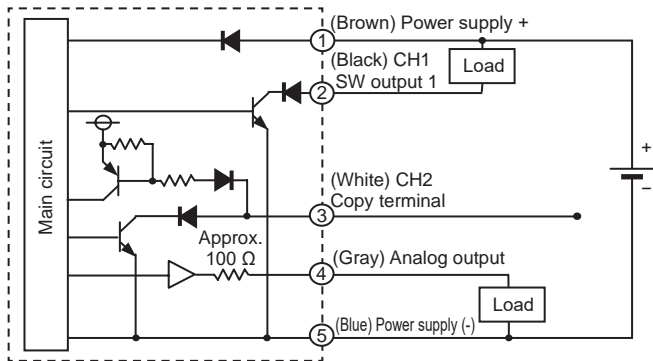
*3: The joiner set (joiner, bolt, O-ring) and one gasket are included.

Dimensions

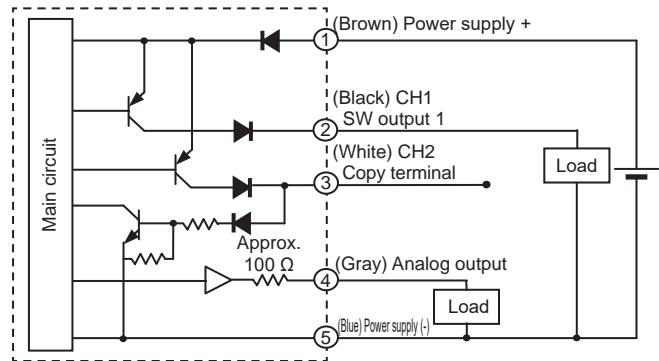


Example of internal circuit and load connection

● NPN output

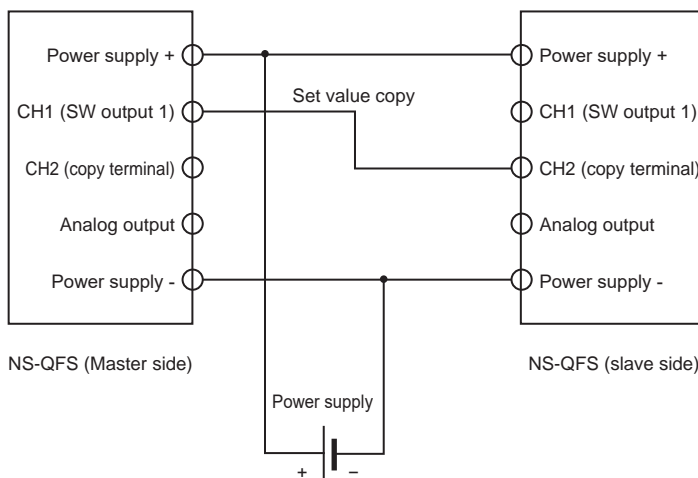


● PNP output



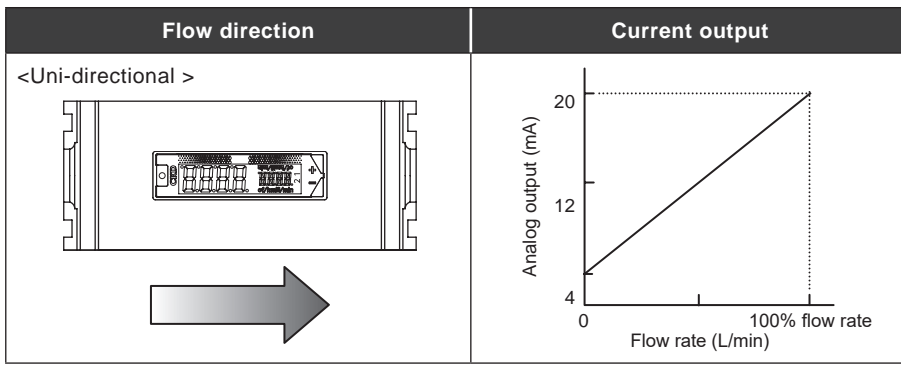
Terminal No.	Option Lead wire color	Name
(1)	Brown	Power supply (+) (voltage output: 12 to 24 V, current output: 24 V)
(2)	Black	CH1 (Switch output 1: max. 50 mA)
(3)	White	CH2 (copy terminal)
(4)	Gray	Analog output Current output: 4 to 20 mA load impedance 300 Ω or less
(5)	Blue	Power supply - (GND)

<When using setting copy function>



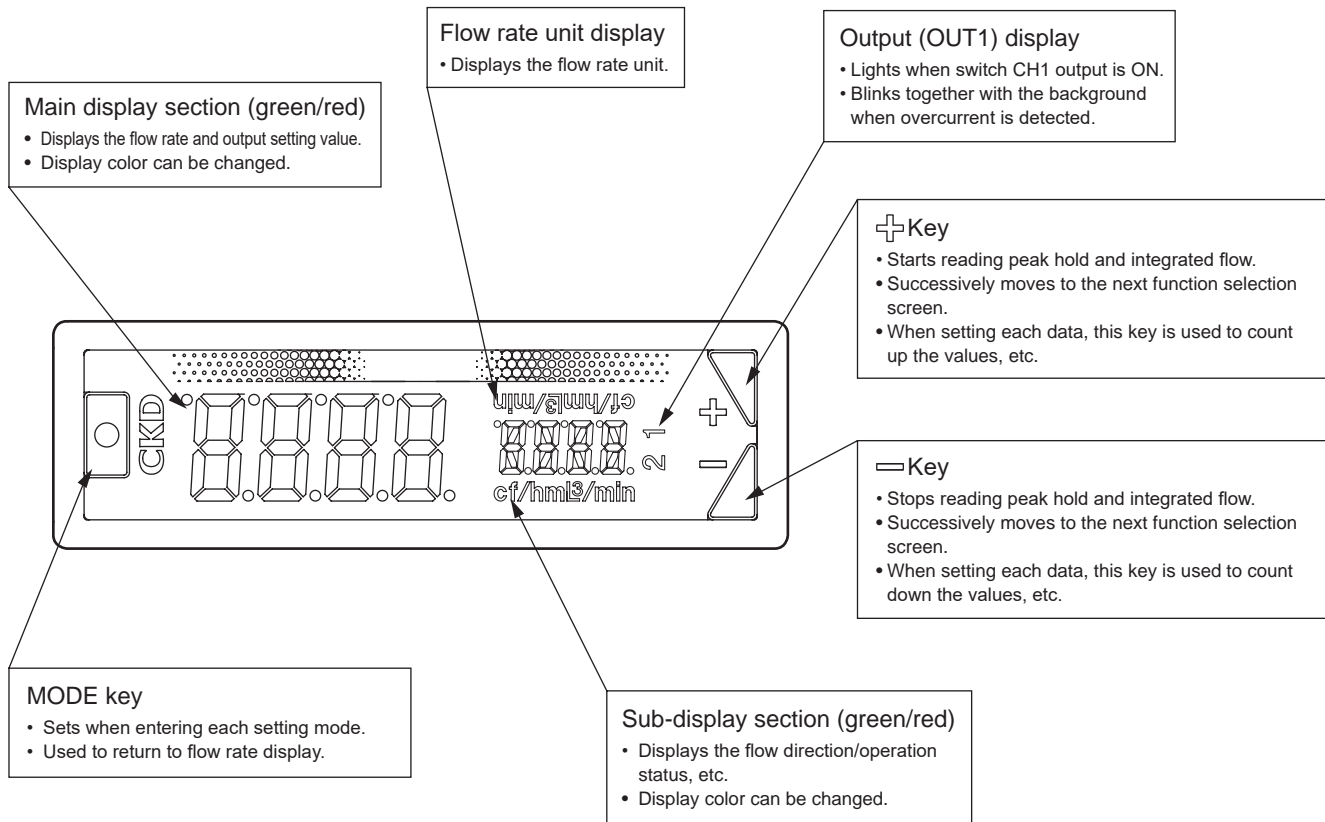
Connect CH1 (SW output 1) on the master side to CH2 (copy terminal) on the slave side and power ON the sensor to use the setting copy function (F93). Use this connection only when using the setting copy function.
As with the load connection example above, if copying is performed with the load connected to CH1, or the switch is operated while CH1 and CH2 are connected the device may operate unexpectedly or the device and NS-QFS may malfunction. Never use the unit with the copy terminal connected.

Analog output characteristics



Names and functions of display/operation section (LCD display)

● Display section name



Names and functions of display/operation section

The function and various settings may be performed during normal flow rate display or after entering each mode.
The modes are also divided into Maintenance mode, SET mode, and Setting Monitor mode according to the frequency of use.

● Normal operation (RUN mode)

Item	Explanation	Default setting
Instantaneous flow rate display	Displays the instantaneous flow rate.	Display (measurement)
Peak hold function	Max. and min. values for the flow rate within a set interval are displayed.	Non-display (stop)
Accumulated flow display	The accumulated flow can be displayed. The switch output function includes a function to turn the switch ON/OFF at a level higher than the recommended cumulative value, and an integrated pulse function to output the pulse at a set cumulative value.	Non-display (measurement)

● SET mode

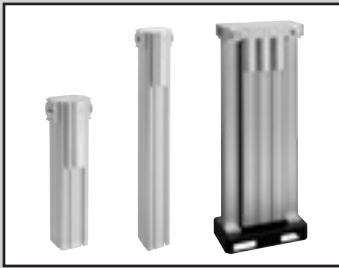
No.	Item	Explanation	Default setting
F.01	Selection of CH1 operation	Select the CH1 setting. Switch output operation and integrated pulse settings can be set.	No switch output
F.03	Integrating function settings	You can choose to acquire integrating flow values consecutively or at set times. You can also choose to keep the data or not.	Continuous acquisition: Data hold OFF
F.04	Sub-screen display setting	Set the sub-display section's display method. Can be switched to flow direction, reference state, or numbering display.	Flow direction
F.05	Display color setting	Set the display color. (red, green) The color for a normal display and for switch output ON can be set.	At normal: Green At switch ON: Red
F.07	Display inversion function	The LCD display can be vertically inverted.	Standard display
F.08	Reference state setting	Select from the standard state or reference state. Standard state (ANR): Converted into volumetric flow rate at 20 °C, 1 barometric pressure, relative 65% Reference state (NOR): Converted into volumetric flow rate at 0°C, 1 barometric pressure, 0% RH	ANR
F.09	Unit setting (For overseas only)	The units can be set. Can be selected from L/min and cf/h.	Domestic model: L/min Overseas model: L/min
F.10	Display cycle setting	The digital display refresh cycle can be set in three stages from 0.25 s to 1 s. If the display flickers, it may be improved by setting a longer display refresh cycle.	0.5sec
F.11	Analog output Setting response time	Set the response time. response can be set in seven stages from 0.05 s to approx. 1.50 s. Chattering and mis-operation caused by sudden flow rate changes or noise are prevented.	0.05sec
F.12	Numbering setting	You can set the numbering.	0000
F.14	Setting ECO mode	An ECO mode can be set. If the buttons are not operated for approx. one minute, the eco mode will activate and turn off the display's backlight. Current consumption can be reduced with this mode.	OFF
F.16	Lock setting	You can set the key lock method and the PIN code method. Use selectively depending on the working environment.	OFF
F.17	Peak hold setting	You can choose to acquire peak bottom values consecutively or at set times. You can also choose to keep the data or not.	Continuous acquisition: Data hold OFF

● Maintenance mode

No.	Item	Explanation	Default setting
F.91	Forced output function	Use this function to forcibly turn the switch output ON and confirm the wiring connection or initial operation of the input device.	-
F.92	Zero adjustment	The zero point deviation is compensated.	Adjust value: 0
F.93	Setting copy function	Set values can be copied if the model supports copying between two NS-QFS's. (Copying is only possible between products with the same model No.)	-
F.99	Reset function	Returns the settings to the default settings.	-

● Setting monitor mode

Item	Explanation	Default setting
Settings monitor function	Details set in the SETmode can be confirmed. (Setting details cannot be edited.)	-



Nitrogen gas extraction unit

NS Series

Modular design for easy system expansion with peripheral components

■ Nitrogen gas is obtained just by supplying compressed air.



Specifications

■ Single cylinder

Item		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 class	1:6:1(JIS B 8392-1:2012, ISO 8573-1:2010)					
	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 (%) or higher	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
			90	27.0	78.1	137.3	313.5
	Inlet air flow rate L/min(ANR)		99.9	17.3	50.9	100.0	278.2
			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
			90	60.0	173.6	305.1	696.7

■ Double cylinder

Item		NS-4S2	NS-4S3	NS-4L2	NS-4L3	NS-4L4	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 class	1:6:1 (JIS B 8392-1:2012, ISO 8573-1:2010)											
	Inlet air pressure MPa	0.7											
	Inlet air temperature °C	25											
	Ambient temperature °C	25											
RatingFlow rate	Outlet nitrogen gas flow rate L/min(ANR)	Nitrogen concentration (%) or higher	99.9	22.0	33.0	61.2	91.8	122.4	66.0	88.0	110.0	183.6	244.8
			99	56.4	84.6	133.8	200.7	267.6	169.2	225.6	282.0	401.4	535.2
			97	99.8	149.7	236.2	354.3	472.4	299.4	399.2	499.0	708.6	944.8
			95	130.6	195.9	338.4	507.6	676.8	391.8	522.4	653.0	1015.2	1353.6
			90	274.6	411.9	627.0	940.5	1254.0	823.8	1098.4	1373.0	1881.0	2508.0
	Inlet air flow rate L/min(ANR)		99.9	200.0	300.0	556.4	834.6	1112.8	600.0	800.0	1000.0	1669.2	2225.6
			99	235.0	352.5	557.6	836.4	1115.2	705.0	940.0	1175.0	1672.8	2230.4
			97	269.8	404.7	638.4	957.6	1276.8	809.4	1079.2	1349.0	1915.2	2553.6
			95	290.4	435.6	752.0	1128.0	1504.0	871.2	1161.6	1452.0	2256.0	3008.0
			90	610.2	915.3	1393.4	2090.1	2786.8	1830.6	2440.8	3051.0	4180.2	5573.6

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

Selection guide

The temperature and inlet air pressure affect the outlet nitrogen gas flow and should be corrected if they differ from the ratings in the specification section.

STEP 1 Confirm the working conditions and specification rates.

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

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

(1) Temperature - Gas flow rate compensation coefficient

Temperature (°C)	Outlet nitrogen gas concentration				
	99.9%	99%	97%	95%	90%
5	0.64	0.79	0.79	0.75	0.78
10	0.73	0.84	0.84	0.81	0.84
25	1	1	1	1	1
35	0.97	1.05	1.04	1.07	1.07
40	0.95	1.08	1.06	1.11	1.11
50	0.9	1.09	1.11	1.15	1.2

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

(2) Pressure - Gas flow rate compensation 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 Determine the appropriate model from 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 compensation coefficient of inlet air flow rate affected by inlet air temperature.

(3) Temperature - Air flow rate compensation coefficient

Temperature (°C)	Outlet nitrogen gas concentration				
	99.9%	99%	97%	95%	90%
5	0.73	0.68	0.75	0.69	0.76
10	0.8	0.76	0.81	0.77	0.82
25	1	1	1	1	1
35	1.21	1.17	1.11	1.13	1.11
40	1.32	1.25	1.17	1.2	1.16
50	2.05	1.38	1.31	1.31	1.3

STEP 6 Confirm the compensation coefficient of inlet air flow rate affected by inlet air pressure.

(4) Pressure - Air flow rate compensation 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 Determine 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	Compensation coefficient for outlet nitrogen gas flow rate	Compensation coefficient for inlet air flow rate
Inlet air temperature	35 to 39°C	35°C	(1) 1.05	(3) 1.17
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%.
 66.9 (rated outlet nitrogen gas flow rate) $\times 1.05 \times 0.65 = 45.7 \text{L/min}$ (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 $278.8 \times 1.17 \times 0.79 = 257.7 \text{L/min}$ (ANR)

How to order

NS - 4 S 1 10A - B T - FP2

Model No.

A Body size

B Membrane unit size

C Quantity

D Port size

E Option

F Mounting direction

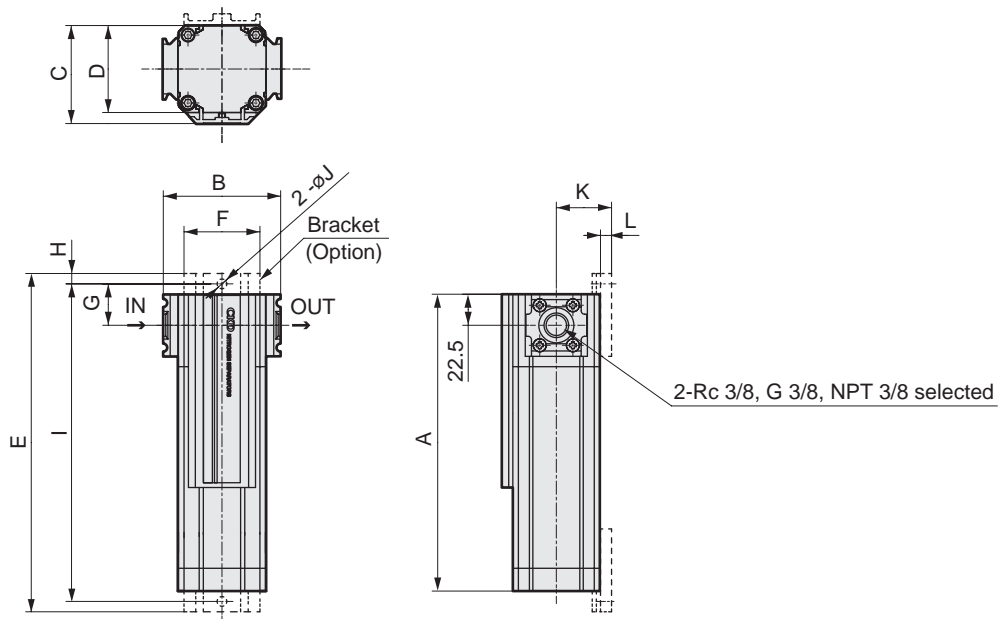
G Series

Code	Description
A Body size	
3	Body width 63
4	Body width 79
B Membrane unit size	
S	Short
L	Long
C Quantity (*1)	
1	1 pc.
2	2 pcs. (Select from models NS-4S, and 4L)
3	3 pcs. (Select from models NS-4S, and 4L)
4	4 pcs. (Selectable model is NS-4L)
6	6 pcs. (Select from models NS-4S, and 4L)
8	8 pcs. (Select from models NS-4S, and 4L)
A	10 pcs. (Selectable model is NS-4S)
D Port size	
10A	Rc 3/8(NS-3S1,3L1,4S1,4L1)
10B	G 3/8(NS-3S1,3L1,4S1,4L1)
10C	NPT 3/8(NS-3S1,3L1,4S1,4L1)
20A	Rc 3/4(NS-4S2,4S3,4L2,4L3,4L4)
20B	G 3/4(NS-4S2,4S3,4L2,4L3,4L4)
20C	NPT 3/4(NS-4S2,4S3,4L2,4L3,4L4)
25A	Rc 1(NS-4S6,4S8,4SA,4L6,4L8)
25B	G 1(NS-4S6,4S8,4SA,4L6,4L8)
25C	NPT 1(NS-4S6,4S8,4SA,4L6,4L8)
E Option (*2)	
N	No option
B	Bracket
C	Bracket + reverse flow (*3)
D	Bracket + exhaust port
F	Bracket + reverse flow + exhaust port (*3)
X	Reverse flow (*3)
E	With exhaust port
H	Reverse flow + With exhaust port (*3)
F Mounting direction	
Blank	Vertical mounting
T	Horizontal mounting (available with NS-4S1, 4L1)
G Series	
Blank	Standard
FP2	Series for food processing

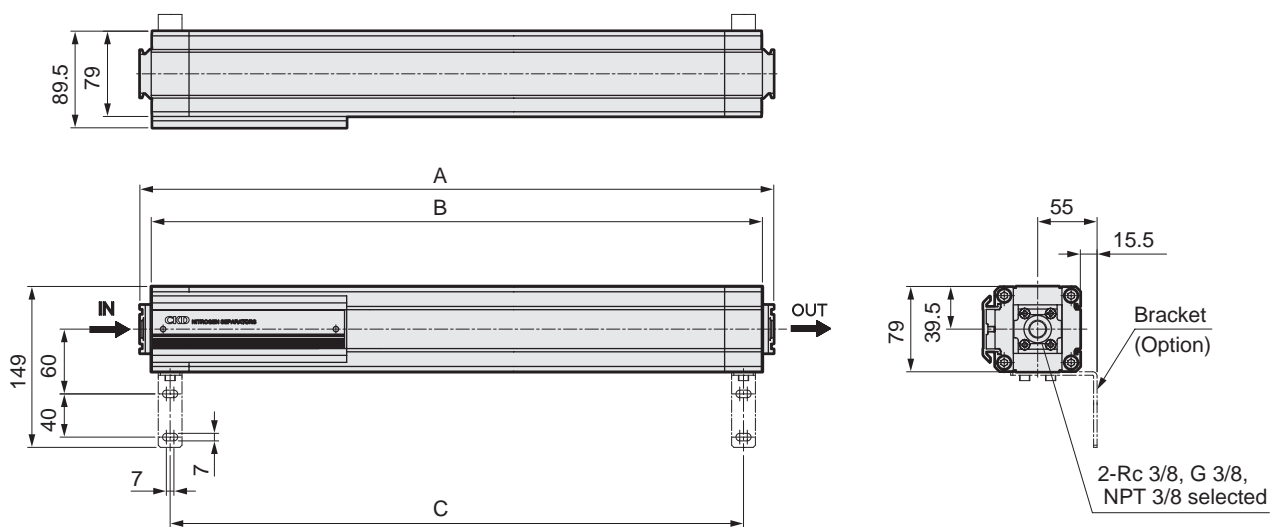
⚠ Precautions for model No. selection

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

Dimensions



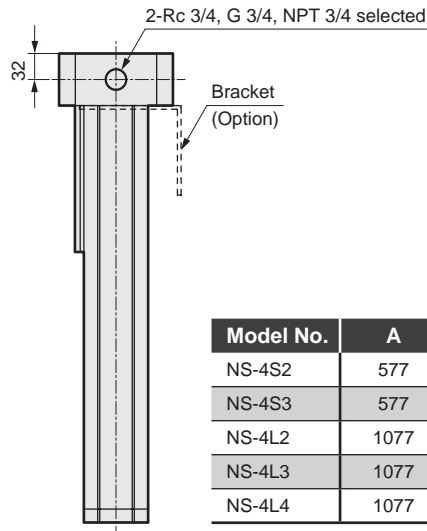
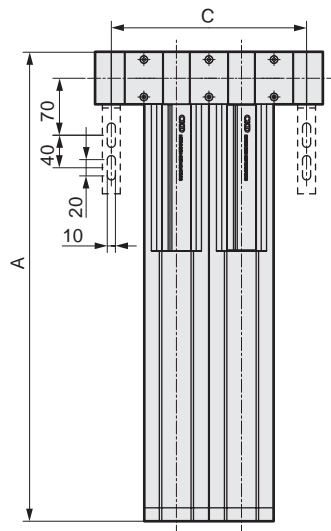
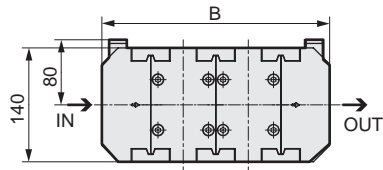
Model No.	A	B	C	D	Weight (kg)	Bracket relational dimensions							
						E	F	G	H	I	J	K	L
NS-3S1	315	85	71	63	1.8	345	55	30	7.5	330	7	40	8
NS-3L1	565	85	71	63	2.7	595	55	30	7.5	580	7	40	8
NS-4S1	565	100	90	79	4.0	605	70	32.5	10	585	9	50	10
NS-4L1	1065	100	90	79	6.8	1105	70	32.5	10	1085	9	50	10



Model No.	A	B	C	Weight (kg)
NS-4S1*-*T	587	566	531	4.2
NS-4L1*-*T	1087	1066	1031	7.0

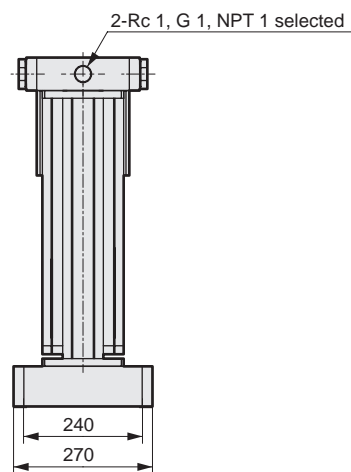
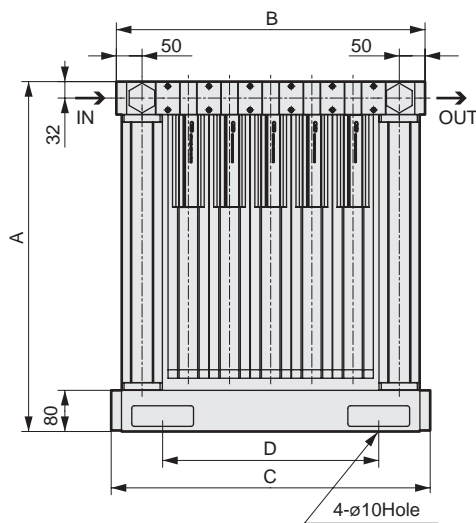
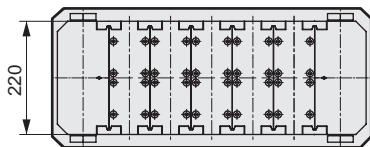
Dimensions

● Qty: 2, 3, 4 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
NS-4L4	1077	440	400	32

● Qty: 6, 8 or 10 units



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



Safety Precautions

Be sure to read this section before use.

When designing and manufacturing a device using CKD products, the manufacturer is obligated to check that device safety mechanism, pneumatic control circuit, or water control circuit and the system operated by electrical control that controls the devices is secured.

It is important to select, use, handle and maintain the product appropriately to ensure that the CKD product is used safely.

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 in general industrial machinery equipment or parts. It is not intended for use outdoors (except for products with outdoor specifications) 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 device design and control, etc. ISO4414, JIS B 8370 (Pneumatics fluid power - General rules and safety requirements for systems and their components) 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 warnings and cautions in the following pages to prevent accidents.
- The precautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.

 **DANGER:** When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, and when there is a high degree of emergency to a warning.

 **WARNING:** If handled incorrectly, a dangerous situation may occur, resulting in death or serious injury.

 **CAUTION:** When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation. Every item provides important information and must be observed.

Warranty

- 1** **Warranty period**

The product specified herein is warranted for one (1) year from the date of delivery to the location specified by the customer.
- 2** **Warranty coverage**

If the product specified herein fails for reasons attributable to CKD within the warranty period specified above, CKD will promptly provide a replacement for the faulty product or a part thereof or repair the faulty product at one of CKD's facilities free of charge. However, following failures are excluded from this warranty:

 - 1) Failure caused by handling or use of the product under conditions and in environments not conforming to those stated in the catalog, the Specifications, or the Instruction Manual.
 - 2) Failure caused by use of the product exceeding its durability (cycles, distance, time, etc.) or caused by consumable parts.
 - 3) Failure not caused by the product.
 - 4) Failure caused by use not intended for the product.
 - 5) Failure caused by modifications/alterations or repairs not carried out by CKD.
 - 6) Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
 - 7) Failure caused by acts of nature and disasters beyond control of CKD.

The warranty stated herein covers only the delivered product itself. Any loss or damage induced by failure of the delivered product is excluded from this warranty.
Note: For details on the durability and consumable parts, contact your nearest CKD sales office.
- 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

* Refer to pages 32 to 36 for cautions on PNA and NS-QFS 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 using this product where it will be subject to air with a relative humidity of 50% or more. (Performance will decrease sharply if the separation membrane gets wet with droplets (such as water).)
- Avoid using air containing corrosive gases (strong acidic gases such as hydrogen sulfide, sulfur dioxide, hydrogen chloride, fluorine, etc.) or strong alkali gases (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 anti-bacterial/bacteria-removing filters for food processes.)

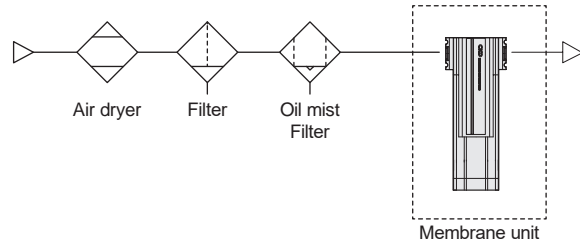
"Food Sanitation Act compliant" refers to products with materials conforming to the Food Sanitation Act.

Use after confirming the structure and material, valve structure, working fluids, and working atmospheres of each component carefully yourself.

Internal parts may wear when the needle valve operates. If the product is 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. If the working fluid could contain hydrocarbons, install an activated carbon filter.

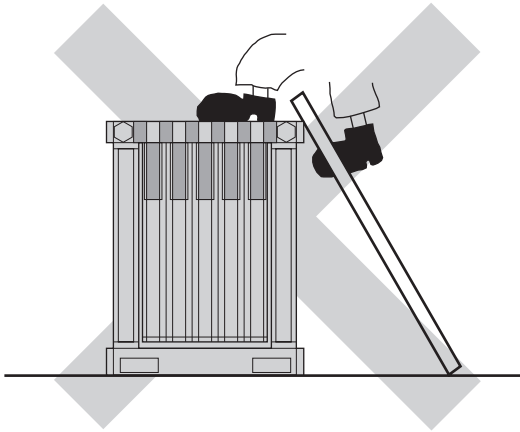


Types of chemicals	Categories of chemicals	Main products of chemicals	General applications	Polycarbonate
Inorganic compounds	Acids	Hydrochloric acid, sulfuric acid, fluorine, phosphoric acid, chromic acid, etc.	Acid washing of metals, acidic degreasing solutions, Coating treatment solution	x
	Alkalines	Caustic soda, caustic potash, calcium hydroxide, aqueous ammonia, Sodium carbonate, etc.	Alkaline degreasing solution for metals	x
	Inorganic salts	Sodium sulfide, potassium nitrate, potassium bichromate, sodium sulfate, etc.		x
Organic compounds	Aromatic hydrocarbons	Benzene, toluene, xylene, ethyl benzene, styrene etc.	Contained in paint thinner (Benzene, toluene, and xylene)	x
	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.)	x
	Chlorinated aromatic hydrocarbons	Chlorobenzene, dichlorobenzene, benzene hexachloride (B/H/C), etc.	Agricultural chemicals	x
	Petroleum components	Solvent, naphtha, gasoline		x
	Alcohols	Methyl alcohol, ethyl alcohol, Cyclohexanol, benzyl alcohol	Used as antifreezing agent	x
	Phenol	Carbolic acid, cresol, naphthol, etc.	Disinfectant solution	x
	Ethers	Methyl ether, methyl ethyl ether, Ethyl ether	Additive of brake oil	x
	Ketones	Acetone, methyl ethyl ketone, cyclohexanone, acetophenone, etc.		x
	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	x
	Phosphate ester	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	x
	Oxyacids	Glycol acid, lactic acid, malic acid, citric acid, tartaric acid		x
	Nitro compounds	Nitromethane, nitroethane, nitroethylene, nitrobenzene, etc.		x
	Amines	Methylamine, dimethylamine, ethylamine, aniline, acetanilide, etc.	Additive of brake oil	x
Nitriles	Acetonitrile, acrylonitrile, benzonitrile, acetoneitrile, etc.	Raw material for nitrile rubber	x	

Mounting, installation and adjustment

⚠ CAUTION

- Do not step onto the body.



- When piping, remove cutting oil, rust preventing agents, contaminants, etc.
- Mount the air filter and oil mist filter 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]
- Install an oil removing filter (M type) in front of the membrane unit inlet to remove all 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 or 4 units), fix the inlet and outlet pipes or fix the body with a bracket.
- When installing NS (6 or more units), place 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.

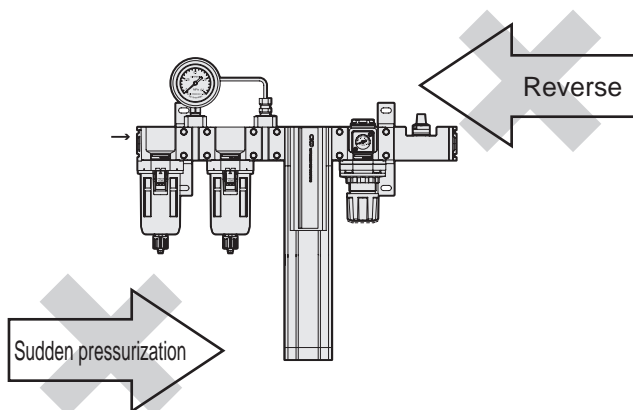
Use/maintenance

⚠ WARNING

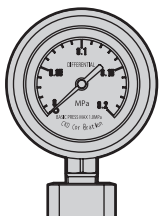
- There may be oxygen deficiency in the nitrogen gas. Observe the following instructions when using.
 - Use in well ventilated locations.
 - Ventilate the work area when nitrogen gas is being used.
 - Perform periodical leakage inspections of nitrogen gas piping.
- Oxygen-rich gas is discharged from the exhaust port of the membrane unit, so be aware of the following points when installing the equipment.
 - Install away from sources of fire and flammable substances.
 - Ventilate the work area during operation of the equipment.
- Do not use this product for purposes that directly concern 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 comes to the end of its service life 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 the differential pressure gauge.) (Do not touch the urethane rubber foam layer when replacing the mantle)
[NSU Series]



0.07MPa

- 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 a required nitrogen concentration after compressed air is supplied.



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: Oxygen Monitor PNA Series

Design/selection

CAUTION

Working environment

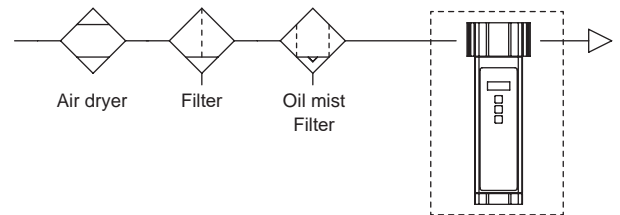
- Avoid installing this product where it will be subject to direct sunlight or rain.
- In the following atmospheres, the oxygen concentration monitor may generate measurement errors, or the performance of the components or oxygen detection element may suffer.
 - Use outside the 0 to 50 °C temperature range or with elements other than air causes significant measurement errors. Avoid using in such conditions.
 - Air containing freon gas, silicon-based gas, SO_x (sulfur oxide), H₂S (hydrogen sulfide) or other corrosive gases, Cl₂ (chlorine), F₂ (fluorine), Br₂ (bromine) or other halogen gases, or air that separates into these gases at high temperatures of approx. 500 °C cannot be used.
 - If used in air containing flammable gases, the flammable gas will burn and the results will decrease.
 - Use in air containing large quantities of dust or oil mist will lead to element deterioration.
 - The element will be damaged if the sensor is exposed to liquids such as water drops or liquid solutions.
 - The element will be damaged if used in locations with strong impacts or vibrations.
 - Avoid use in locations with strong magnetic fields or significant electrical noise.
 - The results will fail to stabilize in environments where the pressure pulses (changes continuously) in a short cycle. Static pressure is required for stable measurements.

■ "Food Sanitation Act compliant" refers to products with materials conforming to the Food Sanitation Act.

■ Use after confirming the structure and material, valve structure, working fluids, and working atmospheres of each component carefully yourself.

Check the working circuit and working fluid.

To prevent decreased oxygen concentration monitor performance, install the dryer, air filter and oil mist filter on the primary side, and remove water or oil.



■ This product does not have explosion-proof specifications. Since the detection element is heated by the heater, it may lead to an explosion if used in an explosive atmosphere.

■ This product is not an oxygen detector. Do not use it as an oxygen concentration monitor in accordance with the Industrial Safety and Health Act.

■ When using this product as a CE compliant product, prepare a dedicated power supply.

Working conditions for CE compliance

This product is CE-marked, indicating conformity with the EMC Directives.

The standard for the immunity for industrial environments applied to this product is EN61326-1. The following stability is applicable in an EMC Directive demand test environment.

Stability $\pm 0.5\% \text{ O}_2 \pm 1$ digit (for 0.00 to 10.00% O_2)
 $\pm 1.0\% \text{ O}_2 \pm 1$ digit (for 10.01 to 25.00% O_2)

Mounting, installation and adjustment

CAUTION

■ When piping, remove cutting oil, rust preventing agents, contaminants, etc.

■ Install an oil removing filter (M type) in front of the oxygen monitor to remove all water drops and oil.

Use/maintenance

CAUTION

■ Do not disassemble or modify, as this may cause malfunction.

■ The sensor may deteriorate depending on the usage conditions. Calibration once a year is recommended for maintaining long-term performance.



Pneumatic components (flow rate sensor)

Safety Precautions

Be sure to read this section before use.

Refer to "Pneumatic, Vacuum and Auxiliary Components (No. CB-024SA)" for general precautions.

Product-specific cautions: Flow rate sensor NS-QFS Series

Design/selection

Working fluids

DANGER

- Never use with a flammable fluid

WARNING

- This product cannot be used as a billing meter. Do not use this product for commercial transactions as it is not compliant with the Measurement Act. Intended applications include industrial sensors.
- Do not use fluids which are not applicable.
- Use dry gas which does not contain corrosive elements such as chlorine, sulfur or acids, and which is clean and does not contain dust or oil mist.
- Depending on the fluid, retaining the fluid for long periods could adversely affect the performance. Do not seal the fluid in the pipe for long periods of time.
- Working pressure/flow rate range
Applications exceeding the max. working pressure and specified flow rate range may result in faults. Use this product only within the specified range.
- When using a valve on the primary side of the sensor, use only valves with oil-prohibited specifications. This sensor could malfunction or fail if exposed to splattering grease, oil, etc. As friction powder may be generated depending on the valve, mount a filter to prevent the powder from entering the sensor.

Working environment

DANGER

- Explosion-proof environments: Never use this product in an explosive gas atmosphere. The structure is not explosion-proof, and explosions or fires could occur.

WARNING

- Corrosive environments: Do not use this product in an atmosphere containing corrosive gases such as sulfur dioxide.
- Ambient/fluid temperatures: Use ambient/fluid temperatures from 5 to 50°C within the specified range. Even if the temperature is within the specified range, do not use this product if the ambient temperature and fluid temperature could suddenly change and cause dew to condense.
- Drip-proof environments: The degree of protection of this product is equivalent to IP40. Do not install this product where water, salt, dust, or swarf is present or in a pressurized or depressurized environment. The product cannot be used with large temperature variations or high temperature/humidity since condensation may occur inside the body.

Flow rate unit

CAUTION

- This product's flow rate is measured at a mass flow rate unaffected by temperature or pressure. The unit is L/min, but this is the display when the mass flow rate is converted to volumetric flow rate at 20°C 1 atmosphere (101 kPa) relative humidity 65%RH.

Overflow

CAUTION

- The sensor can handle an overflow double the measured range. If dynamic pressure is applied near the maximum working pressure (when a pressure difference exceeding the max. working pressure is applied between primary and secondary sides), the sensor may operate abnormally. If dynamic pressure is applied, such as when a workpiece is filled for leakage inspection, provide a bypass circuit or restrictor so that dynamic pressure is not applied to the sensor.

Others

CAUTION

- The flow path is not completely free of dust generation. A final clean filter should be used in circuits where dust generation could be a problem.

Mounting, installation and adjustment

Piping

CAUTION

- Always attach the pipes before starting wiring.
- Align the fluid flow direction to the direction indicated on the body when connecting the pipes.
- Do not install the regulator/solenoid valve, etc., immediately before this product. Generated drift may cause errors. Provide a straight pipe with approx. 10 times the bore size when necessary.
- Before installing piping, clean out the pipes using air blower to remove all foreign matter and cutting chips from the pipes. The rectifier or sensor chip could be damaged if a large amount of foreign matter, cutting chips, etc., enters.
- Make sure that the leakage detection solution does not enter the inside of this product when inspecting the pipe for leaks.
- This product is exclusively for nitrogen gas extraction unit system type NSU. When piping, provide modular connection with our products.

Mounting

CAUTION

- The LCD display type flow rate meter uses a liquid crystal display. This may be difficult to read depending on the angle.

Wiring

DANGER

- Use power supply voltage and output within the specified voltage.
If voltage exceeding the specified voltage is applied, the sensor could malfunction or be damaged, or electrical shock or fire could occur. Do not use any load that exceeds the rated output. Otherwise, output damage or fire may result.
- Stop the control device and equipment and turn power OFF before wiring. Starting operation suddenly could cause unpredictable and dangerous operation. Conduct an energized test with controls and machine devices stopped, and set target switch data. Be sure to discharge any accumulated electrostatic charge among personnel, tools, or equipment before and during work.

WARNING

- Install the product and wiring away from sources of noise, such as power distribution wires. Provide separate countermeasures for surge applied to the power cable. The display or output could fluctuate.
- Do not short-circuit the load. Failure to observe this could result in rupture or burning.
- Ensure that wires are properly insulated. Check that wires do not come into contact with other circuits, that no ground faults occur, and that the insulator between terminals is not defective. Overcurrent could flow in and damage the sensor.
- Check line color when wiring. As incorrect wiring could result in sensor damage and malfunctions, check wire color against the instruction manual before wiring.
- Use a stabilized DC power supply within the specified rating that has been insulated from the AC power supply. A non-insulated power supply could result in electrical shock. If power is not stabilized, the peak value could be exceeded. This could damage the product or impair accuracy.
- The power supply is a DC stabilized power supply completely isolated from the AC primary side. Connect either the + side or - side of the power to the F.G. Between the internal power circuit and the product's housing, a varistor (limit voltage approx. 40 V) is connected to prevent dielectric breakdown of the sensor. Do not conduct a withstand voltage test or insulation resistance test between the internal power circuit and product housing. Disconnect wiring first if this testing is required. An excessive potential difference between the power supply and product housing will burn internal parts. After installing, connecting and wiring the unit, electrical welding of the device/frame, short-circuit accidents, etc., could cause welding current, excessively high voltage caused by welding, or surge voltage, etc., to run through the wiring, ground wire, or fluid path connected between the above devices, damaging wires or devices. Conduct any work such as electrical welding after removing this device and disconnecting all electric wires connected to the F.G.

- Do not use at levels exceeding the power supply voltage range. If voltage exceeding this range or AC power is applied, the controller could rupture or burn.
- Check that stress (7 N and over) is not directly applied to lead wire.

During adjustment

⚠ CAUTION

- If switches are operated when fluid is pulsating or flow rate is otherwise unstable, operation may be unstable. Avoid setting switches in an unstable area. Confirm that switch operation is stable before use.

Use/maintenance

⚠ WARNING

- Working conditions for CE compliance
This product is CE-marked, indicating conformity with the EMC Directives. The standard for the immunity for industrial environments applied to this product is EN61000-6-2; the following requirements must be satisfied in order to conform to this standard:

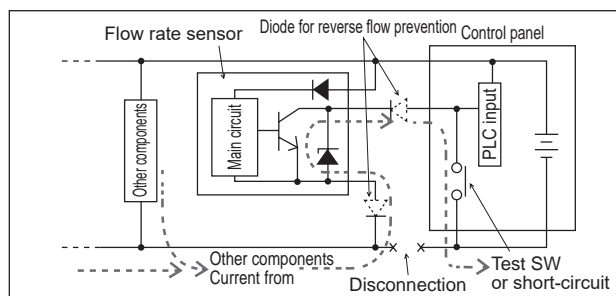
Conditions

- The evaluation of this product is performed by using a lead wire that has a power supply line and a signal line paired to assess the product's performance.
- This product is not equipped with surge protection. Implement surge protection measures on the system side.
- Do not disassemble or modify, as this may cause malfunction.
- Output accuracy is affected by temperature characteristics and heat generated when energized. Provide a standby time (5 minutes or more) after turning the power ON for use.
- Immediately after power is turned ON, this product does not start flow rate detection switch operation for approx. 5 seconds to complete self-diagnosis. Provide a control circuit/program that ignores signals for at approximately five seconds after power is turned ON.

⚠ CAUTION

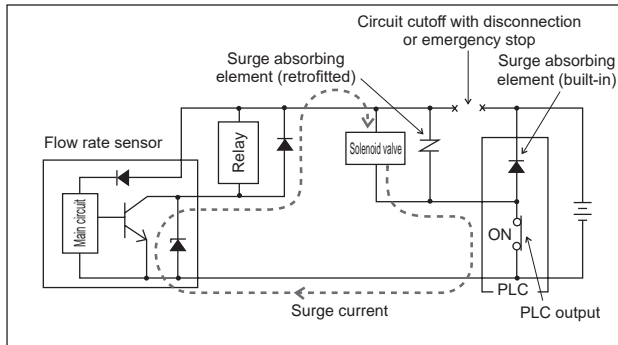
- If a problem occurs during operation, immediately turn the power OFF, stop use, and contact your dealer.
- This product uses a micro-sensor chip, and must be installed where it will not be subject to dropping, impact or vibration. Handle this product as a precision component during installation and transportation.
- Keep this product's flow rate within the rated flow range.
- Use this product within the working pressure.
- Contact us when purchasing separate lead wires. for maintenance.

- If the output setting value is changed, control system devices could operate unintentionally. Stop devices before changing settings.
- Analog output continues even if the flow rate range is exceeded. "H" or "Lo" will be displayed. Note that this is outside the guaranteed precision.
- The accuracy may vary from the initial status depending on the working environment or working conditions. It is recommended to check the operation of the product periodically.
- The sensor chip will degrade when used for long periods and cause the detected flow rate to fluctuate. Periodically inspect the sensor chip.
- Pay attention to the reverse current caused by disconnected wires/wiring resistance. If other devices, including a flow rate sensor, are connected to the same power supply as the flow rate sensor, and the switch output wire and power cable negative (-) side are short-circuited to check the operation of the control panel input unit, or if the power cable negative (-) side is disconnected, reverse current could flow to the flow rate sensor's switch output circuit and cause damage.



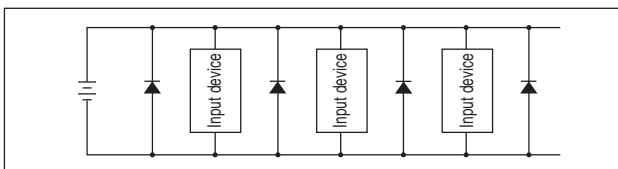
- Take the following measures to prevent damage caused by reverse current
 - (1) Avoid centralizing current at the power cable, especially the minus side power cable, and use as thick a cable as possible.
 - (2) Limit the number of devices connected to the same power source as the flow rate sensor.
 - (3) Insert a diode parallel to the flow rate sensor's output line to prevent reverse current.
 - (4) Insert a diode parallel to the flow rate sensor power wire's negative (-) side to prevent reverse current.

- Pay attention to surge current flow-around.
When flow rate sensor power is shared with an inductive load that generates surges, such as a solenoid valve or relay, if the circuit is cut off while the inductive load is functioning, surge current could enter the switch output circuit and cause damage depending on where the surge absorbing element is installed.



Take the measures below to prevent damage from sneak surge current.

- (1) Separate the power supply for output including the inductive load, such as the solenoid valve and relay, and input, such as the flow rate sensor.
- (2) If a separate power supply cannot be used, directly install a surge absorption element for all inductive loads. Consider that the surge absorption element connected to the PLC, etc., protects only the individual device.
- (3) Connect a surge absorption element to places on the power wiring shown in the figure below, as a measure against disconnections in unspecified areas.



- Do not rotate the cover. This may lead to failure.
- The display case is made of resin. Do not use solvent, alcohol or detergent in cleaning, since the resin could absorb it. There is a risk of affecting the resin. Wipe off dirt with a rag soaked in a diluted neutral detergent solution and wrung out well.

Related products

Equipment for food manufacturing processes FP Series

- An extensive lineup of everything from air filters to actuators allows for secure and safe use in food processing.
- FP1 Series uses food grade lubricant (NSF H1) to eliminate concerns of contamination from lubricants
- In addition to FP1, FP2 Series uses resin and rubber materials that are compliant with the Food Sanitation Act

Catalog No. CC-1271A



Anti-bacterial/bacteria-removing filter

- Antibacterial activity value 4 or more
- Bacterial retention performance: LRV10 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 anti-bacterial materials
- Equipped with maintenance label to inform of maintenance period as standard
- New odor removal filter added to lineup

Catalog No. CC-1311A



Air blow nozzle BN* Series

- Wide range of variations
Diverse lineup of shapes to match industries and applications
- 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
Employs a special structure that ejects air to the target area more uniformly. 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.

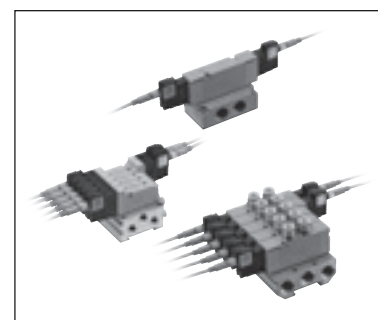
Catalog No. CC-1347A



Intrinsically safe explosion-proof pilot operated 3, 5-port valve 4GD/E EJ Series

- Can be used in Japan Explosion-Proof Certification Class 1 and Class 2 danger zones
Explosion-proof performance Ex ib II C T4 Gb Certification organization: DEKRA
- Valve width of 10 mm (4G1 EJ), which is the smallest in the explosion-proof class
- High environmental performance, reliability and ease of use
 - Equipped with a manual protection cover and check valve for preventing malfunctions.
 - 2-direction cable connectors
 - The in-stop valve spacer (optional) enables individual valves to be replaced without stopping the production line.
- Conforms to IP67

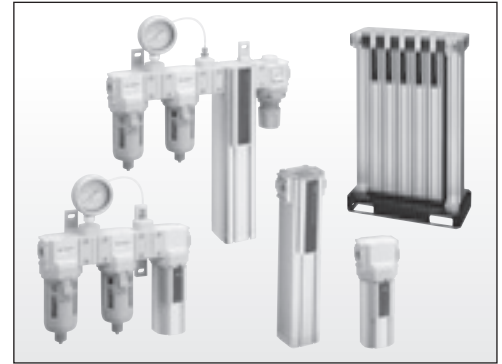
Catalog No. CC-1445A



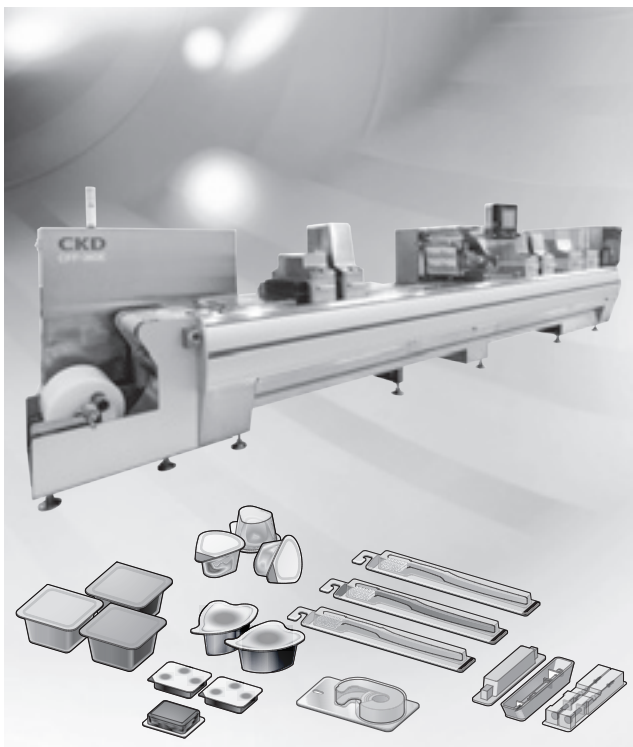
Super dryer SD/SU Series

- 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 75 kW grade large flow rate compressors.

Catalog No. CB-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

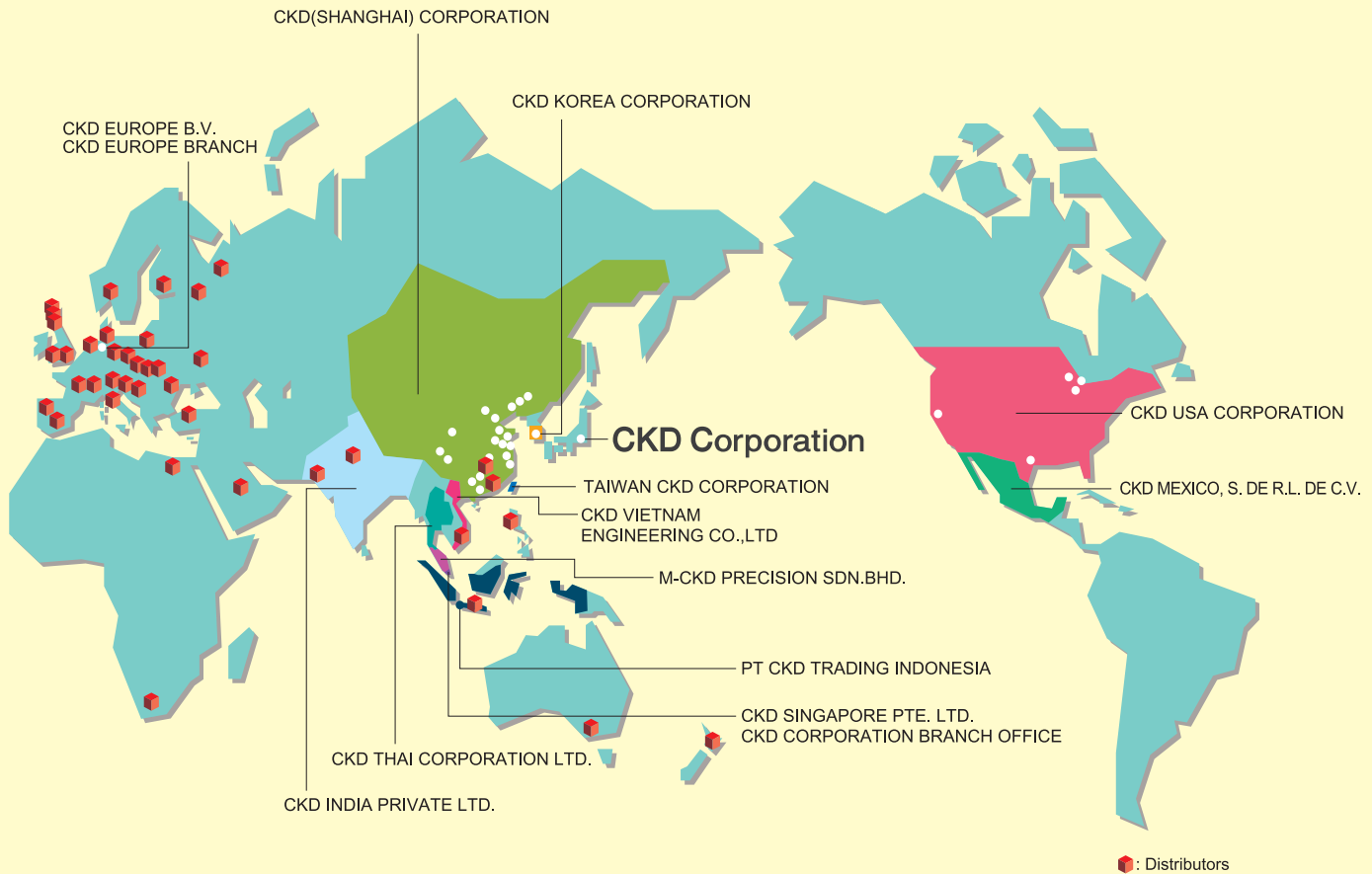
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- SARABURI OFFICE

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